EA Engineering, Science, and Technology, Inc.

405 S. Highway 121 Bypass
Suite C-100
Lewisville, Texas 75056
Telephone: 972-538-2701
FAX: 972-315-5181
www.eaest.com

12 August 2013

Mr. Brian Mueller
Task Order Monitor
U.S. Environmental Protection Agency (EPA) Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Subject: **Field Sampling Plan Addendum**
Falcon Refinery Superfund Site
Remedial Investigation/Feasibility Study
EPA Region 6 Remedial Action Contract 2
Contract: EP-W-06-004
Task Order: 0088-RICO-06MC

Dear Mr. Mueller:

EA Engineering, Science, and Technology, Inc. (EA) is enclosing one hard copy and one electronic copy of the Final Field Sampling Plan Addendum on compact disc for the above-referenced Task Order to EPA. This addendum updates the original Field Sampling Plan to incorporate changes made in Field Change Form 01 for this task order. Additional hard copies and electronic copies are being submitted to the recipients listed below.

If you have any questions regarding this submittal, please call me at (972) 315-3922.

Sincerely yours,
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Robert M. Owens
Project Manager

Enclosure

9569024

cc: Michael Pheeny, EPA Contracting Officer (letter only)
Rena McClurg, EPA Project Officer (letter only)
Anna Milburn, EPA Ecological Risk Assessor
Kenneth Shewmake, EPA Ecological Risk Assessor
Phillip Winsor, Texas Commission on Environmental Quality (TCEQ) RPM
Vickie Reat, TCEQ Ecological Risk Assessor
Jessica White, National Oceanic and Atmospheric Association, RRC Region 6
Clare Lee, U.S. Fish and Wildlife Service (USFWS) Contaminant Biologist
Barry Forsythe, USFWS
Ron Brinkley, USFWS Contaminant Biologist
Don Pitts, Texas Parks and Wildlife Department (TPWD) Program Director
Andy Tirpak, TPWD NRDA Trustee
Jane Sarosdy, Texas General Land Office (TGLO) Director, NRDA Trustee
Tommy Mobley, TGLO Tech. Program Manager
Tim Startz, EA Program Manager (letter only)
File

TRANSMITTAL OF DOCUMENTS FOR ACCEPTANCE BY EPA		DATE: 12 August 2013	TRANSMITTAL NO.: **0010**
TO: **Mr. Brian Mueller** **U.S. Environmental Protection Agency (EPA) Region 6**		FROM: **Mr. Robert Owens** **EA Engineering, Science, and Technology, Inc.**	
SUBTASK NO.	DELIVERABLE	NO. OF COPIES	
1.2.1	Field Sampling Plan Addendum Falcon Refinery Superfund Site Remedial Investigation/Feasibility Study	EPA - 3 hard copies, 3 electronic copies on compact disc (CD) National Oceanic and Atmospheric Admnistration (NOAA) - 1 hard copy, 1 electronic copy on CD Texas Commission on Environmental Quality (TCEQ) - 2 hard copies, 2 electronic copies on CD Texas General Land Office (TGLO) - 2 hard copies, 2 electronic copies on CD Texas Parks and Wildlife Department (TPWD) - 2 hard copies, 2 electronic copies on CD U.S. Fish and Wildlife Service (USFWS) - 3 hard copies, 3 electronic copies on CD	
ACCEPTANCE ACTION			
DOCUMENTS FOUND ACCEPTABLE (LIST BY SUBTASK NO.)		NAME/TITLE/SIGNATURE OF REVIEWER DATE	

Field Sampling Plan Addendum

Remedial Investigation/Feasibility Study

Falcon Refinery Superfund Site
Ingleside, San Patricio County, Texas
EPA Identification No. TXD086278058

Remedial Action Contract 2 Full Service
Contract: EP-W-06-004
Task Order: 0088-RICO-06MC

Prepared for

U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

Prepared by

EA Engineering, Science, and Technology, Inc.
405 S. Highway 121
Building C, Suite 100
Lewisville, Texas 75067
(972) 315-3922

August 2013
Revision: 00
EA Project No. 14342.88

Field Sampling Plan Addendum

Falcon Refinery Superfund Site
Ingleside, San Patricio County, Texas
EPA Identification No. TXD086278058

Remedial Action Contract 2 Full Service
Contract: EP-W-06-004
Task Order: 0088-RICO-06MC

12 August 2013

Tim Startz, PMP — Date
EA Program Manager

12 August 2013

David S. Santoro, P.E., L.S. — Date
EA Quality Assurance Officer

Brian Mueller — Date
U.S. Environmental Protection Agency Region 6 Task Order Monitor

