

QUALITY ASSURANCE PROJECT PLAN
Grenada Manufacturing
(a.k.a. Rockwell International Wheel and Trim)
Grenada, Mississippi
MSD007037278

Prepared for:
United States Environmental Protection Agency/Environmental Response Team
Durham, North Carolina

By:
Lockheed Martin/Scientific, Engineering, Response and Analytical Service
Work Assignment Number: SERAS-293

Based on the Intergovernmental Data Quality Task Force Uniform
Federal Policy for Quality Assurance Project Plans
(Final Version 1.1, June 2006)

April 8, 2016

TABLE OF CONTENTS

QAPP Worksheet #1.	Title and Approval Page.....	1
QAPP Worksheet #2.	QAPP Identifying Information.....	2
QAPP Worksheet #3.	Distribution List	7
QAPP Worksheet #4.	Project Personnel Sign-Off Sheet.....	8
QAPP Worksheet #5.	Project Organizational Chart.....	9
QAPP Worksheet #6.	Communication Pathways.....	10
QAPP Worksheet #7.	Personnel Responsibilities and Qualification Table.....	11
QAPP Worksheet #8.	Special Personnel Training Requirements Table	12
QAPP Worksheet #9.	Project Scoping Session Participants Sheet.....	14
QAPP Worksheet #10.	Problem Definition	15
QAPP Worksheet #11.	Project Quality Objectives/Systematic Planning Process Statements...	17
QAPP Worksheet #12.	Measurement Performance Criteria Table	19
QAPP Worksheet #13.	Existing Data Criteria and Limitations Table.....	20
QAPP Worksheet #14.	Summary of Project Tasks	21
QAPP Worksheet #15.	Reference Limits and Evaluation Table	22
QAPP Worksheet #16.	Project Schedule Timeline Table	24
QAPP Worksheet #17.	Sampling Design and Rationale	25
QAPP Worksheet #18.	Sampling Locations and Methods/SOP Requirements Table	26
QAPP Worksheet #19.	Analytical SOP Requirements Table.....	27
QAPP Worksheet #20.	Field Quality Control Sample Summary Table.....	28
QAPP Worksheet #21.	Project Sampling SOP References Table	29
QAPP Worksheet #22.	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	30
QAPP Worksheet #23.	Monitoring/Analytical SOP References Table.....	33
QAPP Worksheet #24.	Analytical Instrument Calibration Table.....	34
QAPP Worksheet #25.	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table.....	35
QAPP Worksheet #26.	Sample Handling System	36
QAPP Worksheet #27.	Sample Custody Requirements	37
QAPP Worksheet #28.	QC Samples Table.....	38
QAPP Worksheet #29.	Project Documents and Records Table	39
QAPP Worksheet #30.	Analytical Services Table.....	40
QAPP Worksheet #31.	Planned Project Assessments Table	41
QAPP Worksheet #32.	Assessment Findings and Corrective Action Responses.....	42
QAPP Worksheet #33.	QA Management Reports Table.....	43
QAPP Worksheet #34.	Verification (Step I) Process Table	44
QAPP Worksheet #35.	Validation (Steps IIa and IIb) Process Table.....	45
QAPP Worksheet #36.	Validation (Steps IIa and IIb) Summary Table	46
QAPP Worksheet #37.	Usability Assessment	47
FIGURE 1.	Potential Sub-Slab and Soil Gas Locations	48

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 1 of 49

**QAPP Worksheet #1
Title and Approval Page**

Site Name/Project Name: Grenada Manufacturing (a.k.a. Rockwell International Wheel and Trim) EPA ID# MSD007037278
Site Location: Grenada, Mississippi (MS)

Document Title: Quality Assurance Project Plan (QAPP) for Grenada Manufacturing – May 2016 Mobilization

Lead Organization: Environmental Protection Agency/Environmental Response Team (EPA/ERT)

Preparer's Name and Organizational Affiliation: Brian Kanupp, Lockheed Martin/Scientific, Engineering, Response and Analytical Services (SERAS)

Preparer's Address, Telephone Number, and E-mail Address: 109 TW Alexander Drive, Durham, NC, 27711, (919) 541-7671, brian.p.kanupp@lmco.com

Preparation Date (Month/Day/Year): April 08, 2016

Investigative Organization's Project Manager/ Date: David B. Mickunas
Signature

Printed Name/Organization: David Mickunas/ERT Work Assignment Manager

Investigative Organization's Project QA Officer/Date: Steven Blaze 4/9/16
Signature

Printed Name/Organization: Steven Blaze/ERT Quality Coordinator

Lead Organization's Project Manager/Date: Brian Kanupp 05/02/2016
Signature

Printed Name/Organization: Brian Kanupp/SERAS Task Leader

Approval Signatures/Date: Deborah Killeen 4/8/16
Signature

Printed Name/Title: Deborah Killeen/SERAS QA/QC Officer

Approval Authority: SERAS

Other Approval Signatures/Date: Kevin Taylor 4/8/16
Signature

Printed Name/Title: Kevin Taylor /SERAS Program Manager

Document Numbering System: SERAS-293-DQAPP-040816

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	11 12

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
2.7 Existing Data Evaluation	<ul style="list-style-type: none"> - Sources of Existing Data and Information - Existing Data Criteria and Limitations Table 	13
2.8 Project Overview and Schedule	<ul style="list-style-type: none"> - Summary of Project Tasks 	14
2.8.1 Project Overview	<ul style="list-style-type: none"> - Reference Limits and Evaluation Table 	15
2.8.2 Project Schedule	<ul style="list-style-type: none"> - Project Schedule/Timeline Table 	16
Measurement/Data Acquisition		
3.1 Sampling Tasks	<ul style="list-style-type: none"> - Sampling Design and Rationale 	17
3.1.1 Sampling Process Design and Rationale	<ul style="list-style-type: none"> - Sample Location Map 	
3.1.2 Sampling Procedures and Requirements	<ul style="list-style-type: none"> - Sampling Locations and Methods/SOP Requirements Table 	18
3.1.2.1 Sampling Collection Procedures	<ul style="list-style-type: none"> - Analytical Methods/SOP Requirements Table 	19
3.1.2.2 Sample Containers, Volume, and Preservation	<ul style="list-style-type: none"> - Field Quality Control Sample Summary Table 	20
3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures	<ul style="list-style-type: none"> - Sampling SOPs 	
3.1.2.3 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Project Sampling SOP References Table 	21
3.1.2.4 Supply Inspection and Acceptance Procedures	<ul style="list-style-type: none"> - Field Equipment Calibration, Maintenance, Testing, and Inspection Table 	22
3.1.2.6 Field Documentation Procedures		
3.2 Analytical Tasks	<ul style="list-style-type: none"> - Analytical SOPs 	
3.2.1 Analytical SOPs	<ul style="list-style-type: none"> - Analytical SOP References Table 	23
3.2.2 Analytical Instrument Calibration Procedures	<ul style="list-style-type: none"> - Analytical Instrument Calibration Table 	24
3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 	25
3.2.4 Analytical Supply Inspection and Acceptance Procedures		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Required Documents
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	26 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		

Title: Grenada Manufacturing QAPP

Revision Number: 0.0

Revision Date: 04/08/16

Page: 6 of 49

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Data Review		
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	34 35 36 NA
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		

