Chapter XII. MISCELLANEOUS SAMPLING

Section A. Field Blanks and Duplicates

Overview

Duplicate sampling and field blanks must be performed at a minimum of 2.5% of our sites. To assure we meet these requirements, each team list will have a designated duplicate and field blank. Procedures for performing duplicates and field blanks are presented below.

Part 1. Field Blanks

Field blanks are simply samples of deionized water that are preserved in the field. The purpose of the field blank is to detect onsite contamination and verify the purity of the sample fixatives.

Obtaining the Field Blank Water

Before leaving the office, obtain the deionized water by collecting it directly from the laboratory supplied containers.

Procedures for obtaining water from the laboratory supplied containers are as follows:
1) Fill up an unused, one-gallon cubitainer with some water (approximately 100 mL).
2) Screw on the lid, shake the rinse water, and dump. Repeat.
3) After two rinses, completely fill up the one-gallon cubitainer, expunge any remaining air, and place in the vehicle to be used in the field as a source for the field blank water.

Field blanks are to be prepared in the field only and not in the laboratory or garage. A stream location is sometimes designated on the sample list for a field blank. If you miss the exact location indicated on the sheet, prepare a field blank at the next location. The reason why field blanks are indicated on your list is to remind you to do it AND to assure that field blanks are prepared at random locations and times.

A field blank will consist of any parameters that are or may be analyzed during the work week. This may include:
- 1 full cubitainer for Unfixed Samples (Chlorides, Hot Acidity, Alkalinity, TSS, Sulfates, Lab pH, Lab Cond., Cold Acidity, Total Orthophosphate, etc.)
- 1 full cubitainer for Sulfuric Acid Preserved Samples (Total Phosphorous, TKN, NO_2-NO_3-N, Unionized NH_3)
- ½ full cubitainer for Nitric Acid Preserved Samples (All Total Metals)

- ½ full cubitainer for Filtered Nitric Acid Preserved Samples (All Dissolved Metals)
- ½ full cubitainer for Filtered Unfixed Samples (Dissolved Orthophosphate)

Do not prepare a field blank for fecal samples, as the deionized water is not sterile.

Field Blank Field Procedures

1. To prepare a field blank, retrieve your pre-filled one-gallon cubitainer with DI water from storage in the vehicle.
2. Label an appropriate number of one liter cubitainers in a manner that it will appear to be an actual water sample to the lab, but will also be recognizable as a field blank to WAB employees.
3. Fix and handle the samples as you would do for a stream sample by substituting the DI water in the one-gallon cubitainer for actual stream water (including filtering for dissolved parameters if that was or will be done during the week).
4. After the sample has been submitted to the lab, write "FIELD BLANK" at the top of the DEP copy (white) of the Analysis Request Form with Chain-of-Custody (COC) before turning it in with the other forms.

Part 2. Duplicate Samples

Wadeable Benthic Sites (Random, Targeted, and TMDL Bio)

With the exception of GPS and Water Quality Sonde readings, a Wadeable Benthic site is to be duplicated in its entirety. Each team member should treat the site as though he/she is sampling alone: Do your own habitat, water quality and benthic and periphyton collection. The two sets of forms and benthic and water samples should be clearly marked with Dup #1 and Dup #2. On-site water quality data (*i.e.*, pH, Conductivity, DO, Temperature) should only be recorded on the first duplicate form (Dup #1).

Sites to be duplicated are indicated on the team lists. These sites are randomly selected and the main purpose of indicating these sites is to remind you to perform duplicate sampling and to assure that duplicates are performed at random locations and times. It is possible that the site selected is unsuitable for benthic sampling or has insufficient habitat to conduct duplicate benthos collections. If this is the case, the duplicate can be performed at an alternate site. Additionally, if you encounter a site that is ideal for duplicate sampling before you get to your designated site, you may conduct the duplicate at that site and drop the designated one. The important thing is that duplicate sampling is performed for the given group of samples or team list.

