APPENDIX C

GEOTECHNICAL SAMPLE RESULTS

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RE: McLaren Tailings Abandoned Mine Site
Pioneer Technical Services Project No. 10133

ATTN: John;

Several samples of material were collected from the McLaren Tailings project and delivered to our ASTM/AASHTO accredited materials testing laboratory in Helena. A list containing sample identification, collection date and time, corresponding laboratory sample number, and analysis performed are displayed in Table 1. The purpose of the testing was to evaluate moisture content within the materials, bulk density of the materials, plasticity of the materials and what percentages of lime admixtures should be added to the tailings during their eventual placement in a repository. The in-place tailings are excessively wet and the lime is intended to dry the tailings to a moisture content that will make them workable in the field.

Table 1: McLaren Tailings Sample Data

Lab mple mber	Sample Identification	Collection Date	Collection Time	Moisture Content	Sieve Analysis of Coarse and Fine Aggregate	Particle Size Analysis of Soils	Liquid and Plastic Limits	Proctor Moisture/Density Relationships	Specific Gravity of Soils
				ASTM D2216	ASTM C117, C136	ASTM D422	ASTM D4318	ASTM D698	ASTM D854
627	McLaren-CS-01-A-091508	9/15/2008	1400	X		X	X		X
628	McLaren-CS-02-A-091508	9/15/2008	1545	X		X	X		X
629	McLaren-CS-03-A-091508	9/15/2008	1705	X		X	X		X
630	McLaren-CS-04-A-091508	9/15/2008	1800	X		X	X		X
631	McLaren-CS-05-A-091508	9/16/2008	800	X		X	X		X
635	McLaren-TP-01-A-091008	9/10/2008	1715	X		X	X	X	X
636	McLaren-TP-01-B-091008	9/10/2008	1720	X		X	X	X	X
637	McLaren-TP-02-A-091108	9/11/2008	830	X		X	X	X	X
638	McLaren-TP-02-B-091108	9/11/2008	830	X		X	X	X	X
639	McLaren-TP-03-A-091108	9/11/2008	1320	X		X	X	X	X
640	McLaren-TP-03-B-091108	9/11/2008	1325	X		X	X	X	X
641	McLaren-TP-04-A-091208	9/12/2008	1400	X		X	X	X	X
644	McLaren-RA-01-A-090808	9/8/2008	1420	X	X		X		X
643	McLaren-RA-01-B-090809	9/8/2008	1425	X		X	X		X
642	McLaren-RA-01-C-090810	9/8/2008	1410	X		X	X		X

Moisture content analysis was performed on samples that had been collected and placed in one-gallon zip-top baggies. The baggies accompanied bulk samples from the same horizon. Table 2 displays the results of moisture content testing performed.

Table 2: Moisture Content As-Received

Lab Sample Number	Sample Identification	As-Received Moisture Content (%)
6627	CS-01-A	3.6
6628	CS-02-A	7.1
6629	CS-03-A	6.4
6630	CS-04-A	4.9
6631	CS-05-A	5.7
6635	TP-01-A	21.1
6636	TP-01-B	22.6
6637	TP-02-A	28.0
6638	TP-02-B	31.0
6639	TP-03-A	23.4
6640	TP-03-B	35.8
6641	TP-04-A	49.3
6644	RA-01-A	34.8
6643	RA-01-B	6.4
6642	RA-01-C	8.1

Table 3 contains the results of grain size analysis testing performed in conjunction with particle size analysis of soils.

Table 3: Grain Size Sieve Analysis (1 of 2)

Lab Number:		6627	6628	6629	6630	6631	6644	6643	6642
Sample Identification		CS-1	CS-2	CS-3	CS-4	CS-5	RA-01A	RA-01B	RA01-C
Sieve Size (mm)	Sieve Size	Percent Passing							
37.50	1.5"								100
25.00	1"		100	100			100	100	99
19.00	3/4"	100	99	99	100	100	99	99	96
12.50	1/2"	95	96	96	96	96	98	97	91
9.50	3/8"	91	92	94	92	90	98	95	85
4.75	# 4	82	86	88	82	78	96	90	71
2.00	# 10	71	78	78	71	66	91	81	54
0.850	# 20	62	72	69	62	57	83	72	43
0.425	# 40	55	64	61	54	50	72	65	37
0.250	# 60	46	56	51	46	43	62	56	34
0.150	# 100	37	48	43	36	36	52	45	31
0.075	# 200	26.1	34.6	31.4	24.8	26.8	39.3	32.5	26.0

Table 3: Grain Size Sieve Analysis (2 of 2)

Lab Number:		6635	6636	6637	6638	6639	6640	6641
Sample Identification		TP-01A	TP-01B	TP-02A	TP-02B	TP-03A	TP-03B	TP-04
Sieve Size (mm)	Sieve Size	Percent Passing						
37.50	1.5"		100			100		
25.00	1"		99	100		99	100	
19.00	3/4"	100	99	99		98	99	
12.50	1/2"	99	99	98		97	99	
9.50	3/8"	99	99	98		96	99	
4.75	# 4	99	98	96	100	94	98	
2.00	# 10	98	96	95	99	88	98	
0.850	# 20	97	96	93	99	85	97	100
0.425	# 40	95	96	91	98	82	97	99
0.250	# 60	91	95	87	97	77	96	99
0.150	# 100	83	94	80	94	70	92	99
0.075	# 200	63.8	91.5	62.8	83.1	51.7	79.6	98.8

Specific gravity testing was performed on the portion of the samples smaller than 2.00mm. This was required to perform the hydrometer portion of the grain size analysis. Several of the samples have a specific gravity significantly higher than the 2.60 to 2.70 range considered for most soils indicating the presence of heavy metals. Table 4 displays the results of specific gravity testing.

Table 4: Specific Gravity of Soils (-2.00mm)

Lab Sample Number	Sample Identification	Specific Gravity
6627	CS-01-A	2.741
6628	CS-02-A	2.748
6629	CS-03-A	2.746
6630	CS-04-A	2.745
6631	CS-05-A	2.748
6635	TP-01-A	3.554
6636	TP-01-B	3.546
6637	TP-02-A	3.346
6638	TP-02-B	3.319
6639	TP-03-A	3.365
6640	TP-03-B	3.280
6641	TP-04-A	3.257
6644	RA-01-A	2.740
6643	RA-01-B	2.707
6642	RA-01-C	2.270

The complete (sieve and hydrometer) results of the particle size analysis are displayed on the gradation curves provided with this report.

The sample from RA-01-A was highly organic and contained an appreciable amount of material less dense than water, making the hydrometer readings impractical. The sieve analysis for this sample is included for informational purposes. This sample may be considered a peat moss.

Table 5 displays the results of three soil classifications systems – American Association of State Highway Officials (AASHTO), Unified Soil Classification System (USCS), and the United States Department of Agriculture (USDA). The Atterberg limits values needed for the AASHTO and USCS classifications are also presented.

Table 5: Soil Classifications and Atterberg Limits

Lab Sample Number	Sample Identification	AASHTO Classification	USCS Classification	USDA Textural Classification	Liquid Limit	Plastic Limit	Plastic Index
6627	CS-01-A	A-2-4 (0)	Silty Sand with Gravel (SM)	Sandy Loam	NP	NP	NP
6628	CS-02-A	A-2-4 (0)	Silty Sand (SM)	Sandy Loam	NP	NP	NP
6629	CS-03-A	A-2-4 (0)	Silty Sand (SM)	Sandy Loam	NP	NP	NP
6630	CS-04-A	A-2-4 (0)	Silty Sand with Gravel (SM)	Sandy Loam	NP	NP	NP
6631	CS-05-A	A-2-4 (0)	Silty Sand with Gravel (SM)	Sandy Loam	18	17	1
6635	TP-01-A	A-4 (0)	Sandy Silt (ML)	Loam	20	20	NP
6636	TP-01-B	A-4 (0)	Silt (ML)	Silt Loam	NP	NP	NP
6637	TP-02-A	A-4 (0)	Sandy Silt (ML)	Loam	22	20	2
6638	TP-02-B	A-4 (0)	Silty with Sand (ML)	Silt Loam	30	23	7
6639	TP-03-A	A-4 (0)	Sandy Silt (ML)	Sandy Loam	NP	NP	NP
6640	TP-03-B	A-4 (0)	Lean Clay with Sand (CL)	Silt Loam	31	22	9
6641	TP-04-A	A-7-6 (0)	Silt (ML)	Silty Clay Loam	46	28	18
6644	RA-01-A	A-8	---	---	NP	NP	NP
6643	RA-01-B	A-2-4 (0)	Silty Sand (SM)	Sandy Loam	NP	NP	NP
6642	RA-01-C	A-2-4 (0)	Silty Sand with Gravel (SM)	Sandy Loam	NP	NP	NP

We performed initial Proctor moisture/density relationship testing on the samples as a base line prior to mixing percentages of lime. Table 6 displays the results of the initial Proctor testing performed on the as-received samples. The as-received moisture contents are also provided for comparison.

Table 6: Proctor Moisture/Density Relationships, Moisture Content As-Received

Lab Sample Number	Sample Identification	Maximum Dry Density (lb/ft^3)	Optimum Moisture Content (%)	As-Received Moisture Content (%)	Percent Over Optimum Moisture	Wet Density (lb/ft^3)
6635	TP-01-A	125.3	17.0	21.1	4.1	151.7
6636	TP-01-B	131.4	14.9	22.6	7.7	161.0
6637	TP-02-A	126.3	15.8	28.0	12.2	161.7
6638	TP-02-B	121.2	17.4	31.0	13.6	158.8
6639	TP-03-A	124.6	16.4	23.4	7.0	153.8
6640	TP-03-B	116.9	19.0	35.8	16.8	158.7
6641	TP-04-A	104.8	25.3	49.3	24.0	156.5

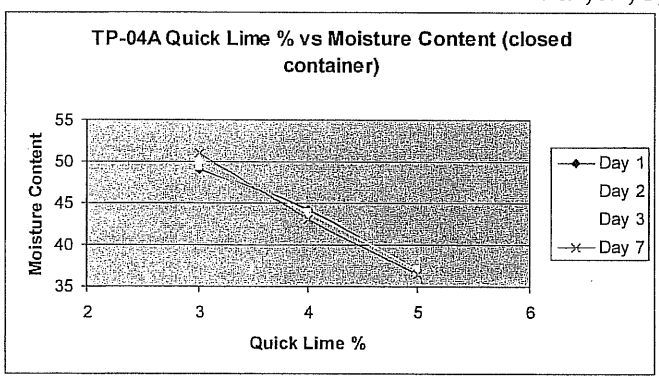
The values presented in Table 6 indicate the in-situ moisture contents are all in excess of their optimum moisture contents. In most cases, the in-situ moisture contents are significantly higher than their optimums.

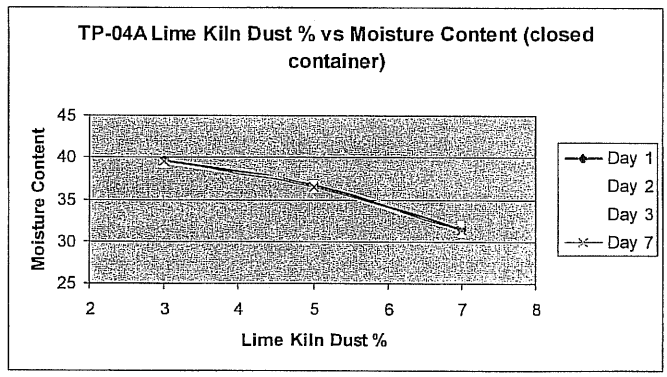
Three types of lime admixtures were evaluated to determine if the tailings can be amended to reduce the moisture content and thereby make them workable within a reasonable amount of time. Samples of 3/8" Quicklime (QL) and Lime Kiln Dust (LKD) were received from the Graymont Indian Creek Plant in Townsend Montana and a sample of 3/8" Quicklime (QL) from Wyoming Lime Producers located in Frannie, Wyoming . To determine the amount of lime necessary to amend the soils, several tests using different percentages of lime have been performed.

