DEVELOPING AN EFFECTIVE SAMPLING PROGRAM

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WHY IS A SAMPLING PLAN IMPORTANT?

- Required by the permit!
- Generates **data** to determine if BMPs and site pollution control activities are adequate to reduce/remove pollutants
- Stormwater sampling **data** has the greatest potential impact on permit compliance and consequences!

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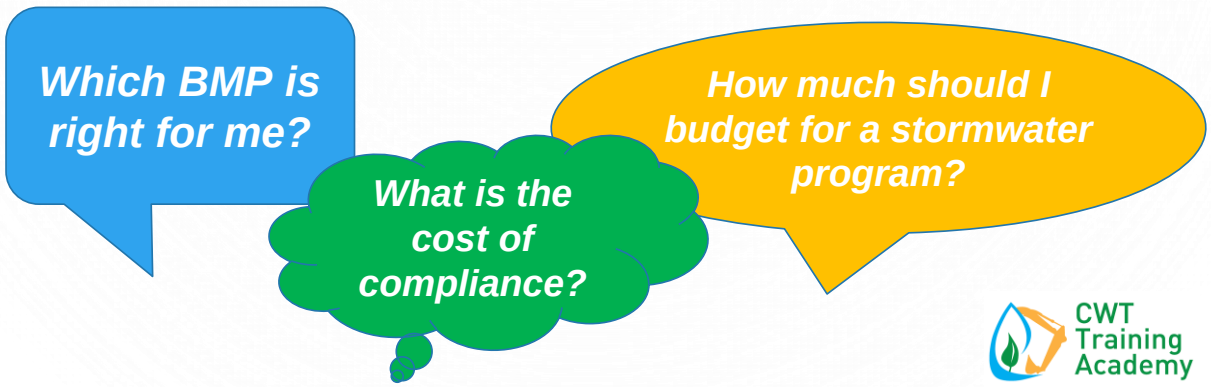
Sampling data influences your stormwater program more than any other element.



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YOUR SAMPLING PROGRAM

CONTROL THE CONTROLLABLES!

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WHAT CREATES GOOD SAMPLING DATA?

- Good Sampling Procedures
  +
- Good Sample Handling
  +
- Good Laboratory Procedures
  +
- Good Sampling Plan

_____

= a Good Sampling Program!

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7 STEP SAMPLING PROGRAM

- Step #1: Identify Sample Pollutants
- Step #2: Select a Laboratory Partner
- Step #3: Pinpoint Sampling Locations
- Step #4: Create a Sampling Plan
- Step #5: Obtain Sampling Supplies
- Step #6: Determine Sample Timing and Collect Samples
- Step #7: Ensure Proper Recordkeeping and Reporting

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Step 1

Know what to sample

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KNOW THE DIFFERENCE BETWEEN:

Benchmark

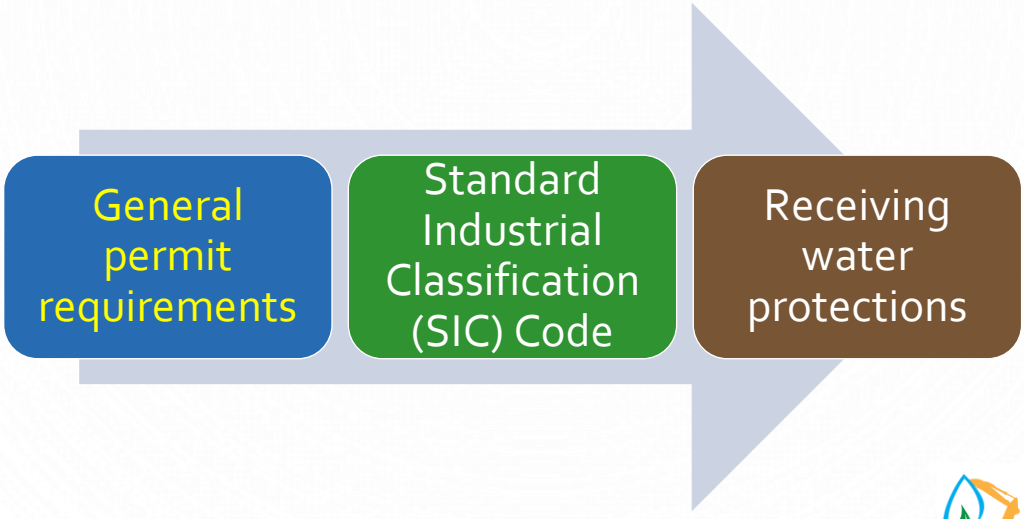
- An indicator value
- Triggers corrective action with BMPs within prescribed timeframe
- Allows for adaptive management

