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Environmental Programs Directorate
Corrective Actions Projects

Standard Operating Procedure

for **PROCESSING STORM WATER SAMPLES**

APPROVAL SIGNATURES:

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Responsible Line Manager	**Organization**	**Signature**	**Date**
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1.0 PURPOSE AND SCOPE

This procedure describes the process for filtering and preserving storm water samples for shipment to an analytical laboratory. This SOP applies to all LANL personnel and any subcontractors who conduct chemical preservation of water samples either in the field at the time of sample collection or in the Storm Water Processing Facility.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

The Environmental Protection Agency (EPA) issued National Pollution Discharge Elimination System (NPDES) Individual Permit requires LANL to monitor storm water runoff from Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs), collectively referred to as Sites with regard to potential pollutants. The EPA issued NPDES Multi-Sector General Permit requires LANL to monitor storm water discharges and comply with requirements for storm water discharges associated with industrial activities.

Water samples are collected in the field. Chemical preservation and filtration are conducted in the field immediately following sample collection or in the Storm Water Processing Facility. If chemical preservation and filtration are conducted in the Storm Water Processing Facility, samples and contact waste shall be returned from the field in accordance with the applicable sampling procedure.

A LANL Project Leader will be appointed as the primary person with responsibility for the steps in this procedure.

2.2 Precautions

This procedure is used with an approved Integrated Work Document (IWD) and/or other safety documents as required. Use of acids and bases requires an IWD. Review IWDs for facility specific requirements, training, precautions and access controls.

3.0 EQUIPMENT AND TOOLS

- Copy of this procedure
- Copy of Integrated Work Document (IWD)
- Necessary keys
- Safety glasses with side shields
- Leather gloves or equivalent work gloves
- Glass and poly bottles appropriate for samples to be collected at the site (reference sampling plan)
- Lids for bottles
- Teflon tubing for intake
- Tygon tubing for exhaust

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Accepting Samples from the Field

Field Personnel	1.	Deliver to the Storm Water Processing Facility: • Samples • Completed, reviewed, and signed (relinquished by) Form 10013-1, ISCO Sampler Inspection and Sample Retrieval form (reference SOP-10013). • Contact waste
Sample Processor	2.	Verify volumes, review, and accept samples by signing “Received by” on Form 10013-1. Maintain original with water samples.
	3.	Provide a spreadsheet of all samples received to the Sample Data Manager with dates, times, and volumes of samples collected.

4.2 Determine Analyses Needed

Sample Data Manager	1.	Use the project specific guidance included in Attachment 3 to guide which analytical suites will be submitted for analyses and which will be abandoned or rescheduled when limited sample volume is available and the project allows partial fulfillment of planned analyses. IPC-1
	2.	Generate Form 5215-1, Storm Water Sample Processing Log with labels (Attachment 1) using the appropriate LANL Sample Management Office application.
	3.	Submit the forms and labels to Sample Processor.
Sample Processor	4.	Generate Form 5215-2, Storm Water Sample Processing Form (Attachment 2) and append it with the above forms to the original Form 10013-1 and keep with water sample.
	5.	Add Sample ID from Form 5215-1 to Form 5215-2 and 10013-1.
	6.	Add Field WO Number and SMA Number or Station Number for MSGP samplers from Form 5215-1 to Form 5215-2

4.3 Process Storm Water Samples

Sample Processor	1.	Process only one sample (i.e., samples from one site) at a time. **NOTE:** Sample collection bottles are the bottles the sample was collected in the field. Sample containers are containers/bottles that the original sample is transferred to after processing. These containers are transferred to the Sample Management Office for shipment to the analytical laboratory.
	2.	Don fresh gloves, lab coat, and protective eyewear. Long pants are required. No open toed shoes are allowed. Confirm eyewash is operational prior to processing samples.

Sample Processor (cont.)	3.	Record the analytical sample requested for each sample bottle on Form 5215-2 Storm Water Sample Processing Form. If any blank rows are left, put a line through them and initial and date.
	4.	Affix appropriate label to sample container.
	5.	Split up samples into appropriate sample containers.