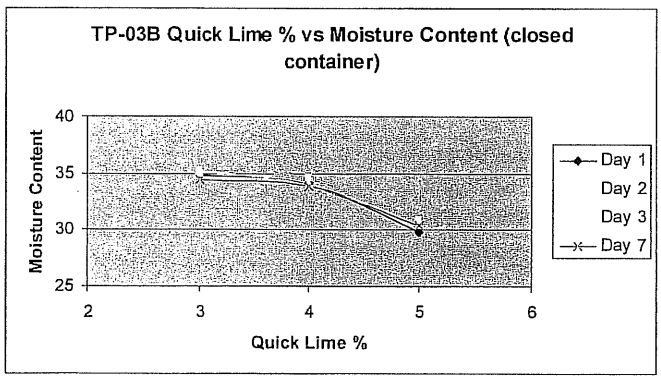
Using the samples from TP-3B and TP-4A, which had the highest in-situ moisture contents, were mixed with differing percentages of QL and LKD. The samples were stored in closed containers for set amounts of time prior to being compacted by ASTM D698 guidelines. A moisture content sample was collected from within each mold to calculate its dry unit weight. Testing times were performed at 1-, 2-, 3-, and 7-day intervals after the addition of the QL and LKD.

There was an initial reduction of moisture content noted from its unaltered state to the first day after mixing. This effect did not continue through the next six days. After the first day, the moisture content remained unchanged and did not become more workable while stored in the closed containers. This indicates the moisture reduction that occurred with the addition of lime is mostly complete within one day. The following charts display the moisture contents and dry densities measured within the closed container at the 1-, 2-, 3-, and 7-day trials of TP-3B and TP-4A.

Chart 1: Moisture Content Results after 1-, 2-, 3-, and 7-Day Trials – Closed Air







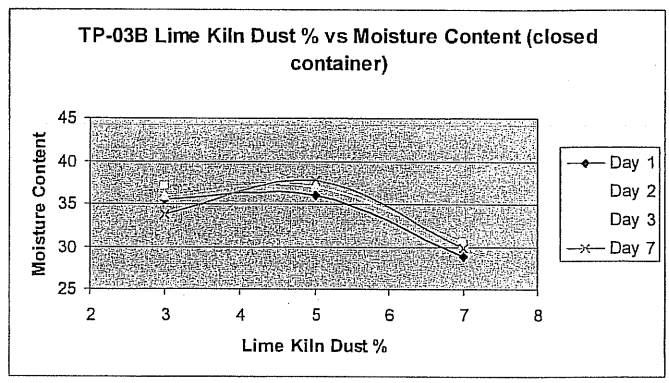
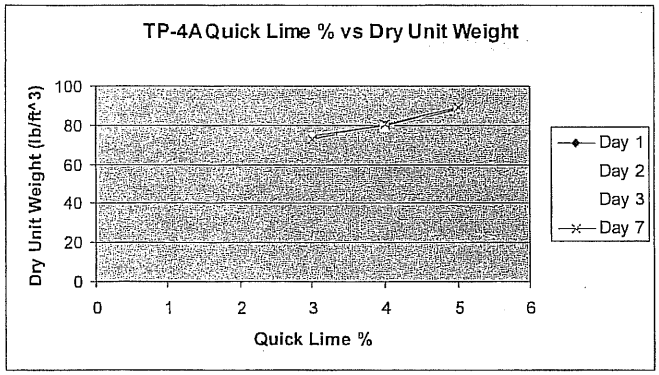
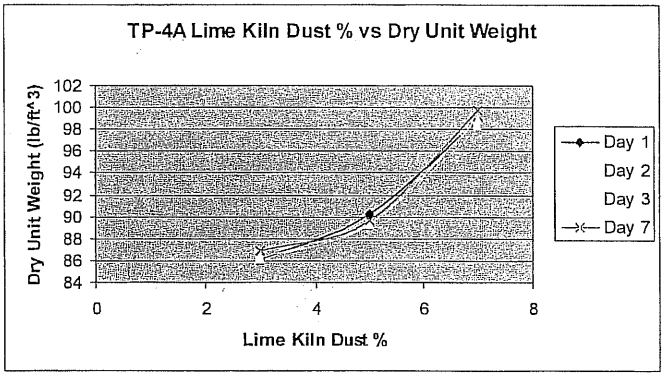
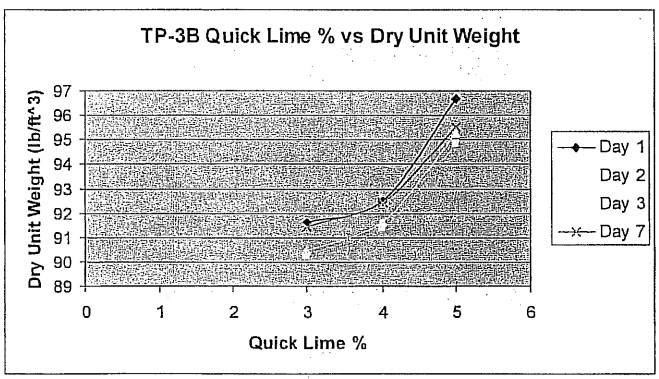
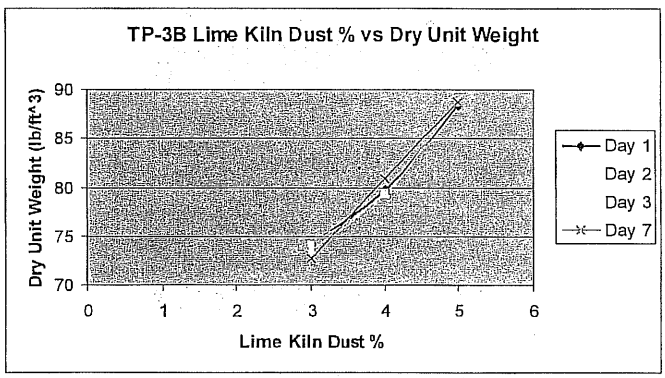


Chart 2: Dry Density Results after 1-, 2-, 3-, and 7-Day Trials





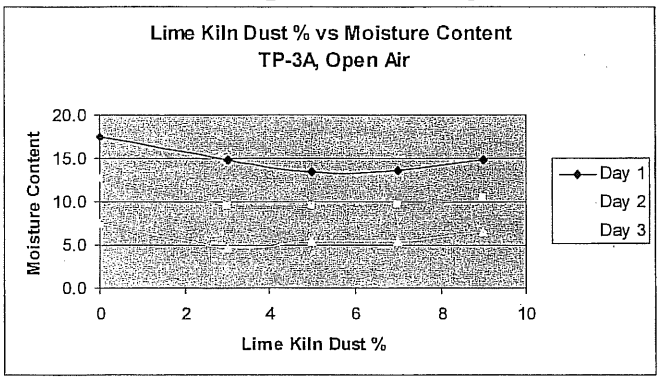


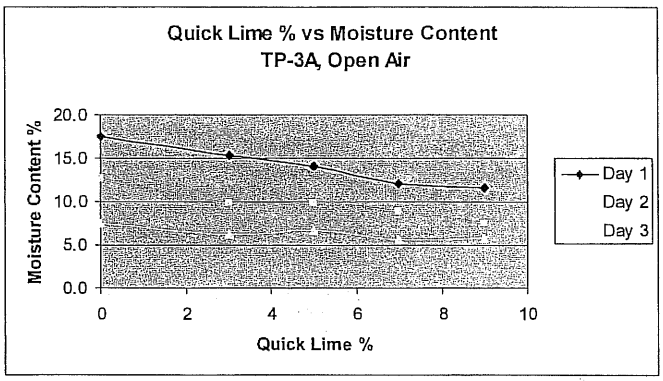


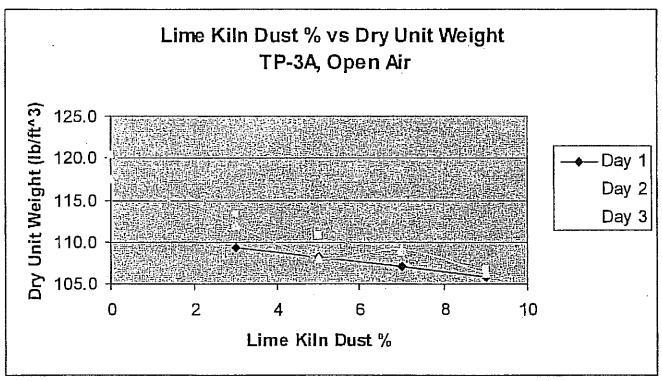
After the closed container testing results were analyzed, it was determined that testing performed under our laboratory atmospheric conditions would better represent field conditions during construction . The samples from TP-04A and TP-03A, and a composite blend of 50% TP-03A and TP-03B were mixed with differing percentages of LKD and QL and allowed to dry in the prevailing laboratory conditions. Testing was performed following the same criteria as performed on the closed container sample testing. The prevailing laboratory conditions varied from 62°F to 70°F with the relative humidity varying from 22%-35%.

From the data displayed in Charts 3, 4, and 5, it appears from the open air testing that the addition of LKD and QL quickens the moisture loss during the first day and continues to effect a moisture loss in subsequent days. The samples containing moisture contents over 30 percent (TP-04) at the onset of testing seems to require a higher addition of LKD and QL and time to marble. The term 'marble' means to cure and to make more workable. Test samples that contained less than 30 percent moisture (composite of TP-3A & TP-3B; TP-3A) required very little time to become workable and actually dried to a condition not suitable for compaction with over 3 percent of the limes. The general trend suggests that the moisture content prior to adding the lime admixture has more bearing than the actual material type. In other words, the wetter the material: the higher percentages of lime admixture: and the longer marbling time required for workability. We recommend that during construction of this project, the amount of lime addition be directly related to the moisture contents measured in the field. Based on our testing, we believe 3 percent of either a QL or LKD admixture would make materials containing less than 30 percent moisture workable within a day. For materials containing higher than 30 percent moisture, lime admixtures in the 5 to 7 percent range would likely allow compaction within one to two days. These recommendations are the results of our testing under laboratory conditions. The ambient field conditions could vary greatly from the test conditions used.

Chart 3: TP-03A Open Air Testing Results







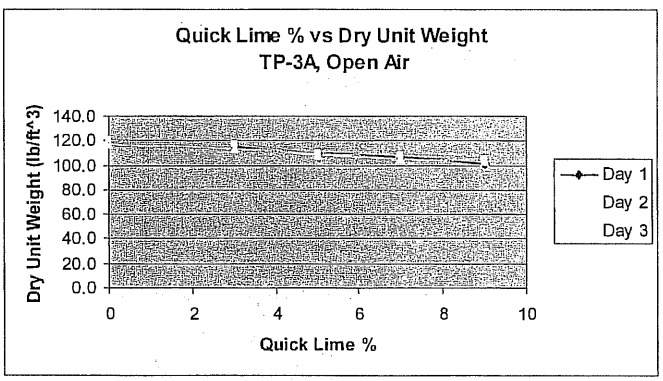
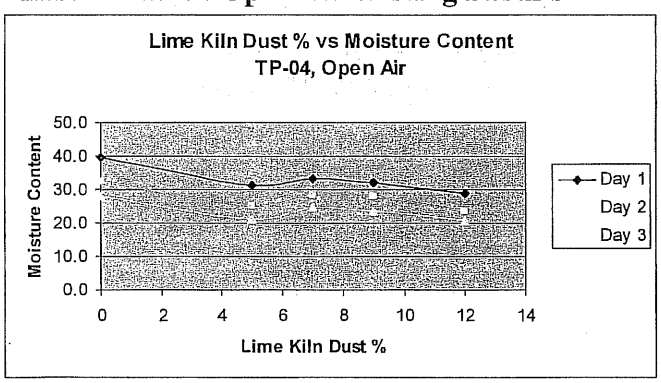
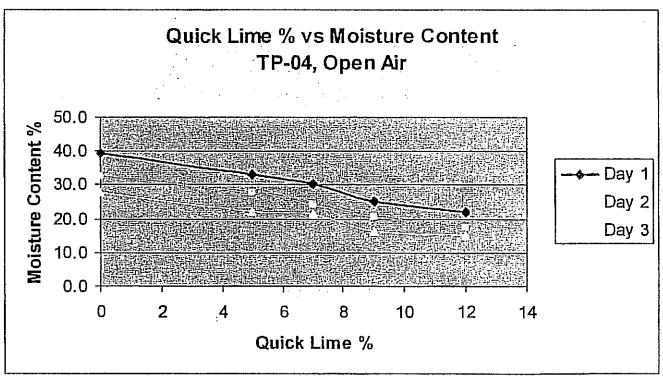
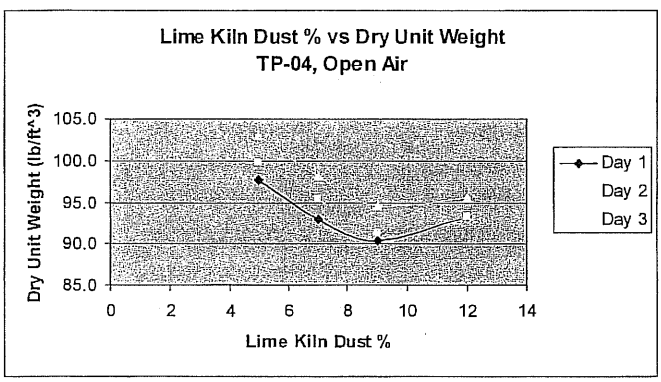


