

June 19, 2019

Mr. Richard L. Hogan
RJK Ranch Holdings, LLC
26 Wilmington Court
Sugar Land, TX 77479

Dear Mr. Hogan,

In April 2019, at the request of RJK Ranch Holdings, LLC (“RJK Ranch”), Lonquist & Co., LLC (“Lonquist”) mobilized to the 450-acre potential mining region of the Hogan Ranch in Atascosa County, Texas. For the purpose of this analysis, frac sand resource was defined as sand that passed through the 40-mesh sieve and was retained above the 140-mesh sieve, to account for a 40/140 (“100 Mesh”) product. Lonquist drilled seven (7) core holes throughout three (3) 150-acre potential extraction areas. Cores were retrieved, evaluated and catalogued by on-site engineers and packaged for storage and shipment to the Lonquist Frac Sand Lab in College Station, Texas.

Stratigraphic columns for the seven core holes are included in Attachment 1 where the lithology of each core can be observed. In the lab, the core holes were divided into mostly 20’ testing intervals for wash loss and sieve analysis to determine the Total Frac Sand Product (40/140), Total Fines (-140), and Total Oversized Sand (+40) Weight Percentages. The samples were washed over a 200 mesh screen, so the Fines are generally a 140/200 product with some even finer grade sand (-200) that did not wash out. The results are reported in the Sieve Testing Summary (Attachment 2). Fines and oversized sand were included in the resource estimates because of potential alternative applications indicated by RJK Ranch.

The Total Frac Sand Resource was estimated by mapping out net pay in each hole as indicated by the lab testing results and calculating tons in place. The property is in close proximity to the known Carrizo Sand updip edge at which we can assume there is zero net feet of sand. The updip edge served as another data point for the evaluation. To calculate a net pay thickness for each hole, the gross sand thickness (defined as the sum of the sand intervals deemed worth testing in the lab through visual observations of sand content) was multiplied by the weighted average Total Frac Sand Product Weight Percentage. Assuming the average *in situ* sand density of 1.58 g/cc as reported by the USDA Custom Soils Report (Attachment 10), the initial extraction areas on the Hogan Ranch yield an estimated 50.8 million tons of Total Frac Sand Resource. The same process was used to estimate resource qualifying as Fines (-140) or Oversized (+40) Sand. Net pay calculations are shown in Attachment 3 and the resource thickness maps used for the tonnage calculations are included in Attachments 4-7. It should be noted that by calculating resource values with an average *in situ* sand density of 1.68 g/cc (i.e. less weathered & denser) instead of 1.58 g/cc could produce up to a 6% increase in resource tonnage depending on the weathered nature of the deposit.

Total Sand Resource Product Break-down			
Category	Product Mesh Sizes	Million Tons	Product Break-down
Oversized	+40	9.3	14.37%
Total Product	40/140	50.8	78.52%
Fines	-140	4.6	7.11%
	<u>Total Sand Resource</u>	<u>64.7</u>	

Resource Product Break-down by Extraction Area "EA" (Million Tons)				
Category	EA-1	EA-2	EA-3	Total
Oversized (+40)	2.8	3.1	3.3	9.3
Total Product (40/140)	19.2	17.	14.6	50.8
Fines (-140)	1.4	1.2	2.0	4.6
<u>Total Sand Resource</u>	<u>23.4</u>	<u>21.3</u>	<u>19.9</u>	<u>64.7</u>

The Lonquist Frac Sand Lab in College Station, Texas performed further frac sand testing in accordance with API Standard No. 19-C (“19C testing”). Intervals from each core hole were selected for crush resistance testing. Generally, the selected intervals varied in depth and clay content. Results from the crush resistance testing on the 100 Mesh (40/140) from each interval are shown below, detailed in the table in Attachment 8, and mapped out in Attachment 9.

100 Mesh (40/140) Crush Resistance Test Results									
Hole No.	1	2	3	4	4	5	6	7	7
Interval (ft)	60-70	60-80	110-140	10-30	60-80	10-30	60-80	0-20	100-110
K-Value (psi)	8K	7K	9K	8K	9K	9K	5K	8K	7K

Full 19C testing was completed on the 100 Mesh from three intervals from three different core holes. Full 19C Testing included a sphericity and roundness assessment and bulk density, turbidity, and acid solubility testing. Detailed results are included in the table in Attachment 8. This testing is summarized below and compared to Black Mountain Sand’s Winter Garden White™ 100 Mesh sand specs as advertised on their website (<https://www.blackmountainsand.com/products/>).

100 Mesh Comparison – RJK Ranch vs. Winter Garden White™						
Sand	Sphericity	Roundness	Bulk Density (g/cc)	Crush K-Value	Turbidity (NTU)	Acid Solubility
RJK Ranch	0.8	0.5	1.4	8K	18.5	2.7%
Winter Garden White™	0.7	0.6	1.4	8K	<250	<3.0%

Note: Variability in sphericity and roundness can be expected due to the subjective nature of the test.

Evaluation of Hogan Ranch Property
Atascosa County, Texas
June 19, 2019
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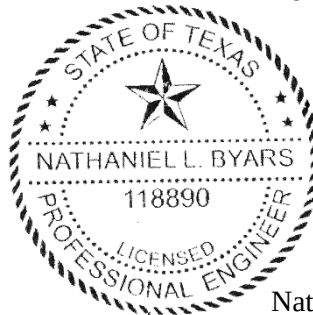
It has been a pleasure to assist RJK Ranch with this analysis. Please call (512 -600-1764) or email (chris@lonquist.com) if you have any questions or need clarification.

Sincerely,



Chris Weyand
Staff Engineer
Lonquist & Co., LLC

Certified By:
Lonquist & Co., LLC
Texas Registration No. F-8952



Date Signed: 6/19/2019

Nathaniel L. Byars, P.E.
Staff Engineer
Texas License No. 118890

ATTACHMENT 1

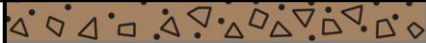
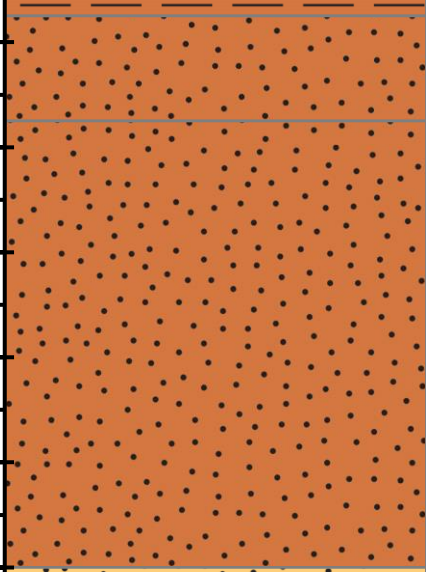
COMBINED STRATIGRAPHIC COLUMNS

Core No. 1	RJK Ranch Holdings	4/16/2019 - 20:30
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.1481064
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.7607608
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 685.7'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Medium grained clay; brown; low clay content; no moisture	Fair: 0 - 1.5'
		Fine grained clay; red; high clay content; no moisture	Poor: 1.5 - 4'
		Coarse grained sand; orange; medium clay content; no moisture	Fair: 4 - 7.5'
		Medium grained clay; orange/white; high clay content; no moisture	Poor: 7.5 - 10'
10		Medium grained clay; orange; high clay content; no moisture	Fair: 10 - 13'
		Medium grained sand; orange; low clay content; no moisture	Good: 13 - 20'
20		Coarse grained sand; dark orange; low clay content; no moisture	Fair: 20 - 22.5'
		Medium grained sand; orange; low clay content; no moisture	Good: 22.5 - 25'
		Coarse grained sand; dark orange; low clay content; no moisture	Fair: 25 - 27.5'
30		Medium to coarse grained sand; dark orange; low clay content; no moisture	Good: 27.5 - 47.5'
40			
50	Fine grained clay; white/red/yellow; high clay content; no moisture	Poor: 47.5 - 57.5'	
60		Medium to coarse grained sand; dark orange; low clay content; some moisture	Good: 57.5 - 65'
		Fine grained clay; tan/red/black; high clay content; no moisture	Poor: 65 - 77.5'
70		Medium grained sand; yellow/orange/black/grey; low clay content; some moisture	Good: 77.5 - 92.5'
80		Fine grained clay; black; high clay content; no moisture	Poor: 92.5 - 102.5'
90		Fine grained clay; black; high clay content; no moisture	Poor: 92.5 - 102.5'
		Medium to coarse grained clay; black; high clay content; no moisture	Fair: 102.5 - 106'
100		Medium grained sand; black; medium clay content; no moisture	Fair: 106 - 112.5'
		Medium grained clay; black; high clay content; no moisture	Fair: 112.5 - 115'
110		Medium grained clay; black; high clay content; no moisture	Fair: 112.5 - 115'
120			
130			

Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 115'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 112.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 2	RJK Ranch Holdings	4/16/2019 - 14:30
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.1542736
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.7614036
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 646.3'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Top soil and medium grained sand; brown; low clay content; no moisture	Good: 0 - 4'
		Fine grained clay; red; high clay content; no moisture	Poor: 4 - 7.5'
10		Medium grained sand; red/orange; medium clay content; no moisture	Fair: 7.5 - 17.5'
20		Medium grained sand; orange/white/red; medium to high clay content; no moisture	Good: 17.5 - 60'
30			
40			
50		Medium grained sand; white/yellow/orange/red; low clay content; no moisture	Good: 60 - 85'
60			
70			
80			
90		Fine grained clay; black; high clay content; some moisture	Fair: 85 - 90'
		Coarse grained sand; black; medium clay content; some moisture	Fair: 90 - 107.5'
100			
110		Medium grained clay; black; high clay content; no moisture	Poor: 107.5 - 117.5'
120			
130			

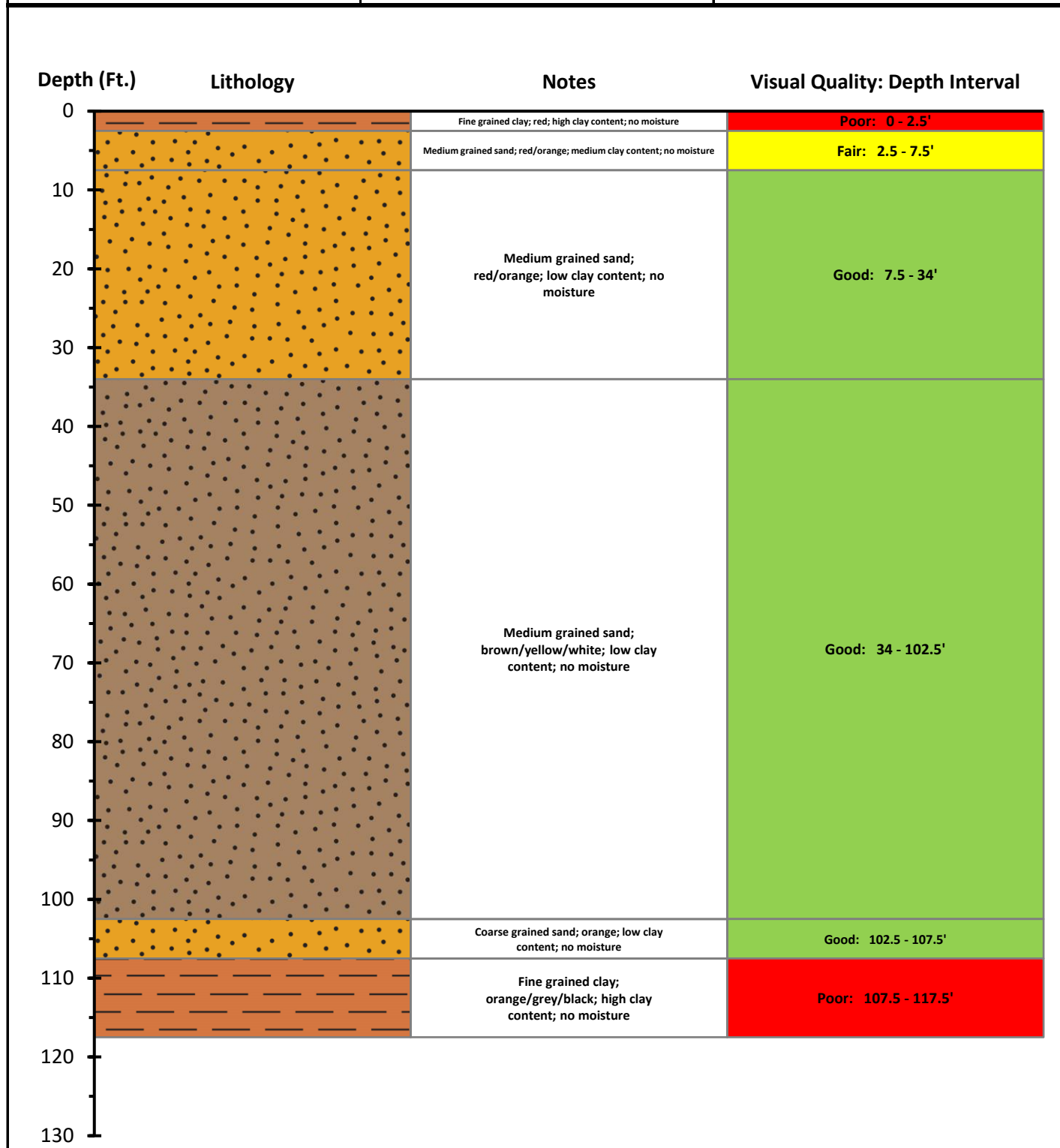
Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 117.5'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 107.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 3	RJK Ranch Holdings	4/16/2019 - 10:15
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.1509488
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.7580223
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 656.2'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Medium grained sand; brown/orange; medium clay content; no moisture	Fair: 0 - 6'
10		Fine grained clay; grey/orange; high clay content; no moisture	Poor: 6 - 17.5'
20		Medium grained sand; tan; medium clay content; no moisture	Fair: 17.5 - 19'
		Fine grained clay; orange/brown; high clay content; no moisture	Poor: 19 - 25'
30		Fine grained clay; orange/grey; high clay content; no moisture	Fair: 25 - 30'
		Fine to medium grained sand; orange/grey; medium clay content; no moisture	Fair: 30 - 34'
40		Fine grained clay; orange/red; medium clay content; no moisture	Fair: 34 - 37.5'
		Medium grained sand; brown/orange; medium clay content; no moisture	Fair: 37.5 - 41'
50		Medium grained sand; yellow/orange; medium clay content; no moisture	Good: 41 - 51'
		Fine grained clay; black; high clay content; no moisture	Poor: 51 - 57.5'
60		Medium grained sand; yellow/grey; low clay content; no moisture	Good: 57.5 - 63'
70		Medium grained sand; yellow/white/red; low clay content; no moisture	Good: 63 - 82.5'
80			
	Fine grained clay; black/grey; high clay content; no moisture	Fair: 82.5 - 87.5'	
90		Medium grained sand; yellow/orange; low clay content; no moisture	Good: 87.5 - 95'
		Medium grained sand; red/black; high clay content; no moisture	Fair: 95 - 97.5'
100		Medium grained sand; grey/orange; low clay content; some moisture (washout from 122-127.5, but deemed "Good")	Good: 97.5 - 157.5'
110			
120		Fine grained clay; black/yellow; high clay content; some moisture	Fair: 157.5 - 165'
130			
140		Medium grained sand; black/yellow; medium clay content; some moisture	Fair: 165 - 177.5'
150			
160		Fine grained sand; black/grey; low clay content; some moisture	Good: 177.5 - 182.5'
170			
180		Fine grained clay; black; high clay content; some moisture	Poor: 182.5 - 190'
190			
200			

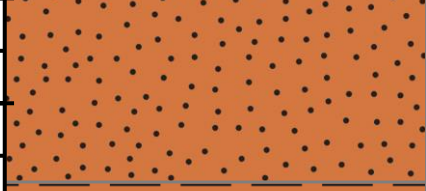
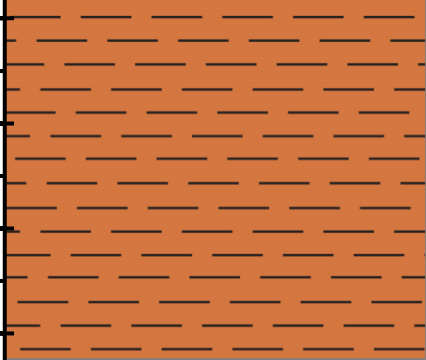
Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 190'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 182.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 4	RJK Ranch Holdings	4/17/2019 - 18:00
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.1482988
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.7528185
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 702.1'



Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 117.5'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 107.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 5	RJK Ranch Holdings	4/14/2019 - 16:15
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.150600
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.751180
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 666.0'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Medium grained sand; brown/red/orange; low clay content; no moisture	Good: 0 - 7.5'
10		Medium to coarse grained sand; red/orange; low clay content; no moisture	Good: 7.5 - 30'
20			
30		Medium grained sand; red/orange/brown; low to medium clay content; no moisture	Good: 30 - 47.5'
40			
50		Fine to medium grained clay; brown/orange/grey; medium to high clay content; no moisture	Fair: 47.5 - 82.5'
60			
70			
80			
82.5		Fine grained clay; black/brown; high clay content; no moisture	Poor: 82.5 - 87.5'
90		Fine grained sand; brown/grey; low to medium clay content; no moisture	Good: 87.5 - 105'
100			
105		Medium grained sand; grey/orange; medium clay content; no moisture	Fair: 105 - 110'
110		Fine grained clay; black; high clay content; no moisture	Poor: 110 - 123'
120			
130			

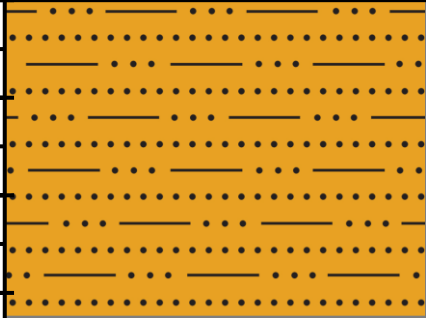
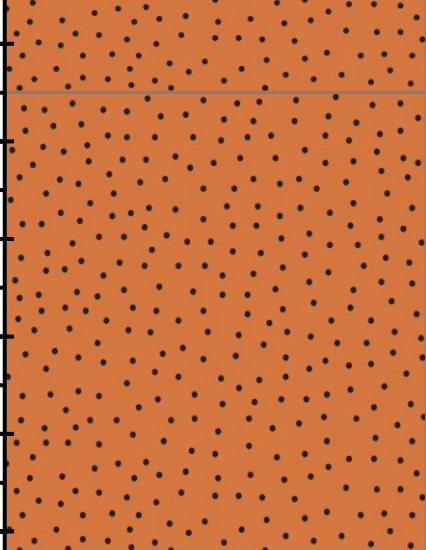
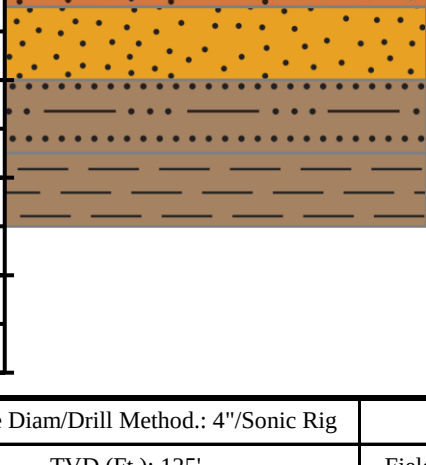
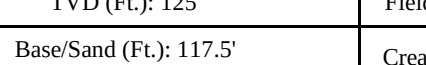
Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 123'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 110'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 6	RJK Ranch Holdings	4/17/2019 - 13:30
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.1505016
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.7638859
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 659.4'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Medium grained sand; brown; low clay content; no moisture	Good: 0 - 2.5'
		Medium grained clay; red; high clay content; no moisture	Fair: 2.5 - 7.5'
10		Medium grained sand; red/brown; medium clay content; no moisture	Fair: 7.5 - 11.5'
		Medium grained clay; red/brown/grey; high clay content; no moisture	Fair: 11.5 - 17.5'
20		Medium grained sand; brown/orange; medium clay content; no moisture	Good: 17.5 - 22.5'
		Medium grained sand; orange/white/grey; low clay content; no moisture	Good: 22.5 - 37.5'
30		Fine grained clay; orange/grey; high clay content; no moisture	Fair: 37.5 - 41.5'
40		Medium grained sand; orange; low clay content; some moisture	Good: 41.5 - 46'
		Fine grained clay; black/grey; high clay content; no moisture	Poor: 46 - 47.5'
50		Medium grained sand; orange/brown; medium clay content; no moisture	Good: 47.5 - 55'
60		Medium grained sand; white/orange/yellow; low clay content; no moisture	Good: 55 - 85'
70		Medium grained sand; dark orange; medium clay content; no moisture	Good: 85 - 96'
80		Fine grained clay; grey/red; high clay content; no moisture	Poor: 96 - 97.5'
90		Medium grained sand; orange/yellow; medium clay content; no moisture	Good: 97.5 - 107.5'
100		Medium grained sand; white/orange; low clay content; some moisture	Good: 107.5 - 150'
110		Fine grained clay; black; high clay content; no moisture	Poor: 150 - 155'
120		Medium grained sand; black/grey; medium clay content; no moisture	Fair: 155 - 157.5'
130		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
140		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
150		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
160		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
170		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
180		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'
		Fine grained clay; black; high clay content; no moisture	Poor: 157.5 - 170'

Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			LONQUIST FRAC SAND SERVICES
TVD (Ft.): 170'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 157.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

Core No. 7	RJK Ranch Holdings	4/14/2019 - 12:00
	RJK Ranch Property	Atascosa Co., TX
out of 7 Cores	Driller/Rig - Company: Boart Longyear	Lat (WGS 84 DD): 29.153772
Total No. of Sample Bags in Core:	Property Owner: Richard Hogan	Long: (WGS 84 DD): -98.746368
Frac Sand Lab Sample No.:	Sec/Township/Range:	Elevation (Ft.): 610.2'

Depth (Ft.)	Lithology	Notes	Visual Quality: Depth Interval
0		Fine to medium grained clay; grey/orange/red/brown; low to high clay content; no moisture	Fair: 0 - 32.5'
10			
20			
30			
32.5			
32.5		Medium grained sand; grey/orange; medium clay content; no moisture	Fair: 32.5 - 37.5'
37.5		Fine grained sand; grey/orange; low clay content; no moisture	Good: 37.5 - 40'
40		Fine grained sand; orange/black; medium clay content; no moisture	Fair: 40 - 45'
45		Fine grained sand; grey/red/orange; low clay content; no moisture	Good: 45 - 55'
50			
60			
70			
80			
55		Fine to medium grained sand; dark grey/orange; low to medium clay content; some moisture	Good: 55 - 102.5'
60			
70			
80			
90			
102.5		Medium grained sand; orange; low clay content; some moisture	Good: 102.5 - 110'
110		Medium grained clay; black; medium clay content; some moisture	Fair: 110 - 117.5'
117.5		Fine grained clay; black; high clay content; some moisture	Poor: 117.5 - 125'
120			
130			
140			

Borehole Diam/Drill Method.: 4"/Sonic Rig	Lead Engineer: Tyler Moehlman			
TVD (Ft.): 125'	Field Geologist/Engineer: Dennis Stanberry			
Base/Sand (Ft.): 117.5'	Created by: SMS	Approved by: ASG	5/13/2019	
Total Ore Resource (Ft.):				

ATTACHMENT 2

SIEVE TESTING SUMMARY TABLE

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-1							
		0-10'		10-30'		30-50'		50-60'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-1 0-10'		HR-1 10-30'		HR-1 30-50'		HR-1 50-60'	
Field Sample Reference Code		2019-04-HR-1 0-10'		2019-04-HR-1 10-30'		2019-04-HR-1 30-50'		2019-04-HR-1 50-60'	
Attrition Scrub Post-Wash Loss	(wt %)	53.04%		18.57%		20.62%		Not Tested - High Clay Content	
Mean Particle Diameter		0.601 mm		0.567 mm		0.308 mm			
Median Particle Diameter		0.391 mm		0.395 mm		0.300 mm			
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES				YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	41.3%	13.1%	44.5%	10.6%	82.2%	9.2%		
% Over-size	(wt %)	45.1%	86.4%	43.9%	88.4%	6.9%	89.0%		
% Fines	(wt %)	13.6%	0.5%	11.6%	0.9%	11.0%	1.8%		
Sieve Test Results		HR-1							
		0-10'		10-30'		30-50'		50-60'	
Post-Wash Loss	(wt %)	53.0		18.6		20.6			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	0.4	0.2	0.0	0.0	0.0	0.0		
	16	11.0	5.2	9.8	7.9	0.0	0.0		
	30	18.5	8.7	14.9	12.1	0.9	0.7		
	40	15.2	7.1	19.3	15.7	6.0	4.7		
	45	10.6	5.0	15.1	12.3	12.0	9.5		
	50	10.2	4.8	13.5	11.0	31.2	24.8		
	60	12.6	5.9	10.0	8.1	30.8	24.5		
	70	7.9	3.7	6.0	4.9	8.2	6.5		
	80	6.1	2.9	4.3	3.5	3.7	2.9		
	100	6.1	2.9	3.4	2.8	2.4	1.9		
	120	0.7	0.4	2.0	1.6	1.8	1.4		
	140	0.1	0.0	1.0	0.8	1.3	1.0		
	170	0.3	0.1	0.5	0.4	0.9	0.7		
	200	0.2	0.1	0.4	0.3	0.8	0.6		
	Pan	0.0	0.0	0.0	0.0	0.1	0.1		
Total		100.0	47.0	100.0	81.4	100.0	79.4		
Normalized Values (Includes Wash Loss %)		HR-1							
		0-10'		10-30'		30-50'		50-60'	
40/70 Cut	(wt %)	19.4		36.3		65.2		0.0	
70/140 Cut	(wt %)	6.1		8.7		7.3		0.0	
Ratio	(40/70:70/140)	3.2		4.2		8.9			
Post-Wash Loss	(wt %)	53.0		18.6		20.6			
Over-size Waste	(wt %)	21.2		35.8		5.4		0.0	
Fines Waste	(wt %)	0.2		0.7		1.4		0.0	
Total Waste	(wt %)	74.5		55.1		27.5			
Total Product	(wt %)	25.5		44.9		72.5		Not Tested - High Clay Content	

LONQUIST FRAC SAND SERVICES		RJK HOGAN RANCH FRAC SAND TESTING							
		Test Results Summary							
		HR-1							
		60-70'		70-80'		80-90'		90-100'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-1 60-70'		HR-1 70-80'		HR-1 80-90'		HR-1 90-100'	
Field Sample Reference Code		2019-04-HR-1 60-70'		2019-04-HR-1 70-80'		2019-04-HR-1 80-90'		2019-04-HR-1 90-100'	
Attrition Scrub Post-Wash Loss	(wt %)	37.27%		Not Tested - High Clay Content		18.25%		Not Tested - High Clay Content	
Mean Particle Diameter		0.268 mm				0.233 mm			
Median Particle Diameter		0.249 mm				0.222 mm			
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*						YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	59.1%	30.5%			55.3%	40.5%		
% Over-size	(wt %)	6.1%	65.1%			1.4%	56.8%		
% Fines	(wt %)	34.9%	4.4%			43.2%	2.7%		
Sieve Test Results		HR-1							
		60-70'		70-80'		80-90'		90-100'	
Post-Wash Loss	(wt %)	37.3				18.3			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	0.1	0.0			0.1	0.0		
	16	0.2	0.1			0.2	0.1		
	30	1.1	0.7			0.3	0.2		
	40	4.7	2.9			0.9	0.7		
	45	8.3	5.2			2.0	1.6		
	50	14.6	9.1			6.9	5.7		
	60	20.7	13.0			21.6	17.7		
	70	15.5	9.7			24.8	20.3		
	80	14.3	9.0			23.4	19.1		
	100	8.7	5.4			10.0	8.1		
	120	4.6	2.9			4.9	4.0		
	140	3.0	1.9			2.3	1.9		
	170	2.1	1.3			1.4	1.1		
	200	1.9	1.2			1.1	0.9		
	Pan	0.4	0.3			0.2	0.2		
	Total		100.0	62.7			100.0	81.7	0.0
Normalized Values (Includes Wash Loss %)		HR-1							
		60-70'		70-80'		80-90'		90-100'	
40/70 Cut	(wt %)	37.1		0.0		45.2		0.0	
70/140 Cut	(wt %)	19.1		0.0		33.1		0.0	
Ratio	(40/70:70/140)	1.9				1.4			
Post-Wash Loss	(wt %)	37.3				18.3			
Over-size Waste	(wt %)	3.8		0.0		1.2		0.0	
Fines Waste	(wt %)	2.8		0.0		2.2		0.0	
Total Waste	(wt %)	43.8		0.0		21.7		0.0	
Total Product	(wt %)	56.2		Not Tested - High Clay Content		78.3		Not Tested - High Clay Content	

LONQUIST FRAC SAND SERVICES		Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
				HR-1		HR-2					
				100-115'		0-20'		20-40'		40-60'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019			
Field Sample Name		HR-1 100-115'		HR-2 0-20'		HR-2 20-40'		HR-2 40-60'			
Field Sample Reference Code		2019-04-HR-1 100-115'		2019-04-HR-2 0-20'		2019-04-HR-2 20-40'		2019-04-HR-2 40-60'			
Attrition Scrub Post-Wash Loss	(wt %)	61.57%		32.92%		32.38%		31.75%			
Mean Particle Diameter		0.235 mm		0.228 mm		0.234 mm		0.238 mm			
Median Particle Diameter		0.148 mm		0.167 mm		0.166 mm		0.204 mm			
Silica Content	(wt %) SiO ₂										
Computerized Particle Analysis*						YES					
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)											
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140		
% In-size	(wt %)	12.6%	62.1%	17.1%	67.1%	26.8%	49.3%	39.6%	49.3%		
% Over-size	(wt %)	10.0%	22.6%	8.6%	25.8%	9.4%	36.3%	5.6%	45.2%		
% Fines	(wt %)	77.4%	15.2%	74.2%	7.1%	63.7%	14.5%	54.8%	5.5%		
Sieve Test Results		HR-1		HR-2							
		100-115'		0-20'		20-40'		40-60'			
		61.6		32.9		32.4		31.7			
Post-Wash Loss	(wt %)										
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)		
	8	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1		
	16	1.8	0.7	0.6	0.4	0.5	0.4	0.2	0.1		
	30	5.5	2.1	3.8	2.5	3.7	2.5	1.6	1.1		
	40	2.7	1.0	4.2	2.8	5.2	3.5	3.6	2.4		
	45	1.4	0.5	2.9	1.9	4.1	2.8	3.5	2.4		
	50	2.4	0.9	4.0	2.7	5.5	3.7	6.0	4.1		
	60	4.0	1.5	4.7	3.2	8.4	5.7	13.2	9.0		
	70	4.9	1.9	5.5	3.7	8.8	6.0	16.9	11.5		
	80	8.9	3.4	12.6	8.5	7.8	5.2	19.9	13.6		
	100	16.9	6.5	27.4	18.4	13.4	9.1	15.6	10.7		
	120	22.5	8.7	19.5	13.1	15.6	10.5	9.3	6.3		
	140	13.8	5.3	7.6	5.1	12.6	8.5	4.5	3.1		
	170	6.8	2.6	3.6	2.4	7.4	5.0	2.6	1.8		
	200	6.8	2.6	2.8	1.9	6.1	4.1	2.3	1.6		
	Pan	1.7	0.6	0.6	0.4	1.0	0.7	0.6	0.4		
	Total		100.0	38.4	100.0	67.1	100.0	67.6	100.0	68.3	
Normalized Values (Includes Wash Loss %)		HR-1		HR-2							
		100-115'		0-20'		20-40'		40-60'			
40/70 Cut	(wt %)	4.9		11.5		18.1		27.0			
70/140 Cut	(wt %)	23.9		45.0		33.3		33.7			
Ratio	(40/70:70/140)	0.2		0.3		0.5		0.8			
Post-Wash Loss	(wt %)	61.6		32.9		32.4		31.7			
Over-size Waste	(wt %)	3.8		5.8		6.4		3.8			
Fines Waste	(wt %)	5.9		4.8		9.8		3.8			
Total Waste	(wt %)	71.3		43.5		48.5		39.3			
Total Product	(wt %)	28.7		56.5		51.5		60.7			

