Identifier: **SOP-5161 (formerly SOP-15.01-R1)**	Revision: **0**	Los Alamos NATIONAL LABORATORY EST.1943
Effective Date: 6/10/08	Next Review Date: 6/10/13	

Waste & Environmental Services

Standard Operating Procedure

for **ROUTINE VALIDATION OF VOLATILE ORGANIC COMPOUND (VOC) ANALYTICAL DATA**

APPROVAL SIGNATURES:

Subject Matter Expert:	**Organization**	**Signature**	**Date**
Bill Hardesty	WES-EDA	Signature on File	4/21/08
Quality Assurance Specialist:	**Organization**	**Signature**	**Date**
Laura Ortega	QA-IQ	Signature on File	4/30/08
Responsible Line Manager:	**Organization**	**Signature**	**Date**
Craig Eberhart	WES-EDA	Signature on File	4/21/08

1.0 PURPOSE AND SCOPE

This procedure represents the minimum standards for evaluating routine volatile organic compounds range organics analytical data. This procedure is a mandatory document and shall be implemented by all Los Alamos National Laboratory (LANL or Laboratory) personnel and contractors who evaluate routine volatile organic compounds range organics analytical data for the specific LANL projects.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

This procedure conforms to the requirements of Environmental Protection Agency (EPA) Methodologies and the EPA document, "U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review." LANL data validation is performed according to procedures based upon the NNSA Model Data Validation Procedure. Data qualifiers and reason codes are assigned according to the specifications in this method specific procedure.

2.2 Precautions

Nothing in this procedure precludes the data validator from going beyond the minimum requirements specified within this procedure. If additional directions are required, the data validator shall reference NNSA Model Data Validation Procedure, EPA method specific guidelines and/or National Functional Guidelines for Organic Data Review. Implementation of this procedure may be followed by a more focused and data use-specific evaluation of the data by the project chemist, especially if the implementation of this procedure indicates the data may contain technical deficiencies.

3.0 EQUIPMENT AND TOOLS

None.

4.0 STEP-BY-STEP PROCESS DESCRIPTION

4.1 Qualifications for Data Validators

Data Validator	1.	Possess a minimum of a bachelor's degree in chemistry, or one of the physical sciences AND either two (2) years of experience in generating analytical data in an environmental analytical laboratory AND two (2) years of data validation experience.
	2.	Complete Attachment 1, Data Validation Cover Sheet, and Attachment 2, Volatile Organic Compound (VOC) Analytical Data Validation Checklist, during data validation.
	3.	Refer to Attachment 3, Guidance for the Qualifier and Reason Code Application, for additional guidance.

4.2 Records

Data Validator	1.	Submit the following records generated by this procedure to the Records Processing Facility: • Completed Data Validation Cover Sheets; and • Completed Volatile Organic Compound (VOC) Analytical Data Validation Checklists.

5.0 PROCESS FLOW CHART

For specific validation criteria follow the NNSA Model for Data Validation.

6.0 ATTACHMENTS

Attachment 1 5161-1 Data Validation Cover Sheet (1 page)

Attachment 2 5161-2 Volatile Organic Compound (VOC) Analytical Data Validation Checklist (4 pages)

Attachment 3 5161-3 Guidance for the Qualifier and Reason Code Application (4 pages)

7.0 REVISION HISTORY

Author: Bill Hardesty

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)]*
R0	4/27/00	Initial Procedure	All
R1	5/29/03	Rewritten to streamline and update process	All
Review	4/20/04	Deemed process adequate.	All
0	5/29/08	This document supersedes SOP-15.01-R1. Editorial and formatting changes; organizational name updated. New Document Number issued (SOP-5161,R0).	T

ATTACHMENT 1: DATA VALIDATION COVER SHEET

5161-1

Data Validation Cover Sheet

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Section I.