Chart 4: TP-04 Open Air Testing Results







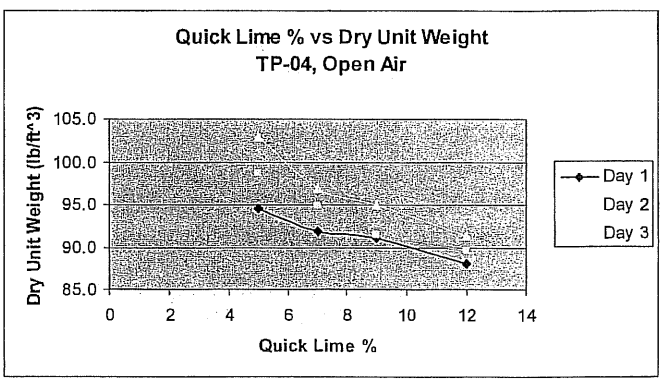
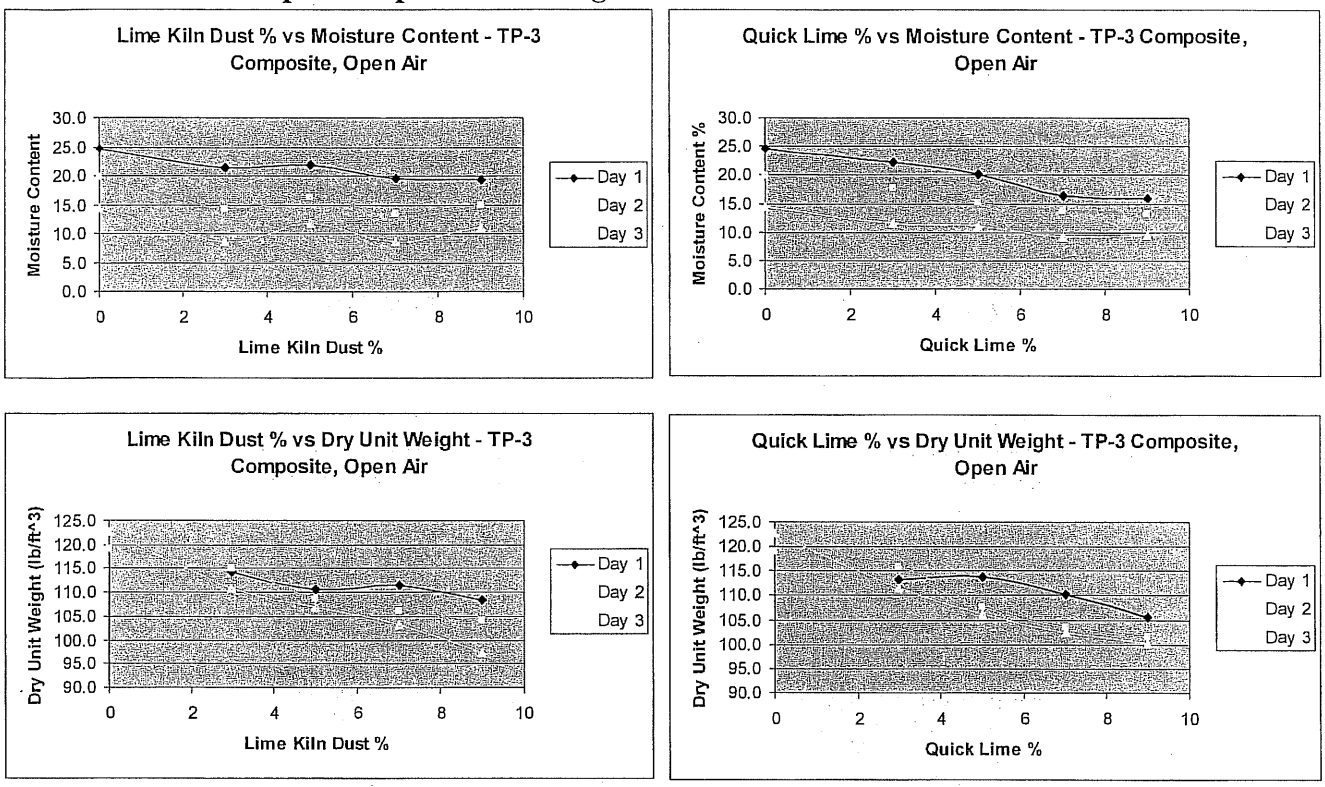


Chart 5: TP-03 Composite Open Air Testing Results

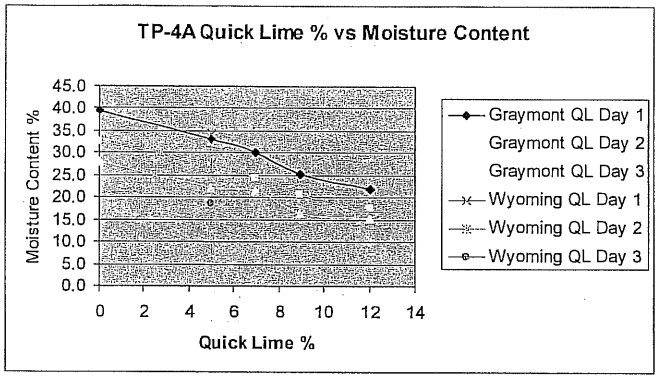


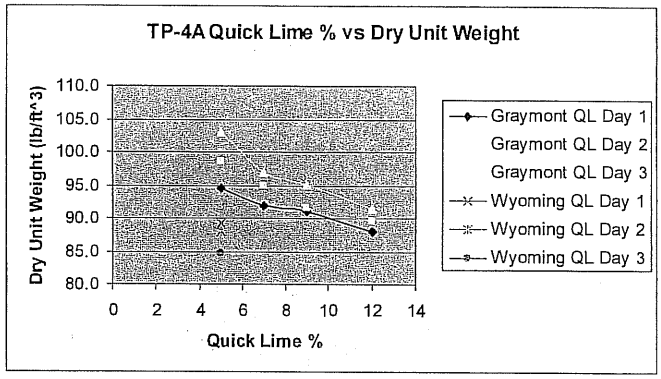
The dry unit weights generally lessened with increased percentages of the lime admixtures. The loss is likely due to the specific gravity of the material decreasing with the addition of the lime admixtures.

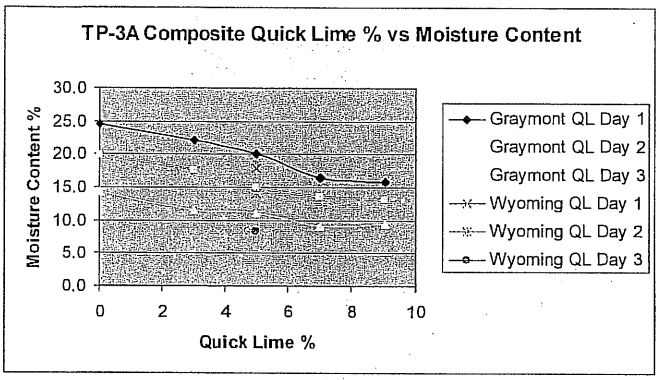
During testing, the addition of all admixtures raised the temperature of the soil significantly immediately after mixing. The effect of temperature increase dissipated within the first 24 hours. Discreet measurements of the mixtures were taken approximately five minutes after mixing with temperature still slightly increasing.

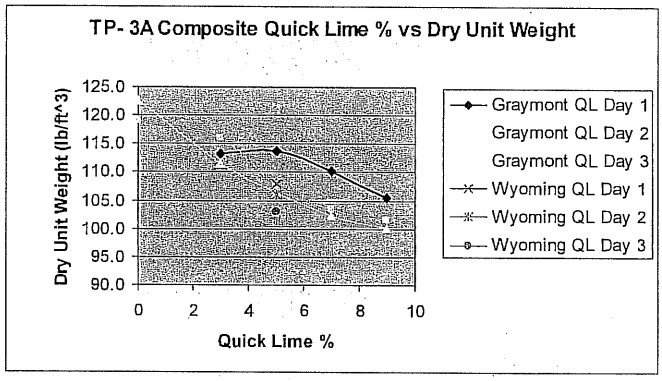
To confirm the testing results with the QL and LKD from the Graymount facility, a test was performed with the QL from Wyoming Lime Producers located in Frannie, Wyoming. To confirm the prior testing results utilizing the QL from Wyoming Lime Producers samples from TP-03A, -03B, and -04A were amended with 3% and 5% QL and tested for three days. Chart 6 presents these results.

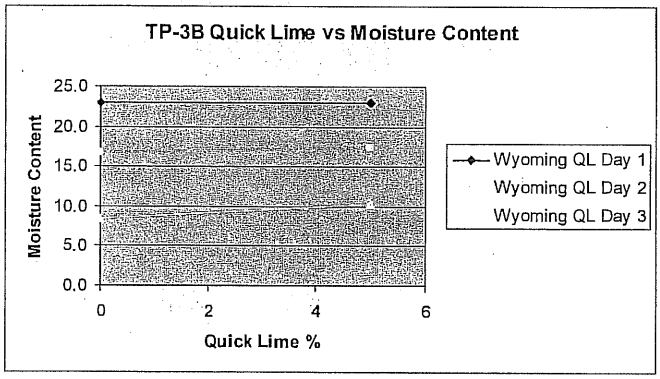
Chart 6: Wyoming Quick Lime Addition

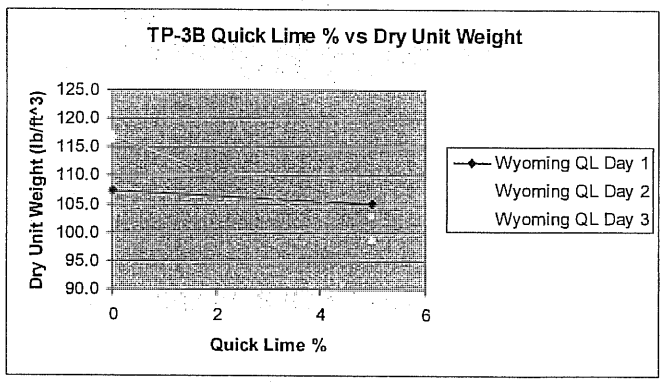












The Atterberg Limits were conducted on the lime amended samples from TP-02A, -02B, -03A, -03B, and -04A. The values for the liquid limit, plastic limit, and plasticity index are presented in Table 7. The addition of the lime amendments tended to lessen the plasticity index and create a silty material from a clayey material.

