

Field Quality Control Guidance

Maine Department of Environmental Protection

ME LUST Program

Standard Operating Procedure: Field Quality Control
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Approval:

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date



1.0 APPLICABILITY:

MEDEP LUST Program is responsible for the investigation and remediation of petroleum contaminated sites throughout Maine. Fieldwork for this program may include initial investigation of a reported spill, routine monitoring of an established site, or collecting samples that will be used to support a decision to close a site. The level of quality control needed to meet the needs for the sampling event should be established prior to fieldwork. This SOP is applicable to all phases of LUST Program field sampling.

2.0 PURPOSE

The purpose of this document is to describe the Maine Department of Environmental Protection, LUST Program guidance for collecting and evaluating field quality control samples.

3.0 DEFINITIONS

- 3.1 GRO: Gasoline Range Organics
- 3.2 VOC: Volatile Organic compounds
- 3.3 LUST: Leaking underground storage tanks
- 3.4 RPD: Relative percent difference, a measure of precision

4.0 RESPONSIBILITIES

All MEDEP LUST Program staff will follow the procedures outlined in this SOP for the collection and evaluation of quality control samples. The project scientist for a site is generally responsible for field quality control, with input from appropriate staff. Their respective supervisors and managers are responsible for ensuring that they are familiar with and adhere to this procedure, and receive the appropriate training and guidance to conduct fieldwork.

5.0 FIELD QUALITY CONTROL GUIDANCE

5.1 Requirements for Quality Control Sample Collection:

Requirements for collection of field quality control samples will depend on the type of site and what data will be used for. Section 5.2 contains general guidelines. Specific requirements should be included in a site work plan as necessary.

For sites that do not require a specific site work plan section 5.2 guidelines should be followed for sampling events that will be used for key project decisions, site closure, and for sampling events used for site monitoring when multiple sample locations are to be sampled.

For occasional sampling including preliminary investigations and routine monitoring of small sites [less than 10 samples] quality control samples are not routinely



required. However, if questions of data quality are raised, confirmation sampling should be undertaken that includes the appropriate quality control samples.

5.2 Collection and Evaluation Procedures:

5.2.1 **Trip Blanks** are taken when sampling for GRO or VOC to ensure that routine sample handling procedures including sample bottle contamination issues do not lead to false positive analyses. One trip blank should be taken to each sampling event/ site.

A trip blank is organic free water placed in sample bottles prior to a site visit. Typically laboratories supply the appropriate trip blank. The trip blank is then transported to the site along with sample bottles, and ultimately back to the laboratory for analysis. Trip blanks must be properly labeled, but are not included as samples on the chain of custody form.

Trip blanks are analyzed when field blank samples indicate a problem, or if field blanks are not collected. Analysis of the trip blank in conjunction with a field blank or equipment blank will help determine where a sample contamination problem originates.

Trip blanks should not contain any analytes of interest at or above the quantitation limit of the test. If trip blank contamination is documented, all positive sample results are suspect, and depending on the level of contamination, may require re-sampling.

5.2.2 **Field blanks** are taken when sampling for all analyses to ensure site conditions do not lead to false positive analyses. One field blank should be taken for each batch of up to 20 samples during a sampling event when taken. Often field blanks are not taken for field events that involve samples from a variety of locations since site conditions at one location may be different from other locations. Field blanks should be taken according to the judgement of the project scientist. Generally if solvent odors are present field blanks should be taken for VOC.

To collect field blanks, analyte free water must be transported to the field, and poured into appropriate sampling bottles on-site. Field blanks should be properly labeled, and identified on the chain of custody record. They are analyzed as samples by the analytical laboratory.

Field blanks should not contain any analytes of interest at or above the quantitation limit of the test. If field blank contamination is documented, all positive sample results are suspect, and depending on the level of contamination, may require re-sampling. Field blank contamination also triggers analysis of the trip blank.

5.2.3 **Equipment Blanks:** When sampling equipment, such as bailers, pumps with tubing, hand augers, etc. is used to collect samples, an equipment blank is collected to assess decontamination procedures for the equipment. One



equipment blank should be taken for each batch of up to 20 samples during a sampling event.

Equipment blanks are not necessary when using dedicated or disposable equipment unless contamination from the constituent materials is suspected.