REQUEST NUMBER: _____ VALIDATION DATE: _____ LAB CODE: _____

CONTRACT LABORATORY NAME: _____

VALIDATOR: _____ ORGANIZATION: _____

ANALYTICAL SUITE (CHECK ALL THAT APPLY):

☐ **TPH-GRO**	☐ **HIGH EXPLOSIVES**	☐ **DIOXIN FURANS**	☐ **LCMSMS PERCHLORATES**
☐ **TPH-DRO**	☐ **METALS**	☐ **PCB CONGENERS**	☐ **ORGANOCHLORINE PESTICIDES/POLYCHLORINATED BIPHENYLS**
☐ **GENERAL CHEMISTRY**	☐ **RADIOCHEMISTRY**	☐ **LCMSMS HIGH EXPLOSIVES**	

☐ **OTHER (DESCRIBE):** _____

Section II. Completeness Check

YES	NO	N/A	(CHECK ONE)	YES	NO	N/A	(CHECK ONE)
☐	☐	☐	1. CHAIN-OF-CUSTODY FORM(S)	☐	☐	☐	6. RAW/BSS DATA
☐	☐	☐	2. CASE NARRATIVE	☐	☐	☐	7. QUALITY CONTROL FORMS
☐	☐	☐	3. SAMPLE RESULT FORMS	☐	☐	☐	8. QUANTITATION REPORTS
☐	☐	☐	4. SAMPLE CHROMATOGRAMS	☐	☐	☐	9. TICS FORMS
☐	☐	☐	5. STANDARD CHROMATOGRAMS	☐	☐	☐	10. TICS MASS SPECTRA

Comments/problems noted (include information about requests for further information submitted to the contract laboratory and agreed-upon date of resolution and contract laboratory point of contact):

VALIDATOR'S SIGNATURE: _____ DATE: _____

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ATTACHMENT 2: VOLATILE ORGANIC COMPOUND (VOC) ANALYTICAL DATA VALIDATION CHECKLIST

5161-2

Volatile Organic Compound (VOC) Analytical Data Validation Checklist

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Los Alamos NATIONAL LABORATORY EST. 1943

Yes	No	N/A (Check One)		Assign Qualifier Listed Below If Criterion = Yes	
				Non-detected Analyte	Detected Analyte
☐	☐	☐	1. The holding time was >1 and ≤2 times the applicable holding time requirement.	UJ, V9	J-, V9
☐	☐	☐	2. The holding time was >2 times the applicable holding time requirement.	R, V9a	J-, V9a
☐	☐	☐	3. The instrument performance sample did not pass method acceptance criteria.	R, V16	R, V16
☐	☐	☐	4. Samples were analyzed outside specific method tune time criteria.	N/A	J, V16b
☐	☐	☐	5. The required instrument performance sample information is missing. Contact the SMO or external laboratory for information.	R, V16c	R, V16c
☐	☐	☐	6. The affected results were not analyzed with a valid 5-point calibration curve and/or a standard at the reporting limit.	UJ or R, V7	J, V7
☐	☐	☐	7. The affected analytes were analyzed with an initial calibration curve that exceeded the %RSD criteria and/or the associated multipoint calibration correlation coefficient is <0.995.	UJ, V7a	J, V7a
☐	☐	☐	8. The affected analytes were analyzed with an RRF of <0.05 in the initial calibration and/or CCV.	R, V7b	J, V7b
☐	☐	☐	9. The Initial Calibration Verification (ICV) and/or Continuing Calibration Verification (CCV) were recovered outside the method-specific limits.	UJ, V7c	J, V7c
☐	☐	☐	10. The ICV and/or CCV were not analyzed at the appropriate method frequency.	UJ, V7d	J, V7d

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☐	☐	11. Required calibration information is missing or samples were analyzed on an expired calibration. Contact the SMO or external laboratory for information.	R, V7f	R, V7f
☐	☐	☐	12. The sample result is ≤5X (10X for common organic laboratory contaminants) the concentration of the related analyte in the method blank.	N/A	U,V4
☐	☐	☐	13. The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5X (10X for common laboratory contaminants).	N/A	J, V4a
☐	☐	☐	14. The sample result is ≤5X the concentration of the related analyte in the trip blank, rinsate blank, and/or equipment blank.	N/A	U, V4d
☐	☐	☐	15. Required method blank information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, V4e	R, V4e
☐	☐	☐	16. The IS retention time has shifted by more than 30 seconds.	UJ, V0	J, V0
☐	☐	☐	17. Analyte is positively confirmed but outside the IS retention time window; however, spectral matches must be provided.	N/A	J, V0a
☐	☐	☐	18. Required IS retention time documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, V0b	R, V0b
☐	☐	☐	19. The quantitating IS area count is <10% of the expected value, which indicates increased potential for false negative results and other possible problems with sample quantitation. Follow method-specific windows.	R, V1a	J, V1a
☐	☐	☐	20. The IS area count for the quantitating IS is <50% but >10% for organics window relation to the previous continuing calibration. Follow the method-specific windows.	UJ, V1b	J, V1b