4.4 Processing Filtered Samples (if required)

Sample Processor	1.	Filter samples IF REQUESTED on Form 5215-1, Storm Water Sample Processing Log. If not requested proceed to section 4.5.
	2.	Using a suitable length of tubing, run a tube from the sample collection bottle to a filter and then addition tubing through the Geopump and into a new sample container. (This places the filter upstream of the Geopump, preventing the tubing from over-pressuring and blowing the filter off the tubing. This will make a mess.)
	3.	Turn on the Geopump.
	4.	If flow diminishes to less than about one mL per second during the filtering of a sample, replace the filter as follows: • Hold the filter up and remove the tube from the sample collection bottle. Continue pumping until flow stops. • Turn off Geopump. • Purge all water from the spent filter. • Remove the spent filter from tubing. • Don new gloves (to prevent cross-contamination of tubing) and place fresh filter into tubing. • Continue filtering process.
	5.	After the last sample bottle is filled, clean up the area.
	6.	Don new gloves before filtering a new sample (to prevent cross-contamination).

4.5 Preserve Samples (applies to both filtered and unfiltered samples)

Sample Processor	1.	**IMPORTANT**: Preservation entails the addition of acid or base to a sample. Acids used include hydrochloric acid (HCl), nitric acid (HNO_3), and sulfuric acid (H_2SO_4). Bases used in preservation include sodium hydroxide (NaOH). These are all strong acids and bases that can cause severe burns. Extreme care should be taken when using these acids and bases. Refer to EP-ERSS-SOP-5056, Sample Containers and Preservation, for additional guidance.
	2.	Preserve (add acid or base) samples according to the requirements on the sample container label and Form 5215-1 Storm Water Sample Processing Log.

Sample Processor (cont.)

3. After a minimum of 5 minutes, agitate preserved sample and then check pH. (pH for samples preserved with acid is expected to be less than 2. pH for samples preserved with base is expected to be greater than 12.)

   Using a dropper, decant off a small volume of sample and test the pH and record as follows.

If	**Then**
pH is less than 2	enter "pH<2" on the *Analytical Request Form/Chain of Custody* form
pH is greater than 12	enter "pH>12" on the *Analytical Request Form/Chain of Custody* form
pH is between 2 and 12	enter the pH value on the *Analytical Request Form/Chain of Custody* form (*example*: "pH=5")

4. Securely affix lid to sample container. Clean and dry the exterior of sample container, ensure lid is on securely, and check sample container for leakage and breakage.

5. Apply chain-of-custody tape to the lid/bottle.

6. Carefully place sample containers in the cooler and package sample containers with blue ice.

7. Complete the Form 5215-1 Storm Water Sample Processing Log and Form 5215-2 Storm Water Sample Processing Form.

4.6 Submit Samples for Shipping

Sample Processor

1. Submit samples with original 5215-1 Storm Water Sample Processing Log to the Sample Management Office (WES-SMO) for shipping to the analytical laboratory in accordance with EP-ERSS-SOP-5057 Handling, Packaging, and Transporting Field Samples.

   The SMO accepts samples by signing the Form 5215-1 Storm Water Sample Processing Log.

   Retain a copy of Form 5215-1.

4.7 Clean Up

Sample Processor

1. After each sample in the Storm Water Processing Facility is processed, clean the area.

4.8 Waste Disposal

Sample Processor	1. Place used empty glass bottles in cardboard box, close the box with tape, and dispose of box in the dumpster. Carefully place any broken glass in the Broken Glass Box in the Storm Water Processing Facility.
	2. Seal contact waste in an appropriate sized baggie. Label with Site ID and date. Store in a satellite accumulation area prior to off-site disposal.
	3. Pour excess waste water in an appropriate sized waste water container based on a Hazardous/Non-Hazardous listing. Label container with Site ID and date and store in a satellite accumulation area prior to off-site disposal.
	4. If sample or contact waste is suspected to be contaminated with listed hazardous waste, store in a satellite accumulation area or a <90 day storage area for analysis prior to off-site disposal.

4.9 Submit Records Package

Sample Processor	1. Submit the copy of Form 5215-1 with the original Forms 5215-2 and 10013-1and any other pertinent documentation to the Process Control Coordinator.

5.0 RESULTING RECORDS

1. Submit the following documents generated from this procedure to the Records Processing Facility in accordance with EP-DIR-SOP-4004, Records Transmittal and Retrieval Process.
    - Form 5215-1 Storm Water Sample Processing Log
    - Form 5215-2 Storm Water Sample Processing Form

6.0 DEFINITIONS

None.

