



Suggested Practices for Sampling with Lysimeters

Lysimeters are instruments used to study percolation and leaching losses of soil. Wastewater treatment facilities may be required by the Water Quality Control Division (the Division) at the Colorado Department of Public Health and Environment to use lysimeters to demonstrate compliance with a wastewater discharge permit. This guidance document provides suggested practices for sampling with lysimeters. The document is not all inclusive and should be used only as a guide in meeting the Division's compliance expectations.

A. POROUS CUP LYSIMETERS

Field Equipment Preparation

Prior to initiating ground-water sampling activities, the monitoring person or personnel shall have calibrated all field test equipment and decontaminated all probes. All sample bottles are obtained from the laboratory for each parameter required in the permit. No decontamination of the vacuum or sample tubing is necessary, because they are dedicated in the lysimeter.

Each Porous Cup Lysimeter has the necessary vacuum tube and sample tube already installed in the lysimeter. The operator needs to bring the required vacuum and pressure-inducing device. The device first applies a vacuum to draw the soil moisture into the porous cup. Next a pressure is applied to drive the soil moisture sample into the sample bottle.

B. GROUND-WATER SAMPLE COLLECTION

In accordance with the "The Basic Standards for Ground Water", the field personnel shall filter the samples for nitrate, chloride and sulfate prior to preservation. [Refer to Regulation No. 41, "The Basic Standards for Ground Water", to determine which parameters are required to be filtered prior to preservation.] The filter is a 45-micron filter. Some samples require preservative and some do not. The field personnel should obtain the required bottles from the laboratory that is performing the analyses. All samples are to be iced in a cooler until they are handed to the laboratory personnel. The permittee is required to maintain chain of custody on all sample bottles.

The permittee's laboratory provides the containers used in the collection of samples, in order to perform the required Standard Methods analysis. The size and preservation of each parameter's container is provided in the chart, below.

Field personnel are responsible for complete documentation of sampling, which will be kept in an approved permittee generated field data sheet. All entries are to be made in ink. The data sheet is to indicate the preservation for all samples and is to provide a means to maintain chain-of-custody record for all samples until they are received by the laboratory for analysis. Weather conditions at the time of sampling shall be noted on the data sheet.

The field personnel are responsible for the proper sampling procedure to obtain the required amount of fluid for analysis. For ease of identification of the vacuum tube and the sample tube, different colors are to be used, i.e. the

sample tube is a green tube or painted green and the vacuum tube is a blue tube of painted blue.

The field personnel shall draw soil moisture into the porous sampling cup by placing a vacuum on the lysimeter's vacuum tube. This is accomplished by clamping off the sample tube and using a vacuum pump to evacuate the vacuum tube. The lysimeter should be kept under vacuum throughout the interval between sampling. Lysimeters should be checked to see if the vacuum is still holding. If not, the vacuum pump should be used to re-evacuate the porous cup and re-establish a vacuum.

Releasing the clamp on both tubes and pressurizing the vacuum tube with a pressure pump accomplish sampling. The applied pressure will force the collected fluid in porous cup out through the sample tube. The discharge from the sample tube may be collected directly into the appropriate sample bottles previously prepared and supplied by the laboratory. See the table below for further guidance pertaining to sample bottles, preservation and holding times.

SAMPLE COLLECTION BOTTLES, HOLDING TIMES AND QUANTITY OF SAMPLE

The Water Quality Control Division has recommended procedures for sampling and delivery to a certified laboratory. Table 1, below, lists the proper sampling procedures, sample volumes, type of sample container, preservation and holding time for a valid sample. This table is summary of Division guidance found in the "References" in the permit Rationale.

PARAMETER	FIELD FILTERED	CONTAINER	VOL. REQ. MILLILITERS (MINIMUM)	PRESERVATION	HOLDING TIME
TOTAL COLIFORM	NO	POLYPROPYLENE, GLASS STERILIZED	200	COOL TO 40 C	6 HOURS TRANSPORT 2 HOURS PROCESS in LAB
CHLORIDE	YES	PLASTIC, GLASS	50	NONE REQUIRED	28 DAYS
SULFATE	YES	PLASTIC, GLASS	100	COOL TO 40 C	28 DAYS
NITRATE + NITRITE	YES	PLASTIC, GLASS	200	COOL TO 40 C ADD H ₂ SO ₄ pH <2	28 DAYS
TOTAL DISSOL. SOLIDS	NO	PLASTIC, GLASS	200	COOL TO 40 C	7 DAYS
TOTAL ORG. CARBON	NO	AMBER GLASS	4 x 15	COOL TO 40 C	28 DAYS
IRON	YES	GLASS RINSE W/1+1 HNO ₃	500	FIELD ACIDIFY W/HNO ₃ TO pH <2 COOL TO 40 C	6 MONTHS
TOTAL PHOSPHORUS	NO	GLASS RINSE W/1+1 HNO ₃	100	COOL TO 40 C	48 HOURS
BOD ₅	NO	PLASTIC, GLASS	1000	COOL TO 40 C	48 HOURS

Plastic bottles are to be made out of polyethylene. Both the plastic bottles and the glass bottles need to have screw caps. All bottles are to be thoroughly cleaned before the sample is placed in them. Those sample bottles for parameters for acidification is needed may already have the acid in them. Do not throw the acid out of the bottles.

The permittee is requested to maintain a logbook or a log form to record the sampling procedure. The logbook/form should allow space to log readings for the field parameters of temperature, pH and conductivity. In addition the field testing procedure should include the time the sample was taken, the volume of water pumped or

the number of bails since the last sample plus the cumulative number of bails (or volume). Allow space for a physical description of the sample, whether the sample was clear/turbid, what color (if any) was noted in the sample(s). In addition to the above information, the logbook/form is to allow space for the following information:

- o Location/Identification of sample site (LY051B, LY051C, etc);
- o Date and time of sample collection;
- o Name of sampler;
- o Unusual characteristics of the sample or the purging process, such as sediment in the water, or
- o An odor was noted in the sample,
- o Weather at time of sample.