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☐	☐	21. The IS area count for the quantitating IS is >200% of the area count for the previous organic continuing calibration. Follow the method-specific windows.	UJ, V1c	J, V1c
☐	☐	☐	22. Required IS information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, V1d	R, V1d
☐	☐	☐	23. The surrogate is <10%R. Follow the external laboratory limits located within the associated data package.	R, V3	J-, V3
☐	☐	☐	24. The surrogate is < the Lower Acceptance Limit (LAL) but ≥10%R. Follow the external laboratory limits located within the associated data package.	UJ, V3a	J-, V3a
☐	☐	☐	25. The surrogate %R is > the Upper Acceptance Limit (UAL) Follow the external laboratory limits located within the associated data package.	N/A	J+, V3b
☐	☐	☐	26. At least one surrogate is > the UAL and one surrogate is < the LAL. Follow the external laboratory limits located within the associated data package.	UJ, V3c	J, V3c
☐	☐	☐	27. Required surrogate information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, V3d	R, V3d
☐	☐	☐	28. The LCS percent recovery was <10%. Follow the external laboratory limits located within the associated data package.	R, V12	J-, V12
☐	☐	☐	29. The LCS percent recovery was < the LAL but > 10%. Follow the external laboratory limits located within the associated data package.	UJ, V12a	J-, V12a
☐	☐	☐	30. The LCS percent recovery was > the UAL. Follow the external laboratory limits located within the associated data package.	N/A	J+, V12b
☐	☐	☐	31. The LCS documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.	R, V12c	R, V12c

Yes	No	N/A		Assign Qualifier Listed Below If Criterion = Yes	
(Check One)				Non-detected Analyte	Detected Analyte
☐	☐	☐	**32. The affected analyte is considered not detected because mass spectrum did not meet specifications.**	**N/A**	**U, V8**
☐	☐	☐	**33. The mass spectrum column documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**	**R, V8a**	**R, V8a**
☐	☐	☐	**34. Duplicate, dilution, or reanalysis.**	**UJ, V88**	**J, V88**
☐	☐	☐	**35. The affected analytes have elevated detection limits and may not meet project DQOs because the sample was diluted without any target analytees identified due to matrix interference. Qualify as Reject if the analytical laboratory cannot provide proof for matrix interference.**	**UJ, R, V15**	**R, V15**
☐	☐	☐	**36. Qualification of data via data validation did not occur based on Quality Control requirements in this procedure. Adhere to the external laboratory qualifiers found within the Form I analytical data summary sheets generated by the external laboratory.**	**U, U_LAB**	**J, J_LAB, NQ, NQ**
☐	☐	☐	**37. The LANL project chemist identified quality deficiencies in the reported data that requires further qualification. This code can only be used under advisement by the LANL project chemist.**	**UJ, R, V19**	**J, R, V19**

ATTACHMENT 3: GUIDELINES FOR THE QUALIFIER AND REASON CODE APPLICATION

5161-3

Guidelines for the Qualifier and Reason Code Application

Records Use only

No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
1	**UJ**	**J**	**V0**	**The IS retention time has shifted by >30 seconds.**
2	**N/A**	**J**	**V0a**	**Analyte is positively confirmed but outside the IS retention window; however, spectral matches must be provided.**
3	**R**	**R**	**V0b**	**Required retention time documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**
4	**R**	**J-**	**V12**	**The LCS percent recovery was <10%. Follow the external laboratory limits located within the associated data package.**
5	**UJ**	**J-**	**V12a**	**The LCS percent recovery was < the Lower Acceptance Limit (LAL) but >10%. Follow the external laboratory limits located within the associated data package.**
6	**N/A**	**J+**	**V12b**	**The LCS percent recovery was > the Upper Acceptance Limit (UAL). Follow the external laboratory limits located within the associated data package.**
7	**R**	**R**	**V12c**	**The LCS documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information located within the associated data package.**

