



Soil Sampling Requirements for Volatile Organics in Land Quality Programs

Policy Number: DEQ15-LQ-0053-QAG Ver 1.1	
Effective Date: 10/21/2015	Next Scheduled Revision Date: 10/21/2020
Approval: Bruce Gilles (Authorization on file)	Title: Manager, Cleanup and Emergency Response Program

Intent/ Purpose/ Statement of Need	<p>This policy clarifies implementation requirements for sampling and analysis of Volatile Organic Compounds in soil samples as discussed in OARs 150 and 122.</p> <p>Disclaimer: This policy is intended solely as guidance for DEQ employees. It does not constitute rulemaking by the Environmental Quality Commission and may not be relied upon to create an enforceable right or benefit, substantive or procedural, enforceable at law or in equity, by any person. With written managerial approval, DEQ employees may deviate from this directive. DEQ anticipates revising this directive from time to time as conditions warrant.</p>
Authority	ORS 465.315, OAR 340-122, OAR 340-150.
Applicability	Applicable to Land Quality Programs that perform soil sampling for analysis of Volatile Organic Compounds (VOCs) including Underground Storage Tanks Programs (UST/LUST), Heating Oil Tanks Program(HOT), , Environmental Cleanup Program including brownfields, and Hazardous Waste Program.
POLICY	<p>(1) Soil samples collected for the analysis for Volatile Organic Compounds (VOCs) must be collected in conformance with US EPA SW-846 Update III, Revised May 1997 (EPA Method 5035) or US EPA SW-846, July 2002 (EPA Method 5035A)</p> <p>(2) The preferred sampling containers for VOCs in soils are specifically designed for this purpose and referred to as VOA vials.</p> <p>(3) Soil samples collected in VOA vials for purposes of analyzing VOCs should be preserved in the field according to one of the options in Method 5035A Table A.1. If the samples cannot be preserved in the field, the laboratory must analyze the samples or preserve the samples as set forth in Method 5035A Table A.1 within 48 hours from the time of collection. Once preserved, the analytical holding time is 14 days from the time of collection.</p> <p>(4) Samples collected in containers other than VOA vials for purposes of analyzing for VOCs, such as glass wide mouth jars or brass sleeves (and approved by the DEQ project manager) must be kept on ice from the time of sampling until the time of delivery to the laboratory. The laboratory must analyze the samples or subsample and preserve the samples as set forth in Method 5035A Table A.1 within 48 hours from the time of collection. Once subsampled and preserved, the analytical holding time is 14 days from the time of collection.</p> <p style="padding-left: 40px;">(a) No subsamples (e.g. for other analyses) may be removed from the sample container before the subsamples are removed for the VOC analysis.</p>

	<p>(b) Once subsamples have been removed from soil samples in a jar or sleeve, additional subsamples cannot be used for subsequent analyses for VOC testing due to potential loss of target analytes. Subsamples may still be removed for any non-volatile analytes (e.g. metals, semi-volatile organics).</p> <p>(5) The sample chain of custody forms and analytical lab reports for all soil samples taken for VOC analysis must note the type of sample container used.</p> <p>(6) Reported sample results from samples not collected and preserved according to these requirements must be qualified (data flags). At the discretion of the DEQ project manager, DEQ may either accept the data for qualified use or reject the data for risk assessment or compliance verification purposes.</p> <p>(7) Alternative procedures or practices must be approved in writing by the DEQ Project Manager.</p> <p>(8) Additional information is attached in:</p> <ul style="list-style-type: none"> • Appendix A – Background on VOC Soil Sampling Requirements and Rationale • Appendix B – Statutes, Rules and Guidance Related to Soil Sampling VOCs.
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Revision History

Date / Version	Changes	Changes made by:
10/14/2015 Ver 1.0	New Document	Hoatson / Chapman
10/21/2015 Ver 1.1	Editorial corrections and formatting	Thompson / Hoatson

Appendix A. Background on VOC Soil Sampling Requirements and Rationale

The Oregon cleanup statutes require DEQ to adopt rules establishing appropriate sampling approaches and data quality requirements, ORS 465.315(2)(J). Sampling and analysis requirements are adopted under authority of the cleanup program in ORS Chapter 465 specific to sampling and analysis, and general authority of the tanks program in ORS Chapter 466. The administrative rules for “Cleanup Rules for Leaking Petroleum UST Systems” are at OAR 340-122-0205 to -0360. The “Underground Storage Tank Rules” at OAR Chapter 340 Division 150 specifically point to the Division 122 Rules, see OAR 340-150-0135(7).

OAR 340-122-0218 and OAR 340-150-0010(13) both require the use of analytical methods in US EPA SW-846 Update III, Revised May 1997 (Method 5035). VOC sample preparation Method 5035 “Closed-System Purge-And-Trap And Extraction For Volatile Organics In Soil And Waste Samples” is the only sample collection/preparation method associated with the purge and trap analysis of volatile organics (Method 8260B GCMS, or 8021A (GC)). This method requires sampling into specially designed VOA vials.

The sample preparation Method 5035 is written to minimize loss of VOCs by minimizing handling and exposure to air. (There is an alternate Method 5021 included in the SW846 guidance which also requires VOA vials when sampling soils for VOAs; Method 5035 is preferred). In addition, Method 5035 is consistent with another method referred to in rule, Method NWTPH-Gx requires sampling into “soil VOA bottles.”, see OAR 240-122-0218(1)(d) requiring compliance with Northwest Total Petroleum Hydrocarbon Methods.