Effluent limit (limit) or numeric standard

- A health-based limit
- A line in the sand that if crossed is a violation of water quality
- Requires immediate response

8

3 DRIVERS DETERMINING WHAT YOU SAMPLE FOR



GENERAL POLLUTANT PARAMETERS

- Based on commonly found materials or pollutants in industrial 1200A discharge; therefore, applicable to ALL facilities
- Permit pollutant thresholds are '**benchmarks**', which indicate contamination, and are a level above which it is considered likely to cause a water quality violation
- Exceedances of these benchmarks require corrective actions
- If corrective actions are taken properly, will not result in violation

1200A REQUIRED BENCHMARKS

The benchmarks in Table 1 **apply to each point source discharge** associated with the industrial activity, with the following exceptions:

a. Uncommingled mine dewatering water from industrial sand facilities are not subject to TSS and pH benchmarks.

b. Uncommingled mine dewatering water from construction sand and gravel and crushed stone facilities are not subject to pH benchmarks.

Table 1. Statewide Benchmarks Parameter Benchmark

pH	5.5 – 9.0 SU
Total Suspended Solids	100 mg/L
Settleable Solids	0.20 ml/L
Total Oil & Grease	10 mg/L

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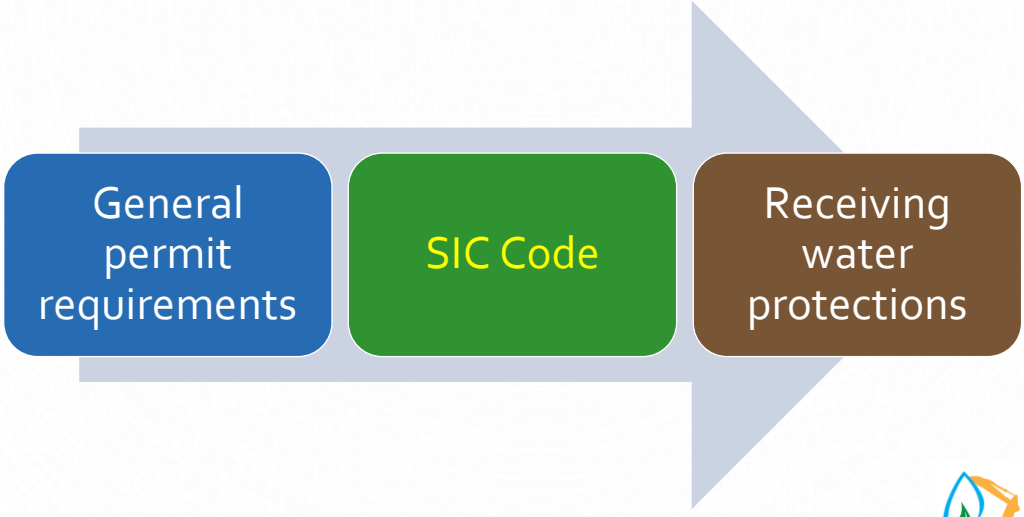
3 DRIVERS DETERMINING WHAT YOU SAMPLE FOR



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STEP #1: IDENTIFY SAMPLE POLLUTANTS

12

1200A REQUIRED EFFLUENT LIMITS

SIC Codes Affected:

- Sand Facilities 1446,
- Sand and Gravel 1442,
- Stone 1423 & 1429

Effluent Limits for Uncommingled Mine Dewatering Discharges from Industrial Sand Facilities

pH	6.0 – 9.0 SU	
Total Suspended Solids	45 mg/L (1 day)	25 mg/L (30 day average)

