United States Environmental Protection Agency
Region 6

Hurricane Harvey Response Support
Site-Specific
Uniform Federal Policy
Quality Assurance Project Plan (UFP-QAPP)
For
Response Collection Pad
Soil Sampling

Prepared by:

Weston Solutions, Inc.
Region 6 Superfund Technical Assessment and
Response Team 4 (START 4)

September 15, 2017

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LIST OF APPENDICES

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LIST OF ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
%D	percent difference
%R	percent recovery
%RSD	percent relative standard deviation
µg/kg	microgram per kilogram
µg/L	microgram per liter
AES	Atomic Emission Spectrometry
ANSI	American National Standards Institute
ARCS	Alternative Remedial Contract Strategy
ASQ	American Society for Quality
ASTM	ASTM International
B	bias
BFB	bromofluorobenzene
BS	blank spike
CA	Corrective Action
CAS	Chemical Abstracts Service
CCB	continuing calibration blank
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHMM	Certified Hazardous Materials Manager
CLP	Contract Laboratory Program
CPR	Cardiopulmonary Resuscitation
CO	Contracting Officer
CRL	Central Regional Laboratory
CVAA	cold vapor atomic absorption
CWA	Clean Water Act
D	laboratory duplicate
DFTPP	decafluorotriphenylphosphine
DI	deionized
DMC	deuterated monitoring compound
DMP	Data Management Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
DDT	dichlorodiphenyltrichloroethane
DUA	data usability assessment
ECD	electron capture detector
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
ERT	Environmental Response Team
ESAT	Environmental Services Assistance Team
FedEX	Federal Express
FEMA	Federal Emergency Management Agency
FID	flame ionization detector
GC	gas chromatography
GC/ECD	gas chromatography/electron capture detector
GC/MS	gas chromatography/mass spectrometry

LIST OF ACRONYMS *(Continued)*

GPS	Global Positioning System
HASP	Health and Safety Plan
HDPE	high density polyethylene
HPLC	high performance liquid chromatography
HSO	Health and Safety Officer
ICB	initial calibration blank
ICP-MS	inductively coupled plasma/mass spectrometry
ICS	Incident Command System
ICV	initial calibration verification
IDQTF	Intergovernmental Data Quality Task Force
IDW	investigation-derived waste
IS	internal standard
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LEB	leachate extraction blank
LFB	laboratory fortified blank
LFSM	laboratory fortified sample matrix
LFSMD	laboratory fortified sample matrix duplicate
LLCCV	low level continuing calibration verification
LRB	laboratory reagent blank
MA	modified analyses
MB	method blank
MCL	maximum contaminant level
MDL	method detection limit
mg/kg	milligrams per kilogram
mL	milliliter
MPC	Measurement Performance Criteria
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NCP	National Contingency Plan
ng/kg	nanogram per kilogram
OC	organochlorine
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbons
PAL	Project Action Limit
PCB	polychlorinated biphenyls
PDS	post-digeston spike
P.E.	Professional Engineer
PE	performance evaluation
PM	Project Manager
PO	Project Officer
POC	Point of Contact
PPE	personal protective equipment
PQO	Project Quality Objective
PT	proficiency testing

LIST OF ACRONYMS *(Continued)*

PTFE	polytetrafluoroethylene
PTL	Project Team Lead
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QMP	Quality Management Plan
RCMS	Removal Cost Management System
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RML	Removal Management Levels
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RSL	regional screening level
SAS	Special Analytical Services
S/D	matrix spike and duplicate
SD	standard deviation
SDG	Sample Delivery Group
SHSO	Site Health and Safety Officer
SIM	selected ion monitoring
SOP	Standard Operating Procedure
SOW	Statement of Work
SRM	Standard Reference Material
SSL	soil screening level
START	Superfund Technical Assessment and Response Team
SVOC	semivolatile organic compound
TAL	Target Analyte List
TBD	to-be-determined
TNRCC	Texas Natural Resource Conservation Commission
TCL	Target Compound List
TDD	Technical Direction Document
TM	Task Manager
TO	Task Order
TSA	Technical Systems Audit
UFP-QAPP	Uniform Federal Policy–Quality Assurance Project Plan
URL	Uniform Resource Locator
VOA	volatile organic analysis
VOC	volatile organic compound
VTSR	verified time of sample receipt
WESTON®	Weston Solutions, Inc.

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TABLE 1 — Crosswalk: UFP-QAPP Workbook to 2106-G-05 QAPP

Optimized UFP-QAPP Worksheets		2106-G-05 QAPP Guidance Section	
A. Project Management and Objectives			
1 & 2	Title and Approval Page	2.2.1	Title, Version, and Approval/Sign-Off
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4, 7, & 8	Personnel Qualifications and Sign-Off Sheet	2.2.1	Title, Version, and Approval/Sign-Off
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6	Communication Pathways	2.2.4	Project Organization and Schedule
9	Project Planning Session Summary	2.2.5	Project Background, Overview, and Intended Use of Data
10	Problem Definition	2.2.5	Project Background, Overview, and Intended Use of Data
11	Project/Data Quality Objectives	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
12	Measurement Performance Criteria	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
13	Secondary Data Uses and Limitations	Chapter 3	QAPP ELEMENTS FOR EVALUATING EXISTING DATA
14 & 16	Project Tasks & Schedule	2.2.4	Project Organization and Schedule
15	Project Action Limits and Laboratory-Specific Detection/Quantitation Limits	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
B. Measurement/Data Acquisition			
17	Sampling Design and Rationale	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
18	Sampling Locations and Methods	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
		2.3.2	Sampling Procedures and Requirements
19 & 30	Sample Containers, Preservation, and Hold Times	2.3.2	Sampling Procedures and Requirements
20	Field Quality Control (QC) Sample Summary	2.3.5	QC Requirements

TABLE 1 — Crosswalk: UFP-QAPP Workbook to 2106-G-05 QAPP (Continued)

Optimized UFP-QAPP Worksheets		2106-G-05 QAPP Guidance Section	
21	Field Standard Operating Procedures (SOPs)	2.3.2	Sampling Procedures and Requirements
22	Field Equipment Calibration, Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
23	Analytical SOPs	2.3.4	Analytical Methods Requirements and Task Description
24	Analytical Instrument Calibration	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
26 & 27	Sample Handling, Custody, and Disposal	2.3.3	Sample Handling, Custody Procedures, and Documentation
28	Analytical QC and Corrective Action	2.3.5	QC Requirements
29	Project Documents and Records	2.2.8	Document and Records Requirements
C. Assessment/Oversight			
31, 32, & 33	Assessments and Corrective Action	2.4	ASSESSMENTS AND DATA REVIEW (CHECK)
		2.5.5	Reports to Management
D. Data Review			
34	Data Verification and Validation Inputs	2.5.1	Data Verification and Validation Targets and Methods
35	Data Verification Procedures	2.5.1	Data Verification and Validation Targets and Methods
36	Data Validation Procedures	2.5.1	Data Verification and Validation Targets and Methods
37	Data Usability Assessment	2.5.2	Quantitative and Qualitative Evaluations of Usability
		2.5.3	Potential Limitations on Data Interpretation
		2.5.4	Reconciliation with Project Requirements

Introduction

On 25 August 2017, Hurricane Harvey made first landfall in the United States on the south Texas coast, returned to the Gulf of Mexico on 29 August 2017 and then made second landfall on 30 August 2017 on the southwestern coast of Louisiana. Hurricane Harvey caused massive damage and flooding to broad areas of Texas and Louisiana. The U.S. Environmental Protection Agency Region 6 initiated Hurricane Harvey Response activities under The Stafford Act to support State and Local official with on-going response actions. As part of Hurricane Harvey Response activities, environmental soil samples will be collected to assess site conditions at four designated orphan container response collection pad staging areas (Alpha, Bravo and Charlie) in south Texas.

- Alpha Collection Pads
    - Pad 1 – 704 W. Yoakum Ave., Aransas Pass, Texas (Lat. 27.908315°N, -95.287510°W,
    - Pad 2 – Port St., Port Aransas, Texas (27.836593°N, -97.072659°W)
- Bravo Collection Pad – Clinton Drive at Dorsett Street, Houston, Texas (29.753778°N, -95.287510°W)
- Charlie Collection Pad – 6000 Airline Drive, Beaumont, Texas (29.956523°N, -94.019922°W)

The objective of response pad sampling is to provide pre-deployment data and post-deployment data in order to document site conditions within the staging area prior to site activities and to document site conditions after the completion of site activities. The data will be evaluated to assess whether there has been an increase in the concentration of the chemicals present at the response pads. Samples will be collected prior to the staging, Hazard Categorization Field Screening (HAZCAT®), and bulking of drummed waste. Samples will also be collected after site activites have been completed.

The purpose of this document is to describe the personnel; standard operating procedures (SOPs) for data collection, assessment, and storage; and other QA documentation for all tasks that could be expected to be completed for EPA Region 6 in support of Hurricane Harvey Response Activities associated with impacted areas along the Texas and Louisia Gulf Coast. It provides completed optimized UFP-QAPP worksheets prepared in accordance with U.S. EPA's *UFP-QAPPs, Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs, Part 1: UFP-QAPP Manual, EPA-505-B-04-900A, (March 2005); Part 2A: UFP-QAPP Workbook, Revision 1, (March 2012);* Section 6 (Part B) of *Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use*, American National Standards Institute (ANSI)/American Society for Quality (ASQ) E4 (ANSI/ASQ, 2004); *EPA Requirements for Quality Assurance Project Plans,* QA/R-5 (March 2001); and U.S. EPA's *CIO 2106-G-05 QAPP* (January 2012), which supersedes the update of QA/G5, *Guidance for Quality Assurance Project Plans* (December 2002). A crosswalk between this UFP-QAPP and the EPA requirements for QA documents is included in Table 1.

The specific requirements of the UFP-QAPP are identified in each of the worksheets. The EPA Region 6 QA Document Review Crosswalk will be the cross-reference between the QAPP and project-specific documents.

This document provides a process for obtaining data of sufficient quality and quantity to satisfy project needs associated with the Hurricane Harvey response. It identifies policy, organization, functional activities, and data quality objectives (DQOs) and measures necessary to obtain adequate data for a given purpose. Additionally, it identifies the requirements to develop the rationale for selection of the proposed sampling locations, analyses, and specific procedures for collecting data on a site-specific basis during removal, assessment, and/or emergency response activities. Environmental samples will be collected for analytical analysis through an EPA contractor -subcontracted laboratory. The field work and data evaluation will be completed in accordance with this Site-Specific UFP-QAPP. Addendums to this document will be issued to address any new procedures required. UFP-QAPP review documentation, and revisions if necessary, will be submitted to EPA following management approval.

Worksheet 1 & 2 — Title and Approval Page

(UFP-QAPP Manual Section 2.1)
(EPA 2106-G-05 Section 2.2.1)

1. **Project Identifying Information**

   a) **Site Name/Project Name:** Hurricane Harvey Response Support
   b) **Site Location/Number:** EPA Region 6: Texas
   c) **Contract/Work Assignment Number:** EP-S5-17-02

2. **List Plans and reports from previous investigation relevant to this project.**
   Not applicable

Lead Organization's Program Manager:

Cecilia Shappee, P.E./WESTON
Printed Name/Title

Signature/Date

Lead Organization's Quality Manager:

Gretchen Fodor, CHMM/WESTON
Printed Name/Title

Signature/Date

Lead Organization's Chemist:

Jeff Wright, CHMM/WESTON
Printed Name/Title

Signature/Date

EPA Region 6, Operations Section Chief:

Nicolas Brescia
Printed Name/Title

Signature/Date

EPA Region 6, REOC Managerr:

Althea Foster
Printed Name/Title

Signature/ Date

Worksheet 1 & 2 — Title and Approval Page *(Continued)*

(UFP-QAPP Manual Section 2.1)
(EPA 2106-G-05 Section 2.2.1)

EPA Region 6, Environmental Unit Lead:

Jon Rauscher
Printed Name/Title

Signature/ Date

EPA Region 6, Quality Manager:

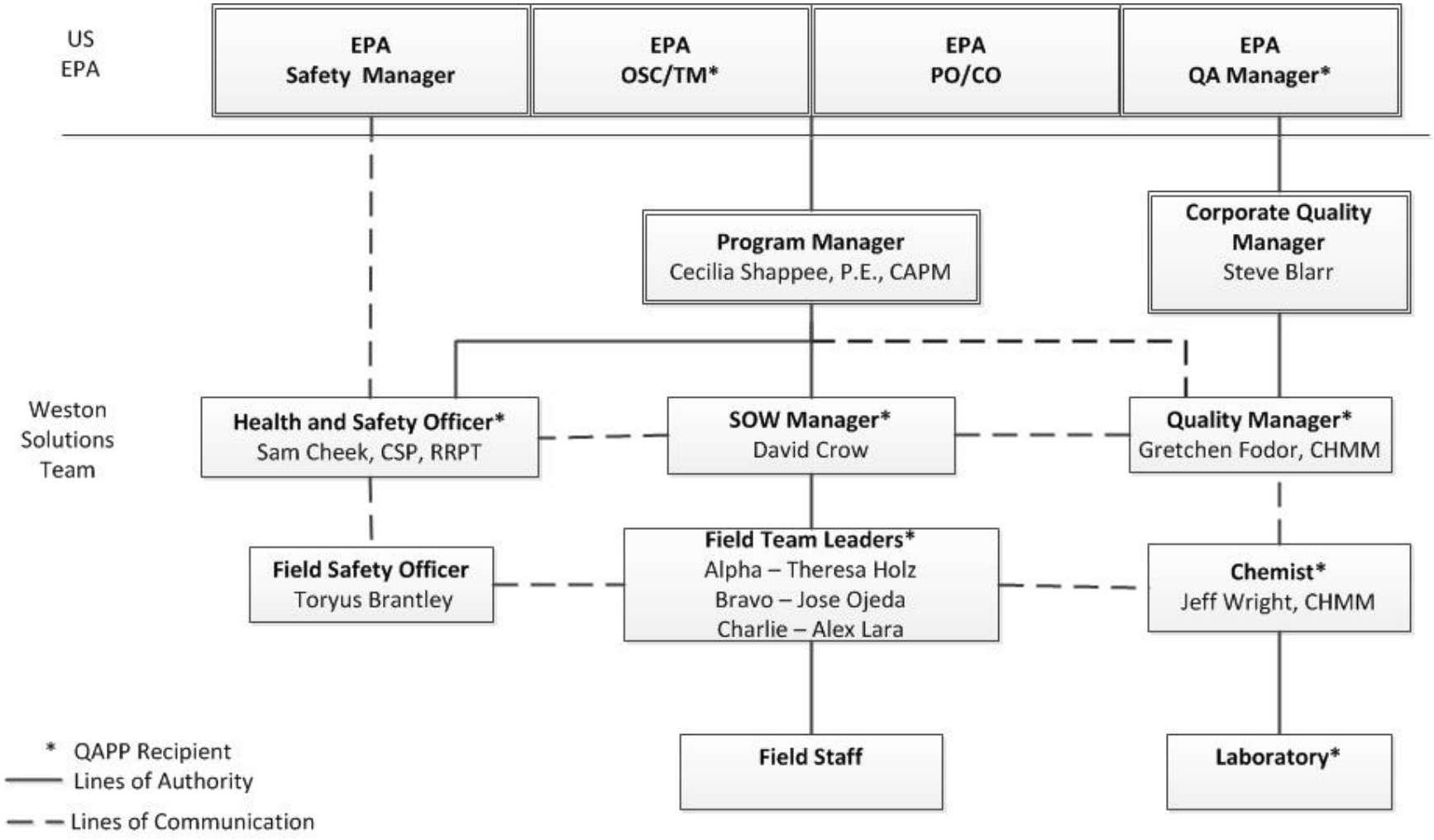
Walt Helmick
Printed Name/Title

Signature/Date

Worksheet 3 & 5 — Project Organization and QAPP Distribution

(UFP-QAPP Manual Section 2.3 and 2.4)
(EPA 2106-G-05 Section 2.2.3 and 2.2.4)

Project Organization Chart



Worksheet 3 & 5 — Project Organization and QAPP Distribution *(Continued)*

(UFP-QAPP Manual Section 2.3 and 2.4)
(EPA 2106-G-05 Section 2.2.3 and 2.2.4)

QAPP Recipients	Title	Organization	Telephone Number	E-Mail Address
Brian Delaney	Contracting Officer	EPA Region 6	214.665.7473	Delaney.Brian@epa.gov
Will LaBombard	Project Officer	EPA Region 6	214.665.7199	LaBombard.Will@epa.gov
Walt Helmick	Quality Assurance Manager	EPA Region 6	214.665.8373	Helmick.Walt@epa.gov
Cecilia Shappee	Program Manager	WESTON	713.985.6601	c.shappee@westonsolutions.com
Gretchen Fodor	Quality Manager	WESTON	703.724.0544	gretchen.fodor@westonsolutions.com
Jeff Wright	Chemist	WESTON	225.297.5415	jeff.wright@westonsolutions.com
David Crow	WESTON SOW Manager	WESTON	469.666.5550	david.crow@westonsolutions.com
Sam Cheek	Health and Safety Officer	WESTON	469.666.5585	sam.cheek@ westonsolutions.com
Jeff Wright or designee	Task Manager for WESTON START R6 Data Validation Team	WESTON	225.297.5415	jeff.wright@westonsolutions.com

Worksheet 4, 7 & 8 — Personnel Qualifications and Sign-off Sheet

(UFP-QAPP Manual Sections 2.3.2 - 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

Organization: WESTON					
Name	**Project Title / Role**	**Education / Experience**	**Specialized Training / Certifications[1]**	**Training Provider[2]**	**Signature / Date**
Cecilia Shappee	Program Manager/Point of contact (POC) with EPA CO/PO. Oversees implementation and performance associated with the contract and has ultimate responsibility and authority to ensure all contractual requirements are met, including timeliness and management of budget. Ensures the quality of work performed. Provides overall management and support to the POC for the Contract, including cost, schedule, and technical quality. Assists in day-to-day management of project operations, deliverable completion, field investigations, quality control, and health and safety. Maintains communication and coordination with EPA for the duration of the project, including progress and detailed cost reporting. Oversees the management and coordination between WESTON staff, subcontractors, and EPA.	B.S. and Master in Civil Engineering / 24 years of EPA Region 6 program management experience as Program Manager and Deputy Program Manager, including 16 years of experience for START contracts and 8 years for the ARCS program. As Program Manager, have overseen 300+ TDDs and 19 Active Task Orders for START 3. As START Quality Officer and Deputy Program Manager, oversaw 809+ TDDs and 43 Task Orders.	Professional Engineer in the states of OK (#16565), TX (#61446) and KS (# 13805); Corrective Action Project Manager in TX (#CAPM01614); ICS 100 – 400, 700 & 800; Basic/4-Hour Radiation Training; 40-Hour Hazardous Waste Site Training, OSHA; 8-Hour Hazardous Waste Refresher, OSHA; 8-Hour Site Supervisor Training, OSHA; RCMS Training; Hazardous Waste Management and Shipping for Environmental Professionals; First Aid and CPR; Hazardous Categorization Field Testing; EPA HRS Training.	WESTON, Registered Training Organization – Various	

