



OIO-TP-5161

Revision: 0.1

Effective Date: 8/19/2015

Next Review Date: 8/19/2018

Environment, Safety, Health Directorate**OIO-DO****Technical Procedure****Routine Validation of Volatile Organic Compound Analytical Data****Document Owner:**

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Derivative Classifier: Unclassified or **DUSA ENVPRO**

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REVISION HISTORY

Document Number and Revision <i>[Include revision number, beginning with Revision 0]</i>	Effective Date <i>[Document Control Coordinator inserts effective date]</i>	Description of Changes <i>[List specific changes made since the previous revision]</i>
SOP-15.01, Rev. 0	4/27/00	Initial procedure.
SOP-15.01 R1	5/29/03	Rewritten to streamline and update process
SOP-15.01 R1	4/20/04	Periodic Review no change. Deemed process adequate.
SOP-5161 R0	5/29/08	This document supersedes SOP-15.01-R1. Editorial and formatting changes; organizational name updated.
OIO-TP-5161 R0.1	8/24/2015	Periodic Review. Minor revision, changed Document type and Organization.

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1.0 PURPOSE AND SCOPE

This procedure represents the minimum standards for evaluating routine volatile organic compounds (VOC) 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 VOC range organics analytical data for the specific LANL projects.

2.0 BACKGROUND AND PRECAUTIONS

2.1 Background

This procedure conforms to the requirements of U.S. 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 National Nuclear Security Agency (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

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 or two (2) years of experience in data validation.
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.

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4.2 Records

1. Submits the following records generated by this procedure to the Environmental Protection Records Management Office:
 - 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 RECORDS

Records generated by this PROCEDURE will be submitted to the Environmental Protection Records Management Office for document management in accordance with Institutional Records Management Procedure, P1020-1 and ENV-DO-QP-110, Records Management Plan.

7.0 ATTACHMENTS OR APPENDICES

Attachment 1: *5161-1 Data Validation Cover Sheet*

Attachment 2: *5161-2 Volatile Organic Compound (VOC) Analytical Data Validation Checklist*

Attachment 3: *5161-3 Guidance for the Qualifier and Reason Code Application*

ATTACHMENT 1 – 5161-1 DATA VALIDATION COVER SHEET
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5161-1 Data Validation Cover Sheet	Records Use only  Los Alamos NATIONAL LABORATORY EST. 1943
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Section I.

Request Number: _____ Validation Date: _____ Lab Code: _____

Contract Laboratory Name: _____

Validator: _____ Organization: _____

Analytical Suite (Check All That Apply):

<input type="checkbox"/> TPH-GRO	<input type="checkbox"/> High Explosives	<input type="checkbox"/> Dioxin Furans	<input type="checkbox"/> LCMSMS Perchlorates
<input type="checkbox"/> TPH-DRO	<input type="checkbox"/> Metals	<input type="checkbox"/> PCB Congeners	<input type="checkbox"/> Organochlorine Pesticides/Polychlorinated Biphenyls
<input type="checkbox"/> General Chemistry	<input type="checkbox"/> Radiochemistry	<input type="checkbox"/> LCMSMS High Explosives	

Other (Describe): _____

Section II. Completeness Check

YES	NO	N/A	(check one)	YES	NO	N/A	(check one)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. Chain-Of-Custody Form(S)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. Raw/BSS Data
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. Case Narrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. Quality Control Forms
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. Sample Result Forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. Quantitation Reports
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. Sample Chromatograms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. TICS Forms
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. Standard Chromatograms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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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(Attach additional comment sheets as necessary)

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**ATTACHMENT 2 – 5161-2 VOLATILE ORGANIC COMPOUND (VOC)
ANALYTICAL DATA VALIDATION CHECKLIST**

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5161-2	Records Use only
Volatile Organic Compound (VOC) Analytical Data Validation Checklist	

