

APPENDIX F

Technical Memorandum – Evaluation of Right of Way
Soil Boring Program Results South of Hillside Road



TECHNICAL MEMO

To:

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District

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Date:

April 6, 2017

Arcadis Project No.:

04285081

Subject:

Former Laredo Air Force Base Shot Gun Range Remedial Investigation
Evaluation of Right of Way Samples Collected South of Hillside Road

PURPOSE

The purpose of this Technical Memo is to provide an evaluation of soil sample results from borings installed in road rights-of-ways (ROWs) south of Hillside Road to delineate the horizontal extent of polynuclear aromatic hydrocarbons (PAHs) exceeding the residential assessment level (RAL) from the Former Laredo Air Force Base (LAFB) Shot Gun Range (SGR) site (the site).

BACKGROUND

The RAL for the SGR is determined by the residential Tier 1 $TotSoil_{Comb}$ protective concentration level (PCL for the combined exposure pathway of soil ingestion, dermal contact, inhalation volatiles and particulates, and ingestion of aboveground and below-ground vegetables) for a 30-acre source. During implementation of the Remedial Investigation (RI) activities, the Residential Tier 1 $TotSoil_{Comb}$ PCL for benzo(a)pyrene was obtained from the March 2016 Tier 1 PCL Tables, published by the Texas Commission on Environmental Quality (TCEQ) on its website, and the value for the RAL was established as 0.56 milligrams per kilogram (mg/kg). Based on this RAL, both incremental sampling methodology (ISM) samples and soil boring samples within decision units on the southern boundary of the SGR exceeded the assessment level, and the TCEQ agreed to discrete sampling in street ROWs south of Hillside to complete the horizontal delineation.

SAMPLING SCOPE

The ROW sampling was performed in July and November of 2016. Twenty-one soil borings were installed within the Hillside Road ROW, ROWs within the Flynn Subdivision, and on the Assisting Texas With Housing, Inc. property. ROW soil boring locations are presented on **Figure 1**. Boring logs for the ROW soil borings are presented in Attachment 1. Soil samples were collected from up to five depth intervals per boring (0-0.5 feet, 0.5-2 feet, 2-4 feet, 4-6 feet, and 6-8 feet). The 0-0.5 foot depth interval was analysed first, and if the benzo(a)pyrene concentration exceeded 0.56 mg/kg, deeper samples were then analyzed.

In March 2017, the TCEQ updated its Tier 1 PCL table, and based on changes to its slope factor, the Residential Tier 1 $TotSoil_{Comb}$ PCL for benzo(a)pyrene was increased to 4.1 mg/kg. Therefore, while the extent of the ROW soil boring program was based on a delineation value of 0.56 mg/kg, the data obtained are evaluated against a Residential Tier 1 $TotSoil_{Comb}$ PCL of 4.1 mg/kg, as discussed below.

EVALUATION OF RESULTS

Analytical Results

The benzo(a)pyrene concentration for each sample interval analyzed is plotted with the boring location on **Figure 1**. The benzo(a)pyrene concentration in two samples exceeded the Residential Tier 1 $TotSoil_{Comb}$ PCL:

- ROW 21 Boring (0-2 feet): 10.3 mg/kg
- ROW 22 Boring (0-2 feet): 8.59 mg/kg

Both borings are located on the Assisting Texas With Housing, Inc. property. Because ROW samples directly south of the SGR were below the RAL and had much lower concentrations than the samples from ROW 21 and ROW 22 borings, a further evaluation of the data was performed to evaluate whether the concentrations from ROW 21 and ROW22 may be due to a separate PAH source.

PAH Origin Analysis

An analysis of the origins of PAHs present within the SGR versus the PAHs present within the ROW samples, especially at the Assisting Texas With Housing, Inc. property, was performed using scatter plots and bar graphs as discussed below.

