pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF CLEAN WATER

STREAMBED SEDIMENT COLLECTION PROTOCOL

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INTRODUCTION

The Pennsylvania Department of Environmental Protection (DEP) strives to better understand environmental issues and systems through various forms of data collection. Water, macroinvertebrates, and fish are routinely collected to help determine a water body's health and analyze pollution sources and causes. Streambed sediment is another parameter that can explain a lot about a system.

Bed sediments can accumulate substances that may not be detectable in a single grab water sample. They have the potential for accumulating a variety of trace elements and toxins. Additionally, they could re-enter the water column as suspended sediment, introducing those substances into the system and causing further problems downstream. It has been shown that bed and suspended sediments accumulate more trace metals than are normally present in the water column (Horowitz 1985).

Monitoring streambed sediment parameters can assist in point and non-point source investigations, spill and complaint issues, and routine monitoring. Testing sediment could show if contaminants are present, such as high levels of metals, radionuclides, or organic compounds, and assist in making assessment decisions on impairment or attainment of flowing water bodies. It can be used in conjunction with the Instream Comprehensive Evaluation to assess use attainment.

This document provides guidelines for the standardized collection of streambed sediment samples from flowing water body systems. The methods described here are adapted from scientific, peer-reviewed methods, and were developed, field tested, and implemented by the Department's technical experts. This protocol does not attempt to describe the entire spectrum of sediment sample collection techniques, and review of other documentation is encouraged depending on your specific sampling situation.

Because sampling situations vary largely, no single sediment sampling procedure can be universally recommended. This document describes sediment 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 and equipment employed.

Investigators should be aware of, and work to prevent, 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.

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COLLECTION REQUIREMENTS

Collector Identification Number. Field staff required to collect sediment 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 Number Request Form" found at the Department's internal Bureau of Laboratory's (BOL) website (Lab Forms).

Sample Information System (SIS) Requirements. Field staff must obtain a 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 the following: sample results, sample medium, sample collection location, field parameters, quality control identification, and general comment information.

Field staff will also need to obtain the correct SIS securities which will allow them to manage sample information in SIS by contacting their appropriate systems coordinator. SIS securities are broken down into roles. Roles include (1) Querying, (2) Project Entry, (3) Monitoring Point Entry, and (4) Sample Entry. Each of these roles are then applied to many specific programs or business units including (1) Watershed Conservation, (2) Water Supply Management, and (3) Land Recycling and Waste Management. Program or business unit names periodically change due to reorganizations and other reasons.

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

DEP Laboratory Sample Submission Sheet. Investigators must submit samples to the PA DEP Bureau of Laboratories (BOL) using a "Sample 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 (military time); fixative(s) used; standard analysis code (SAC); under certain circumstances, legal seal numbers for each sample collected; the number of bottles submitted per test suite; collector name; current date; phone number; and any additional comments that lab analysts will use to properly handle samples. There are options to record samples individually ("Single Sample Sheet") or to record multiple samples on one sheet ("Multiple Sample Sheet").

As described previously, collector identification numbers are unique to each field staff member 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. Date and time collected should be

accurately documented. 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. Suite codes are also available, and are often used for radionuclide and organic samples. Each DEP program uses different SACs or suites for specific projects or purposes. For example, SAC 018 is used by “Water Supply Management” when submitting water chemistry samples for Special Protection Surveys. The analytes/tests listed under SAC 018 are those specifically identified by regulation that surface water must meet and therefore be assessed for if a special protection determination is warranted. Other programs have developed SACs for their unique purposes, and the DEP BOL encourages programs to create SACs tailored to a program’s specific needs.

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 needed, 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, current date, phone number, and number of bottles submitted per test suite were added to the DEP laboratory “Sample Submission Sheet” to meet National Environmental Laboratory Accreditation Program (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, current 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 pieces of information to be documented are any additional comments that lab analysts need 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 may need 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 odor, sheen, color, viscosity, foaming, field meter readings, historical knowledge about the site, and any other information that lab analysts may need to safely and correctly handle your samples. The BOL requests collectors contact 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 variety of program-specific sediment sampling techniques that require a multitude of supplies (sampling bottles, bags, etc.), and can include specialized equipment (En Core ™ soil corer, Ponar dredge, etc.). This section describes equipment and supplies required to employ the most commonly used sampling techniques and does not include all streambed sediment sampling techniques that could be employed. Additional techniques may be added as they become applicable and as standard procedures are solidified. Much of the equipment used to sample soils can be used to sample sediments as long as sediment is not lost in the water column on the way to the surface; sampling equipment will be determined by water depth, velocity, and other physical parameters.

Parameter-specific equipment requirements, sample collection, labeling, and storage will be covered in subsequent sections below. See Appendix A for a 'Sampling Gear Checklist'.