Equipment blanks should be properly labeled, and identified on the chain of custody record. They are analyzed as samples by the analytical laboratory.

Equipment blanks should not contain any analytes of interest at or above the quantitation limit of the test. If equipment blank contamination is documented, all positive sample results are suspect, and depending on the level of contamination, may require re-sampling.

- 5.2.4 **Field Duplicates** are taken to assess precision in the field. One field Duplicate should be taken for each batch of up to 20 samples during a sampling event.

When taking aqueous samples, the field duplicate should be taken directly after the sample using the appropriate sample container.

When taking soil samples, GRO and VOC duplicates should be "co-located" that is taken from soil immediately adjacent to where the sample was taken. Other types of samples can be composited. To take composite samples, place enough soil into a container [plastic for metals, and stainless steel for everything else] for both the sample and the duplicate. Mix thoroughly, and fill the appropriate sample containers.

Samples should be labeled and included on the chain of custody record.

Evaluate results by calculating the RPD between the sample and duplicate.

$$RPD = 100 \times (|S - D| / ((S + D)/2));$$

where: S is the sample concentration; and
 D is the duplicate concentration.

Water samples should be within 30% RPD and soil samples should be within 50% RPD. If overall precision is outside criteria, laboratory precision should be evaluated to help determine whether this represents a sampling or analysis issue. Sampling precision should be included in an overall analysis of data quality. If sample results are close enough to a site action level, and will be used to make decisions about closing a site, re-sampling may be indicated. Field duplicate precision information should be included in any data evaluation reports.

- 5.2.5 **Matrix Spikes** and matrix spike duplicates are not required field samples, but are useful to assess matrix interference for the site. Matrix spikes are



not used for GRO in groundwater, and are most useful for soil samples. These samples should be collected at the discretion of the project scientist, or according to criteria set up in a site work plan. Note that matrix spike and spike duplicates are required for SW846 solid waste methods such as 8260/8270.

For the field sampler matrix spike and matrix spike duplicate collection entails providing enough of the sample so the laboratory can analyze three samples [the sample, a matrix spike, a matrix spike duplicate].

Matrix spike and spike duplicate samples are evaluated by the laboratory for accuracy [percent recovery], and also for precision [RPD]. Criteria used to evaluate these samples are found in the appropriate analytical method.

5.3 Sample Preservation Issues:

- 5.3.1 All samples should be preserved according to guidelines included in Attachment 1 whenever possible. These guidelines should be strictly met for all sampling events that will be used for key project decisions, site closure, and for sampling events used for site monitoring when multiple sample locations are to be sampled.
- 5.3.2 It is recognized that due to unforeseen circumstances some samples may need to be taken without proper refrigeration. In these cases, samples should be transported to a lab or an office refrigerator within 4 hours of collection. Sample results that will be most affected by this deviation from guidelines are those for VOC or GRO. In cases where samples are not properly chilled in the field, data quality issues should be evaluated based on sample temperature, time not under refrigeration and use of the data. If data quality does not support project data quality objectives, confirmation sampling may be required.

6.0 REFERENCES

Test Methods for Evaluating Solid Waste, SW 846, third edition, Chapter 1; USEPA, final update III, December 1996