Worksheet 4, 7 & 8 — Personnel Qualifications and Sign-off Sheet *(Continued)*

(UFP-QAPP Manual Sections 2.3.2 - 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

Organization: WESTON					
Name	**Project Title / Role**	**Education / Experience**	**Specialized Training / Certifications[1]**	**Training Provider[2]**	**Signature / Date**
Gretchen Fodor	Responsible for quality systems implementation and management, review and approval of quality documents, review and approval of contract deliverables, and performing quality assessments and quality system audits. Has direct and independent reporting requirements to the WESTON Chief Operating Officer on nonconformance, performance, and corrective action issues. Tracks the development and implementation of project-specific QAPPs, FSPs, and SOPs. Encourages continual improvement by implementing policies based on audit observations and issues identified by field personnel.	M.S., Environmental Studies, University of Massachusetts (1998); B.S., Chemistry, St. Lawrence University (1975)/ CHMM with 30 years of environmental chemistry quality experience on 500+ EPA TDDs in Regions 1, 3, and 6 providing data validation/QA support.	Certified Hazardous Materials Manager (#07662); Level A Trained; Basic/Advanced/4-Hour Refresher Radiation Training; 40-Hour/8-Hour Hazardous Waste Site Trainings, OSHA; 8-Hour Site Supervisor Training, OSHA; 8-Hour WMD Awareness Training; EPA HRS Training; SCRIBE; and Asbestos Inspector Training.	WESTON, Registered Training Organization – Various	
Jeff Wright	Chemist for quality systems implementation and management, review and approval of quality documents, review and approval of contract deliverables, and performing quality assessments and quality systems audits. Maintains authority over implementation of quality systems management.	B.S., Chemistry; B.S. Biology/ Over 25 years of environmental experience, including emergency response; planning and preparedness; removal assessments and actions; and remedial assessments, evaluations, and actions.	CLP Program Organic and Inorganic Data Validation Training; EPA Hazard Ranking System Training; Certified Hazardous Materials Manager; R6 QA Annual Training; 40-Hour OSHA Hazardous Waste Site Worker Training; 8-Hour OSHA Refresher Training; First Aid and CPR: FEMA ICS Levels 100, 200, 300, 700, and 800.	WESTON, EPA, Registered Training Organization – Various	

Worksheet 4, 7 & 8 — Personnel Qualifications and Sign-off Sheet *(Continued)*

(UFP-QAPP Manual Sections 2.3.2 - 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

Organization: WESTON					
Name	**Project Title / Role**	**Education / Experience**	**Specialized Training / Certifications[1]**	**Training Provider[2]**	**Signature / Date**
David Crow	SOW Manager / Operational POC for project level communications with EPA OSCs/Task Managers (TMs), ensure performance associated with the contract, coordinate and communicate with EPA in the pre-planning phase of individual Technical Direction Document (TDD) assignments, provide technical direction to the Project Team Lead (PTL), and support any functions delegated by the Program Manager.	10+ years of experience and Bachelor's degree in the fields conduct environmental response, assessment, removal, remediation and data support.	Typical Training/Certs = ICS Levels 100-400, 700 & 800; Radiation Training; 40-Hour OSHA & 8-Hour Hazardous Waste Refresher, OSHA; 8-Hour Site Supervisor Training, OSHA; HazCat Field Testing; 30-Hour Construction Safety and Health Training; Hazardous Waste Management and Shipping; SCRIBE; Advanced ArcMap Training; and ESRI	WESTON, EPA, Registered Training Organization – Various	
Project Team Lead (PTL) for each Consolidation Pad: Teresa Holz (Alpha) Jose Ojeda (Bravo) Alex Lara (Charlie)	PTL / Supervises field sampling and coordinates all field activities. Ensures all training/certifications are satisfied for field team personnel.	On File	40-Hour OSHA Hazardous Waste Site Worker Training; 8-Hour OSHA Refresher Training; First Aid and CPR; FEMA ICS Levels 100, 200, 700, and 800 at minimum.	WESTON, Registered Training Organization – Various	N/A

[1] Training records and/or certificates are on file at the Weston Solutions, Inc., office and are available upon request.

[2] Training provider and date of training will vary from person to person due to individual scheduling of training.

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Worksheet 6 — Communication Pathways

(UFP-QAPP Manual Section 2.4.2)
(EPA 2106-G-05 Section 2.2.4)

Communication Drivers	Organization/Title	Name	Contact Information	Procedures (Timing, Pathways, Documentation, etc.)
Regulatory Agency Interface	EPA CO/PO/QA Manager	Will LaBombard	214.665.7199	Maintain lines of communication between EPA CO and WESTON Program Manager.
Approves Site-Specific QA Documents	EPA OSC/TM	Walt Helmick	225.297.5415	Approves site-specific QAPPs in accordance with EPA guidance documents and policy. Provides guidance or instruction for site-specific QA documents.
POC with EPA OSC/TM/PO/QA Manager	WESTON Program Manager	Cecilia H. Shappee	713.985.6601	Maintain lines of communication between EPA OSC/TM , PO, and WESTON SOW and Quality Managers.
Manage all Project Phases	WESTON SOW Manager and Project Team Leads (PTLs)	See Worksheet 3 & 5	See Worksheet 3 & 5	Manage day to day operations of the project. Reports to Program Manager and EPA OSC/TM issues with cost, schedule, etc.
Health and Safety Monitoring/Reporting	WESTON Health and Safety Manager	Sam Cheek	469.666.5585	Communicates with PTL and SOW Manager regarding safety issues, stop work, and reporting on a daily basis, when required.
Project UFP-QAPP Amendments	WESTON Quality Manager	Gretchen Fodor	703.724.0544	Major changes to the EPA Hurricane Harvey UFP-QAPP must be approved by the Quality Manager before implementation.
Changes to Project QAPP Prior to Field Work	WESTON Quality Manager	Gretchen Fodor	703.724.0544	WESTON Quality Manager and SOW Manager communicates changes to QAPP to WESTON PTL and, as needed, to the WESTON Chemist and EPA OSC/TM. Communicates with PTL to determine need for field corrective actions.

Worksheet 6 — Communication Pathways

(UFP-QAPP Manual Section 2.4.2)
(EPA 2106-G-05 Section 2.2.4)

Changes made to Project QAPP in the Field and Daily Field Progress Reports	WESTON PTL	Michelle Brown	469.666.5527	Communicate QAPP changes and changes in field activities to WESTON Chemist, EPA OSC/TM and SOW Manager on a daily basis, when required. If corrective actions are necessary, the PTL will communicate the QAPP changes to the WESTON Quality Manager.
Lab Data Quality Issues (including sample receipt variances and laboratory quality control variances)	Laboratory Project Manager (PM)	Sachin Kudchadkar (TestAmerica, Inc.)		Laboratory PM will report any issues with project samples to the WESTON Chemist within 1 business day of notification. The WESTON Chemist will contact the field sampler if necessary to resolve sample receiving discrepancies.
Data verification and data validation issues	WESTON Data Validation Coordinator	Jeff Wright	225.278.8406	The WESTON Data Validator will contact the subcontract laboratory in writing to resolve data package errors and missing data elements. The WESTON Data Validator will review the data package for conformance to the analytical method and analytical technical specifications.
Analytical Corrective Actions	WESTON Chemist/Data Validation Coordinator Laboratory PM	Jeff Wright TestAmerica PM	225.297.5415	The need for analytical corrective actions will be determined (1) by the WESTON Chemist upon notification by the Laboratory PM of quality problems encountered or (2) during WESTON's review of the data by either the WESTON Chemist or WESTON data validator. Deficiencies identified by the WESTON data validator will be communicated in writing to the WESTON Chemist for action by the laboratory.

Worksheet 6 — Communication Pathways

(UFP-QAPP Manual Section 2.4.2)
(EPA 2106-G-05 Section 2.2.4)

				If laboratory corrective actions are necessary, the WESTON Chemist will communicate with the WESTON Quality Manager.
Data Tracking and Management, Release of Analytical Data	WESTON Chemist WESTON SOW Manager	Jeff Wright David Crow	225.297.5415 469.666.5500	The need for corrective actions will be determined by the Chemist upon review of the data. No analytical data will be released prior to validation and all releases must be approved by the Chemist, Quality Manager and EPA OSC/TM.

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Worksheet 9 — Project Planning Session Summary

(UFP-QAPP Manual Section 2.5.1 and Figures 9-12)
(EPA 2106-G-05 Section 2.2.5)

Project Planning and Scoping meetings will be coordinated at or from the EPA Region 6 Regional Emergency Operations Center (REOC) with the input of EPA and EPA contractor personnel. The meetings and correspondence will define the purpose and environmental decisions to be made, and the project quality objectives needed to achieve the expected results.

Site Name/Project Name: Hurricane Harvey Response Support – Response Collection Pad Sampling
Site Location: R6 Dallas REOC planning for Alpha, Bravo, and Charlie branches
Date of Session(s): August 28, 2017, September 1 and 2, 2017
Scoping Session Purpose:.

Name	Title	Affiliation	Phone #	E-mail Address	*Project Role
Jon Rauscher	EU Leader	EPA R6	-	Rauscher.Jon@epa.gov	Environmental Unit Leader
Philip Turner	EU Co-lead	EPA R6	-	Turner.Philip@epa.gov	Environmental Unit Leader
Michelle Brown	EU liaison	Weston	-	michelle.brown@westonsolutions.com	EU liaison
Jeff Wright	Project Chemist	Weston	225-297-5415	Jeff.Wright@westonsolutions.com	Project Chemist

Comments/Decisions:

- Soil Sampling - Which list of analytes and what analyses will be used for soil sampling. List compiled of VOCs, SVOC, OC Pesticides, Herbicides, PCBs, and metals (including mercury). Lists were derived from CLP methods SOM02.4 and ISM02.4.
- What will be the procedure for collecting waste pad soils?
- What will be the action levels and DQOs?

Consensus Decisions:

- The analyte lists provided to the EU were approved.
- The procedure for collecting the samples (5-point composites from 50x50 grids) was approved by EU.
- Evaluate chemistry results once the pre-deployment and post-deployment samples have been collected and analyzed. The process for evaluating the samples are described below.

  The four steps are summarized as follows:

  1. Filter out those analytes that were undetected in all samples.
  2. Filter out those analytes with greater concentrations in pre-deployment samples than in post-deployment samples.
  3. Evaluate the composites pre-deployment versus post-deployment. The comparison will be made at the upper 95 percent confidence level of the mean.
  4. If the post-deployment samples exceed the upper 95 percent confidence level, then site will be assessed for further action.

Notes/Comments:

Action Items:

Action	Responsible Party	Due Date
Develop collection procedure	EU/Weston	9/1
Develop screening process	EU	9/2
Input RMLs into approved analyte list and ensure contracted lab meets data requirements	Weston	9/1 - 9/3

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Worksheet 10 — Problem Definition

(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

- Introduction and Project Objectives

  The objective is to determine the nature and type of contaminants in soils in areas where flood waters have receded and where recovered containers will be staged prior to disposal. Pre-deployment and post-deployment soil samples will be analyzed for volatile organic compounds (VOCs) by EPA Method 8260B, semivolatile organic compounds (SVOCs) by EPA Method 8270D, pesticides by EPA Method 8081A, herbicides by EPA Method 8151A, polychlorinated biphenyls (PCBs) by EPA Method 8082A, total analyte list (TAL) metals by EPA Methods 6020 and 7471A, and total petroleum hydrocarbons (TPHs) by TNRCC Method 1005. Soil sample results will be reported on a dry weight basis. Regional Response Action Levels (RMLs) will be used as a guide to select analytical methods with appropriate laboratory reporting limits (RLs) to support the project objective.

  The objective of response pad sampling is to provide pre-deployment sample data and post-deployment data in order to document site conditions within the staging area prior to site activities and to document site conditions after the completion of site activities. The data will be evaluated to assess whether there has been an increase in the concentration of the chemicals present at the response pads. Pre-deployment samples will be collected prior to the staging, Hazard Categorization Field Screening (HAZCAT®), and bulking of drummed waste. Post-deployment samples will also be collected after site activites have been completed.

- Health and Safety Plan Implementation;

  Health and Safety operations will be conducted consistent with activities and responsibilities of the Incident Command System (ICS). All field activities will be conducted in accordance with the Hurricane Harvey Collection Pad health and safety plan (HASP). The Field Safety Officer (FSO) will be responsible for implementation of the HASP during all field investigation activities. All EPA contractors and subcontractors will be required to conduct their activities according to the guidelines and requirements of the HASP.

- Sampling and Sample Handling Procedures;

  Soil samples from Alpha Branch, Bravo Branch, and Charlie Branch will be collected using equipment and procedures appropriate to the matrix, parameters, and sampling objective. Discrete 5-gram and 10-gram soil cores will be sampled for VOCs and TPH respectively, and placed into the containers designated in QAPP Worksheet 19&30. A one-gallon zipper-type baggie will be half-filled with soil collected as a 5-point composite. The soil will be homogenized, then subsampled into individual sample containers. Sample volumes required by the laboratory are included in QAPP Worksheet 19&30. Samples will be stored in the proper types of containers and preserved in a manner appropriate to the analysis to be performed. All clean, decontaminated sampling equipment and sample containers will be maintained in a clean, segregated area (SOP 2012). All samples will be collected with

Worksheet 10 — Problem Definition

(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

clean dedicated disposable or decontaminated non-dedicated equipment. All samples collected for laboratory analysis will be placed into pre-cleaned, unused glass or plastic containers as appropriate based on the particular analytical method (refer to QAPP Worksheet 19&30). Sampling personnel will change gloves between each sample collection/handling. All samples will be assembled and catalogued prior to shipping to the designated laboratory. Sampling and Sample Handling SOPs are provided by reference in Worksheet 22. The EPA contractor personnel will prepare and complete Chain-of-Custoday forms and labels using the SCRIBE environmental sampling data management system. The sample labels will be affixed to the sample containers (except for tared soil vials for VOCs which will be affixed to the zippered baggie containing the tared VOA vias. The Chain-of-Custody forms will accompany samples to the laboratory in the sample coolers.During the project and at its completion, the Data Manager will publish the SCRIBE file to SCRIBE.net to establish a permanent record of the samples collected and the data resulting in the analysis of those samples.

- Analytical Approach;

  Samples collected by EPA during this sampling task will be delivered to designated laboratory for TPH utilizing TNRCC Method 1005 and VOCs, SVOCs, TAL metals (including mercury), pesticides, herbicides and PCBs, utilizing EPA publication SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*

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Worksheet 11 — Project/Data Quality Objectives

(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

The Data Quality Objective (DQO) for the pre-deployment and post-deployment soil samples collected from the Response Collection Pads is to provide chemistry data that will assess whether Response activities have impacted the soil in the Response Collection Pad. Specific Response activities include staging of orphan drums and tanks, household hazardous waste, white goods, and HAZCAT operations.

As described in QAPP Worksheets 9 and 10, a four-step process will be used to evaluate the samples and includes the following steps:

1. Filter out those analytes that were undetected in all samples.
2. Filter out those analytes with greater concentrations in pre-deployment samples than in post-deployment samples.
3. Evaluate the composite pre-deployment sample results versus post-deployment sample results. The comparison will be made at the upper 95 percent confidence level of the mean.
4. If the post-deployment sample results exceed the upper 95 percent confidence level, then the pad location will be assessed for further action.

Worksheet 11 — Project/Data Quality Objectives

(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

Description of Screening Process

Screening Filter	Table	Description
Analytes with non-detections for all site samples	"Analytes Not Detected "	These analytes removed as COPCs
Comparison of pre-deployment to post-deployment	Pre and Post Deployment Sample Results – Pre-Deployment results are greater than Post-Deployment	Those analytes with post-deployment results less than or equal to the associated concentrations reported in the pre-deployment sample results, will be screened out.
Comparison of post-deployment to pre-deployment	Pre and Post Deployment Sample Results – Post-Deployment results are greater than Pre-Deployment	Concentrations for each sample are listed. Ranges of concentrations for pre-deployment samples are compared to ranges of concentrations for post-deployment samples. Those analytes with post-deployment results greater than or equal to the upper 95 percent confidence level of the mean value will require further assessment.
Reasonableness evaluation for remaining analytes.	"Post Deployment Results final screening" - Evaluate possible health effects for each remaining analyte. Provide comments as to whether further sampling or action is needed.	Consider: 1) Presence of analyte in the corresponding Trip Blank or Lab QA 2) Likelihood of COPC resulting from the hurricane response action; 3) Exposure at site relative to assumptions used in screening level calculations, e.g., 8-hr daily exposure for 30 years; 4) Persistence of analyte. 5) Justifications for applying a less conservative standard, e.g., 10^{-5} or 10^{-4} risk, rather than 10^{-6}.

Worksheet 12 — Measurement Performance Criteria Tables

(UFP-QAPP Manual Section 2.6.2)
(EPA 2106-G-05 Section 2.2.6)

The analytical methods presented in the Worksheet 12 measurement performance criteria (MPC) tables include the analytical methods that have been requested during Hurricane Harvey Response Support Sampling activities.

Analytical Method Categories and Method Selection

Analytical methods were developed by EPA and other related organizations for specific programs or analytical needs; analyses from any of these method categories may be requested based on Site-Specfic conditions and DQOs.

A summary of methods included by parameter in Worksheet 12 that have been be requested include the following:

Parameter	Method Number (SW-846)[1]
VOCs	EPA 8260B/C
SVOCs	EPA 8270D
OC Pesticides	EPA 8081A
PCBs (Aroclors)	EPA 8082A
Herbicides	EPA 8151A
Total Petroleum Hydrocarbons (TPH)	TNRCC 1005
Metals (ICP-MS)	EPA 6020A
Mercury	EPA 7470A/7471A

[1] Various versions of the listed method are indicated by the A, B, C, and D suffixes.

Worksheet #12.1: Measurement Performance Criteria for Volatile Organic Compounds (VOCs) by GC/MS

Matrix: Soil/Sediment, Water
Analytical Group/Method: VOCs/EPA 8260B
Concentration Level: Low/Medium

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS/MSD	One set per extraction batch when sufficient sample volume is provided or as requested. Soil RPD: ≤ laboratory statistically derived control limit
Accuracy/Bias - Laboratory	LCS: 1 per analysis batch of up to 20 samples	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and/or laboratory SOP	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank for EPA 8260B: 1 per 12- hour shift Instrument blank (all methods): after samples with analytes exceeding the instrument calibration range or detector saturation	EPA 8260B Blanks: ▪ Method: analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations <RL ▪
Overall Accuracy/Bias (Contamination)	Field Blanks include: Trip Blank, Equipment Blank, Ambient Field blank[1]	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs	Action Level at least 3 to 10x > RL

Water samples may include trip and Field Blanks
QC Samples for VOCs by GC/MS are listed along with their method-specified frequency and MPCs.
[1]Ambient field blanks will be collected for aqueous VOC samplesEquipment blanks are not required if the sample is collected with dedicated sampling equipment.