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
AVS/SEM	Acid Volatile Sulfides/Simultaneously Extracted Metals
COPC	Contaminant of potential concern
CSM	Conceptual Site Model
EA	EA Engineering, Science, and Technology, Inc.
EPA	U.S. Environmental Protection Agency
ERA	Ecological risk assessment
FS	Feasibility Study
FSP	Field Sampling Plan
HHRA	Human health risk assessment
NRDA	Natural Resource Damage Assessment
PCB	Polychlorinated biphenyl
RAC	Remedial Action Contract
RI	Remedial Investigation
site	Falcon Refinery Superfund Site
SVOC	Semi-volatile organic compound
TGLO	Texas General Land Office
TPWD	Texas Parks and Wildlife Department
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile organic compound

DISTRIBUTION LIST

U.S. Environmental Protection Agency

Name: Michael Pheeny
Title: EPA Region 6 Contracting Officer (Letter Only)

Name: Rena McClurg
Title: EPA Region 6 Project Officer (Letter Only)

Name: Brian Mueller
Title: EPA Region 6 Task Order Monitor

Name: Anna Milburn
Title: EPA Region 6 Ecological Risk Assessor

Name: Kenneth Shewmake
Title: EPA Region 6 Ecological Risk Assessor

Texas Commission on Environmental Quality

Name: Phillip Winsor
Title: Project Manager

Name: Vickie Reat
Title: Ecological Risk Assessor

Other State/Federal Natural Resource Trustees

Name: Jessica White
Title: National Oceanic and Atmospheric Association, Regional Resource Coordinator, Region 6

Name: Clare Lee
Title: U.S. Fish and Wildlife Services (USFWS) Contaminant Biologist

Name: Barry Forsythe
Title: USFWS

Name: Ron Brinkley
Title: USFWS Contaminant Biologist

Name: Don Pitts
Title: Texas Parks and Wildlife Department (TPWD) Program Director

Name: Andy Tirpak
Title: TPWD Natural Resource Damage Assessment (NRDA) Trustee

Name: Jane Sarosdy
Title: Texas General Land Office (TGLO) Director, NRDA Trustee

Name: Tommy Mobley
Title: TGLO Technical Program Manager

EA Engineering, Science, and Technology, Inc.

Name: Tim Startz
Title: Program Manager (Letter Only Via E-mail)

Name: Robert Owens
Title: Project Manager

Name: File
Title: EA Document Control File

1. PROJECT DESCRIPTION AND OBJECTIVES

EA Engineering, Science, and Technology, Inc. (EA) has been authorized by the U.S. Environmental Protection Agency (EPA), under Remedial Action Contract (RAC) Number EP-W-06-004, Task Order 0088-RICO-06MC, to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Falcon Refinery Superfund Site (site). EA has prepared this Field Sampling Plan (FSP) Addendum to address the changes to the original FSP submitted to the EPA on 4 February 2012. These changes have been made in accordance with specification provided in the Field Change Form No. 01 and the Technical Exchange Meeting held on 2 May 2013. Appendix A of the FSP has not changed. The sampling design matrix for investigative samples in Appendix B of the FSP has been updated and is included in this FSP Addendum. All the figures in the FSP have been updated and are included in this FSP Addendum. The sections of the original FSP that have changed are discussed below. The section numbers correspond to the section numbers in the original FSP.

1.3 PROJECT OBJECTIVES

The key components for the RI/FS have been changed as noted below:

- **Soil Sampling**
  - Onsite and offsite surface and subsurface soil sampling (up to 195 samples) will be collected from surface soil and from subsurface soil from borings installed to approximate depths to 15 feet below ground surface to assess presence of contaminants of potential concern (COPCs) of high toxicity and/or high mobility, define the nature and extent, characterize waste to allow for a disposal option evaluation in the FS, evaluate whether COPCs are migrating offsite, and develop data to be used in the Ecological Risk Assessment (ERA) and Human Health Risk Assessment (HHRA).
  - Surface and subsurface soil samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Soil samples will also be analyzed for total organic carbon.
  - Two surface soil samples in Area of Concern (AOC) 3 will be analyzed for tributyltin compounds.
  - Background soil samples will only be analyzed for metals.
  - Soil samples taken above and below the water table from monitoring well borings will be also be analyzed for particle size, fraction of organic carbon, moisture content, specific gravity, wet sieve, and/or Atterberg limits.