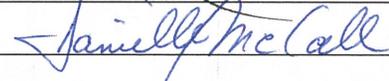
QAPP Worksheet #3
Distribution List

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
David Mickunas	Work Assignment Manager (WAM)	ERT	(919) 541-4191	(919) 541-0496	mickunas.dave@epamail.epa.gov	SERAS-293-DQAPP-040816
Stephen Blaze	Quality Coordinator	ERT	(732) 906-6921	(732) 321-6724	blaze.stephen@epamail.epa.gov	SERAS-293-DQAPP-040816
Cathy Amoroso	Remedial Project Manager (RPM)	EPA Region 4	(404)-562-8637	N/A	amoroso.cathy@epa.gov	SERAS-293-DQAPP-040816
Brian Kanupp	Gas Chromatography/Mass Spectrometry (GC/MS) Chemist/Task Leader (TL)	SERAS	(919) 541-7671	(919) 541-1536	brian.p.kanupp@lmco.com	SERAS-293-DQAPP-040816
Danielle McCall	Senior Mass Spectrometry /Mass Spectrometry (Sr. MS/MS) Chemist	SERAS	(919) 541-3508	(919) 541-1536	danielle.l.mccall@lmco.com	SERAS-293-DQAPP-040816
Deborah Killeen	Quality Assurance/Quality Control (QA/QC) Officer	SERAS	(732) 321-4245	(732) 494-4021	deborah.a.killeen@lmco.com	SERAS-293-DQAPP-040816
Kevin Taylor	Program Manager	SERAS	(732) 321-4202	(732) 494-4021	kevin.c.taylor@lmco.com	SERAS-293-DQAPP-040816

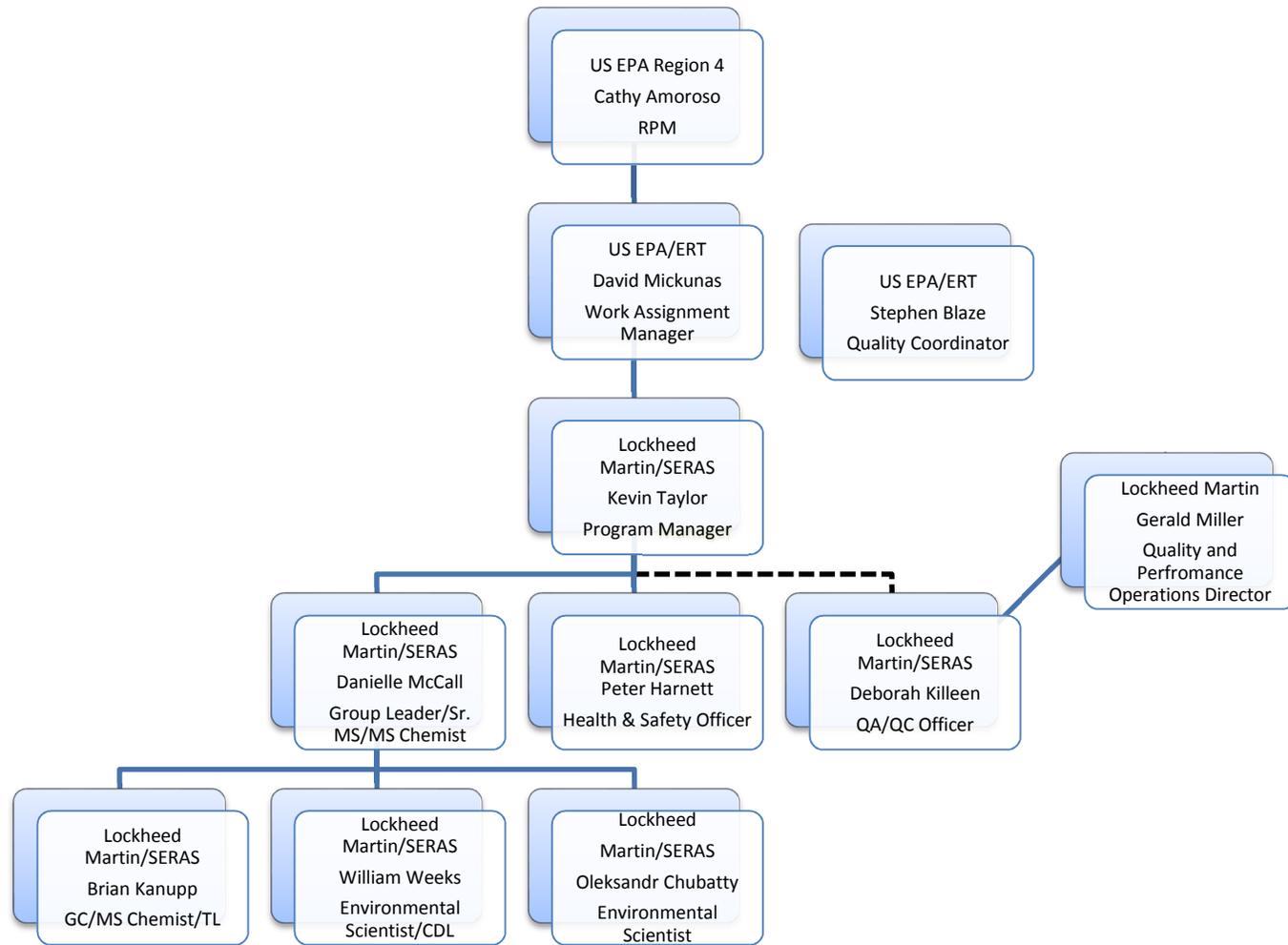
Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 8 of 49

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: SERAS/ERT/EPA R4

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Brian Kanupp	SERAS GC/MS Chemist/TL	(919) 541-7671		05/02/2016
David Mickunas	ERT WAM	(919) 541-4191		05/2/16
Cathy Amoroso	EPA Region 4 RPM	(404)-562-8637		
William Weeks	SERAS Environmental Scientist w/Commercial Driver's License (CDL)	(732) 321-4236		5/2/16
Danielle McCall	SERAS Sr. MS/MS Chemist	(919) 541-3508		5/2/16
Gary Newhart	ERT WAM	(513) 569-7661		

QAPP Worksheet #5 Project Organizational Chart



Title: Grenada Manufacturing QAPP

Revision Number: 0.0

Revision Date: 04/08/16

Page: 10 of 49

**QAPP Worksheet #6
Communication Pathways**

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Approval of initial QAPP and any amendments	ERT WAM ERT Quality Coordinator SERAS Program Manager SERAS QA/QC Officer SERAS TL	David Mickunas Stephen Blaze Kevin Taylor Deborah Killeen Brian Kanupp	(609) 865-1574 (732) 906-6921 (732) 321-4202 (732) 321-4245 (919) 541-7671	SERAS internal peer review, followed by ERT approval, implementation of changes effective only with approved QAPP or QAPP Change Form.
Nonconformance and Corrective Action	SERAS TL ERT WAM SERAS QA/QC Officer	Brian Kanupp David Mickunas Deborah Killeen	(919) 541-7671 (609) 865-1574 (732) 321-4245	Use of the Work Assignment Field Change Form for field issues.
Posting of Deliverables to the ERT-Information Management System (IMS) website	SERAS TL SERAS QA/QC Officer SERAS Administrative Support SERAS Advanced Air Laboratories Group Leader	Brian Kanupp Deborah Killeen Eileen Ciambotti Danielle McCall	(919) 541-7671 (732) 321-4245 (732) 321-4255 (919) 541-3508	As per work assignment, posting of deliverables to ERT- IMS website constitutes delivery to the WAM.
Work Assignment	SERAS Program Manager	Kevin Taylor	(732) 321-4202	Describes scope of work to SERAS personnel from the ERT WAM.
Health and Safety On-Site Meeting	SERAS TL and/or Site Health and Safety Officer	Brian Kanupp	(919) 541-7671	Describe potential site hazards, required personal protective equipment, and access to local emergency services.