7.0 PROCESS FLOW CHART

None.

8.0 ATTACHMENTS

Attachment 1: Form 5215-1 Example of Storm Water Sample Processing Log

Attachment 2: Form 5215-2 Storm Water Sample Processing Form

Attachment 3: SOP-5215-3 Analytical Suite Prioritization at Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project

9.0 REVISION HISTORY

Revision No. *[Enter current revision number, beginning with Rev.0]*	Effective Date *[DCC inserts effective date for revision]*	Description of Changes *[List specific changes made since the previous revision]*	Type of Change *[Technical (T) or Editorial (E)]*
0	1/06	New document issued as ENV-WQH-SOP-066.0, "Filtering and Chemical Preservation of Water Samples."	T
0	3/9/2010	New document superseding and cancelling ENV-WQH-SOP-066.0. New process owner is ADEP; procedure issued as SOP-5215, "Processing Storm Water Samples".	T
1	July 2010	Minor edits and mention of MSGP storm water program.	E
2	3/18/2011	Minor edits; updated organization facility.	E
2.1	5/19/11	Minor edit; Updated reference to Form 10013-1 (Section 4.1, 4.2 and 4.9).	E
2.1 IPC-1	9/8/2011	Added guidance in Section 4.2.1 to include Attachment 3.	T

ATTACHMENT 1	
SOP-5215-1 Storm Water Sample Processing Log	Los Alamos NATIONAL LABORATORY EST. 1943

Los Alamos National Laboratory SMO 2

STORM WATER SAMPLE PROCESSING LOG

FIELD WO #: ES-4315	**SAMPLER No:** Los Alamos above Rio Grande	**SMA No:** E109.9
SAMPLER TYPE: DC	**FIELD QC TYPE:** NA	**SAMPLE MATRIX:** WM
LOCATION TYPE: WCS	**SAMPLE USAGE:** ENVSUR	

EVENT ID: 2749	**EVENT NAME:** ESR Snowmelt Sampling 2010
COLLECTION DATE/TIME: 5/24/2010 9:15:00 AM	**RETRIEVAL DATE/TIME:** 5/24/2010 9:15:00 AM

SAMPLE PROCESSING REQUEST

SAMPLE ID: WTESR-10-15729 **SAMPLE PREP:** UF

PRIORITY	ORDER CODE	CONTAINER TYPE	# of CONT.	PRESERVATIVE	SPECIAL INSTRUCTIONS	PROCESSING COMMENTS
	AMENDMENT		0	None		
	AMENDMENT		0	None		
0	SW-SSC	1 LITER POLY	1	Ice		
1	SW-Hardness	0.5 LITER POLY	1	Nitric Acid		
1	SW-Metals-Total	0.5 LITER POLY	1	Nitric Acid		
2	SW-D/F-1613B	1 LITER AMBER GLASS	2	Ice		
2	SW-PCB-1668A-MDL	1 LITER AMBER GLASS	2	Ice		
3	SW-AM241	1 LITER POLY	1	Nitric Acid		
3	SW-Gamma	1 LITER POLY	1	Nitric Acid		
3	SW-Gross Alpha	1 LITER POLY	1	Nitric Acid		
3	SW-ISOPU	1 LITER POLY	1	Nitric Acid		
3	SW-ISOU	1 LITER POLY	1	Nitric Acid		
3	SW-SR90	1 LITER POLY	1	Nitric Acid		

SAMPLE COMMENTS:

PROCESSED BY (Printed Name) (Signature)	**Date/Time**	**REVIEWED BY** (Printed Name) (Signature)	**Date/Time**
RELINQUISHED BY (Printed Name) (Signature)	**Date/Time**	**RECEIVED BY** (Printed Name) (Signature)	**Date/Time**
RELINQUISHED BY (Printed Name) (Signature)	**Date/Time**	**RECEIVED BY** (Printed Name) (Signature)	**Date/Time**

ATTACHMENT 1 (cont.)

SOP-5215-1 (cont.)