Commonly used equipment for sampling sediment:

- Scoops/spatulas/trowels (manual sampling) – plastic and stainless steel
- En Core ™ soil corer
- Dredges (e.g. Eckman, petite Ponar)
- Sample bottles (e.g. 500ml, 40ml amber VOA with polytetrafluoroethylene (PTFE) septa caps)
- Plastic bags, 4 Mil thickness (radiological samples)
- Stainless steel and plastic containers for compositing samples
- Sieves and/or cloth mesh (to filter samples to retain fine sediment)
- Wash bottle/deionized water
- Coolers
- Ice
- Field meter (e.g. YSI), calibration solutions, spare batteries
- Field data sheets or notebook
- DEP BOL Sample Submission Sheets
- Ziploc bags (for bottles and/or sample submission sheets)
- Nitrile gloves (ideally elbow or full-arm length)
- Permanent markers (black Sharpies work best)
- Pencils
- Clear packing tape
- Legal seals (if required)
- Detergent (0.2% phosphate-free)
- Methanol (to rinse organics equipment)
- 5% HCl (to rinse trace elements equipment)
- Brushes (to remove soil from equipment)
- GPS/maps

- Camera
- Munsell Soil Color Chart

The numbers and types of sample bottles field staff need for one sediment sample depend on the specific SAC or suite. Sample bottle and preservative requirements are found at the Department's internal BOL website at Supplies and Collector Information. Additional information can be found by contacting the appropriate person under the Department's internal BOL website at Directory.

The choice to use scoops/spatulas, corers, or dredges depends heavily on site conditions and your specific project requirements. Hand-held scoops and spatulas are convenient for shallow, slow-moving, wadeable streams. They are easy to use and clean. Unfortunately, with this method, it can be easy to lose fine sediment, which is desirable for most tests. Additionally, it can be harder to gather in deeper water, and if contamination is a concern, it increases the likelihood of skin contact with material. Deeper and faster-moving water may require the use of a hand-held or mechanical dredge, such as an Eckman or Ponar. The use of a boat may be required or, alternatively, dredges can often be lowered from bridges. However, the project aim should be considered in choosing where to lower a dredge from; runoff from the bridge may or may not be desired. These are convenient ways to gather bed sediment when the bottom cannot be manually reached, but a downside is that it is easy to gather too much deeper sediment, and there is far less control over where and what is actually collected. If historical sediment information is desired, corers are an option. These range from large, cumbersome varieties to small, hand-held corers, such as those used for volatile organic compounds (e.g. En Core ™). In all cases, excessive ornamentation or wooden parts are discouraged to permit easy and thorough decontamination (United States Environmental Protection Agency (US EPA) 2006b). Collectors are encouraged to seek guidance on the variety of dredges and corers available from the literature at the end of this document.

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 allowing radionuclide samples to ingrow, he or she should contact the appropriate technician at the laboratory to ensure enough time is allocated for the pre-test procedures. Additionally, large quantities of samples should always be pre-authorized with the laboratory to avoid exceeding holding times.

SITE SELECTION AND SAMPLING DESIGN

A sample collection plan is recommended before commencing a sampling project. This should include the location(s) to be sampled, reasons for sampling, number of samples, media of interest (water, sediment, soil, macroinvertebrates, etc.), parameters to sample, QA/QC plans, equipment, preservatives, sample container types, estimated costs, maps, and any other notes or comments pertaining to the project. More

information on developing Project Plans can be found in US EPA 2002a, US EPA 2002b, and US EPA 2006a. It can be very helpful and more descriptive of a site to take water samples, at minimum, in conjunction with sediment sampling. Macroinvertebrate and fish samples can also help describe impact to a system.

Prior to sampling, any historical information, aerial photography, and/or topographic maps of the locations should be gathered and analyzed. Geomorphology and underlying geology around the water body may be helpful in determining parameters of interest. Point and non-point source pollution possibilities should be documented. Past water quality and/or biological monitoring results should be gathered. Additionally, it should be noted whether sampling locations are in close proximity to gaging stations or other continuous monitoring stations – this data could prove useful during final data analysis.

Determining sample design is one of the most important parts of a field collection plan. It is necessary to determine whether a statistical or judgment-based approach is desired. This depends substantially on the project questions – for example, whether or not background samples are being collected, or a spill or discharge effect is being investigated. Many sampling design options exist, with many options being statistical in nature. These include systemic sampling, where the distance between sampling locations is kept consistent (Horowitz 1985). This is not appropriate if a known contaminant is present in an area of sediment. Another statistical approach is random sampling, where sample locations are arbitrarily selected so that one area is not more likely to be chosen over another. If your area is homogenous, this is recommended (Horowitz 1985). Stratified random sampling is another option. This involves dividing a target area that may have a contaminant or area of interest into several areas that are homogenous. Random sites to sample are then chosen within those areas. This helps remove heterogeneity at a site (Horowitz 1985). A non-statistical design method is judgmental sampling – sampling sites are chosen based on professional judgment, *not* scientific theory. This is a good method to use for sites where a known contaminant is present (i.e. discharge pipe) and can be extremely resource-efficient if there is a lack of funds or equipment (PA DEP ICE 2009).

It can be helpful to anticipate how the data will be used. Consider if it will impact legal or regulatory actions, and how the data will be analyzed and presented. Also consider what criteria may be used during its interpretation (Ohio Environmental Protection Agency (EPA) 2001). PA DEP has no narrative or general sediment quality criteria at this time. However, in order to apply sediment results, one can refer to The Pennsylvania Code, Chapter 93, Water Quality Standards: § 93.6 (a) “Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.” and (b) “In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum and substances that produce color, tastes, odors, turbidity or settle to form deposits.”

A variety of parameters can be measured in streambed sediment. Radioisotopes, trace elements and metals, organics, and physical parameters can all be analyzed. As stated above, many SACs and suites have already been created and may offer the correct combination of tests you are looking for. To view the current list of SACs and suite codes available, staff can refer to the Department's internal BOL website at Standard Analysis Codes. As previously mentioned, if you plan on sampling a large quantity of samples with a combination of parameters not currently available, refer to the "Standard Analysis Code Request Form" at the Department's internal BOL website at Lab Forms to create a new SAC or suite. Available analyses, prices, and analysis times can be found at the Department's internal BOL website at Price Lists. Additional information can be found by contacting the appropriate person at the Department's internal BOL website at Directory.