QAPP Worksheet #7
Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Brian Kanupp	GC/MS Chemist/TL	SERAS	Project Supervision/Site Health and Safety Officer/Sampling, Analytical, and Monitoring Operations	Minimum B.S. degree plus 13 years of related experience / LM Employee Files
William Weeks	Environmental Scientist w/CDL	SERAS	CDL Driver/Sampling and Monitoring Operations	Minimum B.S. degree plus 3 years of related experience/LM Employee Files
Danielle McCall	Sr. MS/MS Chemist	SERAS	Assignment Oversight/Sampling, Analytical, and Monitoring Operations	Minimum B.S. degree plus 14 years of related experience/LM Employee Files
Oleksandr Chubatyy	Information Technology/Data Reduction Specialist	SERAS	Floor Plans/ARC-GIS/Data Reduction	Minimum B.S. degree plus 3 years of related experience/LM Employee Files
Deborah Killeen	QA/QC Officer	SERAS	QA Oversight/Deliverable Review	Minimum B.S. degree plus 14 years of related experience/LM Employee Files
Peter Harnett	Health & Safety (H&S) Officer	SERAS	H&S Oversight/Health and Safety Program (HASP) Review	Minimum BS degree plus 14 years related experience/Lockheed Martin Employee Files
Kevin Taylor	Program Manager	SERAS	Program Manager	Minimum BS degree plus 14 years related experience/Lockheed Martin Employee Files
David Mickunas	WAM	EPA/ERT	Technical Direction	EPA job-related qualifications/EPA Files
Stephen Blaze	Quality Coordinator	EPA/ERT	Project Quality Assurance	EPA job-related qualifications/EPA Files
Cathy Amoroso	RPM	EPA R4	Project Oversight	EPA job-related qualifications/EPA Files
Gary Newhart	WAM	EPA/ERT	Technical Direction	EPA job-related qualifications/EPA Files

**QAPP Worksheet #8
Special Personnel Training Requirements Table**

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Project Oversight/TL TAGA Monitoring/VOC Analysis/Sampling Operations	Health and Safety 40-Hour Course	Compliance Solutions	Apr 2015	Brian Kanupp	TL/GC/MS Chemist/SERAS	Health & Safety Files
	Demonstration of Capability (GC/MS)	SERAS	Mar 2016	Brian Kanupp		Quality Files
	Annual Data Integrity Training/Peak Integration Training		Apr 2015			
Trace Atmospheric Gas Analyzer (TAGA) Monitoring/Volatile Organic Compound (VOC) Analysis/Sampling Operations	Health and Safety 8-hour Refresher	Compliance Solutions	Jan 2015	Danielle McCall	SERAS	Health & Safety Files
	Demonstration of Capability (GC/MS)	SERAS	Mar 2016	Danielle McCall	Sr. MS/MS Chemist/SERAS	Quality Files
	Annual Data Integrity Training/Peak Integration Training		Apr 2015			
Data Reduction/Global Positioning System/Geographic Information System (GPS/GIS)	Health and Safety 8-hour Refresher	SERAS	Feb 2016	Oleksandr Chubatyy	Data Reduction Specialist/SERAS	Health & Safety Files
Field Operations	Health and Safety 8-hour Refresher	SERAS	Sept 2015	William Weeks	Environmental Scientist/SERAS	Health & Safety Files
QA Oversight	Uniform Federal Policy for Quality Assurance Project Plans	Advanced Systems	Jan 2006	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
QA Oversight	Changes to Environmental Laboratory Accreditation	Advanced Systems	May 2009	Deborah Killeen	QA/QC Officer/SERAS	Quality Files

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
QA Oversight	Lead Auditor Training	IT Corp	Sept 1991	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
Validation	Data Review & Validation	Laboratory Data Consultants	Jan 2007	Deborah Killeen	QA/QC Officer/SERAS	Quality Files

QAPP Worksheet #9 Project Scoping Session Participants Sheet

Project Name: Grenada Manufacturing (a.k.a. Rockwell International Wheel and Trim) (WA# SERAS-293) Projected Date(s) of Sampling: Week of May 2, 2016 Project Manager: Dave Mickunas			Site Name: Grenada Manufacturing (a.k.a. Rockwell International Wheel and Trim) Site Site Location: Grenada, MS		
Date of Session: 4/07/2016 Scoping Session Purpose: Discuss vapor intrusion mobilization and sampling activities					
Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Brian Kanupp	GC/MS Chemist/TL	SERAS	(919)-541-7671	brian.p.kanupp@lmco.com	Sampling, Analysis, Monitoring Operations
Danielle McCall	Senior MS/MS Chemist	SERAS	(919)-541-3508	danielle.l.mccall@lmco.com	Sampling, Analytical, Monitoring Oversight
David Mickunas	Work Assignment Manager	US EPA/ERT	(609)-865-1574	mickunas.dave@epa.gov	Work Assignment Manager
William Weeks	Environmental Scientist	SERAS	(732) 321-4236	william.v.weeks@lmco.com	Field Engineer
Deborah Killen	QA/QC Officer	SERAS	(732) 321-4245	deborah.a.killeen@lmco.com	QA Oversight/Deliverable Review
Peter Harnett	Health & Safety (H&S) Officer	SERAS	(732) 494-4011	peter.b.harnett@lmco.com	H&S Oversight
Oleksandr Chubatyy	Information Technology/Data Reduction Specialist	SERAS	(732) 321-4249	oleksandr.m.chubatyy@lmco.com	Floor Plan/ARC-GIS/Data Reduction

Comments/Decisions: TAGA 3064 from RTP will be mobilized on 04/29/16. Bill Weeks will drive it to Grenada, Mississippi (MS). Danielle McCall and Brian Kanupp, will fly to Jackson, MS or Memphis, Tennessee (TN) as flight schedules permit and drive to the Site on 05/01/16. Instrument checkout and setup for the TAGA and GC/MS will occur on-site in Grenada, MS on 05/01/16. Approximately 18 sub-slab vapor intrusion probes will be installed in residences and sampled by SERAS personnel. Approximately 5-6 outdoor soil gas probes will be installed by EPA Region 4 or their contractors and sampled and analyzed by SERAS personnel. TAGA indoor air monitoring of approximately 18 residences, and TAGA mobile monitoring on and around the Site will be directed by the EPA WAM or Region 4 RPM, Cathy Amoroso, and conducted by SERAS personnel. GC/MS analysis of bag samples collected from the sub-slab and soil gas probes will be conducted on-site by SERAS personnel. Field operations, including sub-slab probe installation, TAGA indoor air and mobile monitoring, Tedlar bag sampling of sub-slab and soil gas probes, and GC/MS analysis are scheduled to commence on 05/02/16 and conclude on 05/05/16. Access agreements to properties will be obtained by EPA Region 4 and may determine the ultimate scope of the operations. Flexibility of field operations should be maintained. The target compound list for TAGA monitoring will be tetrachloroethene (PCE) and trichloroethene (TCE) total dichloroethenes (DCE), benzene, toluene total xylenes (m,p & o-xylene and ethylbenzene) and vinyl chloride (VCL). The target compound list for GC/MS analysis will be PCE, TCE, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), benzene, toluene, m&p-xylene, o-xylene, ethylbenzene and VCL. EPA Regional Screening Levels (RSLs) for sub-slab and soil gas are listed in Worksheet #15. Meteorological data collected throughout the event from local meteorological stations will be used. Demobilization is scheduled for 05/06/16.

Consensus Decisions: WAM indicated that the scope and schedule may change based on access agreements.