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-2							
		60-80'		80-90'		90-100'		100-117.5'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-2 60-80'		HR-2 80-90'		HR-2 90-100'		HR-2 110-117.5'	
Field Sample Reference Code		2019-04-HR-2 60-80'		2019-04-HR-2 80-90'		2019-04-HR-2 90-100'		2019-04-HR-2 110-117.5'	
Attrition Scrub Post-Wash Loss	(wt %)	15.86%		38.41%		34.59%		Not Tested - High Clay Content	
Mean Particle Diameter		0.691 mm		0.214 mm		0.176 mm			
Median Particle Diameter		0.388 mm		0.187 mm		0.152 mm			
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES							
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	38.4%	14.5%	31.2%	50.9%	15.1%	73.9%		
% Over-size	(wt %)	46.5%	85.0%	5.2%	36.4%	1.8%	16.9%		
% Fines	(wt %)	15.0%	0.6%	63.6%	12.7%	83.1%	9.2%		
Sieve Test Results		HR-2							
		60-80'		80-90'		90-100'		100-117.5'	
Post-Wash Loss	(wt %)	15.9		38.4		34.6			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	8.1	6.8	0.0	0.0	0.1	0.0		
	16	3.1	2.6	0.2	0.1	0.3	0.2		
	30	22.0	18.5	1.5	0.9	0.7	0.5		
	40	13.3	11.2	3.4	2.1	0.8	0.5		
	45	7.1	6.0	3.3	2.0	0.6	0.4		
	50	7.6	6.4	4.6	2.8	1.2	0.8		
	60	13.1	11.0	9.5	5.8	4.1	2.7		
	70	10.6	8.9	13.9	8.6	9.2	6.0		
	80	8.7	7.4	17.4	10.7	14.0	9.2		
	100	5.7	4.8	13.7	8.4	20.1	13.1		
	120	0.0	0.0	11.0	6.8	26.0	17.0		
	140	0.0	0.0	8.8	5.4	13.8	9.0		
	170	0.3	0.3	6.7	4.2	5.1	3.3		
	200	0.3	0.2	5.0	3.1	3.6	2.4		
	Pan	0.0	0.0	0.9	0.6	0.5	0.3		
	Total		100.0	84.1	100.0	61.6	100.0	65.4	0.0
Normalized Values (Includes Wash Loss %)		HR-2							
		60-80'		80-90'		90-100'		100-117.5'	
40/70 Cut	(wt %)	32.3		19.2		9.9		0.0	
70/140 Cut	(wt %)	12.2		31.4		48.3		0.0	
Ratio	(40/70:70/140)	2.7		0.6		0.2			
Post-Wash Loss	(wt %)	15.9		38.4		34.6			
Over-size Waste	(wt %)	39.2		3.2		1.2		0.0	
Fines Waste	(wt %)	0.5		7.8		6.0		0.0	
Total Waste	(wt %)	55.5		49.4		41.8		0.0	
Total Product	(wt %)	44.5		50.6		58.2		Not Tested - High Clay Content	

LONQUIST FRAC SAND SERVICES		RJK HOGAN RANCH FRAC SAND TESTING							
		Test Results Summary							
		HR-3							
		0-30'	30-50'		50-60'		60-80'		
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-3 0-30'		HR-3 30-50'		HR-3 50-60'		HR-3 60-80'	
Field Sample Reference Code		2019-04-HR-3 0-30'		2019-04-HR-3 30-50'		2019-04-HR-3 50-60'		2019-04-HR-3 60-80'	
Attrition Scrub Post-Wash Loss	(wt %)	Not Tested - High Clay Content		55.11%		Not Tested - High Clay Content		28.09%	
Mean Particle Diameter				0.221 mm				0.233 mm	
Median Particle Diameter				0.148 mm				0.204 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*								YES	
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)			16.0%	56.5%			40.9%	49.8%
% Over-size	(wt %)			7.3%	23.2%			4.4%	45.2%
% Fines	(wt %)			76.8%	20.3%			54.8%	5.0%
Sieve Test Results		HR-3							
		0-30'		30-50'		50-60'		60-80'	
Post-Wash Loss	(wt %)			55.1				28.1	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8			0.2	0.1			0.1	0.0
	16			1.7	0.7			0.5	0.4
	30			3.3	1.5			0.8	0.6
	40			2.2	1.0			3.0	2.1
	45			1.5	0.7			3.7	2.7
	50			3.0	1.3			6.8	4.9
	60			5.2	2.3			14.1	10.2
	70			6.3	2.8			16.2	11.6
	80			10.1	4.5			19.2	13.8
	100			15.5	7.0			13.8	9.9
	120			18.2	8.2			11.2	8.1
	140			12.7	5.7			5.6	4.0
	170			8.3	3.7			2.6	1.9
	200			9.3	4.2			2.1	1.5
	Pan			2.7	1.2			0.3	0.2
	Total		0.0		100.0	44.9	0.0		100.0
Normalized Values (Includes Wash Loss %)		HR-3							
		0-30'		30-50'		50-60'		60-80'	
40/70 Cut	(wt %)	0.0		7.2		0.0		29.4	
70/140 Cut	(wt %)	0.0		25.3		0.0		35.8	
Ratio	(40/70:70/140)			0.3				0.8	
Post-Wash Loss	(wt %)			55.1				28.1	
Over-size Waste	(wt %)	0.0		3.3		0.0		3.1	
Fines Waste	(wt %)	0.0		9.1		0.0		3.6	
Total Waste	(wt %)	0.0		67.5		0.0		34.8	
Total Product	(wt %)	Not Tested - High Clay Content		32.5		Not Tested - High Clay Content		65.2	

LONQUIST FRAC SAND SERVICES		Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
				HR-3							
				80-90'		90-110'		110-140'		140-160'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019			
Field Sample Name		HR-3 70-80'		HR-3 90-110'		HR-3 110-140'		HR-3 140-160'			
Field Sample Reference Code		2019-04-HR-3 70-80'		2019-04-HR-3 90-110'		2019-04-HR-3 110-140'		2019-04-HR-3 140-160'			
Attrition Scrub Post-Wash Loss	(wt %)	Not Tested - High Clay Content		34.85%		24.16%		26.29%			
Mean Particle Diameter				0.240 mm		0.352 mm		0.224 mm			
Median Particle Diameter				0.200 mm		0.287 mm		0.212 mm			
Silica Content	(wt %) SiO ₂										
Computerized Particle Analysis*						YES					
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)											
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140		
% In-size	(wt %)			37.3%	50.7%	55.7%	21.5%	48.5%	44.9%		
% Over-size	(wt %)			5.0%	42.3%	21.7%	77.5%	1.4%	49.9%		
% Fines	(wt %)			57.7%	7.0%	22.5%	1.1%	50.1%	5.2%		
Sieve Test Results		HR-3									
		80-90'		90-110'		110-140'		140-160'			
Post-Wash Loss	(wt %)			34.9		24.2		26.3			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)		
	8			0.7	0.4	0.1	0.0	0.1	0.1		
	16			0.1	0.1	0.2	0.2	0.2	0.1		
	30			1.3	0.8	8.2	6.2	0.5	0.3		
	40			3.0	1.9	13.3	10.1	0.6	0.4		
	45			2.9	1.9	10.8	8.2	1.3	0.9		
	50			5.3	3.5	12.9	9.8	6.4	4.7		
	60			12.3	8.0	18.3	13.9	18.5	13.6		
	70			16.8	10.9	13.7	10.4	22.3	16.5		
	80			21.5	14.0	11.7	8.9	21.2	15.7		
	100			15.9	10.3	7.2	5.5	12.1	8.9		
	120			8.7	5.7	1.8	1.3	7.2	5.3		
	140			4.6	3.0	0.7	0.5	4.5	3.3		
	170			3.2	2.1	0.6	0.4	2.6	1.9		
	200			3.1	2.0	0.5	0.3	2.2	1.6		
	Pan			0.7	0.4	0.0	0.0	0.4	0.3		
	Total		0.0		100.0	65.1	100.0	75.8	100.0	73.7	
Normalized Values (Includes Wash Loss %)		HR-3									
		80-90'		90-110'		110-140'		140-160'			
40/70 Cut	(wt %)	0.0		24.3		42.3		35.8			
70/140 Cut	(wt %)	0.0		33.0		16.3		33.1			
Ratio	(40/70:70/140)			0.7		2.6		1.1			
Post-Wash Loss	(wt %)			34.9		24.2		26.3			
Over-size Waste	(wt %)	0.0		3.3		16.5		1.0			
Fines Waste	(wt %)	0.0		4.5		0.8		3.8			
Total Waste	(wt %)	0.0		42.7		41.5		31.1			
Total Product	(wt %)	Not Tested - High Clay Content		57.3		58.5		68.9			

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-3				HR-4			
		160-180'		180-190'		0-10'		10-30'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-3 160-180'		HR-3 180-190'		HR-4 0-10'		HR-4 10-30'	
Field Sample Reference Code		2019-04-HR-3 160-180'		2019-04-HR-3 180-190'		2019-04-HR-4 0-10'		2019-04-HR-4 10-30'	
Attrition Scrub Post-Wash Loss	(wt %)	41.66%		Not Tested - High Clay Content		32.98%		19.07%	
Mean Particle Diameter		0.351 mm				0.326 mm		0.319 mm	
Median Particle Diameter		0.277 mm				0.279 mm		0.293 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES				YES		YES	
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	78.5%	14.7%			51.3%	27.1%	66.5%	18.3%
% Over-size	(wt %)	6.4%	84.9%			18.1%	69.3%	12.7%	79.2%
% Fines	(wt %)	15.2%	0.5%			30.7%	3.6%	20.8%	2.4%
Sieve Test Results		HR-3				HR-4			
		160-180'		180-190'		0-10'		10-30'	
Post-Wash Loss	(wt %)	41.7				33.0		19.1	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	1.9	1.1			0.1	0.0	0.1	0.0
	16	1.1	0.7			0.5	0.3	0.3	0.3
	30	0.5	0.3			5.2	3.5	2.4	2.0
	40	2.8	1.7			12.3	8.2	9.9	8.0
	45	9.8	5.7			13.1	8.8	15.2	12.3
	50	20.2	11.8			13.2	8.8	19.3	15.6
	60	30.6	17.8			14.2	9.5	20.0	16.2
	70	18.0	10.5			10.8	7.2	12.0	9.7
	80	10.1	5.9			9.9	6.7	7.7	6.2
	100	4.6	2.7			8.8	5.9	6.6	5.3
	120	0.0	0.0			5.3	3.5	2.4	1.9
	140	0.0	0.0			3.1	2.1	1.7	1.4
	170	0.2	0.1			1.8	1.2	1.2	1.0
	200	0.2	0.1			1.6	1.1	1.0	0.8
	Pan	0.0	0.0			0.2	0.1	0.2	0.2
Total		100.0	58.3	0.0		100.0	67.0	100.0	80.9
Normalized Values (Includes Wash Loss %)		HR-3				HR-4			
		160-180'		180-190'		0-10'		10-30'	
40/70 Cut	(wt %)	45.8		0.0		34.3		53.8	
70/140 Cut	(wt %)	8.6		0.0		18.2		14.8	
Ratio	(40/70:70/140)	5.3				1.9		3.6	
Post-Wash Loss	(wt %)	41.7				33.0		19.1	
Over-size Waste	(wt %)	3.7		0.0		12.1		10.3	
Fines Waste	(wt %)	0.3		0.0		2.4		2.0	
Total Waste	(wt %)	45.6		0.0		47.5		31.3	
Total Product	(wt %)	54.4		Not Tested - High Clay Content		52.5		68.7	

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-4							
		30-40'		40-60'		60-80'		80-100'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-4 30-40'		HR-4 40-60'		HR-4 60-80'		HR-4 80-100'	
Field Sample Reference Code		2019-04-HR-4 30-40'		2019-04-HR-4 40-60'		2019-04-HR-4 60-80'		2019-04-HR-4 80-100'	
Attrition Scrub Post-Wash Loss	(wt %)	Not Tested - High Clay Content		27.42%		15.34%		10.70%	
Mean Particle Diameter				0.191 mm		0.505 mm		0.599 mm	
Median Particle Diameter				0.186 mm		0.299 mm		0.501 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*						YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)			31.6%	61.5%	48.8%	17.2%	28.5%	5.2%
% Over-size	(wt %)			0.0%	31.7%	33.2%	82.1%	64.9%	93.4%
% Fines	(wt %)			68.3%	6.9%	18.0%	0.8%	6.6%	1.4%
Sieve Test Results		HR-4							
		30-40'		40-60'		60-80'		80-100'	
Post-Wash Loss	(wt %)			27.4		15.3		10.7	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8			0.0	0.0	2.3	1.9	0.0	0.0
	16			0.0	0.0	3.4	2.8	3.3	2.9
	30			0.0	0.0	17.5	14.8	30.8	27.5
	40			0.0	0.0	10.1	8.6	30.9	27.6
	45			1.2	0.9	6.4	5.4	15.5	13.8
	50			3.9	2.9	10.2	8.6	7.8	6.9
	60			10.0	7.2	18.9	16.0	3.4	3.1
	70			16.6	12.0	13.4	11.3	1.8	1.6
	80			22.9	16.6	9.8	8.3	1.4	1.3
	100			20.0	14.5	6.3	5.3	1.4	1.3
	120			12.8	9.3	0.8	0.7	1.3	1.2
	140			5.8	4.2	0.3	0.2	1.0	0.9
	170			3.1	2.3	0.4	0.3	0.6	0.6
	200			2.8	2.0	0.3	0.3	0.8	0.7
	Pan			0.9	0.7	0.0	0.0	0.0	0.0
	Total		0.0		100.0	72.6	100.0	84.7	100.0
Normalized Values (Includes Wash Loss %)		HR-4							
		30-40'		40-60'		60-80'		80-100'	
40/70 Cut	(wt %)	0.0		23.0		41.3		25.4	
70/140 Cut	(wt %)	0.0		44.6		14.6		4.6	
Ratio	(40/70:70/140)			0.5		2.8		5.5	
Post-Wash Loss	(wt %)			27.4		15.3		10.7	
Over-size Waste	(wt %)	0.0		0.0		28.1		58.0	
Fines Waste	(wt %)	0.0		5.0		0.6		1.3	
Total Waste	(wt %)	0.0		32.4		44.1		70.0	
Total Product	(wt %)	Not Tested - High Clay Content		67.6		55.9		30.0	

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-4				HR-5			
		100-110'		110-117.5'		0-10'		10-30'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-4 100-110'		HR-4 110-117.5'		HR-5 0-10'		HR-5 10-30'	
Field Sample Reference Code		2019-04-HR-4 100-110'		2019-04-HR-4 110-117.5'		2019-04-HR-5 0-10'		2019-04-HR-5 10-30'	
Attrition Scrub Post-Wash Loss	(wt %)	29.56%		Not Tested - High Clay Content		11.36%		14.69%	
Mean Particle Diameter		0.803 mm				0.399 mm		0.511 mm	
Median Particle Diameter		0.674 mm				0.301 mm		0.377 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES				YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	17.4%	1.0%			68.6%	13.5%	56.3%	5.0%
% Over-size	(wt %)	81.3%	98.7%			16.3%	84.9%	37.6%	94.0%
% Fines	(wt %)	1.3%	0.3%			15.1%	1.7%	6.0%	1.0%
Sieve Test Results		HR-4				HR-5			
		100-110'		110-117.5'		0-10'		10-30'	
Post-Wash Loss	(wt %)	29.6				11.4		14.7	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	0.1	0.0			2.3	2.0	0.3	0.2
	16	11.7	8.2			1.0	0.9	5.0	4.3
	30	46.3	32.6			3.9	3.5	14.7	12.5
	40	23.3	16.4			9.1	8.1	17.7	15.1
	45	9.3	6.6			13.6	12.0	18.8	16.0
	50	4.4	3.1			20.6	18.2	16.9	14.4
	60	3.6	2.5			23.1	20.5	16.3	13.9
	70	0.0	0.0			11.3	10.0	4.4	3.7
	80	0.0	0.0			5.6	4.9	2.1	1.8
	100	1.0	0.7			5.8	5.1	1.3	1.1
	120	0.0	0.0			1.2	1.1	1.0	0.8
	140	0.0	0.0			1.0	0.8	0.6	0.5
	170	0.2	0.1			0.8	0.7	0.5	0.5
	200	0.2	0.1			0.7	0.6	0.5	0.4
	Pan	0.0	0.0			0.1	0.1	0.0	0.0
	Total		100.0	70.4	0.0		100.0	88.6	100.0
Normalized Values (Includes Wash Loss %)		HR-4				HR-5			
		100-110'		110-117.5'		0-10'		10-30'	
40/70 Cut	(wt %)	12.2		0.0		60.8		48.1	
70/140 Cut	(wt %)	0.7		0.0		11.9		4.3	
Ratio	(40/70:70/140)	17.7				5.1		11.3	
Post-Wash Loss	(wt %)	29.6				11.4		14.7	
Over-size Waste	(wt %)	57.3		0.0		14.5		32.1	
Fines Waste	(wt %)	0.2		0.0		1.5		0.9	
Total Waste	(wt %)	87.1		0.0		27.3		47.7	
Total Product	(wt %)	12.9		Not Tested - High Clay Content		72.7		52.3	