Table 7: Atterberg Limits on Lime Amended Tailings

Location	Admixture %	Liquid Limit	Plastic Limit	Plastic Index
TP-02A	**0**	**22**	**20**	**2**
	3% QL	NP	NP	NP
	5% QL	NP	NP	NP
	3% LKD	NP	NP	NP
	5% LKD	NP	NP	NP
TP-02B	**0**	**30**	**23**	**7**
	3% QL	NP	NP	NP
	5% QL	NP	NP	NP
	3% LKD	28	26	2
	5% LKD	34	26	8
TP-03A	**0**	**NP**	**NP**	**NP**
	3% QL	NP	NP	NP
	5% QL	NP	NP	NP
	3% LKD	NP	NP	NP
	5% LKD	NP	NP	NP
TP-03B	**0**	**31**	**22**	**9**
	3% QL	35	30	5
	5% QL	NP	NP	NP
	3% LKD	33	25	8
	5% LKD	35	28	7
TP-04A	**0**	**46**	**28**	**18**
	5% QL	46	36	10
	7% QL	48	37	11
	5% LKD	44	34	10
	7% LKD	51	41	10

Shrink/swell tests were conducted using a one-dimensional consolidometer. The moisture content was 53.8 percent prior to adding lime to the shrink/swell samples. Three samples from TP-04A were prepared by compacting lime amended material inside a mold and then pressing a consolidometer ring through the compacted material. The moisture content was measured again after the samples were prepared. The consolidometer rings were placed with a 150-pound seating load and dial indicators were monitored for volume movement. The dial indicators have incremental readings of 0.0001 inches. The samples were allowed to consolidate under the seating load for several days before they were inundated with water. The samples were monitored for volume swell over the next several days. The purpose of this testing was to evaluate the volume change potential of amended soils that may be rained or snowed upon prior to receiving a capping layer. The results of the testing are presented in Table 8 along with the sample's specific gravity. Based on these results, it would be beneficial to protect the top layer at the end of each construction season from accumulating moisture.

Table 8: Shrink/Swell testing of Lime Amended Tailings

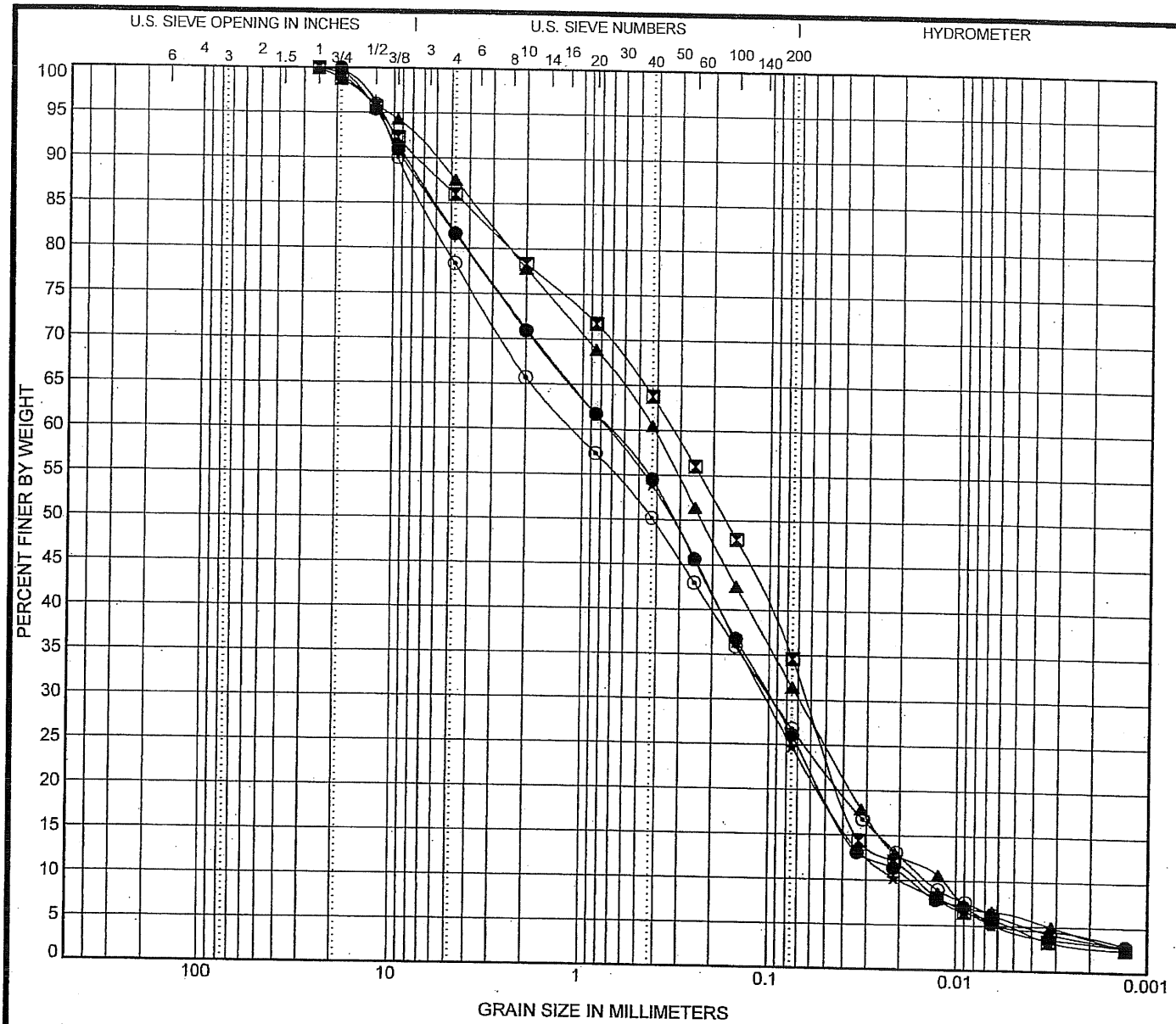
Admixture %	Unit Weight (pcf)	Moisture Content (%)	Shrink (%)	Swell (%)	Specific Gravity
5% LKD	125.84	44.57	0.057	0.66	3.372
5% QL	121.88	44.28	0.49	1.04	3.256
7% QL	126.28	39.53	0.64	1.26	3.210

The gradation curves and photographs of the material are included with this report. If you have any questions regarding these results please contact Todd Lorenzen or Paul Bushnell at 406-457-8252.

Sincerely,
PIONEER TECHNICAL SERVICES, INC.

Todd Lorenzen, P.E.
Geotechnical Project Manager

Paul Bushnell
Materials Testing Supervisor



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	CS-01	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP	0.74	41.24
⊠	CS-02	0.0	SILTY SAND(SM)	NP	NP	NP	0.73	20.32
▲	CS-03	0.0	SILTY SAND(SM)	NP	NP	NP	0.98	35.32
★	CS-04	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP	0.72	36.67
⊙	CS-05	0.0	SILTY SAND with GRAVEL(SM)	18	17	1	0.58	79.29

	Specimen Identification		D100	D50	D15	D10	%Gravel	%Sand	%Silt	%Clay
●	CS-01	0.0	19	0.324	0.038	0.017	18.4	55.5	22.9	3.2
⊠	CS-02	0.0	25	0.171	0.034	0.016	14.0	51.4	31.7	2.9
▲	CS-03	0.0	25	0.23	0.025	0.012	12.4	56.2	27.6	3.7
★	CS-04	0.0	19	0.328	0.037	0.02	18.2	57.0	21.1	3.7
⊙	CS-05	0.0	25	0.418	0.026	0.014	21.7	51.5	23.3	3.5

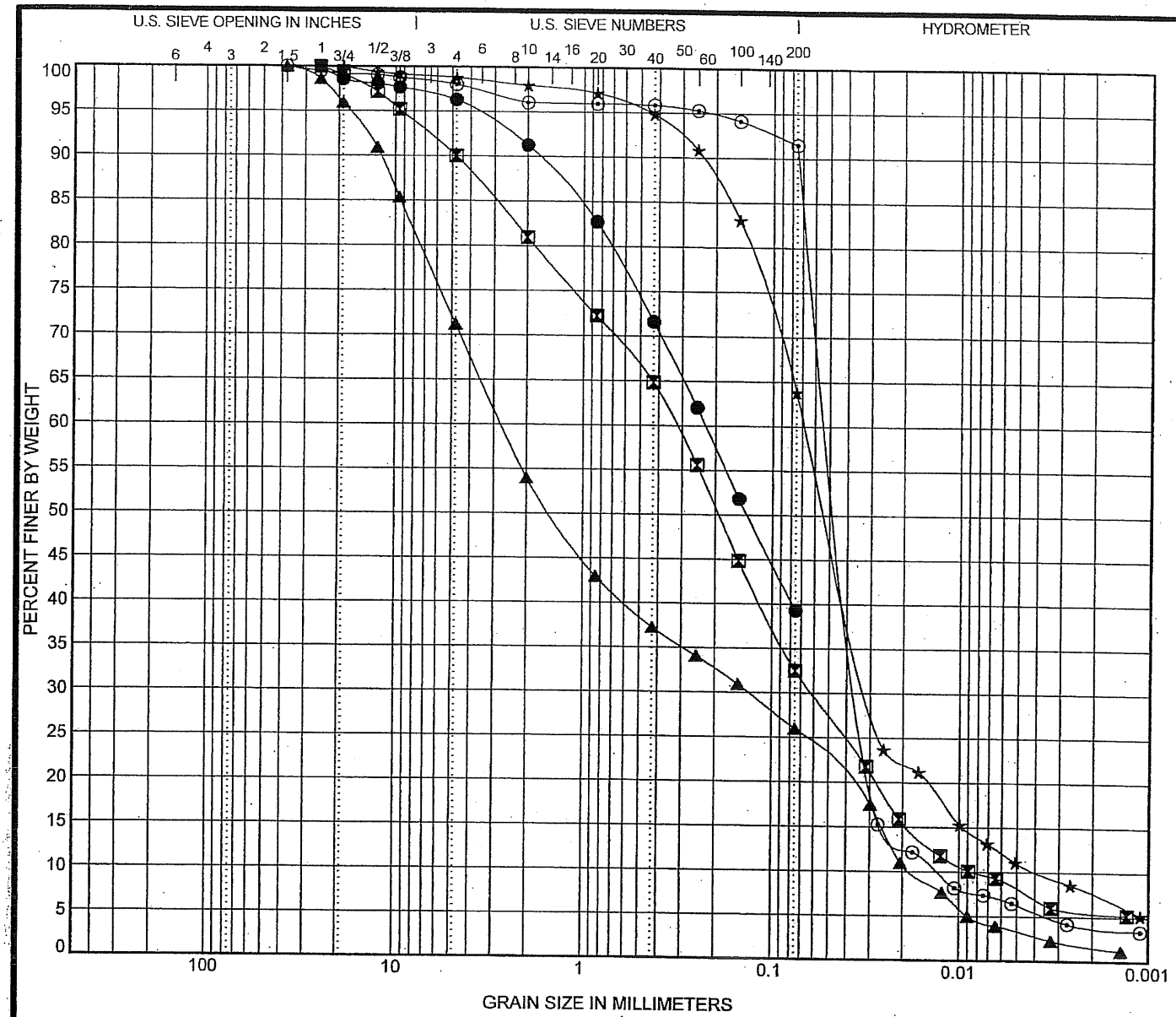
PIONEER TECHNICAL SERVICES, INC.

