

USEPA Contract Laboratory Program
Statement of Work for Organic Analysis of Low/Medium
Concentration of Volatile Organic Compounds SOM01.2
Data Validation



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INTRODUCTION

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the method in the "USEPA Contract Laboratory Program Statement of Work for Organics Analysis Multi-Media, Multi-Concentration, SOM01.2, February 2007". The validation procedures and actions discussed in this document are based on the requirements set forth in the "USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, July 2007". This document attempts to cover technical problems specific to low/Medium concentration of volatile compounds. Situations may arise where data limitations must be assessed based on the reviewer's own professional judgement.

In addition to technical requirements, contractual requirements may also be covered in this document. While it is important that instances of contract non-compliance be addressed in the Data Assessment, the technical criteria are always used to qualify the analytical data.

Summary

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are as follows:

Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
- JN - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Lab Qualifiers:

- D - The positive value is the result of an analysis at a secondary dilution factor.
- B - The analyte is present in the associated method blank as well as in the sample. This qualifier has a different meaning when validating inorganic data.
- E - The concentration of this analyte exceeds the calibration range of the instrument.
- P - Pesticide/Aroclor target analytes when the % Difference between the analyte concentrations obtained from the two dissimilar GC columns is greater than 25%.

The reviewer must prepare a detailed data assessment to be submitted along with the completed SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data and contract non-compliance.

Reviewer Qualifications:

Data reviewers must possess a working knowledge of the USEPA Statement of Work SOM01.2 and National Functional Guidelines mentioned above.

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YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ LAB: _____

SITE NAME: _____ SDG No(s) .: _____

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples?

ACTION: If no, contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples?

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package?

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package?

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2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, and Sampling Trip Report?

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

3.1 Is the SDG Narrative or Cover Letter Present?

3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?

3.3 Does the Narrative contain the following information SOM01.1, page B-12, section 2.5.1)? Description of trap, column used, storage of samples, case#, SDG#, analytical problems, and discrepancies between field and lab weights.

3.4 Does the narrative, VOA section, contain a list of all TICs identified as alkanes and their estimated concentrations?

3.5 Did the contractor record the temperature of the cooler on the Form DC-1, Item 9 - Cooler Temperature, and in the SDG Narrative?

3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?

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		YES	NO	N/A
.				
3.7	Does the Case Narrative contain the "verbatim" statement (page B-12, section 2.5.1 of the SOM)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If unavailable, document under the Contract Problems/Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1	Check the package for the following (see SOM reporting requirements, section 2.1, page B-10):			
a.	Is the package paginated in ascending order starting from the SDG narrative?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Are all forms and copies legible?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Assembled in the order set forth in the SOW?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Low/Med Concentration Volatiles Data present?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Action: Take action as specified in section 3.7 above.

PART A: Low/Medium Volatile ANALYSES

1.0 Sample Conditions/Problems

1.1	Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the

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YES NO N/A

cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? 11

2.2 Preservation: Aqueous samples must be preserved with HCL to pH of 2 or below and cooled at 4°C ± 2°C. Non-aqueous samples: frozen (less than -7°C) or properly cooled (4°C ± 2°C) and preserved with NaHSO₄.

Action: Qualify sample results according to the following table.

Holding Time Actions for Low/Medium Volatile Analyses

Matrix	Preserved	Criteria	ACTION	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 Days	NO Action	
	No	> 7 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes	> 14 Days	J	R
Non-Aqueous	No	≤ 14 Days	J	R
	Yes	≤ 14 Days	No Action	
	Yes/No	> 14 Days	J	R

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II)

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. YES NO N/A

3.1 Are the Volatile SMC Recovery Summaries (Form II present?

ACTION: Contact the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk?

ACTION: Circle all outliers in red.

3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?

If yes, were samples re-analyzed?

Were method blanks re-analyzed?

