

## Appendix 4 (Laboratory and In situ Direct Shear Results)

## PARAMETERS WITH UNITS

<b>Parameters</b>	<b>Units</b>
Measured Cohesion	kPa
Intrinsic Cohesion	kPa
Friction Angle	(°)
Water Content	%
Wet Density	kg/m <sup>3</sup>
Dry Density	kg/m <sup>3</sup>
Matric Suction	kPa
Normal Stress	kPa
Peak Shear Stress	kPa
Post Peak Stress	kPa
Gravel	%
Sand	%
Fine	%
Maximum Particle Size	cm
Shear Box Size	cm
Liquid Limit	%
Plastic Limit	%
Plasticity Index	%

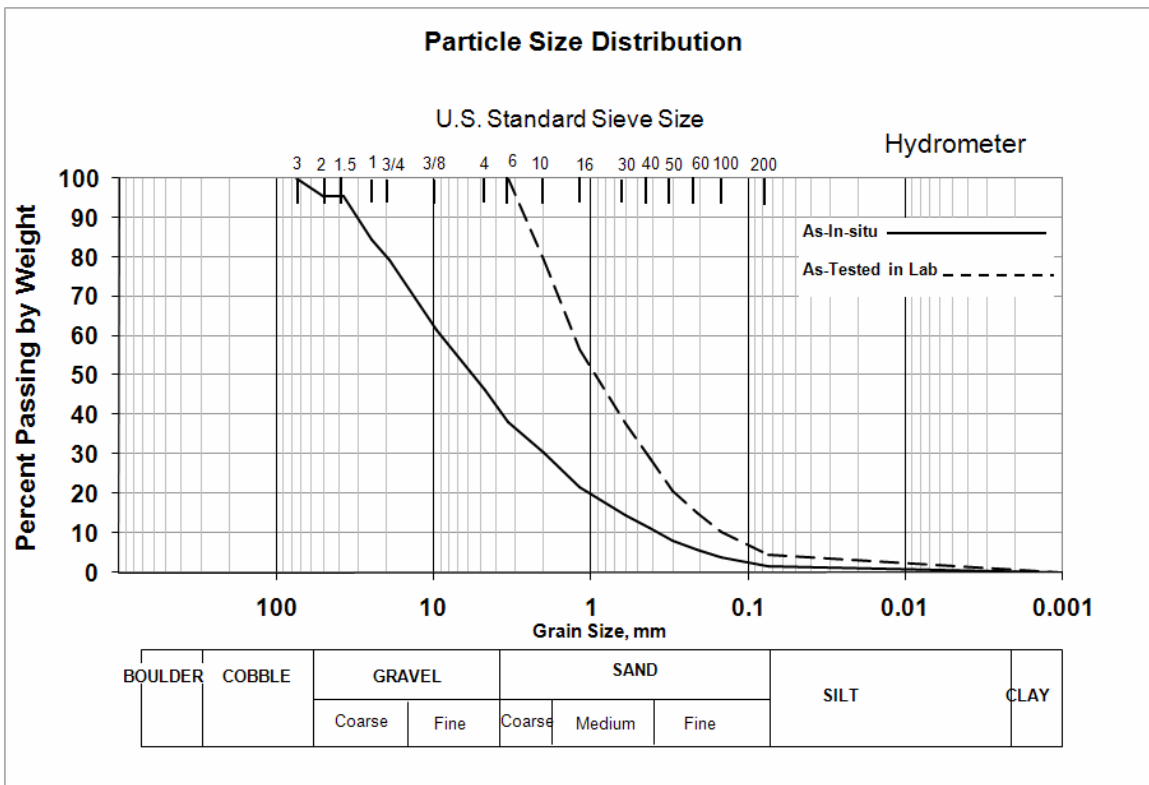
## PARTICLE –SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 1  
 TEST DATE: N/A

SAMPLE: MID-AAF-0001-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 29.3	GRAVEL: 53.7
PLASTIC LIMIT: 20.6	SAND: 44.6
PLASTICITY INDEX: 8.7	FINE: 1.7
SPECIFIC GRAVITY: 2.7	
ATTERBERG CLASSIFICATION: CL	



**UNIFIED SOIL CLASSIFICATION:**

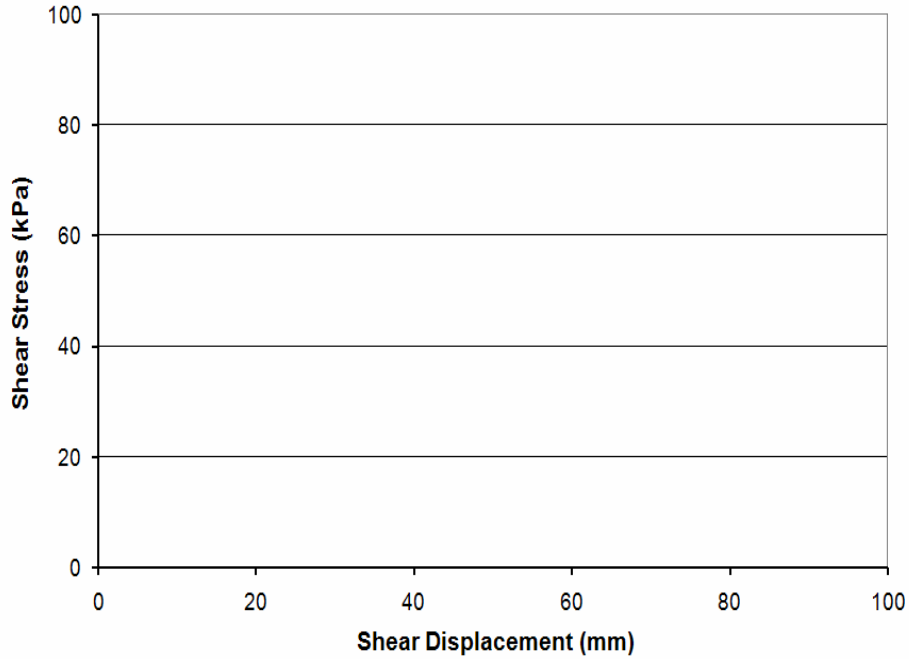
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	2	30.27	0.0419		0.0015	
2	50	95.49	16	1.18	21.67	0.0303		0.0013	
1-1/2	37.5	95.49	30	0.6	14.49	0.0217			
1	25	84.58	40	0.425	11.17	0.0157			
3/4	19	79.44	50	0.3	7.97	0.0114			
3/8	9.5	61.44	70	0.212	5.81	0.0082			
4	4.75	46.34	100	0.15	3.95	0.0058			
6	3.36	38.22	200	0.075	1.74	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