GRAIN SIZE DISTRIBUTION

Project: McLaren Tailings

Number: 10133

US GRAIN SIZE ASTM MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	RA-01	0.0		NP				
⊠	RA-01	2.0	SILTY SAND(SM)	NP	NP	NP	1.36	37.67
▲	RA-01	4.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP	0.36	153.98
★	TP-01	0.0	SANDY SILT(ML)	20	20	NP	3.51	17.82
⊙	TP-01	7.0	SILT(ML)	NP	NP	NP	1.67	3.72

Specimen Identification			D100	D50	D15	D10	%Gravel	%Sand	%Silt	%Clay
●	RA-01	0.0	25	0.135			3.7	57.0	39.3	
⊠	RA-01	2.0	25	0.192	0.019	0.009	10.0	57.5	26.9	5.6
▲	RA-01	4.0	37.5	1.466	0.026	0.018	28.8	45.2	24.3	1.7
★	TP-01	0.0	19	0.052	0.009	0.004	1.2	34.9	56.3	7.6
⊙	TP-01	7.0	37.5	0.043	0.026	0.013	2.0	6.5	87.6	3.9

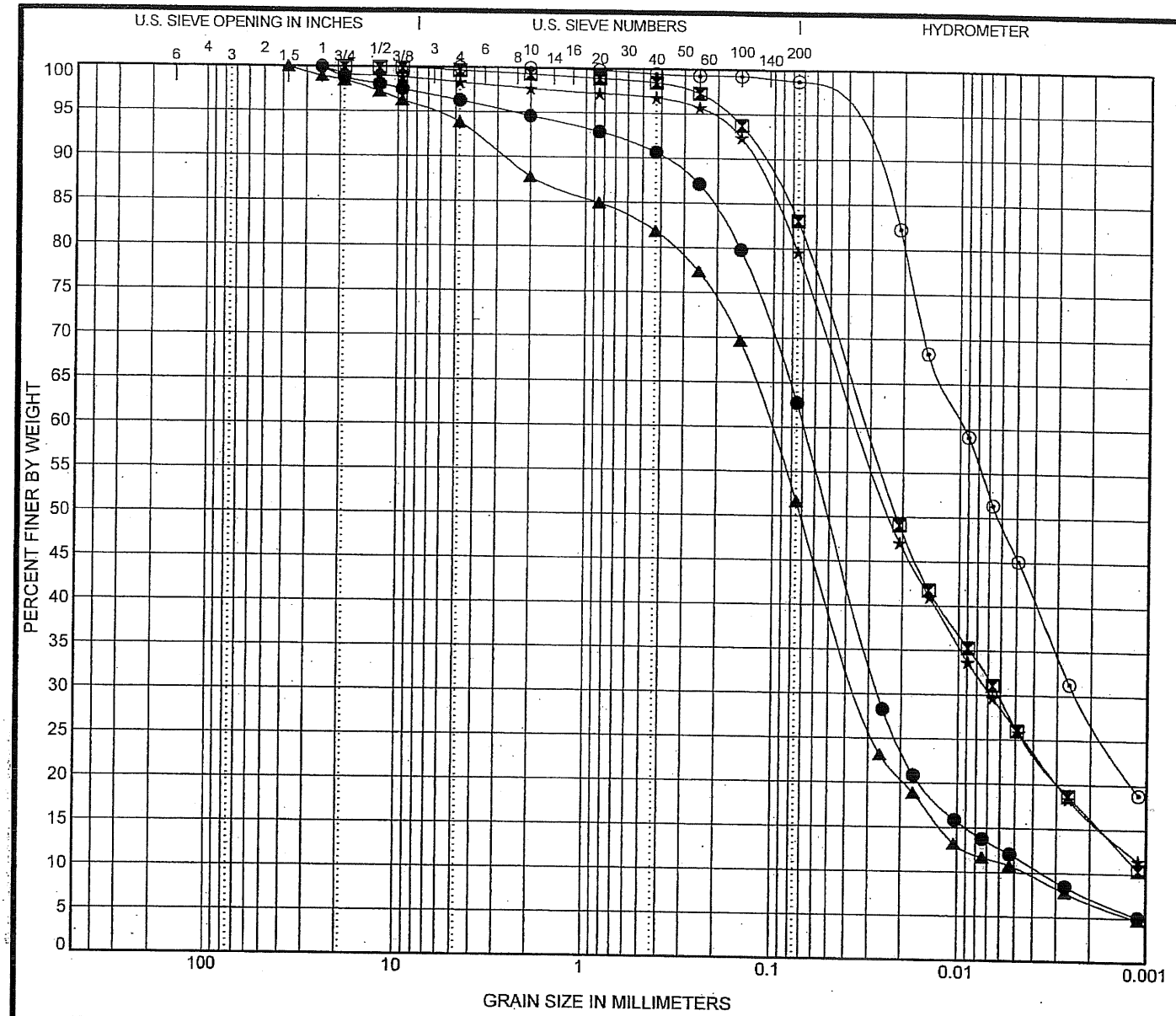
PIONEER TECHNICAL SERVICES, INC.

GRAIN SIZE DISTRIBUTION

Project: McLaren Tailings

Number: 10133

US GRAIN SIZE ASTM MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-02	0.0	SANDY SILT(ML)	22	20	2	2.86	19.21
⊠	TP-02	7.0	SILT with SAND(ML)	30	23	7		
▲	TP-03	0.0	SANDY SILT(ML)	NP	NP	NP	2.43	23.36
★	TP-03	7.0	LEAN CLAY with SAND(CL)	31	22	9		
⊙	TP-04	0.0	SILT(ML)	46	28	18		

	Specimen Identification		D100	D50	D15	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-02	0.0	25	0.05	0.009	0.004	3.7	33.5	55.4	7.4
⊠	TP-02	7.0	19	0.022	0.002		0.4	16.5	66.9	16.2
▲	TP-03	0.0	37.5	0.07	0.012	0.004	6.1	42.2	44.9	6.8
★	TP-03	7.0	25	0.023	0.002		1.7	18.7	63.3	16.3
⊙	TP-04	0.0	4.75	0.006			0.0	1.2	71.2	27.5

PIONEER TECHNICAL SERVICES, INC.

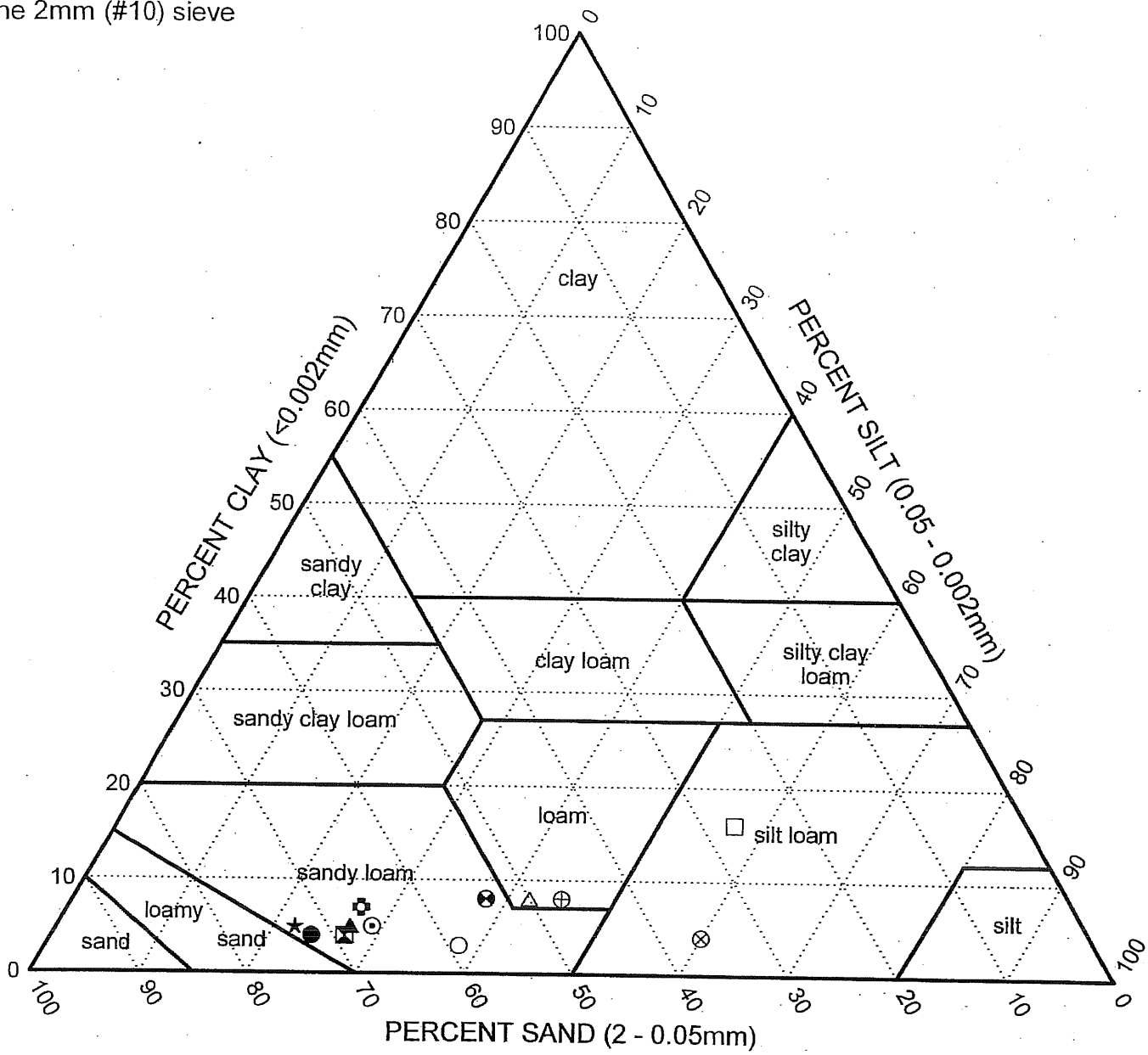
GRAIN SIZE DISTRIBUTION

Project: McLaren Tailings

Number: 10133

US GRAIN SIZE ASTM MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09

Fractions normalized to 100% passing the 2mm (#10) sieve



	Borehole	Depth (ft)	USDA Classification	Sand (%)	Silt (%)	Clay (%)
●	CS-01	0.0	SANDY LOAM	72.5	23.1	4.5
⊠	CS-02	0.0	SANDY LOAM	68.5	27.8	3.7
▲	CS-03	0.0	SANDY LOAM	67.9	27.3	4.8
★	CS-04	0.0	SANDY LOAM	73.2	21.6	5.2
⊙	CS-05	0.0	SANDY LOAM	66.3	28.3	5.4
✿	RA-01	2.0	SANDY LOAM	66.0	27.1	6.9
○	RA-01	4.0	SANDY LOAM	58.7	38.2	3.1
△	TP-01	0.0	LOAM	50.1	42.2	7.7
⊗	TP-01	7.0	SILT LOAM	36.3	59.6	4.1
⊕	TP-02	0.0	LOAM	47.2	45.1	7.8
□	TP-02	7.0	SILT LOAM	27.1	56.6	16.3
⊛	TP-03	0.0	SANDY LOAM	53.5	38.7	7.7

PIONEER TECHNICAL SERVICES, INC.

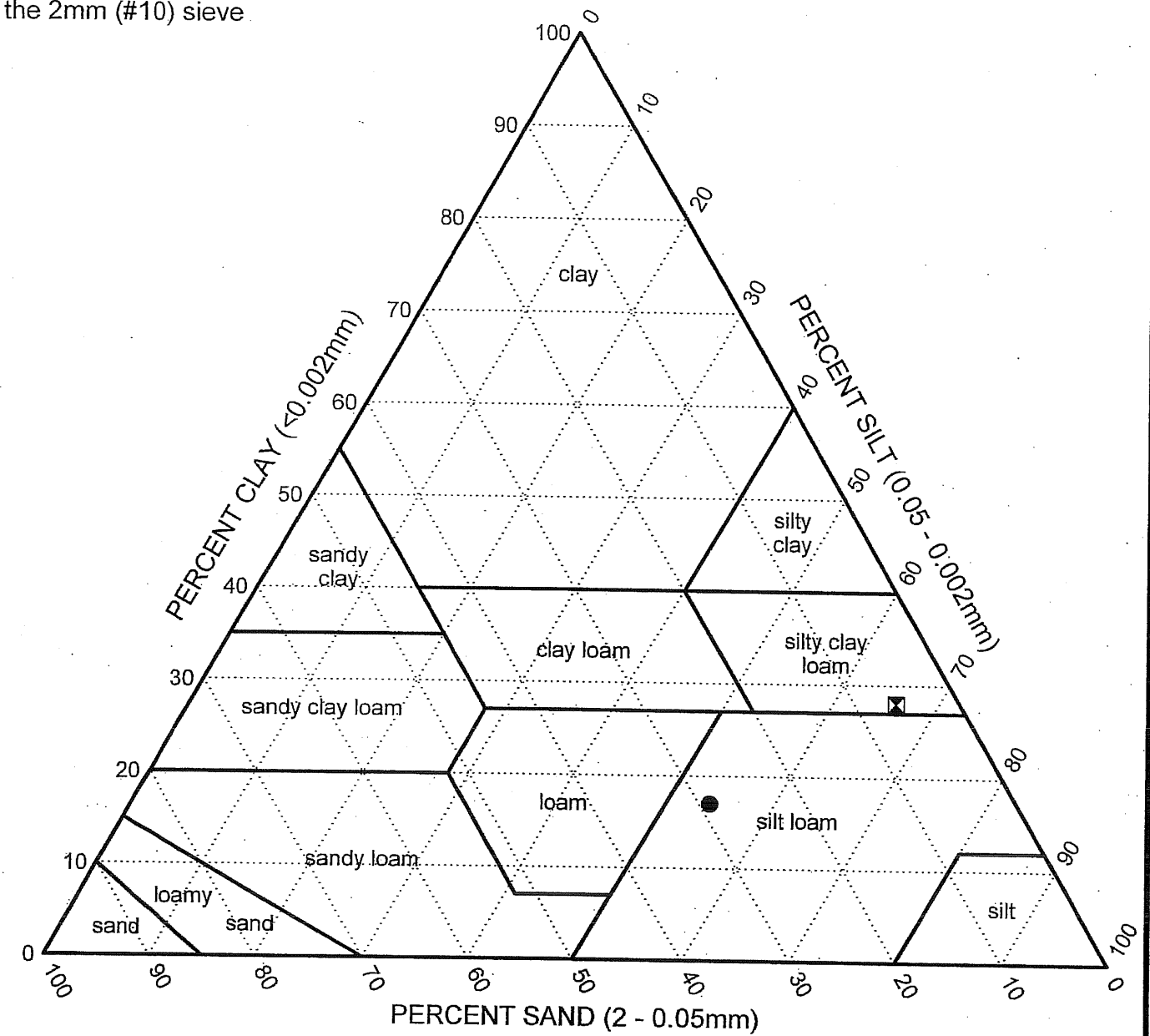
USDA Textural Classification Chart

Project: McLaren Tailings

Number: 10133

USDA TEXTURAL CLASSIFICATION MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09