Yes No N/A (Check One)				Assign Qualifier Listed Below If Criterion = Yes	
				Nondetected Analyte	Detected Analyte
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. The holding time was >1 and ≤2 times the applicable holding time requirement.	UJ, V9	J-, V9
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. The holding time was >2 times the applicable holding time requirement.	R, V9a	J-, V9a
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. The instrument performance sample did not pass method acceptance criteria.	R, V16	R, V16
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. Samples were analyzed outside specific method tune time criteria.	N/A	J, V16b
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. The required instrument performance sample information is missing. Contact the Sample Management Office (SMO) or external laboratory for information.	R, V16c	R, V16c
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. The affected analytes were analyzed with an initial calibration curve that exceeded the percent relative standard deviation criteria and/or the associated multipoint calibration correlation coefficient is <0.995.	UJ, V7a	J, V7a
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. The affected analytes were analyzed with a relative response factor of <0.05 in the initial calibration and/or continuing calibration verification (CCV).	R, V7b	J, V7b
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. The initial calibration verification (ICV) and/or CCV were recovered outside the method-specific limits.	UJ, V7c	J, V7c
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. The ICV and/or CCV were not analyzed at the appropriate method frequency	UJ, V7d	J, V7d

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**ATTACHMENT 2 – 5161-2 VOLATILE ORGANIC COMPOUND (VOC)
ANALYTICAL DATA VALIDATION CHECKLIST (CONT.)**

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Yes No N/A (Check One)				Assign Qualifier Listed Below If Criterion = Yes	
				Nondetected Analyte	Detected Analyte
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12. The sample result is ≤ 5 times (10 times for common organic laboratory contaminants) the concentration of the related analyte in the method blank.	N/A	U, V4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13. The affected analytes are considered estimated and biased high because this analyte was identified in the method blank but was > 5 times (10 times for common laboratory contaminants).	N/A	J, V4a
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14. The sample result is ≤ 5 times the concentration of the related analyte in the trip blank, rinsate blank, and/or equipment blank.	N/A	U, V4d
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16. The internal standard (IS) retention time has shifted by more than 30 seconds.	UJ, V0	J, V0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17. Analyte is positively confirmed but outside the IS retention time window; however, spectral matches must be provided.	N/A	J, V0a
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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

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**ATTACHMENT 2 – 5161-2 VOLATILE ORGANIC COMPOUND (VOC)
ANALYTICAL DATA VALIDATION CHECKLIST (CONT.)**

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Yes No N/A (Check One)				Assign Qualifier Listed Below If Criterion = Yes	
				Non-detected Analyte	Detected Analyte
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23 The surrogate is <10%R. Follow the external laboratory limits located within the associated data package.	R, V3	J-, V3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28. The laboratory control sample (LCS) %R was <10%. Follow the external laboratory limits located within the associated data package.	R, V12	J-, V12
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	29. The LCS %R was < the LAL but >10%. Follow the external laboratory limits located within the associated data package.	UJ, V12a	J-, V12a

**ATTACHMENT 2 – 5161-2 VOLATILE ORGANIC COMPOUND (VOC)
ANALYTICAL DATA VALIDATION CHECKLIST (CONT.)**

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Yes No N/A (Check One)				Assign Qualifier Listed Below If Criterion = Yes	
				Nondetected Analyte	Detected Analyte
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30. The LCS percent recovery was > the UAL. Follow the external laboratory limits located within the associated data package.	N/A	J+, V12b
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	32. The affected analyte is considered not detected because mass spectrum did not meet specifications.	N/A	U, V8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	34. Duplicate, dilution, or reanalysis.	UJ, V88	J, V88
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	35. The affected analytes have elevated detection limits and may not meet project data-quality objectives because the sample was diluted without any target analytes identified as a result of matrix interference. Qualify as Reject if the analytical laboratory cannot provide proof for matrix interference.	UJ, R, V15	R, V15
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	37. The LANL project chemist identified quality deficiencies in the reported data that require further qualification. This code can only be used under advisement by the LANL project chemist.	UJ, R, V19	J, R, V19

