US OIL RECOVERY SUPERFUND SITE
WORK PLAN REFINEMENT/MODIFICATION NOTICE

REFERENCE DOCUMENTS: Remedial Investigation/Feasibility Study (RI/FS) Work Plan, Sampling and Analysis Plan Volume I Field Sampling Plan (FSP), Sampling and Analysis Plan Volume II Quality Assurance Project Plan (QAPP) (all dated December 23, 2015).

WORK PLAN REFINEMENT/MODIFICATION NOTICE NO.: WRN AO1-1-8
DATE: December 10, 2018

DESCRIPTION OF REFINEMENT/MODIFICATION:

This Work Plan Refinement/Modification Notice (WRN) describes the details for the work proposed for additional activities associated with Iteration 2 of the RI/FS. This WRN describes a sediment reconnaissance study of Vince Bayou, describes how additional delineation sample locations will be selected, and provides a proposed analyte list for the additional delineation samples.

Sediment Reconnaissance Study of Vince Bayou

During the first Vince Bayou sampling event, soft sediment was observed at each of the six locations at a thickness of six inches or less, which is assumed to be the biologically active sediment layer. A hard clay bottom (presumably the Beaumont Clay) was observed beneath the soft sediment. There was only a thin (<1/2-inch) transition zone between the soft sediment and the hard clay bottom.

A sediment reconnaissance study will be performed to characterize the distribution of soft sediment within the bayou in the vicinity of the Site. Data to be collected include: 1) the thickness of soft sediment above the hard clay bottom of the bayou, 2) the grain size and carbon content of sediment; and 3) any other important sediment characteristics (texture, odor, color, presence of biota, etc.). The results of the sediment reconnaissance study will provide data for a weight-of-evidence approach to select additional step-out sampling locations for further delineation. The data from the cross-sectional sediment profiles will inform the understanding of sediment accumulation that can be used as part of the weight-of-evidence approach. A more detailed description of how the sediment reconnaissance data will be used to make informed decisions regarding sediment step-out sampling locations is provided in the next section of this WRN.

The sediment reconnaissance study will be performed within the general area proposed for additional COPC delineation sampling, which includes 10 shoreline-to-shoreline transects that are upstream, downstream and across the bayou from the original sampling locations from WRN-7 (see attached map, Figure 1). Each transect will consist of five sample locations across the bayou (except at VBSD-5 where it will be extended into a low energy feature across the bayou). The sampling procedures for the reconnaissance study are as follows:

1) At each location, the thickness of sediment will be measured to the top of the hard Beaumont Clay and sediment sample(s) will be collected using an appropriate sample device (e.g., piston core, Ekman dredge, etc.).
2) Water depth to the top of sediment will be measured at each location and the exact location and time of measurement noted.
3) At the reconnaissance sample locations, samples of soft sediment will be collected at the intervals of 0-6 inches and 6-12 inches if present.
4) Three of the five sediment samples along each transect (near-shore, mid-channel, far-shore) will be analyzed for grain size and total organic carbon (TOC) (see Figure 1). As noted in the above discussion, two additional sediment samples will be collected along the transect near VBSD-5 with one being analyzed for grain size and TOC. Fraction organic carbon (FOC) will be calculated by the lab for each sample that is analyzed for grain size and TOC.

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5) Each sediment sample will be described for texture; other observations will also be noted (e.g. odor, color).

The water elevation of Vince Bayou will be collected during low and high tides on the day(s) of the study. Data from the nearest tidal station, Manchester Station, located on the Houston Ship Channel approximately 2.75 miles upstream of the Vince Bayou and Houston Ship Channel confluence, will be used to identify low and high tide times.

Sediment Delineation Samples

Six sediment and surface water samples were collected in Vince Bayou in accordance with WRN-AOI-1-7 and the data from those samples is provided in the attached Tables 1-5.

Additional sediment delineation sample locations will be conservatively selected based on the results of the sediment reconnaissance study and past sediment sampling results to identify sample locations that are most likely to have been impacted by Site activities. A weight-of-evidence approach will be used to select sediment delineation sampling locations that will use the sediment thickness data (focusing on potential depositional areas), TOC/FOC data (i.e., identifying areas with relatively high TOC concentrations), grain size (i.e., identifying areas of fine-grained sediment versus more coarse material), and other potential observations (e.g., chemical odors, presence of obvious non-native material or fill) from the reconnaissance study. A decision diagram for delineation sample location selection, with primary and secondary decision factors defined, is presented as Figure 2. These judgmental samples likely overestimate potential risk, and as such the sampling approach will provide a higher degree of confidence in evaluating whether the COPC originated at the USOR property.

At least 10 sediment COPC delineation samples will be collected along the transect lines, as follows:

1) Generally, six step-out locations (final locations selected using the process defined on Figure 2) to laterally delineate sediment preliminary screening values (PSVs) exceedances measured in samples collected from VBSD-1 through VBSD-6 will be sampled. It is envisioned that these six step-out samples will be collected further into the bayou away from the shoreline locations VBSD-1 through VBSD-6.
2) In addition, two upstream delineation samples (final locations selected using the process defined on Figure 2) will be collected south of VBSD-1 and two downstream delineation samples will be collected north of VBSD-6.
3) At the delineation sample locations, sediment samples will be collected in 6-inch intervals until the base of soft sediment is reached or to a maximum depth of 12 inches, whichever comes first. Sediment samples will be collected with an appropriate sample device (e.g. piston core, Ekman dredge, etc.).
4) The 0-6-inch samples from the six step-out locations and the first upstream and downstream sample locations will be analyzed in the laboratory on a 5-day rush turnaround for the COPCs identified in Table 6 (see additional discussion on COPCs below).
5) The data from the 0-6-inch sample intervals will be compared to the appropriate PSVs and additional analyses will be conducted, if necessary, as follows:
    a. For the step-out locations, if PSVs are exceeded in the sample from the 0-6 inch interval, and samples were collected from the 6-12 inch interval (i.e., there was more than 6 inches of sediment present at that location), the 6-12 inch interval will be analyzed for the COPCs in Table 6.
    b. For the first upstream and downstream samples, if PSVs are exceeded in the 0-6 inch interval, and a 6-12 inch sample was collected at a location, the 6-12 inch interval in the first upstream and downstream samples will be analyzed for COPCs in the laboratory and the 0-6 inch samples in the second upstream and downstream samples will be analyzed for COPCs in the laboratory. If 6-12 inch sediment samples were collected at the second upstream and downstream sample locations, and PSVs were exceeded in the 0-6 inch samples, the 6-12 inch sediment samples will be analyzed for COPCs.

The delineation samples will be analyzed for the proposed COPC list (Table 6) identified in the Additional Sampling Activities Related to Iteration 2 COPC Selection Memo, included as Attachment A of this WRN and as described in the following section below. In addition, the delineation samples will be analyzed for TOC/FOC and grain size. Following receipt of the laboratory results, additional sediment sample locations may be identified and samples collected and analyzed for the proposed COPC list, TOC/FOC, and grain size.

The rationale for the delineation sampling locations is as follows:

- Laterally delineate PSV exceedances observed in samples collected from VBSD-1 through VBSD-6 away from the southern shoreline of Vince Bayou and upstream/downstream of the existing sediment sample locations; and
- Collect additional data to facilitate a risk evaluation for the following exposure pathways:
    - Ecological: water column community and benthic invertebrates; and
    - Human Health: Off-property recreational user (only in water depths of 2 meters or less).