Fractions normalized to 100% passing the 2mm (#10) sieve



	Borehole	Depth (ft)	USDA Classification	Sand (%)	Silt (%)	Clay (%)
●	**TP-03**	**7.0**	**SILT LOAM**	**29.0**	**54.3**	**16.7**
⊠	**TP-04**	**0.0**	**SILTY CLAY LOAM**	**6.5**	**66.0**	**27.5**

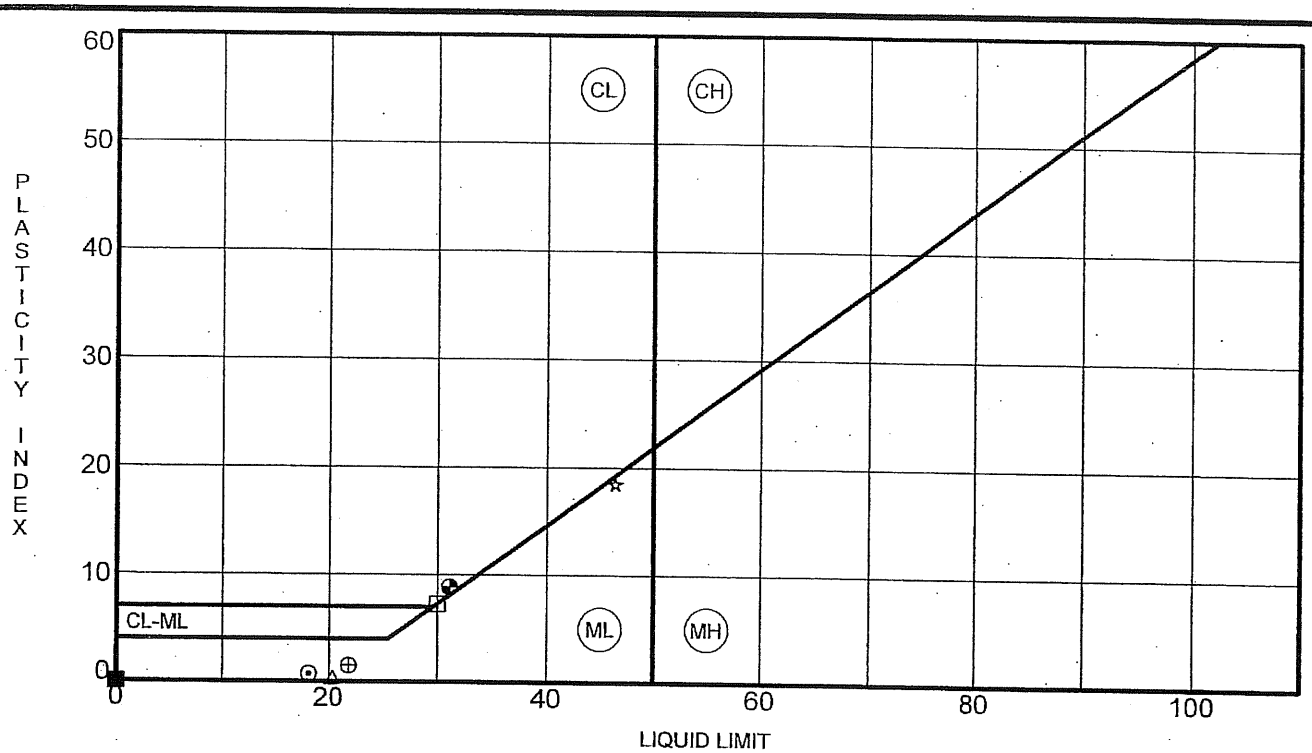
PIONEER TECHNICAL SERVICES, INC.

USDA Textural Classification Chart

Project: McLaren Tailings

Number: 10133

USDA TEXTURAL CLASSIFICATION .MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



	Specimen Identification		LL	PL	PI	Fines	Classification
●	CS-01	0.0	NP	NP	NP	26	SILTY SAND with GRAVEL(SM)
⊠	CS-02	0.0	NP	NP	NP	35	SILTY SAND(SM)
▲	CS-03	0.0	NP	NP	NP	31	SILTY SAND(SM)
★	CS-04	0.0	NP	NP	NP	25	SILTY SAND with GRAVEL(SM)
⊙	CS-05	0.0	18	17	1	27	SILTY SAND with GRAVEL(SM)
✿	RA-01	2.0	NP	NP	NP	33	SILTY SAND(SM)
○	RA-01	4.0	NP	NP	NP	26	SILTY SAND with GRAVEL(SM)
△	TP-01	0.0	20	20	NP	64	SANDY SILT(ML)
⊗	TP-01	7.0	NP	NP	NP	92	SILT(ML)
⊕	TP-02	0.0	22	20	2	63	SANDY SILT(ML)
□	TP-02	7.0	30	23	7	83	SILT with SAND(ML)
◓	TP-03	0.0	NP	NP	NP	52	SANDY SILT(ML)
◒	TP-03	7.0	31	22	9	80	LEAN CLAY with SAND(CL)
☆	TP-04	0.0	46	28	18	99	SILT(ML)

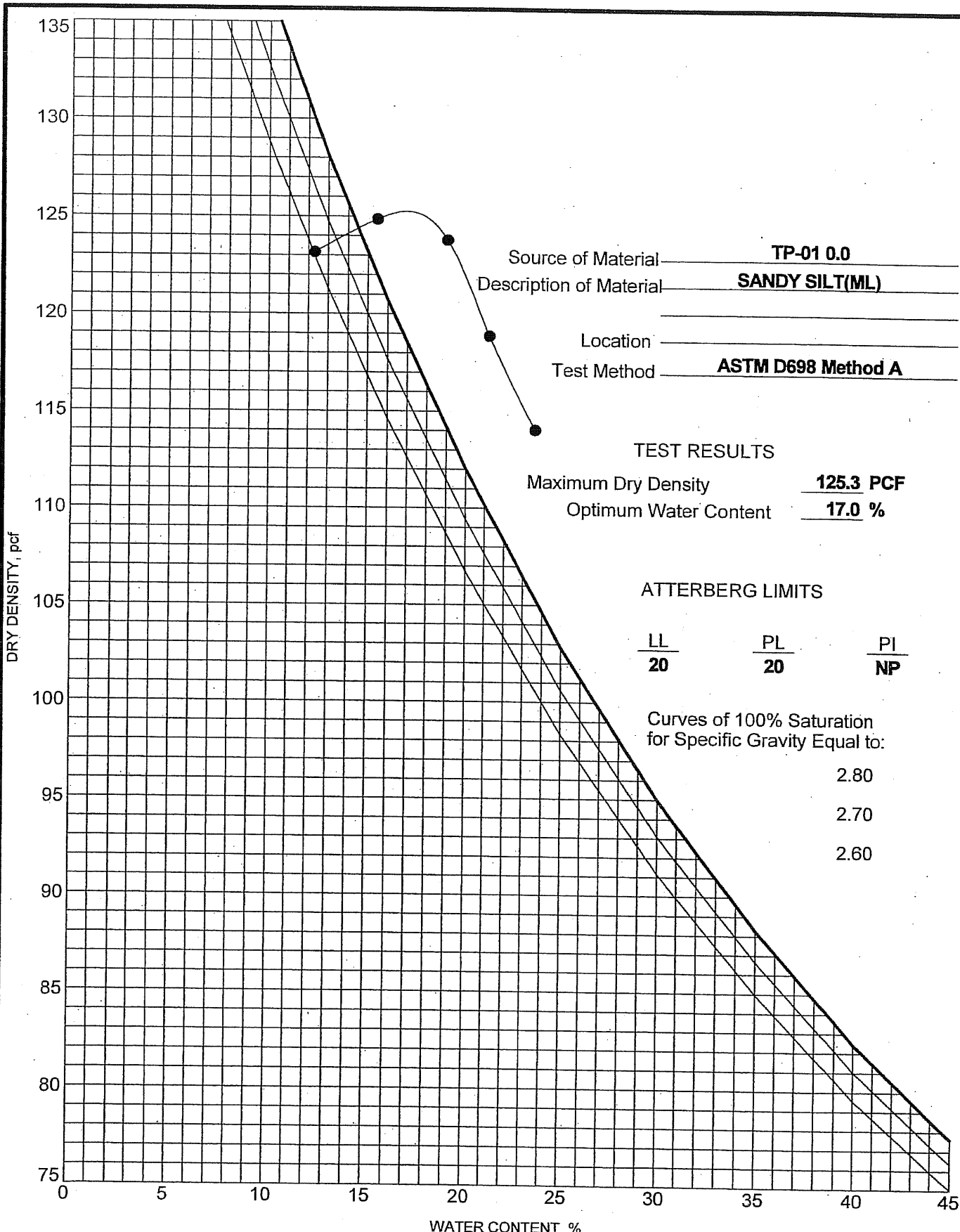
PIONEER TECHNICAL SERVICES, INC.

ATTERBERG LIMITS' RESULTS

Project: McLaren Tailings

Number: 10133

US ATTERBERG LIMITS MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: **TP-01 0.0**

Description of Material: **SANDY SILT(ML)**

Location:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**125.3 PCF**
Optimum Water Content	**17.0 %**

