



STANDARD OPERATING PROCEDURE  
***PREPARATION OF SAMPLE CONTAINERS FOR GROUND WATER  
MONITORING***

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## **1.0 INTRODUCTION**

### **1.1 Purpose**

This Standard Operating Procedure (SOP) explains how to prepare, label and package sample containers used to collect ground water samples. This SOP also describes Chain-of-Custody (COC) documentation and handling requirements specific to the ground water monitoring program. This SOP will be followed when the study protocol does not include study-specific sample container requirements.

### **1.2 Definitions**

- 1.2.1 A **sample container** holds the medium being sampled, e.g. water, when analyzing for pesticides.
- 1.2.2 A **chain of custody** (COC) is a document designed to track a sample bottle from bottle preparation through sample analysis as defined in SOP ADMIN006.01.
- 1.2.3 A **sample pack** is a water-resistant holder used to protect sample containers during transport to and from the study sites.
- 1.2.4 A **storage pack** is a box of labeled sample containers designated for a single study.
- 1.2.5 A **Volatile Organic Analysis** (VOA) vial is a container designed for collecting water samples to be analyzed for volatile organic compounds. Multiple vials make up a single sample.

## **2.0 MATERIALS**

- 2.1 New sample bottles as detailed in the study protocol.
- 2.2 Labels pre-printed with study number, sample number, and sample type.
- 2.3 Clear adhesive tape wide enough to cover a label.
- 2.4 Study-specific COCs.
- 2.5 For sample-packs:
  - (a) Polystyrene bottle trays
  - (b) 24" X 24" (minimum) plastic bags
  - (c) 6" X 12" (minimum) plastic bags
  - (d) Rubber bands

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- 2.6** For storage packs:
- (a) Shipping box for appropriate sample containers, normally a 12-pack
  - (b) Self-adhesive labels (approximately 2" X 3")
- 2.7** For VOA sample vials:
- (a) 6" X 10" (minimum) resealable plastic bags
  - (b) 12" X 16" (minimum) resealable plastic bags
  - (c) 6" X 12" (minimum) plastic bags
  - (d) Cardboard file box
- 2.8** Permanent marking pen

**3.0 PROCEDURES**

**3.1 Study Specific Decisions**

Before preparing sample containers for a study, the project leader or field coordinator must review the protocol and, if necessary, consult with the analyzing laboratory to determine:

- 3.1.1 The type(s) of sample container(s) needed;
- 3.1.2 The number of sample containers required, including spares and quality control;
- 3.1.3 The number of sample packs to assemble;
- 3.1.4 The type of sample pack and/or storage pack required;
- 3.1.5 Discrete label numbers to prevent confusion of sample results;
- 3.1.6 The appropriate COC form(s); and
- 3.1.7 Additional container materials required such as aluminum foil or Teflon sheets.

**NOTE:** If a deviation from this SOP occurs or is required, the project leader will detail the changes in an amendment to the study protocol.

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**3.2 Sample Container Preparation**

This section does not apply to VOA vials. See section 3.5 for VOA vial preparation.

- 3.2.1 Obtain sufficient sample containers, labels, COCs (refer to section 3.6 for COC Handling) and other supplies to complete the number of sample containers/packs required by the study. Ensure that the sample containers are of proper type and size and comply with any specific requirements included in the study protocol. If the study protocol does not specify the type of sample container required, consult with the project leader before beginning sample container preparation.
- 3.2.2 Print sample container labels with the study number, unique sample number, and sample type for every sample container that will be used. Use the standardized spreadsheet program located within the study folder on the shared Ground water directory (\\dprhq01\groundwater\) to create labels.  
  
If there is no spreadsheet available, let the project leader know that one needs to be created. This spreadsheet can be modified from a previous project or found on the shared Ground Water directory at: GroundWater\PCPA\Forms\Labels.xls.
- 3.2.3 Remove sample containers from the shipping box and check their condition. Ensure that the sample containers are clean and undamaged and the caps are securely fastened. Discard sample containers that are dirty, damaged or have lost their caps. Wipe off any accumulated dust.
- 3.2.4 Cut out a pre-printed label and affix it horizontally to the sample container using the clear tape. Place the labels high enough on the sample containers so that they will not get wet during transport. Smooth the tape to assure a good seal around the label.
- 3.2.5 Place the sample container in a sample pack or in the storage pack as detailed in sections 3.3 and 3.4.

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**3.3 Sample Pack Preparation**

To avoid damage during transport to and from the study sites, sample containers are packed into tight-fitting water-resistant holders (often referred to as “six-packs”). A sample pack includes sample containers from a single well. Each sample container within the sample pack has a sample number.

3.3.1 This section does not apply to VOA vials. See section 3.5 for VOA vial sample pack preparation.

3.3.2 Obtain water-resistant sample pack holders that fit the sample containers used for the study. The sample containers should fit snugly in the holders to prevent damage during transport.

If the study protocol specifies other types of sample containers, check with the project leader to ensure that the appropriate sample pack holders are available.

3.3.3 Indicate the sample type on the top of the bottle caps as dictated by the study protocol using a permanent marker. Use the following abbreviations:

- (a) Primary samples: P1, P2, etc.
- (b) Back up samples B1, B2, etc.
- (c) Field blank samples: FB1, FB2, etc.