As indicated above, the analytical data from the ten proposed sediment samples will be compared to applicable PSVs as outlined in the RI/FS Work Plan and previous sampling activities at the Site. If PSVs are exceeded for site-related COPCs in the sediment delineation samples, then additional sediment samples will be proposed. Depending on the data, these additional sample locations may or may not be along the transects described in this WRN. In addition, the data distribution will be evaluated to assess 1) the need for additional samples to conduct the extent evaluation and 2) the extent of COPCs in sediment to facilitate the assessment of potential ecological and human health risk (if any). Furthermore, sediment data will be evaluated to determine whether additional Vince Bayou investigation activities are warranted (see RI/FS Work Plan Iteration 3).

Additional surface water sample collection and analysis is not proposed for future sampling events for the following reasons: 1) the COPCs detected in surface water samples (Tables 4-5) were measured at very low concentrations (and many were J-flagged since they were measured below the sample quantitation limit); 2) the dynamic nature of surface water in a tidal setting such as Vince Bayou makes it difficult to determine whether ubiquitous compounds such as pesticides are site-related; and 3) while there were some minor exceedances of PSVs for some compounds, the data are sufficient to assess ecological and human health risks related to COPCs in surface water.

<u>COPC Selection</u>

After discussions and agreement with EPA and TCEQ on October 10, 2018 and December 6, 2018, the COPC selection process was refined to a single-step. Total petroleum hydrocarbons and volatile organic compounds (3 compounds), which were not detected above the applicable human health or ecological PSVs, were removed from the COPC list. The list of metals, pesticides, herbicides and semi-volatile organic compounds that was originally developed for Iteration 2 will be fully retained. The proposed analyte list is presented on Table 6.

RATIONALE FOR REFINEMENT/MODIFICATION:

A sediment reconnaissance study is proposed to evaluate the sediment thickness and characteristics across the proposed expanded study area and to provide data to select delineation sediment sample locations. Delineation sediment samples are proposed to evaluate the extent of COPCs in Vince Bayou sediment and to collect additional data to facilitate the assessment of potential ecological and human health risk (if any).

Respondents' Project Coordinator: _____ Date: 12/11/2018

Eric Pastor
Golder Associates Inc.

EPA Project Manager: _____ Date: 12/11/2018

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TABLES

Table 1
Vince Bayou Sediment Data Compared to Ecological Preliminary Screening Values
US Oil Recovery Superfund Site
Pasadena, TX

COPC	Saltwater Benchmark (PSV)	PSV Source	Sample ID and Date					
			VBSD-01 7/13/2018	VBSD-02 7/13/2018	VBSD-03 7/13/2018	VBSD-04 7/12/2018	VBSD-05 7/12/2018	VBSD-06 7/12/2018
METALS								
Antimony	2	1	1.68 JL	0.271 J	**5.19**	**5.71**	0.825	**7.07**
Arsenic	8.2	1	**97.1**	**16**	**1370**	**258**	**80.6**	**325**
Barium	2218	3	155	163	193	662	173	127
Boron	2.5	4	**12.6**	**10.5**	**14.7**	**22.3**	**15**	**13.4**
Chromium	81	1	29.9 JH	18	32.2	37.1	22	40.7
Cobalt	10	2	7.57	6.63	6.77	**11.1**	7.63	6.47
Manganese	260	2	243	**359**	260	**611**	**270**	183
Mercury	0.15	1	**2.17 JH**	0.0886	**3.36**	**45.9**	**0.622**	**1.27**
Selenium	1	2	0.701 J	0.214 J	**4.58**	**13.3**	0.867	**7.03**
Thallium	0.5	4	<0.38	<0.28	<0.4	**0.98**	<0.29	0.341 J
PESTICIDES AND HERBICIDES								
2,4-D	0.0066	4	<0.0013 JL	<0.0009 JL	<0.0014 JL	<0.0011 JL	<0.001	<0.001
2,4-DB	0.0066	4	<0.0016 JL	<0.0012 JL	**0.03 J**	<0.0015 JL	<0.0013	<0.0013
4,4′-DDD	0.0012	1	**0.0058 J**	**0.0098**	**0.3**	**0.076**	<0.0007	<0.0008
4,4′-DDE	0.0012	1	**0.013**	**0.0048**	**0.084**	**0.17 J**	<0.0007	<0.0008
4,4′-DDT	0.0039	1	**0.0043 J**	**0.0077**	**1.2**	**0.77**	<0.0007	<0.0008
Aldrin	0.0095	2	0.0035	0.0034	**0.027 J**	**3.6**	<0.0004	<0.0005
alpha-BHC	0.0003	1	<0.0005	**0.0024**	**0.0099**	<0.0005	<0.0004	<0.0005
alpha-Chlordane	0.0023	1	<0.0004	<0.0003	**0.017**	**0.0053 J**	<0.0003	<0.0003
beta-BHC	0.0003	1	<0.0005	<0.0004	**0.032**	<0.0005	<0.0004	<0.0005
Dalapon	0.0033	4	<0.0022 JL	<0.0016 JL	<0.0023 JL	<0.002 JL	<0.0017	<0.0018
delta-BHC	0.0003	1	**0.0017 J**	<0.0003	<0.0004	**0.0017 J**	<0.0003	<0.0003
Dichlorprop	0.0066	4	<0.0029 JL	<0.0021 JL	<0.0031 JL	<0.0026 JL	<0.0023	<0.0024
Dieldrin	0.0007	1	**0.0026 J**	**0.001 J**	**0.016 J**	**0.018 J**	<0.0007	<0.0008
Dinoseb	0.0033	4	<0.0025 JL	<0.0019 JL	<0.0027 JL	<0.0023 JL	<0.002 J	<0.0021 J
Endosulfan I	0.0017	4	<0.0005	<0.0004	**0.013**	**0.084 J**	<0.0004	<0.0005
Endosulfan II	0.0033	4	<0.0011	<0.0008	**0.015**	0.0025 J	<0.0009	<0.0009
Endosulfan sulfate	0.0033	4	<0.0011	<0.0008	0.0025 J	0.0018 J	<0.0009	<0.0009
Endrin	0.0027	1	0.0019 J	<0.0008	**0.018 J**	<0.001	<0.0009	<0.0009
Endrin aldehyde	0.00267	1	0.0015 J	<0.0008	**0.017**	**0.0028 J**	<0.0009	<0.0009
Endrin ketone	0.00267	1	0.0013 J	<0.0008	**0.0096 J**	**0.0061**	<0.0009	<0.0009
gamma-BHC	0.0003	1	<0.0004	<0.0003	<0.0004	<0.0003	<0.0003	<0.0003
gamma-Chlordane	0.0023	1	0.0057 UJ	0.0015 UJ	0.016 UJ	**0.026 J**	<0.0003	<0.0003
Heptachlor	0.0006	1	<0.0005	<0.0004	<0.0006	<0.0005	<0.0004	<0.0005
Heptachlor epoxide	0.0006	1	**0.0027 J**	<0.0004 J	**0.0093 J**	**0.0039 J**	<0.0004	<0.0005
MCPA	0.66	4	<0.18 JL	<0.13 JL	<0.19 JL	<0.16 JL	<0.14	<0.15 JL
MCPP	0.66	4	<0.29 JL	<0.21 JL	**3.3 JL**	<0.26 JL	<0.23	<0.24 JL
Toxaphene	0.0001	2	<0.0086	<0.0064	<0.0093	<0.0078	<0.0068	<0.0072