Scatter Plot

Graphing of data points as ratios of PAH concentrations [benzo(a)pyrene to benzo(b)fluoranthene on the y-axis and benz(a)anthracene to chrysene on the x-axis) was performed and is shown on **Figure 2**. Samples results from the SGR are plotted in blue and sample results from ROWs are plotted in orange. As shown on **Figure 2**, the surficial results for ROW 21 and ROW 22 are not clustered with the majority of the other samples from the SGR and the ROW borings, indicating that these samples may have a different source.

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Legend

Decision Units (DU)

ROW Boring Representation for Benzo(a)pyrene Concentrations

Concentration Less Than RAL and Critical PCL

Concentration Greater Than RAL and Critical PCL

ROW Boring Representation

Each Depth Interval Represents
Result For One Discrete Sample

0.0-0.5 feet bgs

0.5-2.0 feet bgs

2.0-4.0 feet bgs

4.0-6.0 feet bgs

6.0-8.0 feet bgs

0 180 360

SCALE IN FEET

Notes:

- 1) Parcel data obtained from the City of Laredo, Texas GIS website.
- 2) bgs = below ground surface
- 3) ROW = Right-of-Way
- 4) All concentrations shown are in milligrams per kilogram (mg/kg)
- 5) RAL = Residential Assessment Level (4.1 mg/kg)
- 6) Critical PCL = Protective Concentration Level (4.1 mg/kg)

U.S. ARMY CORP OF ENGINEERS - FORT WORTH DISTRICT
FORMER LAREDO AIR FORCE BASE, LAREDO, TEXAS
SHOTGUN RANGE REMEDIAL TECHNICAL MEMO