- **Ground Water Sampling**

  — Onsite (up to 17 samples) and offsite (up to 10 samples) ground water samples will be collected from permanent and temporary monitoring wells to determine the nature and extent of ground water COPCs. Permanent and temporary monitor well data will be used in the HHRA and ERA. Data collected during the onsite ground water investigation will also be used to update the pathway and receptor analysis presented in the conceptual site model (CSM), if necessary.
  — Onsite ground water samples will be analyzed for VOCs, SVOCs, and total and dissolved metals.
  — Offsite (background) ground water samples will only be analyzed for metals. Filtered samples will be collected for metals analyses, in addition to unfiltered ones.

- **Surface Water and Sediment Sampling**

  — Onsite wetlands, intracoastal, and offsite background surface water (up to 33 samples) and sediment (up to 30 samples) investigations will be performed to define the nature and extent of COPCs, provide data to be used in the HHRA and ERA, and to update the pathway and receptor analysis presented in the CSMs, if necessary.
  — Onsite sediment and surface water samples will be analyzed for VOCs, SVOCs, and total and dissolved metals.
  — Surface water samples will also be analyzed for total suspended solids. Sediment samples will also be analyzed for acid volatile sulfides/simultaneously extracted metals (AVS/SEM).
  — Offsite sediment and surface water samples will be analyzed for SVOCs and metals. Filtered samples will be collected for metals analyses, in addition to unfiltered ones for surface water.

- **Ecological Characterization**

  — An ecological characterization may be conducted if the previous ecological characterization is not of the quality needed for this RI/FS.
  — Up to 16 fish tissue samples will be collected and analyzed based on the results of the Screening Level Ecological Risk Assessment. Samples will be analyzed for parameters as directed by EPA, but will likely include lipids, metals, and SVOCs.

2. METHODOLOGY

2.1 SAMPLE COLLECTION

2.1.1 Sediment Sampling for AVS/SEM

Sampling for AVS/SEM analysis for sediment samples will require minimal disturbance of the sediment. The sediment samples collected for this analysis should not be homogenized. The undisturbed sediment should be placed in the sample container leaving minimum headspace.

2.3 SAMPLE CONTAINER, VOLUME, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Samples are not being analyzed for polychlorinated biphenyl (PCB), PCB congeners, and herbicides and pesticides. Therefore, Table 4 of the original FSP has been modified as follows.

TABLE 4 REQUIRED VOLUME, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Parameter	Method	Volume and Container	Preservatives	Holding Time [a]
Investigative Solid Samples				
Metals (including mercury)	CLP ISM01.3	One 8-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	180 days (28 days for mercury)
VOCs	CLP SOM01.2	Three 5-gram EnCore samplers and One 4-ounce glass jar with Teflon™-lined cap	Store at 4±2°C	48 hours
SVOCs	CLP SOM01.2	One 8-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	14 days
AVS/SEM	EPA-121-R91-100	One 4-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	14 days
Tributyltin Compounds	GC-FPD	One 4-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	14 days
TOC	EPA Method 9060	One 8-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	28 days
Lipids (Fish Tissue)	Modified Bligh Dyer Method or an approved laboratory standard operating procedure.	One 4-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	14 days
SVOCs (Fish Tissue)	SW-846 Method 8270C	One 4-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	14 days
Metals (Fish Tissue)	SW-846 Method 6020 and 7471 (Mercury)	One 4-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	180 days (28 days for mercury)
Moisture Content, Bulk Density, Particle	ASTM D2216, ASTM D7263, ASTM D422, ASTM D854/C127,	3-inch diameter Shelby Tube, at least 18 inches long, capped and taped with no headspace.	None	None