During or after completing a sample collection plan, the collector should perform field reconnaissance of the site(s). Ease of site access, stream flow, and sediment deposition locations should be reviewed. One should ideally avoid sampling sediment immediately after a significant precipitation event where runoff from the surrounding land could occur (Shelton & Capel 1994). Manmade structures, such as bridges, should be noted and sampling immediately downstream of them should be avoided. Runoff from structures can easily impact surrounding sediment downstream. Point and non-point sources of pollution should be noted. Field recon is also an opportunity to determine necessary equipment for sediment collection, such as dredges versus scoops. Additionally, it can assist in determining locations where it is most likely for sediment to deposit and where concentrations of contaminants could be highest. Locations where sediment can accumulate, and therefore accumulate contaminants, include areas with aquatic vegetation, where velocity decreases, and inside bends in the stream (Oak Ridge Associated Universities (ORAU) Training, 2012). Sediment can also accumulate near man-made structures, but again, care must be taken to ensure sediment in those locations is of interest to the project and not a result of surrounding land runoff, if that is not the target.

COLLECTION METHODS

General Considerations. Collectors need to first ensure they have formed an adequate sampling plan that will be representative of the system under investigation. Care must be utilized during collection to reduce contamination from outside sources and maximize the integrity of the 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.

As stated above, the lab should be contacted prior to large or unique sampling events. Previous weather conditions and discharge may be analyzed to ensure samples are being collected at the optimal time. Discharge data for continuous monitors throughout

the state can be found on the United States Geological Survey website. Equipment should be gathered and a checklist made prior to departure. Once at the site, before handling sample containers, 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, or nicotine. Gloves are recommended for all sediment sampling due to the high possibility of sample contamination. Unlike water samples, sediment samples are handled quite a bit more and there are many more opportunities to introduce contaminants.

For most sediment sampling, the surficial 1 to 6 cm of sediment with grain sizes < 0.06 mm (silts and clays) are desired. It is best to avoid sands (0.06 – 2 mm) and larger grain sizes. Fine grained particles tend to accumulate more trace elements than coarser particles. This is due to a number of factors, including higher available surface area on finer particles (Horowitz 1985). For some organics analyses, grain size < 2.0 mm (sand, silt, clay) is acceptable (Shelton & Capel 1994). In general, the way to distinguish between sand, silt, and clay is as follows:

Soil Type	Grain Size	Description
Sand	0.06 – 2.0 mm	gritty, non-plastic, loose particulates
Silt	0.004 – 0.06 mm	smooth, talc-like, non-plastic, loose particulates
Clay	< 0.004 mm	dense, moldable like putty, cohesive

Adapted from: Ohio EPA. 2001. Sediment sampling guide and methodologies. 2nd Edition.

In the event that a site contains large amounts of sandy material, sieving may be necessary if the aim is to determine the highest concentrations present. In general, it is a good idea to make sure your sample contains > 30% fine material, i.e. silts and clays (Ohio EPA 2001).

Thoroughly clean all new and used equipment. Prior to using equipment for the first time, it is advisable to wash and soak it for 30 minutes in a 0.2% phosphate-free detergent (Shelton & Capel 1994). After soaking, rinse the equipment in deionized water, air dry (if possible), and store in individual, sealable containers or bags. If sampling for organic contaminants, clean your stainless steel or Telfon equipment with soap and tap water, rinse with deionized water, dry, rinse with acetone, and, lastly, rinse with hexane (as recommended by DEP BOL staff). Wrap organics equipment in aluminum foil. It is highly advised to have several sets of equipment, particularly if planning to sample reference (background) and impacted sites in one trip. It is difficult to fully clean equipment in the field. If doing so, save your rinsate. It is also advisable to occasionally collect a rinsate blank.

First, calibrate any field sampling equipment, such as YSI meters (see the PA DEP "Surface Water Collection Protocol" for more details). If dealing with a possibly impacted site and reference location(s) have been chosen, sample reference locations

first if combining impacted and reference sites into one trip. This will help lessen the possibility of contamination between sites. It is important to note that safety is always first – avoid wading into high flow areas or locations where slippage could occur, wear appropriate wading gear, and have the proper length and type of gloves on if dealing with impacted sites or chemicals.

If sampling is taking place due to a point-source pollution incident, it is advised to sample downstream of the discharge, at the discharge, and upstream of the discharge, at minimum. In order to collect a sample representative of a particular location, plan to collect at between 5 to 10 depositional zones within a study site and composite those into one sample (Shelton & Capel 1994). For example, if collecting at a point of acid mine discharge (AMD), composite sediment at between 5 to 10 depositional zones downstream of the discharge, composite sediment at between 5 to 10 depositional zones at the discharge, and composite sediment at between 5 to 10 depositional zones upstream of the discharge. Compositing several "zones" of sediment will allow for a more representative description of the sample area and will not target one spot. Additionally, due to lack of sediment buildup at some locations, compositing several spots of sediment buildup facilitates obtaining only the first 1 to 6 cm of sediment. Of course, specific project needs may deviate from this, so plan and document your study accordingly. Additionally, composite sampling is *not* appropriate for the collection of volatile organics samples.