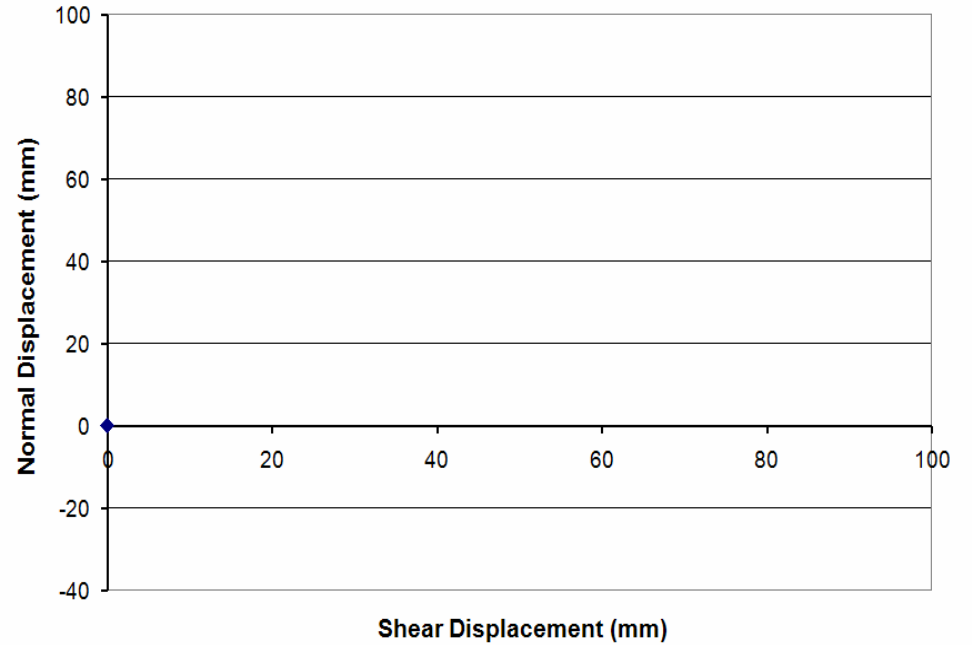
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 1  
 TEST DATE: N/A

UTM Northing: 4060686  
 UTM Easting: 454294



**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

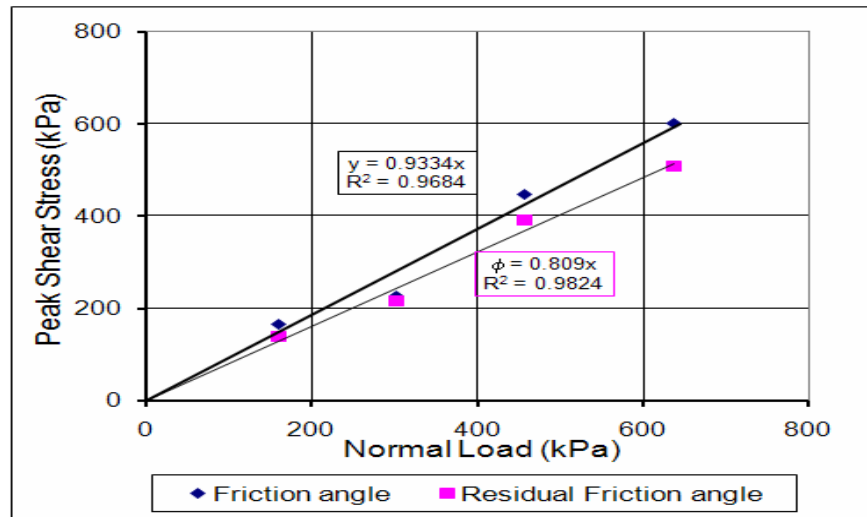
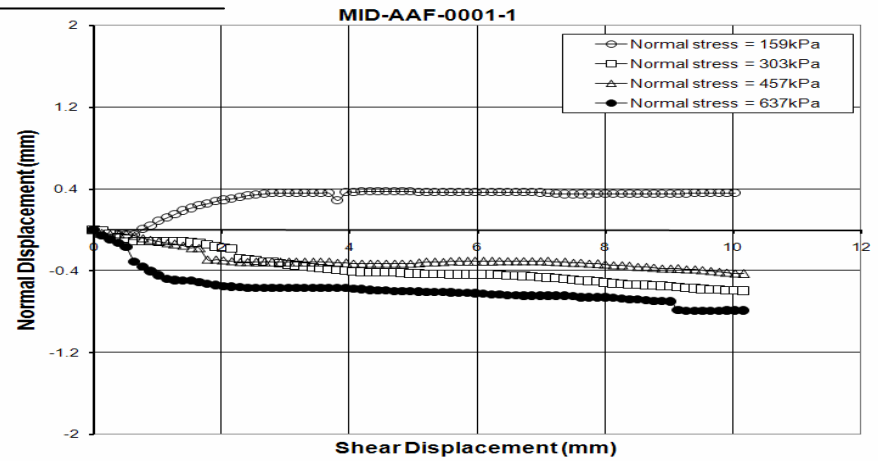
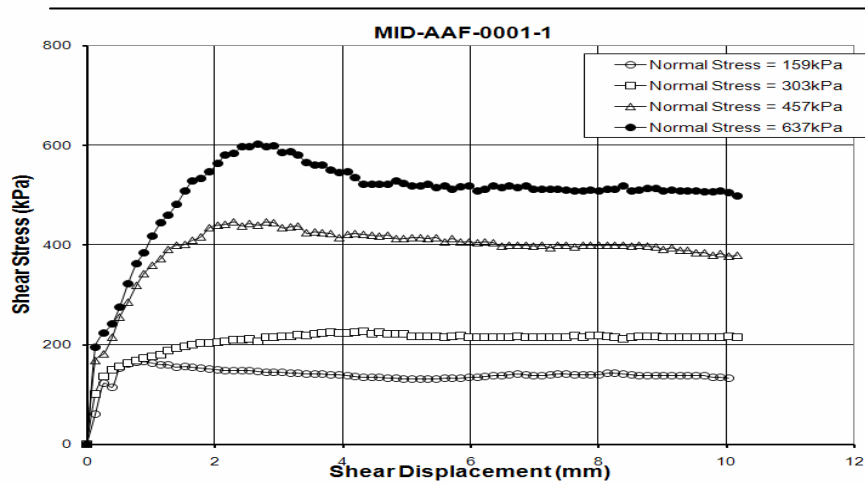
<b>Field id:</b>	MID-AAF-0001-1						
Measured Cohesion	20.6	Water Content	na	Shear box size	30	Peak Shear Stress	41.70
Intrinsic Cohesion	na	Wet Density	na	Matric Suction	na	Post Peak Shear Stress	
Max. Particle Size	unknown	Dry density	2120	Normal Stress	17.27	Elevation (ft)	2875.3



# LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

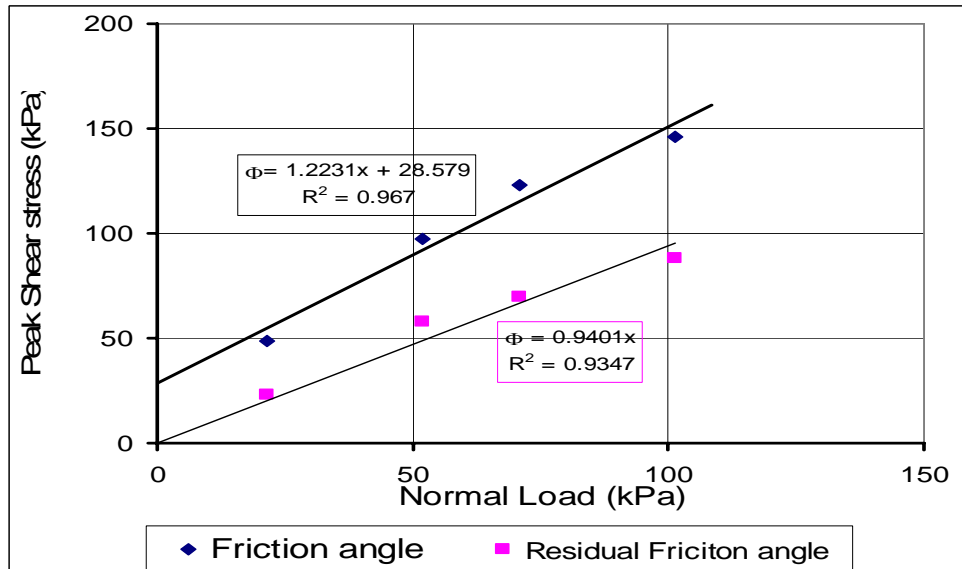
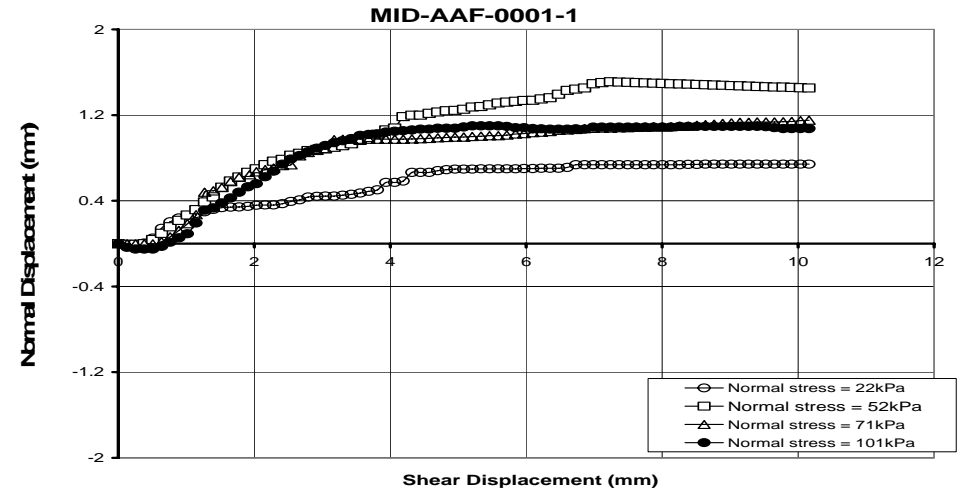
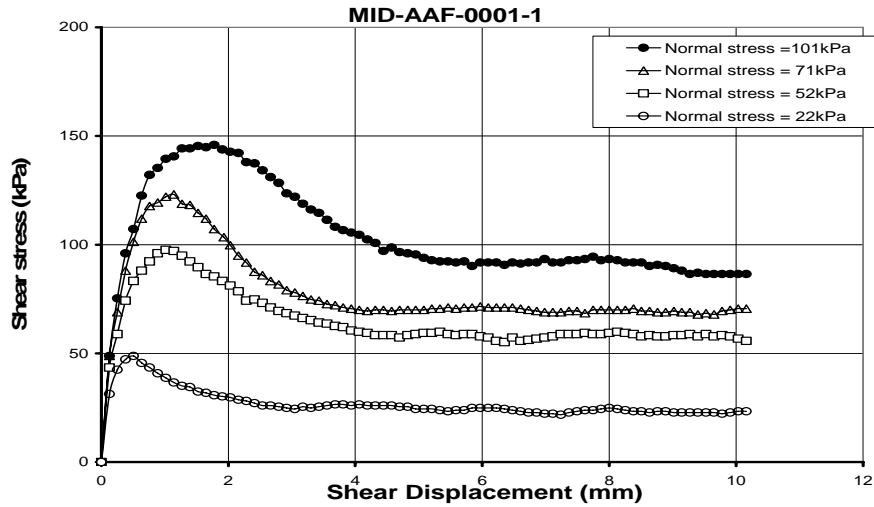
TEST NO: 1  
 TEST DATE: 7/16/2007