LONQUIST FRAC SAND SERVICES		RJK HOGAN RANCH FRAC SAND TESTING							
		Test Results Summary							
		HR-5							
		30-50'		50-60'		60-80'		80-90'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-5 30-50'		HR-5 50-60'		HR-5 60-80'		HR-5 80-90'	
Field Sample Reference Code		2019-04-HR-5 30-50'		2019-04-HR-5 50-60'		2019-04-HR-5 60-80'		2019-04-HR-5 80-90'	
Attrition Scrub Post-Wash Loss	(wt %)	22.91%		Not Tested - High Clay Content		57.58%		Not Tested - High Clay Content	
Mean Particle Diameter		0.383 mm				0.188 mm			
Median Particle Diameter		0.306 mm				0.114 mm			
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES							
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	43.9%	23.0%			15.3%	40.0%		
% Over-size	(wt %)	27.6%	71.5%			5.6%	20.9%		
% Fines	(wt %)	28.5%	5.5%			79.1%	39.1%		
Sieve Test Results		HR-5							
		30-50'		50-60'		60-80'		80-90'	
Post-Wash Loss	(wt %)	22.9				57.6			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	0.1	0.0			0.1	0.0		
	16	1.1	0.8			1.4	0.6		
	30	12.9	10.0			2.6	1.1		
	40	13.5	10.4			1.5	0.6		
	45	11.7	9.0			1.2	0.5		
	50	12.3	9.5			3.8	1.6		
	60	12.3	9.4			6.1	2.6		
	70	7.7	5.9			4.2	1.8		
	80	5.3	4.1			2.6	1.1		
	100	8.1	6.2			2.9	1.2		
	120	5.6	4.3			9.0	3.8		
	140	4.0	3.1			25.6	10.8		
	170	2.7	2.1			18.1	7.7		
	200	2.4	1.8			17.8	7.5		
	Pan	0.5	0.4			3.2	1.3		
	Total		100.0	77.1	0.0		100.0	42.4	0.0
Normalized Values (Includes Wash Loss %)		HR-5							
		30-50'		50-60'		60-80'		80-90'	
40/70 Cut	(wt %)	33.9		0.0		6.5		0.0	
70/140 Cut	(wt %)	17.7		0.0		17.0		0.0	
Ratio	(40/70:70/140)	1.9				0.4			
Post-Wash Loss	(wt %)	22.9				57.6			
Over-size Waste	(wt %)	21.3		0.0		2.4		0.0	
Fines Waste	(wt %)	4.2		0.0		16.6		0.0	
Total Waste	(wt %)	48.4		0.0		76.5			
Total Product	(wt %)	51.6		Not Tested - High Clay Content		23.5		Not Tested - High Clay Content	

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-5				HR-6			
		90-110'		110-123'		0-20'		20-40'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-5 90-110'		HR-5 110-123'		HR-6 0-20'		HR-6 20-40'	
Field Sample Reference Code		2019-04-HR-5 90-110'		2019-04-HR-5 110-123'		2019-04-HR-6 0-20'		2019-04-HR-6 20-40'	
Attrition Scrub Post-Wash Loss	(wt %)	31.65%		Not Tested - High Clay Content		47.10%		21.96%	
Mean Particle Diameter		0.197 mm				0.262 mm		0.246 mm	
Median Particle Diameter		0.180 mm				0.176 mm		0.229 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*		YES							
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	23.1%	68.1%			24.2%	54.7%	53.9%	34.7%
% Over-size	(wt %)	2.3%	25.4%			12.5%	36.7%	5.5%	59.4%
% Fines	(wt %)	74.6%	6.5%			63.3%	8.6%	40.6%	5.9%
Sieve Test Results		HR-5				HR-6			
		90-110'		110-123'		0-20'		20-40'	
Post-Wash Loss	(wt %)	31.6				47.1		22.0	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8	0.1	0.0			0.0	0.0	0.0	0.0
	16	0.2	0.1			1.5	0.8	0.1	0.1
	30	0.8	0.6			4.5	2.4	2.0	1.6
	40	1.2	0.8			6.5	3.5	3.4	2.6
	45	1.2	0.8			4.7	2.5	3.6	2.8
	50	2.4	1.6			5.1	2.7	7.2	5.6
	60	6.7	4.6			6.6	3.5	22.9	17.9
	70	12.8	8.8			7.8	4.1	20.1	15.7
	80	24.9	17.0			11.6	6.1	11.6	9.1
	100	20.3	13.9			13.6	7.2	10.2	8.0
	120	17.0	11.6			18.6	9.8	8.3	6.5
	140	5.9	4.0			10.9	5.8	4.6	3.6
	170	3.1	2.1			4.9	2.6	2.7	2.1
	200	2.8	1.9			3.4	1.8	2.7	2.1
	Pan	0.7	0.5			0.4	0.2	0.5	0.4
Total		100.0	68.4	0.0		100.0	52.9	100.0	78.0
Normalized Values (Includes Wash Loss %)		HR-5				HR-6			
		90-110'		110-123'		0-20'		20-40'	
40/70 Cut	(wt %)	15.8		0.0		12.8		42.0	
70/140 Cut	(wt %)	46.5		0.0		28.9		27.1	
Ratio	(40/70:70/140)	0.3				0.4		1.6	
Post-Wash Loss	(wt %)	31.6				47.1		22.0	
Over-size Waste	(wt %)	1.6		0.0		6.6		4.3	
Fines Waste	(wt %)	4.5		0.0		4.6		4.6	
Total Waste	(wt %)	37.7		0.0		58.3		30.9	
Total Product	(wt %)	62.3		Not Tested - High Clay Content		41.7		69.1	

LONQUIST FRAC SAND SERVICES		Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
				HR-6							
				40-60'		60-80'		80-110'		110-150'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019			
Field Sample Name		HR-6 40-60'		HR-6 60-80'		HR-6 80-110'		HR-6 110-150'			
Field Sample Reference Code		2019-04-HR-6 40-60'		2019-04-HR-6 60-80'		2019-04-HR-6 80-110'		2019-04-HR-6 110-150'			
Attrition Scrub Post-Wash Loss	(wt %)	35.08%		18.37%		22.15%		16.70%			
Mean Particle Diameter		0.176 mm		0.210 mm		0.273 mm		0.268 mm			
Median Particle Diameter		0.177 mm		0.190 mm		0.254 mm		0.237 mm			
Silica Content	(wt %) SiO ₂										
Computerized Particle Analysis*				YES				YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)											
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140		
% In-size	(wt %)	13.0%	81.8%	31.1%	60.9%	56.2%	29.6%	53.6%	35.5%		
% Over-size	(wt %)	0.2%	13.2%	3.3%	34.4%	8.6%	64.7%	7.4%	61.0%		
% Fines	(wt %)	86.8%	5.0%	65.6%	4.7%	35.3%	5.7%	39.0%	3.5%		
Sieve Test Results		HR-6									
		40-60'		60-80'		80-110'		110-150'			
Post-Wash Loss	(wt %)	35.1		18.4		22.1		16.7			
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)		
	8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0		
	16	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.2		
	30	0.1	0.0	0.7	0.5	2.2	1.7	1.9	1.5		
	40	0.1	0.1	2.7	2.2	6.3	4.9	5.2	4.3		
	45	0.1	0.0	2.8	2.3	8.8	6.8	6.8	5.7		
	50	0.2	0.1	4.8	3.9	14.8	11.5	11.6	9.7		
	60	2.1	1.4	8.8	7.1	19.7	15.4	18.8	15.6		
	70	10.7	6.9	14.7	12.0	12.8	10.0	16.5	13.7		
	80	34.6	22.5	23.6	19.3	11.0	8.6	16.7	13.9		
	100	27.4	17.8	19.2	15.7	8.2	6.4	10.3	8.6		
	120	14.2	9.2	12.3	10.1	6.2	4.9	5.7	4.8		
	140	5.7	3.7	5.8	4.7	4.2	3.2	2.9	2.4		
	170	2.7	1.7	2.6	2.1	2.7	2.1	1.7	1.4		
	200	2.0	1.3	1.8	1.4	2.5	1.9	1.5	1.2		
	Pan	0.3	0.2	0.3	0.2	0.5	0.4	0.2	0.2		
Total		100.0	64.9	100.0	81.6	100.0	77.9	100.0	83.3		
Normalized Values (Includes Wash Loss %)		HR-6									
		40-60'		60-80'		80-110'		110-150'			
40/70 Cut	(wt %)	8.5		25.3		43.7		44.7			
70/140 Cut	(wt %)	53.1		49.7		23.0		29.6			
Ratio	(40/70:70/140)	0.2		0.5		1.9		1.5			
Post-Wash Loss	(wt %)	35.1		18.4		22.1		16.7			
Over-size Waste	(wt %)	0.1		2.7		6.7		6.1			
Fines Waste	(wt %)	3.2		3.8		4.4		2.9			
Total Waste	(wt %)	38.4		24.9		33.3		25.7			
Total Product	(wt %)	61.6		75.1		66.7		74.3			

LONQUIST FRAC SAND SERVICES Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
		HR-6		HR-7					
		150-170'		0-20'		20-40'		40-60'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019	
Field Sample Name		HR-5 150-170'		HR-7 0-20'		HR-7 20-40'		HR-7 40-60'	
Field Sample Reference Code		2019-04-HR-5 150-170'		2019-04-HR-7 0-20'		2019-04-HR-7 20-40'		2019-04-HR-7 40-60'	
Attrition Scrub Post-Wash Loss	(wt %)	Not Tested - High Clay Content		48.98%		67.59%		61.59%	
Mean Particle Diameter				0.354 mm		0.293 mm		0.178 mm	
Median Particle Diameter				0.275 mm		0.127 mm		0.141 mm	
Silica Content	(wt %) SiO ₂								
Computerized Particle Analysis*				YES				YES	
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)									
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)			47.5%	27.7%	5.5%	55.2%	19.8%	60.3%
% Over-size	(wt %)			22.0%	69.6%	10.1%	15.6%	3.1%	22.9%
% Fines	(wt %)			30.4%	2.8%	84.4%	29.3%	77.1%	16.8%
Sieve Test Results		HR-6		HR-7					
		150-170'		0-20'		20-40'		40-60'	
Post-Wash Loss	(wt %)			49.0		67.6		61.6	
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)
	8			0.1	0.0	3.0	1.0	0.1	0.0
	16			1.1	0.6	3.4	1.1	0.2	0.1
	30			9.2	4.7	2.7	0.9	0.5	0.2
	40			11.7	5.9	0.9	0.3	2.3	0.9
	45			9.5	4.9	0.5	0.2	2.9	1.1
	50			11.1	5.7	0.8	0.3	3.9	1.5
	60			15.3	7.8	1.5	0.5	5.6	2.1
	70			11.6	5.9	2.7	0.9	7.5	2.9
	80			10.3	5.3	5.2	1.7	4.5	1.7
	100			8.9	4.5	10.3	3.3	14.6	5.6
	120			5.5	2.8	20.9	6.8	22.1	8.5
	140			3.0	1.5	18.8	6.1	19.1	7.3
	170			1.5	0.8	13.6	4.4	9.1	3.5
	200			1.1	0.6	12.5	4.0	6.9	2.7
	Pan			0.1	0.1	3.2	1.0	0.8	0.3
Total		0.0		100.0	51.0	100.0	32.4	100.0	38.4
Normalized Values (Includes Wash Loss %)		HR-6		HR-7					
		150-170'		0-20'		20-40'		40-60'	
40/70 Cut	(wt %)	0.0		24.3		1.8		7.6	
70/140 Cut	(wt %)	0.0		14.1		17.9		23.1	
Ratio	(40/70:70/140)			1.7		0.1		0.3	
Post-Wash Loss	(wt %)			49.0		67.6		61.6	
Over-size Waste	(wt %)	0.0		11.2		3.3		1.2	
Fines Waste	(wt %)	0.0		1.4		9.5		6.5	
Total Waste	(wt %)	0.0		61.6		80.3		69.2	
Total Product	(wt %)	Not Tested - High Clay Content		38.4		19.7		30.8	

LONQUIST FRAC SAND SERVICES		Test Results Summary		RJK HOGAN RANCH FRAC SAND TESTING							
				HR-7							
				60-80'		80-100'		100-110'		110-120'	
Sample Collection Date		4/19/2019		4/19/2019		4/19/2019		4/19/2019			
Field Sample Name		HR-7 60-80'		HR-7 80-100'		HR-7 100-110'		HR-7 110-120'			
Field Sample Reference Code		2019-04-HR-7 60-80'		2019-04-HR-7 80-100'		2019-04-HR-7 100-110'		2019-04-HR-7 110-120'			
Attrition Scrub Post-Wash Loss	(wt %)	39.12%		32.20%		30.39%		60.62%			
Mean Particle Diameter		0.150 mm		0.252 mm		0.240 mm		0.177 mm			
Median Particle Diameter		0.129 mm		0.190 mm		0.218 mm		0.124 mm			
Silica Content	(wt %) SiO ₂										
Computerized Particle Analysis*				YES				YES			
* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)											
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140		
% In-size	(wt %)	1.2%	74.7%	31.1%	52.6%	50.4%	42.6%	13.9%	49.8%		
% Over-size	(wt %)	1.4%	2.7%	10.4%	41.5%	2.8%	53.2%	5.0%	18.9%		
% Fines	(wt %)	97.3%	22.6%	58.5%	5.9%	46.8%	4.2%	81.1%	31.3%		
Sieve Test Results		HR-7									
		60-80'		80-100'		100-110'		110-120'			
		39.1		32.2		30.4		60.6			
Post-Wash Loss	(wt %)										
Weight % Retained	Sieve No.	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)	Sieve Results (Excludes Wash loss %)	Normalized (Includes Wash loss %)		
	8	0.3	0.2	0.1	0.0	0.2	0.2	0.1	0.0		
	16	0.5	0.3	0.4	0.3	0.2	0.2	0.8	0.3		
	30	0.5	0.3	3.6	2.4	0.5	0.4	1.9	0.8		
	40	0.2	0.1	6.4	4.3	1.8	1.2	2.2	0.9		
	45	0.1	0.1	5.3	3.6	3.5	2.4	1.8	0.7		
	50	0.1	0.1	7.0	4.8	8.0	5.5	2.2	0.9		
	60	0.2	0.1	9.5	6.4	18.5	12.8	3.6	1.4		
	70	0.8	0.5	9.3	6.3	20.5	14.3	6.3	2.5		
	80	4.0	2.4	12.8	8.7	20.1	14.0	1.0	0.4		
	100	14.7	8.9	15.7	10.6	13.1	9.1	12.1	4.8		
	120	34.7	21.1	16.2	11.0	6.3	4.4	16.8	6.6		
	140	21.3	12.9	7.9	5.4	3.1	2.1	20.0	7.9		
	170	12.4	7.6	3.1	2.1	2.0	1.4	15.2	6.0		
	200	8.6	5.2	2.5	1.7	1.9	1.3	12.4	4.9		
	Pan	1.6	1.0	0.3	0.2	0.3	0.2	3.7	1.4		
Total		100.0	60.9	100.0	67.8	100.0	69.6	100.0	39.4		
Normalized Values (Includes Wash Loss %)		HR-7									
		60-80'		80-100'		100-110'		110-120'			
40/70 Cut	(wt %)	0.8		21.1		35.1		5.5			
70/140 Cut	(wt %)	45.5		35.6		29.7		19.6			
Ratio	(40/70:70/140)	0.0		0.6		1.2		0.3			
Post-Wash Loss	(wt %)	39.1		32.2		30.4		60.6			
Over-size Waste	(wt %)	0.9		7.1		1.9		2.0			
Fines Waste	(wt %)	13.8		4.0		2.9		12.3			
Total Waste	(wt %)	53.8		43.3		35.3		74.9			
Total Product	(wt %)	46.2		56.7		64.7		25.1			

ATTACHMENT 3
NET PAY CALCULATIONS

Net Pay Calculation - RJK Ranch Holdings LLC

Total Frac Sand Product (40/140)			HR-1			HR-2			HR-3			HR-4			HR-5			HR-6			HR-7														
Weighted Avg (wt %)			51.53627509			53.50748			56.32261			50.97858			50.23136			66.16236			39.44343														
Gross Pay (ft)			85			100			130			100			90			150			120														
Net Pay (ft)			43.80583383			53.50748			73.21939			50.97858			45.20822			99.24354			47.33212														
	Interval	Thickness	% Product (wt %)																																
	0-10'	10	25.54032021			0-20'	20	56.53523			30-50'	20	32.51211			0-10'	10	52.51355			0-10'	10	72.71223			0-20'	20	41.7351			0-20'	20	38.35834		
	10-30'	20	44.92576843			20-40'	20	51.45277			60-80'	20	65.1786			10-30'	20	68.65284			10-30'	20	52.32126			20-40'	20	69.13426			20-40'	20	19.65066		
	30-50'	20	72.53747317			40-60'	20	60.6746			90-110'	20	57.34668			40-60'	20	67.58611			30-50'	20	51.58885			40-60'	20	61.58502			40-60'	20	30.76707		
	60-70'	10	56.16323506			60-80'	20	44.4945			110-140'	30	58.54185			60-80'	20	55.89068			60-80'	20	23.45239			60-80'	20	75.07319			60-80'	20	46.23807		
	80-90'	10	78.32349676			80-90'	10	50.57689			140-160'	20	68.87536			80-100'	20	30.04741			90-110'	20	62.3225			80-110'	30	66.74983			80-100'	20	56.72424		
	100-115'	15	28.73653536			90-100'	10	58.18368			160-180'	20	54.37145			100-110'	10	12.91823								110-150'	40	74.28269			100-110'	10	64.74218		
																										110-120'	10	25.10222			110-120'	10			