Sampling stations located upstream of the discharge pipe should be in non-impacted areas to serve as controls. 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, if the investigator is interested in determining the downstream point where the discharge ceases to be an effect in the sediment, 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. Sampling can occur at any noted deposition points between in order to characterize effects of the discharge. Depending on stream size, flow, velocity of the plume, and angle at which it enters the stream, solids may deposit at a variety of locations.

Conductivity measurements may be adequate tools to determine the point of complete mix. Conductivity measurements should be taken at multiple points along a cross-section. The same protocol used to divide a stream for flow measurements may be utilized, as described in the Department's Instream Comprehensive Evaluations (ICE) Streamflow Measurement Protocol (Appendix D). Following the streamflow protocol, each cross-section should be divided into at least 20 sub-sections to ensure that no more than 5% of the total stream discharge flows through any one sub-section. Conductivity measurements are then taken at each sub-section. The point of complete mix occurs when the conductivity measurements across a cross-section are approximately stable. Stability occurs when the relative percent difference between the range of measurements is less than 10% (Colorado Department of Public Health and Environment 2002). Inevitable variability of conductance occurs across a stream

channel, but past studies have indicated that a stream fully mixed with a discharge will often have ranges of conductivities across a transect that are >1% different, but are very rarely >10% different (Colorado Department of Public Health and Environment 2002). Transects should be done at regular intervals downstream until the point of complete mix is reached.

At each site, always collect water samples first to avoid stirring up sediment that could contaminate your water sample. Take any water field measurements before sediment sampling. Additionally, always work in a downstream to upstream fashion at a site. Lastly, always document the appearance, odor, sheen, and feel of the sediment on your 'Sediment Field Form' (see Appendix B).

Wadeable Samples. Gather your equipment (scoop, appropriate sampling container [see parameter-specific instructions, below], gloves) and enter stream at the most downstream of your sampling locations. If interested in surficial, recent deposition, sample only the top 1 – 6 cm of sediment; if interested in historical sediment accumulation, sample > 6 cm. Facing upstream, rinse your sampling container several times with native water, emptying it behind you (downstream) to avoid stirring up any additional sediment. Enter water column at the first sediment depositional area, using care to gather upstream of your current standing position and not stepping where you plan to collect, and gather a scoopful of sediment. Slowly raise the scoop out of the water to avoid losing fine material and place sediment into sampling container. Move to the next depositional zone at your first site and repeat, again using care not to step where you plan to collect and always working from downstream to upstream. If you collect a lot of water, carefully decant it as you collect, trying to allow it to settle first as much as possible to avoid loss of fine materials. Additionally, avoid collecting vegetation or other debris. The lab needs to pulverize samples before analysis, so the more fine sediment and the less debris collected, the better.

Once you have collected enough sediment, exit the stream and empty the sample into an appropriate compositing container. Remove any large pebbles, sticks, vegetation, or other debris. Allow the sediment to settle and carefully decant the water off, or, alternatively, sieve the sample to ensure only fine grained materials are collected. Generally, if you sieve one sample in a project, you will want to sieve *all* samples in that project for consistency. In any case, fully note on your field sheet the texture, color, and odor of the sediment. Homogenize the sample using a spatula or trowel. One recommendation to fully homogenize is to "quarter" the sample into four parts, mix those parts, and then mix the entire sample together (US EPA 2006b). Place sample back into the sampling container and record all details about the site and collection methods on your field sheet. Add fixative to the sample, if required. If refrigeration is necessary, place the sample in a cooler with ice in order to cool the sample to 4 °C. Do not use dry ice because the sample may freeze. Record GPS coordinates of your location and take photographs, if necessary.

Corers may be necessary if the interest is in collecting historical sediment or volatile organic compounds that cannot be exposed to air. Coring allows stratification of the

sediment and the possibility of testing individual layers. A corer is pushed into the sediment and the core is captured in the sample tube (ORAU Training 2012). They can be particularly useful in fast-moving streams where grab samplers would be difficult to use. They come in a variety of shapes and sizes for different needs. Many include a valve or catcher that will prevent loss of the core as it is being brought to the surface. The DEP BOL requires the use of an En Core ™ corer (or similar) or a corer using pre-preserved (methanol) vials for volatile organic compound soil and sediment samples. If it is not possible to use these types of corers, a note must be made on the "Sample Submission Sheet" or a data release form will be sent to you. The EPA has a detailed description on how to collect volatile organic compounds in US EPA Test Method 5035A (2002c) - Appendix A. Refer to the DEP BOL for more information regarding volatile organic compound collecting.

To collect sediment with a corer, either push or hammer it into the sediment (ORAU Training 2012). Be sure to push it straight down and pull it straight up without turning it, and do not fill the tube completely. Keep the sampler vertical when pulled out of the sediment to avoid mixing. Cap the bottom of the sample tube as soon as possible, then the top. If there is some water left in the tube, carefully decant it off and stuff a cloth into the end – this reduces mixing. Augers, often used for soil, can be used for collecting sediment and are turned and pushed into sediment; however, sample loss could be an issue. Refer to the literature in the "References" section of this document for further information on using a variety of corers, augers, and dredges to collect streambed sediment.

Non-Wadeable Samples. If the water flow is deep and/or fast moving and you cannot manually collect sediment, consider using a dredge. These can either be lowered from a boat or a structure such as a bridge. Depending on size, they can be manually lowered or lowered using a winch. If boating, be sure to turn off your engine before using the dredge to eliminate impact on your sample.