Soil samples for VOCs will be collected using EnCore sampling devices or using Terracore devices and placed in tared volatile organic analysis (VOA) vials in the field. Soil samples for VOCs only will also require collection of a separate jar for percent solids determination. Refer to optimized QAPP Worksheet 19&30 for details.

Worksheet #12.2: Measurement Performance Criteria for Semivolatile Organic Compounds (SVOCS) by GC/MS

Matrix: Soil/Sediment
Analytical Group/Method: SVOCs/ EPA 8270D
Concentration Level: Low/Medium

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS/MSD	%R within statistically derived laboratory acceptance limits
Accuracy/Bias - Laboratory	LCS: 1 per extraction batch of up to 20 samples of each matrix	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and laboratory SOP	EPA 8270D: %R within statistically-derived control limits developed by the laboratory
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank (all methods): 1 per extraction batch of 20 samples Instrument blank (all methods): run after high concentration samples or detector saturation	EPA 8270D Blanks: ▪ Method: analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations < RL
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

QC Samples for SVOCs by gas chromatography/mass spectrometry (GC/MS) are listed along with their method-specified frequency and MPCs.
[1]Blank media which have not been opened and exposed to the sampling environment will be provided as lot blanks.

Worksheet #12.3: Measurement Performance Criteria for Organochlorine (OC) Pesticides by GC/ECD

Matrix: Soil/Sediment
Analytical Group/Method: Pesticides/ EPA 8081A
Concentration Level: Low

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS and MSD (all pesticide methods): 1 per 20 samples of each matrix	RPDs within statistically derived laboratory acceptance limits
Accuracy/Bias - Laboratory	LCS: 1 per analysis batch of up to 20 samples of each matrix	EPA 8081A, : %R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD: 1 per 20 samples of each matrix	EPA 8081A, %R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and laboratory SOP	%R within statistically derived laboratory acceptance limits
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank (all methods): 1 per extraction batch Instrument blank: After high concentration samples	EPA 8081ABlanks: ▪ Method: analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations < MDL
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank	All analyte concentrations < RL

Worksheet #12.3: Measurement Performance Criteria for Organochlorine (OC) Pesticides by GC/ECD *(Continued)*

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

[1]Blank media which have not been opened and exposed to the sampling environment will be provided as lot blanks.

Worksheet #12.4: Measurement Performance Criteria for Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD

Matrix: Soil/Sediment,
Analytical Group/Method: PCBs as Aroclors/ EPA 8082A
Concentration Level: Low

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS and MSD: 1 per 20 samples of each matrix	RPDs within statistically derived laboratory acceptance limits
Accuracy/Bias - Laboratory	LCS: 1 per analysis batch of up to 20 samples of each matrix	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD: 1 per 20 samples of each matrix	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and laboratory SOP	%R within statistically derived laboratory acceptance limits
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank: 1 per extraction batch of 20 samples Instrument blank: After high concentration samples	EPA 8082A Blanks: ▪ Method: analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations < MDL
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

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Worksheet #12.5: Measurement Performance Criteria for Chlorinated Herbicides by GC/ECD

Matrix: Water, Soil/Sediment,
Analytical Group/Method: Herbicides/ EPA 8151A
Concentration Level: Low

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision – Laboratory	MS and MSD: 1 per 20 samples of each matrix	RPDs within statistically derived laboratory acceptance limits
Accuracy/Bias - Laboratory	LCS: 1 per extraction batch of up to 20 samples of each matrix *(Full list spike is required)*	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD: 1 per 20 samples of each matrix	%R within statistically derived laboratory acceptance limits
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and laboratory SOP	%R within statistically derived laboratory acceptance limits
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank: 1 per extraction batch Instrument blank: After high concentration samples TCLP/SPLP LEB: 1 per extraction batch of 20 samples	EPA 8151A Blanks: ▪ Method: analyte concentrations <MDL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations < MDL ▪ TCLP/SPLP LEB: required but no acceptance criteria
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

Worksheet #12.6: Measurement Performance Criteria for Total Petroleum Hydrocarbons by GC/FID

Matrix: Water, Soil/Sediment
Analytical Group/Method: TPH, Texas 1005
Concentration Level: Low

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS/MSD	RPD within statistically-derived control limits developed by the laboratory
Accuracy/Bias - Laboratory	LCS: 1 per analysis batch of up to 20 samples	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias – Laboratory	Surrogates added to each field and QC sample as specified by the method and laboratory SOP	%R within statistically derived laboratory acceptance limits
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank: 1 per extraction batch Instrument blank: after high concentration samples or when interference is suspected	TPH Blanks: ▪ Method: analyte concentrations <MDL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater ▪ Instrument: analyte concentrations < MDL
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

Worksheet #12.7: Measurement Performance Criteria for Metals and Mercury

Matrix: Soil/Sediment
Analytical Group/Method: Metals and Mercury / EPA 6020A7471B0A/
Concentration Level: Low

Data Quality Indicators (DQIs)	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision - Overall	Field Duplicates: 1 per 20 field samples	Soil RPD: ≤50%
Precision - Laboratory	MS/MSD	RPD within statistically-derived control limits developed by the laboratory
Accuracy/Bias - Laboratory	LCS: 1 per analysis batch of up to 20 samples of similar matrix	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias – Laboratory (matrix interference)	MS/MSD	%R within statistically-derived control limits developed by the laboratory
Accuracy/Bias (Laboratory Contamination)	Laboratory Blanks include: Method blank: 1 per digestion batch Instrument blank: at beginning of analytical run (ICB), and after every 10 analytical samples (CCB)	Metals and Mercury Blanks: ▪ Method: analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater Instrument: analyte concentrations < RL
Overall Accuracy/Bias (Contamination)	Field Blanks include: Equipment Blank (NA)	All analyte concentrations < RL
Sensitivity (method)	Review Laboratory RLs and MDLs against action limits	Action Level at least 3 to 10x > RL

Metals methods include Inductively-Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Inductively-Coupled Plasma-Mass Spectroscopy (ICP-MS), and Cold Vapor Atomic Absorption (CVAA).

Worksheet 13 — Secondary Data Uses and Limitations

(UFP-QAPP Manual Section 2.7)
(EPA 2106-G-05 Chapter 3: QAPP Elements for Evaluating Existing Data)

No Secondary Data sources are anticipated to be used for this samping sampling event. If any data needed for this project implementation or decision making that are obtained from non-direct measurement sources such as computer databases, background information, technologies and methods, environmental indicator data, publications, photographs, topographical maps, literature files and historical data bases will be compared to the DQOs for the project to determine the acceptability of the data.

Data Type	**Data Source** (originating organization, report title and date)	**Data Uses Relative to Current Project**	**Factors Affecting the Reliability of Data and Limitations on Data Use**
NA	NA	NA	NA

Worksheet 14 & 16 —Project Tasks Summary

(UFP-QAPP Manual Section 2.8.2)
(EPA 2106-G-05 Section 2.2.4)

Sampling Tasks:

Soil samples will be collected to assess site conditions at four designated orphan container response pad staging areas (Alpha, Bravo and Charlie) in south Texas. The primary concern being addressed is to screen for unacceptable risk from hazardous substances is site soils in areas where flood waters have receded and where orphaned drums and containers will be staged prior to disposal. Soil will be collected from from multiple locations in the pad area. Samples will be collected from each location using standard field protocol as described in Worksheets 10 and 17. Sampling and Sample Handling SOPs are provided by reference in Worksheet 22.

Analysis Tasks:

VOCs – Soil and aqueous Field Blanks and Trip Blanks – EPA SW846 Method 8260B
TPH – Soil – TNRCC Method 1005
SVOCs – Soil – EPA SW846 Method 8270D
Pesticides – Soil – EPA SW846 Method 8081A
Herbicides – Soil – EPA SW846 Method 8151A
PCBs – Soil – EPA SW846 Method 8082A
TAL Metals – Soil – EPA SW846 Methods 6020/7471A
Percent Moisture - soil

Quality Control Tasks:

QA/QC samples will include the collection of one co-located duplicate soil sample at the ratio of 1 per 20 samples and one trip blank per day for VOCs.

Data Management Tasks:

Activities under this project will be reported in status reports and other deliverables (*e.g.,* analytical reports, final reports) described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:
Environmental Sampling Data Management System: Upon receipt of the Laboratory EDD, the data will be uploaded into the project SCRIBE file. During the project and at its completion, the Data Manager will publish the SCRIBE file to SCRIBE.net to establish a permanent record of the samples collected and the data resulting in the analysis of those samples. All project data will be managed in accordance with the U.S. EPA Region 6, Data Management Plan, Version 1.0, August, 2017.
Data Summary Tables: Will be provided to EPA as requested and upon receipt of EDD from Laboratory.

Data Validation Report: Will be completed with 48 hours of receipt of final data deliverable from the Laboratory. Data Validation Report will be included in final report deliverable to EPA
Final Report: We completed and completed and submitted to the EPA at a completion time to be determined.
Maps/Figures: Maps depicting site layout and sample locations will be included in the final report, as appropriate.

Documentation and Records:

All sample documents will be completed legibly, in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error.

Field Logbook: The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. The field logbook will be bound and paginated. All entries will be dated and signed by the individuals making the entries, in accordance with WESTON SOP 1501.01 and should include (at a minimum) the following:

1. Site name and project number
2. Name(s) of personnel on-site
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Sample and sample location identification and description*
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with COC information
11. Record of photographs
12. Site sketches
13. GPS Coordinates for each sample location

* The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

Sample Labels: Sample labels, either handwritten or generated using Scribe software, will clearly identify the particular sample, and should include the following:

1. Site/project number.
2. Sample identification number.
3. Sample collection date and time.
4. Designation of sample (grab or composite).
5. Sample preservation.
6. Analytical parameters.
7. Name of sampler.

Sample labels will be written in indelible ink and securely affixed to the sample container. Tie-on labels can be used if properly secured.

Custody Seals: Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

Sampling, sample custody and sample shipping SOPs (#1001.01, 1001.10, 1101.01 and 1102.01) are referreced in Worksheet 21.1.

Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and system audit will be in accordance with the project plan.

Data Review Tasks: Soil and QC aqueous data will be validated by EPA Region 6 subcontractor data validation personnel. Data Validation will consist of a Stage 2A validation review unless otherwise specified by EPA. Verify that the data validation report consists of the following for all field samples submitted to the laboratory: Data validation report (pdf) and Excel EDD file with the final data validation qualifiers will be provided as deliverables.

Definitive data projects: Laboratory analytical results will be assessed by the data reviewer for compliance with required precision, accuracy, completeness, representativeness, and sensitivity Project validation criteria as per QAPP Worksheets 12, 15, 19 & 30, and 28 and cited EPA SW-846 methodology will be used. WESTON-contracted laboratory data packages will be verified and validated using a Stage 2A validation, as described in the EPA *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (January 2009). Validation qualifiers will be applied using the following hierarchy: *EPA National Functional Guidelines for Organic Data Review*; *EPA National Functional Guidelines for Inorganic Data Review*; and analytical methods from EPA Publication SW-846; and the laboratory-specific SOP.

Worksheet 15 — Project Action Limits and Laboratory-Specific Detection/Quantitation Limits

(UFP-QAPP Manual Sections 2.6.2.3 and Figure 15)
(EPA 2106-G-05 Section 2.2.6)

The following information is provided for each matrix, analyte, analytical method, and concentration level (if applicable) for the sampling events associated with EPA contractor subcontracted laboratory, Test America, Inc. This document will be updated as additional sampling parameters, event and/or laboratories are added to this project.

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Worksheet #15.1: Laboratory Reporting Limits – Target Analyte List (TAL) VOCs by EPA 8260B (Soil)

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
1,1,1-Trichloroethane	71-55-6	mg/kg	*24000*	0.005	0.00074	70 - 132	30	60 - 135	40
1,1,2,2-Tetrachloroethane	79-34-5	mg/kg	*60*	0.005	0.00087	61 - 137	30	19 - 178	40
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	mg/kg	*20000*	0.005	0.00067	70 - 134	30	38 - 130	40
1,1,2-Trichloroethane	79-00-5	mg/kg	*4.5*	0.005	0.0005	70 - 130	30	53 - 138	40
1,1-Dichloroethane	75-34-3	mg/kg	*360*	0.005	0.00087	70 - 130	30	55 - 133	40
1,1-Dichloroethene	75-35-4	mg/kg	*680*	0.005	0.0005	70 - 130	30	50 - 134	40
1,2,3-Trichlorobenzene	87-61-6	mg/kg	*190*	0.005	0.00044	66 - 147	30	10 - 136	40
1,2,4-Trichlorobenzene	120-82-1	mg/kg	*170*	0.005	0.00097	68 - 140	30	10 - 130	40
1,2-Dibromo-3-chloropropane	96-12-8	mg/kg	*0.53*	0.005	0.00244	51 - 135	30	49 - 150	40
1,2-Dibromoethane	106-93-4	mg/kg	*3.6*	0.005	0.0003	70 - 130	30	57 - 130	40
1,2-Dichlorobenzene	95-50-1	mg/kg	*5400*	0.005	0.00025	70 - 130	30	70 - 130	40
1,2-Dichloroethane	107-06-2	mg/kg	*46*	0.005	0.00052	70 - 130	30	55 - 132	40
1,2-Dichloropropane	78-87-5	mg/kg	*28*	0.005	0.0005	70 - 130	30	61 - 130	40
1,3-Dichlorobenzene	541-73-1	mg/kg	-	0.005	0.00031	70 - 130	30	70 - 130	40
1,4-Dichlorobenzene	106-46-7	mg/kg	*260*	0.005	0.00032	70 - 130	30	70 - 130	40
2-Butanone	78-93-3	mg/kg	*81000*	0.01	0.0019	48 - 146	30	11 - 164	40
2-Hexanone	591-78-6	mg/kg	*600*	0.01	0.00101	53 - 135	30	33 - 145	40
4-Methyl-2-pentanone	108-10-1	mg/kg	*99000*	0.01	0.00147	57 - 133	30	32 - 141	40
Acetone	67-64-1	mg/kg	*180000*	0.05	0.0072	41 - 173	30	10 - 200	40
Benzene	71-43-2	mg/kg	*120*	0.005	0.00063	70 - 131	30	56 - 132	40
Bromochloromethane	74-97-5	mg/kg	*450*	0.005	0.0009	70 - 130	30	70 - 130	40
Bromodichloromethane	75-27-4	mg/kg	*29*	0.005	0.00066	70 - 120	30	66 - 130	40
Bromoform	75-25-2	mg/kg	*1900*	0.005	0.00137	59 - 137	30	51 - 137	40
Bromomethane	74-83-9	mg/kg	*21*	0.005	0.0011	57 - 155	30	37 - 147	40
Carbon disulfide	75-15-0	mg/kg	*2300*	0.01	0.00055	70 - 138	30	51 - 151	40
Carbon tetrachloride	56-23-5	mg/kg	*65*	0.005	0.00113	70 - 136	30	57 - 135	40
Chlorobenzene	108-90-7	mg/kg	*830*	0.005	0.00096	70 - 130	30	62 - 130	40
Chloroethane	75-00-3	mg/kg	*41000*	0.005	0.00026	62 - 146	30	44 - 136	40
Chloroform	67-66-3	mg/kg	*32*	0.005	0.00087	70 - 130	30	61 - 133	40

Worksheet #15.1: Project Action Limits and Laboratory Reporting Limits – Target Analyte List (TAL) VOCs by EPA 8260B (Soil) *(Continued)*

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Chloromethane	74-87-3	mg/kg	*330*	0.005	0.0012	61 - 137	30	61 - 133	40
cis-1,2-Dichloroethene	156-59-2	mg/kg	*470*	0.005	0.00057	70 - 130	30	56 - 130	40
cis-1,3-Dichloropropene	10061-01-5	mg/kg	-	0.005	0.00045	70 - 130	30	52 - 130	40
Cyclohexane	110-82-7	mg/kg	*20000*	0.005	0.00192	70 - 130	30	54 - 130	40
Dibromochloromethane	124-48-1	mg/kg	*830*	0.005	0.00094	60 - 135	30	61 - 140	40
Dichlorodifluoromethane	75-71-8	mg/kg	*260*	0.005	0.00073	62 - 146	30	10 - 152	40
Ethylbenzene	100-41-4	mg/kg	*580*	0.005	0.00045	70 - 130	30	48 - 138	40
Isopropylbenzene	98-82-8	mg/kg	*5800*	0.005	0.00075	65 - 140	30	65 - 140	40
m,p-Xylene	179601-23-1	mg/kg	*1700*	0.01	0.0005	70 - 130	30	33 - 140	40
Methyl Acetate	79-20-9	mg/kg	*1700*	0.025	0.00275	59 - 136	30	60 - 140	40
Methyl tert-butyl ether	1634-04-4	mg/kg	*230000*	0.005	0.00183	70 - 130	30	26 - 170	40
Methylcyclohexane	108-87-2	mg/kg	-	0.005	0.00146	70 - 130	30	60 - 140	40
Methylene chloride	75-09-2	mg/kg	*1000*	0.025	0.005	61- 150	30	48 - 147	40
o-Xylene	95-47-6	mg/kg	*1900*	0.005	0.0004	70 - 130	30	38 - 142	40
Styrene	100-42-5	mg/kg	*18000*	0.005	0.00071	70 -130	30	46 - 130	40
Tetrachloroethene	127-18-4	mg/kg	*240*	0.005	0.00074	70- 130	30	66 -130	40
Toluene	108-88-3	mg/kg	*15000*	0.005	0.0009	70 - 130	30	48 - 135	40
trans-1,2-Dichloroethene	156-60-5	mg/kg	*4700*	0.005	0.00114	70 - 132	30	55 - 132	40
trans-1,3-Dichloropropene	10061-02-6	mg/kg	-	0.005	0.00058	70 - 131	30	40 - 135	40
Trichloroethene	79-01-6	mg/kg	*12*	0.005	0.00028	70 - 130	30	57 - 130	40
Trichlorofluoromethane	75-69-4	mg/kg	*70000*	0.005	0.0005	68 - 146	30	44- 130	40
Vinyl chloride	75-01-4	mg/kg	*5.9*	0.005	0.0006	65 - 139	30	41 - 135	40
Xylene (total)	1330-20-7	mg/kg	*1700*	0.01	0.0005	70 - 130	30	49 - 137	40

Notes:

[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3

CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

Worksheet #15.1: Project Action Limits and Laboratory Reporting Limits – Target Analyte List (TAL) VOCs by EPA 8260B (Soil) *(Continued)*

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision

mg/kg - milligrams per kilogram

MS/MSD - Matrix Spike/Matrix Spike Duplicate

MS/MSD and LCS control limits are specified by the analytical laboratory. The CLP method does not require an LCS.

MDLs from the EPA Region 6 EPA Laboratory and CLP laboratories are not available to START; MDLs for WESTON-subcontracted laboratories will be reviewed during the site scoping process to ensure they are less than the CRQL (for CLP methods) or laboratory Reporting Limit (RL) for non-CLP methods.