Oversized (+40)		HR-1			HR-2			HR-3			HR-4			HR-5			HR-6			HR-7																							
Weighted Avg (wt %)		13.44896294			11.46688			6.018304			26.22333			14.34477			4.805357			4.262041																							
Gross Pay (ft)																							85			100			130			100			90			150			120		
Net Pay (ft)																																											
Interval	Thickness	% +40 Cut (wt %)																																									
0-10'	10	21.17794524	0-20'	20	5.788177	30-50'	20	3.258055	0-10'	10	12.09635	0-10'	10	14.45735	0-20'	20	6.604545	0-20'	20	11.24525																							
10-30'	20	35.75879038	20-40'	20	6.390179	60-80'	20	3.128055	10-30'	20	10.31047	10-30'	20	32.11669	20-40'	20	4.303554	20-40'	20	3.274034																							
30-50'	20	5.443625016	40-60'	20	3.805696	90-110'	20	3.258259	40-60'	20	0.007483	30-50'	20	21.2538	40-60'	20	1.028003	40-60'	20	1.179065																							
60-70'	10	3.805046761	60-80'	20	39.15987	110-140'	30	16.48789	60-80'	20	28.13158	60-80'	20	2.393891	60-80'	20	2.733342	60-80'	20	0.871669																							
80-90'	10	1.177182291	80-90'	30	3.197045	140-160'	20	1.038288	80-100'	20	57.97905	90-110'	20	1.558404	80-110'	30	6.689916	80-100'	20	7.05748																							
100-115'	15	3.834119947	90-100'	10	1.183951	160-180'	20	3.704492	100-110'	10	57.27974				110-150'	40	6.130529	100-110'	10	1.932205																							
																		110-120'	10	1.957295																							

Fines (-140)	HR-1			HR-2			HR-3			HR-4			HR-5			HR-6			HR-7		
Weighted Avg (wt %)			2.154443249			5.14462			3.467392			2.035825			5.979137			3.813844			7.130654
Gross Pay (ft)			85			100			130			100			90			150			120
Net Pay (ft)			1.831276761			5.14462			4.50761			2.035825			5.381223			5.720766			8.556785
	Interval	Thickness	% Fines Cut (wt %)																		
	0-10'	10	0.239484525	0-20'	20	4.754346	30-50'	20	9.117079	0-10'	10	2.405866	0-10'	10	1.471441	0-20'	20	4.561954	0-20'	20	1.418411
	10-30'	20	0.740765902	20-40'	20	9.777987	60-80'	20	3.602656	10-30'	20	1.966597	10-30'	20	0.876151	20-40'	20	4.604724	20-40'	20	9.486636
	30-50'	20	1.396001258	40-60'	20	3.772888	90-110'	20	4.540414	40-60'	20	4.983652	30-50'	20	4.247677	40-60'	20	4.235269	40-60'	20	6.459894
	60-70'	10	2.762228073	60-80'	20	0.488026	110-140'	30	0.811501	60-80'	20	0.634929	60-80'	20	16.57641	60-80'	20	3.818869	60-80'	20	13.77501
	80-90'	10	2.248091181	80-90'	10	7.815665	140-160'	20	3.798126	80-100'	20	1.271271	90-110'	20	4.47016	80-110'	30	4.412656	80-100'	20	4.013475
	100-115'	15	5.859619677	90-100'	10	6.044039	160-180'	20	0.262523	100-110'	10	0.239487				110-150'	40	2.882015	100-110'	10	2.938283
																			110-120'	10	12.32271

ATTACHMENT 4
TOTAL FRAC SAND (40/140) RESOURCE
THICKNESS MAP



RJK Ranch Holdings, Atascosa County, TX

HOGAN RANCH

Total Product 40/140

Net Pay (Feet)

POSTED WELL DATA
Core Hole
● Total Product 40/140 Net Pay (FT)
Total Depth

CONTOURS
Total Product 40/140 Weighted Average
Total Product 40/140 Weighted Average.GRD
Contour Interval = 5

REMARKS
EA1 Volume = 19,175,678.42 TONS
Average Thickness = 59.71 feet

EA2 Volume = 17,046,922.02 TONS
Average Thickness = 52.77 feet

EA3 Volume = 14,569,067.93 TONS
Average Thickness = 45.13 feet

Carrizo Updip Edge (zero Sand)
from Geologic Map of Texas

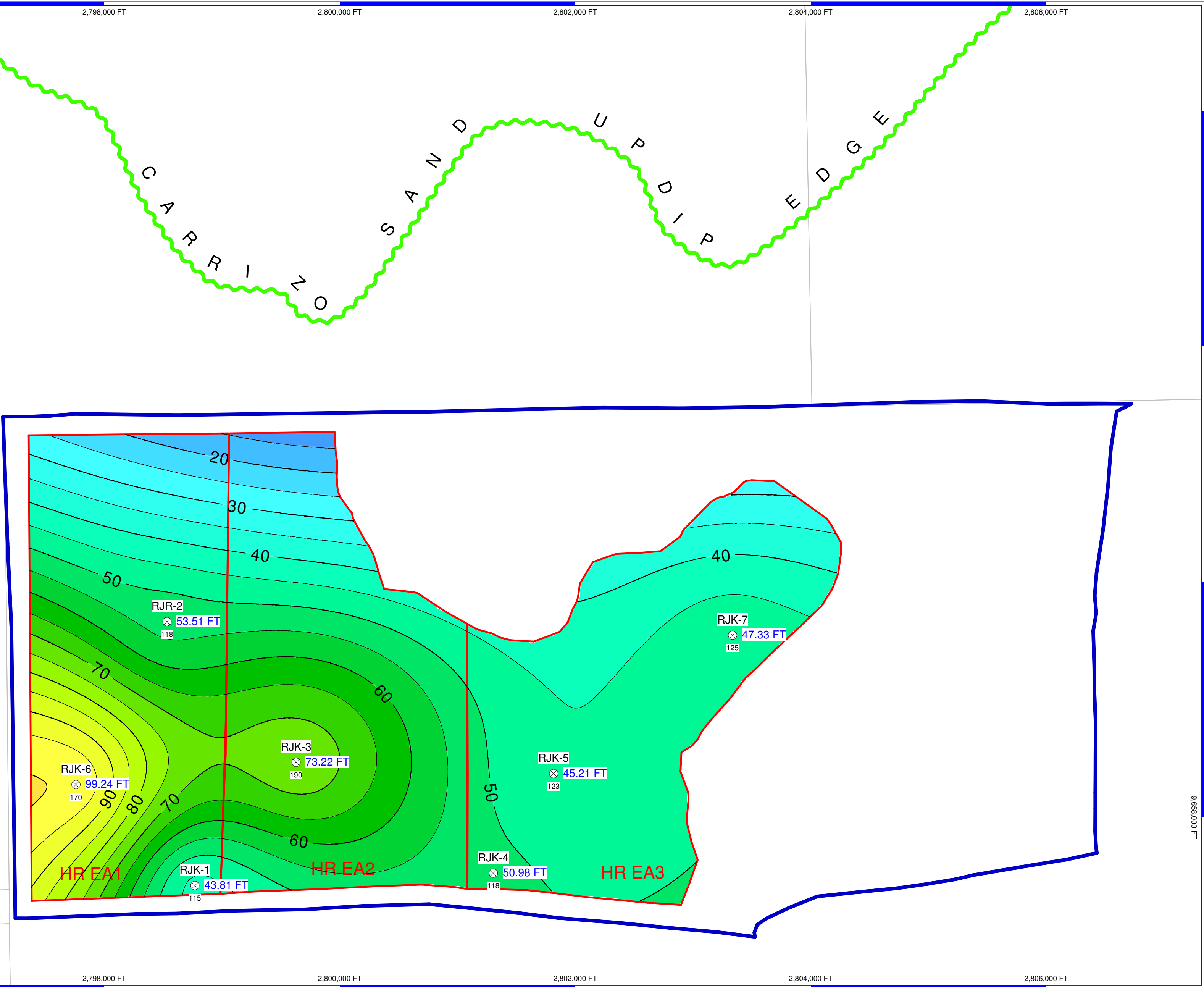
Dark Blue Line is the Property Boundary

By: Craig W. Tilley P.G.

MAP PROJECTION
Datum: North American Datum 1983 (NAD83)



May 17, 2019



ATTACHMENT 4
FINES (-140) RESOURCE
THICKNESS MAP



RJK Ranch Holdings, Atascosa County, TX

HOGAN RANCH

Fines -140

Net Pay (Feet)

POSTED WELL DATA
Core Hole
● Fines -140 Net Pay (FT)
Total Depth

CONTOURS
Fines -140 Net Pay
Fines -140 Net Pay GRD
Contour Interval = 1

REMARKS
EA1 Volume = 1,378,754.5 TONS
Average Thickness = 4.29 feet

EA2 Volume = 1,226,008.21 TONS
Average Thickness = 3.80 feet

EA3 Volume = 1,956,877.04 TONS
Average Thickness = 6.06 feet

Carrizo Updip Edge (zero Sand)
from Geologic Map of Texas

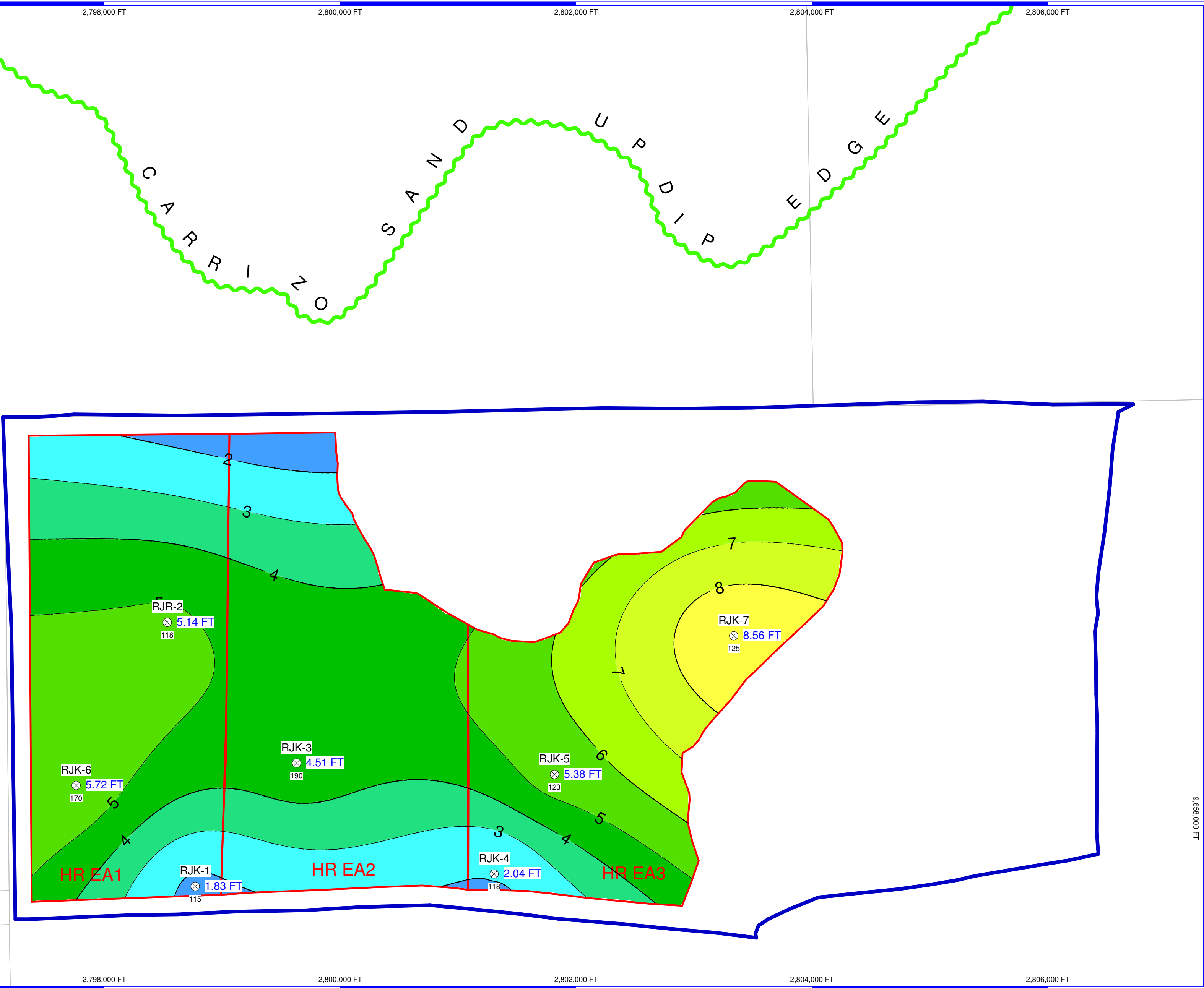
Dark Blue Line is the Property Boundary

By: Craig W. Tilley P.G.

MAP PROJECTION
Datum: North American Datum 1983 (NAD83)



May 17, 2019



ATTACHMENT 6
OVERSIZED (+40) RESOURCE
THICKNESS MAP



RJK Ranch Holdings, Atascosa County, TX

HOGAN RANCH
Oversized +40
Net Pay (Feet)

POSTED WELL DATA
Core Hole
Oversized +40 Net Pay (FT)
Total Depth

CONTOURS
Oversized +40 Net Pay
Oversized +40 Net Pay GRD
Contour Interval = 5

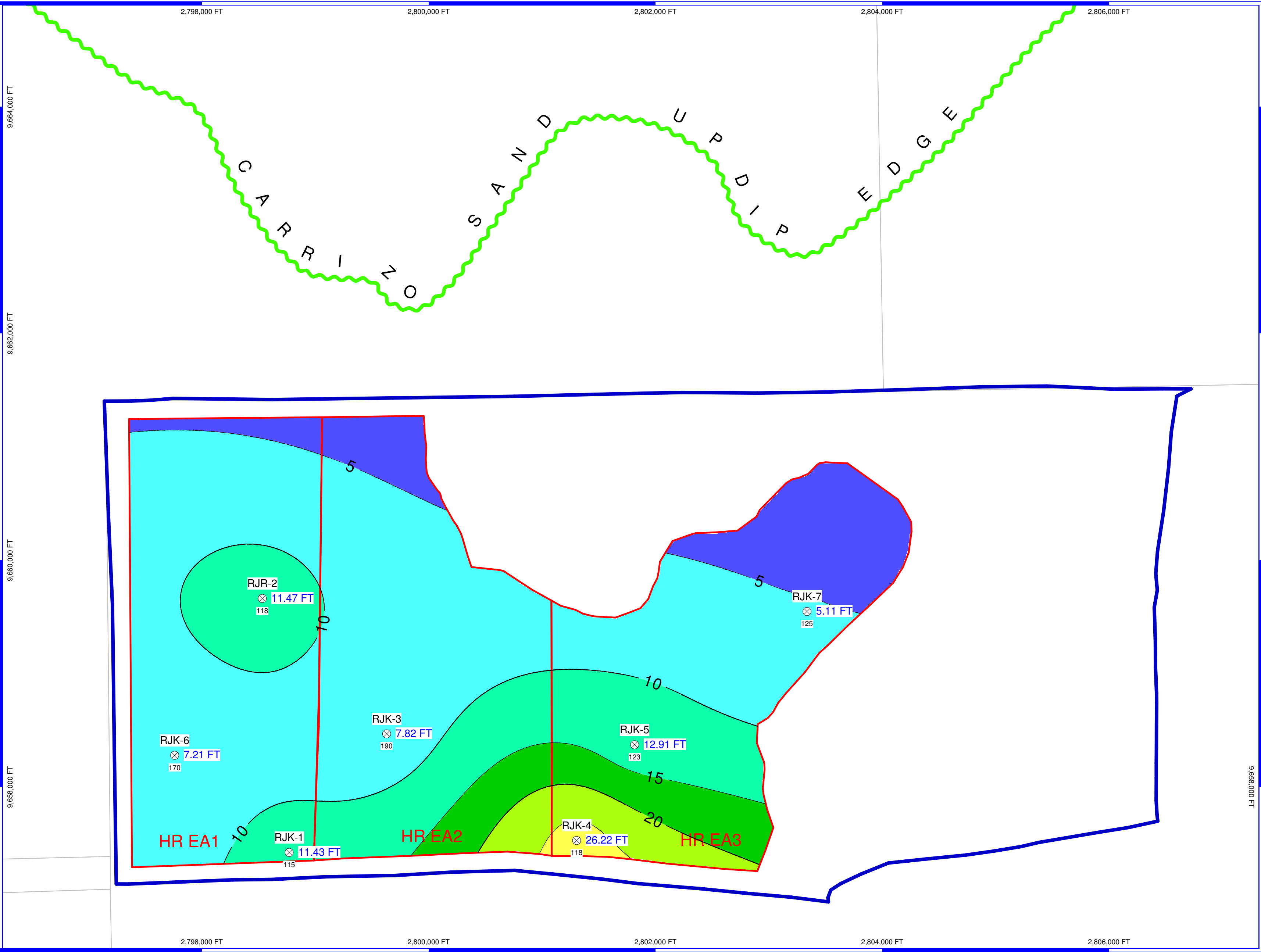
REMARKS
EA1 Volume = 2,765,302.17 TONS
Average Thickness = 8.61 feet
EA2 Volume = 3,143,056.18 TONS
Average Thickness = 9.73 feet
EA3 Volume = 3,342,972.09 TONS
Average Thickness = 10.36 feet
Carrizo Updip Edge (zero Sand)
from Geologic Map of Texas
Dark Blue Line is the Property Boundary

By: Craig W. Tilley P.G.