Parameter	Method	Volume and Container	Preservatives	Holding Time [a]
Size (wet), Specific Gravity, Atterberg Limits	ASTM D4318			
Fraction Organic Carbon	Walkley-Black	One 8-ounce amber glass jar with Teflon™-lined cap	Store at 4±2°C	28 days
Investigative Water Samples				
Metals (including mercury)	CLP ISM01.3	One 1-liter HDPE bottle	Nitric acid to Ph ≤ 2; Store at 4±2°C	180 days (28 days for mercury)
VOCs	CLP SOM01.2	Three 40-milliliter amber volatile organic analyte (VOA) glass vials with Teflon™-lined cap	Hydrochloric acid to Ph≤2; Store at 4±2°C	14 days
SVOCs	CLP SOM01.2	Two 1-liter amber glass bottles	Store at 4±2°C	7 days
TSS	SM 2540 D	One 1-liter HDPE bottle	Store at 4±2°C	7 days
Investigative Soil Vapor Samples				
VOCs	EPA Method TO-15	6-liter Summa canister	None	28 days
IDW Special Analysis				
Reactivity Corrosivity Ignitability	SW-846 Method 9045C or 9040B, Method 1030, and Chapter 7	One 8-ounce amber glass jar with Teflon™-lined cap (solid) or one 500-milliliter HDPE bottle (water/sludge)	Store at ≤6°C	NA/72 hours
TCLP metals (including mercury)	SW-846 Methods 1311/6020/6010B/7470A	One 8-ounce amber glass jar with Teflon™-lined cap (solid) or one 1-liter glass bottle (water/sludge)	Store at ≤6°C	180 days (28 days for mercury)
TCLP VOCs	SW-846 Methods 1311/8260B	One 4-ounce amber glass jar with Teflon™-lined cap (solid) or Three 40-milliliter amber VOA glass vials with Teflon™-lined cap (water/sludge)	Store at 4±2°C	14 days
TCLP SVOCs	SW-846 Methods 1311//8270C	One 8-ounce amber glass jar with Teflon™-lined cap (solid) or one 1-liter glass bottle (water)	Store at 4±2°C	14 days

NOTE:

a Holding time is measured from the time of sample collection to the time of sample extraction and/or analysis.
ASTM = American Society for Testing and Materials
°C = degrees Celsius
CLP = Contract Laboratory Program
GC-FPD = Gas Chromatography – Flame Photometric Detector
HDPE = high-density polyethylene
NA = Not applicable
SVOC = Semi-volatile organic compound
TAL = Target Analyte List
TBD = To be determined
TCLP = Toxicity Characteristic Leaching Procedure
TOC = Total organic carbon
TSS = Total suspended solids
VOA = Volatile organic analyte
VOC = Volatile organic compound

3. FIELD IMPLEMENTATION

3.1 AOC-1

Figure 2 identifies the updated soil and ground water sample locations for AOC-1. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.2 AOC-2

Figure 3 identifies the updated soil and ground water sample locations for AOC-2. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.3 AOC-3

Figure 4 identifies the updated soil and surface water sample locations for AOC-3. Sediment samples will not be taken in AOC-3. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.4 AOC-4

Figure 5 identifies the updated soil and ground water sample locations for AOC-4. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.5 AOC-5

Figure 6 identifies the updated sediment and surface water sample locations for AOC-5. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

Fish samples will be collected from the intracoastal waterway if specified for sampling and analysis. Whole fish and fish fillet samples will be collected and prepared for laboratory analysis submittal. Fish tissue will be analyzed for lipids, SVOCs, and metals.

3.6 AOC-6

Figure 7 identifies the updated soil sample locations for AOC-6. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.7 AOC-7

Figure 8 identifies the updated soil sample locations for AOC-7. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

3.8 BACKGROUND LOCATIONS

Figure 9 identifies the updated background soil, sediment, surface water, and ground water sample locations. The sample design matrix in Appendix B has been updated to identify the number of samples that will be taken and the analyses that will be performed.

FIGURES

N

0 250 500

Feet

Legend:

Area of Concern Boundary

Active NORCO Pipeline

Above ground

Underground

Abandonded NORCO Pipeline

Above ground

Underground

Outside Operations

Gulf South Pipeline

Boss Pipeline

Gathering Line 2'

Plains Marketing Pipeline

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 1
Site Map
Field Sampling Plan

2013-02-01 R:\Federal\EPA\RAC II\0088-Falcon Refinery RI\FS\GIS\MXDs\SiteMap.mxd EA-Dallas jschwertz

N

0 200 400

Feet

Legend:

- Proposed Monitoring Well Location
- Proposed Soil Sample Location
- Area of Concern 1 Boundary

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 2
AOC-1 Sample Locations
Field Sampling Plan

2013 -07-29 R:\Federal\EPA\RAC II\0088-Falcon Refinery RIFS\GIS\MXDs\AOC1.mxd EA-Dallas jschwertz

N

0 100 200

Feet

Legend:

- Proposed Monitoring Well Location
- Proposed Soil Sample Location
- Area of Concern 2 Boundary

Note:
Soil boring co-located with MW-11

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 3
AOC-2 Sample Locations
Field Sampling Plan

2013 -06-25 R:\Federal\EPA\RAC II\0088-Falcon Refinery RIFS\GIS\MXDs\AOC2.mxd EA-Dallas jschwertz

N

0 250 500

Feet

Legend:

- Proposed Monitoring Well Location
- Proposed Soil Sample Location
- Proposed Surface Water Sample Location
- Area of Concern 3 Boundary