3.3.4 To reduce the opportunity for error or confusion, sample packs should be prepared using a consistent pattern. The example below shows a sample pack where two samples – one for oryzalin and one for triazine – will be taken from one well.

P1 #101 Oryzalin	P2 #102 Triazine	B1 #103 (either)
FB2 #106 (either)	FB1 #105 (either)	B2 #104 (either)

**NOTE:** Depending on the study protocol and the size of the sample pack holder, it may be partially or entirely filled.

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- 3.3.5 Put the sample pack, along with the associated folded and bagged COCs in a 24" X 24" plastic bag and close the top of the bag with a rubber band.
- 3.3.6 Label the large bag with the study number, the range of the sample numbers inside, and other information required by the project leader. Use a permanent marker to write directly on the bag or on a white adhesive label.

### **3.4 Storage Pack Preparation**

This section does not apply to VOA vials. See section 3.5 for VOA vial sample pack preparation.

A storage pack is a box of labeled sample containers designated for a single study. Whenever possible, the manufacturer's original shipping box is used. Storage packs are not intended for a single sampling site like sample packs; they are used as needed for a given study. Sample containers are pulled from the storage pack as needed at the sample site.

- 3.4.1 Place the sample container with the lowest sample number in the left-hand compartment at the narrow end of the storage box. Continue placing the labeled sample containers in sequence (lowest to highest) down the row away from you. When that row is full, follow the same pattern in the row immediately to the right of the filled row (nearest to furthest compartment. Follow this pattern until the box is full.
- 3.4.2 Use an adhesive label to mark the outside of the storage box with the study number and the range of sample container numbers inside.
- 3.4.3 On the inside box flap, at the beginning of each row, list the range of sample number in that row.
- 3.4.4 Place the unfolded COCs in sequence from lowest to highest, on top of the sample containers and close up the box.

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**3.5 VOA Vial and Sample Pack Preparation**

- 3.5.1 Review the study protocol to determine the number of VOA vials per sample and the need for sample- or storage-packs.
- 3.5.2 Obtain sufficient VOA vials, labels, COCs (refer to section 3.6 for COC Handling) and other supplies to complete the number of sample containers/packs required by the study.
- 3.5.3 Print sample container labels with the study number, sample number, and sample type for every sample container that will be used. Each sample number will be repeated multiple times (typically three) as each sample will consist of multiple vials. Use a VOA vial specialized spreadsheet located within the study folder on the shared Ground water directory to create these labels.
- 3.5.4 If the study protocol is not specific and the project leader has not specified other requirements, use the following procedure to create VOA sample packs:
  - 3.5.4.1 Place three VOA vials bearing the same sample number together in a resealable 6" X 10" plastic bag. The package of three VOA vials are treated as a single sample.
  - 3.5.4.2 Using a permanent marker, label the bag of three vials with the lowest sample number as "P" (primary); the bag with the next lowest sample number(s) as "B1", "B2", etc. (backup); and the bag with highest sample number as "FB" (field blank).
  - 3.5.4.3 Combine the individual packages in a large resealable plastic bag to form a VOA-sample-pack.

**3.6 COC Handling**

- 3.6.1 Complete one COC for each sample container or individually numbered bag of VOA vials as detailed in SOP ADMIN006.01.

Ensure that each COC includes the study number, sample number, chemicals to be analyzed, and the preparer's signature.

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3.6.2 For sample packs:

- 3.6.2.1 Assign the lowest sample number in a sample pack to the primary sample container, the next highest sample number to the back-up sample container, and the highest sample number in the pack to the field blank sample container.
- 3.6.2.2 Include the sample numbers of the other sample containers (i.e. back-ups and field blanks) within the "Remarks" sections of each COC. The sample number specific to each COC will be outlined by a square with bold font. Indicate the type of replicate or field blank with the abbreviation (i.e. P1, B1, FB1, etc.) written on top of the COC.
- 3.6.2.3 Organize the COCs for the sample-pack from lowest to the highest sample number. Fold the COCs and place in a 6" x 12" plastic bag with the lowest sample number showing, then place the bag between the bottle within the sample-pack.

3.6.3 For storage packs:

- 3.6.3.1 Complete the COCs as described in section 3.6.1.
- 3.6.3.2 Enclose the matching COCs within the storage-pack flat on top of the sample containers inside the box in sequential order. Primary, back up, and field blank containers may not be designated until the samples are collected.

3.6.4 For VOA sample packs:

- 3.6.4.1 Fold and place the COCs in a 6" X 12" plastic bag with the lowest sample number visible.
- 3.6.4.2 Place the bagged COCs in the large resealable bag with the VOA containers.
- 3.6.4.3 Seal the large bag; label it as described in section 3.3.5; and place it in a box with other VOA sample-packs for the same study. Label the box with the study and the letter "VOA".



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3.6.5 Once the COCs are numbered, they must remain with associated sample containers. COCs are stored with the sample containers before and after sampling, travel in the same vehicle when the containers are in transit and are delivered with the containers to the analyzing laboratory.

**3.7 Storage**

All prepared sample/storage-packs for a given study shall be stored together on the shelves in the West Sacramento warehouse. The warehouse manager will direct the location of storage and whether to use a pallet or place the packs directly on the shelves. Place a removable label with the study number on the shelving to easily identify what containers are stored at each location.