TMDL (Water Quality and Limited Habitat)

Duplicate samples for non-biological TMDL samples are limited to water quality only. There is no need to submit a duplicate TMDL-Initial or TMDL-Secondary habitat form, as most field personnel will be working solo and unable to replicate this portion. Duplication will be limited to the water quality parameters assigned to that site; *i.e.*, if the site is fecal only, just do fecal.

Duplicates for TMDL samples should be conducted at sites where the most parameters on the list are collected (if such sites exist on the list) and should be rotated to different sites each sampling event.

Field Blanks and Duplicates Quality Assurance/Quality Control

Sample labels are to be accurate and complete and contain all the information discussed above. Sampling equipment will be checked for contaminants and excess dirt or moisture cleaned before and after each sampling event. Lot numbers of all preservatives are recorded on the Analysis Request Form with Chain-of-Custody (COC) for each sample submitted and entered into the database to allow for easy tracking.

The field blank and duplicate data are looked at by Watershed Assessment Branch staff and scrutinized to find any possible discrepancies, contamination, or faults in the sampling methods and techniques. Any problems are brought to the attention of the program management and steps are made to immediately correct the problem. Data that is related to the problem are flagged with notes concerning the details of the situation so that decisions can be made whether or not to include the data in any further assessments or analysis.

Once a year, all field participants in the WAB attend mandatory training sessions in March-April prior to the initiation of the major sampling season. The purpose of these sessions is to ensure that all field personnel are familiar with habitat sampling protocols and calibrated to sampling standards. A hands-on session concerning the collection and handling of water quality samples is included. Any persons unable to attend the annual training session will be instructed and evaluated on the job in the following month by one of the WAB training instructors. In the field, individuals who are more experienced in collecting water quality field blanks and duplicates will be teamed up with the less experienced to assure reinforcement of training and accurate results. This document is also provided to all program personnel for review and use in the field.

Section B. Source Sampling Procedures for TMDL Monitoring

Source Sampling Overview

This section covers some of the techniques used to document sources during the Total Maximum Daily Load (TMDL) sampling and modeling process. This is a very important component of TMDL sampling as a good understanding of the location and nature of various pollutant sources will result in better TMDL models. It is necessary to document all sources of importance and relevance encountered and forward this information to the TMDL Source Tracker, whose primary task is to catalogue, document, and quantify as much pollutant source information as possible for the ongoing TMDL.

The following instructions are from a memo from the TMDL source tracker concerning various TMDL sources:

Part 1. AMD/AML

Some AMD/AML sources are selected to be included on the TMDL sample lists and will be sampled quarterly for AMD parameters and flow. One may encounter other AMD/AML sources on these and other streams that are not on this sample list while sampling. A source form can be filled out for these other sources as it is deemed appropriate. Include at least field readings, estimated flow, GPS coordinates, pictures, and the visible impact on stream. A sample is not needed unless it is suspected that this is a one-time event or intermittent source. The Field Supervisor will forward a copy to the Source Tracker and they will let you know if any follow-up is needed. Generally, the Source Tracker will follow up with additional source sampling.

Here are some tips about how to address AMD Sources previously published from a January 2007 Memo:

- ✓ AMD sources can discharge via pipes and culverts or simply as seeps from the hillside/stream bank, narrow channel-ways, and/or an artesian upwelling.
- ✓ A good strategy for locating AMD sources is to hike up the receiving stream towards the potential site looking closely for pour points, precipitates on the bottom (orange, white, black), water discoloration (opaque blue/greenish). It is also useful to routinely check YSI field readings of the receiving stream for changes as you move up the watershed. Increasing conductivity and decreasing pH values in the receiving stream as you move up <u>may</u> indicate that you are getting closer to a source. Underground mine discharges are typically 54 degrees F (12.2 degrees C). You can use stream temperatures to help guide you to sources.
- ✓ If you locate a cluster of AMD sources that collect into a common channel before entering the receiving stream, it is acceptable to sample the combined sources/channel below them to get the cumulative concentrations/impacts of the discharge. Also, it would be beneficial to get GPS coordinates for each source

portal even though you won't be sampling them individually; however, be certain to capture coordinates at the location of a grab sample and flow.