Worksheet #15.2: Laboratory Reporting Limits – Target Analyte List (TAL) SVOCs by 8270D (Soil)

Analyte	CAS Number	Units	RMLs[a]	Lab Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
1,1'-Biphenyl	92-52-4	mg/kg	*140*	0.333	0.189	15 - 120	50	10 - 200	50
1,2,4,5-Tetrachlorobenzene	95-94-3	mg/kg	*70*	0.333	0.169	41 - 120	50	10 - 200	50
1,4-Dioxane	123-91-1	mg/kg	*530*	0.333	0.183	10 - 120	50	10 - 200	50
2,2'-Oxybis(1-chloropropane)	108-60-1	mg/kg	*9400*	0.333	0.198	32 - 120	50	20 - 120	50
2,3,4,6-Tetrachlorophenol	58-90-2	mg/kg	*5700*	0.333	0.181	44 - 120	50	10 -200	50
2,4,5-Trichlorophenol	95-95-4	mg/kg	*19000*	0.333	0.218	39 - 120	50	27 - 120	50
2,4,6-Trichlorophenol	88-06-2	mg/kg	*190*	0.333	0.192	39 - 120	50	24 - 122	50
2,4-Dichlorophenol	120-83-2	mg/kg	*570*	0.333	0.175	32 - 120	50	17 - 120	50
2,4-Dimethylphenol	105-67-9	mg/kg	*3800*	0.67	0.335	32 - 120	50	17 - 120	50
2,4-Dinitrophenol	51-28-5	mg/kg	*380*	0.333	0.251	10 - 142	50	10 - 150	50
2,4-Dinitrotoluene	121-14-2	mg/kg	*170*	0.333	0.208	43 - 120	50	24 - 121	50
2,6-Dinitrotoluene	606-20-2	mg/kg	*36*	0.333	0.223	43 - 120	50	24 - 120	50
2-Chloronaphthalene	91-58-7	mg/kg	*14000*	0.333	0.209	34 - 120	50	24 - 120	50
2-Chlorophenol	95-57-8	mg/kg	*1200*	0.333	0.191	32 - 120	50	25 - 120	50
2-Methylnaphthalene*	91-57-6	mg/kg	*720*	0.067	0.026	28 - 120	50	13 - 120	50
2-Methylphenol	95-48-7	mg/kg	*9500*	0.333	0.216	36 - 120	50	23 - 120	50
3-Methylphenol	108-39-4	mg/kg	*9500*	0.333	0.203	37 - 120	50	19 - 120	50
2-Nitroaniline	88-74-4	mg/kg	*1900*	0.333	0.207	40 - 120	50	31 - 120	50
2-Nitrophenol	88-75-5	mg/kg	-	0.333	0.243	29 - 120	50	23 - 120	50
3,3'-Dichlorobenzidine	91-94-1	mg/kg	*120*	0.333	0.243	39 - 120	50	10 - 120	50
3-Nitroaniline	99-09-2	mg/kg	-	0.67	0.23	42 - 120	50	31 - 120	50
4,6-Dinitro-2-methylphenol	534-52-1	mg/kg	*15*	0.333	0.229	27 - 134	50	10 - 134	50
4-Bromophenyl-phenylether	101-55-3	mg/kg	-	0.333	0.205	40 - 120	50	31 - 120	50
4-Chloro-3-methylphenol	59-50-7	mg/kg	*19000*	0.333	0.168	38 - 120	50	21 - 120	50
4-Chloroaniline	106-47-8	mg/kg	*270*	0.333	0.227	35 - 120	50	26 - 120	50
4-Chlorophenyl-phenylether	7005-72-3	mg/kg	-	0.333	0.201	42 - 120	50	26 - 120	50
4 Methylphenol	106-44-5	mg/kg	*19000*	0.333	0.203	37 - 120	50	19 - 120	50
4-Nitroaniline	100-01-6	mg/kg	*760*	0.67	0.238	43 - 120	50	28 - 120	50
4-Nitrophenol	100-02-7	mg/kg	-	0.67	0.382	32 - 136	50	16 - 139	50

Worksheet #15.3: Laboratory Reporting Limits – Target Analyte List OC Pesticides by EPA 8081A (Soil) *(Continued)*

Analyte	CAS Number	Units	RMLs[a]	Lab Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Acenaphthene*	83-32-9	mg/kg	*11000*	0.067	0.032	36 - 120	50	19 - 120	50
Acenaphthylene*	208-96-8	mg/kg	-	0.067	0.029	38 - 120	50	25 - 120	50
Acetophenone	98-86-2	mg/kg	*23000*	0.333	0.186	30 - 120	50	10 - 200	50
Anthracene*	120-12-7	mg/kg	*54000*	0.067	0.029	46 - 124	50	28 - 125	50
Atrazine	1912-24-9	mg/kg	*240*	0.333	0.168	41 - 120	50	10 - 200	50
Benzaldehyde	100-52-7	mg/kg	*17000*	0.67	0.254	10 - 150	50	10 - 200	50
Benzo(a)anthracene	56-55-3	mg/kg	*110*	0.067	0.03	45 - 120	50	23 - 120	50
Benzo(a)pyrene	50-32-8	mg/kg	*11*	0.067	0.027	45 - 120	50	15 - 128	50
Benzo(b)fluoranthene	205-99-2	mg/kg	*110*	0.067	0.028	43 - 120	50	12 - 133	50
Benzo(g,h,i)perylene	191-24-2	mg/kg	-	0.067	0.033	38 -120	50	22 - 120	50
Benzo(k)fluoranthene	207-08-9	mg/kg	*1100*	0.067	0.027	42 -120	50	28 - 120	50
Bis(2-chloroethoxy)methane	111-91-1	mg/kg	*570*	0.333	0.2	32 - 120	50	24 - 120	50
Bis(2-chloroethyl)ether	111-44-4	mg/kg	*23*	0.333	0.213	31 - 120	50	22 - 120	50
Bis(2-ethylhexyl)phthalate	117-81-7	mg/kg	*3800*	0.333	0.207	43 - 120	50	26 - 120	50
Butylbenzylphthalate	85-68-7	mg/kg	*29000*	0.333	0.215	43 - 133	50	24 - 133	50
Caprolactam	105-60-2	mg/kg	*94000*	0.333	0.155	18 - 138	50	10 - 199	50
Carbazole	86-74-8	mg/kg	-	0.333	0.207	44 - 120	50	25 - 123	50
Chrysene	218-01-9	mg/kg	*11000*	0.067	0.037	43 - 120	50	20 - 120	50
Dibenzo(a,h)anthracene	53-70-3	mg/kg	*11*	0.067	0.032	32 - 128	50	12 - 128	50
Dibenzofuran	132-64-9	mg/kg	*220*	0.333	0.21	41 - 120	50	21 - 120	50
Diethylphthalate	84-66-2	mg/kg	*150000*	0.333	0.212	41 - 122	50	29- 122	50
Dimethylphthalate	131-11-3	mg/kg	-	0.333	0.207	55 - 120	50	30 - 120	50
Di-n-butylphthalate	84-74-2	mg/kg	*19000*	0.333	0.211	46 - 127	50	29 - 126	50
Di-n-octylphthalate	117-84-0	mg/kg	*1900*	0.333	0.178	40 -130	50	27 - 130	50
Fluoranthene*	206-44-0	mg/kg	*7200*	0.067	0.034	46 - 120	50	10 - 143	50
Fluorene*	86-73-7	mg/kg	*7200*	0.067	0.029	42 - 120	50	20 - 120	50
Hexachlorobenzene	118-74-1	mg/kg	*21*	0.333	0.25	44 - 120	50	25 - 120	50
Hexachlorobutadiene	87-68-3	mg/kg	*120*	0.333	0.167	31 - 120	50	10 - 120	50
Hexachlorocyclopentadiene	77-47-4	mg/kg	*5.3*	0.333	0.15	24 - 120	50	10 - 120	50

Worksheet #15.3: Laboratory Reporting Limits – Target Analyte List OC Pesticides by EPA 8081A (Soil) *(Continued)*

Analyte	CAS Number	Units	RMLs[a]	Lab Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Hexachloroethane	67-72-1	mg/kg	*130*	0.333	0.181	33 - 120	50	10 - 120	50
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	*110*	0.067	0.029	41 - 121	50	22 - 121	50
Isophorone	78-59-1	mg/kg	*38000*	0.333	0.188	33 - 120	50	24 - 120	50
Naphthalene	91-20-3	mg/kg	*380*	0.067	0.029	32 - 120	50	10 - 120	50
Nitrobenzene	98-95-3	mg/kg	*380*	0.333	0.201	26 - 120	50	19 - 120	50
N-Nitroso-di-n-propylamine	621-64-7	mg/kg	*7.8*	0.333	0.194	35 -120	50	24 - 120	50
N-Nitrosodiphenylamine	86-30-6	mg/kg	*11000*	0.333	0.053	52 - 120	50	26 -150	50
Pentachlorophenol	87-86-5	mg/kg	*100*	0.67	0.266	44 - 134	50	19 - 145	50
Phenanthrene	85-01-8	mg/kg	-	0.067	0.034	45 - 120	50	21 - 122	50
Phenol	108-95-2	mg/kg	*57000*	0.333	0.203	30 - 120	50	15 - 120	50
Pyrene	129-00-0	mg/kg	*5400*	0.067	0.034	43 - 120	50	20 - 123	50

Notes:
[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;
CAS - Chemical Abstracts Service Registry
LCS - Laboratory Control Sample
MDL - Method Detection Limit
mg/kg - milligrams per kilogram
MS/MSD - Matrix Spike/Matrix Spike Duplicate

Worksheet #15.3: Laboratory Reporting Limits – Target Analyte List OC Pesticides by EPA 8081A (Soil)

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
4,4'-DDD	72-54-8	mgkg	*230*	0.0017	0.00043	52 - 142	40	10 - 154	40
4,4'-DDE	72-55-9	mgkg	*200*	0.0017	0.0005	46 -138	40	14 - 139	40
4,4'-DDT	50-29-3	mgkg	*110*	0.0017	0.00085	25 - 150	40	10 - 152	40
Aldrin	309-00-2	mgkg	*3.9*	0.0017	0.00031	49 - 127	40	11 - 140	40
alpha-BHC	319-84-6	mgkg	*8.6*	0.0017	0.0002	49 - 127	40	23 - 138	40
alpha-Chlordane	5103-71-9	mgkg	-	0.0017	0.00043	51 - 133	40	10 - 140	40
beta-BHC	319-85-7	mgkg	*30*	0.0017	0.00045	44 - 130	40	12 - 150	40
Chlordane	12789-03-6	mgkg	*100*	0.05	0.01	-	-	-	-
delta-BHC	319-86-8	mgkg	-	0.0017	0.001	48 - 129	40	10 - 149	40
Dieldrin	60-57-1	mgkg	*3.4*	0.0017	0.0004	48 - 128	40	10 - 148	40
Endosulfan I	959-98-8	mgkg	-	0.0017	0.00047	51 - 124	40	10 - 158	40
Endosulfan II	33213-65-9	mgkg	-	0.0017	0.00055	51 - 132	40	10 - 152	40
Endosulfan sulfate	1031-07-8	mgkg	*57*	0.0017	0.0005	49 - 129	40	10 - 148	40
Endrin	72-20-8	mgkg	*57*	0.0017	0.00043	46 - 130	40	20 - 145	40
Endrin aldehyde	7421-93-4	mgkg	-	0.0017	0.00051	46 - 130	40	13 - 150	40
Endrin ketone	53494-70-5	mgkg	-	0.0017	0.00059	43 - 138	40	13 - 150	40
gamma-BHC (Lindane)	58-89-9	mgkg	*57*	0.0017	0.00039	47 - 130	40	24 - 145	40
gamma-Chlordane	5103-74-2	mgkg	-	0.0017	0.00079	52 - 131	40	10 - 140	40
Heptachlor	76-44-8	mgkg	*13*	0.0017	0.00042	37 - 142	40	10 - 150	40
Heptachlor epoxide	1024-57-3	mgkg	*3.1*	0.0017	0.00065	50 - 126	40	15 - 139	40
Methoxychlor	72-43-5	mgkg	*950*	0.0033	0.00049	20 - 150	40	10 - 150	40
Toxaphene	8001-35-2	mgkg	*49*	0.0667	0.02	-	-	-	-

Notes:
a - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;

CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

ug/kg - micrograms per kilogram

MS/MSD - Matrix Spike/Matrix Spike Duplicate

THQ - Target Hazard Quotient

Worksheet #15.4: Laboratory Reporting Limits – Target Analyte List PCBs by EPA 8082A (Soil)

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Aroclor-1016	12674-11-2	mg/kg	*12*	0.0333	0.01	60 - 137	50	10 - 150	50
Aroclor-1221	11104-28-2	mg/kg	*20*	0.0333	0.01	-	-	-	-
Aroclor-1232	11141-16-5	mg/kg	*17*	0.0333	0.01	-	-	-	-
Aroclor-1242	53469-21-9	mg/kg	*23*	0.0333	0.01	-	-	-	-
Aroclor-1248	12672-29-6	mg/kg	*23*	0.0333	0.01	-	-	-	-
Aroclor-1254	11097-69-1	mg/kg	*3.5*	0.0333	0.01	-	-	-	-
Aroclor-1260	11096-82-5	mg/kg	*24*	0.0333	0.01	56 - 141	50	10 - 150	50
PCBs (Total)	1336-36-3	mg/kg	*23*	0.0333	0.02	-	-	-	-

Notes:
[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;

CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

mg/kg - milligrams per kilogram
MS/MSD - Matrix Spike/Matrix Spike Duplicate

Worksheet #15.5: Laboratory Limits – Herbicides by EPA 8151A (Soil)

Analyte	CAS Number	Units	RMLs[a]	Lab Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
2,4,5-T	93-76-5	mg/kg	*1900*	0.06	0.007	51 - 134	40	30 - 120	40
2,4,5-TP (Silvex)	93-72-1	mg/kg	*1500*	0.06	0.006	57 - 120	40	32 - 120	37
2,4'-D	94-75-7	mg/kg	*2100*	0.24	0.03	55 - 120	40	26 -120	40
2,4-DB	94-82-6	mg/kg	*5700*	0.24	0.064	52 - 143	40	17 - 124	40
Dalapon	75-99-0	mg/kg	*5700*	0.12	0.044	10 - 125	40	10 - 120	40
Dicamba	1918-00-9	mg/kg	*5700*	0.12	0.029	41 - 146	40	24 - 126	40
Dichloroprop	120-36-5	mg/kg	-	0.24	0.029	69 - 133	40	45 - 120	40
Dinoseb	88-85-7	mg/kg	*190*	0.06	0.012	22 - 120	40	22 - 120	40
MCPA	94-74-6	mg/kg	*95*	24	3.1	42 - 141	40	37 - 120	40
MCPP	93-65-2	mg/kg	*190*	24	2.21	5 - 124	40	33 - 120	40

Notes:

[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;

CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

mg/kg - milligrams per kilogram

MS/MSD - Matrix Spike/Matrix Spike Duplicate

Worksheet #15.6: Laboratory Limits – Total Petroleum Hydrocarbons by TNRCC 1005 (Soil)

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
C6-C12	STL00061	mg/kg	-	0.01	0.0038	75 - 125	20	75 -125	20
>C12-C28	STL00035	mg/kg	-	0.01	0.00406	75 - 125	20	75 -125	20
>C28-C35	STL00147	mg/kg	-	0.01	0.00406	75 - 125	20	75 -125	20
C6-C35	STL00006	mg/kg	-	0.01	0.0038	75 - 125	20	75 -125	20

[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;
CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

mg/kg - milligrams per kilogram
MS/MSD - Matrix Spike/Matrix Spike Duplicate

TNRCC - Texas Natrual Resource Conservation Commission

Worksheet #15.7: Laboratory Limits – Target Analyte List Inorganics by EPA 6020/7471A (Soil)

Analyte	CAS Number	Units	RMLs[a]	Laboratory Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Aluminum	7429-90-5	mg/kg	*230000*	5	2.5	80 - 120	20	75 - 125	20
Antimony	7440-36-0	mg/kg	*94*	0.25	0.0961	80 - 120	20	75 - 125	20
Arsenic	7440-38-2	mg/kg	*68*	0.25	0.0499	80 - 120	20	75 - 125	20
Barium	7440-39-3	mg/kg	*46000*	0.25	0.109	80 - 120	20	75 - 125	20
Beryllium	7440-41-7	mg/kg	*470*	0.25	0.0876	80 - 120	20	75 - 125	20
Cadmium	7440-43-9	mg/kg	*210*	0.25	0.0721	80 - 120	20	75 - 125	20
Calcium	7440-70-2	mg/kg	-	25	13.8	80 - 120	20	75 - 125	20
Chromium	7440-47-3	mg/kg	-	0.25	0.112	80 - 120	20	75 - 125	20
Cobalt	7440-48-4	mg/kg	*94*	0.25	0.0525	80 - 120	20	75 - 125	20
Copper	7440-50-8	mg/kg	*9400*	0.5	0.177	80 - 120	20	75 - 125	20
Iron	7439-89-6	mg/kg	*160000*	25	5.53	80 - 120	20	75 - 125	20
Lead	7439-92-1	mg/kg	*400*	0.5	0.205	80 - 120	20	75 - 125	20
Magnesium	7439-95-4	mg/kg	-	25	5.47	80 - 120	20	75 - 125	20
Manganese	7439-96-5	mg/kg	-	2.5	0.603	80 - 120	20	75 - 125	20
Nickel	7440-02-0	mg/kg	*4600*	0.25	0.133	80 - 120	20	75 - 125	20
Potassium	7440-09-7	mg/kg	-	50	24.5	80 - 120	20	75 - 125	20
Selenium	7782-49-2	mg/kg	*1200*	0.25	0.0435	80 - 120	20	75 - 125	20
Silver	7440-22-4	mg/kg	*1200*	0.25	0.0686	80 - 120	20	75 - 125	20
Sodium	7440-23-5	mg/kg	-	50	28.1	80 - 120	20	75 - 125	20
Thallium	7440-28-0	mg/kg	*2.3*	0.25	0.0689	80 - 120	20	75 - 125	20
Vanadium	7440-62-2	mg/kg	*1200*	0.25	0.0573	80 - 120	20	75 - 125	20
Zinc	7440-66-6	mg/kg	*70000*	1.25	0.768	80 - 120	20	75 - 125	20

Notes:
[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;
CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

mg/kg - milligrams per kilogram
MS/MSD - Matrix Spike/Matrix Spike Duplicate

Worksheet #15.7: Laboratory Limits – Target Analyte List Inorganics by EPA 6020/7471A (Soil) *(Continued)*

Analyte	CAS Number	Units	RML[a]	Laboratory Limits		Laboratory Accuracy and Precision Criteria			
				Lab RL	Lab MDL	LCS Recovery Limits	LCS Precision	MS/MSD Recovery Limits	MS/MSD Precision
Mercury	7439-97-6	mg/kg	***33***	0.2	0.018	80 - 120	20	80 - 120	20

Notes:
[a] - EPA 2017 Removal Management Levels (July 2017): Removal Management Levels (RMLs) correspond to a target cancer risk (TCR) of 10^{-4} or target hazard quotient (THQ) of 3;
CAS - Chemical Abstracts Service Registry

LCS - Laboratory Control Sample

MDL - Method Detection Limit

mg/kg - milligrams per kilogram
MS/MSD - Matrix Spike/Matrix Spike Duplicate

Worksheet 17 — Sampling Design and Rationale

(UFP-QAPP Manual Section 3.1.1)
(EPA 2106-G-05 Section 2.3.1)

Sampling Tasks:

Soil samples will be collected at each designated Response Collection pad to provide pre-staging data and post-staging data in order to document site conditions within the staging area prior to site activities and to document site conditions after the completion of site activities. The data will be evaluated to assess whether there has been an increase in the concentration of the chemicals present at the response pads. Samples will be collected prior to the staging, Hazard Categorization Field Screening (HAZCAT®), and bulking of drummed waste.