<b>Field id:</b>	MID-AAF-0001-1						
Measured Cohesion		Water Content		Void Ratio		Peak Shear Stress	166.05,226.71,446.55,602.65
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	139.16,216.49,393.33,509.51
Friction Angle	43.03	Dry density	1960	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO:  
 TEST DATE:



<b>Field id:</b>	MID-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	48.81,97.61,123.08,145.89
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.25,57.90,69.43,88.28
Friction Angle ( $^{\circ}$ )	50.73	Dry density	1990	Normal Stress	22,52,71,101	Elevation	

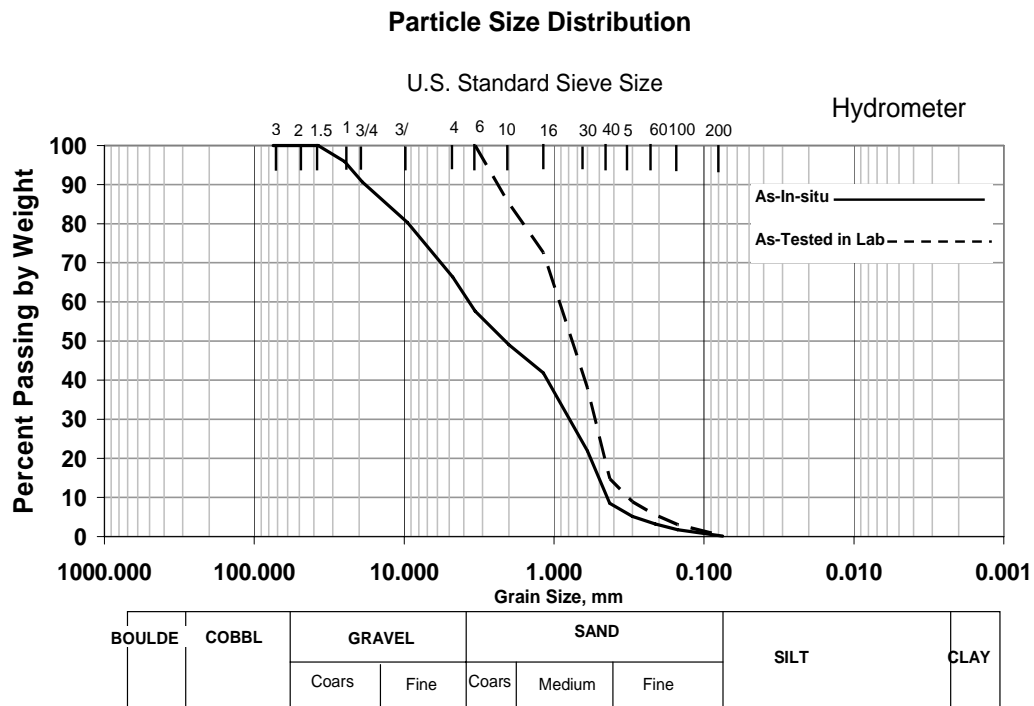
## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 2  
 TEST DATE: 12/25/2006

SAMPLE: **MID-AAF-0002-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 26.8	GRAVEL: 33.7
PLASTIC LIMIT: 20.1	SAND: 66.2
PLASTICITY INDEX: 6.7	FINE: 0.1
SPECIFIC GRAVITY: 2.7	
ATTERBERG CLASSIFICATION: CL-ML	



UNIFIED SOIL CLASSIFICATION:

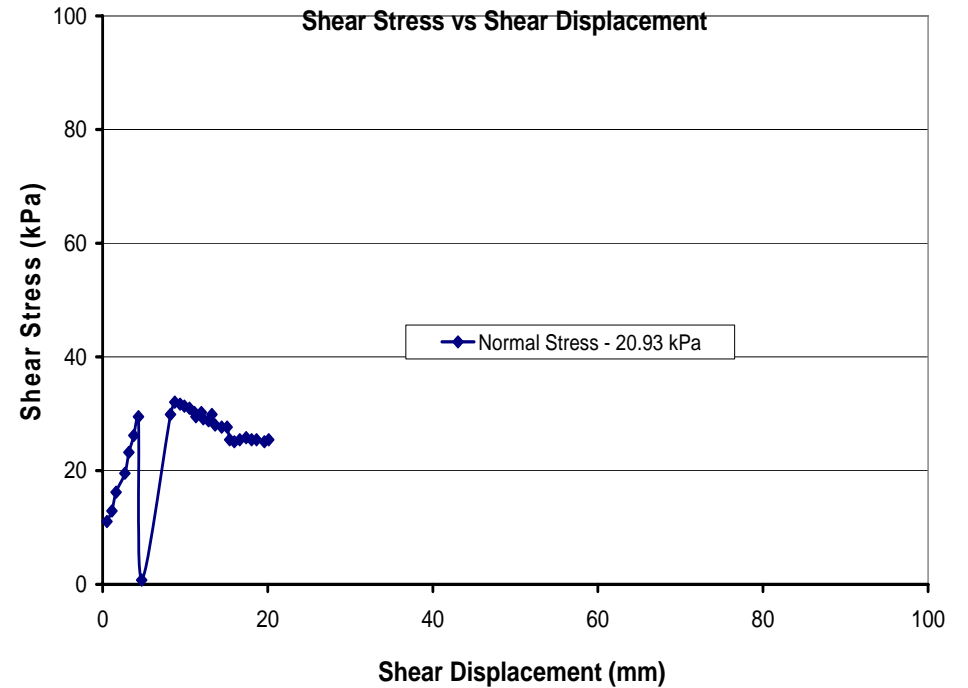
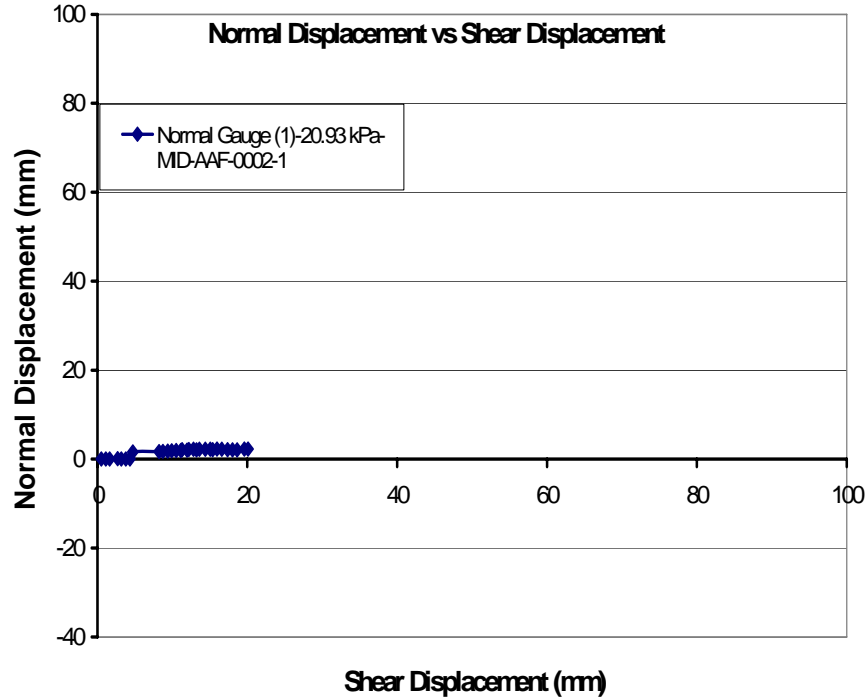
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	2	49.09	0.0419		0.0015	
2	50	100.00	16	1.18	41.86	0.0303		0.0013	
1-1/2	37.5	100.00	30	0.6	21.87	0.0217			
1	25	95.90	40	0.425	8.53	0.0157			
3/4	19	90.67	50	0.3	5.13	0.0114			
3/8	9.5	80.30	70	0.212	3.20	0.0082			
4	4.75	66.35	100	0.15	1.75	0.0058			
6	3.36	57.63	200	0.075	0.13	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 2  
 TEST DATE: N/A

UTM Northing: 4060694  
 UTM Easting: 454395

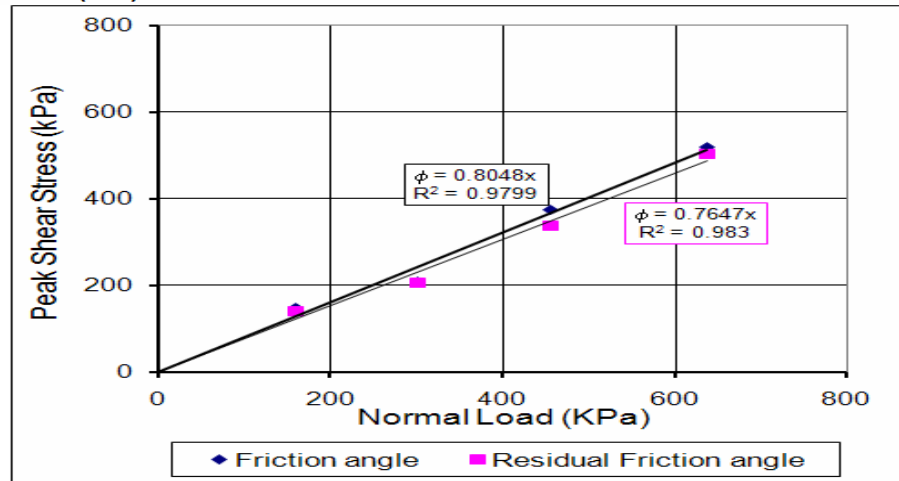
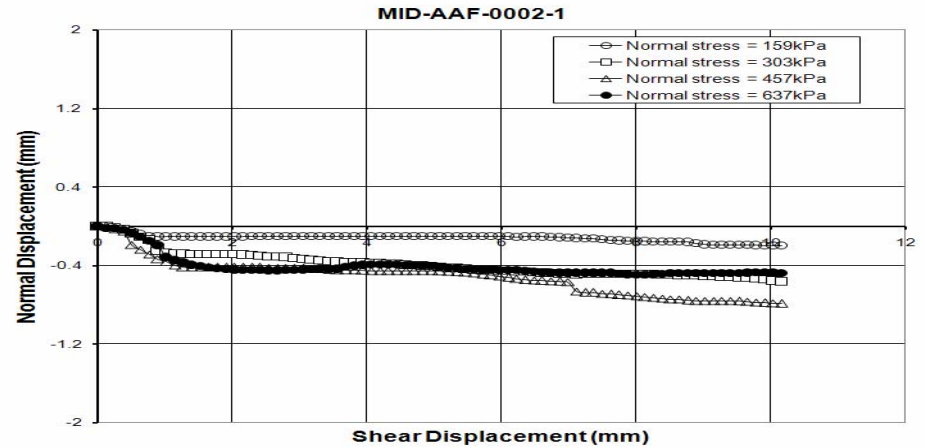
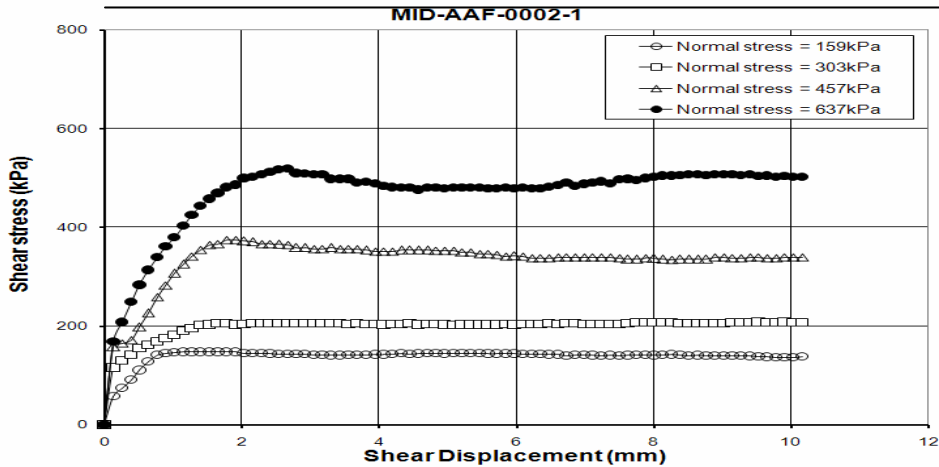


