

**Colorado Department of Public Health and Environment
Water Quality Control Division
Colorado Discharge Permit System**

CDPS

STORMWATER SAMPLING

GUIDANCE DOCUMENT

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CDPS GUIDANCE DOCUMENT

STORMWATER SAMPLING

1. INTRODUCTION

1.1 Purpose

The purpose of this guidance document is to provide basic guidelines for Colorado Discharge Permit System (CDPS) permittees who are required to sample their stormwater discharges, as described under Monitoring Conditions of the Heavy Industrial General Permit and the Recycling Industry General Permit. This document is intended to be a supplement to your CDPS permit, *not* a substitution for it. The monitoring requirements section, as well as the rest of your CDPS permit, should be thoroughly reviewed. More detailed information regarding sampling can be obtained from the EPA NPDES Storm Water Sampling Guidance Document referenced later in this document.

1.2 Who is Required to Sample?

Monitoring requirements are noted at the bottom of page 1 of your CDPS General Permit for Stormwater Discharges Associated With Heavy Industrial Activity or your CDPS General Permit for Stormwater Discharges Associated with the Recycling Industry. Questions concerning these monitoring requirements can be addressed to the Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division (WQCD) at (303) 692-3500. Ask for Nathan Moore or Kathy Dolan.

2. WHEN TO SAMPLE

2.1 Sampling Frequency

Unless otherwise specified, all sampling is required under stormwater general permits is on an annual basis.

2.2 Storm Event Criteria

All samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches in magnitude, and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch of rainfall) storm event. Runoff from either rain storms or melting snow is acceptable.

3. WHERE TO SAMPLE STORMWATER DISCHARGES

3.1 Area of Industrial Activity

Stormwater samples should be taken at a location where runoff collects from the area of industrial activity (activity, storage area, materials handling area, etc.) for which sampling is required. For example: if a chemical is used in processing activities, then the outfall(s) sampled should convey runoff from the area/areas where the chemical is exposed to stormwater. Sampling point(s) should be identified in your Stormwater Management Plan which was submitted to CDPHE in accordance with your CDPS permit requirements. If your plan does not identify sampling locations, it should be amended and the amendment should be sent in with your next annual report. If you are unsure where to sample, you can call the Division to discuss a location.

3.2 Representative Discharge

If your facility has two or more outfalls, one sample *may* be designated as representative of more than that one outfall. This is acceptable only for drainage basins that produce substantially identical discharges. The permittee will determine substantially identical discharges based on a consideration of physical features, materials and activities, etc. within the basin. In addition, for each outfall that the permittee believes is

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representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area, e.g., low (under 40%), medium (40% to 65%) or high (above 65%) shall be provided. Refer to Appendix B of this document.

4. SAMPLING FUNDAMENTALS

In order to obtain samples that are representative of the storm event being monitored, careful planning of sampling strategy and understanding sampling fundamentals, prior to the actual sampling event, is critical.

4.1 Staffing Considerations

Person(s) who will be collecting samples should be identified well ahead of time, so that they can familiarize themselves with procedures that are involved in properly obtaining stormwater discharge samples. Samplers will need to react quickly once a qualifying storm event occurs. A grab sample must be obtained during the first 30 minutes of the discharge. Arrangements should be made for personnel to be available for storm events that may occur outside normal business hours.

4.2 Laboratory for Sample Analysis

You should choose a laboratory and discuss your sampling strategy with them, prior to the actual sampling event. If provided with a list of parameters to be tested, they can provide information on analyses they will run, volumes of water needed for analyses, preservation of samples and holding times. They can also provide appropriate containers for sample collection.

4.3 Grab Samples

Grab samples are required for all monitoring under Colorado stormwater general permits. A grab sample is a discrete, individual sample taken within a short period of time. Analysis of grab samples characterizes the quality of a storm water discharge at a given time of the discharge. These samples are intended to characterize the maximum concentration of a pollutant that may occur in the discharge. Grab samples must be taken in the first thirty minutes of the discharge. If the collection of a grab sample during the first thirty minutes is impracticable, a grab sample can be taken during the first hour of the discharge, and the discharger shall submit with the monitoring report a description of why a grab sample during the first thirty minutes was impracticable.

4.4 Sampling from Holding Ponds

For facilities with holding ponds or other impoundments, sampling shall be performed at the outlet from the pond. If no discharge from the pond to surface waters occurs, then no sampling is necessary. Please note that if any process water mixes with stormwater, all of the water is considered to be process water and needs to be covered under a CDPS industrial wastewater discharge permit.

4.5 Manual Versus Automatic Sampling

Manual and automatic sampling techniques are methods by which samples can be collected. Manual samples are simply samples collected by hand. Automatic samplers are powered devices that collect samples according to preprogrammed criteria. For most pollutants (except fecal streptococcus, fecal coliform, oil and grease and volatile organic compounds, which must be collected manually), either manual or automatic sample collection will conform with CDPS permit requirements.