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SEMI-VOLATILE ORGANIC COMPOUNDS								
1,4-Dioxane	0.33	4	<0.004 JL	<0.003	<0.0042	<0.0036	<0.0031	<0.0033
1-Methylnaphthalene	0.07	1	<0.0027	0.056	0.0037 J	<0.0024	0.0027 J	0.008
2-Methylnaphthalene	0.07	1	<0.0009	**0.076**	0.0052 J	<0.0008	<0.0007	0.011
Acenaphthene	0.016	1	<0.0009	<0.0007	<0.001	<0.0008	<0.0007	<0.0008
Acenaphthylene	0.044	1	<0.0018	<0.0013	<0.0019	<0.0016	<0.0014	<0.0015
Anthracene	0.0853	1	0.0053 J	<0.0007	0.0026 J	<0.0008	<0.0007	<0.0008
Benz(a)anthracene	0.261	1	0.028	0.0036 J	0.017	0.017	0.042	<0.0024
Benzo(a)pyrene	0.43	1	0.025	0.0048	0.022	0.02	0.058	<0.0015
Benzo(b)fluoranthene	1.1	2	0.039	0.007	0.036	0.029	0.061	0.0092
Benzo(g,h,i)perylene	0.497	2	0.018	0.0042 J	0.019	0.016	0.05	0.0063
Benzo(k)fluoranthene	0.537	2	0.016	0.0035 J	0.014	0.011	0.016	0.0029 J
Bis(2-ethylhexyl)phthalate	0.182	1	0.075	0.02	0.07	0.046	0.0067 J	0.0054 J
Butyl benzyl phthalate	0.049	1	<0.0023	<0.0017	0.0042 J	<0.0021	<0.0018	<0.0019
Carbazole	0.0066	4	0.003 J	<0.0016	<0.0023	<0.0019	<0.0017	<0.0018
Chrysene	0.384	1	0.036	0.0056	0.03	0.022	0.069	0.0086
Dibenz(a,h)anthracene	0.0634	1	0.0051 J	<0.0021	0.0049 J	0.0049 J	0.013	<0.0024
Fluoranthene	0.6	1	0.052	0.0065	0.038	0.027	0.036	0.01
Fluorene	0.019	1	<0.002	0.0025 J	<0.0021	<0.0018	<0.0016	<0.0016
Indeno(1,2,3-cd)pyrene	0.488	2	0.024	0.0048	0.022	0.02	0.041	0.0043 J
Naphthalene	0.16	1	<0.0011	0.0025 J	<0.0012	<0.001	<0.0009	0.009
Phenanthrene	0.24	1	0.018	0.0043 J	0.011	0.0052 J	0.0089	0.0052
Pyrene	0.665	1	0.045	0.005	0.031	0.022	0.043	0.014
Total PAHs	4.022	1	0.32	0.19	0.26	0.20	0.45	0.10
VOLATILE ORGANIC COMPOUNDS								
1,4-Dichlorobenzene	0.7	1	<0.0016 JL	<0.0019	<0.0013	<0.0018	<0.0015	<0.0016
Benzene	1.36	1	<0.0008	<0.001	<0.0007	<0.0009	<0.0007	<0.0008
Chlorobenzene	2.73	1	<0.001	<0.0011	<0.0008	<0.0011	<0.0009	<0.0009
PETROLEUM HYDROCARBONS								
C6-C12	25	4	<12	<13	<9	<13	16 J	<14
>C12-C28	25	4	<16	<17	<12	<17	<14	<14
>C28-C35	25	4	<16	<17	<12	<17	<10	<11
TPH	25	4	<12	<13	<9	<13	16 J	<11

Notes:

All units milligrams per kilogram (mg/kg)

PSV - Preliminary Screening Value

Values in orange text are sample detection limits that exceed the PSV.

Bolded and highlighted values are concentrations that exceed the PSV.

PSV sources are as follows:

1. Sediment Benchmarks, Second Effects Levels, and Benthic PCLs. August 2014. http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html;
2. Screening Quick Reference Table for Organics in Sediment and Soil NOAA 2008;
3 Leung, K.M.Y., A Bjorgeaester, J.S. Gray, W. K. Li, G.C.S. Lui, Y. Wang and P.K.S. Lam. 2005. Deriving Sediment Quality Guidelines from Field-Based Species Sensitivity Distributions. Environ. Sci. Technol. 39:5148-5146; or
4. The Method Quantitation Limit for that compound.

Table 2
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US Oil Recovery Superfund Site
Pasadena, TX

COPC	$^{Tot}Sed_{Comb}$	Sample ID and Date					
		VBSD-01 7/13/2018	VBSD-02 7/13/2018	VBSD-03 7/13/2018	VBSD-04 7/12/2018	VBSD-05 7/12/2018	VBSD-06 7/12/2018
METALS							
Antimony	83	1.68 JL	0.271 J	5.19	5.71	0.825	7.07
Arsenic	115	97.1	16	**1370**	**258**	80.6	**325**
Barium	22861	155	163	193	662	173	127
Boron	106513	12.6	10.5	14.7	22.3	15	13.4
Chromium	36460	29.9 JH	18	32.2	37.1	22	40.7
Cobalt	31954	7.57	6.63	6.77	11.1	7.63	6.47
Manganese	14028	243	359	260	611	270	183
Mercury	34	2.17 JH	0.0886	3.36	**45.9**	0.622	1.27
Selenium	2663	0.701 J	0.214 J	4.58	13.3	0.867	7.03
Thallium	43	<0.38	<0.28	<0.4	0.98	<0.29	0.341 J
PESTICIDES AND HERBICIDES							
2,4-D	2534	<0.0013 JL	<0.0009 JL	<0.0014 JL	<0.0011 JL	<0.001	<0.001
2,4-DB	1225	<0.0016 JL	<0.0012 JL	0.03 J	<0.0015 JL	<0.0013	<0.0013
4,4´-DDD	12	0.0058 J	0.0098	0.3	0.076	<0.0007	<0.0008
4,4´-DDE	8.7	0.013	0.0048	0.084	0.17 J	<0.0007	<0.0008
4,4´-DDT	8.7	0.0043 J	0.0077	1.2	0.77	<0.0007	<0.0008
Aldrin	0.08	0.0035	0.0034	0.027 J	**3.6**	<0.0004	<0.0005
alpha-BHC	0.41	<0.0005	0.0024	0.0099	<0.0005	<0.0004	<0.0005
alpha-Chlordane	4.1	<0.0004	<0.0003	0.017	0.0053 J	<0.0003	<0.0003
beta-BHC	1.4	<0.0005	<0.0004	0.032	<0.0005	<0.0004	<0.0005
Dalapon	4593	<0.0022 JL	<0.0016 JL	<0.0023 JL	<0.002 JL	<0.0017	<0.0018
delta-BHC	1.4	0.0017 J	<0.0003	<0.0004	0.0017 J	<0.0003	<0.0003
Dichlorprop	1531	<0.0029 JL	<0.0021 JL	<0.0031 JL	<0.0026 JL	<0.0023	<0.0024
Dieldrin	0.09	0.0026 J	0.001 J	0.016 J	0.018 J	<0.0007	<0.0008
Dinoseb	153	<0.0025 JL	<0.0019 JL	<0.0027 JL	<0.0023 JL	<0.002 J	<0.0021 J
Endosulfan I	306	<0.0005	<0.0004	0.013	0.084 J	<0.0004	<0.0005
Endosulfan II	919	<0.0011	<0.0008	0.015	0.0025 J	<0.0009	<0.0009
Endosulfan sulfate	919	<0.0011	<0.0008	0.0025 J	0.0018 J	<0.0009	<0.0009
Endrin	46	0.0019 J	<0.0008	0.018 J	<0.001	<0.0009	<0.0009
Endrin aldehyde	46	0.0015 J	<0.0008	0.017	0.0028 J	<0.0009	<0.0009
Endrin ketone	46	0.0013 J	<0.0008	0.0096 J	0.0061	<0.0009	<0.0009
gamma-BHC	2.0	<0.0004	<0.0003	<0.0004	<0.0003	<0.0003	<0.0003
gamma-Chlordane	4.1	0.0057 UJ	0.0015 UJ	0.016 UJ	0.026 J	<0.0003	<0.0003
Heptachlor	0.32	<0.0005	<0.0004	<0.0006	<0.0005	<0.0004	<0.0005
Heptachlor epoxide	0.16	0.0027 J	<0.0004 J	0.0093 J	0.0039 J	<0.0004	<0.0005
MCPA	77	<0.18 JL	<0.13 JL	<0.19 JL	<0.16 JL	<0.14	<0.15 JL
MCPP	153	<0.29 JL	<0.21 JL	3.3 JL	<0.26 JL	<0.23	<0.24 JL
Toxaphene	1.29	<0.0086	<0.0064	<0.0093	<0.0078	<0.0068	<0.0072