<b>Field id:</b>	MID-AAF-0002-1						
Measured Cohesion	14.99	Water Content	5.62	Shear box size	5.08	Peak Shear Stress	31.34
Intrinsic Cohesion	14.45	Wet Density	2240	Matric Suction	2	Post Peak Shear Stress	25.10
Max. Particle Size	unknown	Dry density	2120	Normal Stress	17.27	Elevation	2878.4

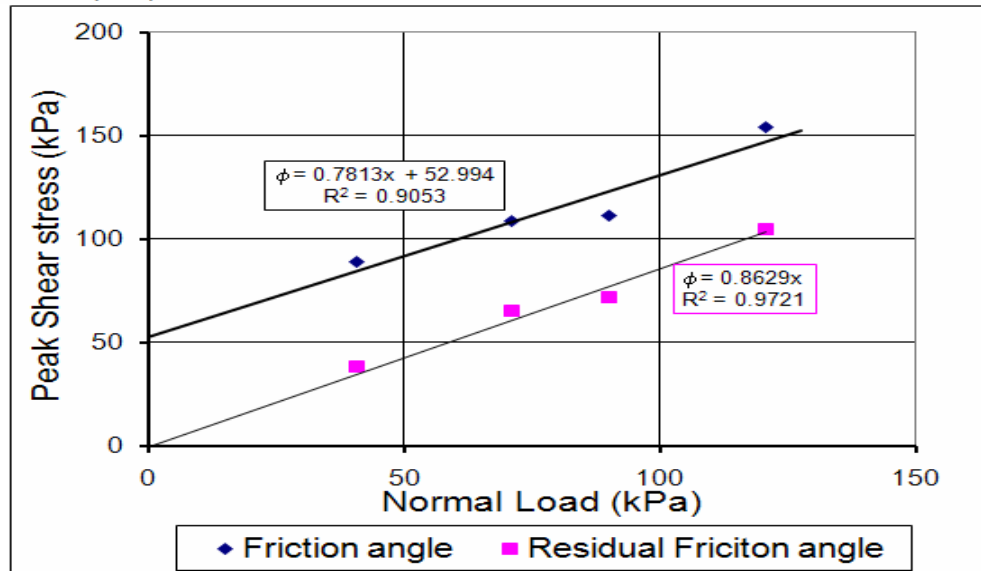
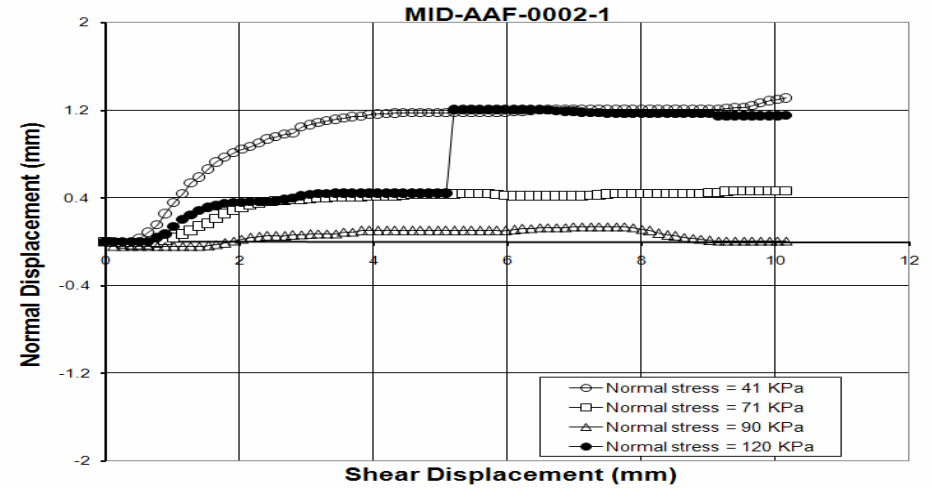
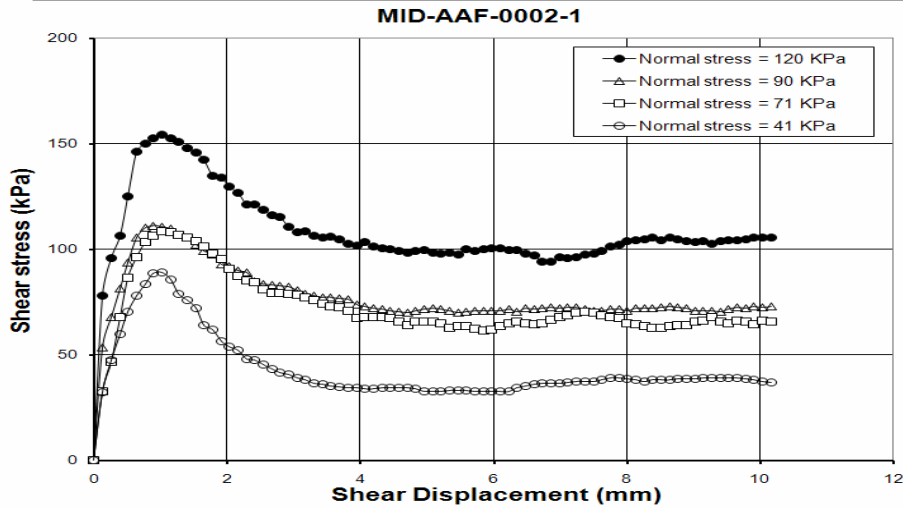
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 2  
 TEST DATE: 9/27/2006