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ATTACHMENT 3 – 5161-3 GUIDELINES FOR THE QUALIFIER AND REASON CODE APPLICATION

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5161-3	Records Use only
Guidelines for the Qualifier and Reason Code Application	

No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
1	UJ	J	V0	The internal standard (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 Sample Management Office (SMO) or external laboratory for information.
4	R	J-	V12	The laboratory control sample (LCS) percent recovery (%R) was <10%. Follow the external laboratory limits located within the associated data package.
5	UJ	J-	V12a	The LCS %R 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 %R 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.
8	UJ, R	R	V15	The affected analytes have elevated detection limits and may not meet project data-quality objectives because the sample was diluted without any target analytes identified from 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.

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No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
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 be used ONLY 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.
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.

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ATTACHMENT 3 – 5161-3 GUIDELINES FOR THE QUALIFIER AND REASON CODE APPLICATION (CONT.)

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No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
22	U	N/A	V4	The sample result is ≤ 5 times (10 times 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 > 5 times (10 times for common laboratory contaminants).
24	U	N/A	V4d	The sample result is ≤ 5 times 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 percent relative standard deviation criteria and/or the associated multipoint calibration correlation coefficient is < 0.995 .
28	R	J	V7b	The affected analytes were analyzed with a relative response factor of < 0.05 in the initial calibration and/or continuing calibration verification (CCV).
29	UJ	J	V7c	The initial calibration verification (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.

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No.	Valid Flag Code Nondetect	Valid Flag Code Detect	Valid Reason Code	Valid Reason Description
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 <2 times the published method for holding times.
36	R	J-	V9a	The extraction/analytical holding time was exceeded by > times 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.



Environment, Safety and Health

Electronic Public Reading Room - Posting of Controlled Procedures

Operations Integration Office Management Approval:

Print Name	Signature	Date
Ellena Martinez	<i>Ellena Martinez</i>	3/4/16

Derivative Classifier:

OUO
 UCNI
 Unclassified
 Classified

Print Name	Signature	Date
Larry W. Maassen	<i>Larry Maassen</i>	3/4/16

List of Controlled Documents:

Procedure No.	Title/Description
Air Monitoring (ENV)	
ENV-ES-TPP-003	Technical Project Plan for the Neighborhood Environmental Watch Network (NEWNET)
ENV-ES-TPP-007	Technical Project Plan for the Direct Penetrating Radiation Monitoring Network (DPRNET)
Data Validation (ADESH)	
OIO-TP-5161	Routine Validation of Volatile Organic Compound Analytical Data
OIO-TP-5162	Routine Validation of Semivolatile Organic Compound Analytical Data
OIO-TP-5163	Routine Validation of Organochlorine Pesticide and Polychlorinated Biphenyl Analytical Data
OIO-TP-5165	Routine Validation of Metals Analytical Data
General Field Work	
OIO-TP-222	Shipping/Receiving of Environmental Samples by the Sample Management Office (SMO)
OIO-QP-219	Sample Control and Field Documentation
Soil, Foodstuffs, and Biota Sampling (ENV)	
ENV-ES-TPP-002	Technical Project Plan for Biota Dose Assessment
ENV-ES-TP-003	Collection of Soil and Vegetation Samples for the Environmental Surveillance Program
ENV-ES-TP-004	Produce Sampling
ENV-ES-TP-007	Game Animal Sampling
ENV-ES-TP-006	Sampling Soil and Vegetation at Facility Sites
SOP-5247	Collection of Benthic Macroinvertebrates in the Rio Grande
ENV-ES-TP-008	Collection of Crawfish in the Rio Grande
Well Drilling, Construction, Development, Maintenance, and Abandonment	
ENV-RCRA-QP-010	Land Application of Groundwater