Table 2
Vince Bayou Sediment Data Compared to Human Health Preliminary Screening Values
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SEMI-VOLATILE ORGANIC COMPOUNDS							
1,4-Dioxane	495	<0.004 JL	<0.003	<0.0042	<0.0036	<0.0031	<0.0033
1-Methylnaphthalene	8660	<0.0027	0.056	0.0037 J	<0.0024	0.0027 J	0.008
2-Methylnaphthalene	495	<0.0009	0.076	0.0052 J	<0.0008	<0.0007	0.011
Acenaphthene	7423	<0.0009	<0.0007	<0.001	<0.0008	<0.0007	<0.0008
Acenaphthylene	7423	<0.0018	<0.0013	<0.0019	<0.0016	<0.0014	<0.0015
Anthracene	37113	0.0053 J	<0.0007	0.0026 J	<0.0008	<0.0007	<0.0008
Benz(a)anthracene	1.6	0.028	0.0036 J	0.017	0.017	0.042	<0.0024
Benzo(a)pyrene	0.16	0.025	0.0048	0.022	0.02	0.058	<0.0015
Benzo(b)fluoranthene	1.6	0.039	0.007	0.036	0.029	0.061	0.0092
Benzo(g,h,i)perylene	3711	0.018	0.0042 J	0.019	0.016	0.05	0.0063
Benzo(k)fluoranthene	16	0.016	0.0035 J	0.014	0.011	0.016	0.0029 J
Bis(2-ethylhexyl)phthalate	24	0.075	0.02	0.07	0.046	0.0067 J	0.0054 J
Butyl benzyl phthalate	30618	<0.0023	<0.0017	0.0042 J	<0.0021	<0.0018	<0.0019
Carbazole	71	0.003 J	<0.0016	<0.0023	<0.0019	<0.0017	<0.0018
Chrysene	159	0.036	0.0056	0.03	0.022	0.069	0.0086
Dibenz(a,h)anthracene	0.16	0.0051 J	<0.0021	0.0049 J	0.0049 J	0.013	<0.0024
Fluoranthene	4948	0.052	0.0065	0.038	0.027	0.036	0.01
Fluorene	4948	<0.002	0.0025 J	<0.0021	<0.0018	<0.0016	<0.0016
Indeno(1,2,3-cd)pyrene	1.6	0.024	0.0048	0.022	0.02	0.041	0.0043 J
Naphthalene	2474	<0.0011	0.0025 J	<0.0012	<0.001	<0.0009	0.009
Phenanthrene	3711	0.018	0.0043 J	0.011	0.0052 J	0.0089	0.0052
Pyrene	3711	0.045	0.005	0.031	0.022	0.043	0.014
VOLATILE ORGANIC COMPOUNDS							
1,4-Dichlorobenzene	227	<0.0016 JL	<0.0019	<0.0013	<0.0018	<0.0015	<0.0016
Benzene	99	<0.0008	<0.001	<0.0007	<0.0009	<0.0007	<0.0008
Chlorobenzene	14700	<0.001	<0.0011	<0.0008	<0.0011	<0.0009	<0.0009
PETROLEUM HYDROCARBONS							
C6-C12	44100	<12	<13	<9	<13	16 J	<14
>C12-C28	15309	<16	<17	<12	<17	<14	<14
>C28-C35	NA	<16	<17	<12	<17	<10	<11
TPH	NA	<12	<13	<9	<13	16 J	<11

Notes:

All units milligrams per kilogram (mg/kg)

PSV - Preliminary Screening Value

Bolded and highlighted values are concentrations that exceed the PSV.

1. PSVs are the TCEQ Tier 1 Sediment PCLs ($^{Tot}Sed_{Comb}$), March 2006.

Table 3
Sediment Fate and Transport Parameters
US Oil Recovery Superfund Site
Pasadena, TX

Parameter	Sample ID and Date					
	VBSD-01 7/13/2018	VBSD-02 7/13/2018	VBSD-03 7/13/2018	VBSD-04 7/12/2018	VBSD-05 7/12/2018	VBSD-06 7/12/2018
Organic Carbon						
Total Organic Carbon (weight %)	0.53	1.28	2.92	2.00	0.42	0.87
Fraction Organic Carbon (g-C/g-soil)	0.005	0.013	0.029	0.020	0.004	0.009
Grain Size (%)						
Sand	29.3	16.5	13.1	19.8	32	29.5
Silt	38.3	44.1	52.5	47.6	32.4	37.8
Clay	32.4	39.4	34.4	32.6	35.6	32.7

Table 4
Vince Bayou Surface Water Data Compared to Ecological Preliminary Screening Values
US Oil Recovery Superfund Site
Pasadena, TX