No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
8	**UJ, R**	**R**	**V15**	**The affected analytes have elevated detection limits and may not meet project DQOs because the sample was diluted without any target analytes identified due to matrix interference. Qualify as Reject if the analytical laboratory cannot provide proof for matrix interference.**
9	**R**	**R**	**V16**	**The instrument performance sample did not pass the method acceptance criteria.**
10	**N/A**	**J**	**V16b**	**Samples were analyzed outside specific method tune time criteria.**
11	**R**	**R**	**V16c**	**The required instrument performance sample information is missing. Contact the SMO or external laboratory for information.**
12	**UJ, R**	**J, R**	**V19**	**The project chemist identified quality deficiencies in the reported data that requires further qualification. This code can ONLY be used under advisement by the project chemist.**
13	**R**	**J**	**V1a**	**The quantitating IS area count is <10% of the expected value. Follow the method-specific windows.**
14	**UJ**	**J**	**V1b**	**The IS area count for the quantitating IS is <50% but >10% for organics window relation to the previous continuing calibration. Follow the method-specific windows.**
15	**UJ**	**J**	**V1c**	**The IS area count for the quantitating IS is >200% of the area count for the previous organic continuing calibration. Follow the method-specific windows.**
16	**R**	**R**	**V1d**	**Required IS information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**
17	**R**	**J-**	**V3**	**The surrogate is <10%R, which indicates the potential for a severely low bias in the results. Follow the external laboratory limits located within the associated data package.**
18	**UJ**	**J-**	**V3a**	**The surrogate is < the LAL but ≥10%R, which indicates the potential for a low bias in the results. Follow the external laboratory limits.**

No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
19	**N/A**	**J+**	**V3b**	**The surrogate %R value is > the UAL, which indicates a potential for a high bias in the results and a potential for false positive results. Follow the external laboratory limits located within the associated data package.**
20	**UJ**	**J**	**V3c**	**At least one surrogate is > the UAL and one surrogate is < the LAL, which indicates a > normal degree of uncertainty in the result. Follow the external laboratory limits located within the associated data package.**
21	**R**	**R**	**V3d**	**Required surrogate/tracer information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**
22	**U**	**N/A**	**V4**	**The sample result is ≤5X (10X for common organic laboratory contaminants) the concentration of the related analyte in the method blank, which indicates the reported detection is considered indistinguishable from contamination in the blank.**
23	**N/A**	**J**	**V4a**	**The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was >5X (10X for common laboratory contaminants).**
24	**U**	**N/A**	**V4d**	**The sample result is ≤5X the concentration of the related analyte in the trip blank, rinsate blank, or equipment blank, which indicates the reported detection is considered indistinguishable from contamination in the blank.**
25	**R**	**R**	**V4e**	**Required method blank information is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**
26	**UJ, R**	**J**	**V7**	**The affected results were not analyzed with a valid 5-point calibration curve and/or a standard at the reporting limit.**
27	**UJ**	**J**	**V7a**	**The affected analytes were analyzed with an initial calibration curve that exceeded the %RSD criteria and/or the associated multipoint calibration correlation coefficient is <0.995.**
28	**R**	**J**	**V7b**	**The affected analytes were analyzed with an RRF of <0.05 in the initial calibration and/or CCV.**

No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
29	**UJ**	**J**	**V7c**	**The ICV and/or CCV were recovered outside the method-specific limits.**
30.	**UJ**	**J**	**V7d**	**The ICV and/or CCV were not analyzed at the appropriate method frequency.**
31.	**R**	**R**	**V7f**	**Required calibration information is missing or samples were analyzed on an expired calibration. Contact the SMO or external laboratory for information.**
32.	**N/A**	**U**	**V8**	**The affected analyte is considered not detected because mass spectrum did not meet specifications.**
33.	**UJ**	**J**	**V88**	**Duplicate, dilution, or reanalysis.**
34.	**R**	**R**	**V8a**	**The mass spectrum column documentation is missing. Data may not be acceptable for use. Contact the SMO or external laboratory for information.**
35	**UJ**	**J-**	**V9**	**The extraction/analytical holding time is exceeded by <2X the published method for holding times.**
36	**R**	**J-**	**V9a**	**The extraction/analytical holding time was exceeded by >2X the published method for holding times.**
37	**U**	**J, NQ**	**U_LAB, J_LAB, NQ**	**Qualification of data via data validation did not occur based on Quality Control requirements in this procedure. Adhere to the external laboratory qualifiers found within the Form I analytical data summary sheets generated by the external laboratory.**

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