A systemic (i.e., grid) sampling approach will be utilized at each temporary collection pad site. The pad will be divided into a minimum of eight equally sized grids. Each grid will be approximately 50 x 50 square foot (ft^2) in area. The VOC and TPH grab samples will be collected at the center of the grid using Terracore (or equivalent) sampling devices. Samples must be delivered to the laboratory within 48-hours to meet required holding time for VOCs. The remaining parameters will be collected as a 5-point composite surface soil sample.

A minimum of eight composite soil samples should be collected from each temporary pad site if feasible. Pre-deployment and post-deployment soil samples must be collected at the same locations (i.e., GPS locations need to documented).

All soil samples will be collected from the surface by scraping the top 2.5 cm (1 inch) of surface soil with a non-dedicated or dedicated sampling device (scoop, spoon or trowel). The sample will be placed immediately into a zip lock type plastic bag, where it will be composited before being placed into the appropriate sample containers required for SVOCs, pesticides, herbicides, PCBs and TAL metals analysis. Soil sampling activities will be conducted in accordance with guidelines outlined in EPA Contractor and EPA/ERT Soil Sampling SOPs #302, 2001 and 2012 (Worksheet 21).

Field Blanks

Field blanks consist of blank matrix samples collected in the field. Field blanks include trip blanks and equipment blanks, if non-dedicated sampling equipment is used, Each field blank type is described below.

Equipment Blanks (Rinsate Blank)

Soil samples will be collected with dedicated sampling equipment whenever available, however; therefore Equipment Rinsate Blanks will not be collected during this sampling event. An equipment blank will be collected from Charlie pad if non-dedicated equipment is used to collect the soil.

Trip Blank

A trip blank is primarily used to provide information about volatile contaminants that may be introduced into field samples during transport and sample storage. A trip blank is a sample prepared in the field or in the laboratory, accompanies the sample bottles to the laboratory, and is analyzed for the same volatile target analytes as the associated field samples. For trip blanks prepared in the field, DI water is placed into pre-preserved sample containers. Because trip blanks

are transported, stored, prepared and analyzed in the laboratory, they may be exposed to contamination from both field and laboratory sources. The method blank results, which would aid in identifying laboratory contaminants, are used to evaluate potential sources of contamination in trip blanks during data validation and the qualified trip blank results are compared with field sample results to assess the potential for contamination of field samples during transport and storage.

Trip blanks will be collected at a minimum frequency of one per cooler of soil samples. Trip blanks will be shipped to the same laboratory as the associated VOC samples and analyzed for the same list of target analytes.

Field Duplicate (Co-located)

A field duplicate is a field sample collected at the same time and in the same location as its associated parent sample. The pair of field duplicate samples is collected using the same equipment, placed in separate but identical types of sample containers, and preserved in the same manner. The field duplicates are shipped to the laboratory and are treated as separate samples by the laboratory, and taken through identical sample preparation and analysis processes. Field duplicates provide information on the precision of the sample collection and the overall analytical process. There are two categories of field duplicate samples which are defined by the sample collection method: co-located field duplicates and subsample field duplicates

Co-located field duplicates are independent samples collected from side-by-side locations at the same point in time and space to be considered identical. Co-located field duplicate samples are not homogenized prior to placement in the sample container. An example of co-located field duplicates is soil samples collected for VOC analysis which are collected side-by-side using EnCore® or similar sampling devices. It is not acceptable to homogenize soil for VOC analysis due to loss of VOCs during the homogenization process; therefore, collecting co-located field duplicates for VOCs is the only acceptable sampling method.

A field duplicate samples will be collected at a frequency of 5% (1 field duplicate for every 20 samples collected per matrix).

Temperature Indicator

A temperature indicator is a container of water that is packed and shipped to the laboratory with the field samples requiring preservation by cooling to 4 degrees Celsius (°C) (±2°C). Upon opening the sample cooler, the laboratory measures the temperature of the temperature indicator. The temperature reading is used to document whether field samples were received within the acceptable temperature range. This information is used by both the laboratory and by the data validator. If the temperature indicator is outside the acceptance criteria, the laboratory is expected to notify the Project Chemist immediately for guidance on whether to proceed with analysis. It should be noted that samples received by the laboratory on the same day as collection may not have adequate time to achieve ideal preservation temperatures. However, by providing the laboratory documentation as evidence that the preservation process is underway during sample receipt (e.g., solid ice remaining in the cooler), data quality will not likely be impacted.

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Worksheet 18 — Sampling Locations and Methods

(UFP-QAPP Manual Section 3.1.1 and 3.1.2)
(EPA 2106-G-05 Sections 2.3.1 and 2.3.2)

PAD ID / Sampling Location	Matrix	No. of Sample Locations	Type	Analyte/Analytical Group	Sampling SOP Reference[1]	Comments
Alpha Pad 1 / 704 W. Yoakum Ave., Aransas Pass, TX	Soil	8	Surface Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	Worksheet 21	Samples submitted to Test America, Inc.
Alpha Pad 2 / Port St. Port Aransas, TX	Soil	6	Surface Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	Worksheet 21	Samples submitted to Test America, Inc.
Bravo Pad / Clinton Drive at Dorsett Street, Houston, TX	Soil	8	Surface Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	Worksheet 21	Samples submitted to Test America, Inc.
Charlie Pad / 6000 Airline Drive, Beaumont, TX	Soil	8	Surface Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	Worksheet 21	Samples submitted to Test America, Inc.

[1] Sampling SOPs references will be provided in Worksheet 21.

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Worksheet 19 & 30 — Sample Containers, Preservation, and Hold Times

(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

Samples collected during Hurricane Harvey response collection pad sampling event will be shipped to Test America, Inc. laboratories.

QAPP Worksheet 19 & 30 tabulates the sample containers and preservation requirements for each analysis and matrix type. This list is based on Laboratory bottleware and preservation requirements. Containers used for sample collection are pre-cleaned Laboratory Quality Certified bottles. Technical holding times for sample preparation and analysis are listed in this worksheet.

Data package turnaround times may vary by analysis/laboratory; however, sample submittal, requested turnaround times and data deliverable dates are documented in the Hurricane Harvey Sample Tracking spreadsheet which is part of the project file. The data package turnaround times will also be cited on the COC forms as directed by EPA.

Worksheet 19 & 30 — Sample Containers, Preservation, and Hold Times *(Continued)*

(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

Laboratory : Test America, Inc., - Corpus Christi, TX and Houston, TX
List Any Required Accreditations/Certifications: TCEQ Certified by Method Analysis (Preferred)
Back-up Laboratory: NA
Sample Delivery Method: Drop-off at Laboratory or ship Fed-Ex

Analytical Group (Concentration Level)	Matrix	Analytical Method	Containers (number, size, type per sample)	Preservation Requirements (chemical, temperature, light protected)	Technical Hold Time (Sample Preparation)	Technical Hold Time (Analysis)
Percent solids for soil VOCs only	Soil	NA	(1) 40-mL VOA vial, dry with no headspace	Iced to ≤6ºC, not frozen	None	None
VOCs (Low/Med)	Soil	EPA 5035A/ EPA 8260C	5-gram soil cores extruded into (2) 40-mL amber VOA vials with DI water$_4$ and a stir bar plus (1) 40-mL VOA vial with MeOH	(2) 40-mL VOA vials with 5 mL DI water and (1) 40-mL VOA vial with MeOH then Iced to ≤6ºC	48-Hours to freeze.	48 Hours or 14 days from collection, if frozen
TPH	Soil	TNRCC Method 1005	(2) 5-gram EnCore/TerracCore samplers	(2) 40-mL VOA vials (pre-weighed) with No Preservative. mL	48-Hours to freeze.	48 Hours or 14 days from collection, if frozen
SVOCs (Low)	Soil	EPA 8270D	(1) 4-oz glass wide mouth jar with PTFE-lined lid	Iced to ≤6ºC, not frozen	14 days (sampling to extraction)	40 days (extraction to analysis)
OC Pesticides (Low)	Soil	EPA 8081A	(1) 4-oz glass wide mouth jar with PTFE-lined lid	Iced to ≤6ºC, not frozen	14 days (sampling to extraction)	40 days (extraction to analysis)

Worksheet 19 & 30 — Sample Containers, Preservation, and Hold Times *(Continued)*

(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

Analytical Group (Concentration Level)	Matrix	Analytical Method	Containers (number, size, type per sample)	Preservation Requirements (chemical, temperature, light protected)	Technical Hold Time (Sample Preparation)	Technical Hold Time (Analysis)
PCBs as Aroclors (Low)	Soil	EPA 8082A	(1) 8-oz glass wide mouth jar with PTFE-lined lid	Iced to ≤6ºC, not frozen	14 days (sampling to extraction)	40 days (extraction to analysis)
Herbicides (Low)	Soil	EPA 8151A	(1) 8-oz glass wide mouth jar with PTFE-lined lid	Iced to ≤6ºC, not frozen	14 days (sampling to extraction)	40 days (extraction to analysis)
ICP-MS Metals and Mercury	Soil	EPA 6020A and 7471A	(1) 4-oz glass wide mouth jar *No extra volume needed for S/D*	Iced to ≤6ºC, not frozen	none	180 days for all metals except 28 days for mercury
VOCs	Water	EPA 5030/8260C	(2) 40-mL amber VOA vials	HCl to a pH < 2; Iced to ≤6ºC	none	14 days

Volumes presented in this table should be considered maximum sample amounts needed by the laboratory and include sufficient sample for re-extraction/re-digestion if needed.
For some similar analyses, sample volumes may be combined into one container to reduce the number of bottles sent to the laboratory.

Worksheet 20 — Field Quality Control Sample Summary

(UFP-QAPP Manual Sections 3.1.1 and 3.1.2.)
(EPA 2106-G-05 Section 2.3.5)

Matrix	Analyte/Analytical Group	No. of Field Samples[1]	No. of Field Duplicates	No. of MS/MSD	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blanks	No. of Other	Total No. of Samples to Laboratory
Alpha Collection Pad1/Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	16	2	1	2	NA	2 (VOCs)	NA	24
Alpha Collection Pad2/Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	12	2	1	2	NA	2 (VOCs)	NA	20
Bravo Collection Pad/Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	16	2	1	2	NA	2 (VOCs)	NA	24
Charlie Collection Pad/Soil	VOCs, TPH, SVOCs, Pesticides, Herbicides, PCBs and TAL Metals	16	2	1	2	NA	2 (VOCs)	NA	24

[1] Samples that are collected at different depths at the same location, and analyzed separately, will be counted as separate field samples. Even if they are taken from the same container as the parent field sample, MS/MSDs are counted separately, because they are analyzed separately.
NA – Not Applicable

Project-specific QC samples may include field duplicate, field blanks (i.e., equipment blanks and trip blanks), and MS/MSD samples and will be collected in accordance with the frequencies recorded on Worksheet 12.

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Worksheet 21 — Field SOPs

(UFP-QAPP Manual Section 3.1.2)
(EPA 2106-G-05 Section 2.3.2)

The Hurricane Harvey Team uses two main categories of Field SOPs for field operations:

- EPA Contractor SOPs are generally divided into task or activity-specific categories, such as sample collection, field screening instruments, field screening kits/methods, and monitoring well installation SOPs. A list of typical contractor Field SOPs are provided in Worksheet 21.1.

- EPA Environmental Response Team (ERT) SOPs are also used for field operations. A complete list of EPA ERT SOPs is included in Worksheet 21.. The EPA ERT may also be downloaded from the following location: www.response.epa.gov/site/doc_list.aspx?site_id=2107&category=Field%20Activities

Worksheet 21.1 — EPA Contractor (Weston) Field SOPs

SOP Number or Reference	Title, Revision, Date, and URL (if available)	Originating Organization	SOP Option or Equipment Type (if SOP provides different options)	Modified for Project? Y/N	Comments
Task Specific					
Documentation					
SOP #1501.01	Logbook Documentation	EPA Contractor	Site-specific	N	None
SOP #1502.01	Photographic Documentation	EPA Contractor	Site-specific	N	None
SOP #1502.02	Photograph Management and Reporting	EPA Contractor	Site-specific	N	None
SOP #1101.01	Sample Custody in the Field	EPA Contractor	Site-specific	N	None
Soil Sampling					
SOP #1001.01	Surface Soil Sampling	EPA Contractor	Project-specific	N	None
SOP #1001.10	Soil Compositing	EPA Contractor	Project-specific	N	None

Worksheet 21 — Field SOPs *(Continued)*

(UFP-QAPP Manual Section 3.1.2)
(EPA 2106-G-05 Section 2.3.2)

Worksheet 21.1 — EPA Contractor (WESTON) Field SOPs *(Continued)*

SOP Number or Reference	Title, Revision, Date, and URL (if available)	Originating Organization	SOP Option or Equipment Type (if SOP provides different options)	Modified for Project? Y/N	Comments
SOP #1102.01	Sample Shipping	EPA Contractor	Project-specific	N	None

Worksheet 21.2 — EPA ERT SOPs

SOP Number or Reference	Title, Revision, Date, and URL (if available)	Originating Organization	SOP Option or Equipment Type (if SOP provides different options)	Modified for Project? Y/N	Comments
2001	General Field Sampling Guidelines, 6/2011	U.S. EPA, ERT	Site-specific	N	None
2002	Sample Documentation, Rev. 1.0, 1/4/16	SERAS	Site-Specific	N	None
2005	Quality Assurance/Quality Control Samples	U.S. EPA, ERT	Site-specific	N	None
2006	Sampling Equipment Decontamination, 12/2015	U.S. EPA, ERT	Non-phosphate Detergent, Tap Water. Distilled/Deionized Water, 10% Nitric Acid, Solvent Rinse (Pesticide Grade)	N	None
2012	Soil Sampling, 6/2011	U.S. EPA, ERT	Site-specific	N	None
2049	Investigation-Derived Waste (IDW) Management, 6/2011	U.S. EPA, ERT	Site-specific	N	None
4001	Logbook Documentation, Rev. 1.0, 10/31/16	SERAS	NA	N	None
4005	Chain of Custody Procedures, Rev. 2.0, 1/30/16	SERAS	NA	N	None

Worksheet 21.2 — EPA ERT SOPs *(Continued)*

Environmental samples are being collected for analysis through the a EPA Contractor-subcontracted laboratory.

During sampling activities, IDW may be generated. IDW may consist of decontamination fluids, drill cuttings, purge/development water, excess sampled media (e.g., soil, sediment, water, etc.), disposable sampling supplies, and personal protective equipment (PPE) (e.g., Tyvek/Saranex coveralls, gloves, booties, etc.). Handling of IDW will be performed according with SOP 2049 as listed above and procedures described in *Management of Investigation Derived Wastes during Site Inspections, May 1991*. Waste disposal for IDW will be dependent upon classification of the waste as either RCRA hazardous or RCRA nonhazardous waste.

Worksheet 22 — Field Equipment Calibration, Maintenance, Testing, and Inspection

(UFP-QAPP Manual Section 3.1.2.4)
(EPA 2106-G-05 Section 2.3.6)

WESTON field personnel are responsible for the calibration of WESTON field equipment and field equipment provided by subcontractors. Documented and approved procedures will be used for calibrating measuring and testing equipment. Widely accepted procedures, such as those published by EPA and ASTM, or procedures provided by manufacturers in equipment manuals will be adopted. Items may include, but are not limited to those identified in the table below.

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Title or Position of Responsible Person	SOP Reference[1]
Sampling Tools (Disposable Scoops)	NA	NA	NA	Visually inspect for obvious defects or broken parts	Prior to use	NA	Replace	Field Team Leader	NA
Disposable, inert sample mixing containers	NA	NA	NA	Visually inspect for cleanliness	Prior to use	NA	Replace	Field Team Leader	NA

[1] Refer to Field SOPs (Worksheets 21.1 and 21.2) .

Worksheet 23 — Analytical SOPs

(UFP-QAPP Manual Section 3.2.1)
(EPA 2106-G-05 Section 2.3.4)

The table below lists the current SOPs that are being utilized by the EPA Contractor subcontracted laboratory Test America, Inc. for analysis of soil and aqueous QC samples associated with the Response Pad soil sampling event.

Lab SOP Number	Title, Revision Date, and/or Number and URL (if available)	Screening or Definitive Data	Matrix/Analytical Group	Instrument	Oranization Performing Analysis	Modified for Project? (Y/N)
CC-ATM-V001, Rev. 11	METHOD 8260C VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), 8/2006, http://www.epa.gov/osw/hazard/testmethods/pdfs/8260c.pdf	Definitive	Soil /VOCs	GC/MS	Test America, Inc.	N
8270 625/NV04-22.17a	METHOD 8270D SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS, 2/2007, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8270d.pdf	Definitive	Soil /SVOCs	GC/MS	Test America, Inc.	N
CC-ATM-GC001, Rev. 11	TNRCC METHOD 1005 (TX1005), Revision 03, 6/2001 TOTAL PETROLEUM HYDROCARBONS www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/1005_final.pdf	Definitive	Soil/TPH	GC/FID	Test America, Inc.	N
TBDCC-ATM-M025, Rev. 5	METHOD 6020A INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY (ICP-MS), 2/2007, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/6020a.pdf	Definitive	Soil/Metals (no mercury)	ICP-MS	Test America, Inc.	N
CC-ATM-M001, Rev.10	METHOD 7471B MERCURY IN SOLID OR SEMISOLID WASTE (MANUAL COLD-VAPOR TECHNIQUE), 2/2007, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/7471b.pdf	Definitive	Soil /Mercury	CVAA	Test America, Inc.	N

Worksheet 23 — Analytical SOPs *(Continued)*

(UFP-QAPP Manual Section 3.2.1)
(EPA 2106-G-05 Section 2.3.4)

Lab SOP Number	Title, Revision Date, and/or Number and URL (if available)	Screening or Definitive Data	Matrix/Analytical Group	Instrument	Oranization Performing Analysis	Modified for Project? (Y/N)
8081 608 608.2/NV04-53.12b	METHOD 8081B ORGANOCHLORINE PESTICIDES BY GAS CHROMATOGRAPHY (GC), 2/2007, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8081b.pdf	Definitive	Soil /Pesticides	GC	Test America, Inc.	N
8082 608/NV04-105.15a	METHOD 8082A PCBs by GC, 2/2007, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8082a.pdf	Definitive	Soil /PCBs	GC	Test America, Inc.	N
NC-GC-044 Rev. 1	METHOD 8151A CHLORINATED HERBICIDES BY GC USING ETHYLATION OR PENTAFLUOROBENZYLATION DERIVATIZATION, 12/1996, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8151a.pdf	Definitive	Soil /Herbicides	GC	Test America, Inc.	N

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Worksheet 24 — Analytical Instrument Calibration

(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

UFP-QAPP Worksheet 22 documents calibration procedures for field instrumentation. WESTON field personnel are responsible for the calibration of WESTON and sub-contractor provided analytical field equipment. Documented and approved procedures will be used for calibrating measuring and testing equipment. Widely accepted procedures, such as those published by EPA and ASTM, or procedures provided by manufacturers in equipment manuals will be adopted.