COPC	Saltwater Chronic Benchmark (PSV)	PSV Source	Sample ID and Date					
			VBSW-01 7/13/2018	VBSW-02 7/13/2018	VBSW-03 7/13/2018	VBSW-04 7/12/2018	VBSW-05 7/12/2018	VBSW-06 7/12/2018
METALS								
Antimony	0.73	1	0.000663 J	0.000525 J	0.00057 J	0.000484 J	0.000475 J	0.000475 J
Arsenic (dissolved)	0.078	1	0.0018 J	0.00172 J	0.00174 J	0.002 J	0.00204	0.00238
Barium	25	1	0.0509	0.0502	0.0419	0.0631	0.0651	0.0602
Boron	1.2	2	0.174	0.183	0.113	0.302	0.304	0.275
Chromium (dissolved)	0.0274	2	<0.000535	0.000435 J	0.000781 J	<0.0004	0.00124 J	<0.0004
Cobalt	0.001	2	<0.000424	0.000388 J	0.000328 J	0.000381 J	0.000367 J	0.000354 J
Manganese (manganese)	0.1	2	0.0422	0.0415	0.0302	0.0648	0.0671	0.0659
Mercury	0.0011	1	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Selenium	0.136	1	0.011	<0.0011	<0.0011	<0.0011	<0.0011 J	<0.0011 J
Thallium	2.1	1	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
PESTICIDES AND HERBICIDES								
2,4-D	0.0002	3	<0.00006	<0.00006	<0.00006	<0.00006	<0.000061	<0.00006
2,4-DB	0.0004	3	<0.00008	<0.00008	<0.00008	<0.00008	<0.000081	<0.00008
4,4′-DDD	0.000025	1	<0.000003	0.0000052 JL	0.0000072 J	0.0000089 J	0.0000091 J	0.000012 J
4,4′-DDE	0.000025	1	<0.000003	<0.000003 JL	0.0000052 J	0.000004 J	<0.000003	<0.000003
4,4′-DDT	0.000001	1	<0.000003	<0.000003 JL	**0.0000071 J**	**0.0000082 J**	<0.000003	**0.000007**
Aldrin	0.00013	1	<0.000001	<0.000001 JL	<0.000001	<0.000001	<0.000001	<0.000001
alpha-BHC	0.025	1	0.0000024	<0.000001 JL	0.0000059	0.0000048	0.000004 J	0.000003 J
alpha-Chlordane	0.000004	1	<0.000003	<0.000003 JL	<0.000003	**0.000007 J**	<0.000003	0.000004
beta-BHC	0.025	1	<0.000001 JL	<0.000001 JL	0.000004 J	<0.000001	<0.000001	<0.000001
Dalapon	0.0002	3	<0.00007 JL	<0.00007 JL	<0.00007 JL	<0.00007 JL	<0.000071 JL	<0.00007 JL
delta-BHC	0.025	1	<0.000001	<0.000001 JL	<0.000001	0.0000035	0.0000052	<0.000001
Dichlorprop	0.0004	3	<0.00008	<0.00008	<0.00005	<0.00008	<0.000081	<0.00008
Dieldrin	0.000002	1	<0.000003	<0.000003 JL	<0.000003	<0.000003	**0.000005 J**	**0.000005 J**
Dinoseb	0.0003	3	<0.00005	<0.00005	<0.00005	<0.00005	<0.000051	<0.00005
Endosulfan I	0.000009	1	0.000007 J	0.000007 J	0.000008 J	0.000008 J	0.000008 J	0.000007 J
Endosulfan II	0.000009	1	<0.000003	<0.000003 JL	<0.000003	<0.000003	<0.000003	0.0000049
Endosulfan sulfate	0.000009	1	<0.000003	<0.000003 JL	<0.000003	<0.000003 JL	<0.000003	<0.000003
Endrin	0.000002	1	<0.000003	**0.000003 J**	<0.000003	<0.000003	<0.000003	<0.000003
Endrin aldehyde	0.000002	1	<0.000003	<0.000003 JL	<0.000003	**0.000004 J**	<0.000003	<0.000003
Endrin ketone	0.000002	1	<0.000003	<0.000003 JL	<0.000003	<0.000003	<0.000003	<0.000003
gamma-BHC	0.000016	1	0.0000043	<0.000001 JL	0.000005	<0.000001	<0.000001	<0.000001
gamma-Chlordane	0.000004	1	0.0000032 JH	0.000003 J	0.0000037	**0.000004 J**	0.000003 J	**0.0000041**
Heptachlor	0.000004	1	<0.000001	<0.000001 JL	0.000004 J	<0.000001	<0.000001	<0.000001
Heptachlor epoxide	0.0000036	1	<0.000001	<0.000001 JL	0.000003 J	0.000003 J	<0.000001	<0.000001
MCPA	0.0042	2	<0.0082	<0.0081	<0.0081	<0.0081	<0.00818	<0.0081
MCPP	0.03	3	<0.007	<0.007	<0.007	<0.007	<0.00707	<0.007
Toxaphene	0.0000002	2	<0.000025	<0.000026 JL	<0.000025	<0.000025	<0.000025	<0.000026

Table 4
Vince Bayou Surface Water Data Compared to Ecological Preliminary Screening Values
US Oil Recovery Superfund Site
Pasadena, TX

COPC	Saltwater Chronic Benchmark (PSV)	PSV Source	Sample ID and Date					
			VBSW-01 7/13/2018	VBSW-02 7/13/2018	VBSW-03 7/13/2018	VBSW-04 7/12/2018	VBSW-05 7/12/2018	VBSW-06 7/12/2018
SEMI-VOLATILE ORGANIC COMPOUNDS								
1,4-Dioxane	0.01	3	<0.000058 JL	<0.000057 JL	<0.000057 JL	<0.000058	<0.000058 JL	<0.000058 JL
1-Methylnaphthalene	0.03	1	<0.00001 JL	<0.00001	<0.00001 JL	<0.00001	<0.00001 JL	<0.00001
2-Methylnaphthalene	0.03	1	<0.000019 JL	<0.000019	<0.000019 JL	<0.000019	<0.000019 JL	<0.000019
Acenaphthene	0.0404	1	<0.000027 JL	<0.000027	<0.000027 JL	<0.000027	<0.000028 JL	<0.000027
Acenaphthylene	0.0002	3	<0.000015 JL	<0.000015	<0.000015 JL	<0.000015	<0.000015 JL	<0.000015
Anthracene	0.00018	1	<0.000014 JL	<0.000014	<0.000014 JL	<0.000014	<0.000014 JL	<0.000014
Benz(a)anthracene	0.0002	3	<0.00005 JL	<0.00005	<0.00005 JL	<0.000051	<0.000051 JL	<0.000051
Benzo(a)pyrene	0.0002	3	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002
Benzo(b)fluoranthene	0.0002	3	0.00003 JL	<0.000023	0.000056 JL	<0.000023	<0.000023 JL	<0.000023
Benzo(g,h,i)perylene	0.0002	3	<0.000014 JL	<0.000014	0.000039 JL	<0.000014	<0.000014 JL	<0.000014
Benzo(k)fluoranthene	0.0002	3	<0.000019 JL	<0.000019	0.000027 JL	<0.000019	<0.000019 JL	<0.000019
Bis(2-ethylhexyl)phthalate	0.36	2	0.000068 JL	0.000058 J	0.000072 JL	<0.000037	0.000084 JL	0.00055
Butyl benzyl phthalate	0.0034	2	0.00003 JL	0.000053 J	0.000081 JL	<0.000019	0.000021 JL	0.000035 J
Carbazole	0.0002	3	0.000026 JL	<0.000025	<0.000025 JL	<0.000025	<0.000026 JL	<0.000025
Chrysene	0.0002	3	0.000035 JL	<0.000021	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021
Dibenz(a,h)anthracene	0.0002	3	<0.000024 JL	<0.000024	<0.000024 JL	<0.000024	<0.000024 JL	<0.000024
Fluoranthene	0.003	1	0.000041 JL	0.000029 J	0.000054 JL	<0.00001	<0.00001 JL	<0.00001
Fluorene	0.05	1	<0.00003 JL	<0.00003	<0.00003 JL	<0.00003	<0.000031 JL	<0.00003
Indeno(1,2,3-cd)pyrene	0.0002	3	<0.000022 JL	<0.000022	<0.000022 JL	<0.000022	<0.000022 JL	<0.000022
Naphthalene	0.125	1	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002
Phenanthrene	0.0046	1	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021
Pyrene	0.00024	1	0.00004 JL	0.000031	0.000043 J	<0.000019	<0.000019 JL	<0.000019
VOLATILE ORGANIC COMPOUNDS								
1,4-Dichlorobenzene	0.099	1	<0.0004	0.00045 J	<0.0004	<0.0004	<0.0004	<0.0004
Benzene	1.09	1	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chlorobenzene	1.0	1	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
PETROLEUM HYDROCARBONS								
C6-C12	2.5	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C12-C28	2.5	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C28-C35	2.5	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TPH	2.5	3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Notes:

All units milligrams per liter (mg/L)

PSV - Preliminary Screening Value

Values in orange text are sample detection limits that exceed the PSV.

Bolded values are concentrations that exceed the PSV.

PSV sources are as follows:

1. Aquatic Life Risk-Based Exposure Limits. 2017. http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html
2. Screening Quick Reference Table for Organics in Water, NOAA 2008.
3. The Method Quantitation Limit for that compound.

Table 5
Vince Bayou Surface Water Data Compared to Human Health Preliminary Screening Values
US Oil Recovery Superfund Site
Pasadena, TX

COPC	$^{Tot}RW_{Comb}$ [1]	HH RBEL Fish Only	Sample ID and Date					
			VBSW-01 7/13/2018	VBSW-02 7/13/2018	VBSW-03 7/13/2018	VBSW-04 7/12/2018	VBSW-05 7/12/2018	VBSW-06 7/12/2018
METALS								
Antimony	0.20	1.07	0.000663 J	0.000525 J	0.00057 J	0.000484 J	0.000475 J	0.000475 J
Arsenic	0.03	0.01	0.0018 J	0.00172 J	0.00174 J	0.002 J	0.00204	0.00238
Barium	65	NA	0.0509	0.0502	0.0419	0.0631	0.0651	0.0602
Boron	74	NA	0.174	0.183	0.113	0.302	0.304	0.275
Chromium	126	NA	<0.000535	0.000435 J	0.000781 J	<0.0004	0.00124 J	<0.0004
Cobalt	53	NA	<0.000424	0.000388 J	0.000328 J	0.000381 J	0.000367 J	0.000354 J
Manganese	41	0.1	0.0422	0.0415	0.0302	0.0648	0.0671	0.0659
Mercury	4.6	0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Selenium	4.1	4.2	0.011	<0.0011	<0.0011	<0.0011	<0.0011 J	<0.0011 J
Thallium	0.07	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
PESTICIDES AND HERBICIDES								
2,4-D	3.92	NA	<0.00006	<0.00006	<0.00006	<0.00006	<0.000061	<0.00006
2,4-DB	0.95	NA	<0.00008	<0.00008	<0.00008	<0.00008	<0.000081	<0.00008
4,4´-DDD	NA	0.000002	<0.000003	**0.0000052 JL**	**0.0000072 J**	**0.0000089 J**	**0.0000091 J**	**0.000012 J**
4,4´-DDE	NA	0.0000001	<0.000003	<0.000003 JL	**0.0000052 J**	**0.000004 J**	<0.000003	<0.000003
4,4´-DDT	NA	0.0000004	<0.000003	<0.000003 JL	**0.0000071 J**	**0.0000082 J**	<0.000003	**0.000007**
Aldrin	NA	0.00000001	<0.000001	<0.000001 JL	<0.000001	<0.000001	<0.000001	<0.000001
alpha-BHC	0.0004	0.0000084	0.0000024	<0.000001 JL	0.0000059	0.0000048	0.000004 J	0.000003 J
alpha-Chlordane	NA	0.0000025	<0.0000025	<0.0000026 JL	<0.0000025	**0.000007 J**	<0.0000025	**0.000004**
beta-BHC	0.002	0.00026	<0.000001 JL	<0.000001 JL	0.000004 J	<0.000001	<0.000001	<0.000001
Dalapon	18	NA	<0.00007 JL	<0.00007 JL	<0.00007 JL	<0.00007 JL	<0.000071 JL	<0.00007 JL
delta-BHC	0.002	0.00004	<0.000001	<0.000001 JL	<0.000001	0.0000035	0.0000052	<0.000001
Dichlorprop	2.13	NA	<0.00008	<0.00008	<0.00005	<0.00008	<0.000081	<0.00008
Dieldrin	NA	0.00000002	<0.000003	<0.000003 JL	<0.000003	<0.000003	**0.000005 J**	**0.000005 J**
Dinoseb	0.13	NA	<0.00005	<0.00005	<0.00005	<0.00005	<0.000051	<0.00005
Endosulfan I	1.53	0.03	0.000007 J	0.000007 J	0.000008 J	0.000008 J	0.000008 J	0.000007 J
Endosulfan II	0.25	0.04	<0.000003	<0.000003 JL	<0.000003	<0.000003	<0.000003	0.0000049
Endosulfan sulfate	NA	0.04	<0.000003	<0.000003 JL	<0.000003	<0.000003 JL	<0.000003	<0.000003
Endrin	0.01	0.00002	<0.000003	0.000003 J	<0.000003	<0.000003	<0.000003	<0.000003
Endrin aldehyde	NA	0.001	<0.000003	<0.000003 JL	<0.000003	0.000004 J	<0.000003	<0.000003
Endrin ketone	0.01	NA	<0.000003	<0.000003 JL	<0.000003	<0.000003	<0.000003	<0.000003
gamma-BHC	0.002	0.0003	0.0000043	<0.000001 JL	0.000005	<0.000001	<0.000001	<0.000001
gamma-Chlordane	NA	0.0000025	**0.0000032 JH**	**0.0000033 J**	**0.0000037**	**0.0000044 J**	**0.0000034 J**	**0.0000041**
Heptachlor	NA	0.0000001	<0.0000012	<0.0000013 JL	**0.000004 J**	<0.0000013	<0.0000012	<0.0000013
Heptachlor epoxide	0.0002	0.0000003	<0.0000012	<0.0000013 JL	**0.000003 J**	**0.000003 J**	<0.0000012	<0.0000013
MCPA	0.08	NA	<0.0082	<0.0081	<0.0081	<0.0081	<0.00818	<0.0081
MCPP	0.23	NA	<0.007	<0.007	<0.007	<0.007	<0.00707	<0.007
Toxaphene	NA	0.00001	<0.000025	<0.000026 JL	<0.000025	<0.000025	<0.000025	<0.000026

Table 5
Vince Bayou Surface Water Data Compared to Human Health Preliminary Screening Values
US Oil Recovery Superfund Site
Pasadena, TX