SERAS-293-DQAPP-040816

QAPP Worksheet #10 Problem Definition

<p>The problem to be addressed by the project: The environmental study in the Eastern Heights neighborhood grew out of ongoing work by EPA and the Mississippi Department of Environmental Quality (MDEQ) to oversee the cleanup of the Grenada Manufacturing, LLC facility. Remedial activities at the Grenada facility began in 1990 when waste from the former on-site landfill was evacuated for off-site disposal under the direction of MDEQ. Since 1995 EPA has overseen the cleanup of the facility under the Resource Conservation and Recovery Act (RCRA) corrective action program. The original 1998 RCRA permit with the facility was the roadmap for the facility to address legacy contamination and waste. The permit was renewed in 2010. Under the RCRA permits the facility has conducted numerous investigations and response actions including the closure of a former sludge lagoon. Approximately 239 gallons of trichloroethene (TCE) and 2,200 gallons of toluene were removed from groundwater. Institutional controls were put in place to prevent potential exposures. Lastly, an eight million dollar permeable reactive barrier (PRB) was installed for groundwater migration control and treatment. The effectiveness of the PRB is being evaluated by the EPA. Between September and October of 2015, EPA oversaw sampling of indoor air at six residences, outdoor air, and groundwater in the Eastern Heights neighborhood. TCE (and daughter products) have been detected in shallow groundwater in parts of the neighborhood. EPA has determined that additional investigations are needed to address the potential for air contamination. TCE was detected in residential indoor air above regional screening levels, but below levels that require an immediate response action. TCE was also detected at similar levels in the outdoor air near the six residences. EPA conducted additional air sampling in January 2016 and efforts are underway to develop groundwater remediation plans on the Grenada Manufacturing, LLC property. The origin(s) of the TCE groundwater contamination in Eastern Heights is under investigation.</p>
<p>SERAS personnel have been tasked by ERT to provide monitoring, sampling and analytical support to the EPA Region 4 during a vapor intrusion study. Sub-slab and soil gas samples will be used to better characterize the volatile organic compound (VOC) contamination and determine if vapor intrusion is occurring in the residential homes. TAGA mobile monitoring will be conducted around the Site perimeter. Indoor air monitoring and monitoring near the sub-slab port installations will be conducted by the TAGA inside approximately 18 residences.</p>
<p>The environmental questions being asked: Is the contaminant plume contributing to elevated levels of VOCs in the indoor and ambient air in and around the residences of the Eastern Heights neighborhood? Are past waste disposal practices at the facility contributing to air contamination in and around the facility (i.e. is TCE migrating, via the air pathway, from on-site waste disposal areas and/or contaminated groundwater?)</p>
<p>Observations from any site reconnaissance reports: N/A</p>
<p>A synopsis of existing data or information from site reports: Previous Site investigations found TCE present above the indoor air RSLs in six Eastern Heights residences. Previous Site cleanup activities removed large amounts of TCE and toluene from groundwater near the Eastern Heights neighborhood. Groundwater in parts of the Eastern Heights neighborhood is contaminated with TCE and related compounds, including shallow groundwater.</p>
<p>The possible classes of contaminants and the affected matrices: VOC contamination of soil and groundwater impacting indoor and ambient air by vapor intrusion.</p>

Title: Grenada Manufacturing QAPP

Revision Number: 0.0

Revision Date: 04/08/16

Page: 16 of 49

The rationale for inclusion of chemical and nonchemical analyses:

239 gallons of TCE and approximately 2,200 gallons of toluene were removed from groundwater on-site. TCE was detected in residential indoor air above the regional screening levels in the Eastern Heights community. Additional compounds of concern, including benzene, ethylbenzene, xylenes and PCE and its breakdown constituents will be monitored as requested by the RPM. Real-time indoor and ambient air monitoring is intended to determine if vapor intrusion is occurring in the Eastern Heights residences from the contaminant plume. Sub-slab soil gas and soil gas sampling and analysis are intended to characterize and determine the level of VOC present in the soil gas near and in the residences. TAGA monitoring will assist in determining whether the ambient air is being contaminated by release from the facility either by vapor intrusion or groundwater discharge to the surface.

Information concerning various environmental indicators:

The presence of previously identified contamination in ground water and surface water at the Grenada Manufacturing (a.k.a. Rockwell International Wheel and Trim) Site, as well as the adjacent Moose Lodge Road Disposal Site, indicates the possibility of indoor and ambient air contamination from vapor intrusion.

Project decision conditions (“If..., then...” statements):

If the sample results for the sub-slab and soil gas samples exceed the project action limits listed in Worksheet #15, then EPA Region 4 will determine further courses of action. The sub-slab and soil gas project action levels were derived using the vapor intrusion screening level calculator found at <https://www.epa.gov/vaporintrusion>

QAPP Worksheet #11
Project Quality Objectives /Systematic Planning Process Statements

<p>Who will use the data? EPA Region 4</p>
<p>What will the data be used for? Data will be used to characterize the VOC contamination at and around the Site and determine if vapor intrusion may be occurring. Data obtained will be used to support decisions made by the EPA and determine what further actions are necessary.</p>
<p>What type of data is needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques) GC/MS VOC analysis for benzene, toluene, o-xylene, m&p-xylenes, ethyl benzene, PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and VCL – on-site mobile laboratory – sub-slab and soil gas Mobile monitoring and indoor air monitoring by TAGA MS/MS for benzene, toluene, total xylenes (o-xylene, m&p-xylene and ethylbenzene), PCE, TCE, total DCE (1,1-DCE, cis-1,2-DCE and trans-1,2-DCE,) and VCL – on-site mobile laboratory. Real-time data will be transmitted wirelessly via the VIPER data management system and viewable online through ERT Deployment Manager.</p>
<p>How “good” do the data need to be in order to support the environmental decision? On-site GC/MS data must meet definitive data requirements. TAGA MS/MS monitoring data must meet the following screening data requirements: (Refer to Worksheet #22)</p> <ul style="list-style-type: none"> • Monitoring documentation in the form of field logbooks and appropriate field data sheets • All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field, personal, or instrument log notebook. • Detection limits (DLs) and quantitation limits (QLs) will be determined and documented, along with the data, where appropriate.
<p>How much data are needed? (number of samples for each analytical group, matrix, and concentration) VOCs – 18 sub-slab samples from residential units. VOCs - 5-6 soil-gas samples from outdoor wells. Indoor air monitoring for approximately 18 units. Mobile air monitoring at various locations to be determined by the WAM and/or RPM.</p>
<p>Where, when, and how should the data be collected/generated? The data for residences near or adjacent to Grenada Manufacturing (a.k.a. Rockwell International Wheel and Trim) will be collected during the week of May 2, 2016 in accordance with approved sampling and analytical standard operating procedures (SOPs). Indoor air monitoring and mobile monitoring data will be collected and stored via the VIPER data management system. (Refer to Worksheets #21, #22, & #23)</p>
<p>Who will collect and generate the data? SERAS personnel will collect sub-slab and soil gas samples, analyze sub-slab and soil gas samples by GC/MS and perform mobile and stationary monitoring using the TAGA MS/MS.</p>
<p>How will the data be reported? TAGA MS/MS monitoring data will be reported to the WAM on-site after the completion of each survey. A TAGA Analytical Report will be prepared in accordance with SERAS SOP #4014, <i>TAGA Analytical Report Preparation</i>. VOC data from samples collected in Tedlar bags will be reported to the WAM on-site. A final GC/MS Analytical Report will be prepared in accordance with SERAS SOP #4015, <i>GC/MS Analytical Report Preparation</i>. A Trip Report, to include all the generated reports as appendices, will be the final deliverable to the WAM and will be prepared in accordance with SERAS SOP #4017, <i>Preparation of Trip Reports</i>. Data will be disseminated to EPA Region 4 by the WAM.</p>

Title: Grenada Manufacturing QAPP

Revision Number: 0.0

Revision Date: 04/08/16

Page: 18 of 49

How will the data be archived?