Storm Water Sample Processing Log
New Label Format

Los Alamos NATIONAL LABORATORY EST.1943

Los Alamos National Laboratory
Container: 0.5 LITER, POLY
WTESR-10-15726 1 of 1
Analysis: SW-Metals-Dissolved
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 1 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-Gross Alpha
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 1 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-AM241
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 0.5 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-Hardn
Preservativ Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 1 LITER, AMBER GLASS
WTESR-10-15729 1 of 2
Analysis: SW-D/F-1613B
Preservative: Ice
Date: 5/24/2010
Time: 9:15 A

os Alamos National Laboratory
Cont er: 1 LITER, POLY
TES R-10-15729 1 of 1
Analysis: SW-ISOPU
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Labor
Container: 1 LITER, AMBER LASS
WTESR-10-15729 of 2
Analysis: SW-D/F-1613B
Preservative: Ice
D e: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 1 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-ISOU
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 1 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-Gamma
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

Los Alamos National Laboratory
Container: 0.5 LITER, POLY
WTESR-10-15729 1 of 1
Analysis: SW-Metals-Total
Preservative: Nitric Acid
Date: 5/24/2010
Time: 9:15 AM

ATTACHMENT 2

SOP-5215-2

Storm Water Sample Processing Form

SOP5215 **Form 5215-2**

Storm Water Sample Processing Form

Field WO No. from Form 5215-1:

SMA No. from Form 5215-1:

Processing Personnel: Date/Time Sample Processed:

Sample ID from Form 5215-1:

Field sample container number(s) used for aliquot sent to analytical laboratory

ISCO Bottle #	Analytical Sample (Poly Bottles)	ISCO Bottle #	Analytical Sample (Glass Bottles)
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
18		18	
19		19	
20		20	
21		21	
22		22	
23		23	
24		24	

Single Stage Bottle Type:	Analytical Sample:

Note: Samples collected in ISCO samplers are collected sequentially (1-21 or 1-24). Aliquots transferred to other containers for shipment to analytical laboratory(s) will be transferred in this sequential order only. Preferably, a single sample bottle will be used for a single analytical bottle.
Note: "Topping off" of sample bottles to be shipped to analytical laboratory(s) with any remaining field sample is NOT allowed.

ATTACHMENT 3

SOP-5215-3

Analytical Suite Prioritization at Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project

Upper Los Alamos Canyon Gages	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
E026, E030, E038, E039.1, E040	1	PCBs	Yes	No	1
	2	Gamma, Iso Pu, Iso U, Am-241*	Yes	Yes	1
	3	Strontium-90	Yes	Yes	1
	4	Dioxins/Furans	Yes	No	1
	5	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	6	Gross Alpha	Yes	Yes	0.25
	7	Cyanide*	Yes	Yes	0.25

IPC-1

Upper Pueblo Canyon Gages	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
E055, E055.5, E056	1	PCBs	Yes	No	1
	2	Iso Pu	Yes	Yes	1
	3	Dioxins/Furans	Yes	No	1
	4	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	5	Gross Alpha	Yes	Yes	0.25

Lower Watershed Gages	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
E042.1, E050.1, E059, E060.1, E109.9	1	PCBs	Yes	No	1
	2	Gamma, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Strontium-90	Yes	Yes	1
	4	Dioxins/Furans	Yes	No	1
	5	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	6	Gross Alpha/Gross Beta	Yes	Yes	0.25
	7	Radium-226/Radium-228	Yes	Yes	2
	8	Cyanide*	Yes	Yes	0.25

ATTACHMENT 3 (cont.)

SOP-5215-3

Analytical Suite Prioritization at Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project

Retention Basin and Wetland below the SWMU 01-001(f) Drainage	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
CO111041, CO101038	1	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	2	PCBs	Yes	No	1
	3	Iso U	Yes	Yes	1
	4	Total organic carbon	Yes	Yes	0.04
	5	Gross Alpha/Gross Beta	Yes	Yes	0.25

IPC-1

Graduation Canyon below SWMU 00-019	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
CO115002	1	TAL Metals + B + U (F/UF)	No	Yes	0.25/0.25
	2	PCBs	Yes	No	1
	3	Iso U	Yes	Yes	1
	4	Total organic carbon	Yes	Yes	0.04
	5	Gross Alpha/Gross Beta	Yes	Yes	0.25

* Americium-241 and cyanide are analyzed in response to the Las Conchas fire.