COPC	$^{Tot}RW_{Comb}$ [1]	HH RBEL Fish Only	Sample ID and Date					
			VBSW-01 7/13/2018	VBSW-02 7/13/2018	VBSW-03 7/13/2018	VBSW-04 7/12/2018	VBSW-05 7/12/2018	VBSW-06 7/12/2018
SEMI-VOLATILE ORGANIC COMPOUNDS								
1,4-Dioxane	4.4	NA	<0.000058 JL	<0.000057 JL	<0.000057 JL	<0.000058	<0.000058 JL	<0.000058 JL
1-Methylnaphthalene	4.8	NA	<0.00001 JL	<0.00001	<0.00001 JL	<0.00001	<0.00001 JL	<0.00001
2-Methylnaphthalene	0.3	0.001	<0.000019 JL	<0.000019	<0.000019 JL	<0.000019	<0.000019 JL	<0.000019
Acenaphthene	2.4	0.09	<0.000027 JL	<0.000027	<0.000027 JL	<0.000027	<0.000028 JL	<0.000027
Acenaphthylene	3.3	NA	<0.000015 JL	<0.000015	<0.000015 JL	<0.000015	<0.000015 JL	<0.000015
Anthracene	11	1	<0.000014 JL	<0.000014	<0.000014 JL	<0.000014	<0.000014 JL	<0.000014
Benz(a)anthracene	NA	0.00003	<0.00005 JL	<0.00005	<0.00005 JL	<0.000051	<0.000051 JL	<0.000051
Benzo(a)pyrene	NA	0.000003	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002
Benzo(b)fluoranthene	NA	0.00001	**0.00003 JL**	<0.000023	**0.000056 JL**	<0.000023	<0.000023 JL	<0.000023
Benzo(g,h,i)perylene	NA	0.0001	<0.000014 JL	<0.000014	0.000039 JL	<0.000014	<0.000014 JL	<0.000014
Benzo(k)fluoranthene	NA	0.000003	<0.000019 JL	<0.000019	**0.000027 JL**	<0.000019	<0.000019 JL	<0.000019
Bis(2-ethylhexyl)phthalate	NA	0.008	0.000068 JL	0.000058 J	0.000072 JL	<0.000037	0.000084 JL	0.00055
Butyl benzyl phthalate	7.9	0.008	0.00003 JL	0.000053 J	0.000081 JL	<0.000019	0.000021 JL	0.000035 J
Carbazole	0.27	NA	0.000026 JL	<0.000025	<0.000025 JL	<0.000025	<0.000026 JL	<0.000025
Chrysene	NA	0.003	0.000035 JL	<0.000021	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021
Dibenz(a,h)anthracene	NA	0.000001	<0.000024 JL	<0.000024	<0.000024 JL	<0.000024	<0.000024 JL	<0.000024
Fluoranthene	NA	0.02	0.000041 JL	0.000029 J	0.000054 JL	<0.00001	<0.00001 JL	<0.00001
Fluorene	2.1	0.07	<0.00003 JL	<0.00003	<0.00003 JL	<0.00003	<0.000031 JL	<0.00003
Indeno(1,2,3-cd)pyrene	NA	0.00001	<0.000022 JL	<0.000022	<0.000022 JL	<0.000022	<0.000022 JL	<0.000022
Naphthalene	2.6	NA	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002	<0.00002 JL	<0.00002
Phenanthrene	1.1	NA	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021	<0.000021 JL	<0.000021
Pyrene	NA	0.03	0.00004 JL	0.000031	0.000043 J	<0.000019	<0.000019 JL	<0.000019
VOLATILE ORGANIC COMPOUNDS								
1,4-Dichlorobenzene	0.19	0.9	<0.0004	0.00045 J	<0.0004	<0.0004	<0.0004	<0.0004
Benzene	0.24	0.58	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chlorobenzene	1.6	2.7	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
PETROLEUM HYDROCARBONS								
C6-C12	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C12-C28	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C28-C35	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TPH	NA	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Notes:

All units milligrams per liter (mg/L)

PSV - Preliminary Screening Value

1. PSVs are the lowest of the TCEQ Tier 1 Contact Recreation PCLs ($^{Tot}RW_{Comb}$), March 2006 and Human Health Surface Water RBEL Values, Fish Only .

Highlighted concentrations are non-detect concentrations where the detection limit is greater than the PSV.

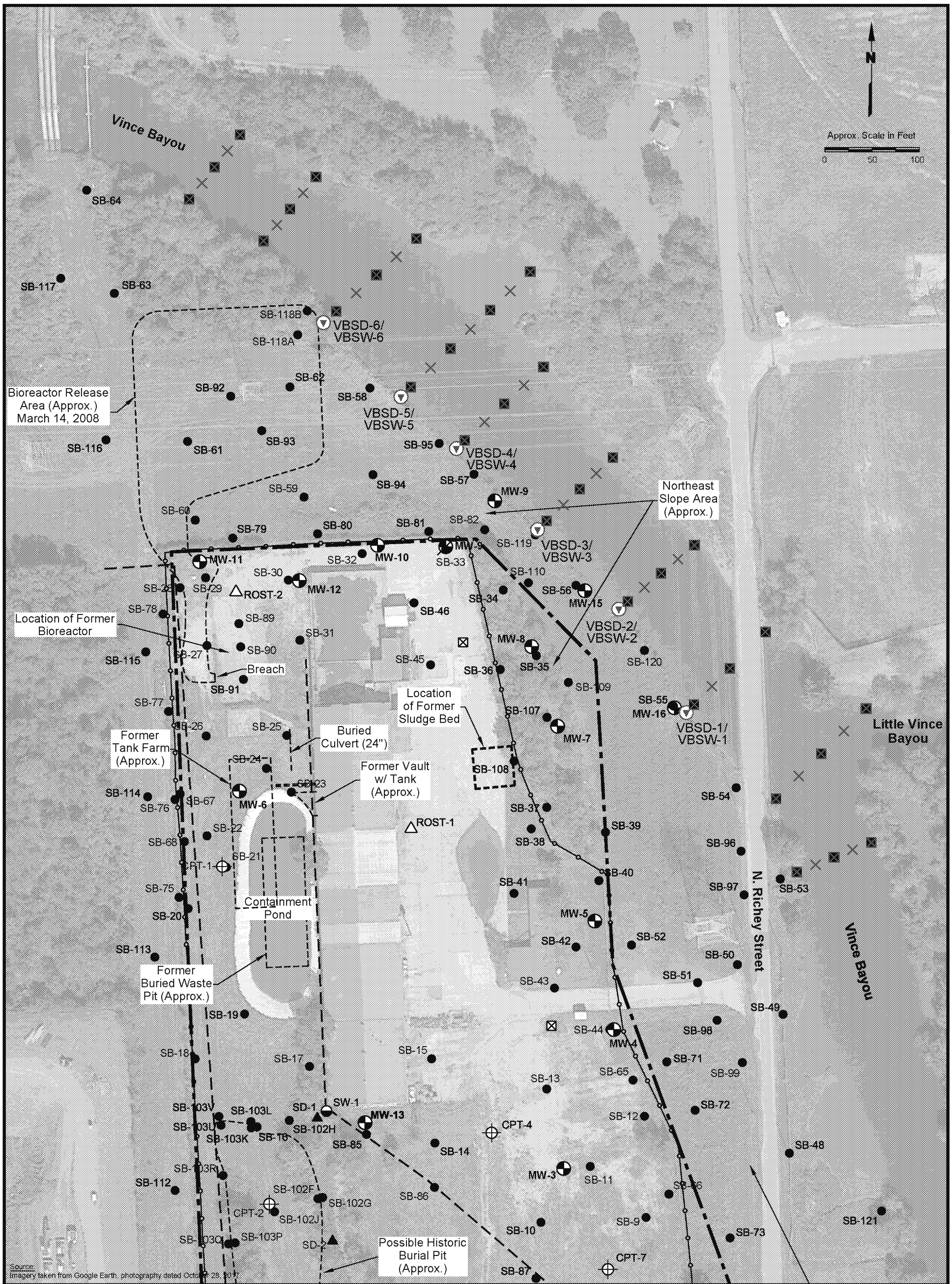
Shaded and bolded concentrations indicate a concentration above a PSV.