Hard copies of all deliverables will be stored in SERAS Central Files and e-copies will be stored on SERAS Local Area Network (LAN). VOC data from sub-slab and soil gas analysis will be imported into a Scribe database and posted to the ERT-IMS website. Data will be archived by SERAS in accordance with Administrative Procedure (AP) #34, *Archiving Data Electronic Files*. VIPER data will be maintained on the ERT server.

QAPP Worksheet 12
Measurement Performance Criteria Table

Matrix	Soil Gas / Sub-Slab Soil Gas (Tedlar Bag)				
Analytical Group	VOA				
Concentration Level	SIM				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP #2102	SERAS SOP #1741	Precision	Relative Percent Difference (RPD) $\pm 25\%$	Laboratory Replicates	A
		Accuracy/Bias	$\pm 30\%$ Recovery	Laboratory Control Sample (LCS)	A
		Accuracy/Bias	$\pm 40\%$ of mean area response	Internal Standards	A
		Accuracy/Bias Contamination	<Reporting Limit (RL)	Method Blank	A
		Sensitivity	Limit of Detection (LOD) – 7 replicates times the Student’s t-factor <RL Limit of Quantitation (LOQ) $\pm 30\%$	LOD/LOQ Study	A
		Completeness	> 90% Tedlar sampling, > 90% laboratory analysis	Data Completeness Check	S & A

¹Reference number from QAPP Worksheet #21 (see Section 3.1.2)

²Reference number from QAPP Worksheet #23 (see Section 3.2)

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 20 of 49

QAPP Worksheet #13
Existing data Criteria and Limitations Table

Existing data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
EPA Responses, Fact Sheets and Presentations	https://www.epa.gov/Grenada_cleanup	United States Environmental Protection Agency	Background and informational purposes	Should not be considered a source for definitive data used to determine project quality objectives
Grenada Manufacturing, LLC Fact Sheets	https://www.deq.state.ms.us/MDEQ.nsf/page/CE_Grenada_ManufacturingLLC	Mississippi Department of Environmental Quality	Background and informational purposes	Should not be considered a source for definitive data used to determine project quality objectives

QAPP Worksheet #14 Summary of Project Tasks

<p>Sub-Slab Soil Gas Probe Installation Tasks: Sub-slab soil gas probes will be installed in appropriate and authorized structures by SERAS personnel upon direction from the WAM or RPM. The probes will be installed at locations chosen by Region 4 and ERT personnel. They will be installed flush with the slab and capped with a Teflon® coated plug that will be removed during sampling operations. Probes will be installed in accordance with SERAS SOP # 2082, <i>Construction and Installation of Permanent of Sub-Slab Soil Gas Vapor Probes</i>.</p>
<p>Sampling Tasks: Sub-slab soil gas and soil gas samples after soil gas well installation is completed by EPA Region 4 or their contractors will be collected in 1-liter (L) Tedlar bags at locations designated by the WAM or RPM in accordance with SERAS SOP #2102, <i>Tedlar Bag Sampling</i>.</p>
<p>Analysis Tasks: VOC analysis of all samples collected in Tedlar bags will be performed on-site in the TAGA mobile laboratory using a GC/MS in accordance with SERAS SOP #1741, <i>Field Analysis of VOCs in Gaseous Phase Samples by GC/MS Loop Injection</i>. Real-time indoor/ambient air monitoring and mobile monitoring will be performed on-site using the TAGA MS/MS in accordance with SERAS SOP #1711 <i>Trace Atmospheric Gas Analyzer (TAGA) IIe</i>.</p>
<p>Quality Control Tasks: Field QC samples are described in <u>Worksheet #20</u>. Analytical QC samples are outlined in Worksheets #12 and #28.</p>
<p>Existing data: Will be used for reference in development of work plan (WP), health and safety plan (HASP), and QAPP.</p>
<p>Data Management Tasks: All sampling locations will be identified by a field assigned number. Field sampling data will be recorded on field data sheets or in field books. All samples will be delivered under chain of custody (COC) to the on-site laboratory. A Scribe® database will be used for data management activities. All deliverables will be generated in accordance to the appropriate SERAS SOP and posted to the ERT-IMS website upon completion. Posting to the ERT-IMS site will be considered as completion of the deliverable. Real-time data will be transmitted wirelessly via the VIPER data management system and viewable online through the Deployment Manager.</p>
<p>Documentation and Records: All documentation will be recorded in accordance with SERAS SOP #4001, <i>Logbook Documentation</i> and SOP #2002, <i>Sample Documentation</i>. Documents and records that may be generated during this project include: WP, QAPP, HASP, Field Laboratory Logbooks, Site Map, Sample Labels, COC Records, Air Sampling Worksheets, Scribe Database, GC/MS Analytical Report, TAGA Analytical Report, Trip Report, VIPER monitoring data, and Field Change Forms, if required.</p>
<p>Assessment/Audit Tasks: No performance audit of field operations is anticipated for this project. The tasks associated with this QAPP are assessed using peer reviews and management system reviews. Peer review enables the chemist to identify and correct reporting errors before reports are submitted. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained.</p>
<p>Data Review Tasks: All project deliverables will receive an internal peer review prior to release, per guidelines established in the SERAS AP #22, <i>Peer Review of SERAS Deliverables</i>. GC/MS analytical data for soil gas and sub-slab samples will be validated during peer review by the SERAS QA/QC Officer and appropriate flags added if data are qualified.</p>

QAPP Worksheet 15
Reference Limits and Evaluation Table

Matrix: Soil Gas / Sub-Slab Soil Gas (Tedlar Bag)

Analytical Group: VOC

Concentration Level: Low Level SIM

Analyte	CAS Number	Project Action Limit ¹ (µg/m ³ /ppbv*)	Project Quantitation Limit (ppbv)	Analytical Method		Achievable Laboratory Limits	
				MDLs ²	Method QLs (ppbv)	MDLs, ppbv ³	QLs, ppbv
Benzene	71-43-2	12/3.76	0.50	0.34	0.50	0.109	0.50
Toluene	108-88-3	170,000/45,100	0.50	0.99	0.50	0.0598	0.50
o-Xylene	95-47-6	3,500/806	0.50	0.57	0.50	0.102	0.50
m&p-Xylenes	108-38-3/106-42-3	3,500/806	0.50	0.76	0.50	0.125	0.50
Ethylbenzene	100-41-4	37/8.52	0.50	0.27	0.50	0.211	0.50
Tetrachloroethene	127-18-4	360/53.1	0.50	0.75	0.50	0.0766	0.50
Trichloroethene	79-01-6	16/2.98	0.50	0.45	0.50	0.0845	0.50
1,1-Dichloroethene	75-35-4	7,000/1,770	0.50	NS	0.50	0.0625	0.50
cis-1,2-Dichloroethene	156-59-2	NS	0.50	NS	0.50	0.0672	0.50
trans-1,2-Dichloroethene	156-60-5	NS	0.50	NL	0.50	0.0350	0.50

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 23 of 49

**QAPP Worksheet 15
Reference Limits and Evaluation Table**

Matrix: Soil Gas / Sub-Slab Soil Gas (Tedlar Bag)

Analytical Group: VOC

Concentration Level: Low Level SIM

Analyte	CAS Number	Project Action Limit ¹ (µg/m ³ /ppbv*)	Project Quantitation Limit (ppbv)	Analytical Method		Achievable Laboratory Limits	
				MDLs ²	Method QLs (ppbv)	MDLs, ppbv ³	QLs, ppbv
Vinyl chloride	75-01-4	5.6/2.19	5.0**	0.33	0.50	1.46	5.0