ATTERBERG LIMITS

LL	PL	PI
20	**20**	**NP**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

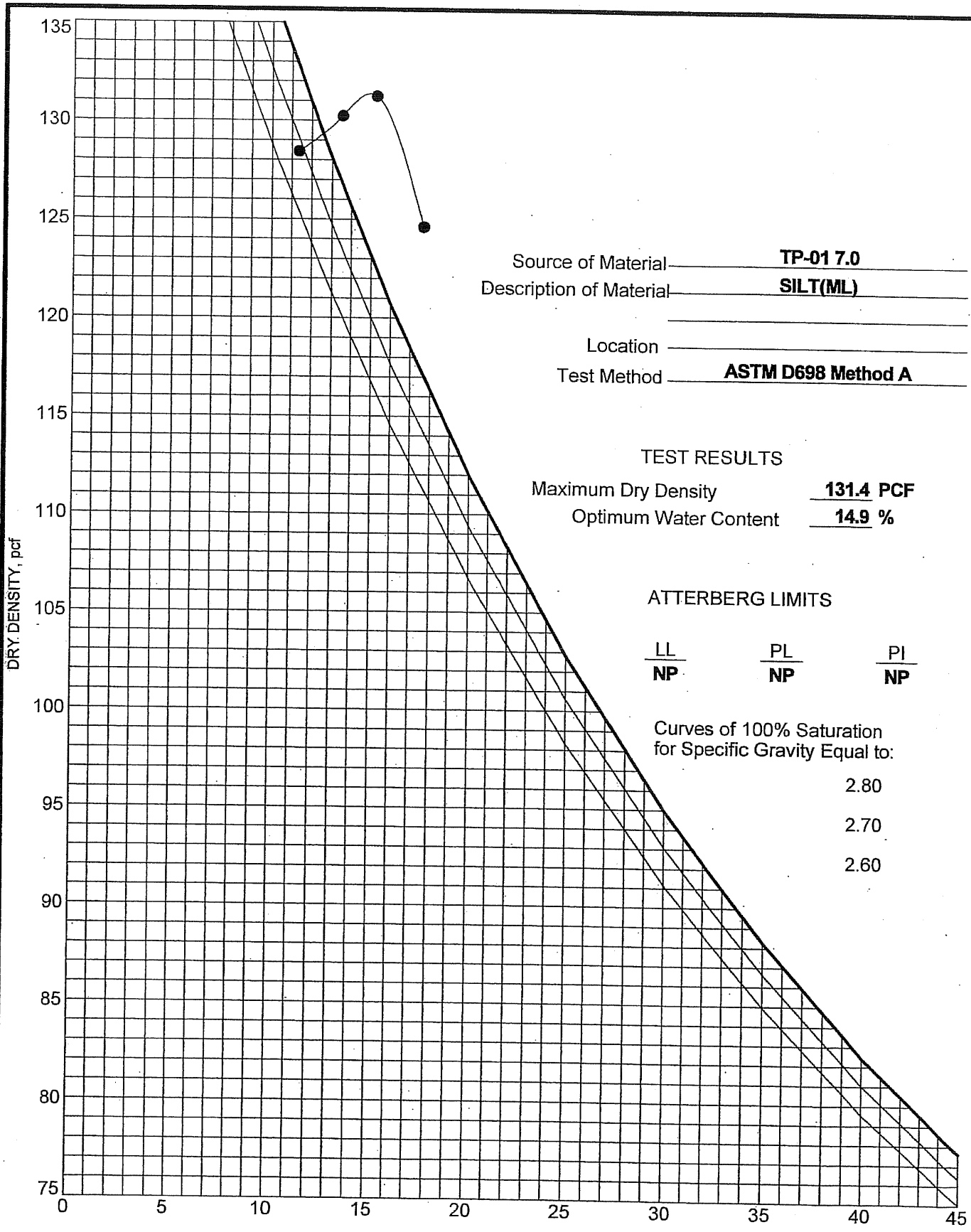
PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US COMPACTION ASTM MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: TP-01 7.0

Description of Material: SILT(ML)

Location:

Test Method: ASTM D698 Method A

TEST RESULTS

Maximum Dry Density: 131.4 PCF

Optimum Water Content: 14.9 %

ATTERBERG LIMITS

LL	PL	PI
NP	NP	NP

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

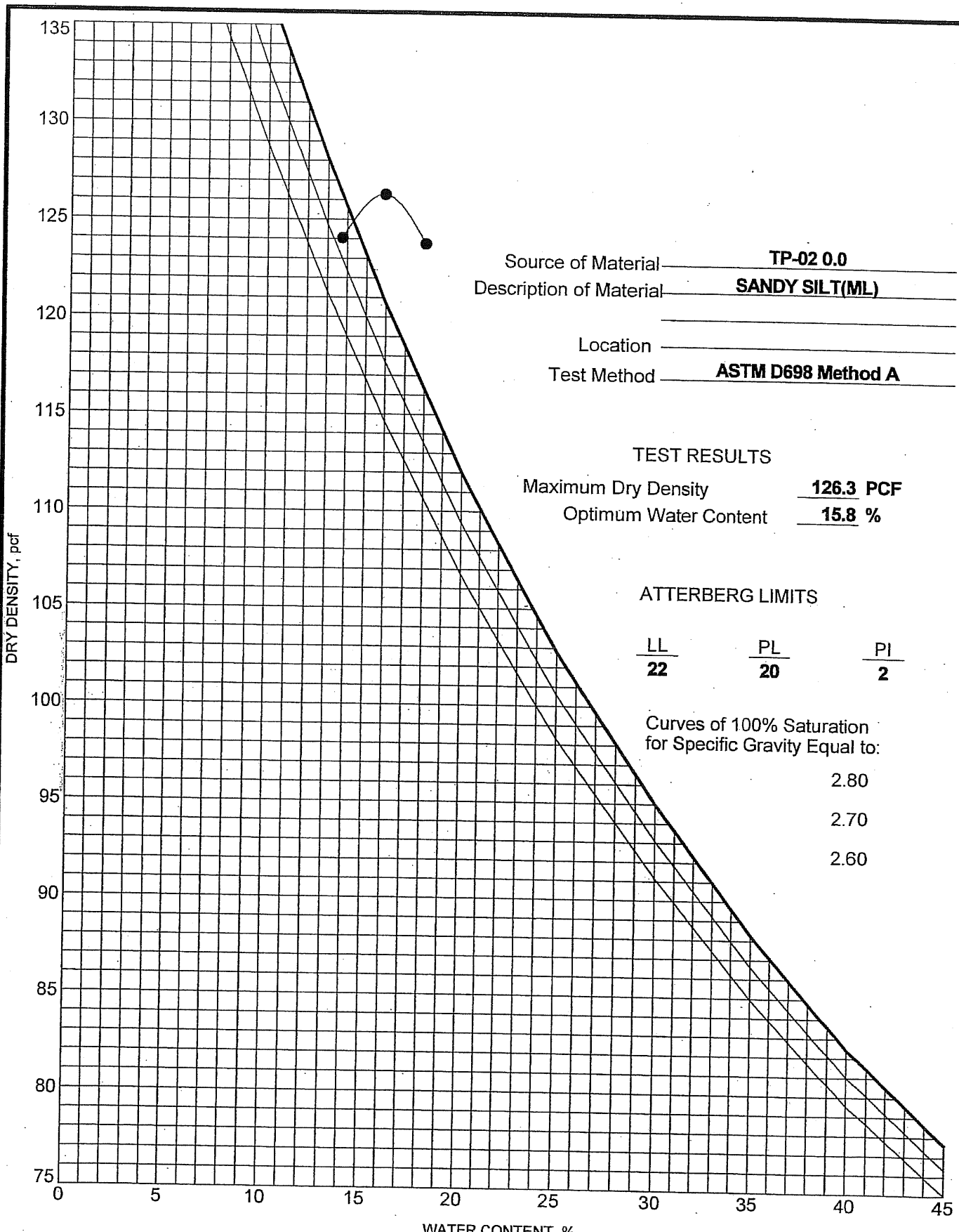
PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US COMPACTION ASTM MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: TP-02 0.0

Description of Material: SANDY SILT(ML)

Location:

Test Method: ASTM D698 Method A

TEST RESULTS

Maximum Dry Density: 126.3 PCF

Optimum Water Content: 15.8 %

ATTERBERG LIMITS

LL	PL	PI
22	20	2

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

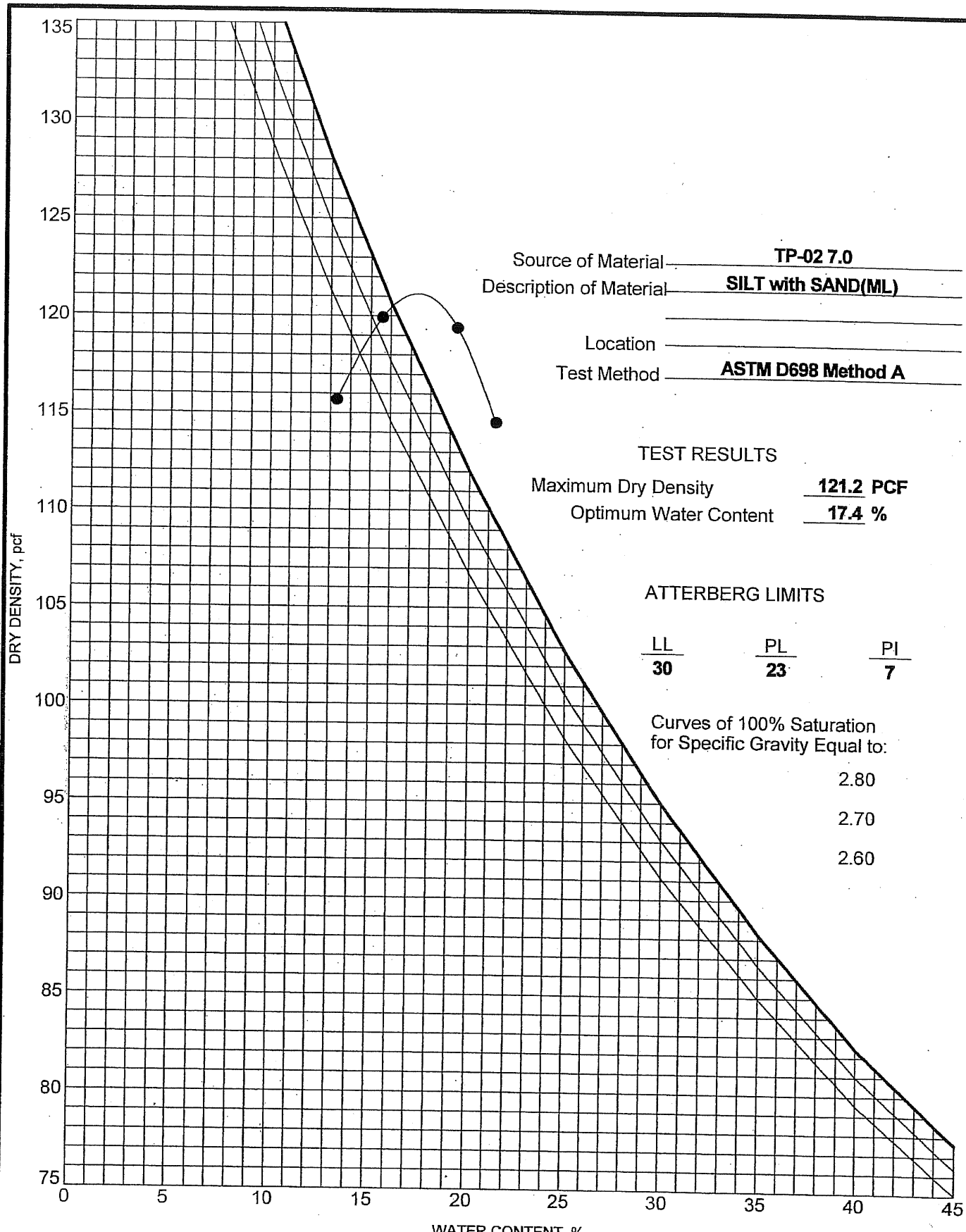
PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US_COMPACTION_ASTM_MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: TP-02 7.0

Description of Material: SILT with SAND(ML)

Location:

Test Method: ASTM D698 Method A

TEST RESULTS

Maximum Dry Density	121.2 PCF
Optimum Water Content	17.4 %

ATTERBERG LIMITS

LL	PL	PI
30	23	7

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

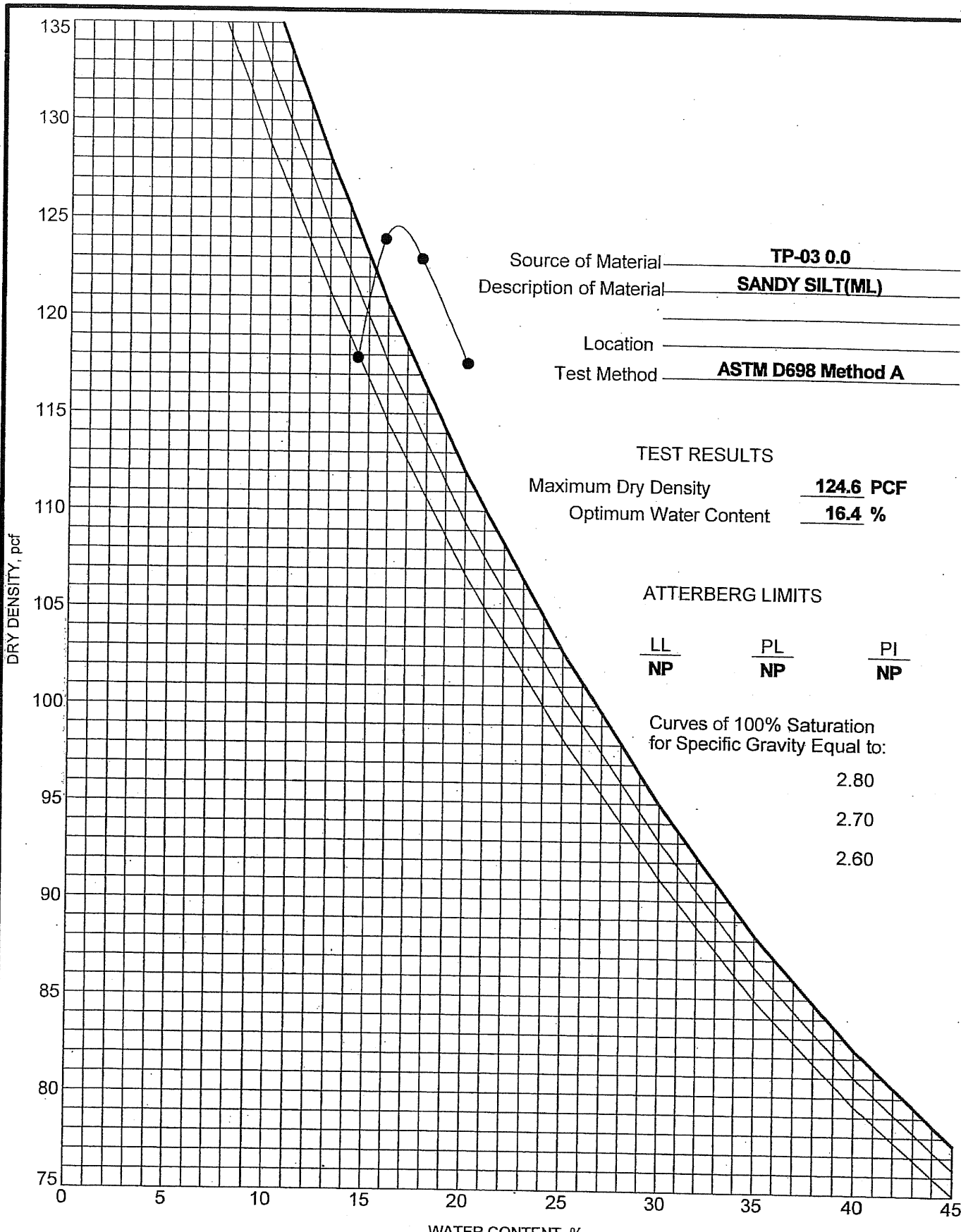
PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US_COMPACTION_ASTM_MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: **TP-03 0.0**

Description of Material: **SANDY SILT(ML)**

Location:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**124.6** PCF
Optimum Water Content	**16.4** %

ATTERBERG LIMITS

LL	PL	PI
NP	**NP**	**NP**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

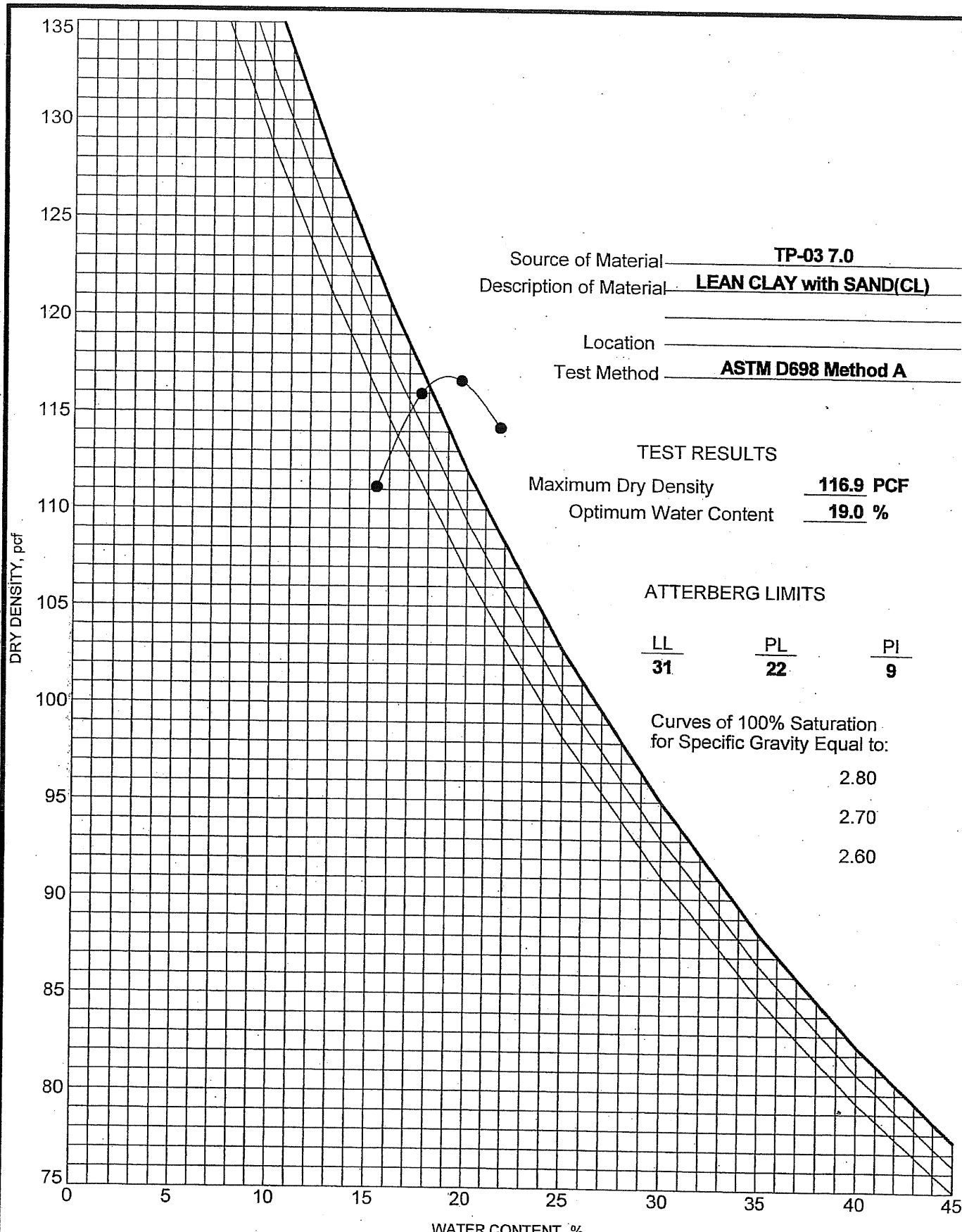
US_COMPACTION_ASTM_MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09

PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133



Source of Material: **TP-03 7.0**

Description of Material: **LEAN CLAY with SAND(CL)**

Location:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density: **116.9 PCF**

Optimum Water Content: **19.0 %**

ATTERBERG LIMITS

LL	PL	PI
31	22	9

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

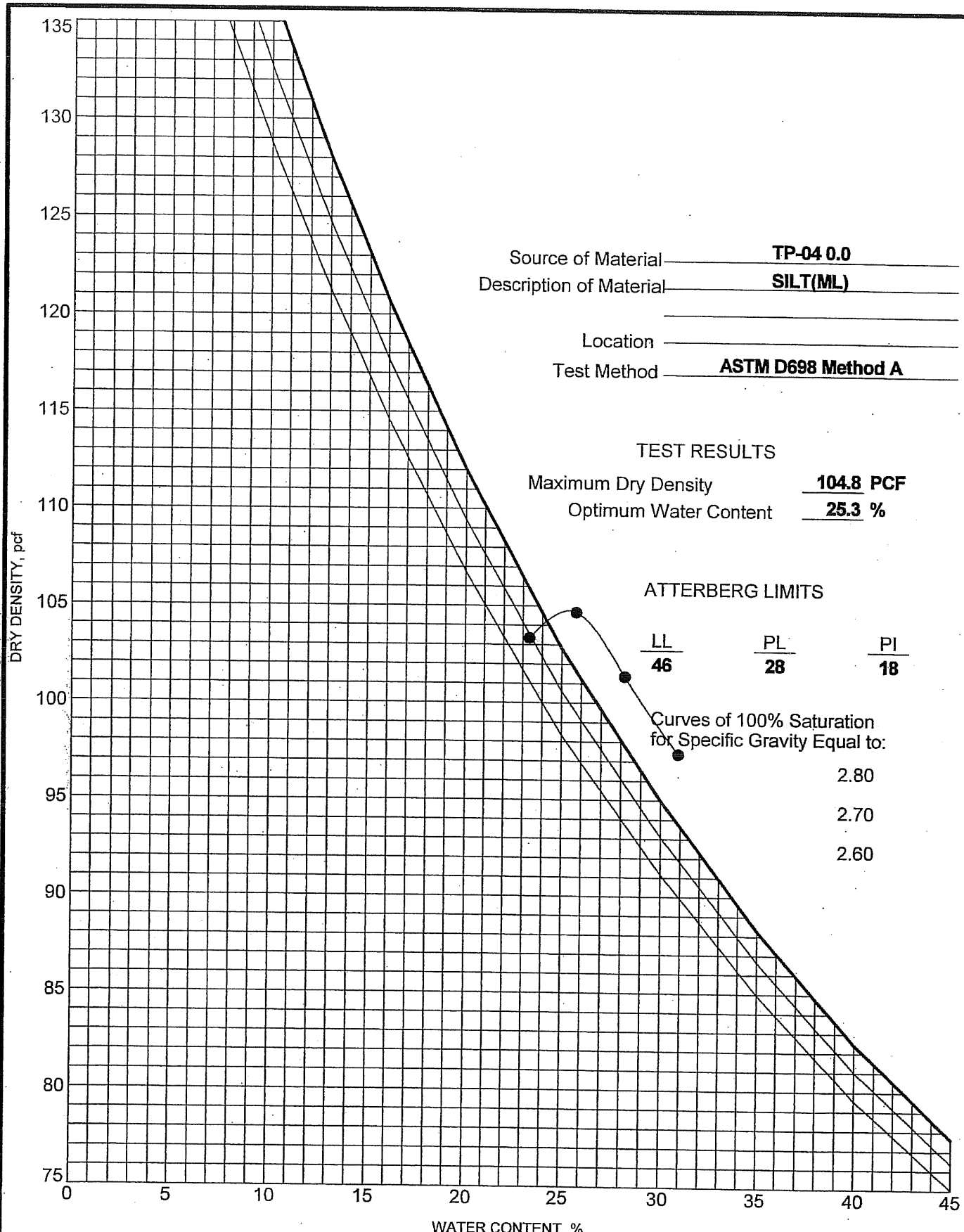
PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US_COMPACTION_ASTM_MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09



Source of Material: **TP-04 0.0**

Description of Material: **SILT(ML)**

Location:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density: **104.8 PCF**

Optimum Water Content: **25.3 %**

ATTERBERG LIMITS

LL	PL	PI
46	28	18

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

PIONEER TECHNICAL SERVICES, INC.

MOISTURE-DENSITY RELATIONSHIP

Project: McLaren Tailings

Number: 10133

US_COMPACTION_ASTM_MCLAREN TAILINGS - 10133.GPJ PIONEER.GDT 2/23/09

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
CS-01	0.0	NP	NP	NP	19	26	A-2-4	3.6			
CS-02	0.0	NP	NP	NP	25	35	A-2-4	7.1			
CS-03	0.0	NP	NP	NP	25	31	A-2-4	6.4			
CS-04	0.0	NP	NP	NP	19	25	A-2-4	4.9			
CS-05	0.0	18	17	1	25	27	A-2-4	5.7			
RA-01	0.0	NP			25	39		34.8			
RA-01	2.0	NP	NP	NP	25	33	A-2-4	6.4			
RA-01	4.0	NP	NP	NP	37.5	26	A-2-4	8.1			
TP-01	0.0	20	20	NP	19	64	A-4	21.1			
TP-01	7.0	NP	NP	NP	37.5	92	A-4	22.6			
TP-02	0.0	22	20	2	25	63	A-4	28.0			
TP-02	7.0	30	23	7	19	83	A-4	31.0			
TP-03	0.0	NP	NP	NP	37.5	52	A-4	23.4			
TP-03	7.0	31	22	9	25	80	A-4	35.8			
TP-04	0.0	46	28	18	4.75	99	A-7-6	49.3			

PIONEER TECHNICAL SERVICES, INC.

Summary of Laboratory Results

Project: McLaren Tailings

Number: 10133