ROW Boring Locations and Benzo(a)pyrene Concentrations in Soil

ARCADIS Design & Consultancy
for natural and
built assets

FIGURE

1

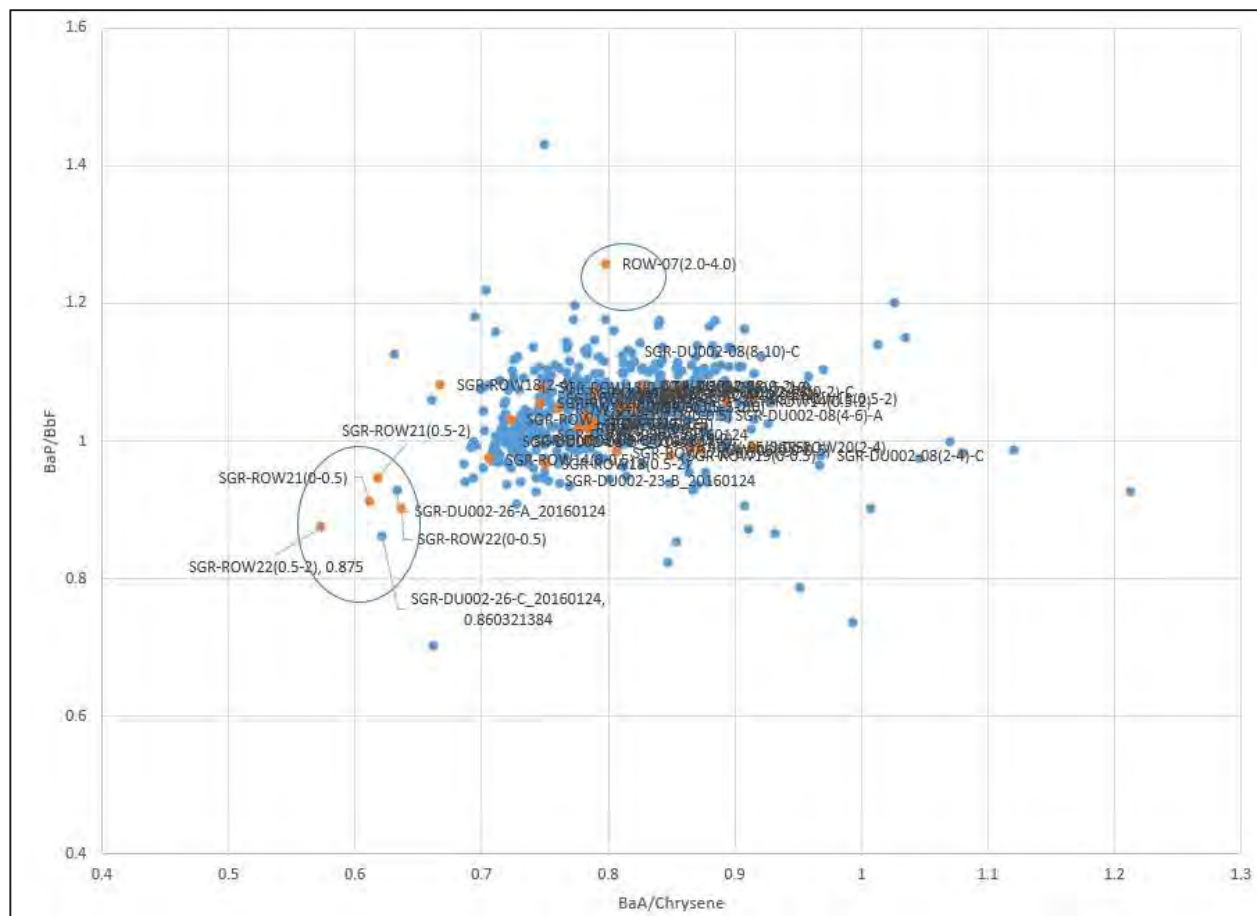


Figure 2 – Scatter Plot of PAH Ratios for SGR and ROW samples

Bar Graphs of PAH Concentrations

Next, the concentrations for 15 PAH constituents were plotted in bar graphs for the following samples:

- DU010-04 (2-4). The 2-4-foot soil sample collected from a boring installed in a DU within the SGR
- Laredo Fragments. A sample of skeet target fragment material collected from the SGR
- ROW-21 (0-0.5). The 0-0.5-foot soil sample collected from boring ROW 21 on the Assisting Texas With Housing, Inc. property
- ROW-22 (0-0.5). The 0-0.5-foot soil sample collected from boring ROW 22 on the Assisting Texas With Housing, Inc. property

The bar graphs are presented on **Figure 3**. A qualitative evaluation of the bar graphs indicates the following:

- The finger print of the PAH constituents present in the samples collected from the SGR [DU10-04(2-4) and Laredo Fragments] is similar. This includes both the PAH constituents that are present in the samples and the relative concentrations of those PAHs.

- The finger print of the PAH constituents present in the surficial soil samples from ROW borings 21 and 22 is similar. Again, this includes both the PAH constituents that are present in the samples and the relative concentrations of those PAHs.
- However, comparison of the finger print of the PAH constituents present in the samples from the SGR [DU10-04(2-4) and Laredo Fragments] to the samples from the ROW 21 / ROW 22 borings on the Assisting Texas With Housing, Inc. property show them to be dissimilar.