¹ Based on the Regional Screening Level (RSL) Resident Air Supporting Table (TR=1E-6, HQ=1) dated November 2015. Soil gas/sub-slab benchmarks are calculated using the EPA Vapor Intrusion Screening Level (VISL) Calculator Version 3.4 June 2015.
<https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels>.
<https://semspub.epa.gov/work/03/2220589.pdf>

² Based on Table 4, Method Detection Limits, Scan Mode, EPA Method TO-15, January 1999 <https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-15r.pdf>

³ Based on Method Detection Limit Study performed on TAGA Mobile Laboratory 3064, December 2015; values below the RL will not be reported
ppbv = parts per billion by volume

µg/m³ = microgram per cubic meter

* NS = Not specified; NL = Not listed in Table 4 of Method TO-15

**The laboratory's achievable Quantitation Limit exceeds the project action limit (PAL)

QAPP Worksheet #16
Project Schedule Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Installation of sub-slab probes	SERAS	5/02/16	5/04/16	No	Not applicable
TAGA Monitoring	SERAS	5/02/16	5/05/16	No	Not applicable
Tedlar Bag Sampling/On-site analysis	SERAS	5/02/16	5/05/16	No	Not applicable
GC/MS Analytical Report	SERAS	5/09/16	2 weeks after demobilization	Final GC/MS Analytical Report	5/23/16
TAGA Analytical Report	SERAS	5/09/16	2 weeks after demobilization	Final TAGA Analytical Report	5/23/16
Trip Report	SERAS	5/23/16	2 weeks after Final TAGA Analytical Report	Final Trip Report	6/10/16

QAPP Worksheet #17 Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

EPA Region 4 personnel will determine what locations are sampled based on appropriate and authorized access agreements, known ground water, soil and sediment contamination, Site reconnaissance, and Site survey data.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details].

Based on EPA vapor intrusion guidelines (<https://www.epa.gov/vaporintrusion/technical-guide-assessing-and-mitigating-vapor-intrusion-pathway-subsurface-vapor>), sub-slab soil gas samples will be collected. Sub-slab soil gas probes will be installed at locations designated by the WAM and/or EPA Region 4 RPM. Sub-slab soil gas samples will be collected in Tedlar bags and analyzed on-site by GC/MS. Soil gas samples will also be collected in Tedlar bags from installed soil gas wells. Approximately 18 sub-slab soil gas samples and five to six soil gas samples will be collected in Tedlar bags. Prior to any sampling event, the unit will be surveyed for lifestyle chemical sources and sources may be removed by SERAS personnel.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number	Matrix	Depth ()	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)*	Sampling SOP Reference ¹	Rationale for Sampling Location ²
To be determined*	Sub-Slab Soil Gas ³	Below slab	VOC	Low Level SIM	~18 (None)	2102	Judgmental/Access Agreement
To be determined	Soil Gas	Below ground, depth to be determined	VOC	Low Level SIM	~5-6 (None)	2102	Judgmental/As determined by RPM and/or WAM

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #21)

²Refer to Worksheet #17

* Exact sampling location information to be added once on site.

³Refer to Figure 1 for potential residential sub-slab locations

Approximate Sample Locations for Soil Gas Samples in Eastern Heights Neighborhood

Soil gas screening using GC/MS in the TAGA Mobile Laboratory	Approximate Latitude	Approximate Longitude	
Soil Gas	33.80590585	-89.79877477	near VAP 4
Soil Gas	33.80541088	-89.79921924	near VAP 5
Soil Gas	33.80526629	-89.79966614	near VAP 6
Soil Gas	33.80565408	-89.80037309	near VAP 7
Soil Gas	33.80599927	-89.80101672	near VAP 8
Playground			contingent on access authorization
Private Residence			NW corner of neighborhood; contingent on access authorization

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil Gas/Sub-Slab Soil Gas	VOC	Low Level SIM	SERAS SOP #1741	5-mL loop injection	1-L Tedlar Bag	Place in dark plastic bag	24 Hours

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference ¹	No. of Sampling Locations	No. of Field Duplicate Pairs	Inorganic No. of MS	No. of Trip Blanks	No. of Equip. Blanks	No. of PT Samples	Total No. of Samples to Lab
Soil Gas/Sub-Slab Soil Gas	VOC	Low Level SIM	SERAS SOP #1741	23-24	NA	NA	NA	NA	NA	~23-24

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
 NA = Not applicable

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
2082	<i>Construction and Installation of Permanent of Sub-Slab Soil Gas Wells, Rev. 0.1, 5/7/15</i>	SERAS	NA		
2002	<i>Sample Documentation, Rev. 1.0, 1/4/16</i>	SERAS	NA		
2005	<i>Quality Assurance/Quality Control Samples, Rev. 0.0, 8/11/94</i>	SERAS	NA		
4005	<i>Chain of Custody Procedures, Rev. 2.0, 1/30/16</i>	SERAS	NA		
2102	<i>Tedlar Bag Sampling, Rev. 0.0 08/06/01</i>	SERAS	1-L Tedlar bags		

NA = Not applicable
 SOPs can be found at https://www.epaos.org/site/site_profile.aspx?site_id=2107

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Mass Flow Controller	Calibrated by operator	NA	Calibration Monitoring	Proper flow being achieved	Daily or when needed	Within 5% of reference standard throughout the range	Recalibrate	Operator	SERAS SOP # 1711
TAGA MS/MS [‡]	Minimum six point calibration for all target compounds	Check gas and standard supply daily, optimize tuning parameters, adjust peak widths, and ensure correct mass assignments	VOC Analysis	Ion source, first quadrupole rods, check needle valve, tighten Swagelok ¼” nuts to injection port	Minimum one to two standard calibrations per monitoring day.	Correlation coefficient (r) of each ion pair is greater than or equal to 0.90	Inspect system for problems; perform maintenance (i.e. source and rod cleaning, etc.). Re-tune and rerun calibration	Analyst	SERAS SOP # 1711
Dwyer Rotameter	Calibrated by manufacturer	NA	NA	NA	Annual	Manufacturer's Specifications	Recalibrate	Manufacturer or designated vendor	Manufacturer's Operating Guide
Gilibrator calibration bubble meter	Calibrated by manufacturer	NA	NA	NA	Annual	Manufacturer's Specifications	Recalibrate	Manufacturer or designated vendor	Manufacturer's Operating Guide

¹Specify the appropriate reference letter or number from the Project Sampling SOP References table (Worksheet #21 and #23).

NA = Not applicable

[‡]See TAGA QA/QC Protocol Table below.