Once at your desired location, set the dredge according to user instructions and carefully lower it to the stream bottom. Trip the dredge, and slowly bring it to the surface. Avoid lowering and raising it too fast, or you risk disturbing the sediment before it reaches the bottom or losing sediment on the way up. Once at the surface, examine the sample and determine if the dredge was properly tripped; if it was not, discard the sediment and re-sample. Dispense your sample in an appropriate compositing container, collect the rest of your depositional zones, and follow the instructions above for decanting/sieving and compositing the sample. See the literature in the "References" section of this document for further information on using a variety of dredges to collect streambed sediment.

Parameter-Specific Considerations: Radionuclides. Stainless steel, high-density polypropylene (HDPP), or polyethylene (HDPE) sampling equipment is recommended (US EPA 2006b). Sampling containers should also be made out of the same plastics and have a PTFE or Teflon ® - lined lid (US EPA 2006b). Verify that the lid will not absorb any water. Stainless steel or plastic compositing containers are recommended.

If testing for gamma-emitting radioisotopes, bags are recommended due to large sample volume. DEP BOL recommends collecting one (1) kg of wet sediment in order to verify having enough sample to analyze ½ kg of dry sediment in the lab. Two 500-mL bottles are also a sufficient amount of sample for analysis. Double or triple-bagging samples is highly recommended. Properly close the bags and use a non-absorbing tape to seal. Gamma-emitting radioisotope sediment samples do *not* require refrigeration or preservatives. The sample holding time is 72 hours if iodine analysis is needed, otherwise it is 6 months. For other tests and details, contact the DEP BOL.

Parameter-Specific Considerations: Metals. High-density polypropylene (HDPP) or polyethylene (HDPE) sampling equipment is recommended; avoid metal sampling equipment whenever possible. There is always the chance of metals in the equipment influencing sample results. Plastic compositing containers are recommended. Most standard plastic water-sampling bottles can be used to store sediment for metals testing. A typical sediment metals sample at DEP BOL requires a 500-mL plastic or glass container. No preservatives are required and refrigeration to 4°C is necessary. Holding time is 6 months. Contact the DEP BOL for specific details for your parameters of interest.

Parameter-Specific Considerations: Volatile & Semi-Volatile Organic Compounds. As stated above, DEP BOL requires samples for volatile organics to be collected with corers. There are two coring methods available: The first is the En Core ™ - for each analysis, 2 x 5 g En Core ™ vials are needed, plus one (1) 40-mL amber glass vial, to be used for moisture determination. There is also a 25 g size available, but this is not recommended and will also require a data release form. A second method uses a small, disposable corer that contains pre-preserved (5 mL of methanol), pre-weighed vials. Weight is recorded on the outside of the vial. The core is collected, the sample is ejected into the vial, and the vial is quickly capped. The vial is not to be packed full and care should be used to avoid losing methanol. The threads of the vial should be cleaned before capping so methanol does not leak out. Do not attach additional labels to the vial since this will change the weight of the vial. Two pre-preserved vials and one (1) 40-mL amber glass vial are required for analysis. Only “high concentration” vials are required.

If unable to use these types of samplers, specifically state the reasons why on your “Sample Submission Sheet” or a “Client Request for Data Release” form will be sent to you. In the instance of not using a core sampler, volatile organics samples need to be packed tightly in 2 x 40-mL amber bottles (unpreserved). A recommended method to avoid air contact is to take a scoop of sediment, remove the top layer in the scoop, and immediately fill the vial with sediment from the scoop. Samples have a holding time of 48 hours using the En Core ™, and must be received by the lab within 24 hours after collection. Samples collected and preserved with methanol have a holding time of 14 days. See the Department’s internal BOL website at Organic Chemistry and US EPA Test Method 5035A (2002c) - Appendix A for more details.

If testing for semi-volatile organic compounds, fill a 500-mL amber glass sampling jar. Volatile and semi-volatile organics sediment samples need to be refrigerated to 4 °C and do not require field preservation, unless you are collecting volatile organics in the pre-preserved vials.

NOTE: When possible, *always* schedule with the lab before collecting samples for organic analyses.

Labeling. While the *minimum requirement* is the collector number and sequential sample number, collectors are encouraged to add date and time collected, general test(s) description (total metals, etc.), and preservation indication. This will help prevent confusing what bottles are from which tests and to help ensure the sample is properly preserved and stored. 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. Therefore, clear packing tape should be wrapped around the bottle to protect hand-written labels. BOL discourages the use of masking tape. Collectors should keep a log book of all samples they take, 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.

Quality Assurance. A duplicate grab sample should 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 sediment. Duplicates are assigned unique sequential sample numbers. The collector needs to carefully annotate which sample is a duplicate. Duplicates must be documented appropriately in SIS under the 'Comments/Quality Assurance' tab.

"Split samples" are collected as one sample and then divided in two for separate analysis (Radtke 2005). These can be sent to different labs for analysis or be tested at the same lab, and can help determine lab analysis variability.

"Rinsate blanks" may be necessary at times if a highly impacted site was sampled. After cleaning equipment, a sample of the cleaning rinsate water is saved and analyzed for parameters of concern (US EPA 2006b). This verifies whether or not the equipment was properly cleaned.

DEP BOL does not require sediment or soil blanks, although they can be submitted. Normally these are purified sand or water.