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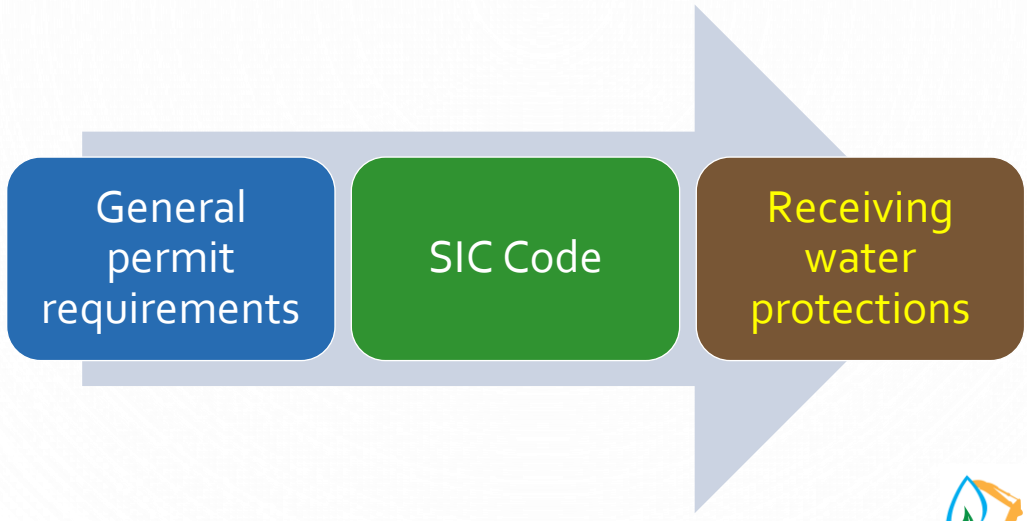
3 DRIVERS DETERMINING WHAT YOU SAMPLE FOR



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STEP #1: IDENTIFY SAMPLE POLLUTANTS

14

IMPAIRMENT POLLUTANTS

- Aldrin
- Heptaclor
- Arsenic & Arsenic (tri)
- Iron
- Lead
- Chlordane
- Mercury
- Copper
- Zinc
- PCBs (Batch plant operators only)
- PAHs
- DDT & DDT Metabolite (DDE)
- Temperature (uncommingled mine dewatering discharges only)
- Dieldrin

STEP #1: IDENTIFY SAMPLE POLLUTANTS

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PARTS PER BILLION!

1 microgram (µg) = 1/1,000,000 gram = 0.000001 gram

A µg/L analogies would be:

- one silver dollar in roll stretching from Detroit to Salt Lake City,
- one sheet in a roll of toilet paper stretching from New York to London,
- one second in nearly 32 years,
- one pinch of salt in 10 tons of potato chips, or
- one drop of ink in one of the largest tanker trucks used to haul gasoline would be an ink concentration.

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Step 2

Find a Lab Partner

17

STEP #2: SELECT A LABORATORY PARTNER

- Only samples analyzed by a certified laboratory will satisfy permit requirements
- Additionally, only samples analyzed using approved methodologies will satisfy permit requirements
- The laboratory may be able to provide much of the prep work for sampling
- Therefore: A laboratory partner is a critical element to success!

STEP #2: SELECT A LABORATORY PARTNER

18

HOW TO DETERMINE A GOOD LAB

- Verify accreditation status
- Obtain detection and reporting limits and compare to requirements
- Visit the laboratory to inspect for cleanliness and build relationships with staff members
- Ask any and all questions before committing to sampling
- Are they using the right instrumentation?

STEP #2: SELECT A LABORATORY PARTNER

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GO VISIT THE LAB

- Hours of operation
- Clean
- Helpful
- Capable

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THINGS TO DISCUSS WITH THE LAB

- Confirm that they are accredited
- Confirm the type and size of sample bottles
- How full to fill the bottles
- Safety concerns
- Sample bottle labels
- Chain of custody documents
- How to obtain bottles and sample cooler
- Holding times for the samples
- When you will deliver the samples to the lab
- Ask for a cost estimate

Consider The Lab A Part Of Your Program!

Step 3

Identify Representative Sample Location(s)

Key Term

Representative

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STEP #3: PINPOINT SAMPLING LOCATIONS

- Permits require that all ‘discharge points’ be accounted for in monitoring program

- **Discharge point:** a point at which surface water sheetflows or passes through the stormwater conveyance system and exits the property

- Discharge points may not be the exact same place as sampling points; however, it must be clearly documented and justified in site SWPPPs and other documents how sampling locations were determined

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WHERE TO GET A SAMPLE?