<b>Field id:</b>	MID-AAF-0002-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	148.01,208.50,375.01,519.40
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	139.55,206.52,337.90,503.03
Friction Angle	38.83	Dry density	1960	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	MID-AAF-0002-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	89.13,108.75,111.41,154.38
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	38.52,65.37,71.97,104.65
Friction Angle	38	Dry density	1990	Normal Stress	41,71,90,120	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

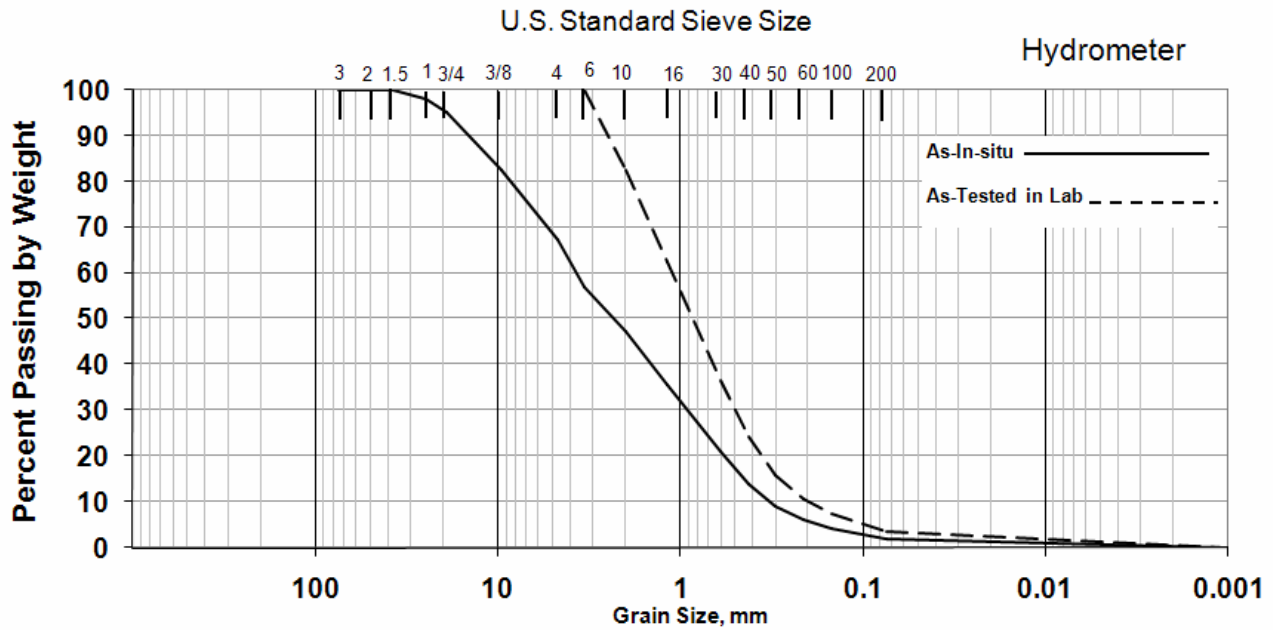
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 3  
 TEST DATE: 7/19/2007

SAMPLE: **MID-AAF-0002-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 31.7	GRAVEL: 32.8
PLASTIC LIMIT: 20.6	SAND: 65.2
PLASTICITY INDEX: 11.1	FINE: 2.0
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION: CL-ML	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