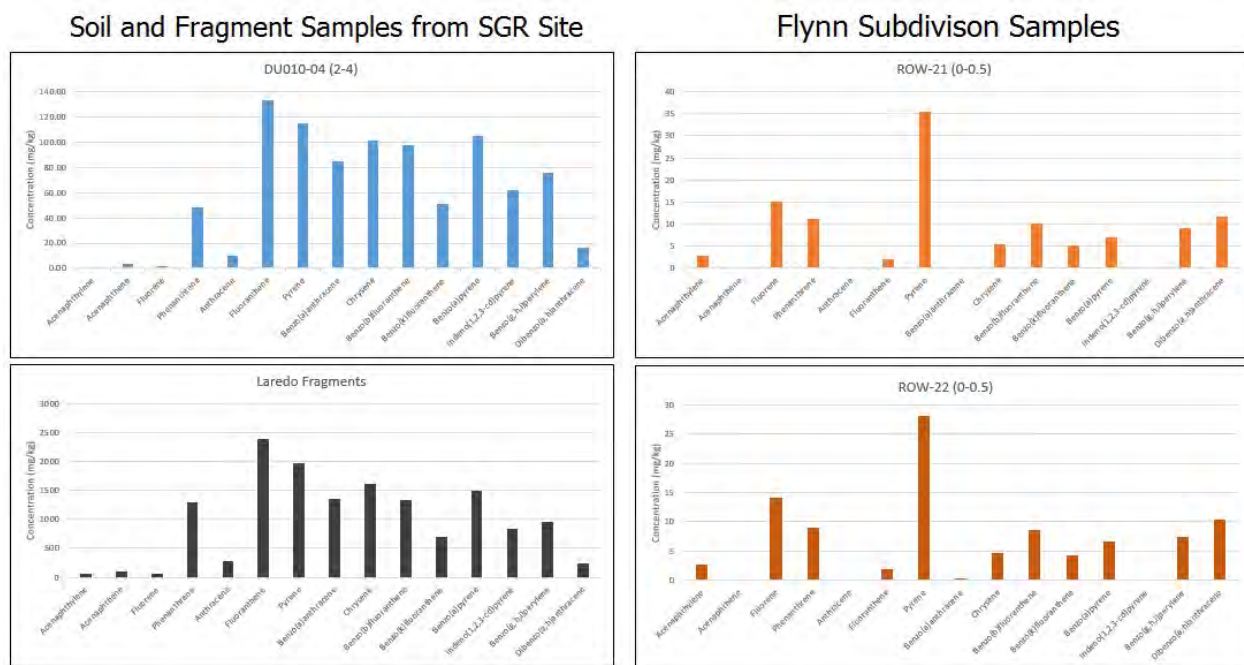


Figure 3 Bar Graphs of Individual PAH Concentrations for Various Samples

Bar Graphs of Percentage of Individual PAHs in Various Samples

Finally, the concentration for each individual PAH was divided by the total PAH concentration of the sample, and the resulting percentage was plotted in a bar graph. This was done for each of the samples evaluated by the bar graphs in the previous section, as well as for two, 4-6-foot samples from DU 074 within the SGR.

The bar graphs are presented on **Figure 4**. To aid in the visual evaluation of the data, bars representing soil samples within the SGR are blue, bars representing samples of the skeet fragments are black, and bars representing samples from the ROW (ROW 21 and 22) are orange. An evaluation of the bar graphs indicates the following:

- For each PAH except phenanthrene, the height of the bars representing the soil samples within the SGR and the bars representing samples of the skeet fragments are of similar heights. Therefore, individual PAHs represent the same percentage of the total in the SGR soil samples and the skeet fragments.
- For each PAH, the height of the bars representing the two ROW soil samples are similar.

- However, the height of the bars representing the ROW samples are generally dissimilar from the height of the bars representing the soil samples within the SGR and the bars representing samples of the skeet fragments.