Table 6
Proposed COPC List
Iteration 2 Vince Bayou Sediment Delineation
US Oil Reovery Superfund Site
Pasadena, Texas

COPC
METALS
Antimony
Arsenic
Barium
Boron
Chromium
Cobalt
Manganese
Mercury
Selenium
Thallium
PESTICIDES AND HERBICIDES
2,4-D
2,4-DB
4,4´-DDD
4,4´-DDE
4,4´-DDT
Aldrin
alpha-BHC
alpha-Chlordane
beta-BHC
Dalapon
delta-BHC
Dichloroprop
Dieldrin
Dinoseb
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
gamma-BHC
gamma-Chlordane
Heptachlor
Heptachlor epoxide
MCPA
MCPP
Toxaphene
SEMI-VOLATILE ORGANIC COMPOUNDS
1,4-Dioxane
1-Methylnaphthalene
2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benz(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Carbazole
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

Notes:
1. Per agreement, VOCs and TPH were not selected as COPCs for the Iteration 2 delineation activities.

FIGURES



Source:
Imagery taken from Google Earth, photography dated October 28, 2017.

EXPLANATION

- Approx. Property Boundary
- Approx. Security Fence
- Approx. Pipeline Location
- Monitoring Well Location
- Soil Boring Location per RI/FS Work Plan or Applicable Work Plan Refinement Notice
- On-Property Surface Water Sample Location
- On-Property Sediment Sample Location
- CPT Location
- CPT/ROST Location
- Vince Bayou Sediment/Surface Water Sample Location
- Vince Bayou Sediment Thickness Probe Location
- Vince Bayou Sediment Sample Location (TOC, Grain Size)

US OIL RECOVERY SUPERFUND SITE

PASADENA, HARRIS COUNTY, TEXAS

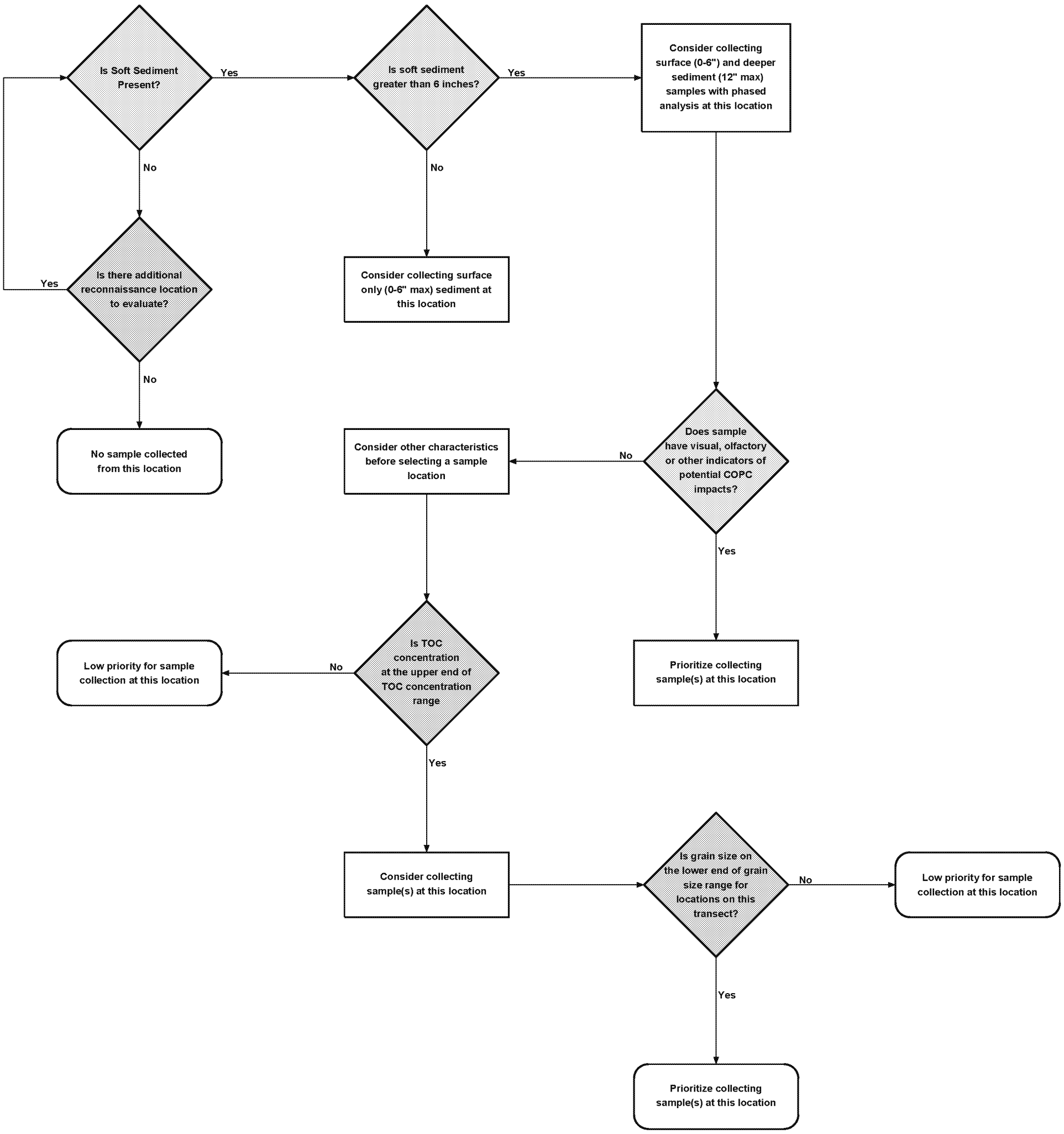
Figure 1

PROPOSED SEDIMENT RECONNAISSANCE STUDY SAMPLE LOCATION MAP

PROJECT: 3333	BY: AJD	REVISIONS
DATE: SEPT., 2018	CHECKED: MKW	

PASTOR, BEHLING & WHEELER, LLC

CONSULTING ENGINEERS AND SCIENTISTS



LEGEND

- PRIMARY DECISION FACTOR
- SECONDARY DECISION FACTOR

CLIENT
US OIL RECOVERY

PROJECT
US OIL RECOVERY SUPERFUND SITE
PASADENA, HARRIS COUNTY, TEXAS

TITLE
DECISION DIAGRAM FOR SELECTING VINCE BAYOU SEDIMENT TRANSECT DELINEATION SAMPLE LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2018-11-01
DESIGNED	AJD
PREPARED	AJD
REVIEWED	RJR
APPROVED	MKW

PROJECT NO	REV	FIGURE
30403333	0	2