Note:
VSP - Visual Sample Plan

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 4
AOC-3 Sample Locations
Field Sampling Plan

2013-07-30 R:\Federal\EPA\RAC II\0088-Falcon Refinery RI\FS\GIS\MXDs\AOC3.mxd EA-Dallas jschwertz

N

0 50 100

Feet

Legend:

- Proposed Monitoring Well Location
- Proposed Soil Sample Location
- Area of Concern 4 Boundary

Note:
VSP - Visual Sample Plan

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 5
AOC-4 Sample Locations
Field Sampling Plan

2013 -06-25 R:\Federal\EPA\RAC II\0088-Falcon Refinery RI\FS\GIS\MXDs\AOC4.mxd EA-Dallas jschwertz

N

0 150 300

Feet

Legend:

- Proposed Sediment/Surface Water Sample Location
- Area of Concern 5 Boundary

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 6
AOC-5 Sample Locations
Field Sampling Plan

2013 -06-25 R:\Federal\EPA\RAC II\0088-Falcon Refinery RI\FS\GIS\MXDs\AOC5.mxd EA-Dallas jschwertz

N

0 50 100

Feet

Legend:

- Proposed Soil Sample Location
- Area of Concern 6 Boundary

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 7
AOC-6 Sample Locations
Field Sampling Plan

2013 -06-25 R:\Federal\EPA\RAC II\0088-Falcon Refinery RIFS\GIS\MXDs\AOC6.mxd EA-Dallas jschwertz

N

0 50 100

Feet

Legend:

- Proposed Soil Sample Location
- Area of Concern 7 Boundary

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 8
AOC-7 Sample Locations
Field Sampling Plan

2013 -06-25 R:\Federal\EPA\RAC II\0088-Falcon Refinery RIFS\GIS\MXDs\AOC7.mxd EA-Dallas jschwertz

N

0 750 1,500

Feet

Legend:

- Proposed Soil Sample Location
- Proposed Temporary Well at Soil Sample Location
- Proposed Sediment/Surface Water Sample Location
- Areas of Concern Boundary

Source: AOC and pipeline locations from TRC, dated, March 10, 2011

Image Source: 2009 Texas Orthoimagery Program, Texas Strategic Mapping Program, TNRIS, 2009

Falcon Refinery Superfund Site
Ingleside, San Patricio County,Texas

Figure 9
Background Sample Locations
Field Sampling Plan

2013 -07-29 R:\Federal\EPA\RAC II\0088-Falcon Refinery RI\FS\GIS\MXDs\Background.mxd EA-Dallas jschwertz