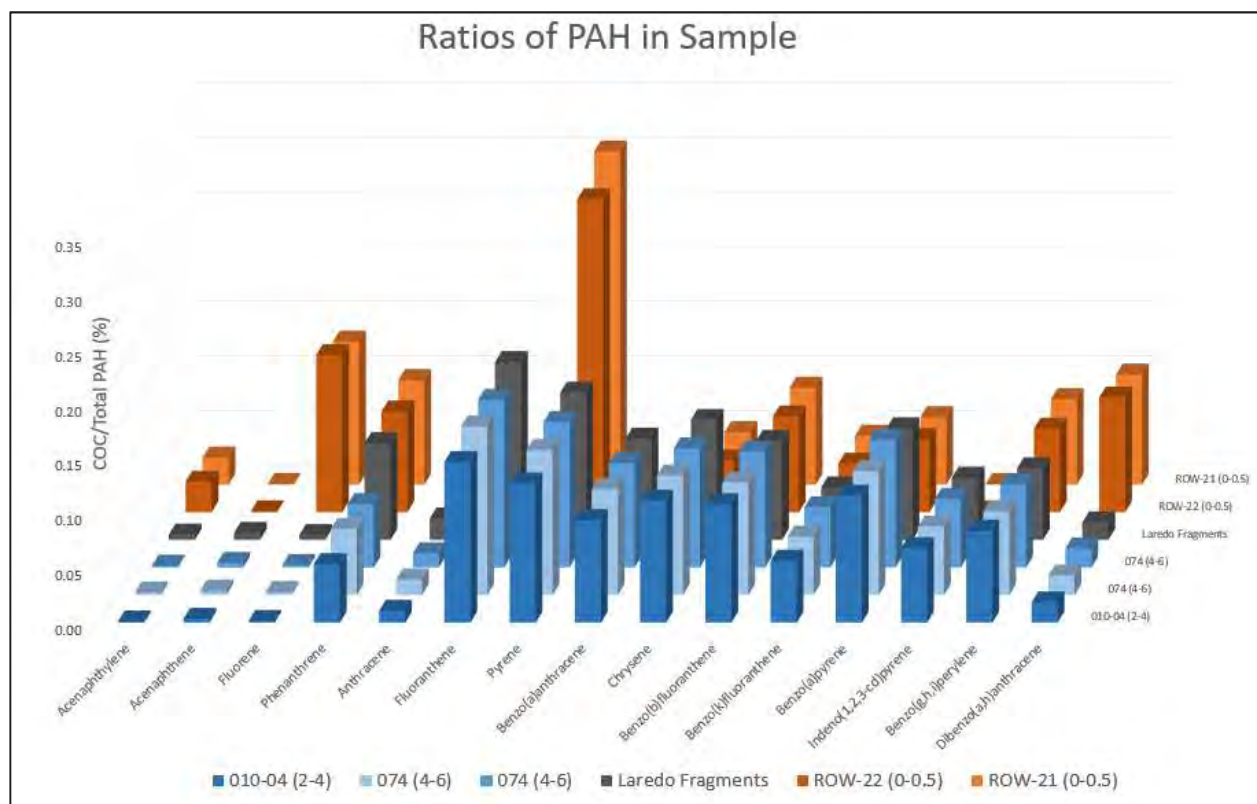


Figure 4 – Percentage of Individual PAHs in Various Samples

CONCLUSIONS


Evaluation of the ROW data compared to data collected from with the SGR shows the data sets to be dissimilar, based on scatter plots, bar graphs of PAH concentrations, and bar graphs of the percentage of individual PAHs within the samples. Therefore, it is concluded that detection of PAHs further to the south of Hillside Drive originate from a different source, and are not associated with the SGR.