Post-Sampling Decontamination. If sampling multiple locations in one trip, try to have multiple sets of equipment, since decontamination in the field can be difficult. Back at the lab, wash all used equipment in phosphate-free detergent; brushes are helpful for removing caked-on soil. Rinse thoroughly. Then, rinse all non-plastic equipment with methanol. Rinse non-metallic equipment, such as those used to sample metals, with a dilute acid, such as 5% HCl (Radtke 2005, Shelton & Capel 1994). It may be necessary to rinse equipment used to sample for radioisotopes with a radioactive decontaminant, such as NoCount ®. Afterwards, rinse all equipment thoroughly with deionized water and allow to air dry (if possible). Equipment that is used to sample for organic contaminants should be rinsed with acetone and then hexane, rather than methanol or acid, after the soap and water wash. Discard disposable equipment rather than clean it. Store equipment in individual, sealable containers or plastic bags. Store equipment used to sample organics in aluminum foil.

Sample Holding Times. 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. Volatile organics, for example, must be received by the laboratory within 24 hours after collection. If a sample exceeds holding time requirements the results will not be reported unless a "Client Request for Data Release" 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. Collectors essentially need to plan their sampling from Monday through Thursday and verify the samples will reach DEP BOL by early Friday morning at the latest.

Shipping. All DEP district and regional offices are designated pick-up locations for water and sediment samples. In most cases, samples must be dropped off for pick up by 1600 hours. Other locations exist, such as at some Pennsylvania Department of Transportation facilities and 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. Collectors need to coordinate with the current courier for specific drop-off and pick-up requirements.

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 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. Be sure that any required legal seals are in place.

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 least 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. 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 samples 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 and complete a '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.

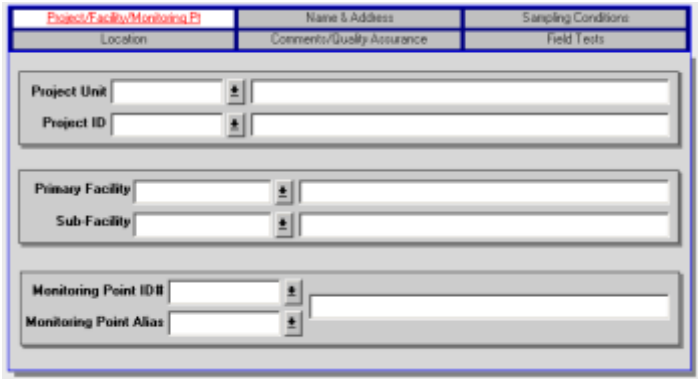
F. Click the  button on the toolbar or press the [F8] key.

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 Users’ Guide’.

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

A. Click the 

TAB label.

1. 

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.

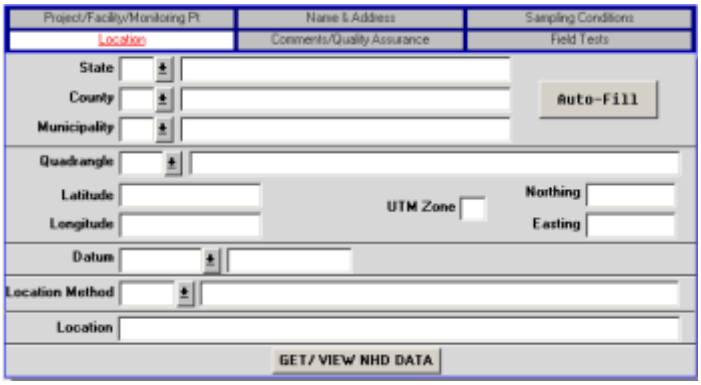
    OR

    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 an 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.

1. 

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 'NAD83' 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.

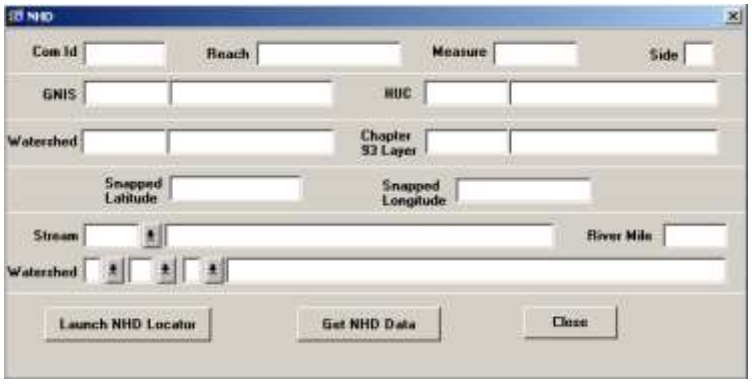
J. Enter the method used to identify the point at which the sample was collected or select by using the button. Press the [TAB] key.