4.6 How to Collect Grab Samples

4.6.1 Manual Collection

A manual grab sample is collected by inserting a container under, or down-current of a discharge, with the container opening facing upstream. Generally, simplified equipment and procedures can be used. Less accessible outfalls may require the use of poles or buckets to collect grab samples. To ensure that manual grab samples are representative of the storm water discharged, the procedures set forth in Appendix A should be followed.

4.6.2 Automatic Sampler Collection

Grab samples can also be collected using programmed automatic samplers. Automatic samplers come equipped with timers or computers that can be programmed to collect grab samples. Considerations when using an automatic sampler include cost, proper cleaning, and power source. Some parameters are not amenable to collection by an automatic sampler. These pollutants include fecal streptococcus, fecal coliform, oil and grease and volatile organic compounds. Refer to the owner's manual for your sampler.

5. ADDITIONAL REQUIRED INFORMATION

The following additional information is required *for each sampling event*:

The date and duration (in hours) of the storm event sampled.

Rainfall measurements or estimates (in inches) of the storm event which generated the sampled runoff. A simple rain gauge is helpful for this.

The duration between the storm event sampled and the end of the previous measurable storm event.

An estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area. Refer to Appendix B for more information.

An estimate of the total volume (in gallons) discharged from the drainage basin sampled. To estimate your total volume in gallons use the following formula:

$$V = \frac{R}{12} \times (A \times C) \times 7.48$$

Where:

V = Volume of discharge in gallons

R = Total rainfall measured in inches

A = Area within the drainage basin in square feet

C = Runoff coefficient (see Appendix B) (no units)

7.48 = Number of gallons per cubic foot

6. SAMPLE HANDLING AND PRESERVATION

For samples to remain representative of the storm event from which they were collected, they must be handled and preserved in a proper manner.

6.1 Sample Containers

Care must be taken to assure that the containers in which samples are to be collected are clean and pose no threat of contamination to the stormwater discharge samples. Containers may be cleaned and prepared for field use according to the procedures described in the EPA Guidance Document (see 12. References), or can be provided by your laboratory. As discussed earlier in this document, arrangements should be made with a laboratory prior to the actual sampling event. The laboratory should provide you with sample containers prepared and cleaned in the laboratory, ready for sample collection. Using these provided containers reduces the risk of contaminating the samples through improper decontamination methods.

6.2 Sample Preservation and Holding Times

Preservation techniques ensure that the sample remains representative of the stormwater discharge at the time of collection. Since many pollutants in the samples collected are unstable (at least to some extent), the sample should be analyzed immediately, or preserved or fixed to minimize changes between the time of collection and analysis. Because immediate analysis is not always possible, most samples are preserved regardless of the time of analysis.

Sample preservation techniques consist of refrigeration, pH adjustment, and chemical fixation. Refrigeration is the most widely used technique because it has no detrimental effect on the sample composition, and it does not interfere with most analytical methods. Refrigeration requires the sample to be quickly chilled to a temperature of 4°C. This technique is used at the beginning of collection in the field, and is continued during shipment, and while the sample is in the laboratory. If taken manually, the samples can be placed in an ice chest. If taken by an automatic sampler, the sampler unit should have refrigeration capabilities.

In addition to preservation techniques, holding times should be considered. The holding time is the maximum amount of time that samples may be held before analysis and still be considered valid. Samples exceeding these holding times are considered suspect and sample collection may have to be repeated.

Again, your laboratory can provide you with holding times acceptable for various parameters you will be testing for. They can also often provide, if necessary, preservatives in the containers they provide you to collect your samples.

7. SAMPLE DOCUMENTATION

Proper labeling of each sample is critical to ensure proper handling and analysis by the laboratory. Your laboratory should provide you with a waterproof gummed sample identification label for each sample. Be sure to get more labels than samples you plan to collect. Use a waterproof ink pen to write the sample information on the label. The label should include the following information:

Unique Sample or Log Number - All samples should be assigned a unique identification number. If there is a serial number on the transportation case, the sampling personnel should add this number to the field records.

Date and Time of Sample Collection - Date and time of sample collection (including notation of a.m. or p.m.) must be recorded.

Source of Sample, Including Facility Name and Address - Use the outfall identification number from the site map with a narrative description.

Name of Sampling Personnel - The name(s) and initials of the person(s) taking the sample must be indicated.

Sample Type - Each sample should indicate that it is a grab sample.

Preservation Used - Any preservatives (and the amount) added to the sample should be recorded. The method of preservation should be indicated.

Analysis Required - All parameters for which the sample must be analyzed at the laboratory should be specified.

Comments - Any relevant information pertaining to the sample or the sampling site that may affect the sample should be recorded. This could include things such as unusual weather conditions.