ATTACHMENT 1
ROW SOIL BORING LOGS

Date Start/Finish: 11/5/16-11/5/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-03 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, moist, very soft, low plasticity, trace organic matter (0'-3' bgs Hand Auger (refusal at 3' bgs - chert))	
		1	0-4	3		ML		Little CLAY, trace fine caliche	
-5	-5	2	4-8	4		SM		SAND (very fine), little CLAY, trace SILT, olive brown, moist to wet, very soft, low plasticity, dark brown SILT lense WET (6.5'-8')	Soil (0.0-1.0' bgs) Bentonite Chips (1.0-8' bgs)
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/5/16-11/5/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-04 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0					ML		SILT, brown, moist, very soft, low plasticity, trace organic matter (0'-2.5' - Hand Auger (refusal at 2.5' bgs - chert)) Trace fine caliche, soft to medium stiff	Soil (0.0-1.0' bgs)
		1	0-4	4					
-5	-5					SM		SAND (very fine), some SILT, brown, moist, very soft, low plasticity, trace gravel Some CLAY, little SILT, olive brown with gray, soft, low plasticity, fine caliche, dark brown SILT lense	Bentonite Chips (1.0-8' bgs)
		2	4-8	4					
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/5/16-11/5/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 10 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-07 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, moist, very soft, low plasticity, trace organic matter (0'-2.5' bgs - Hand Auger)	
		1	0-4	4		CL		Little CLAY, trace gravel	Soil (0.0-1.0' bgs)
-5	-5	2	4-8	4		ML		CLAY, little SILT, gray, moist, medium stiff, olive brown mottling, low plasticity Maroon mottling Some very fine SAND, olive brown, soft, low plasticity, trace fine caliche Little SILT, trace SAND, medium stiff, low plasticity, light yellow SILT lense	Bentonite Chips (1.0-10' bgs)
-10	-10	3	8-12	2				End of Boring at 10' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/5/16-11/5/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-12 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry to moist, very soft, low plasticity, organic matter (0'-1.8' - Hand Auger (refusal at 1.8' bgs - chert))	
		1	0-4	4		ML		Chert fragments, trace organic matter Trace CLAY, trace gravel, light yellow SILT lense, soft, moist	
-5	-5							Little CLAY, soft to medium stiff, trace fine caliche	
		2	4-8	4		SM		SAND (very fine), some CLAY, little SILT, light brown, moist, very soft, low plasticity, trace gravel, dark brown SILT lense	Soil (0.0-1.0' bgs)
								End of Boring at 8' bgs	Bentonite Chips (1.0-8' bgs)

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-13 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0					ML		SILT, brown, moist, very soft, low plasticity, organic matter, trace gravel (sub-angular) (0'-1' bgs - Hand Auger) Little CLAY, chert fragments	Soil (0.0-1.0' bgs)
		1	0-4	4				CLAY, some SILT, gray, moist, medium stiff, low plasticity, trace dark gray mottling, brown SILT lense, fine caliche Trace SAND, very soft, dark red mottling, trace gypsum	Bentonite Chips (1.0-8' bgs)
-5	-5	2	4-8	4		CL			
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-14 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry to moist, very soft, low plasticity, trace gravel, organic matter (0'-1' bgs - Hand Auger) Chert fragments, soft to medium stiff	
		1	0-4	4		ML		Chert fragments Fine caliche	
						CL		CLAY, some SILT, gray, moist, medium stiff, low plasticity, minor dark gray mottling, fine caliche	
-5	-5	2	4-8	4		ML		SILT, little SAND, trace CLAY, olive brown, moist, soft, low plasticity, fine caliche, red/brown SILT lense, trace organic matter	
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-15 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry to moist, very soft, low plasticity, trace organic matter (0'-1' bgs - Hand Auger (refusal at 1' bgs - chert))	
		1	0-4	4		ML			Soil (0.0-1.0' bgs)
-5	-5	2	4-8	4		SM		SAND (very fine), little SILT, trace CLAY, olive brown, moist, very soft, trace fine caliche, trace gravel, dark gray SILT lense	Bentonite Chips (1.0-8' bgs)
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: Ettl Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-16 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0								
		1	0-4	4		ML		SILT, brown, dry to moist, very soft, low plasticity (0'-1' bgs - Hand Auger) Some very fine SAND, soft, low plasticity, trace organic matter	Soil (0.0-1.0' bgs)
-5	-5	2	4-8	4		SM		SAND (very fine), some SILT, trace CLAY, olive brown, moist, low plasticity, trace dark gray SILT, trace fine caliche SAND content increases with depth	Bentonite Chips (1.0-8' bgs)
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/5/16-11/5/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-17 Client: USACE Location: Laredo, TX
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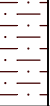