Appendix B

Sample Design Matrix

Appendix B

SAMPLING DESIGN MATRIX
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

SAMPLING AREA	SAMPLE METHOD	Judgmental or Random	SAMPLE INTERVAL (feet bgs)	FIELD SCREENING	SAMPLE COLLECTION DESCRIPTION/ FREQUENCY	ANALYSES												
						TCL VOC	TCL SVOC	TAL METALS	Dissolved Metals	AVS/SEM	TOC	TSS	Tributyltin	Permeability Sampling*	Lipids	PCBs	PCBs Congeners	Herbicides and Pesticides
SOIL SAMPLES - SURFACE AND SUBSRUFACE																		
DIRECT PUSH BORINGS																		
AOC-1N	Direct Push - Continuous Sampling with Acetate Liner	Judgmental	0 to 0.5	Continuous screening with FID/PID at 2-foot intervals from surface to total depth	VOCs - collect grab sample from 0 to 0.5 feet and 0.5 to 2 feet. From 2 feet to top of water table collect sample from interval with highest PID measurement. For all other analysis homogenize sample interval and collect sample.	8	8	8	0	0	8	0	0	0	0	0	0	0
			0.5 to 2			8	8	8	0	0	8	0	0	0	0	0	0	0
			2 to top of water table			8	8	8	0	0	8	0	0	0	0	0	0	0
AOC-1S		Judgmental	0 to 0.5			12	12	12	0	0	12	0	0	0	0	0	0	0
			0.5 to 2			12	12	12	0	0	12	0	0	0	0	0	0	0
			2 to top of water table			12	12	12	0	0	12	0	0	0	0	0	0	0
AOC-2		Judgmental	0 to 0.5			6	6	6	0	0	6	0	0	0	0	0	0	0
			0.5 to 2			6	6	6	0	0	6	0	0	0	0	0	0	0
			2 to top of water table			6	6	6	0	0	6	0	0	0	0	0	0	0
AOC-3		Random	0 to 0.5			3	3	3	0	0	3	0	0	0	0	0	0	0
			0.5 to 2			3	3	3	0	0	3	0	0	0	0	0	0	0
			2 to top of water table			3	3	3	0	0	3	0	0	0	0	0	0	0
AOC-4		Judgmental	0 to 0.5			5	5	5	0	0	5	0	0	0	0	0	0	0
			0.5 to 2			5	5	5	0	0	5	0	0	0	0	0	0	0
			2 to top of water table			5	5	5	0	0	5	0	0	0	0	0	0	0
AOC-6		Judgmental	0 to 0.5			2	2	2	0	0	2	0	0	0	0	0	0	0
			0.5 to 2			2	2	2	0	0	2	0	0	0	0	0	0	0
			2 to top of water table			2	2	2	0	0	2	0	0	0	0	0	0	0
AOC-7		Judgmental	0 to 0.5			2	2	2	0	0	2	0	0	0	0	0	0	0
			0.5 to 2			2	2	2	0	0	2	0	0	0	0	0	0	0
			2 to top of water table			2	2	2	0	0	2	0	0	0	0	0	0	0
Background		Judgmental	0 to 0.5			0	0	10	0	0	0	0	0	0	0	0	0	0
			0.5 to 2			0	0	10	0	0	0	0	0	0	0	0	0	0
			2 to top of water table			0	0	10	0	0	0	0	0	0	0	0	0	0
TOTAL DIRECT PUSH BORING SOIL SAMPLES						**114**	**114**	**144**	**0**	**0**	**114**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MONITORING WELL BORINGS																		
AOC-1N	Hollow Stem Auger Continuous sampling with split spoon or continuous sampling device	Judgmental	0 to 0.5	Continuous screening with FID/PID at 2-foot intervals from surface to total depth	VOCs - collect grab sample from 0 to 0.5 feet and 0.5 to 2 feet. From 2 feet to top of water table collect sample from interval with highest PID measurement. For all other analysis homogenize sample interval and collect sample.	5	5	5	0	0	5	0	0	0	0	0	0	0
			0.5 to 2			5	5	5	0	0	5	0	0	0	0	0	0	0
			2 to top of water table			5	5	5	0	0	5	0	0	5	5	0	0	0
			Below Water Table			0	0	0	0	0	0	0	0	5	5	0	0	0
AOC-1S		Judgmental	0 to 0.5			7	7	7	0	0	7	0	0	0	0	0	0	0
			0.5 to 2			7	7	7	0	0	7	0	0	0	0	0	0	0
			2 to top of water table			7	7	7	0	0	7	0	0	7	7	0	0	0
			Below Water Table			0	0	0	0	0	0	0	0	7	7	0	0	0
AOC-2		Judgmental	0 to 0.5			1	1	1	0	0	1	0	0	0	0	0	0	0
			0.5 to 2			1	1	1	0	0	1	0	0	0	0	0	0	0
			2 to top of water table			1	1	1	0	0	1	0	0	1	1	0	0	0
			Below Water Table			0	0	0	0	0	0	0	0	1	1	0	0	0
AOC-3		Judgmental	0 to 0.5			3	3	3	0	0	3	0	2	0	0	0	0	0
			0.5 to 2			3	3	3	0	0	3	0	0	0	0	0	0	0
			2 to top of water table			3	3	3	0	0	3	0	0	3	3	0	0	0
			Below Water Table			0	0	0	0	0	0	0	0	3	3	0	0	0
AOC-4		Judgmental	0 to 0.5			1	1	1	0	0	1	0	0	0	0	0	0	0
			0.5 to 2			1	1	1	0	0	1	0	0	0	0	0	0	0
			2 to top of water table			1	1	1	0	0	1	0	0	1	1	0	0	0
			Below Water Table			0	0	0	0	0	0	0	0	1	1	0	0	0
TOTAL MONITORING WELL BORING SOIL SAMPLES						**51**	**51**	**51**	**0**	**0**	**51**	**0**	**2**	**34**	**34**	**0**	**0**	**0**
TOTAL SURFACE AND SUBSURFACE SOIL SAMPLES						**165**	**165**	**195**	**0**	**0**	**165**	**0**	**2**	**34**	**34**	**0**	**0**	**0**