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

<u>Chloroethane-d5</u>	<u>1,2-Dichloropropane-d6</u>	<u>1,2-Dichlorobenzene-d4</u>
Dichlorodifluoromethane	Cyclohexane	Chlorobenzene
Chloromethane	Methylcyclohexane	1,3-Dichlorobenzene
Bromomethane	1,2-Dichloropropane	1,4-Dichlorobenzene
Chloroethane	Bromodichloromethane	1,2-Dichlorobenzene
Carbon Disulfide		1,2,4-Trichlorobenzene
		1,2,3-Trichlorobenzene

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<p><u>1,4-Dioxane-d8</u> 1,4-Dioxane</p>	<p><u>trans-1,3-Dichloropropene-d4</u> cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane</p>	<p><u>Chloroform-d</u> 1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform</p>
<p><u>2-Butanone-d5</u> Acetone 2-butanone</p>	<p><u>1,1-dichloroethene-d2</u> trans-1,2-Dichloroethene cis-1,2-Dichloroethene</p>	<p><u>2-Hexanone-d5</u> 4-Methyl-2-pentanone 2-Hexanone</p>
<p><u>Vinyl Chloride-d3</u> Vinyl Chloride</p>	<p><u>Benzene-d6</u> Benzene</p>	<p><u>1,1,2,2-Tetrachloroethane-d2</u> 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane</p>
<p><u>1,2-Dichloroethane-d4</u> Trichlorofluoromethane 1,1-Dichloroethene 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl Acetate Methylene Chloride Methyl tert-Butyl Ether Carbon Tetrachloride 1,2-Dichloroethane 1,1,1-Trichloroethane 1,2-Dibromoethane</p>	<p><u>Toluene-d8</u> Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylenes m,p-Xylene Styrene Isopropylbenzene</p>	

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VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	Recovery Limits (%) for Water Samples	Recovery Limits (%) for Soil samples
Vinyl Chloride-d3	65 - 131	68 - 122
Chloroethane-d5	71 - 131	61 - 130
1,1-Dichloroethene-d2	55 - 104	45 - 132
2-Butanone-d5	49 - 155	20 - 182
Chloroform-d	78 - 121	72 - 123
1,2-Dichloroethane-d4	78 - 129	79 - 122
Benzene-d6	77 - 124	80 - 121
1,2-Dichloropropane-d6	79 - 124	74 - 124
Toluene-d8	77 - 121	78 - 121
trans-1,3-Dichloropropene-d4	73 - 121	72 - 130
2-Hexanone-d5	28 - 135	17 - 184
1,4-Dioxane-d8	50 - 150	50 - 150
1,1,2,2-Tetrachloroethane-d2	73 - 125	56 - 161
1,2-Dichlorobenzene-d4	80 - 131	70 - 131

1. For any recovery greater than the upper limit:
 - a. Qualify "J" all positive associated target compounds.
 - b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:
 - a. Qualify "J" all positive associated target compounds.
 - b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

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YES NO N/A

- a. Qualify "J" all positive associated target compounds.
- b. Qualify "R" all associated non-detects.

NOTE: Up to three (3) DMC's per sample, excluding 1,4-Dioxane-d8, may fail to meet the recovery limits. (SOM, sec. 11.3.4, pg. D-45/Low Medium VOA). Recovery limits for 1,4-Dioxane-d8 are advisory.

As per SOM, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (SOM sec. 11.4.3.1 pg. D-46/Low Medium VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II?

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III)

Note: Data for MS/MSD will not be present unless requested.

4.1 Are the MS/MSD Recovery Forms (Form III Low/Med VOA) present?

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples, whichever is more frequent)?

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, using professional judgement, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. If any MS/MSD % recovery or RPD is out of specification, qualify data to include the consideration of

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the existence of interference in the raw data. Consideration include, but not limited to the following "Action":

Criteria	Action	
	Detected Spiked Compounds	Non-detected Spiked Compounds
%R or RPD > Upper Acceptance Limit	J	No qualification
20% ≤ %R < Lower Acceptance Limit	J	UJ
%R < 20%	J	Use Professional Judgement
Lower Acceptance Limit ≤ %R; RPD ≤ Upper Acceptance Limits	No qualification	

5.0 Method Blanks (Form IV)

- 5.1 Is the Volatile Method Blank Summary (Form IV VOA) present for aqueous and soil samples?
- 5.2 Frequency of Analysis: For the analysis of Low/Med Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent?
- 5.3 Has a VOA method blank been analyzed after the calibration standards and once every 12 hours time period for each GC/MS instrument used?
- 5.4 Was a VOA instrument blank analyzed after each sample/dilution that contains a target compound exceeding the initial calibration range (see SOM, page D-48/Low/Medium VOA, section 12.1.1.3)?

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional

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judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing a target analyte exceeding the initial calibration standards, inspect the sample chromatogram acquired immediately after this sample for possible carryover. The system is considered uncontaminated if the target analyte is below CRQL. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed?