QA/QC Protocols for SOP #1711

Instrument	Procedure	Frequency	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
TAGA MS/MS	Calibrate sample air flow (SAF)	First day of monitoring activities	1200 to 1500 mL/sec based on environmental conditions	Adjust span on MKS box	Analyst	SERAS SOP #1711
TAGA MS/MS	Calibrate mass flow controller (MFC)	First day of monitoring activities	The maximum flow rate should be adjusted to be within 2% of desired flow. After ten readings for each of three flows, maximum error should be below $\pm 5\%$.	Adjust span on MKS box	Analyst	SERAS SOP #1711
TAGA MS/MS	Standard calibration	Beginning (BOD) and end (EOD) of each monitoring day. Depending on environmental and instrumentation factors, calibrations may be repeated prior to any monitoring survey.	Correlation coefficient (r) of each ion pair is greater than or equal to 0.90	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	SERAS SOP #1711
TAGA MS/MS	Transport Efficiency	Beginning and end of each monitoring day	85% efficiency	Inspect Teflon hose for leaks or kinks	Analyst/Field personnel	SERAS SOP #1711

QA/QC Protocols for SOP #1711

Instrument	Procedure	Frequency	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
TAGA MS/MS	Response Factor (RF)/Intermediate Response Factor (IRF)	Calculated from each calibration for each ion pair	IRF is calculated between a pair of calibrations. A percent difference (%D) of the compound's RF is calculated between pairs of calibrations. If %D is greater than 25%, the IRF must be used to quantify the target compound.	Not applicable	Analyst	SERAS SOP #1711
TAGA MS/MS	Detection and Quantitation Limits	Start of each monitoring day	Project specific, calculated using initial ambient air data segment collected at the beginning of BOD calibration and the RF or IRF	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	SERAS SOP #1711
TAGA MS/MS	30 mL spike	One minute data segment collected at end of each monitoring survey	It's equivalent concentration in ppbv (approximately 7 ppbv)	Inspect system for problems; re-tune, perform maintenance (i.e. ion source cleaning, rod cleaning, etc.). Rerun calibration	Analyst	SERAS SOP #1711

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 33 of 49

QAPP Worksheet #23
Monitoring/Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
1711	Trace Atmospheric Gas Analyzer (TAGA) IIE Operation, Rev. 0.0 10/22/2012	Screening	VOC	TAGA MS/MS	SERAS Mobile Laboratory	<input type="checkbox"/>
1741	Field Analysis of VOCs in Gaseous Phase Samples by GC/MS Loop Injection., Rev. 1.1 06/25/2015	Definitive	VOC	GC/MS	SERAS Mobile Laboratory	<input type="checkbox"/>

SOPs can be found at https://www.epaos.org/site/site_profile.aspx?site_id=2107

QQAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
GC/MS	Instrument Performance Check	Every 24 hours	Within the ion abundance criteria listed in the method	Re-tune and recalibrate	Analyst	SERAS SOP #1741
GC/MS	Initial calibration (IC), minimum 5-points for all analytes	Initially prior to sample analysis. After changes to instrument and when instrument does not meet method criteria.	Relative standard deviation (RSD) ≤ 30%	Inspect system for problems; perform maintenance (i.e. ion source cleaning, column replacement, etc.), check calibration standards. Rerun IC, reanalyze affected samples	Analyst	SERAS SOP #1741
GC/MS	Initial Calibration Verification (ICV)	Immediately following an initial calibration	Percent recovery (%R) within ±30%	Rerun ICV. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	SERAS SOP #1741
GC/MS	Daily Continuing Calibration Check (CCC)	Every 24 hours	Percent difference (%D) <±30%	Rerun CCC. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	SERAS SOP #1741
GC/MS	Daily Low Level Continuing Calibration Check (LLCCC)	Every 24 hours	Percent difference (%D) = ±50%	Rerun LLCCC. If needed, inspect system for problems, perform maintenance (i.e. ion source cleaning, column replacement, etc.), rerun IC	Analyst	SERAS SOP #1741

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23)

Title: Grenada Manufacturing QAPP

Revision Number: 0.0

Revision Date: 04/08/16

Page: 35 of 49

QAPP Worksheet #25

Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
GC/MS	Check gas supply daily, bake or change trap as needed, manual tune if 4-Bromofluorobenzene (BFB) not within criteria, cut or change column, change septum as needed.	VOC Analysis	Check ion source, gas supply, septum seal, vacuum, trap	Prior to sample analysis or when instrument does not meet criteria	BFB criteria achieved, Relative standard deviation (RSD) $\leq 30\%$,	Recalibrate and/or perform necessary instrument maintenance, check calibration standards, re-analyze affected samples.	Analyst	SERAS SOP #1741

¹Specify the appropriate reference letter or number from Analytical SOP References table (Worksheet #23)

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): William Weeks, SERAS Environmental Scientist
Sample Packaging (Personnel/Organization): NA
Coordination of Shipment (Personnel/Organization): NA
Type of Shipment/Carrier: NA
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Brian Kanupp, SERAS GC/MS Chemist or Danielle McCall, Sr. MS/MS Chemist
Sample Custody and Storage (Personnel/Organization): Brian Kanupp, SERAS GC/MS Chemist, or Danielle McCall, Sr. MS/MS Chemist
Sample Preparation (Personnel/Organization): NA
Sample Determinative Analysis (Personnel/Organization): Danielle McCall, Sr. MS/MS Chemist
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples will be consumed within 24 hours of collection
Sample Extract/Digestate Storage (No. of days from extraction/digestion): NA
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: NA
Number of Days from Analysis: NA

NA = Not applicable

QAPP Worksheet #27 **Sample Custody Requirements**

<p>Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):</p> <p>Samples collected in Tedlar bags by SERAS personnel will be relinquished under COC to the TAGA Mobile Laboratory for on-site VOC analysis in accordance with SERAS SOP # 4005, <i>Chain of Custody Procedures</i>. All COC records will receive a peer review in the field prior to relinquishment</p> <p>Procedures outlined in SERAS SOP #2002, <i>Sample Documentation</i> will be applied (refer to Worksheet #21).</p>
<p>Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal):</p> <p>No samples will be archived at the laboratory.</p>
<p>Sample Identification Procedures:</p> <p>Each sample will be identified with a unique identification number at the time of collection. The number will be listed on the label of every sample container collected at a given location.</p>
<p>Chain-of-custody Procedures:</p> <p>Chain-of-custody records will be generated for all samples submitted for analysis using Scribe database software. Procedures outlined in SERAS SOP #4005, <i>Chain of Custody Procedures</i> will be applied.</p>

**QAPP Worksheet #28
 QC Samples Table**

Matrix	Soil Gas/Sub-Slab Soil Gas (Tedlar Bag)
Analytical Group	VOC
Concentration Level	Low Level SIM
Sampling SOP	2102
Analytical Method/ SOP Reference	1741
Sampler's Name	William Weeks
Field Sampling Organization	SERAS
Analytical Organization	ERT/SERAS Mobile Laboratory
No. of Sample Locations	23-24

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standard	Each sample	±40% of daily calibration IS response	Re-analyze sample	Analyst	Precision/Accuracy /Bias	±40% of daily calibration IS response
LCS	One perf shift	± 30% R	Clean, repair, re- analyze	Analyst	Accuracy/Bias	± 30% R
Method Blank	1/24-hour clock	< Reporting Limit	Clean, repair, re- analyze	Analyst	Accuracy/Bias Contamination	< Reporting Limit
LOD/LOQ Study	Annual	LOD < Reporting Limit LOQ ±30%	Clean, repair, re- analyze.	Analyst	Sensitivity	LOD < Reporting Limit LOQ ±30% or within control chart limits
Lab Replicates	1 per 24-hour shift	RPD ±25%	Reanalyze and/or flag data	Analyst	Precision	RPD ±25%

NA = Not applicable

QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
Chain of custody records Sample Labels Tedlar Sampling Worksheets Field Change Form (if necessary)	Instrument Run Logs Preventive Maintenance Logs Instrument Printouts Analytical Results Monitoring Results Internal COC Records	NA	UFP-QAPP Verification Checklist	Final TAGA Analytical Report GC/MS Analytical Report Trip Report Scribe Database WP QAPP HASP

NA = Not applicable

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil Gas/Sub-Slab Soil Gas	VOC	Low	See Worksheet #18	SERAS SOP #1741	Preliminary data at end of day of analysis GC/MS Analytical Report in 14 days after demobilization	Lockheed Martin – SERAS 109 T. W. Alexander Dr. Durham, NC 27709 (919) 541-3508 Danielle McCall Sr. MS/MS Chemist	Not applicable