- Requires understanding conveyance system (discharge vs Sampling; substantially identical)
- Location representative of site discharge
- Collected from flowing or cascading water
- Collected from end of pipes
- Collected downstream of all site BMPs
- Collected where it's safe to do so!

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OBTAINING REPRESENTATIVE SAMPLES

Examples of non-representative samples:

- Ditch carrying stormwater from off site property onto yours
  Water could be impacted by neighboring property activity (co-mingling)
- Pipe or culvert discharging underwater in a creek
  Water is diluted and not representative of your discharge
- Manhole drain that carries stormwater from another facility
  Water could be impacted by neighboring property activities
- Sampling location is commingled with dewatering water
  Water is not representative if stormwater discharge

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OBTAINING REPRESENTATIVE SAMPLES

Always sample **downstream of** your detention pond or other site BMPs!

These systems are in place to control pollutants!

STEP #3: PINPOINT SAMPLING LOCATIONS

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Step 4

Make a plan

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STEP #4: CREATE A SAMPLING PLAN

Developed from information compiled during SWPPP creation

- Why – SIC code requirements, TMDL or local authority-driven parameters
- What – Identified parameters and associated benchmarks or limits
- When – Routine monitoring and corrective action-driven frequencies
- Where – Defined sampling points
- How – Sample collection protocol, EPA methodologies, and lab handling, shipping and processing procedures

A FEW COMPONENTS OF A GOOD PLAN

- Uniquely identify each point of discharge and to where they discharge
- Identify personnel dedicated to sampling & Lab Info
- Equipment handling, cleaning and storage
- Forms, checklists, and instructions
- Narrative of activity conducted and BMPs in drainage area
- Justification for non sampled discharge points
  - “Substantially identical”

Step 5

Obtain Sampling Supplies

31

STEP #5: OBTAIN SAMPLING SUPPLIES

- Obtain A “kit” from laboratory
  - Sample bottles, proper gloves, ziplock bags, bubble wrap to protect bottles, COC, etc.
- Site specific sampling plan
- Develop a checklist for sampling
- Site map with all sampling locations identified
- Cooler and “bagged ice” for sample bottles
- Obtain a field sampling notebook (bound pages)
  - Record all observations in this notebook

STEP #5: OBTAIN SAMPLING SUPPLIES

- Foul weather gear
- Permanent ink markers (sharpies)
- Extension pole for grab sampling
- Gloves are important (powder free)!
  - Vinyl class100 gloves - metals
  - Nitrile gloves – other parameters

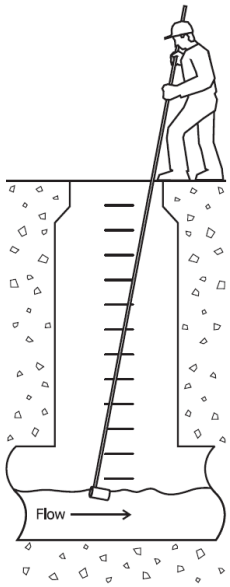
TYPICAL SAMPLING EQUIPMENT

- Bottles based on parameters
- Paperwork
  - Chain of Custody
  - Sample log
- Gloves
- Labels
- Temp check bottle

ASSIST SAMPLING EQUIPMENT

Some equipment depends on sample type:

- Dipping using sample container
- Scoops
- Peristaltic pumps
- Discrete depth samplers
- Bailers
- Buckets
- Automatic samplers



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STEP #5: OBTAIN SAMPLING SUPPLIES

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BE PREPARED TO SAMPLE

- Storm events come with little advanced notice
- Have your map of site and sampling locations
- Develop plan for the order you will take samples from each sample location
- Fill out sample bottle labels for each sampling location
- Get all of your supplies in cooler so they are easily mobile
  - Suggest coolers (rugged, easy to carry, protected from rain)
  - Store all gloves and other supplies in sealable bags

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STEP #5: OBTAIN SAMPLING SUPPLIES

36

Step 6

Collect the sample

37

Stormwater sampling is challenging

- You don’t have control over when it rains!
- Time difference between start of storm and discharge?
- Hours of operation.