MAP PROJECTION
Datum: North American Datum 1983 (NAD83)



May 17, 2019



ATTACHMENT 7
TOTAL SAND RESOURCE
THICKNESS MAP



RJK Ranch Holdings, Atascosa County, TX

HOGAN RANCH
Total Sand Resource
NET PAY (feet)

POSTED WELL DATA
Core Hole
● Lab Total Sand Resource Net Pay (FT)
Total Depth

CONTOURS
Lab Total Sand Resource Net Pay
Lab Total Sand Resource Net Pay with 0 LINE.GRD
Contour Interval = 5

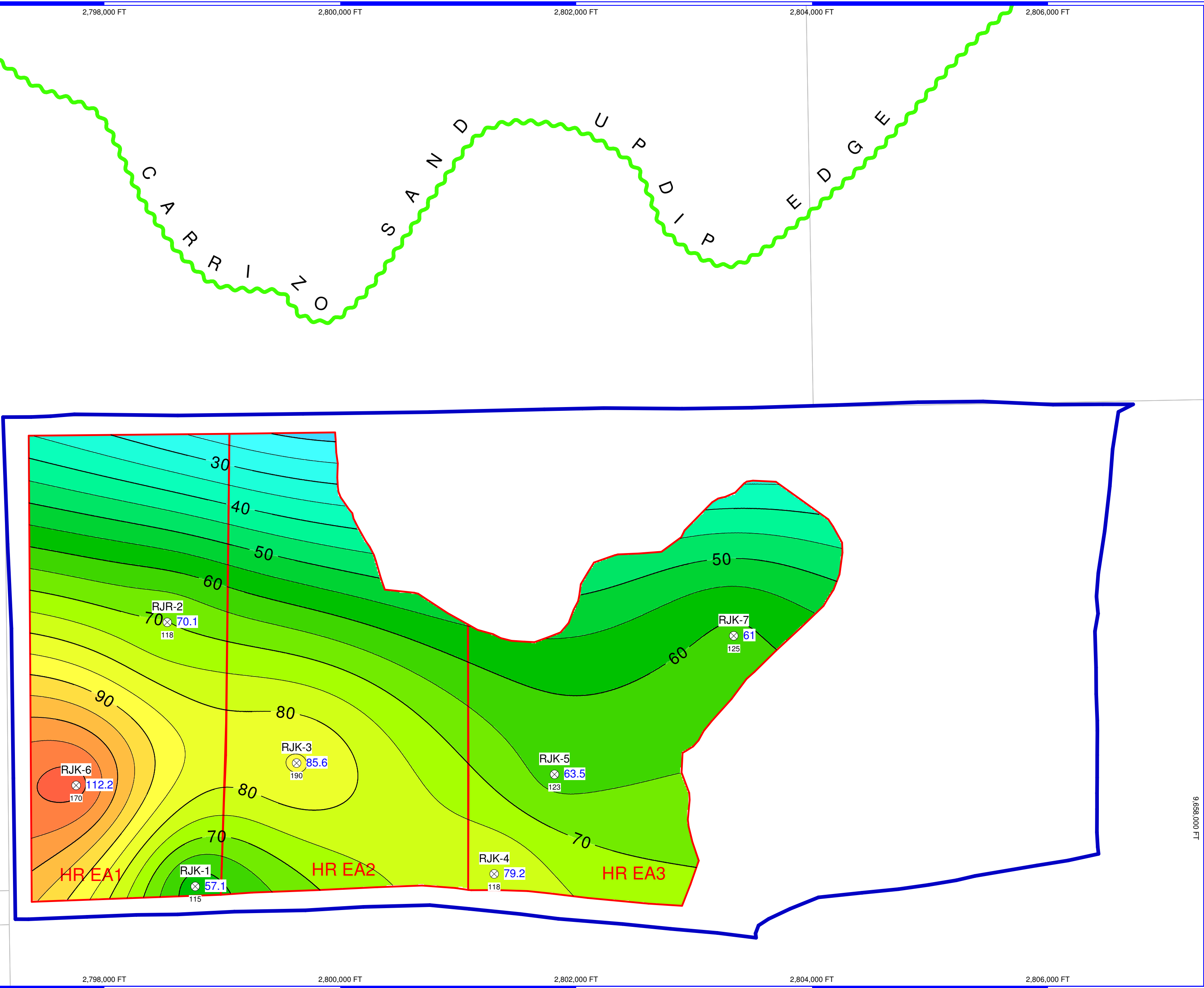
REMARKS
EA1 Volume = 23,100,601.79 TONS
Average Thickness = 71.98 feet
EA2 Volume = 21,063,606.46 TONS
Average Thickness = 65.28 feet
EA3 Volume = 19,609,967.13 TONS
Average Thickness = 60.68 feet
Carrizo Updip Edge (zero Sand)
from Geologic Map of Texas
Dark Blue Line is the Property Boundary

By: Craig W. Tilley P.G.

MAP PROJECTION
Datum: North American Datum 1983 (NAD83)



May 16, 2019



ATTACHMENT 8
DETAILED TESTING SUMMARY



Test Results Summary

RJK HOGAN RANCH API 19C FRAC SAND TESTING

		HR-1		HR-2		HR-3	
		30-50'	60-70'	0-20'	60-80'	30-50'	110-140'
Sample Collection Date		4/19/2019	4/19/2019	4/19/2019	4/19/2019	4/19/2019	4/19/2019
Field Sample Name		HR-1 30-50'	HR-1 60-70'	HR-2 0-20'	HR-2 60-80'	HR-3 30-50'	HR-3 110-140'
Field Sample Reference Code		2019-0419-HR-1 30-50'	2019-0419-HR-1 60-70'	2019-0419-HR-2 0-20'	2019-0419-HR-2 60-80'	2019-0419-HR-3 30-50'	2019-0419-HR-3 110-140'
Attrition Scrub Post-Wash Loss	(wt %)	20.62%	37.27%	32.92%	15.86%	55.11%	24.16%
Mean Particle Diameter		0.308 mm	0.268 mm	0.228 mm	0.691 mm	0.221 mm	0.352 mm
Median Particle Diameter		0.300 mm	0.249 mm	0.167 mm	0.388 mm	0.148 mm	0.287 mm
Silica Content	(wt %) SiO ₂						

* Sieve Analysis Determined via Computerized Particle Analysis (W.S. Tyler)

Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	82.2%	9.2%	59.1%	30.5%	17.1%	67.1%	38.4%	14.5%	16.0%	56.5%	55.7%	21.5%
% Over-size	(wt %)	6.9%	89.0%	6.1%	65.1%	8.6%	25.8%	46.5%	85.0%	7.3%	23.2%	21.7%	77.5%
% Fines	(wt %)	11.0%	1.8%	34.9%	4.4%	74.2%	7.1%	15.0%	0.6%	76.8%	20.3%	22.5%	1.1%
Mesh Size Cut	(API STD 19C)	40/70	70/140	40/140		40/70	70/140	40/140		40/70	70/140	40/140	
Krumbein Roundness												0.533	
Krumbein Sphericity												0.8	
Bulk Density	(lbs/ft ³)	88.0		87.4			81.3	85.9			81.1	86.2	
	(g/cm ³)	1.41		1.40			1.30	1.38			1.30	1.38	
Turbidity	(NTU)											13.8	
Acid Solubility	(%)	not tested	not tested	not tested		not tested	not tested	not tested		not tested	not tested	2.8%	
Crush Resistance (Fines Lost wt %)	1000 psi												
	2000 psi												
	3000 psi										8.64%		
	4000 psi										10.85%		
	5000 psi	9.18%					9.82%						
	6000 psi	13.26%					11.78%						
	7000 psi							8.08%					
	8000 psi			9.67%				10.30%					
	9000 psi			12.47%								9.72%	
	10000 psi											12.04%	
	11000 psi												
	12000 psi												
	13000 psi												
	14000 psi												
Crush Resistance Factor	K-Factor	5K	not tested	8K		not tested	5K	7K		not tested	3K	9K	



Test Results Summary

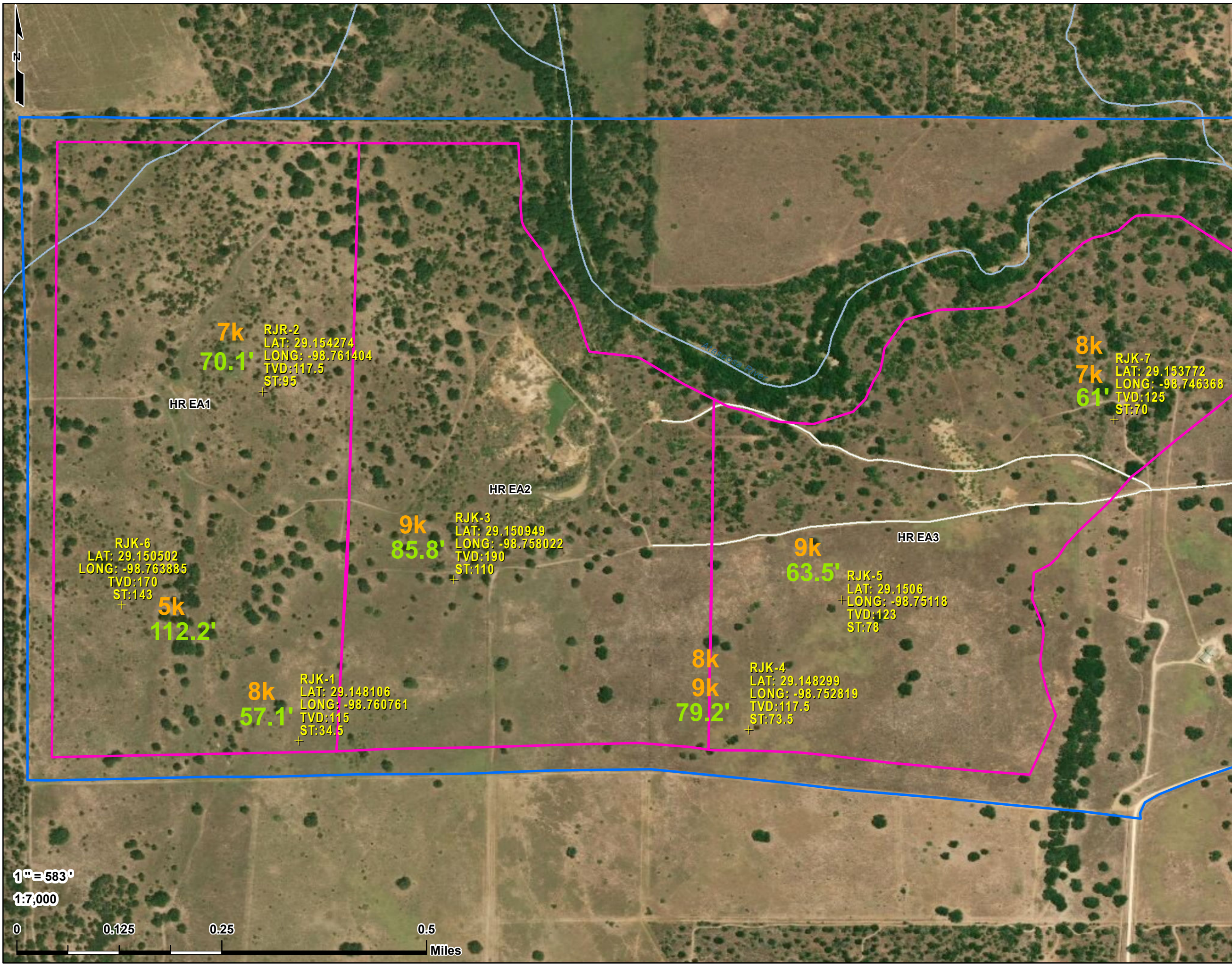
		HR-4		HR-5		HR-6	HR-7	
		10-30'	60-80'	0-10'	10-30'	60-80'	0-20'	100-110'
Sample Collection Date		4/19/2019	4/19/2019	4/19/2019	4/19/2019	4/19/2019	4/19/2019	4/19/2019
Field Sample Name		HR-4 10-30'	HR-4 60-80'	HR-5 0-10'	HR-5 10-30'	HR-6 60-80'	HR-7 0-20'	HR-7 100-110'
Field Sample Reference Code		2019-0419-HR-4 10-30'	2019-0419-HR-4 60-80'	2019-0419-HR-5 0-10'	2019-0419-HR-5 10-30'	2019-0419-HR-6 60-80'	2019-0419-HR-7 0-20'	2019-0419-HR-7 100-110'
Attrition Scrub Post-Wash Loss	(wt %)	19.07%	15.34%	11.36%	14.69%	18.37%	48.98%	30.39%
Mean Particle Diameter		0.319 mm	0.505 mm	0.399 mm	0.511 mm	0.210 mm	0.354 mm	0.240 mm
Median Particle Diameter		0.293 mm	0.299 mm	0.301 mm	0.377 mm	0.190 mm	0.275 mm	0.218 mm
Silica Content	(wt %) SiO ₂							

* Sieve Analysis Determined via Computerized Particle Analysis

Mesh Size Cut	(API STD 19C)	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140	40/70	70/140
% In-size	(wt %)	66.5%	18.3%	48.8%	17.2%	68.6%	13.5%	56.3%	5.0%	31.1%	60.9%	47.5%	27.7%	50.4%	42.6%
% Over-size	(wt %)	12.7%	79.2%	33.2%	82.1%	16.3%	84.9%	37.6%	94.0%	3.3%	34.4%	22.0%	69.6%	2.8%	53.2%
% Fines	(wt %)	20.8%	2.4%	18.0%	0.8%	15.1%	1.7%	6.0%	1.0%	65.6%	4.7%	30.4%	2.8%	46.8%	4.2%
Mesh Size Cut	(API STD 19C)	40/140		40/140		40/70	70/140	40/140		40/140		40/140		40/140	
Krumbein Roundness								0.553		0.507					
Krumbein Sphericity								0.8		0.8					
Bulk Density	(lbs/ft ³)	87.4		87.1		86.3		89.5		82.8		87.6		83.4	
	(g/cm ³)	1.40		1.39		1.38		1.43		1.33		1.40		1.34	
Turbidity	(NTU)							16.6		25.0					
Acid Solubility	(%)	not tested		not tested		not tested	not tested	2.3%		3.1%		not tested		not tested	
Crush Resistance (Fines Lost wt %)	1000 psi														
	2000 psi														
	3000 psi														
	4000 psi					6.62%									
	5000 psi					10.32%				7.38%					
	6000 psi									10.97%					
	7000 psi													9.60%	
	8000 psi	8.48%		7.34%								9.84%		12.58%	
	9000 psi	10.63%		9.86%				9.30%				12.43%			
	10000 psi			12.42%				11.20%							
	11000 psi														
	12000 psi														
	13000 psi														
	14000 psi														
Crush Resistance Factor	K-Factor	8K		9K		4K	not tested	9K		5K		8K		7K	

ATTACHMENT 9

100 MESH CRUSH TESTING RESULTS MAP



Hogan Ranch

Frac Sand Investigation with
Crush Test K-value and Sand Net Pay

RJK Ranch Holdings LLC

Atascosa Co., TX

PCS: NAD 1983 TX-S Central FIPS 4204 (US Ft.)