K. Enter a description of the location at which the sample was collected.

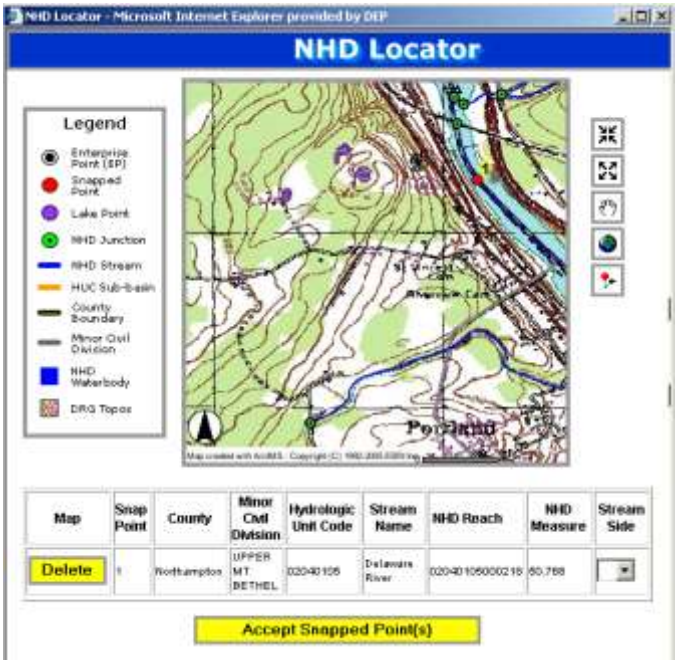
VI. Creating a New NHD Record and Linking to the Sample. If the sample is associated with a monitoring point, the NHD record for the monitoring point will "automatically" display for the sample and cannot be updated. Therefore, this step cannot be completed. This section identifies the steps for inserting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

1. 

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.

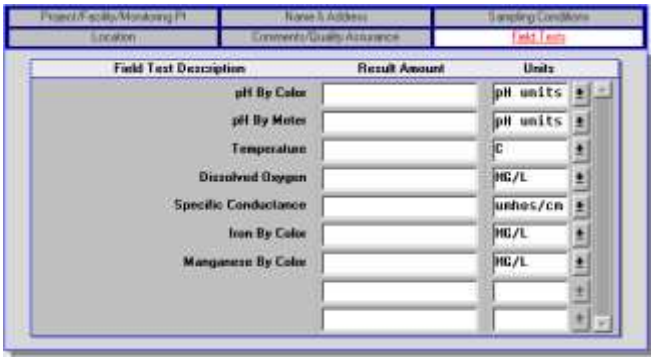
E. Click the ACCEPT SNAPPED POINT(S) button and then click the OK button to exit the NHD Locator Tool and return to the SAMPLE ENTRY Screen.

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 at the sample collection location.

A. Click the Field Tests TAB.

1. 

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

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

C. Click in the *Result Amount* field.

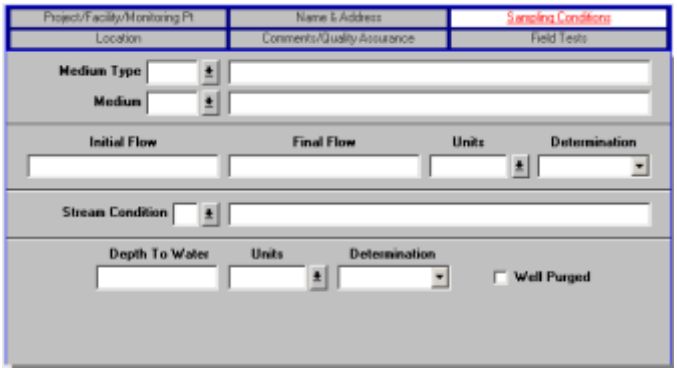
D. Enter the amount for the test. Press the [TAB] key.

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.

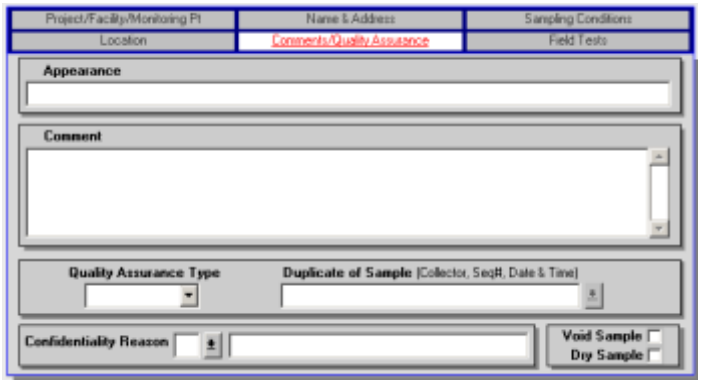
1. 

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. *Sediment samples collected from a stream or lake should have a sample medium of 'Sediment'.

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

A. Click the Comments/Quality Assurance TAB.

1. 

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, check the *Voided Sample* checkbox.

H. If the sample is to be dry, check the *Dry Sample* checkbox.

I. Click the button on the toolbar or press the [F10] key.

REFERENCES

Colorado Department of Public Health and Environment. 2002. Water Quality Control Division. Colorado Mixing Zone Implementation Guidance.

Horowitz, Arthur J. 1985. A primer on trace metal-sediment chemistry. United States Geological Survey. Water-Supply Paper 2277.

Oak Ridge Associated Universities (ORAU) Training. 2012. Environmental Monitoring for Radiation.

Ohio Environmental Protection Agency. 2001. Sediment sampling guide and methodologies (2nd Edition). Division of Surface Water.

Palmer, Marvin. 1985. Methods Manual for Bottom Sediment Sample Collection. United States Environmental Protection Agency. Surveillance and Research Staff – Great Lakes National Program Office. EPA-905-4-85-004.

Pennsylvania Department of Environmental Protection. 2009. Instream Comprehensive Evaluations (ICE). Harrisburg, PA.

_____. 2013. Quality Assurance Manual for the PA Department of Environmental Protection Bureau of Laboratories, Revision 006.

Radtke, D.B. 2005. National field manual for the collection of water-quality data, Chapter A8: Bottom-material samples. Techniques of Water-Resources Investigations. Book 9: Handbooks for Water-Resources Investigations. United States Geological Survey.