38

DIFFERENCE: STORM EVENT AND “DISCHARGE”

Storm event / Rain event = some measurement of precipitation

Example: You turn on your windshield wipers

Discharge / Runoff = stormwater leaving your permit boundary via sheetflow or through stormwater system

STEP #6: DETERMINE TIMING (AND COLLECT!)

Permit will dictate sample timing for the most part

- During operational hours
- Sampling Semesters:
  - Jul 1 – Dec 31 of this yr and
  - Jan 1- Jun 30 of following yr

Early enough in semester to average down if needed

1200A Monitoring Frequency

- Stormwater – w/in first 12 hrs of discharge event
- Mine dewatering – during times of discharge

Table 5: Monitoring Frequency

Pollutant Category	Minimum Frequency
Benchmarks	Four times per year at least 14 days apart. Two samples on or before Dec. 31 and two samples on or after Jan. 1.
Impairment Pollutants, if applicable	Two times per year at least 14 days apart One sample on or before Dec. 31 and one sample on or after Jan. 1.
Effluent Limits	Four times per year at least 14 days apart.

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ONSITE WEATHER CENTER

You may want to have your own onsite rain gauge or weather station

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VISUAL SAMPLING

STEP #6: DETERMINE SAMPLE TIMING (AND COLLECT!)

43

Types of sampling

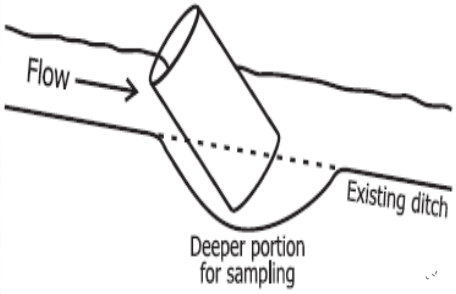
- Visual sampling

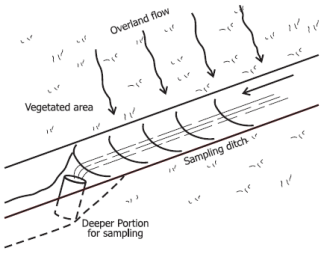
- Color;
- Odor;
- Clarity (diminished);
- Floating solids;
- Settled solids;
- Suspended solids;
- Foam;
- Litter/trash;
- Oil sheen; and
- Other obvious indicators of stormwater pollution.

STEP #6: DETERMINE SAMPLE TIMING (AND COLLECT!)

44

PREP THE SAMPLE LOCATION AHEAD OF TIME





- Safety!
- Avoid contact with the bottom of the sampling location
- Place bottle opening upstream when collecting sample

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STEP #6: DETERMINE SAMPLE TIMING (AND COLLECT!)

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Make sure the Sampler is not identified in the analytical results

Clean sampling techniques ensure nothing the sampler is wearing, breathing, holding, or has touched ends up in the collection jar.

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GLOVES AND SAMPLE HANDLING

- Accessing the sample location:
  - Non-slip
  - Removing grates
  - Clearing vegetation

- Collecting the sample:
  - Correct size
  - Nitrile or vinyl
  - No powder
  - Single use only

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GENERAL GOOD SAMPLING PRACTICE

- Sample where the water has a moderate flow and is well-mixed.
- Sample from a central portion of the stormwater flow, avoiding touching the bottom of channels or pipes to avoid stirring up solid particles.
- Hold bottle with opening facing upstream to avoid contamination
- Do not overfill the bottles, especially those with preservative.
- As soon as the sample is collected, cap the bottle and label it.

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GOOD SAMPLE COLLECTION

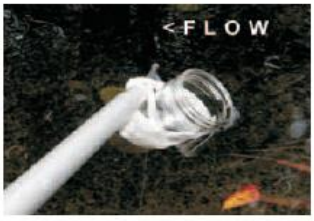
PROPER / IMPROPER METHOD FOR SAMPLING

DO *always wear gloves when taking samples.*

DO NOT *touch openings of bottles. Keep bottles clean to prevent contamination.*

DO NOT *allow bottle lids to touch ground. Keep lids clean to prevent contamination.*

DO NOT *sample with the bottle opening facing downstream, when using a pole or sampling by hand. Water flowing past your container, pole, or hand and into the container can be contaminated by such contact.*



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Field Instruments

Where field and lab staff work together for good data

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SAMPLE HANDLING - PH

- **Hold time: 14 minutes**
- MUST be performed in field
  - Calibration Log
  - pH Meter

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Step 7

Paperwork and Reporting

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STEP #7: PROPER RECORDKEEPING AND RECORDING

- Each sampling event will generate lots of records and documentation
- Each permit has requirements for when and how to report all this information
- Paperwork should always be generated at the actual time of sampling to demonstrate that the sample was collected within the defined permit timeline requirements
- Paperwork should never be filled out retroactively!