Appendix B

SAMPLING DESIGN MATRIX
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

SAMPLING AREA	SAMPLE METHOD	Judgmental or Random	SAMPLE INTERVAL (feet bgs)	FIELD SCREENING	SAMPLE COLLECTION DESCRIPTION/ FREQUENCY	ANALYSES												
						TCL VOC	TCL SVOC	TAL METALS	Dissolved Metals	AVS/SEM	TOC	TSS	Tributyltin	Permeability Sampling*	Lipids	PCBs	PCBs Congeners	Herbicides and Pesticides
QC FOR SURFACE AND SUBSURFACE SOIL SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	11	11	N/A	0	0	N/A	0	N/A	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	11	0	0	N/A	0	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			20	20	20	0	0	20	0	1	N/A	N/A	0	0	0
QC trip blank (water sample)		N/A	N/A		1 per VOC cooler	14	N/A	N/A	0	0	N/A	0	N/A	N/A	N/A	0	0	0
QC Equipment Rinsate (water sample)		N/A	N/A		1 per day per nondedicated equipment	N/A	10	10	0	0	N/A	0	N/A	N/A	N/A	0	0	0
TOTAL QC						**31**	**31**	**31**	**0**	**0**	**20**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
TOTAL SOIL SAMPLES INCLUDING QC - SOLID SAMPLES						**196**	**196**	**226**	**0**	**0**	**185**	**0**	**3**	**34**	**34**	**0**	**0**	**0**
TOTAL WATER QC SAMPLES ASSOCIATE WITH SOIL SAMPLES						**14**	**10**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SEDIMENT SAMPLES																		
AOC-3	Ponar/Sediment Coring Device	Judgmental	0 to 0.5	Not Applicable	Grab Samples	0	0	0	0	0	0	0	0	0	0	0	0	0
AOC-5	Ponar/Sediment Coring Device	Judgmental	0 to 0.5			10	10	10	0	10	10	0	0	0	0	0	0	0
Background	Ponar/Sediment Coring Device	Judgmental	0 to 0.5		Grab Samples - 10 samples collected from marine/coastal and 10 from the wetlands	0	20	20	0	0	0	0	0	0	0	0	0	0
TOTAL SEDIMENT SAMPLES						**10**	**30**	**30**	**0**	**10**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
QC FOR SEDIMENT SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	2	2	N/A	0	N/A	N/A	0	0	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	2	0	1	N/A	0	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			3	3	3	0	1	3	0	0	N/A	N/A	0	0	0
QC trip blank (water sample)		N/A	N/A		1 per VOC cooler	5	N/A	N/A	0	N/A	N/A	0	N/A	N/A	N/A	0	0	0
QC equipment rinsate (water sample)		N/A	N/A		1 per day per nondedicated equipment	N/A	5	5	0	N/A	N/A	0	N/A	N/A	N/A	0	0	0
TOTAL QC						**5**	**5**	**5**	**0**	**2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL SEDIMENT SAMPLES INCLUDING QC - SOLID SAMPLES						**15**	**35**	**35**	**0**	**12**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL WATER SAMPLES ASSOCIATED WITH SEDIMENT SAMPLES						**5**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
SURFACE WATER SAMPLES																		
AOC-3	Disposable Dipper	Random	Not Applicable	pH, specific conductance, temperature, TDS, ORP, and turbidity	Grab Samples	3	3	3	3	0	0	3	0	0	0	0	0	0
		Judgmental	Not Applicable			0	0	0	0	0	0	0	0	0	0	0	0	0
AOC-5		Judgmental	Not Applicable			10	10	10	10	0	0	10	0	0	0	0	0	0
Background		Judgmental	Not Applicable		Grab Samples - 10 samples collected from marine/coastal and 10 from the wetlands	0	20	20	20	0	0	0	0	0	0	0	0	0
TOTAL SURFACE WATER SAMPLES						**13**	**33**	**33**	**33**	**0**	**0**	**13**	**0**	**0**	**0**	**0**	**0**	**0**
QC FOR SURFACE WATER SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	2	2	N/A	N/A	0	0	N/A	0	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	2	2	0	0	N/A	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			4	4	4	4	0	0	4	0	N/A	N/A	0	0	0
QC trip blank		N/A	N/A		1 per VOC cooler	3	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A	0	0	0
QC equipment rinsate		N/A	N/A		1 per day per nondedicated equipment	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A	0	0	0
TOTAL QC						**9**	**6**	**6**	**6**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL SURFACE WATER SAMPLES INCLUDING QC						**22**	**39**	**39**	**39**	**0**	**0**	**17**	**0**	**0**	**0**	**0**	**0**	**0**
GROUND WATER SAMPLES																		
AOC-1N	Low Flow Sampling	Judgmental	Not Applicable	Not Applicable	Grab Sample	5	5	5	5	0	0	0	0	0	0	0	0	0
AOC-1S						7	7	7	7	0	0	0	0	0	0	0	0	0
AOC-2						1	1	1	1	0	0	0	0	0	0	0	0	0
AOC-3						3	3	3	3	0	0	0	0	0	0	0	0	0
AOC-4						1	1	1	1	0	0	0	0	0	0	0	0	0
Background						0	0	10	10	0	0	0	0	0	0	0	0	0
TOTAL GROUND WATER SAMPLES						**17**	**17**	**27**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
QC FOR GROUND WATER SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	2	2	N/A	N/A	0	0	0	0	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	2	2	0	0	0	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			3	3	3	3	0	0	0	0	N/A	N/A	0	0	0
QC trip blank		N/A	N/A		1 per VOC cooler	3	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
QC equipment rinsate		N/A	N/A		1 per day per nondedicated equipment	N/A	5	5	5	0	0	0	N/A	N/A	N/A	0	0	0
TOTAL QD						**8**	**10**	**10**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL GROUND WATER SAMPLES INCLUDING QC						**25**	**27**	**37**	**37**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Appendix B