8. CHAIN OF CUSTODY PROCEDURES

Once samples have been obtained, a written record of the chain of custody of that sample(s) should be made. "Chain of Custody" refers to the documented account of changes in possession that occur for a particular sample or set of samples. Proper documentation of possession from origin to analysis helps assure that the samples have not been tampered with and have remained representative of the stormwater discharge sampled. Information necessary in the chain of custody record includes:

Name and address of facility sampled

Name and address of person to receive test results

Name of person(s) collecting the sample

Sample ID numbers

Date and time of sample collection

Location of sample collection

Analyses required

Shipping ID number

Names and signatures of all persons handling the samples in the field and in the laboratory

A form including the above information can be developed to accompany the sample(s) to their final destination. Carriers typically will not sign for samples, so the container (cooler) with the sample should be sealed with the chain of custody inside for shipping. The laboratory will sign for receipt and return the original to you with test results.

Your chain of custody form should be printed on carbonless, multipart paper so all personnel handling the sample receive a copy.

9. SAMPLE PACKAGING AND SHIPPING

If the samples are not hand delivered to the laboratory or analyzed in an onsite laboratory, they should be placed in a transportation case (cooler) along with the chain of custody record form, pertinent field records, and shipped to the laboratory. Caution should be taken in packing to ensure that glass containers do not break during shipping. Ice or a synthetic ice should be placed in the container so that samples maintain a temperature of 4EC throughout shipping. Seal the container to prevent tampering. Most samples will not require any special transportation precautions, except careful packaging to prevent breakage and/or spillage.

If a sample is shipped by common carrier or sent through the U.S. mail, it must comply with Department of Transportation Hazardous Materials Regulations (49 CFR Parts 171-177). Check with your carrier to be sure no special regulations for transportation apply to your shipment. Stormwater samples are not generally considered hazardous materials, but in the event of a spill, leakage, etc., at the collection site, hazardous materials may be present in the samples. Be aware, before sampling, of what hazardous materials may be in the discharge drainage area.

10. ANALYTICAL CONSIDERATIONS

All stormwater discharges must be sampled and analyzed in accordance with EPA approved analytical methods for parameters required by your CDPS permit. Your laboratory can be consulted for proper testing methods for various parameters. Additional questions can be addressed to the CDPHE Laboratory.

11. REPORTING OF DATA

Reporting of any monitoring data gathered in compliance with your CDPS permit shall be on an annual basis, unless otherwise specified by the CDPHE. Monitoring results shall be summarized for each year (October 1-September 30) and reported on CDPHE approved discharge monitoring report forms and included with your annual report due no later than November 28 of the same year.

12. REFERENCES

For more detailed information regarding stormwater discharge sampling, you can call the U.S. EPA Region VIII at (303)312-6312 and order the following document:

NPDES Stormwater Sampling Guidance Document (EPA 833-B-92-001, 7/92)

Other questions can be addressed to:

Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Nathan Moore or Kathy Dolan
(303)692-3500

Colorado Department of Public Health and Environment
Laboratory Division
(303)692-3090

APPENDIX A

RECOMMENDED OPERATING PROCEDURES FOR COLLECTING GRAB SAMPLES

- Label sample containers before sampling event
- Take a cooler with ice to the sampling site
- Take the grab from the horizontal and vertical center of the channel
- Avoid stirring up bottom sediments in the channel
- Hold the container so the opening faces upstream
- Avoid touching the inside of the container to prevent contamination
- Keep the sample free from uncharacteristic floating debris
- Transfer samples into proper containers (e.g., from bucket to sample container), however, fecal coliform, fecal streptococcus, phenols and oil & grease should remain in original containers
- If taking numerous grabs, keep the samples separate and labelled clearly

* From EPA NPDES Stormwater Sampling Guidance Document (EPA 833-B-92-001, 7/92)

APPENDIX B

Table 2.1 Typical “C” Values (ASCE 1960)

Description of Area	Runoff Coefficients
Business	
Downtown areas	0.70 – 0.95
Neighborhood areas	0.50 – 0.70
Residential	
Single-family areas	0.30 – 0.50
Multiunits, detached	0.40 – 0.60
Multiunits, attached	0.60 – 0.75
Residential (suburban)	0.25 – 0.40
Apartment dwelling areas	0.50 – 0.70
Industrial	
Light areas	0.50 – 0.80
Heavy areas	0.60 – 0.90
Parks, cemeteries	0.10 – 0.25
Playgrounds	0.20 – 0.35
Railroad yard areas	0.20 – 0.40
Unimproved areas	0.10 – 0.30
Streets	
Asphalt	0.70 – 0.95
Concrete	0.80 – 0.95
Brick	0.70 – 0.85
Drives & walks	0.75 – 0.85
Roofs	0.75 – 0.95
Lawns – coarse textured soil (greater than 85% sand)	
Slope: Flat, 2%	0.05 – 0.10
Average, 2-7%	0.10 – 0.15
Steep, 7%	0.15 – 0.20
Lawns – fine textured soil (greater than 40% clay)	
Slope: Flat, 2%	0.13 – 0.17
Average, 2-7%	0.18 – 0.22
Steep, 7%	0.25 – 0.35