The responsibility for the calibration of laboratory equipment rests with the selected laboratories. Each type of instrumentation and each EPA-approved method have specific requirements for the calibration procedures, depending on the analytes of interest and the sample medium. Calibration procedures and calibration frequency for the equipment used to perform the analyses will be in accordance with requirements established by the EPA methods. The Laboratory Manager is ultimately responsible for ensuring that the laboratory instrumentation is maintained in accordance with specifications but the Laboratory Analyst or Bench Chemist is the person who performs these functions. Individual laboratory SOPs will be followed for corrective actions and preventative maintenance frequencies.

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Title/Position Responsible for CA	SOP Reference[1]
CVAA	See 7470A, 7471B,	Daily initial calibration prior to sample analysis. Continuing calibration standards at the frequency specified in the method.	$r^2 \geq 0.995$ for linear regression	Correct problem then repeat initial calibration. If calibration fails again, re-digest the entire digestion batch.	Lab Manager/ Analyst	TBD

Worksheet 24 — Analytical Instrument Calibration *(Continued)*

(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Title/Position Responsible for CA	SOP Reference[1]
GC/FID GC/ECD	See 8081B, 8082A, 8151A,	Initial calibration after instrument set up, then when daily 12-hour calibration verification criteria are not met	For all target compounds, initial $r^2 > 0.995$; and calibration verification % difference <15%	Inspect system; correct problem; re-run calibration and affected samples	Lab Manager/ Analyst	See Method SOP in WS 23
GC/MS	See 8260B/C, 8270D,	Initial calibration after instrument set up, then when daily 12-hour calibration verification criteria are not met	For all target compounds, initial $r^2 > 0.995$; and calibration verification % difference <15%	Inspect system; correct problem; re-run calibration and affected samples	Lab Manager/ Analyst	See Method SOP in WS 23
ICP-MS	See 6020A,	Calibration and initial calibration verification after instrument set up, then daily; continuing calibration verification 10% or every 2 hours, whichever is more frequent	Calibration $r^2 > 0.995$; initial and continuing calibration verification within ± 20% of true values	Inspect system; correct problem; re-run calibration and affected samples	Lab Manager/ Analyst	See Method SOP in WS 23

[1] Refer to the Analytical SOPs table (Worksheet 23).

CVAA = Cold Vapor Atomic Absorption
GC/ECD = Gas Chromatograph/Electron Capture Detector
GC/MS = Gas Chromatograph/Mass Spectrometer
ICP-MS = Inductively Coupled Plasma- Mass Spectrometer

Worksheet 25 — Analytical Instrument and Equipment Maintenance, Testing, and Inspection

(UFP-QAPP Manual Section 3.2.3)
(EPA 2106-G-05 Section 2.3.6)

All laboratories conducting analyses of samples collected during the Hurricane Harvey response will be required to have a preventative maintenance program covering testing, inspection, and maintenance procedures and a schedule for each measurement system and required support activity. The basic requirements and components include the following:

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action (CA)	Title/ Position Responsible for CA	SOP Reference[1]
CVAA (Mercury)	Pump tubing, absorption cell and lens cleaning	Sensitivity check. Passing calibrations: ISM02.4 EPA 7470A EPA 7471B EPA 245.1	Check connections, flush sample lines	As specified by method	Per method criteria: Passing ICAL and CCVs	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
GC/ECD (OC Pesticides)	Replace septa, clean injection port, clip and replace column	See the analytical method and instrument manufacture's recommendations Passing Calibrations: EPA 8081A	Leak test, column and injection port inspection	As specified by method	Per method criteria: Passing DDT and endrin breakdowns. Passing ICAL and CCVs.	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
GC/ECD (PCBs)	Replace septa, clean injection port, clip and replace column	Passing Calibrations: EPA 8082A	Leak test, column and injection port inspection	As specified by method	Per method criteria: Passing ICAL and CCVs	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
GC/ECD (Herbicides)	Replace septa, clean injection port, clip and replace column	Passing Calibrations: EPA 8151A	Leak test, column and injection port inspection	As specified by method	Per method criteria: Passing ICAL and CCVs	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23

Worksheet 25 — Analytical Instrument and Equipment Maintenance, Testing, and Inspection *(Continued)*

(UFP-QAPP Manual Section 3.2.3)
(EPA 2106-G-05 Section 2.3.6)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action (CA)	Title/ Position Responsible for CA	SOP Reference[1]
GC/MS (VOCs)	Replace septa, clean injection port, clip and replace column	Passing tunes and calibrations: EPA 8260B/C	Leak test, column and injection port inspection, source insulator integrity	As specified by method	Per method criteria: Passing BFB tunes, ICAL, and CCVs. Passing internal standards response.	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
GC/MS (SVOCs)	Replace septa, clean injection port, clip and replace column	Passing tunes and calibrations: EPA 8270C/D	Leak test, column and injection port inspection, source insulator integrity	As specified by method	Per method criteria: Passing DFTPP, ICAL, and CCVs. Passing internal standards response.	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
GC/FID (TPH)	Replace septa, clean injection port, clip and replace column	Passing calibrations: TX1005	Leak test, column and injection port inspection	As specified by method	Per method criteria: Passing ICAL and CCVs	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23
ICP-MS (Metals)	Torch, nebulizer, spray chamber, autosampler, pump tubing	Passing tune and calibrations: ISM02.4 EPA 6020A EPA 200.8	Check connections, flush lines, clean nebulizer	As specified by method	Per method criteria: Passing tune, ICAL, and CCVs	Perform maintenance, check standards, recalibrate	Laboratory Analyst	See Method SOP in WS 23

[1] Refer to the Analytical SOPs table (Worksheet 23).

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Worksheet 26 & 27 — Sample Handling, Custody, and Disposal

(UFP-QAPP Manual Section 3.3)
(EPA 2106-G-05 Manual Section 2.3.3)

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): EPA Region 6 Contractor - Weston Solutions, Inc.
Sample Packaging (Personnel/Organization): EPA Region 6 Contractor - Weston Solutions, Inc.
Coordination of Shipment (Personnel/Organization): EPA Region 6 Contractor - Weston Solutions, Inc.
Type of Shipment/Carrier: FedEx, Courier, and/or Hand-Delivered
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Test America, Inc., Analytical Laboratory
Sample Custody and Storage (Personnel/Organization): Test America, Inc., Analytical Laboratory
Sample Preparation (Personnel/Organization): Test America, Inc., Analytical Laboratory
Sample Determinative Analysis (Personnel/Organization): Test America, Inc., Analytical Laboratory
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): All samples will be shipped same day or within 24 hours of collection
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19
SAMPLE DISPOSAL
Personnel/Organization: Test America, Inc., Analytical Laboratory
Number of Days from Analysis: Up to 60 days; Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

Sample Identification Procedures: Each sample will be labeled with the site identification code and a sample type letter code and number that depicts a specific location. Sample nomenclature wil consist of the following components:

- Property/Site Identification (ID) or Area of Concern
- Grid ID
- Sample Collection Depth
- Collection type (Soil, Field QC, etc.)
- QA/QC type (normal, duplícate, etc.)

The following presents the sample nomenclature for analytical samples that will generate unique sample names compatible with most data management systems. The sample nomenclature is based upon specific requirements for reporting these results.

Where:

Property ID: An identifier used to designate the particular property or Area of Concern (AOC) where the sample was collected.

Grid ID: A two- or three-character alphanumeric code used to designate the particular grid or station within the AOC where the sample was collected.

Depth: A two-digit code used to designate what depth of sample was collected:

00	0 to 1 inch

Collection Type: A one-digit code used to designate what type of sample was collected:

1	Surface Water	6	Oil
2	Groundwater	7	Waste
3	Leachate	8	Other
4	Field QC/Water Sample	9	Drinking Water
5	Soil	0	Sediment

QC Type: A one-digit code used to designate the QC type of the sample:

1	Normal	6	Confirmation
2	Duplicate	7	Confirmation Duplicate
3	Rinsate Blank		
4	Trip Blank		
5	Field Blank		

Date: **Year (##), Month (##), Date (##)**

Example:

- ***BP01-02-00-51-170903***: Represents a soil sample collected from Bravo Pad 01, Grid 02 at a depth of 0-1 inche bgs on September 3, 2017.

Location of the sample collected will be recorded in the project database and site logbook. Depending on the type of sample, additional information such as sampling round, date, time etc. will be added.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. Chain-of-custody records will accompany samples from the time of collection and throughout the shipping process. Each individual in possession of the samples must sign and date the sample COC Record. The chain-of-custody record will be considered completed upon receipt at the laboratory. A traffic report and chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook. The chain-of-custody record should include (at minimum) the following: 1) Sample identification number; 2) Sample information; 3) Sample location; 4) Sample date; 5) Sample Time; 6) Sample Type Matrix; 7) Sample Container Type; 8) Sample Analysis Requested; 9) Name(s) and signature(s) of sampler(s); and 10) Signature(s) of any individual(s) with custody of samples.

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

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Worksheet 28 — Analytical Quality Control and Corrective Action

(UFP-QAPP Manual Section 3.4 and Tables 4, 5, and 6)
(EPA 2106-G-05 Section 2.3.5)

Samples may be analyzed under a variety of analytical methods during the period of performance of the Hurricane Harvey response activities. Method selection and MPCs will be based on site-specific DQOs. The MPC listings in the worksheets in this section are based on the current analytical methods being conducted on samples collected during the Hurricane Harvey response. Laboratory analyses will be expected to meet these minimum MPCs.

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Worksheet #28.1: Analytical Quality Control and Corrective Action – VOCs by GC/MS

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per analytical window	Method criteria same as Project-Specific MPC Laboratory SOPs vary by method #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes:** Reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst	Analyte concentrations <MCL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater.
Trip Blank	1 per cooler containing VOC samples	No criteria specified in method or SOPs	Investigate sources of trip blank contamination after method blank actions are applied and considering field blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water used to make the trip blank). Once identified, Quality Manager or Chemist should share findings with PTL, SOW Managers, and field team. Discuss trip blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	All analyte concentrations < CRQL or RL

Worksheet #28.1: Analytical Quality Control and Corrective Action – VOCs by GC/MS *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Equipment and Ambient Field Blanks	1 per day	No criteria specified in method or SOPs	Investigate sources of field blank contamination after method blank actions are applied and considering trip blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss trip blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	All analyte concentrations < RL
Laboratory Control Sample (LCS)	1 per analysis or methanol extraction batch	None listed; laboratory must develop statistically-derived laboratory limits.	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes:** If low spike recovery, reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) any analytes in samples from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	%R within statistically-derived laboratory limits
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results > 4x CRQL or >4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil)

Worksheet #28.1: Analytical Quality Control and Corrective Action – VOCs by GC/MS *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Surrogates (DMCs)	Each field and QC sample	statistically-derived laboratory control limits	Investigate reason for poor surrogate recovery. **CA includes**: Reanalyze sample to confirm the problem is with the sample matrix and not the analysis. Report both sets of results if the reanalysis confirms the initial analysis. Otherwise, report only the compliant analysis.	Lab Analyst	%R within statistically-derived laboratory control limits
Internal Standards (IS)	Each field and QC sample	IS Area in the sample within -50% to +100% of the IS area in the opening CCV	Investigate reason for poor IS performance. If failure is due to instrument performance, the problem must be identified, corrected, and the sample must be reanalyzed. **CA includes**: Reanalyze sample and if upon reanalysis the IS area in the sample is still not within limits, report both the initial and reanalysis in the data package to document matrix interference.	Lab Analyst	IS area in the sample within -50% to +100% of the IS area in the opening CCV
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

Laboratory SOPs are retained on file for WESTON-subcontract laboratories.

Worksheet #28.2: Analytical Quality Control and Corrective Action – SVOCs including PAHs by GC/MS

QC Sample	Number/Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per extraction batch	Method criteria same as Project-Specific MPC Laboratory SOPs vary by method #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes:** Re-extract and reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst/Prep Analyst	analyte concentrations <MCL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater.
Equipment blanks and Lot Blanks	1 per day per type of sampling equipment or 1 per lot of wipes	No criteria specified in method or SOPs	Investigate sources of equipment blank or lot blank contamination after method blank actions are applied and considering other sources of blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water or solvents used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss equipment blank or lot blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	All analyte concentrations < RL

Worksheet #28.2: Analytical Quality Control and Corrective Action – SVOCs including PAHs by GC/MS *(Continued)*

QC Sample	Number/Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Laboratory Control Sample (LCS)	1 per analysis or extraction batch	**:** None listed; laboratory must develop statistically-derived laboratory limits.	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes:** If low spike recovery, re-extract and reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) any analytes in samples from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	%R within statistically-derived laboratory limits
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results > 4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil) RPD ≤30% (Water)
Surrogates (DMCs)	Each field and QC sample	**:** statistically-derived laboratory control limits	Investigate reason for poor surrogate recovery. **CA includes**: Re-extract the sample to confirm the problem is with the sample matrix and not the extraction. Report both sets of results if the re-extraction confirms the initial analysis. Otherwise, report only the compliant analysis.	Lab Analyst	%R within statistically-derived laboratory control limits

Worksheet #28.2: Analytical Quality Control and Corrective Action – SVOCs including PAHs by GC/MS *(Continued)*

QC Sample	Number/Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Internal Standards (IS)	Each field and QC sample	IS Area in the sample within -50% to +100% of the IS area in the opening CCV	Investigate reason for poor IS performance. If failure is due to instrument performance, the problem must be identified, corrected, and the sample must be reanalyzed. **CA includes**: Reanalyze sample and if upon reanalysis the IS area in the sample is still not within limits, report both the initial and reanalysis in the data package to document matrix interference.	Lab Analyst	IS area in the sample within -50% to +100% of the IS area in the opening CCV
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

Laboratory SOPs are retained on file for WESTON-subcontract laboratories.

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Worksheet #28.3: Analytical Quality Control and Corrective Action – OC Pesticides and Herbicides by GC/ECD

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per extraction batch	Method criteria same as Project-Specific MPC SOPs vary by laboratory #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes:** Re-extract and reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst/Prep Analyst	**EPA 8081A and EPA 8151A**: analyte concentrations <MCL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater.
Equipment blanks and Lot Blanks	1 per day per type of sampling equipment or 1 per lot of wipes	No criteria specified in method or SOPs	Investigate sources of equipment blank or lot blank contamination after method blank actions are applied and considering other sources of blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water or solvents used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss equipment blank or lot blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	All analyte concentrations < RL

Worksheet #28.3: Analytical Quality Control and Corrective Action – OC Pesticides and Herbicides by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Laboratory Control Sample (LCS)	1 per extraction batch	**EPA 8081A (OC pesticides) and EPA 8151A (herbicides):** None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes:** If low spike recovery, reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) any analytes in samples from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	**EPA 8151A (herbicides):** Refer to Worksheet 15. 6
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results >4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil)
Matrix Spike (MS)	1 per 20 samples of the same matrix, or one per extraction batch	**EPA 8081A (OC pesticides) and EPA 8151A (herbicides):** None listed; laboratory must develop statistically-derived laboratory limits.	*The MPC only applies when the sample concentration is < 4x the spike added concentration.* No Laboratory CAs required. (Data validator will qualify data based on %R outliers.)	Lab Analyst/Prep Analyst	**EPA 8151A (herbicides):** within statistically-derived laboratory limits ***NOTE:*** *The MPC only applies when the sample concentration is < 4x the spike added concentration.*

Worksheet #28.3: Analytical Quality Control and Corrective Action – OC Pesticides and Herbicides by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Matrix Spike Duplicate (MSD)	1 per 20 samples of the same matrix, or one per extraction batch	Spike %Rs - same as for MS above None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	No required Laboratory CAs. Data validator will qualify data based on RPD exceedances.	Lab Analyst/Prep Analyst	Spike %Rs - same as for MS above RPDs within statistically-derived laboratory limits
Surrogates	Each field and QC sample	**SOM02.4:** limits specified in the method by matrix **Other methods:** None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Investigate reason for poor surrogate recovery. CA includes: Reanalyze and/or re-extract sample to confirm the problem is with the sample matrix and not the extraction. Report both sets of results if the re-extraction confirms the initial analysis. Otherwise, report only the compliant analysis. Flag surrogate outliers on the CLP Form 2 and discuss in the case narrative.	Lab Analyst	%R within statistically-derived laboratory control limits
Dual column confirmation	Performed if analytes are detected	**Other methods:** 40% RPD SOPs vary by laboratory #	Report sample concentrations and RPDs. No CA requirement.	Lab Analyst	RPD <40%

Worksheet #28.3: Analytical Quality Control and Corrective Action – OC Pesticides and Herbicides by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

Laboratory SOPs are retained on file for WESTON-subcontract laboratories.

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Worksheet #28.4: Analytical Quality Control and Corrective Action – PCBs as Aroclors by GC/ECD

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per extraction batch	Method criteria same as Project-Specific MPC SOPs vary by laboratory #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes**: Reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst/Prep Analyst	analyte concentrations <RL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater.