Drawn by: ASG

Date: 6/21/2019

Approved by: ELR

LONQUIST & CO. LLC

PETROLEUM
ENGINEERS

ENERGY
ADVISORS

AUSTIN • HOUSTON • WICHITA • DENVER • CALGARY

Property Boundary

Extraction Area Boundaries

Quality Cores

Status

+ Drilled (7)

Orange Value = 100 Mesh Crush
Resistance k-value (psi)

Green Value = Total Sand Net Pay (ft)

* Note 1: All coordinates shown
are in WGS 84 (DD). *

ATTACHMENT 10

USDA CUSTOM SOILS REPORT



United States
Department of
Agriculture

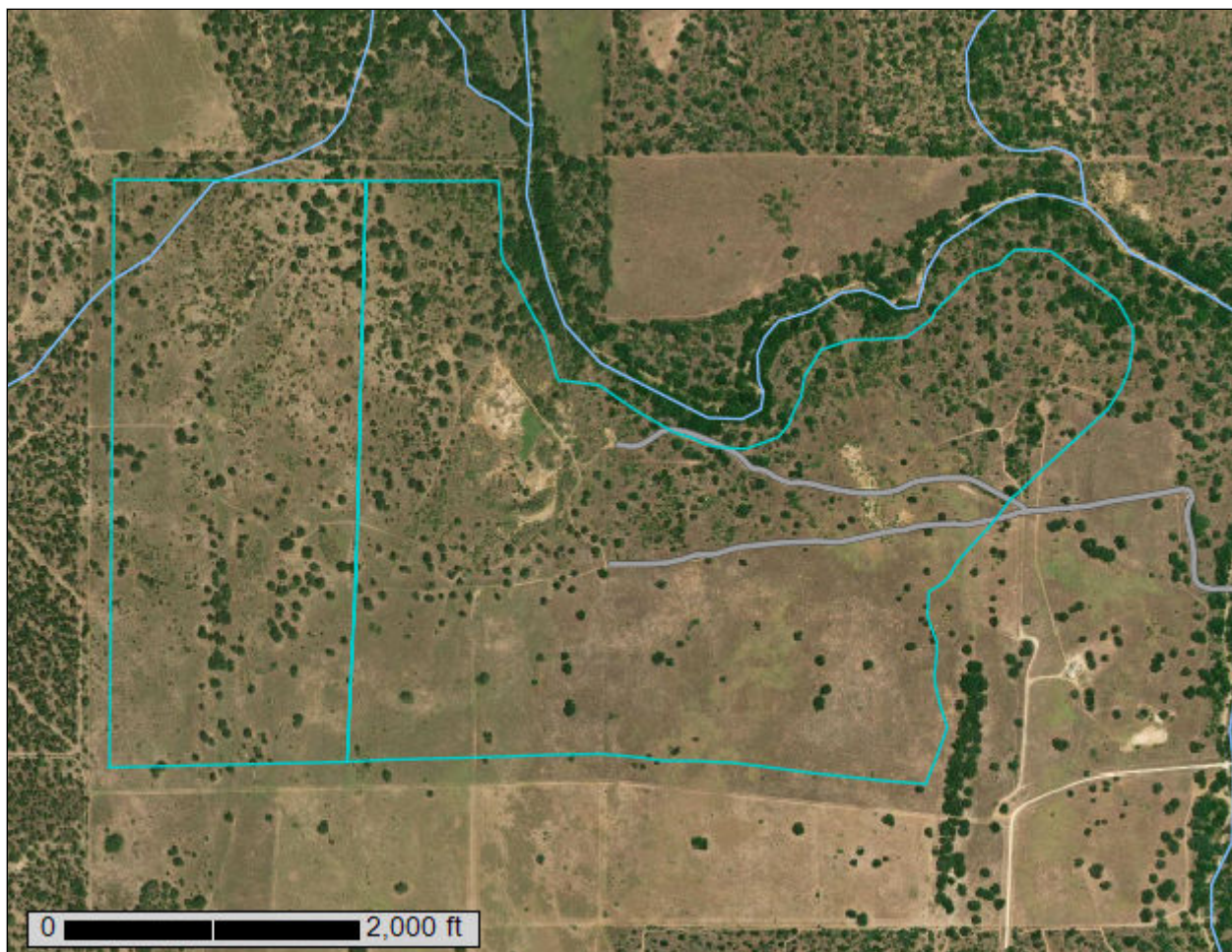
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Atascosa County, Texas**

Hogan Property



May 14, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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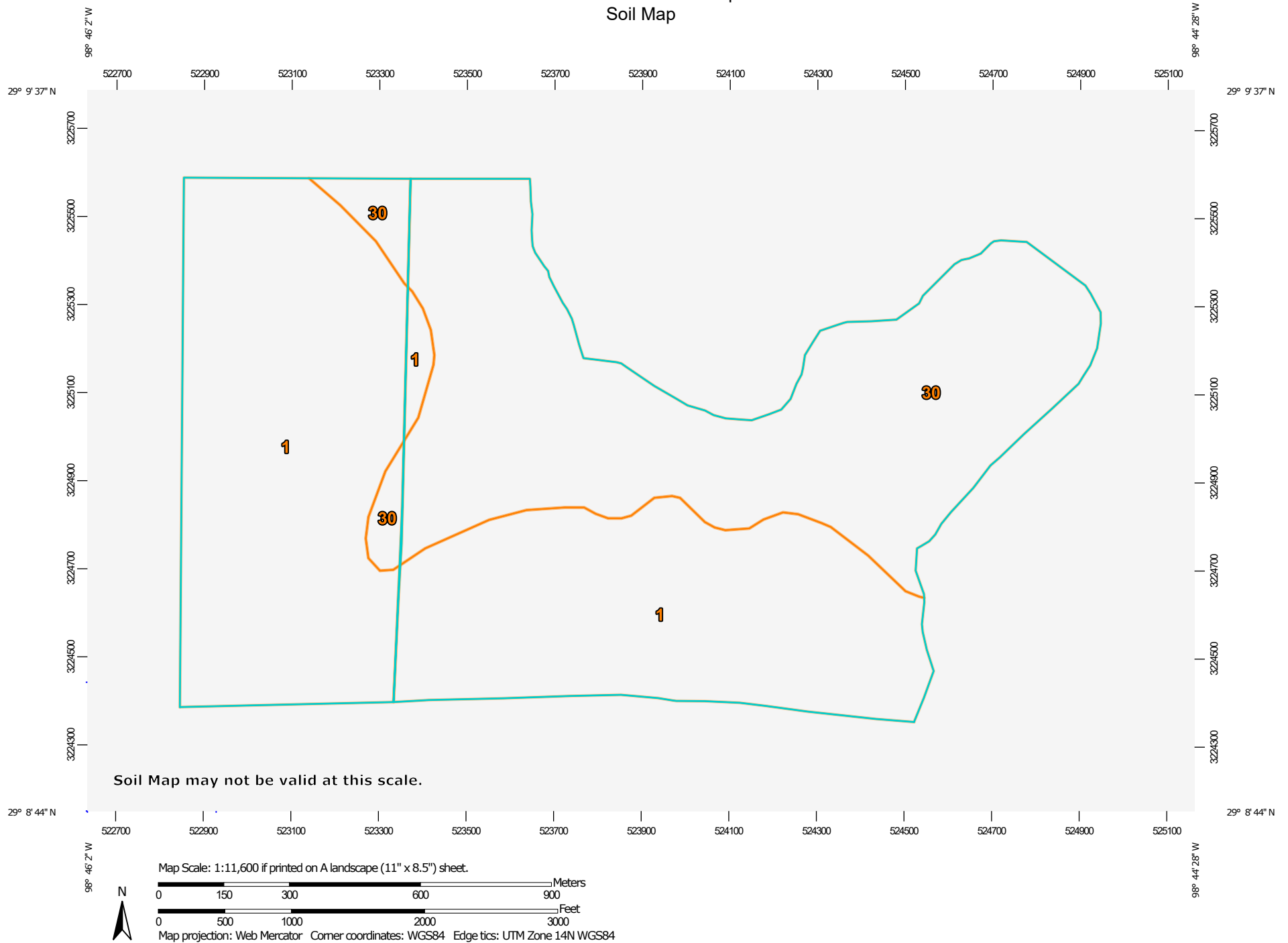
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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report

Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Political Features

 PLSS Township and Range

 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Atascosa County, Texas

Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	189.6	41.9%
Totals for Area of Interest		452.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Custom Soil Resource Report

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Atascosa County, Texas

1—Aluf-Hitilo association, gently undulating

Map Unit Setting

National map unit symbol: d56y

Elevation: 500 to 750 feet

Mean annual precipitation: 24 to 30 inches

Mean annual air temperature: 70 to 72 degrees F

Frost-free period: 230 to 250 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Aluf and similar soils: 47 percent

Hitilo and similar soils: 22 percent

Minor components: 31 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aluf

Setting

Landform: Sand sheets

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Eolian sands derived from sandstone

Typical profile

H1 - 0 to 50 inches: fine sand

H2 - 50 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: Loamy Sand (R083AY022TX)

Hydric soil rating: No

Description of Hitilo

Setting

Landform: Sand sheets

Down-slope shape: Linear

Across-slope shape: Linear

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Parent material: Eolian sands derived from sandstone

Typical profile

H1 - 0 to 46 inches: sand
H2 - 46 to 54 inches: sandy clay loam
H3 - 54 to 62 inches: sandy clay
H4 - 62 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: Loamy Sand (R083AY022TX)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 30 percent
Hydric soil rating: No

Unnamed, hydric

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

30—Nusil-Rhymes association, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2v3bq
Elevation: 80 to 450 feet
Mean annual precipitation: 26 to 37 inches
Mean annual air temperature: 70 to 73 degrees F
Frost-free period: 270 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Nusil and similar soils: 50 percent

Rhymes and similar soils: 35 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nusil

Setting

Landform: Interdunes on stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Eolian sands over loamy alluvium

Typical profile

A - 0 to 20 inches: fine sand

E - 20 to 30 inches: fine sand

Bt - 30 to 60 inches: sandy clay loam

BC - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 15 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: Sandy (R083AY021TX)

Hydric soil rating: No

Description of Rhymes

Setting

Landform: Dunes on stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Eolian sands over loamy alluvium

Typical profile

A - 0 to 7 inches: fine sand

E - 7 to 50 inches: fine sand

Custom Soil Resource Report

Bt - 50 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 5 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: Sandy (R083AY021TX)

Hydric soil rating: No

Minor Components

Wilco

Percent of map unit: 8 percent

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Loamy Sand (R083AY022TX)

Hydric soil rating: No

Papalote

Percent of map unit: 6 percent

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: Tight Sandy Loam (R083AY024TX)

Hydric soil rating: No

Unnamed, hydric

Percent of map unit: 1 percent

Landform: Depressions on stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear, concave

Across-slope shape: Linear, concave

Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

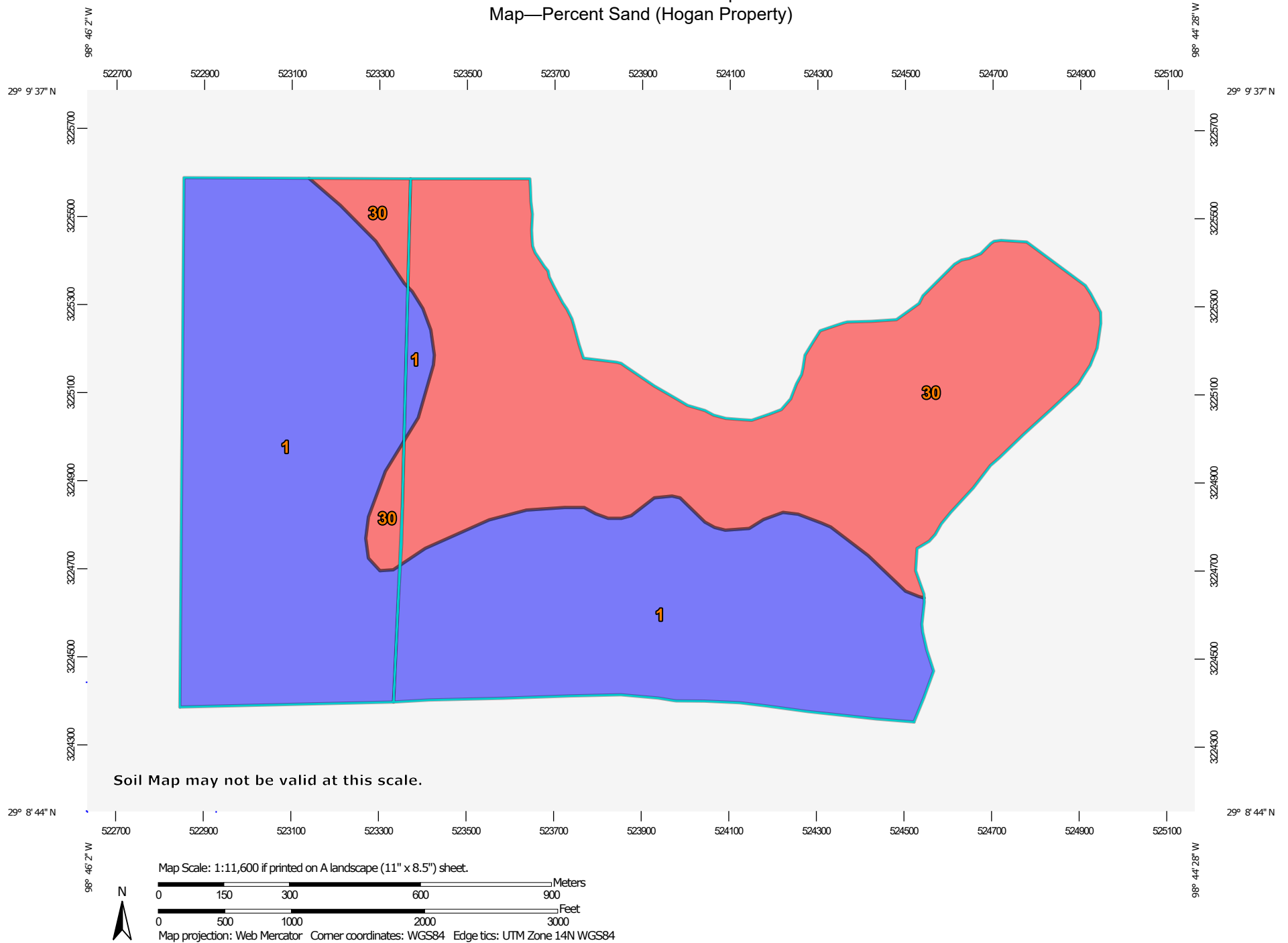
Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Percent Sand (Hogan Property)

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the database, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report Map—Percent Sand (Hogan Property)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 ≤ 78.5
 > 78.5 and ≤ 93.1
 Not rated or not available

Soil Rating Lines

 ≤ 78.5
 > 78.5 and ≤ 93.1
 Not rated or not available

Soil Rating Points

 ≤ 78.5
 > 78.5 and ≤ 93.1
 Not rated or not available

Political Features

 PLSS Township and Range
 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Atascosa County, Texas
Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Table—Percent Sand (Hogan Property)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	93.1	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	78.5	189.6	41.9%
Totals for Area of Interest			452.2	100.0%

Rating Options—Percent Sand (Hogan Property)

Units of Measure: percent

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

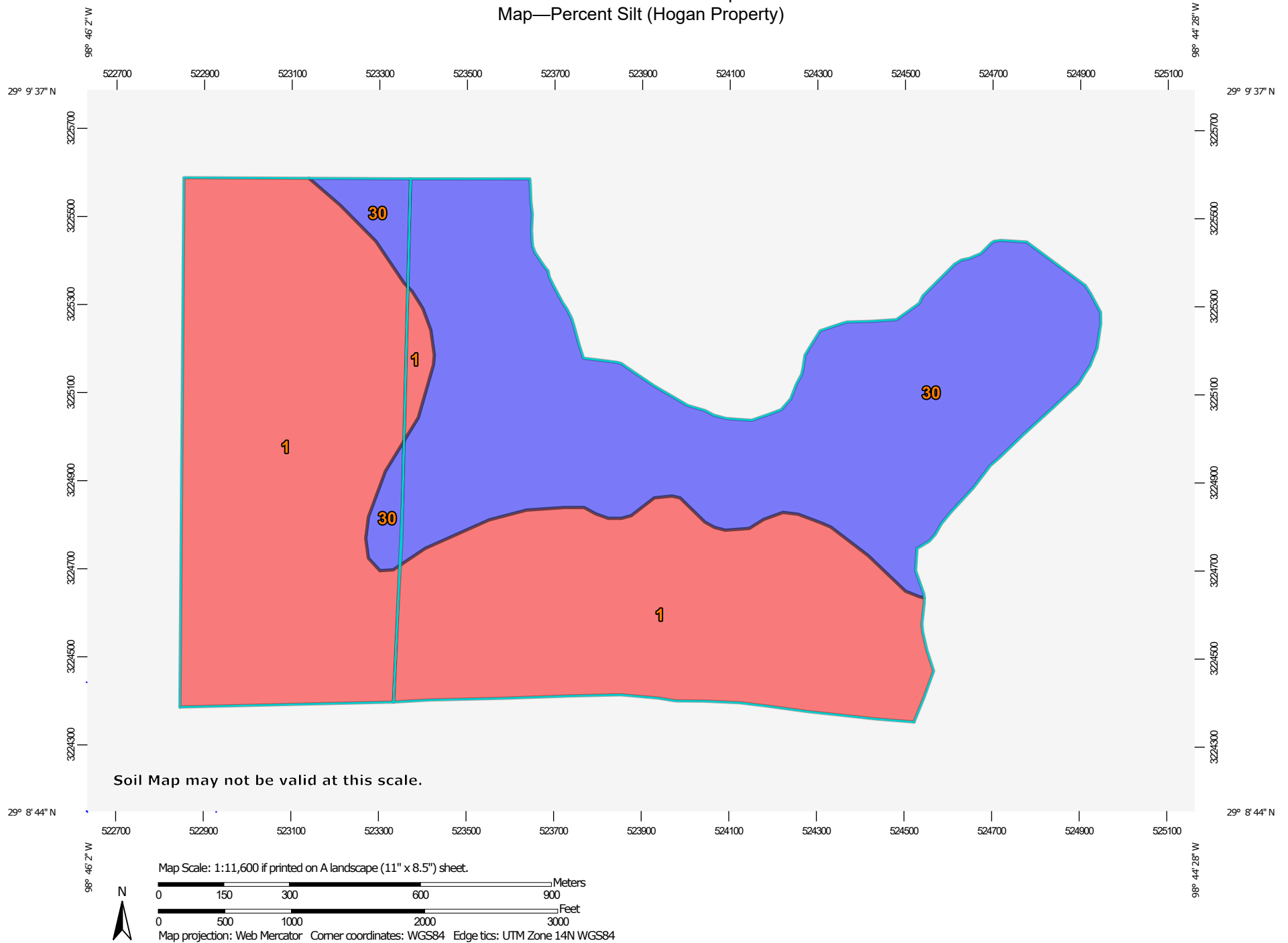
Percent Silt (Hogan Property)