3 IMPORTANT SAMPLING DOCUMENTS

1. Sample log for each monitoring location
2. Bottle labels for every bottle
3. Chain of custody for all the bottles in a sampling event

SAMPLING LOGS

Sample log information should include:

- The date, exact place (monitoring point identification), and time of monitoring, sampling or measurements;
- The individual(s) who performed the monitoring, sampling or measurements;
- The date(s) analyses were performed;
- Previous and current weather conditions
- BMP assessment;
- The analytical techniques or methods used to process the samples;
- The results of any visual or onsite analyses performed; and
- Signature of verification that the information is “true, accurate and complete”.

STEP #7: ENSURE PROPER RECORDKEEPING & RECORDING

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BOTTLE LABEL

- Assigns a sample name
- Identifies the Sample Location
- Sample date and time
- Person how collected the sample
- Often times the sample parameter
- Preservative (if included)

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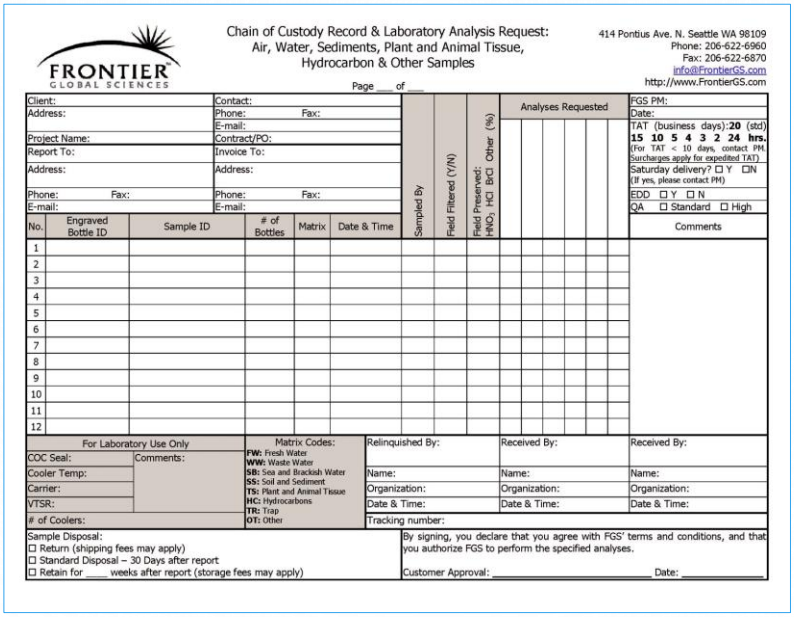
CHAIN OF CUSTODY



FRONTIER GLOBAL SCIENCES

Chain of Custody Record & Laboratory Analysis Request:
Air, Water, Sediments, Plant and Animal Tissue,
Hydrocarbon & Other Samples

Page ___ of ___

414 Pontius Ave. N. Seattle WA 98109
Phone: 206-622-6960
Fax: 206-622-6870
info@FrontierGS.com
http://www.FrontierGS.com

Client:	Contact:		FGS PM:
Address:	Phone: Fax:		Date:
	E-mail:		TAT (business days): **20** (std) **15 10 5 4 3 2 24 hrs.** (For TAT < 10 days, contact PM. Surcharges apply for expedited TAT)
Project Name:	Contract/PO:		Saturday delivery? ☐ Y ☐N (If yes, please contact PM)
Report To:	Invoice To:		EDD ☐ Y ☐ N
Address:	Address:		QA ☐ Standard ☐ High
Phone: Fax:	Phone: Fax:		
E-mail:	E-mail:		

No.	Engraved Bottle ID	Sample ID	# of Bottles	Matrix	Date & Time	Sampled By	Field Filtered (Y/N)	Field Preserved: HNO3 HCl BrCl Other (%)	Analyses Requested	Comments
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