**QAPP Worksheet #31
Planned Project Assessments Table**

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Laboratory Accreditation Audit	Every 2 years	External	NJDEP	NELAC Accreditation Agency	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	NELAC Accreditation Agency
Performance Evaluation Sample	Annual	Internal	SERAS	NELAC Accreditation Agency	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Deborah Killeen, QA/QC Officer, SERAS
Mobile Laboratory Audit	Annual	Internal	SERAS	Deborah Killeen, QA/QC Officer, SERAS	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Danielle McCall, Sr. MS/MS Chemist, ERT/SERAS Mobile Laboratory (RTP Office)	Deborah Killeen, QA/QC Officer, SERAS

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Field Observations/ Deviations from Work Plan	Logbook	Brian Kanupp/TL, SERAS	Immediately	Field Change Form	Brian Kanupp/TL, SERAS	Within 24 hours of change
Lab Performance Audits	Audit report	Deborah Killeen, SERAS QA/QC Officer	Within 30 days	Corrective Action Plan	NELAP Accreditation Agency	Within 30 days
Peer Review	In the deliverable	Brian Kanupp/TL, SERAS	Prior to deliverable due date	Comments directly in the deliverable	Brian Kanupp/TL, SERAS	Prior to deliverable due date
Internal Lab Performance Audits	Audit report	Danielle McCall, TL, SERAS	Within 45 days	Corrective Action Plan	Deborah Killeen, QA/QC Officer, SERAS	Within 45 days

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 43 of 49

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Technical Report	Monthly	20 th of the month following performance period	TL/SERAS	ERT Project Officer and WAM
QA Report	Quarterly	February, May, August, November	QA/QC Officer/SERAS	ERT Project Officer and Quality Coordinator

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain of Custody Record	Reviewed by Field Sampling Personnel in field and prior to final analytical report preparation	Internal	SERAS TL
GC/MS Analytical Report	Reviewed for accuracy	Internal	Peer Review Team
TAGA Analytical Report	Reviewed for accuracy	Internal	Peer Review Team
Trip Report	Reviewed for accuracy	Internal	Peer Review Team
Completeness Check	Review of Planning Documents, Analytical Data package, Sampling Documents and External Reports, as applicable, using the UFP-QAPP Checklist	Internal	SERAS TL

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in the QAPP were followed and any deviations noted	SERAS TL, ERT WAM
IIa	COC Records	Examine COC records and match with requested analyses.	SERAS GC/MS Chemist SERAS QA/QC Officer
IIa	Lab Data Package	Examine packages against COC records (holding times, sample handling, methods, sample identifications, qualifiers).	SERAS GC/MS Chemist SERAS QA/QC Officer
IIb	Lab Data Package	Qualify data based on QC deficiencies (precision/accuracy, %RSD, %D, etc.)	SERAS TL SERAS QA/QC Officer

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIb	Soil Gas	VOC	Low	Draft SOP #1021, <i>Data Validation Procedures for Routine Volatile Organic Analysis in Air by TO-15</i>	SERAS QA/QC Officer

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 47 of 49

Worksheet Not Applicable (State Reason)

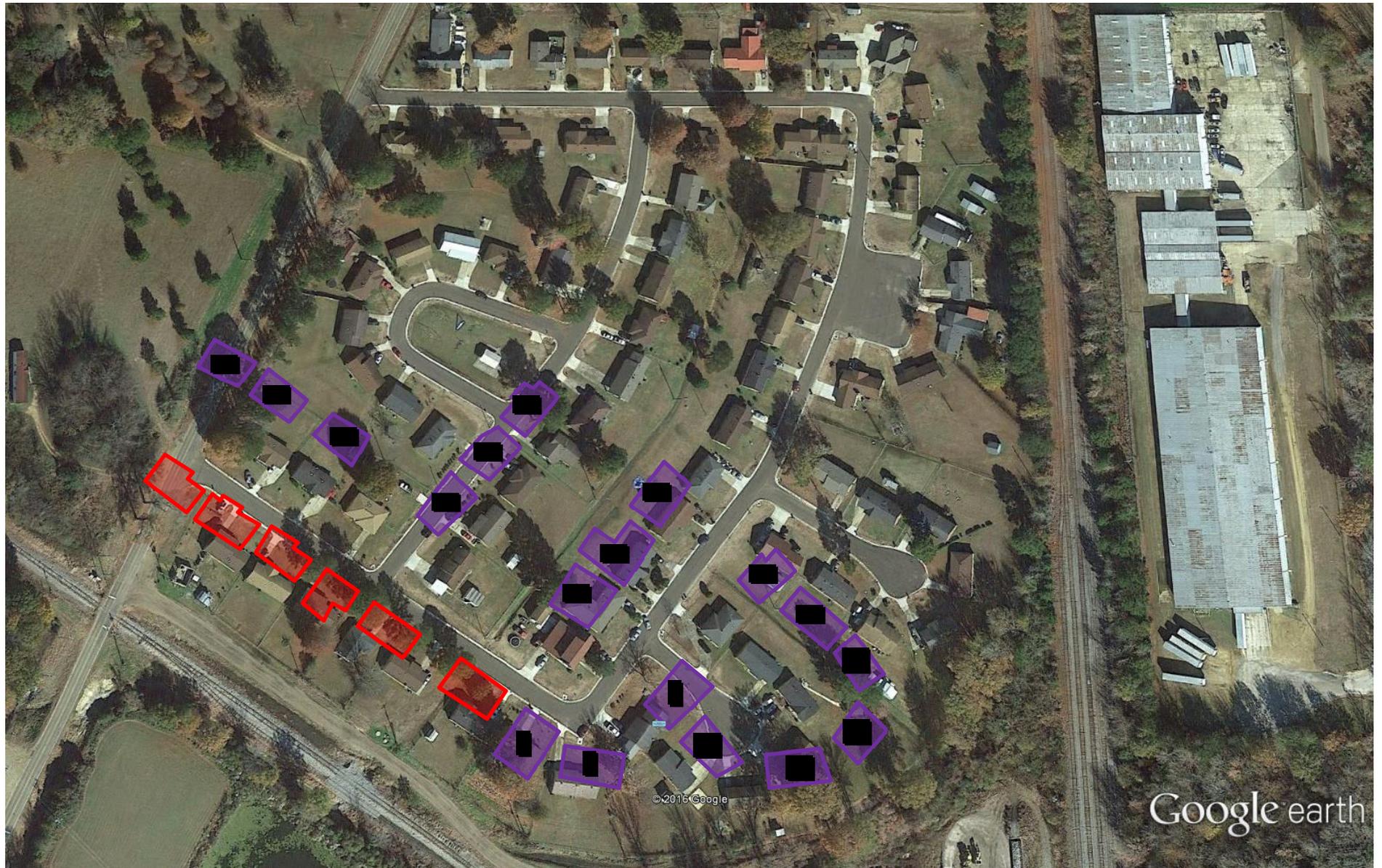
EPA Region 4 will be responsible for assessing the usability of the data.

QAPP Worksheet #37
Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:
Describe the evaluative procedures used to assess overall measurement error associated with the project:
Identify the personnel responsible for performing the usability assessment:
Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

Title: Grenada Manufacturing QAPP
Revision Number: 0.0
Revision Date: 04/08/16
Page: 48 of 49

FIGURE 1
Tentative Sub-Slab and Soil Gas Locations
UFP-QAPP for Grenada Manufacturing
April 2016



SERAS-293-DQAPP-040816

Redaction(s)
subject to Exemption 6 (Personal
Privacy Information)