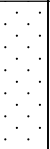
DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0					ML		SILT, brown, moist, very soft, low plasticity, organic matter, chert fragments (0'-2' bgs - Hand Auger (refusal at 2' bgs - chert))	
		1	0-4	4					
-5	-5					SM		SAND (very fine), little SILT, moist, soft, low plasticity, trace gravel, trace chert fragments	
		2	4-8	4				Very soft, low plasticity, dark brown SILT lense, trace organic matter	
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/5/16-11/5/16 Drilling Company: Ettl Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 3.5 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-18 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0					ML		SILT, brown, dry to moist, very soft, low plasticity, organic matter, trace chert fragments (0'-1.5' bgs - Hand Auger (refusal at 1.5' bgs - chert))	 Soil (0.0-1.0' bgs) Bentonite Chips (1.0-3.5' bgs)
		1	0-4	3.5		SM		SAND (very fine), little SILT, moist, very soft, low plasticity, trace organic matter, dark brown SILT lense, chert fragments	
-5	-5	2	4-8	0				End of Boring at 3.5' bgs (refusal at 3.5' bgs - SILTSTONE)	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-19 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry, very soft, low plasticity, organic matter (0'-1' bgs - Hand Auger)	
		1	0-4	4		ML		Fine caliche, moist, medium stiff, trace organic matter, chert fragments	
								Some SAND (very fine), olive brown, dark brown SILT lense Gypsum	
-5	-5	2	4-8	4		CL		CLAY, trace SAND (very fine), trace SILT, gray, moist, soft, olive brown mottling, trace fine caliche, trace tan SILT	
								Very soft	
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: E TTL Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-20 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry, very soft, low plasticity, organic matter, trace gravel (0'-1' bgs - Hand Auger) Chert fragments, moist, trace organic matter, soft to medium stiff	
		1	0-4	4				Trae fine caliche Gray, olive brown mottling, minor dark gray mottling, medium stiff	
						ML			
-5	-5	2	4-8	3				Little SAND (very fine), olive brown, very soft to soft, trace fine caliche, dark brown SILT nodules	
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: Ettl Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-21 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry, very soft, low plasticity, organic matter (0'-1' bgs - Hand Auger) Trace CLAY, soft, moist Trace fine caliche, trace organic matter, light brown SILT lense	
		1	0-4	4		ML			
-5	-5	2	4-8	4		SM		SAND (very fine), little SILT, trace CLAY, olive brown, moist, very soft, low plasticity, trace fine caliche, dark brown SILT lense, minor tan mottling, dark red/brown SILT nodules	Bentonite Chips (1.0-8' bgs)
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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Date Start/Finish: 11/4/16-11/4/16 Drilling Company: Ettl Driller's Name: Rich Herman Drilling Method: GeoProbe Sampling Method: Split Spoon Rig Type: GeoProbe	Northing: Easting: Casing Elevation: Borehole Depth: 8 Ft. bgs Surface Elevation: Descriptions By: Dylan Chappell	Well/Boring ID: ROW-22 Client: USACE Location: Laredo, TX
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DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Skeet Fragments	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
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0	0							SILT, brown, dry, low plasticity, very soft, organic matter (0'-1' bgs - Hand Auger) Trace CLAY, moist, soft, trace organic matter Trace fine caliche	
		1	0-4	4		ML			Soil (0.0-1.0' bgs)
-5	-5	2	4-8	4		SM		SAND (very fine), some SILT, little CLAY, olive brown, moist, very soft to soft, low plasticity, trace fine caliche, minor dark gray mottling Trace gray CLAY, dark brown SILT lense	Bentonite Chips (1.0-8' bgs)
								End of Boring at 8' bgs	

	Remarks: bgs = below ground surface; amsl = above mean sea level; HA = Hand Auger; ppm = parts per million; NA = not applicable/available; SS = split spoon; HV = hydrovac Coordinates referenced to Texas State Plane Coordinate System NAD 83 Texas South Zone Elevations referenced to NAVD 88
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