For Laboratory Use Only		Matrix Codes:	Relinquished By:	Received By:	Received By:
COC Seal:	Comments:	**FW:** Fresh Water **WW:** Waste Water **SB:** Sea and Brackish Water **SS:** Soil and Sediment **TS:** Plant and Animal Tissue **HC:** Hydrocarbons **TR:** Trap **OT:** Other	Name:	Name:	Name:
Cooler Temp:			Organization:	Organization:	Organization:
Carrier:			Date & Time:	Date & Time:	Date & Time:
VTSR:			Tracking number:		
# of Coolers:					

Sample Disposal:
☐ Return (shipping fees may apply)
☐ Standard Disposal – 30 Days after report
☐ Retain for ___ weeks after report (storage fees may apply)

By signing, you declare that you agree with FGS' terms and conditions, and that you authorize FGS to perform the specified analyses.

Customer Approval: _____ Date: _____

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CHAIN OF CUSTODY

- Engraved Bottle ID – The FGS bottle number provided on the sampling container
- Sample ID – A unique sample identifier for your sample(s)
- N of Bottles – The total number of bottles submitted for each sample

No.	Engraved Bottle ID	Sample ID	# of Bottles	Matrix	Date & Time
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Matrix Codes:
FW: Fresh Water
WW: Waste Water
SB: Sea and Brackish Water
SS: Soil and Sediment
TS: Plant and Animal Tissue
HC: Hydrocarbons
TR: Trap
OT: Other

Matrix of the sample being submitted. Stormwater samples are submitted with a matrix code of Waste Water

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STEP #7: ENSURE PROPER RECORDKEEPING & RECORDING

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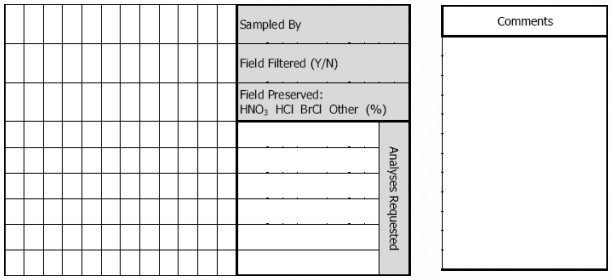
CHAIN OF CUSTODY

- Sampled By – the initials of the person collecting the samples
- Field Filtered – for dissolved analyses, indicate if the samples were filtered in the field
- Field Preserved – indicate the preservation of the sampling containers
- Comments – include any specific sample requirements



STEP #7: ENSURE PROPER RECORDKEEPING & RECORDING

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CHAIN OF CUSTODY

Client Contact, Reporting & Invoicing Information:

- Address, phone number and email are required for data reporting
- The project name is used to identify your project in our database
- If the invoice should be sent to a different person, include the address, phone number and Contract/PO number (if required) for invoicing

Client:	Contact:
Address:	Phone: Fax:
	E-mail:
Project Name:	Contract/PO:
Report To:	Invoice To:
Address:	Address:
Phone: Fax:	Phone: Fax:
E-mail:	E-mail:

STEP #7: ENSURE PROPER RECORDKEEPING & RECORDING

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CHAIN OF CUSTODY

- To satisfy these custody provisions, the laboratory follows the following procedures:
  - Samples are stored in a secure area
  - Laboratory doors are locked at all times
  - Non-frequent visitors are always accompanied by a member of the laboratory staff
  - Samples remain in the secure area until time for disposal or until returned to the client

Relinquished By:	Received By:	Received By:
Name:	Name:	Name:
Organization:	Organization:	Organization:
Date & Time:	Date & Time:	Date & Time:
Tracking number:		

CUSTOMIZE ALL DOCUMENTS

- Visual inspection forms
- Sample Documentation Forms
- Pre fill out Chain of Custody and Bottle Labels
  - Have multiple copies
- Shipping Labels
- Other Documents for Record:
  - Print out weather report
  - Use a camera

YOUR SAMPLING PROGRAM

Each site and/or sample location may have different sampling procedures and equipment.

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YOUR SAMPLING PROGRAM

Good sample plan requires

- Knowing what to sample
- When to sample
- How to properly collect the sample
- Clean sample handling
- Accurate sample processing
- Understanding the data

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64

Questions?

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65