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOM page B-39, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low/Med VOA blanks?

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

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.
Is the chromatographic performance (baseline stability) for each instrument acceptable for Trace VOAs?

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, and storage blanks less than the CRQL?

Exception: Methylene Chloride, Acetone and 2-butanone must be less than 2X times their respective CRQLs.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low/Med Concentration VOAs?

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low/Med Concentration VOAs?

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-50/VOA, section 12.1.5.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

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ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOM sec. 11.3.8 p. D-46/VOA. ("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive hits for Low/Med VOA results (including TICs)?

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field,	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required

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YES NO N/A

Trip, Storage, Instrument **	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required
	Gross contamination	Detects	Qualify results as unusable R
	TIC > 2ug/L	Detects	See "Action" below

* 2x the CRQL for methylene chloride, 2-butanone and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

Note: When applied as described in the table above, the contaminant concentration in the blank are multiplied by the sample dilution factor.

ACTION : For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample?

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

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		YES	NO	N/A
.				
7.1	Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.2	Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3	Did the 12-hour clock begin with either the injection of BFB, or in cases where a closing continuing calibration (CCV) was used as an opening CCV?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Listed below are some, but not necessarily all, examples of acceptable analytical sequences incorporating the use of the opening/closing CCV. Use these examples as a guide for possible analytical sequences that can be expected.

Conditions for When Example Sequence is Appropriate:	Acceptable Criteria That Must be Met:	Notes:
If time remains on the 12 hour clock after initial calibration sequence	<ul style="list-style-type: none"> • BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets both opening and closing CCV criteria • CCV B meets closing CCV criteria. 	The requirement of starting the new 12-hr clock for Analytical Sequence 2 with a new BFB tune is waived if CCV A meets opening CCV criteria. If CCV B meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.
If time remains on the 12 hour clock after initial calibration sequence	<ul style="list-style-type: none"> • BFB tunes meet instrument performance criteria. • The five initial calibration standards meet initial calibration criteria. • CCV A meets closing CCV criteria (but does not meet opening CCV criteria). • CCV B meets opening CCV criteria. • CCV C meets closing CCV Criteria. 	CCV A does not meet opening criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune.

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YES NO N/A

<p>If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV.</p> <p>OR</p> <p>If the most recent closing CCV was not or could not be used as an opening CCV.</p>	<ul style="list-style-type: none"> • BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets both opening and closing CCV criteria. • CCV C meets both opening and closing CCV criteria. 	<p>The requirement of starting the new 12 hour clock for Analytical Sequence 2 with a new BFB tune is waived if CCV B meets opening CCV criteria. If CCV C meets opening CCV criteria, a method blank and subsequent samples may be analyzed immediately after CCV B.</p>
<p>If more than 12 hrs have elapsed since the most recent initial calibration or closing CCV</p> <p>OR</p> <p>If the most recent closing CCV was not or could not be used as an opening CCV</p>	<ul style="list-style-type: none"> • BFB tunes meet instrument performance criteria. • CCV A meets opening CCV criteria. • CCV B meets closing CCV criteria (but does not meet opening CCV criteria). • CCV C meets opening CCV Criteria. • CCV D meets both opening and closing CCV criteria. 	<p>CCV B does not meet opening CCV criteria, therefore a new BFB tune must be performed, immediately followed by CCV B before a method blank and any samples may be analyzed. In this case, the new 12 hr clock and Analytical Sequence 2 begins with the injection of the new BFB tune. The requirement of starting the new 12 hr clock for Analytical Sequence 3 with a new BFB tune is waived if CCV D meets opening CCV criteria. If CCV D meets opening criteria, a method blank and subsequent samples may be analyzed after CCV B.</p>

7.4 Have the ion abundances been normalized to m/z 95 1

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? 1

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent

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		YES	NO	N/A
.				
	the data may be utilized.			
7.6	Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)	___	<input type="checkbox"/>	___
7.7	Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V ?	<input type="checkbox"/>	___	___
ACTION: If large errors exist, take action as specified in section 3.1 above.				
7.8	Is the spectrum of the mass calibration compound acceptable?	<input type="checkbox"/>	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.				