SAMPLING DESIGN MATRIX
FALCON REFINERY SUPERFUND SITE
INGLESIDE, TEXAS

SAMPLING AREA	SAMPLE METHOD	Judgmental or Random	SAMPLE INTERVAL (feet bgs)	FIELD SCREENING	SAMPLE COLLECTION DESCRIPTION/ FREQUENCY	ANALYSES												
						TCL VOC	TCL SVOC	TAL METALS	Dissolved Metals	AVS/SEM	TOC	TSS	Tributyltin	Permeability Sampling*	Lipids	PCBs	PCBs Congeners	Herbicides and Pesticides
SOIL VAPOR SAMPLES																		
AOC-1N	Low Flow Sampling	Judgmental	Not Applicable	Not Applicable	Grab Sample	5	0	0	0	0	0	0	0	0	0	0	0	0
AOC-1S						7	0	0	0	0	0	0	0	0	0	0	0	0
AOC-2						1	0	0	0	0	0	0	0	0	0	0	0	0
AOC-3						3	0	0	0	0	0	0	0	0	0	0	0	0
AOC-4						1	0	0	0	0	0	0	0	0	0	0	0	0
Background						10	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SOIL VAPOR SAMPLES						**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
QC FOR SOIL VAPOR SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	2	N/A	N/A	N/A	0	0	0	0	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			3	N/A	N/A	N/A	0	0	0	0	N/A	N/A	0	0	0
QC trip blank		N/A	N/A		1 per VOC cooler	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
QC equipment rinsate		N/A	N/A		1 per day per nondedicated equipment	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
TOTAL QD						**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL SOIL VAPOR SAMPLES INCLUDING QC						**32**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
FISH TISSUE																		
Intracoastal Waterway	Fillet or Whole	N/A	N/A	Not Applicable	Not Applicable	0	16	16	0	0	0	0	0	0	16	0	0	0
TOTAL FISH TISSUE SAMPLES						**0**	**16**	**16**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**0**	**0**
QC FOR FISH TISSUE SAMPLES																		
QC MS/MSD* {1/20 organics}		Various	Various	Not Applicable	As stated above for each designated sample location	N/A	1	N/A	N/A	0	0	0	0	N/A	N/A	0	0	0
QC MS/MD* {1/20 inorganics}		Various	Various			N/A	N/A	1	N/A	0	0	0	N/A	N/A	N/A	0	0	0
QC field duplicate {1/10}		Various	Various			N/A	N/A	N/A	N/A	0	0	0	0	N/A	N/A	0	0	0
QC trip blank		N/A	N/A		1 per VOC cooler	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
QC equipment rinsate		N/A	N/A		1 per day per nondedicated equipment	N/A	N/A	N/A	N/A	0	0	0	N/A	N/A	N/A	0	0	0
TOTAL QD						**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL FISH TISSUE SAMPLES INCLUDING QC						**0**	**17**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**0**	**0**

* Permeability sampling includes analysis for particle size, fraction organic carbon, moisture content, specific gravity, wet sieve, and or Atterberg limits.

AOC	Area of Concern
AVS/SEM	acid volatile sulfides/simultaneously extracted metals
bgs	below ground surface
FID	Flame Ionization Detector
MD	Matrix Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A/	Not Applicable
PID	Photo-ionization Detector
PCB	Polychlorinated Biphenyls
QC	Quality Control
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
TSS	Total Suspended Solid
VOC	Volatile Organic Compound