Worksheet #28.4: Analytical Quality Control and Corrective Action – PCBs as Aroclors by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Equipment blanks and Lot Blanks	1 per day per type of sampling equipment or 1 per lot of wipes	No criteria specified in method or SOPs	Investigate sources of equipment blank or lot blank contamination after method blank actions are applied and considering other sources of blank contamination. **CA includes**: Review potential laboratory or field sources of contaminants (including type of water or solvents used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss equipment blank or lot blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	All analyte concentrations <RL
Laboratory Control Sample (LCS)	1 per extraction batch	None listed. SOPs vary by laboratory #	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes**: If low spike recovery, reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) any analytes in samples from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	%R within statistically-derived laboratory limits

Worksheet #28.4: Analytical Quality Control and Corrective Action – PCBs as Aroclors by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results >4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil)
Matrix Spike (MS)	1 per 20 samples of the same matrix, or one per extraction batch	**EPA 8082A**: None listed; laboratory must develop statistically-derived laboratory limits. EPA 608: none listed SOPs vary by laboratory #	The MPC only applies when the sample concentration is <4x the spike added concentration. No Laboratory CAs required. (Data validator will qualify data based on %R outliers.)	Lab Analyst/Prep Analyst	**Other methods**: within statistically-derived laboratory limits
Matrix Spike Duplicate (MSD)	1 per 20 samples of the same matrix, or one per extraction batch	Spike %Rs - same as for MS above . None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	No required Laboratory CAs. Data validator will qualify data based on RPD exceedances.	Lab Analyst/Prep Analyst	Spike %Rs - same as for MS above RPDs within statistically-derived laboratory limits

Worksheet #28.4: Analytical Quality Control and Corrective Action – PCBs as Aroclors by GC/ECD *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Surrogates	Each field and QC sample	**Other methods**: statistically derived laboratory control limits	Investigate reason for poor surrogate recovery. **CA includes**: Reanalyze and/or re-extract sample to confirm the problem is with the sample matrix and not the extraction. Report both sets of results if the re-extraction confirms the initial analysis. Otherwise, report only the compliant analysis. Discuss in the case narrative.	Lab Analyst	%R within statistically-derived laboratory control limits
Dual column confirmation	Performed if analytes are detected	40% RPD SOPs vary by laboratory #	Report sample concentrations and RPDs on Form 10 for each detected analyte. No CA requirement.	Lab Analyst	RPD <40%
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

Laboratory SOPs are retained on file for WESTON-subcontract laboratories.

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Worksheet #28.5: Analytical Quality Control and Corrective Action – TPH by GC/FID (TNRCC 1005)

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per extraction batch	Method criteria same as Project-Specific MPC SOPs vary by laboratory #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes:** Reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst	Analyte concentrations <MCL or <5% of regulatory limit or <5% of the sample result for the analyte, whichever is greater.
Trip Blank	1 per cooler containing GRO samples	No criteria specified in method or SOPs	Investigate sources of trip blank contamination after method blank actions are applied and considering field blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water used to make the trip blank). Once identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss trip blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	Analyte concentrations <RL

Worksheet #28.5: Analytical Quality Control and Corrective Action – TPH by GC/FID *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Equipment blank (or Ambient Field Blanks for VOCs only)	1 per day per type of sampling equipment	No criteria specified in method or SOPs	Investigate sources of field blank contamination after method blank actions are applied and considering trip blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and WESTON team. Discuss blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	Analyte concentrations <RL
Laboratory Control Sample (LCS)	1 per extraction batch	None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes:** If low spike recovery, reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) sample concentrations from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	%R within statistically-derived laboratory limits
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results >4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil)

Worksheet #28.5: Analytical Quality Control and Corrective Action – TPH by GC/FID *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Matrix Spike (MS)	1 per 20 samples of the same matrix, or one per extraction batch	None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	*The MPC only applies when the sample concentration is <4x the spike added concentration.* No Laboratory CAs required. (Data validator will qualify data based on %R outliers.)	Lab Analyst/Prep Analyst	**TNRCC 1005:** Recoveries within statistically-derived laboratory limits
Matrix Spike Duplicate (MSD)	1 per 20 samples of the same matrix, or one per extraction batch	Spike %Rs - same as for MS above None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	No required Laboratory CAs. Data validator will qualify data based on RPD exceedances.	Lab Analyst/Prep Analyst	Spike %Rs - same as for MS above RPDs within statistically-derived laboratory limits
Surrogates	Each field and QC sample	%R within statistically derived laboratory control limits	Investigate reason for poor surrogate recovery. **CA includes**: Reanalyze and/or re-extract sample to confirm the problem is with the sample matrix and not the extraction. Report both sets of results if the re-extraction confirms the initial analysis. Otherwise, report only the compliant analysis. Discuss in the case narrative.	Lab Analyst	%R within statistically-derived laboratory control limits
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

Laboratory SOPs are not available from the EPA Region 6 ESB Laboratory or CLP laboratories; however, laboratory SOPs are retained on file for WESTON-subcontract laboratories.

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Worksheet #28.6: Analytical Quality Control and Corrective Action – Inorganics (Metals and Mercury)

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Method Blank (MB)	1 per digestion batch	SOPs vary by laboratory #	Investigate the source of contamination and eliminate the problem before proceeding with further analysis. (Corrective actions are required only if the samples contain the same contaminant at concentrations exceeding the MPC levels.) **CA includes:** Reanalyze the samples if sufficient sample volume remains. Flag (qualify) the sample result. Document the problem in the case narrative.	Lab Analyst	Blank analyte concentrations <1/10 of the Lower Limit of Quantitation check standard or <10% of the regulatory limit or <10% of the lowest sample concentration, whichever is greater.
Equipment Blank	1 per day per type of sampling equipment	No criteria specified in method or SOPs	Investigate sources of field blank contamination after method blank actions are applied and considering trip blank contamination. **CA includes:** Review potential laboratory or field sources of contaminants (including type of water used to make the field blank). Once source is identified, Quality Manager or Chemist should share findings with SOW Managers and Field team. Discuss blank contamination in EPA deliverables and any impacts on data quality.	WESTON PTL, Field Samplers, SOW Manager, Quality Manager, and Chemist	Analyte concentrations <RL

Worksheet #28.6: Analytical Quality Control and Corrective Action – Inorganics (Metals and Mercury) *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Laboratory Control Sample (LCS)	1 per digestion batch	None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Investigate reason for poor LCS recovery. Eliminate problem before proceeding with further analysis. **CA includes:** If low spike recovery, reanalyze samples under compliant LCS, if sufficient sample volumes are available. For any low or high LCS outliers, flag (qualify) sample concentrations from the affected batch. Document the problem in the case narrative.	Lab Analyst and Prep Analyst	%R within statistically-derived laboratory limits
Field Duplicate	1 per 20 field samples of the same matrix	No method or SOP criteria specified	If MPC is not met for the field duplicate results > 4x CRQL or >4x RL, a careful examination of the sampling techniques, sample matrix, and analytical method and other analytical QC criteria will be conducted to identify the root cause of the high RPD and the usability of the data.	WESTON Field Samplers and Chemist	RPD ≤50% (Soil)
Matrix Spike (MS) and post-digestion spike (PDS)	1 per 20 samples of the same matrix, or one per extraction batch	None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Laboratory CA required if %Rs outside of QC limits: Perform a post-digestion spike (PDS) and flag sample results in the digestion batch. (Data validator will qualify sample data based on spike recovery outliers for the MS and PDS.)	Lab Analyst/Prep Analyst	Within statistically-derived laboratory limits

Worksheet #28.6: Analytical Quality Control and Corrective Action – Inorganics (Metals and Mercury) *(Continued)*

QC Sample	Number/ Frequency	Method/SOP Acceptance Criteria	Corrective Action (CA)	Title/position of person Responsible for Corrective Action	Project-Specific MPC
Laboratory Duplicate (D)	1 per 20 samples or one for each extraction batch	None listed; laboratory must develop statistically-derived laboratory limits. SOPs vary by laboratory #	Laboratory CA is to flag sample results for analytes for which the MPC are not met.	Lab Analyst/Prep Analyst	within statistically-derived laboratory limits
Cooler Temperature Indicator	One per cooler	≤6°C (not frozen)	Laboratory to notify WESTON Chemist (WESTON-subcontracted lab only) and confirm whether to proceed with analysis. Resampling may be required.	Laboratory Sample Custodian/ WESTON Chemist	≤6°C (not frozen)

[1]Acceptance criteria for LCSs included under the appropriate method in Section 15.

Laboratory SOPs are retained on file for WESTON-subcontract laboratories.

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Worksheet 29 — Project Documents and Records

(UFP-QAPP Manual Section 3.5.1)
(EPA 2106-G-05 Section 2.2.8)

All records will be generated and verified by EPA or the EPA Contractor. All hard and electronic copies of finalized documents and technical project documents (including but not limited to the QAPP) will be retained by EPA. Other project-related files, such as contract documents and other information will be retained in accordance with EPA and EPA Contractor Policies and Procedures.

Sample Collection and Field Records			
Record	**Generation**	**Verification**	**Storage Location/Archival**
Field Logbook or Data Collection Sheets	PTL/Field Scientist	Delegated QA Manager	Project File
Chain-of-Custody Forms	PTL/Field Scientist	Delegated QA Manager	Project File
Corrective Action Reports (if required)	Delegated QA Manager	Program Manager or designee	Project File
Correspondence	PTL	Delegated QA Manager	Project File
Field Sample Results/Measurements	PTL/Field Scientist	Delegated QA Manager	Project File
Tailgate Safety Meeting Items	PTL/Field Safety Officer	Delegated QA Manager	Project File

Project Assessments			
Record	**Generation**	**Verification**	**Storage Location/Archival**
Field Analysis Audit Checklist	Delegated QA Manager	SOW Manager	Project File
Fixed Laboratory Audit Checklist (if performed)	Delegated QA Manager	SOW Manager	Project File
Data Validation Report	Delegated QA Manager	SOW Manager	Project File
Data Usability Assessment Report	Delegated QA Manager	SOW Manager	Project File
Corrective Action Reports (if required)	Delegated QA Manager	SOW Manager	Project File
Correspondence	Delegated QA Manager	Program Manager or designee	Project File

Worksheet 29 — Project Documents and Records *(Continued)*

(UFP-QAPP Manual Section 3.5.1)
(EPA 2106-G-05 Section 2.2.8)

Laboratory Records			
Record	**Generation**	**Verification**	**Storage Location/Archival**
Sample Receipt, Custody, and Checklist	Laboratory Sample Receiving	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Equipment Calibration Logs	Laboratory Technician	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Standard Traceability Logs	Laboratory Technician	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Sample Prep Logs	Laboratory Technician	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Run Logs	Laboratory Technician	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Equipment Maintenance, Testing, and Inspection Logs	Laboratory Technician/ Laboratory QA Manager	Laboratory PM/Delegated QA Manager	Laboratory File
Corrective Action Reports (if required)	Laboratory QA Manager	Laboratory PM/Delegated QA Manager	Laboratory File and Project File
Laboratory Analytical Results	Laboratory Technician/ Laboratory QA Manager	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Laboratory QC Samples, Standards, and Checks	Laboratory Technician/ Laboratory QA Manager	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File
Instrument Results (raw data) for Primary Samples, Standards, QC Checks, and QC Samples	Laboratory Technician/ Laboratory QA Manager	Laboratory PM/Delegated QA Manager	Laboratory Data Package and Project File

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Worksheet 31, 32 & 33 — Assessments and Corrective Action

(UFP-QAPP Manual Sections 4.1.1 and 4.1.2)
(EPA 2106-G-05 Section 2.4 and 2.5.5)

All reports will be prepared and distributed to the following, to include but not be limited to, the WESTON SOW Manager, Program Manager, and Quality Manager; and the EPA OSC, PO, TM, and QA Manager as applicable.

Assessments:

Assessment Type	Responsible Party & Organization	Number/ Frequency	Estimated Dates	Assessment Deliverable	Deliverable Due Date
Field Sampling Technical Systems Audit (TSA)[1]	Gretchen Fodor (Quality Manager or designee) and David Crow (SOW Manager) WESTON	None planned unless deemed necessary by WESTON or EPA	TBD	TSA Memorandum and Checklist	TBD
Laboratory TSA[2]	Laboratory QA Manager TBD Gretchen Fodor (Quality Manager or designee) WESTON	None planned unless deemed necessary by WESTON or EPA	TBD	Analytical TSA Memorandum and Checklist	TBD
Data Validation	Jeff Wright (Chemist) WESTON	Each data package for which data validation was requested by EPA	TBD	Data Validation Report	TBD
Management/Peer Review	Gretchen Fodor (Quality Manager) and David Crow (SOW Manager) WESTON	Each Deliverable	TBD	Quality Management Report (memo/e-mail to file)	TBD

Worksheet 31, 32 & 33 — Assessments and Corrective Action *(Continued)*

(UFP-QAPP Manual Section 4.1.1 and 4.1.2)

Assessment Response and Corrective Action:

Assessment Type	Responsibility for Responding to Assessment Findings	Assessment Response Documentation	Timeframe for Response	Responsibility for Implementing Corrective Action	Responsible for Monitoring Corrective Action Implementation
Field Sampling Technical Systems Audit (TSA)[1]	PTL WESTON	Findings of field audit.	24 hours of receipt of audit report	David Crow (SOW Manager) WESTON	PTL or David Crow (SOW Manager) WESTON
Laboratory TSA[2]	Laboratory QA Manager Test America, Inc. Gretchen Fodor (Quality Manager or designee) WESTON	Written response to EPA Region 6 subcontractor to address deficiencies	1 week of receipt of request from EPA Region 6 (or EPA CONTRACTOR on behalf of EPA)	Laboratory Manager	Gretchen Fodor (Quality Manager or designee) and/or Jeff Wright (Chemist) WESTON
Data Validation	Gretchen Fodor (Quality Manager or designee) or Jeff Wright (Chemist) WESTON	Validation Report	Within 48 hours of receipt of validation inquiry	Laboratory QA Manager and/or Chemist	Jeff Wright (Chemist) WESTON
Management/Peer Review	David Crow (SOW Manager) WESTON	Quality Management Response	48 hours of receipt of Quality Management report	David Crow (SOW Manager) WESTON	Gretchen Fodor (Quality Manager or designee) and David Crow (SOW Manager) WESTON

[1] Field sampling TSAs may include, but are not limited to the following: sample collection records; sample handling, preservation, packaging, shipping, and custody records; equipment operation, maintenance, and calibration records.

[2] Laboratory TSAs may include, but are not limited to the following: sample log-in, identification, storage, tracking, and custody procedures; sample and standards preparation procedures; availability of analytical instruments; analytical instrument operation, maintenance, and calibration records; laboratory security procedures; qualifications of analysts; case file organization and data handling procedures.

Worksheet 34 — Data Verification and Validation Inputs

(UFP-QAPP Manual Section 5.2.1 and Table 9)
(EPA 2106-G-05 Section 2.5.1)

Data Verification and Validation Inputs are identified in the table below.

Item	Description	Verification (completeness)	Validation (conformance to specifications)
Planning Documents/Records			
1	Approved QAPP	X	
2	Contract	X	
3	Field SOPs	X	
4	Laboratory SOPs	X	
5	Laboratory QA Manual	X	
6	Laboratory Certifications	X	
Field Records			
7	Field Logbooks	X	X
8	Equipment Calibration Records	X	X
9	Chain of Custody Forms	X	X
10	Sampling Diagrams/Surveys	X	X
11	Relevant Correspondence	X	X
12	Change Orders/Deviations	X	X
13	Field Audit Reports	X	X
14	Field Corrective Action Reports	X	X
15	Sample Location Verification (Worksheet 18)	X	X
Analytical Data Package and Other Laboratory Deliverables			
16	Cover Sheet (laboratory identifying information)	X	X
17	Case Narrative	X	X
18	Internal Laboratory Chain of Custody	X	X
19	Sample Receipt Records	X	X
20	Sample Chronology (i.e. dates and times of receipt, preparation, & analysis)	X	X
21	Communication Records	X	X
22	Project-specific PT Sample Results (if analyzed)	X	X
23	Instrument Calibration Records	X	X
24	Definition of Laboratory Qualifiers	X	X
25	Results Reporting Forms	X	X
26	QC Sample Results	X	X
27	Corrective Action Reports	X	X
28	Raw Data	X	X
29	Electronic Data Deliverable	X	X

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Worksheet 35 — Data Verification (Step I) Procedures

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Data Verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. The verification process includes the verification of planning documents, completeness of analytical data packages, sampling documents, and external reports. The goal of data verification is to ensure and document that the data are what they purport to be, that is, that the reported results reflect what was actually done. If data deficiencies are identified, then those deficiencies should be documented for the data user's review and, where possible, resolved by corrective action. Data verification applies to activities in the field as well as in the laboratory.

The following information includes Hurricane Harvey Project documents which may be incorporated by reference in the site-specific SAP, FSP, or QAPP. Inputs may include, but are not limited to, those identified in the table below.

Records Reviewed	Required Documents	Process Description	Responsible Person, Organization
Program QAPP	Contract, EPA and UFP-QAPP Guidance documents	Verify completeness, correctness, and contractual compliance of all program QA/QC against the methods, SOPs, and contract requirements.	WESTON Program Manager WESTON Quality Manager
Site-specific Project QAPP	Project QAPP	Verify sampling and analytical methods specified in site QAPP are correct and all Project QAPP protocols are followed and required QC samples will be collected in the correct bottles and properly preserved.	Project Chemist or Quality Manager
Field Logs and SOPs	QAPP	Ensure that all field sampling SOPs specified in Project QAPP were followed.	WESTON SOW Manager and PTL
Analytical SOPs	Analytical Method and Project QAPP	Ensure that laboratory analytical SOPs comply with the published method.	Laboratory QA Manager, Test America, Inc.,
Laboratory Certifications	Project QAPP	Ensure that laboratory performing analytical sample analyses has current State, National Environmental Laboratory Accreditation Programcertifications as required by the project.	Laboratory PM, Test America, Inc. WESTON Chemist WESTON Quality Manager
Laboratory Deliverables	Project QAPP	Verify that the laboratory deliverable contains all records specified in the Project QAPP. Check sample receipt records to ensure sample condition upon receipt was noted, and any missing/broken sample containers were noted and reported. Compare the data package with Chains of custody to verify that results were provided for all collected samples. Review the narrative to ensure all QC exceptions are	Data Validator, WESTON WESTON Chemist WESTON Quality Manager

Worksheet 35 — Data Verification (Step I) Procedures *(Continued)*

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Records Reviewed	Required Documents	Process Description	Responsible Person, Organization
		described. Review data per Data Validation Stage as requested by EPA.	
WESTON Data Validation Deliverables	Laboratory Report, Analytical Method and Laboratory SOPs	Data Validation will consist of a Stage 2A validation review unless otherwise specified by EPA and includes results for all field samples in the Data validation report (pdf) and Excel EDD file with the final data validation qualifiers	WESTON Data Validator WESTON Chemist WESTON Quality Manager
Field Logbook, Field Sheets, Sample Diagrams/ Surveys	Project QAPP	Verify that records are present and complete for each day of field activities. Verify that all planned samples including field QC samples were collected and that sample collection locations are documented. Verify that meteorological data were provided for each day of field activities. Verify that changes/exceptions are documented and were reported in accordance with requirements. Verify that any required field monitoring was performed and results are documented.	WESTON SOW Manager and PTL
Field Equipment Calibration Records	Project QAPP, SOPs, field logbook	Ensure that all field analytical instrumentation SOPs for equipment calibration were followed.	WESTON SOW and PTL

Worksheet 35 — Data Verification (Step I) Procedures *(Continued)*

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Records Reviewed	Required Documents	Process Description	Responsible Person, Organization
Chain of Custody Forms	Project QAPP; Field Logbook; and other sampling records (e.g., boring logs, etc.)	Verify the completeness of Chain-of-Custody records. Examine entries for consistency with the field logbook. Check that appropriate methods were requested and sample preservation was recorded. Verify that the required volume of sample has been collected and that sufficient sample volume is available for Laboratory QC samples (e.g., MS/MSD and S/D). Verify that all required signatures and dates are present. Check for transcription errors.	WESTON PTL/FTL WESTON Chemist WESTON Quality Manager Laboratory PM, Test America, Inc.
Relevant reports and correspondence	Project QAPP	Verify that reports and/or records are present and complete for each day of field activities. Verify that correspondence is documented and was reported in accordance with requirements.	WESTON SOW Manager and PTL
Audit Reports, Corrective Action Reports	Project QAPP	Verify that all planned audits were conducted. Examine audit reports. For any deficiencies noted, verify that corrective action was implemented according to plan.	WESTON Quality Manager WESTON Chemist Laboratory PM, Test America, Inc.