Shelton, L.R. & P.D. Capel. 1994. Guidelines for collecting and processing samples of stream bed sediment for analysis of trace elements and organic contaminants for the national water-quality assessment program. United States Geological Survey.

United States Environmental Protection Agency. 2002a. Guidance on choosing a sampling design for environmental data collection for use in developing a quality assurance project plan. EPA/240/R-02/005. EPA QA/G-5S.

_____. 2002b. Guidance for quality assurance project plans. EPA/240/R-02/009. EPA QA/G-5.

_____. 2002c. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Method 5035A – Closed-System-Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples. Appendix A: The collection and preservation of aqueous and solid samples for volatile organic compound (VOC) analysis.

_____. 2006a. Guidance on systematic planning using the data quality objectives process. EPA/240/B-06/001. EPA QA/G-4.

_____. 2006b. Sample collection procedures for radiochemical analytes in environmental matrices. Office of Research and Development. National Homeland Security Research Center.

Water Environment Federation. 2002. Handbook on Sediment Quality: Chapter 4. The Federation.

APPENDIX A – SAMPLING GEAR CHECKLIST

SEDIMENT SAMPLING

Equipment:

☐ spatulas/trowels/scoops
☐ dredges (e.g. Eckman, Ponar)
☐ corers with vials (e.g. En Core ™)

Sample containers:

☐ 500 ml plastic sample bottles – trace elements
☐ 500 ml amber glass sample bottles – organics
☐ 40 ml amber glass vials – organics moisture determination
☐ plastic bags – radionuclides

Sample processing:

☐ compositing bowl(s)
☐ sieve(s) - < 63 micron
☐ cloth mesh (disposable sieve)

Other

☐ brushes
☐ Munsell color chart

WATER SAMPLING

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_3 - ampules; total & dissolved metals
☐ Other: NaOH, HCl , H_2SO_4

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 (manual)
☐ meter field manuals (if applicable)

Other:

☐ Gelman .45□ ground water filters
☐ D.I. water (lab tested)
☐ soda water
☐ pipetter & pipettes
☐ buckets & rope (applicable length for bridge sampling)
☐ shipping coolers
☐ 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

☐ sediment field forms
☐ laboratory sediment chem. sheets
☐ laboratory water chem. sheets
☐ bac-t' forms
☐ physical data field forms
☐ flow field forms
☐ habitat assessment forms
☐ surface waters assessment (UW) forms
☐ chlorine demand forms
☐ other:_____

BENTHIC MACROINVERTEBRATES

☐ sample containers
☐ vials
☐ sampler: _____
  ☐ D-frame net
  ☐ kick-screen
  ☐ other: _____
☐ #30 sieve
☐ bucket
☐ forceps
☐ preservative: _____

FISH

☐ Backpack shocker ☐ 2-cycle gas/oil mix
  ☐ probes
☐ nets
☐ bucket(s)
☐ specimen jars
☐ preservative: _____
☐ block nets (if applicable)
☐ measuring board (if applicable)

☐ live bags (or suitable containers, if applicable)
☐ scale
☐ tow boat ☐ generator
☐ probes
☐ 4-cycle gasoline
☐ ear plugs
☐ polarized sunglasses
☐ **Tissue Collection related equipment:**
☐ hexane ☐ filet knife
☐ foil ☐ dry ice ☐ coolers

SHIPPING
☐ courier shipping forms
☐ tape & dispenser

MISC.
☐ hip boots
☐ waders
☐ gloves (winter ___ electrofishing ____)
☐ markers (black Sharpies), pens, & pencils
☐ Ziploc bags
☐ map wheel
☐ calculator
☐ insect repellent
☐ screwdriver/tools
☐ batteries (D-cell, other:_____)
☐ other: _____

APPENDIX B - SEDIMENT FIELD FORM

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

SEDIMENT COLLECTION FIELD DATA FORM

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

Collector ID:		Sequence Number:		Date:		Time (Military):	
Collector Name:			Stream Name:				

Location

County:		Municipality:		Topo. Quad:	

Location Description (latitude, longitude, etc.):

SACs/Suites:	
QA/QC? (circle one):	Duplicate Blank N/A Other (explain-e.g. split sample)

Land Use

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

Land Use Comments:

Canopy Cover: open partly shaded mostly shaded fully shaded

Sediment Sample

Equipment Used (circle one)	scoop/trowel dredge corer other (explain)

Sample Description (DWS discharge in plume X # of meters; at end-of-pipe discharge; reference location; etc.):

Permitted Discharge Name/Permit # (if applicable):			
Number of Deposition Locations:		Depth of Sediment Collection (approx. 1-3 cm, etc.):	
Type, texture, color, & odor of sediment and water:*			

Water

	Collector-Sequence #:	Field Meter Readings: Temp (ºC)	DO (mg/L)	pH	Cond. (umhos)	Alkalinity (mg/L)	Bottle Notes: (N-normal; MNF-metals non-filtered; MF-metals filtered; B-bac't; others: indicate)
1							
2							
3							

Other Notes:

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

Soil Types (summarized):
Sand: 0.06-2.0 mm; gritty, non-plastic, loose particulates
Silt: 0.004-0.06 mm; smooth, talc-like, non-plastic, loose particulates
Clay: <0.004 mm; dense, moldable like putty; cohesive
Adapted from: Ohio EPA. 2001. Sediment sampling guide and methodologies. 2nd Edition.

Soil Color/Types:
Refer to a Munsell Color Chart