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the database, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Percent Silt (Hogan Property)



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 ≤ 0.7
 > 0.7 and ≤ 6.0
 Not rated or not available

Soil Rating Lines

 ≤ 0.7
 > 0.7 and ≤ 6.0
 Not rated or not available

Soil Rating Points

 ≤ 0.7
 > 0.7 and ≤ 6.0
 Not rated or not available

Political Features

 PLSS Township and Range
 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Atascosa County, Texas
Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Table—Percent Silt (Hogan Property)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	0.7	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	6.0	189.6	41.9%
Totals for Area of Interest			452.2	100.0%

Rating Options—Percent Silt (Hogan Property)

Units of Measure: percent

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

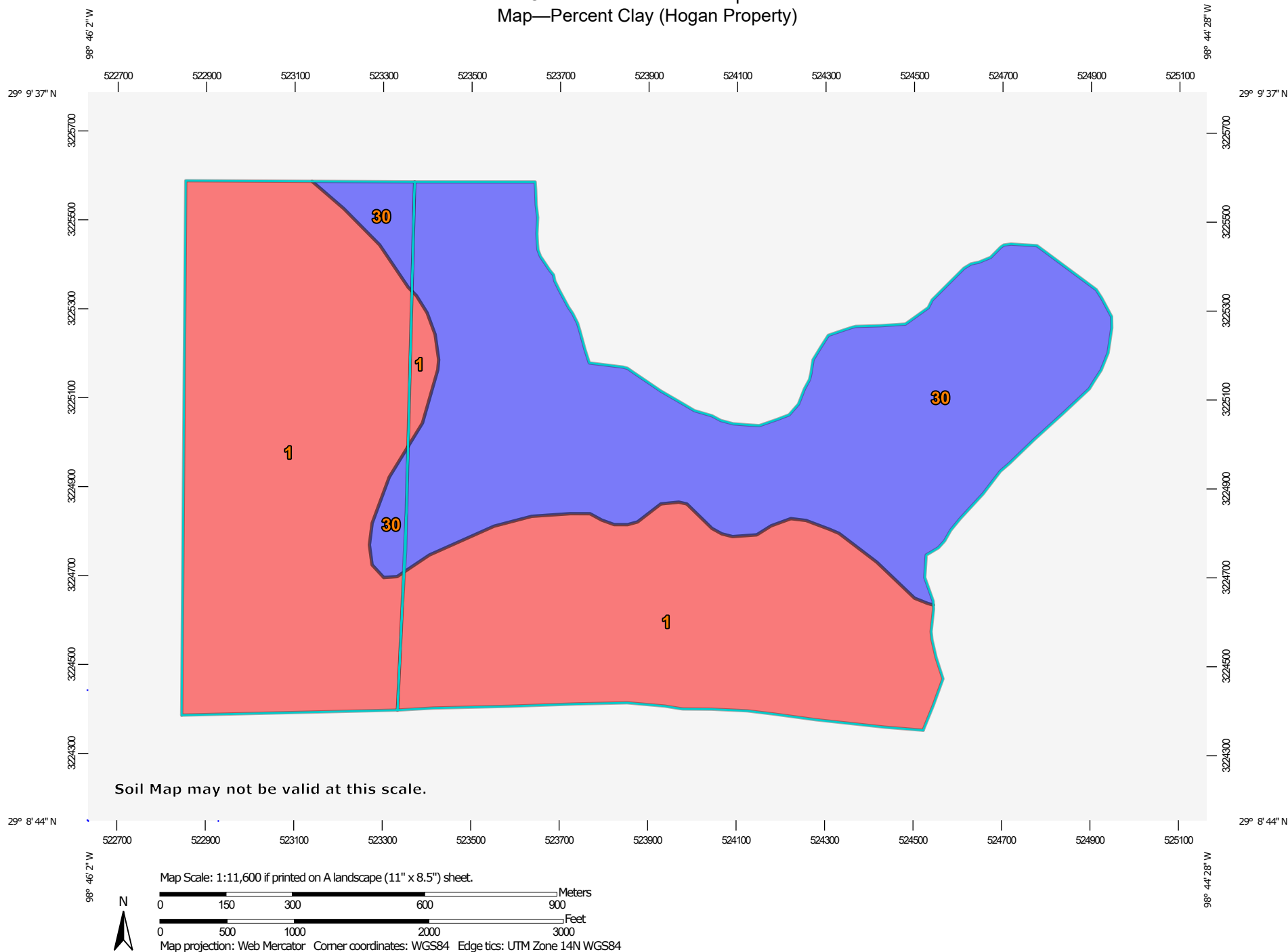
Percent Clay (Hogan Property)

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Most of the material is in one of three groups of clay minerals or a mixture of these clay minerals. The groups are kaolinite, smectite, and hydrous mica, the best known member of which is illite.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report Map—Percent Clay (Hogan Property)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 ≤ 6.1
 > 6.1 and ≤ 15.5
 Not rated or not available

Soil Rating Lines

 ≤ 6.1
 > 6.1 and ≤ 15.5
 Not rated or not available

Soil Rating Points

 ≤ 6.1
 > 6.1 and ≤ 15.5
 Not rated or not available

Political Features

 PLSS Township and Range
 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Atascosa County, Texas
Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Table—Percent Clay (Hogan Property)

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	6.1	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	15.5	189.6	41.9%
Totals for Area of Interest			452.2	100.0%

Rating Options—Percent Clay (Hogan Property)

Units of Measure: percent

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

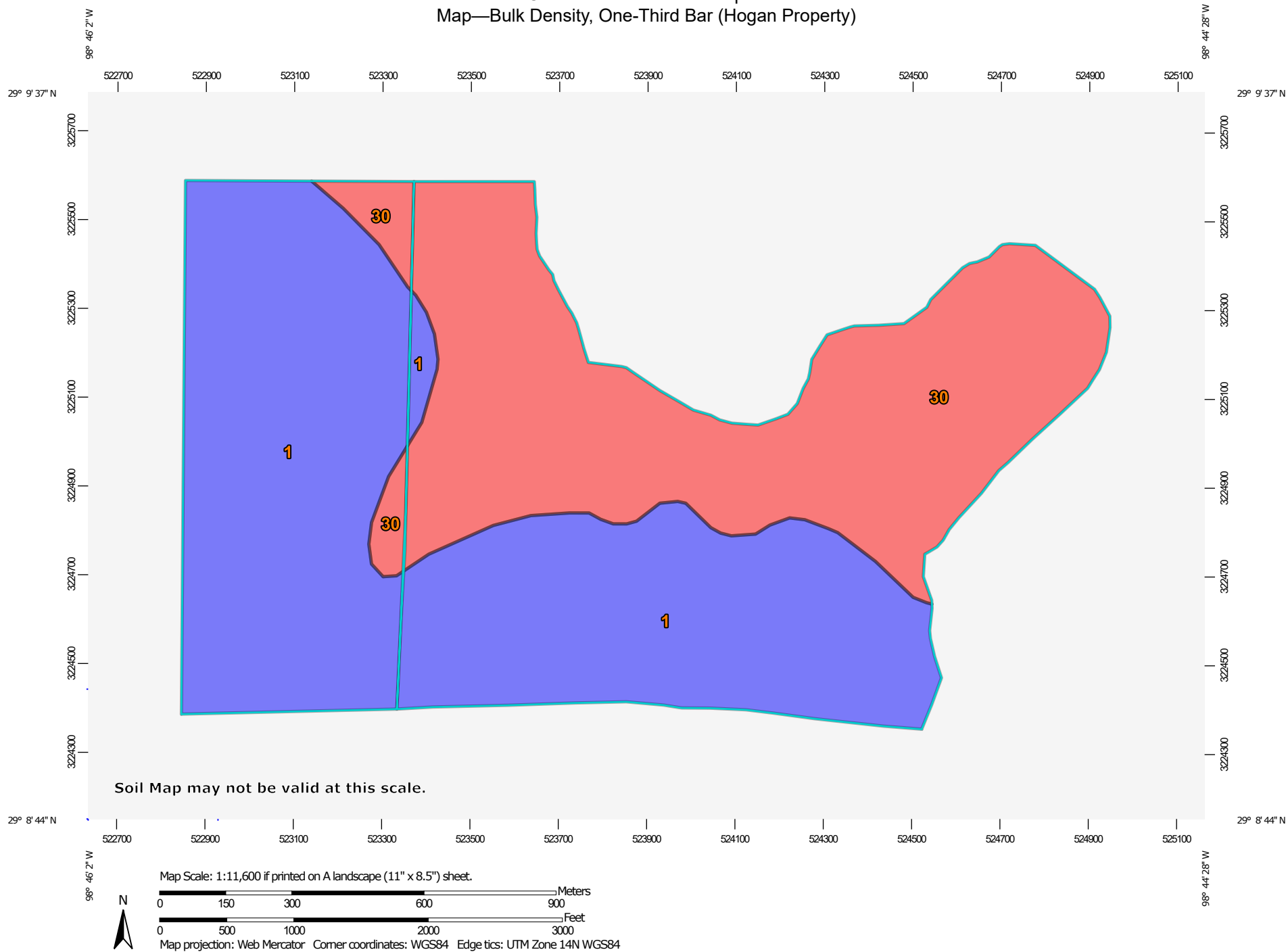
Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Bulk Density, One-Third Bar (Hogan Property)

Bulk density, one-third bar, is the oven-dry weight of the soil material less than 2 millimeters in size per unit volume of soil at water tension of 1/3 bar, expressed in grams per cubic centimeter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Bulk Density, One-Third Bar (Hogan Property)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 ≤ 1.56
 > 1.56 and ≤ 1.58
 Not rated or not available

Soil Rating Lines

 ≤ 1.56
 > 1.56 and ≤ 1.58
 Not rated or not available

Soil Rating Points

 ≤ 1.56
 > 1.56 and ≤ 1.58
 Not rated or not available

Political Features

 PLSS Township and Range
 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Atascosa County, Texas
 Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Table—Bulk Density, One-Third Bar (Hogan Property)

Map unit symbol	Map unit name	Rating (grams per cubic centimeter)	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	1.58	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	1.56	189.6	41.9%
Totals for Area of Interest			452.2	100.0%

Rating Options—Bulk Density, One-Third Bar (Hogan Property)

Units of Measure: grams per cubic centimeter

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie. The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Parent Material Name (Hogan Property)

Parent material name is a term for the general physical, chemical, and mineralogical composition of the unconsolidated material, mineral or organic, in which the soil forms. Mode of deposition and/or weathering may be implied by the name.

The soil surveyor uses parent material to develop a model used for soil mapping. Soil scientists and specialists in other disciplines use parent material to help interpret soil boundaries and project performance of the material below the soil. Many soil properties relate to parent material. Among these properties are proportions of sand, silt, and clay; chemical content; bulk density; structure; and the

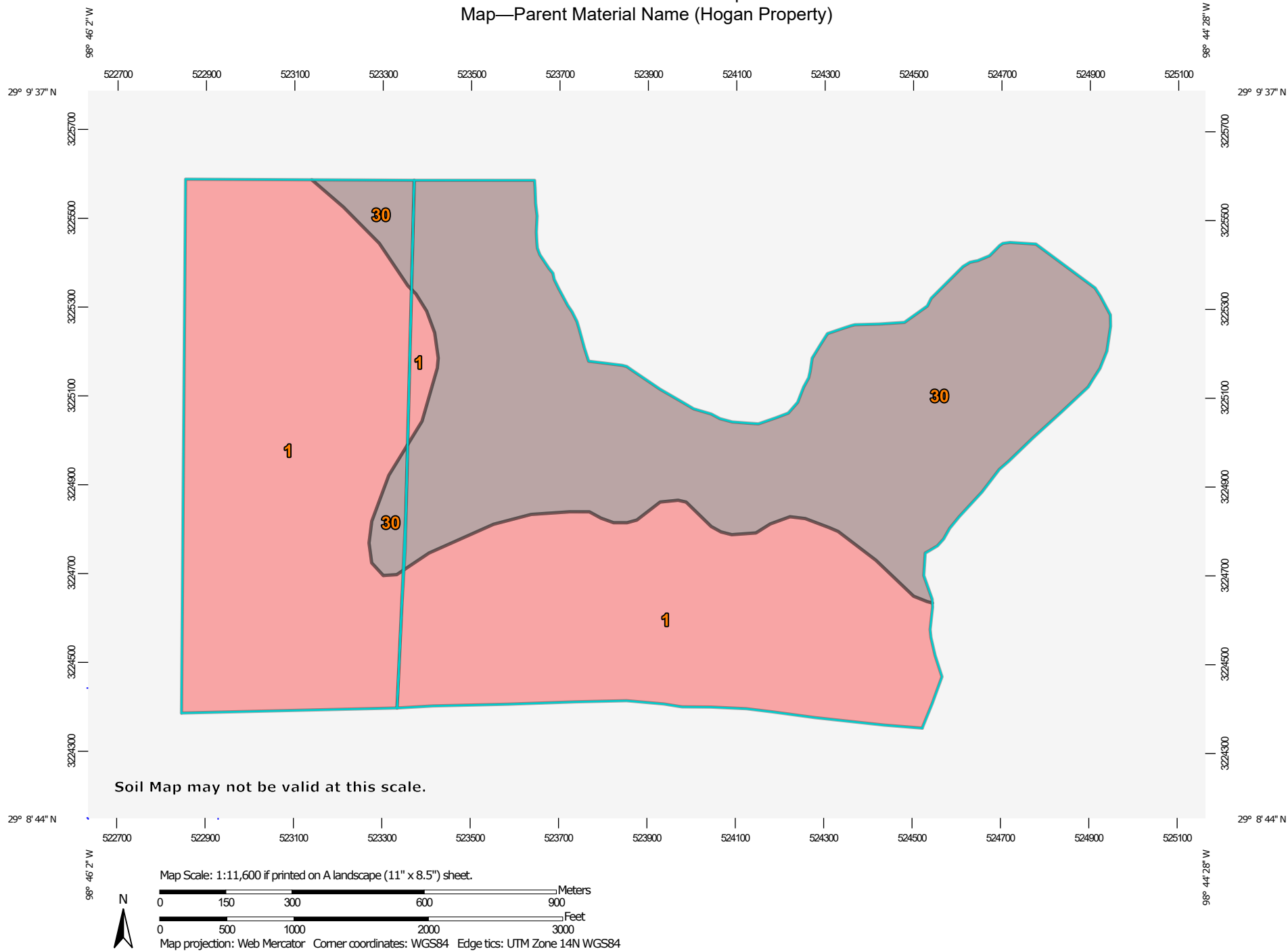
Custom Soil Resource Report

kinds and amounts of rock fragments. These properties affect interpretations and may be criteria used to separate soil series. Soil properties and landscape information may imply the kind of parent material.

For each soil in the database, one or more parent materials may be identified. One is marked as the representative or most commonly occurring. The representative parent material name is presented here.

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Map—Parent Material Name (Hogan Property)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 eolian sands derived from sandstone
 eolian sands over loamy alluvium
 Not rated or not available

Soil Rating Lines

 eolian sands derived from sandstone
 eolian sands over loamy alluvium
 Not rated or not available

Soil Rating Points

 eolian sands derived from sandstone
 eolian sands over loamy alluvium
 Not rated or not available

Political Features

 PLSS Township and Range
 PLSS Section

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Atascosa County, Texas
 Survey Area Data: Version 17, Sep 14, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Table—Parent Material Name (Hogan Property)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Aluf-Hitilo association, gently undulating	eolian sands derived from sandstone	262.6	58.1%
30	Nusil-Rhymes association, 0 to 5 percent slopes	eolian sands over loamy alluvium	189.6	41.9%
Totals for Area of Interest			452.2	100.0%

Rating Options—Parent Material Name (Hogan Property)*Aggregation Method: Dominant Condition*

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

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The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

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