In contrast to these consistent requirements related to sampling and analysis, OAR 340-122-0345, which pertains to specific sample collection methods in a variety of situations, recommends the use of driven-tube type sampler (brass sleeves), and also allows use of a “clean wide-mouth glass jar”. This exception for sampling does not comply with the sample preservation requirements specified under US EPA SW-846, Revised May 1997 (Method 5035) or US EPA SW-846, Revised July 2002 (EPA Method 5035A).

However, collection of soil samples with wide-mouth glass sample jars and utilizing 14 days as the sample holding time currently appears to be the prevailing practice in Oregon. Sample aliquots are removed for analyses within that time. Jars are stored in refrigerators with a standard temperature $< 6^{\circ}\text{C}$ (or $4^{\circ} + 2^{\circ}\text{C}$) as opposed to $< 4^{\circ}\text{C}$ as stated in OAR 340-122-0345. Jars are sometimes re-sampled from an already opened jar (and after the original analysis potentially after several days). Depending on the laboratory, sample data may or may not be qualified to reflect sample containers, or the fact that the jar had previously been opened. Once the original sample jar has been opened and sample removed, it is no longer a sealed container and not appropriate for further VOC analyses. These practices can result in significant losses of volatile organic compound analytes.

The language in OAR 340-122-0345(3)(e) regarding a 14-day holding time to analysis does not preclude another requirement to subsample into appropriate containers in 48 hours. The holding times in SW-846 for VOCs in soils (Chapter 4) are dependent upon the sampling and preservation containers and process.

The use of EnCore[®] and Terra Core[®] samplers are “driven-tube type samplers” as recommended in OAR 340-122-0345, Sample Collection Methods.

The OARs require the use of methods in "Test Methods for Evaluating Solid Waste," SW-846, 3rd Edition, Final Updates I, II, IIA, IIB and III, Revised May 1997 (U.S. EPA). EPA 5035 is in Update III as cited for both sampling and analysis (see 340-122-0218, 340-150-0135(7)).

According to OAR 340-122-0218 (1)(e) "The Department may accept alternative sampling and analytical methods that have been shown to be appropriate for the contaminants of concern and the media of interest, and that have acceptable quality control measures, and limits of detection." In this light, DEQ recommends EPA SW-846 Method 5035A, July 2002 since 5035A provides more clarity and flexibility to the labs and consultants.

In sample preparation Method 5035, there is a 48-hour limit for storing samples in EnCore® samplers before the samples need to be transferred to a VOA vial. Since the EnCore® samplers seal better than wide mouth jars or brass sleeves, DEQ interprets this 48-hour requirement to apply to jars or brass sleeves as well.

Method NWTPH-Gx requires sampling into "soil VOA bottles."

Therefore,

- 1) Soil samples should be directly into VOA vials. This is consistent with Methods 5035 and 5035A, and with NWTPH-Gx.
- 2) If samples are collected in containers other than VOA vials, then these samples must be analyzed or subsampled within 48 hours into VOA vials and appropriately preserved (methanol, freezing, etc.) until the time of analysis. This is consistent with the SW-846 guidance and is not in conflict with the OAR 14-day analytical holding time.

Appendix B. Statutes, Rules and Guidance Related to Soil Sampling VOCs

Oregon Revised Statutes

[ORS 465.315\(2\)\(J\)](#) – DEQ to adopt rules on sampling and analysis

Oregon Administrative Rules

[Division 122 – Hazardous Substance Remedial Action Rules](#)

OAR 340-122-0084 – DEQ to adopt rules on sampling and analysis for risk assessment

OAR 340-122-0205 to -0360 – DEQ cleanup rules for sampling and analysis

OAR 341-122-0218 – DEQ Sampling and Analysis Rule

OAR 340-122-0340 – DEQ Soil Sample Location and Number Rule

OAR 340-122-0345 – DEQ Sample Collection Rule

[Division 150 – Underground Storage Tank Rules](#)

OAR 340-150-0135(7) – Compliance with Division 122

DEQ Guidance Documents

[DEQ10-LQ-0063-QAG](#) - Quality Assurance Policy for the Environmental Cleanup Program (Formerly Policy 760.00), Rev 4, 7/31/2015.

[DEQ86-LAB-0002-QAG](#) - Field Sampling Reference Guide, Rev 8, 7/5/2013,

[DEQ02-LQ-0002-QAPP](#) - Quality Assurance Project Plan, ODEQ Underground Storage Tanks (UST) Program, Rev. 2.0 9/8/2010

[DEQ04-LQ-004-QAPP](#) - Quality Assurance Project Plan, ODEQ Brownfield Program, Rev 2.0 10/10/2011

[DEQ04-LQ-069-QAPP](#) - Quality Assurance Project Plan, ODEQ EPA PA/SI Investigations, Rev 2.2 08/14/2012

DEQ09-LQ-0010-QAPP - Quality Assurance Project Plan, ODEQ Hazardous Waste Inspections, Rev 1.0 04/20/2010

EPA Guidance Documents Adopted by Reference

[SW846-Chapter 4 December 1996](#) (US EPA SW-846 Update III, Revised May 1997)

[SW 846 Method 5035, December 1996](#)

[SW 846 Chapter 4 July 2002](#) (US EPA SW-846, Revised July 2002)

[SW 846 Method 5035A July 2002](#) (including Table A.1)