Attachment 1: SAMPLING CRITERIA FOR METALS AND ORGANIC COMPOUNDS

Organics

Test	Method ¹	Sample Size	Type Container	Preservative	Hold Time	Notes
GRO (water)	ME 4.2.17	2-40 ml	G, TLS ³	cool, 4 C, HCl pH<2	14 Days	trip blank may be needed
GRO (soil)	ME 4.2.17	2-40 ml or 60 ml	G, TLS ³	Methanol & cool, 4 C -or- freeze samples without methanol	14 Days	see GRO in Soil SOP
DRO (water)	ME 4.1.25	1L	Amber G, TLS ³	cool, 4 C; HCl or sodium bisulfate	7 Days extraction	minimize plumbing grease contamination
DRO (soil)	ME 4.1.25	200g	G, TLS ³	cool, 4 C	14 Days extraction	
SVOC (water)	3510C or 3520C/ 8270C	1L	Amber G, TLS ³	cool, 4 C	7 Days extraction	Extra bottles for MS/MDS; minimize phthalate contamination
SVOC (soil)	3540C or 3541/ 8270C	200g	Amber G, TLS ³	cool, 4 C	14 Days extraction	
PCB in water	3510C or 3520C/ 8082	1L	Amber G, TLS ³	cool, 4 C	7 Days extraction	Extra bottles for MS/MDS;
PCB in soil	8082	200g	Amber G, TLS ³	cool, 4 C	14 Days extraction	3550B extraction may be used with caution
Pesticides in water	3510C or 3520C/ 8081A	1L	Amber G, TLS ³	cool, 4 C	7 Days extraction	Extra bottles for MS/MDS;
Pesticides in soil	3540C or 3541/ 8081A	200g	Amber G, TLS ³	cool, 4 C	14 Days extraction	3550B extraction may be used with caution
Herbicides in water	8151A	1L	Amber G, TLS ³	cool, 4 C	7 Days extraction	Extra bottles for MS/MDS;
Herbicides in soil	8151A	200g	Amber G, TLS ³	cool, 4 C	14 Days extraction	
Volatiles (water)	5030/ 8260B 524.2 [DW]	2-40 ml vials	G, TLS ³	cool, 4 C [8260 only] cool, 4 C, HCl pH<2	7 Days 14 Days	Extra bottles for MS/MDS; trip blank may be needed dechlorinate as needed prior to addition of HCl
Volatiles (soil)	5035/ 8260B	3 samples	encore sampler	cool, 4 C	48 hours	Extra bottles for MS/MDS; extra sample for % solids
or	5035/ 8260B	3-40 ml vials, 5g in each vial	G, TLS ³	cool, 4 C; sodium bisulfate soln. in 2 vials and methanol in 1 vial	14 days	Extra bottles for MS/MDS; acetone may be artifact extra sample for % solids
or	8260B	3-40 ml vials	G, TLS ³	freeze	14 days	Extra bottles for MS/MDS; 5g in each vial extra sample for % solids

Attachment 1: SAMPLING CRITERIA FOR METALS AND ORGANIC COMPOUNDS

Metals

Test	Method ¹	Sample Size	Type Container	Preservative	Holding Time	Notes
Dissolved metals	6010B, 6020 or 7000 series	1 L	cube cont.	HNO ₃ to pH<2	6 Mos.	Filter on site
Total metals in water	6010B, 6020 or 7000 series 200.7, 200.8, & 200.9 for drinking water	1 L	cube cont.	HNO ₃ to pH<2	6 Mos.	For RCRA 8 1L includes mercury
Total metals in soil	6010B, 6020 or 7000 series	200g	Whirlpack	none	6 Mos.	
Dissolved Mercury	7470A	1 L	cube cont.	HNO ₃ to pH<2	28 Days	Filter on site
Total Mercury in water	7470A 245.1 [DW]	1 L	cube cont.	Cool 4 C ; HNO ₃ to pH<2	28 Days	
Total Mercury in soil	7471A	200g	Whirlpack	Cool 4 C	28 days	

TCLP

Test	SW 846 Method	Sample Size	Type Container	Preservative	Holding Time
TCLP-VOC	1311/ 8260B	4 oz	G, TLS ³	cool, 4 C	NA
TCLP-Metals	1311/ 6010B or 7000 series	4 oz	G	none	NA
TCLP – herbicides	1311/8151	1 L	G, TLS ³	cool, 4 C	NA

MISC.

Test	SW 846 Method	Sample Size	Type Container	Preservative	Holding Time
Reactive Sulfide & Reactive Cyanide	SW846 Chapter 8 section 3	2- 4 oz jars	G	none	NA
Flash point	1010, 1020A	4 oz	G, TLS ³	cool, 4 C	NA
pH ²	9040A, 9041A, 9045B for soil	4 oz	G	none	NA
Maine Waste Oil Parameters ⁴		2 4 oz amber jars	G, TLS ³	none	NA

Notes:

1. Sw 846 methods, except as noted
2. For situations where the material is very light (e.g. fly ash, feathers, etc.) please provide more material than a 4-oz jar.
3. TLS = Teflon lined cap
4. Maine Waste Oil Parameters include PCBs, flash point, total Halogens, arsenic, cadmium, chromium, and lead