8.0 Target Compound List (TCL) Analytes (Form I)

8.1	Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
	a. Samples and/or fractions as appropriate?	<input type="checkbox"/>	___	___
	b. Regional Control/MS/MSD samples?	<input type="checkbox"/>	___	___
	c. Blanks (method, trip, etc)?	<input type="checkbox"/>	___	___
8.2	Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
	a. Samples and/or fractions as appropriate?	<input type="checkbox"/>	___	___
	b. Regional Control/MS/MSD samples?	<input type="checkbox"/>	___	___
	c. Blanks (method, trip, etc)?	<input type="checkbox"/>	___	___

ACTION: If any data are missing, take action specified in 3.1 above.

8.3	Is chromatographic performance acceptable with respect to:			
	Baseline stability?	<input type="checkbox"/>	___	___
	Resolution?	<input type="checkbox"/>	___	___
	Peak shape?	<input type="checkbox"/>	___	___

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.	YES	NO	N/A
Full-scale graph (attenuation)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ACTION: Use professional judgement to determine the acceptability of the data.

8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration?

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?

8.7 Do sample and standard relative ion intensities agree to within $\pm 20\%$?

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, review section 6.2/Action #2 above before determining if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I VOA-TIC) present? Do listed TICs include scan number or retention time, as well as the estimated "J" and/or "JN" qualifier?

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

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	YES	NO	N/A
.			
a. Samples and/or fractions as appropriate?	[]	___	___
b. Blanks?	[]	___	___
b. Are Alkanes listed in/or part of the Case Narrative?	[]	___	___
ACTION: If any TIC data are missing, take action specified in 3.1 above.			
ACTION: Verify "JN" qualifier is present for all chemically named TICs having a percent match of greater than or equal 85%. TICs labeled "unknown" are qualified with a "J" qualifier.			
9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.)	___	[]	___
ACTION: Flag with "R" only target compound detected in another fraction (except blank contamination).			
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[]	___	___
9.5 Do TICs and "best match" reference spectra relative ion intensities agree within $\pm 20\%$?	[]	___	___
ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate.			
Action: When a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, solvent preservatives or Aldo condensation, the result should be qualified as unusable (R). (i.e., common lab contaminants such as CO ₂ (m/e 44), Siloxanes (m/e 73), diethyl ether, hexane, certain freons. Aldol condensation products: 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one, and 5,5-dimethyl-2(H)-furanone. Solvent preservatives cyclohexene, and related by-products: cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenone, chlorocyclohexene, and chlorocyclohexanol.).			

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.)	___	[]	___
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_____ YES NO N/A

10.2 Are the CRQLs adjusted to reflect sample dilutions and per cent moisture?

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

!0.3 For non-aqueous samples, were the percent moisture < 70%?

Action: If the % moisture ≥ 70.0% and < 90.0%, qualify detects as "J" and non-detects as approximated "UJ" If the % Moisture ≥ 90%, qualify detects as "J" and non-detects as "R"

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration?

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 5, 10, 50, 100, and 200 µg/ℓ for non-ketones, 10, 20, 100, 200 and 400 ug/L for ketones and 100, 200, 1000, 2000, and 4000 ug/L for 1,4-dioxane.

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are the relative standard deviation (RSD) stable for VOA's over the concentration range of the calibration (i.e., %RSD ≤ 20.%, ≤ 40% for poor performers (see table below), ≤ 50% for 1,4-dioxane)?

ACTION: Circle all outliers in red.

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YES NO N/A

NOTE: The twenty two (22) poor performers compounds and associated DMCs are listed below. The relative response factor (RRF) for these compounds must be greater than or equal to 0.010.

Volatile Compounds Exhibiting Poor Response

Volatile Compounds	
Acetone	1,2-Dibromo-3-chloropropane
2-Butanone	Isopropylbenzene
Carbon disulfide	Methyl acetate
Chloroethane	Methylene chloride
Chloromethane	Methylcyclohexane
Cyclohexane	Methyl tert-butyl ether
1,4-Dioxane	trans-1,2-Dichloroethene
1,2-Dibromoethane	4-Methyl-2-pentanone
Dichlorodifluoromethane	2-Hexanone
cis-1,2-dichloroethene	Trichlorofluoromethane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane

ACTION: If %RSD > 20.0%, (> 40.0% for the poor performers, and > 50% for 1,4-dioxane), qualify associated positive results for that analyte "J" (estimated). If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive results "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any \overline{RRF} s < 0.050 (< 0.010 for poor performers) (< 0.005 for 1,4-Dioxane)?