- ✓ If you discover a new source that has never been identified before (*i.e*., not currently on your TMDL list) and it appears substantial/significant it should be sampled. The terms substantial and/or significant can vary in their meaning among individuals. Examples of sources that should be considered substantial/significant are: 1) A small source volumetrically but with high concentrations of dissolved ions flowing into a stream causing discoloration due to precipitates and/or causing noticeable changes to field readings, 2) A large source volumetrically that constitutes a large proportion of the total flow in the receiving stream and substantially alters field readings – this type may not be as concentrated with dissolved ions or have very low pH values like the smaller source but because of its volume should be considered for sampling. Small trickles and seeps that ooze out of the bank and do not appear to influence the receiving stream are typically not sampled (in some areas these are numerous and would quickly overwhelm the budget anyway). Check YSI field readings in stream below the discharge if you are unsure – slowly moving away from the source to evaluate its potential impact. In most cases, it comes down to BPJ (best professional judgment).
- ✓ Photos are extremely important for source sampling since many of them are only visited one time. Several photos of the source should be taken along with its pour point into the receiving stream – describing and detailing its impact, etc.
- ✓ GPS coordinates and directions to the site are also critical. Driving directions and hiking directions should be clear and concise. Check GPS's to be sure they have been switched to NAD 83. All of the source tracking sites we will be doing in the Cheat in January will have coordinates associated with them. <u>However, these coordinates were derived using GIS – not GPS field readings.</u> Therefore they should be considered as approximate locations. In some cases the coordinates will probably be fairly accurate. Other locations are very approximate as they are reported locations that have not yet been confirmed, so you may need to search harder. Be prepared to collect grab samples and flow measurements at longer distances from the vehicle, which may require backpacking with the filtering apparatus, preservatives, and flow equipment.
- ✓ TMDL topographic maps will have the new source tracking sites marked in pink. In general, the source sites were assigned to a particular sample list based on their proximity to their monthly TMDL list of sites.
- ✓ Drawings, maps and good written descriptions of the source and what it does to the receiving stream are beneficial. As always document the local land use and any other pertinent info about the site.
- ✓ The Cheat Sheet has some good tips on recognizing sources, etc.
- ✓ If you arrive at a suspected source location and cannot locate a source, check the field water chemistry (conductivity and pH) of the receiving stream/waterbody. If the stream does not appear to be influenced by a source based on the field readings, and sources cannot be located after a sufficient search, the source tracking obligations are fulfilled.

- ✓ Remember, the absolute data requirements for source tracking are GPS locations, grab samples (indicating chemical properties, *i.e*., YSI), flow measurements, and photographs. If a stream is too small to sample for flow using the Marsh-McBirney flow meter, you may perform a timed-fill technique to estimate time required for a source flow to fill a volumetrically known container. Small flexible (smashable into the substrate) buckets and gallon or liter size cubes with upper side cut off, can be used as flow gathering devices – simply record the filling time and repeat as many times as deemed necessary. This should be done at least three times, using the average time among measurements as the recorded data. For example, 3.2 seconds to fill a 1-liter container. You may also use a small container (fecal bottle) to fill a larger container (1 liter cube) to desired level – keeping track of the time all the while. It is also common to have to measure part of a flow and estimate the total flow on this partial measurement; or even do a visual estimate based on a visual comparison of the source flow to another known/measured flow.

Part 2. Permitted Sources

If it is suspected that a permitted discharge is not within permit limits and is having a negative impact on the stream sample on a particular day, it would be very helpful to the TMDL model to have a sample of the permitted discharge (and its flow) on the same day that the stream sample is taken.

Part 3. Other Sources

It is not necessary to collect samples from “common occurrence” pollutant sources like pastures or log jobs. Reserve source sampling for the rare or severe instances that are impacting the stream samples on a particular day. If it is suspected that runoff from a specific source (*e.g.,* problem log job or dairy manure pond overflow) is impacting the stream sample, go ahead and get a source sample if it is practical to do so. If it is not practical to get a sample, any documentation that can be provided will be helpful (*e.g*., GPS coordinates, directions, pictures). Any general source information that may need to be passed on to the Source Tracker can be sent via email.