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Worksheet 36 — Data Validation (Steps IIA and IIB) Procedures

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Data validation includes a determination, where possible, of the reasons for any failure to meet method, procedural, or contractual requirements, as well as an evaluation of the impact of such failure on the overall data set. Data validation applies to activities in the field and analytical laboratory.

Data validation is typically performed by person(s) independent of the activity being validated. At a minimum, it is preferable that the validator does not belong to the same organizational unit with immediate responsibility for producing the data set.

Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation
IIa	Field logbook, field sampling sheets, and sampling SOPs	Review field logbook, field sampling sheets, and other sampling records to ensure that sampling and documentation procedures specified in the sampling SOPs were performed. To be performed annually, at a minimum, or after first sampling round when new personnel are added to the sampling team. Field audit finding will be documented in a brief checklist-style report.	Project Team Leader, Chemist and/ or QA officer
IIa	Laboratory data package, QAPP and analytical methods	Conformance to QAPP and Method – After receipt of the laboratory data package, confirm that samples were analyzed by the requested method and that all procedures required by the QAPP was followed. Review laboratory narrative to determine whether any method deviations were performed and QC outliers were documented.	Project Chemist Data Validator Quality Manager
IIb	Laboratory data package, QAPP and analytical methods	Comparison of laboratory QC results to Measurement Performance (MPC) – After receipt of the laboratory data package, review QC results and evaluate whether QC samples met MPC specified in the QAPP. Prepare data validation report noting QC outliers and any data qualifiers applied to sample data.	Project Chemist Data Validator Quality Manager
IIb	Field laboratory or fixed laboratory report	Quantitation Limits – Upon receipt, check that soil sample results were reported on a dry weight basis. Confirm that sample results met the project quantitation limits specified in the QAPP.	Project Chemist Data Validator Quality Manager Data Manager

IIa	EDD	Format – After receipt of electronic deliverables, confirm that EDD data format is correct and complete and that results are reported in EPA Scribe reporting format (e.g., MDL,RL) and match the hardcopy and/or pdf data package.	Project Chemist Data Validator Quality Manager Data Manager

Validation will be performed on all laboratory analytical data unless a defined quantity or percentage of samples is identified by the EPA in the Technical Direction Document or during the project scoping meeting on a site-specific basis. Project validation criteria as per QAPP Worksheets 12, 15, 19 & 30, and 28 and cited EPA SW-846 methodology will be used. WESTON-contracted laboratory data packages will be verified and validated using a Stage 2A validation, as described in the EPA *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (January 2009). Validation qualifiers will be applied using the following hierarchy: Region 6 UFP-QAPP for Hurricane Harvey; *EPA National Functional Guidelines for Organic Data Review* (Appendix B); *EPA National Functional Guidelines for Inorganic Data Review* (Appendix C); and analytical methods from EPA Publication SW-846; and the laboratory-specific SOP. Methods for which no data validation guidelines exist will be validated following the guidance deemed most appropriate by the data validator.

The data validator will receive all laboratory packages and analytical results electronically. Additionally, the validator will be required to submit final validation reports via PDF format and must provide an annotated laboratory analytical result electronic data deliverable (EDD) with applicable data validation qualifiers. Approved data will be released to the EPA for reporting.

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Worksheet 37 — Data Usability Assessment

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

Data usability assessments will be performed in accordance with EPA *Guidance for Data Useability in Risk Assessment, September 1992* (Appendix Q) and *Data Quality Assessment, A Reviewer's Guide, February 2006* (Appendix R), or as directed by EPA. This worksheet documents procedures that will be used to perform the data usability assessment (DUA). The DUA is performed at the conclusion of data collection activities using the outputs from data verification and data validation (i.e., data of known and documented quality). It is the data interpretation phase, which involves a qualitative and quantitative evaluation of environmental data to determine whether the site data are of the right type, quality, and quantity to support the decisions that need to be made. It involves a retrospective evaluation of the systematic planning process, and involves participation by key members of the project team. The DUA evaluates whether underlying assumptions used during systematic planning are supported, sources of uncertainty have been accounted for and are acceptable, data are representative of the population of interest, and the results can be used as intended, with the acceptable level of confidence.

Personnel (organization and position/title) responsible for participating in the data usability assessment may include, but not be limited to:

- WESTON SOW Manager;
- WESTON Quality Manager (or designee);
- WESTON Risk Assessor (if required);
- WESTON Chemist;
- WESTON PTL;
- WESTON Statistician (if required).

Based on project-specific oversight responsibilities and analytical scopes, this data usability assessment worksheet outlines the approach that will be taken as the analytical scope expands on a project-specific basis. The following general steps will be followed to assure that the data usability assessment evaluates whether underlying assumptions used during systematic planning are supported, sources of uncertainty have been accounted for and are acceptable, data are representative of the population of interest, and the results can be used as intended, with the acceptable level of confidence:

Step 1 – Review the project's objectives and sampling design: This includes reviewing the DQOs and MPC to make sure they are still applicable. The sampling design should be consistent with stated DQOs.

Step 2 – Review the data verification and data validation outputs: Graphs, maps, and tables can be prepared to summarize the data. Deviations from activities planned in the Project QAPPshould be considered, including samples not collected (potential data gaps), holding time exceedances, damaged samples, impact of non-compliant PE sample results, and SOP deviations. The implications of unacceptable QC sample results should be assessed.

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

Step 3 – Verify the assumptions of the selected statistical method: Verify whether underlying assumptions for the selected statistical methods (if specified in the QAPP) are valid. Common assumptions include the distributional form of the data, independence of the data, dispersion characteristics, homogeneity, etc. Depending on the robustness of the statistical method, minor deviations from assumptions usually are not critical to statistical analysis and data interpretation. If serious deviations from assumptions are discovered, then another statistical method may need to be selected.

Step 4 - Implement the statistical method: Implement the statistical procedures, if specified in the site-specific QAPP, for analyzing the data and review underlying assumptions. For a decision project that involves hypothesis testing (e.g., "concentrations of lead in groundwater are below the action level") consider the consequences of selecting the incorrect alternative; for estimation projects (e.g., establishing a boundary for surface soil contamination), consider the tolerance for uncertainty in measurements.

Step 5 – Document data usability and draw conclusions: Determine whether the data can be used as intended, considering any deviations and corrective actions. Discuss whether DQOs were achieved based on comparison with the site DQIs. Assess the performance of the sampling design and identify limitations on data use. Update the conceptual site model and document conclusions. Prepare a DUA report or include the data usability summary in the final site report. The DUA can be in the form of text and/or a table.

The data usability assessment is considered the final step in the data evaluation process. All data will be assessed for usability regardless of data evaluation/validation process implementation. Data usability goes beyond validation in that it evaluates the achievement of the DQOs based on the comparison of the project DQIs and site-specific QAPP with the obtained results. The results of the data usability assessment, and particularly any changes to the DQOs necessitated by the data not meeting usability criteria, will be communicated in accordance with Worksheet 6.

Primarily, the assessment of the usability will follow procedures described in appropriate EPA guidance documents, particularly *Guidance for Data Useability in Risk Assessment* (Publication No. 9285.7-09A, April 1992)(Appendix Q), and will be conducted according to the process outlined below.

1. **Sampling and Analysis Activities Evaluation**: The first part of the data usability evaluation will include a review of the sampling and analysis activities in comparison to program or site-specific DQIs and this Project QAPP in conjunction with the site-specific QAPP. Specific limitations to the data (i.e., results that are qualified as estimated [J/UJ], or rejected [R], will be determined and documented in the site's database).

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

2. **Achievement of DQIs**: The second part of data usability pertains to the achievement of the program-specific DQIs. Each investigator will compare the performance achieved for each data quality criterion against the expected and planned performance. In general, this comparison will follow from the DQIs used to define each DQO. This comparison is the most critical component of the assessment process. Any deviation from planned performance will be documented and evaluated to determine whether corrective action is advisable. Potential corrective actions will range from re-sampling and/or reanalysis of data, to qualification or exclusion of the data for use in the data interpretation. In the event that corrective action is not possible, the limitations, if any, of the data with regard to achieving the DQOs will be noted.

   In conjunction with the DQI achievement review, the investigators will need to make decisions for the use of qualified values, which are a consequence of the formalized evaluation/validation process. Data qualifiers will be applied to individual data results. Data usability decisions will be made based on the assessment of the usability of each of these results for the intended purpose. Evaluation will describe the uncertainty (bias, imprecision, etc.) of the qualified results. Cumulative QC exceedances from the DQIs may require technical judgment to determine the overall effect on the usability of the data. Decisions about usability of qualified data for use in risk assessment will be based on the EPA document mentioned, which allows for the use of estimated values. Finally, data users may choose to determine final data usability qualifiers as a result of this overall examination and decision process.

3. **Achievement of DQOs**: The final part in the data usability process concerns achievement of the DQOs. Once the data set has been assessed to be of known quality, data limitations have been documented, and overall result applicability/usability for its intended purpose has been determined, the final data assessment can be initiated by considering the answers to the following questions:

   - Are the data adequate to determine the extent to which hazardous substances have migrated or to what extent they were expected to migrate from potential hazardous substance source areas?
   - Do the data collected adequately characterize the nature and extent of potential hazardous substance source areas at the site?
   - Are the data statistically adequate to evaluate on a per chemical and per media basis?
   - Do the data collected allow assessment of hydrogeologic factors, which may influence contaminant migration/distribution?
   - Do laboratory reporting limits attain the applicable state and/or federal standards and/or screening levels?
   - Is the sample set sufficient to develop site-specific removal and disposal treatment methodologies?

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

- Have sufficient data been collected to evaluate how factors, including physical characteristics of the site and climate and water table fluctuations, affect contaminant fate and transport?
- Have sufficient data been collected to determine the toxicity, environmental fate, and other significant characteristics of each hazardous substance present?
- Is the data set sufficient to evaluate the potential extent and risk of future releases of hazardous substances, which may remain as residual contamination at the source facility?

Principal investigators, in conjunction with the project team, will formulate solutions if data gaps are found as a result of problems, biases, trends, etc., in the analytical data, or if conditions exist that were not anticipated in the development of the DQOs. It is particularly important that each data usability evaluation specifically address any limitations on the use of the data that may result from a failure to achieve the stipulated DQO.

If the project scope changes, the DQOs will be expanded. The DQOs will address the specific action limits and measurable performance criteria, in order to make appropriate decisions on the analytical data.

DQIs, such as precision, accuracy, representativeness, completeness, comparability and sensitivity, are discussed below.

Precision

The most commonly used estimates of precision are the RPD for cases in which only two measurements are available, and the percent relative standard deviation (%RSD) when three or more measurements are available. This is especially useful in normalizing environmental measurements to determine acceptability ranges for precision because it effectively corrects for the wide variability in sample analyte concentration indigenous to samples.

Precision is represented as the RPD between measurement of an analyte in laboratory or field duplicate samples or in duplicate spikes (MS/MSD or LCS/LCSD). RPD is defined as follows:

$$RPD = \frac{|C_1 - C_2|}{\frac{C_1 + C_2}{2}} \times 100$$

Where:

C_1 = First measurement value
C_2 = Second measurement value

The RPD for field duplicate samples provides a tool for evaluating field and analytical precision of the sample matrix at a specific sampling location.

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

Precision, when represented as the %RSD between more than two replicate measurements, is calculated by dividing the standard deviation (SD) of the measurements by the mean value for the measurements ($\bar{x}$) then multiplying by 100. For example, the precision between calibration standard Relative Response Factors (RRFs) is evaluated using the %RSD between a minimum of five replicates. %RSD is mathematically expressed by the formula:

$$\%\text{RSD} = \frac{\text{SD}}{\bar{x}}\ x\ 100$$

The mathematical formula for SD is:

$$\text{SD} = \sqrt{\frac{\sum_{i-1}^{n}(xi - \bar{x})^2}{(n-1)}}\ x\ 100$$

where:

xi = each individual value used to calculate the mean
$\bar{x}$ = the mean of n values
n = total number of values

Accuracy/Bias

Accuracy control limits are established by the analysis of organic surrogates and laboratory control samples (LCS), which are prepared in clean water and/or solid matrices. The LCS is typically identified as blank spikes (BS) for organic analyses. For multi-analyte methods, the LCS or BS may contain only a representative number of target analytes rather than the full list. The LCS is subjected to all sample preparation and analysis steps. The amount of each analyte recovered in an LCS analysis is recorded, then entered into a database to generate statistical laboratory control limits. Percent recoveries (%R) of the spiked surrogates or spiked analytes in the LCS and duplicate LCS (i.e., LCSD) provides information on how well the analyte can be recovered in a clean sample matrix.

The %Rs for spiked investigative sample analysis (e.g., MS and MSD samples) provides a tool for evaluating how well the analytes recovered in a specific sample matrix. These values are used to assess a reported result within the context of the project DQOs. For results that are outside the control limits provided in the QAPP or site-specific QAPP, the outlier will be noted in the laboratory case narrative. Percent recovery (%R) is defined as follows:

$$\%\text{Recovery} = \frac{(A_T - A_0)}{A_F}\ \text{x}100$$

Where:

A_T = Total amount recovered in fortified sample
A_0 = Amount recovered in unfortified sample
A_F = Amount added to sample

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

Accuracy for some procedures is evaluated as the degree of agreement between a new set of results and a historical database or a table of acceptable criteria for a given parameter. This is measured as percent difference (%D) from the reference value, and is primarily used by the laboratory as a means for documenting acceptability of organic continuing calibration.

The %D is calculated by expressing, as a percentage, the difference between the original value and new value relative to the original value. This method for precision measurement can be expressed by the formula:

$$\%D = \frac{C_1 - C_2}{C_1} \text{ x}100$$

Where:

C_1 = Concentration of analyte in the initial aliquot of the sample.
C_2 = Concentration of analyte in replicate.

For field measurements such as pH, accuracy is often expressed in terms of bias (B) and is calculated as follows:

$$B = M - A$$

Where:

M = Measured value of Standard Reference Material (SRM)
A = Actual value of SRM

Sensitivity

Sensitivity is the ability of the analytical test method and/or instrumentation to differentiate between detector responses to varying concentrations of the target analyte. Methodology to establish sensitivity for a given analytical method or instrument includes establishing reporting limits (RLs) and method detection limit (MDL) studies. The findings of the usability of the data relative to sensitivity will be included in the report, including any limitations on the data set and/or individual analytical results.

Statistical tests may be conducted to identify potential outliers. Potential outliers will be removed if a review of the field and laboratory documentation indicates that the results are true outliers.

Method sensitivity is typically evaluated in terms of the MDL and is defined as follows for many measurements:

$$MDL = {}^{t}(n - 1, 1 - \alpha = 0.99)(s)$$

Where:

s = Standard deviation of the replicate analyses
${}^{t}(n - 1, 1 - \alpha = 0.99)$ = Student's t-value for a one-sided 99 percent confidence level and a standard deviation estimate with n-1 degrees of freedom

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

n = Number of measurements
α = Statistical significance level

Representativeness

Representativeness is the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. It is a qualitative parameter that depends on proper design of the sampling program.

Data representativeness for this project is accomplished by implementing approved sampling procedures and analytical methods that are appropriate for the intended data uses, and which are established within the site-specific QAPP.

Field personnel will be responsible for collecting and handling samples according to the procedures in this UFP-QAPP so that samples are representative of field conditions. Errors in sample collection, packaging, preservation, or chain-of-custody procedures may result in samples being judged non-representative and may form a basis for rejecting the data.

Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another, whether it was generated by a single laboratory or during inter-laboratory studies. The use of standardized field and analytical procedures ensures comparability of analytical data. Sample collection and handling procedures will adhere to U.S. EPA-approved protocols. Laboratory procedures will follow standard analytical protocols, use standard units, use standardized report formats, follow the calculations as referenced in approved analytical methods, and use a standard statistical approach for QC measurements.

Completeness

Project-specific completeness goals account for all aspects of sample handling, from collection through data reporting. The level of completeness can be affected by loss or breakage of samples during transport, as well as external problems that prohibit collection of the sample. The following general formula is used for determining the percent complete:

$$\text{Completeness} = \frac{A}{B} \text{ x} 100$$

Where:

A = Actual number of measurements judged valid (the validity of a measurement result is determined by judging its suitability for its intended use)
B = Total number of measurements planned to achieve a specified level of confidence in decision making

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

The formula for sampling completeness is:

$$\text{Sampling Completeness} = \frac{\text{Number of locations sampled}}{\text{Number of planned sample locations}} \text{ x } 100$$

An example formula for analytical completeness is:

$$\text{Metals Analytical Completeness} = \frac{\text{Number of Usable Data Points}}{\text{Expected Number of Usable Data Points}} \text{ x } 100$$

Project Completeness Goals

Task	Subtask	Completeness Goal
Sampling	Sample Collection	95%
Analytical Measurements	All Laboratory Analyses	95% of collected analytes
		90% of each target analyte

Worksheet 37 — Data Usability Assessment *(Continued)*

(UFP-QAPP Manual Section 5.2.3 and Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

Overall Data Usability Summary:

- Evaluate whether the site-specific and/or project-required quantitation limits listed in Worksheet 15 were achieved for non-detected site contaminants. If no detectable results were reported and data are acceptable for the verification and validation steps, then the data are usable.
- If detectable concentrations are reported and the verification and validation steps are acceptable, the data are usable.
- If verification and validation are not acceptable, the data may either be qualified as estimated (J, UJ) for minor QC deviations that do not affect the data usability or rejected for major QC deviations affecting data usability. The impact of rejected data will be evaluated and re-sampling may be necessary. Use of estimated data will be discussed in the project report.
- For statistical comparisons and mathematical manipulations, non-detected values will be represented by a concentration equal to one-half the sample-specific reporting limit. Duplicate results (original and duplicate) will not be averaged for the purpose of representing the range of concentrations. However, the average of the original and duplicate will be used to represent the concentration at that sample location.

Graphics

Graphic figures will be generated to depict sample locations, as needed. Also, if necessary, figures will be generated to represent contaminant concentrations at each sampling location. Each figure will contain a detailed legend.

Reconciliation

PQOs will be examined to determine whether the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of the major impacts observed from the data verification and validation, DQIs, and MPC assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined whether the PQO was met and whether project action limits were exceeded. As part of the reconciliation of each objective, conclusions will be drawn, and any limitations on the usability of any of the data will be described in the final report.

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