ACTION: Circle all outliers in red.

ACTION: If any \overline{RRF} values are < 0.05 or < 0.01 for poor performers, and <0.005 for 1,4-Dioxane qualify associated non-detects unusable (R) and associated positive results estimated (J).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance the analytes that fail %RSD and/or RRF criteria.

12.4 Are there any transcription/calculation errors in the reporting of RRFs, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.)

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YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration Verification (CCV) (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the volatile fraction?

13.2 Did the 12 hour clock begin with either the injection of BFB or in cases where a closing CCV can be used as an opening CCV for each instrument?

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

13.3 Do any volatile compounds have a % Difference (% D) between the initial RRF and CCV RRF exceeding $\pm 50\%$ for 1,4-Dioxane, $\pm 40\%$ for the poor performers or $\pm 25\%$ for the remaining compounds?

ACTION: Circle all outliers in red.

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers (< 0.005 for 1,4-Dioxane)?

ACTION: Circle all outliers in red.

Note: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

Note: The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analytical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see table below). If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

Action: Use the following table to qualify data based on the technical acceptance criteria for the opening CCV and closing CCV.

Continuing Calibration Verification (CCV) Actions for Low/Medium Volatiles Analyses

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Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detected Associated Compounds	Non-Detected Associated Compounds
RRF < 0.010 (poor responders) ** RRF < 0.050 (all other volatile target compounds)	RRF < 0.010 ** (for all volatile target compounds)	J	R
RRF ≥ 0.010 (poor responders) RRF ≥ 0.050 (for all other compounds) RRF ≥ 0.005 1,4-Dioxane	RRF ≥ 0.010 *** (for all target volatile compounds)	No Action	
%D > 50.0 or < -50.0 (1,4-Dioxane) %D > 40.0 or < -40.0 (poor responders) %D > 25.0 or < -25.0 (all other volatile target compounds)	%D > 50.0 or < -50.0 (for all volatile target compounds)	J	UJ
%D ≤ 50.0 or ≥ -50.0 (1,4-Dioxane) %D ≤ 40.0 or ≥ -40.0 (poor responders) %D ≤ 25.0 or ≥ -25.0 (all other volatile target compounds)	%D ≤ 50.0 or ≥ -50.0 (for all volatile target compounds)	No Action	
Opening CCV not performed at required frequency *	Closing CCV not performed at required frequency *	R	

* See section 13.2 above ** RRF < 0.005 for 1,4-Dioxane *** 1,4-Dioxane: RRF ≥ 0.005

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors for the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.)

___ 11 ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

Note: All DMCs must meet RRF ≥ 0.010. No qualification of the data is necessary on the DMCs RRF and %RSD/%Diff data alone. However, use professional judgment to evaluate the DMC and %RSD/% Diff data in conjunction with the DMC recoveries to determine the need of qualification of the data.

14.0 Internal Standard (Form VII)

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1. USEPA Contract Laboratory Program of Work for Organic Analysis Multi-Media, Multi-Concentration, SOW/CLPSOM01.2, February 2007
2. National Functional Guidelines for Superfund Organic Methods Data Review July 2007.

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NOTE: Contract Requirements: The SOM (section 11.4.1 page D-46/VOA Low/Medium states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis?

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

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Definitions

- BFB - bromofluorobenzene
- CCS - contract compliance screening
- CLASS - Contract Laboratory Analytical Services Support
- CLP - Contract Laboratory Program
- CRQL - Contract Required Quantitation Limit
- GC/MS - gas chromatography/mass spectroscopy
- kg - kilogram
- µg - microgram
- ℓ - liter
- mℓ - milliliter
- QC - quality control
- RAS - Routine Analytical Services
- RIC - reconstructed ion chromatogram
- RPD - relative percent difference
- RRF - relative response factor
- RRF - average relative response factor (from initial calibration)
- RRT - relative retention time
- RSD - relative standard deviation
- RT - retention time
- RSCC - Regional Sample Control Center
- SDG - sample delivery group
- SOP - standard operating procedure
- SOW - Statement of Work
- TCL - Target Compound List
- TCLP - Toxicity Characteristics Leachate Procedure
- TIC - tentatively identified compound
- TPO - technical project officer
- VOA - volatile organic acid
- VTSR - validated time of sample receipt
- TOPO - Task Order Project Officer

References