### UNIFIED SOIL CLASSIFICATION:

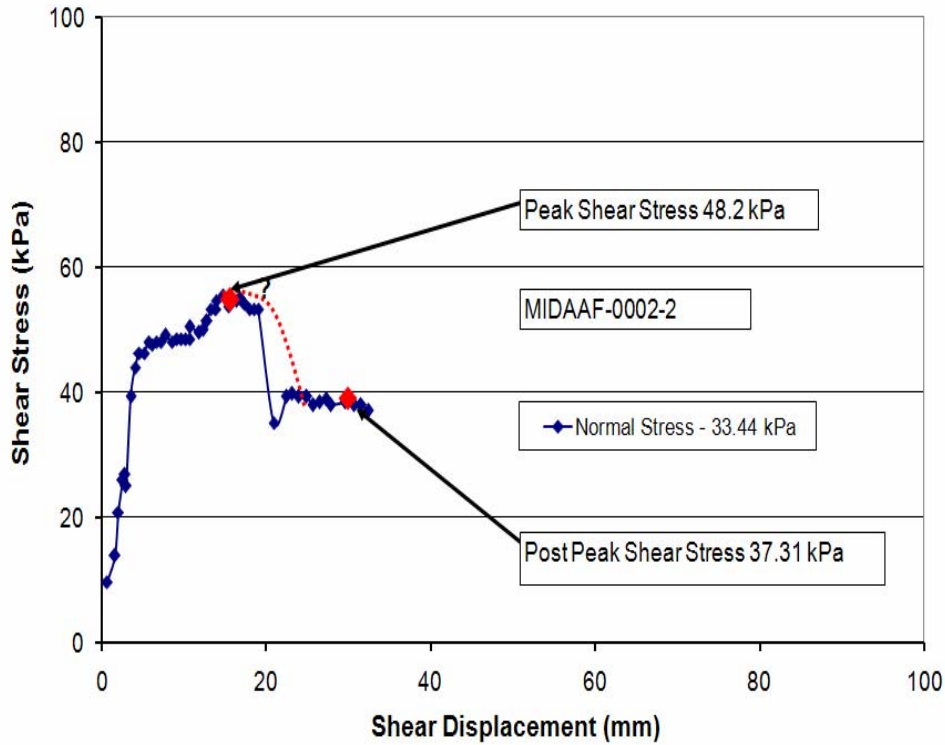
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	47.10	49.09	0.0419		0.0015	
2	50	100.00	16	35.61	41.86	0.0303		0.0013	
1-1/2	37.5	100.00	30	20.90	21.87	0.0217			
1	25	97.97	40	13.80	8.53	0.0157			
3/4	19	95.23	50	9.02	5.13	0.0114			
3/8	9.5	82.40	70	6.14	3.20	0.0082			
4	4.75	66.35	100	0.15	1.75	0.0058			
6	3.36	57.63	200	0.075	0.13	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

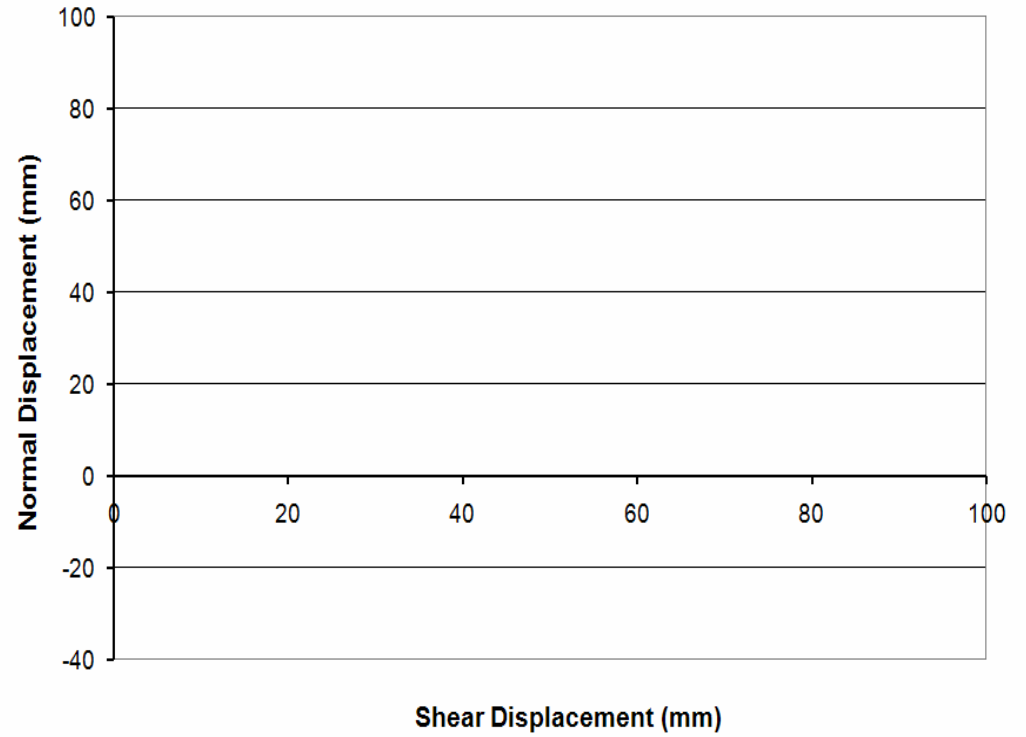
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 3  
 TEST DATE: N/A

UTM Northing:  
 UTM Easting:



**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

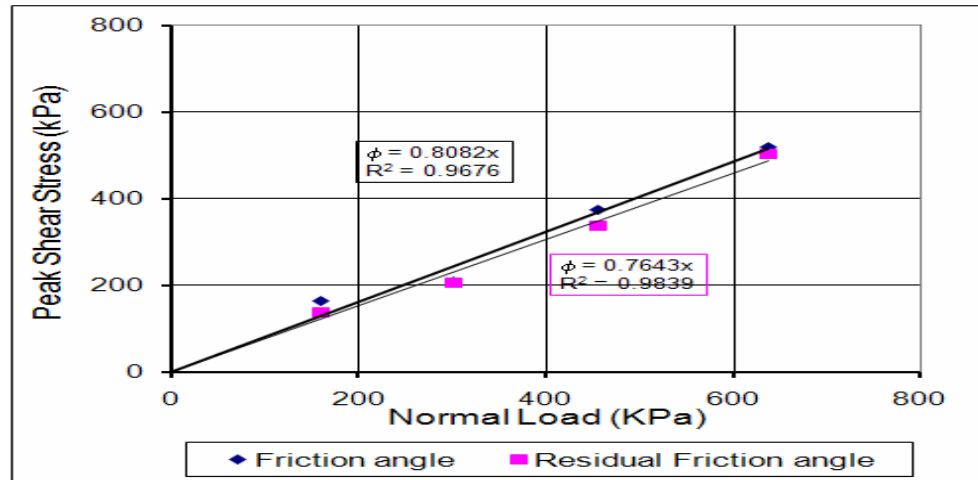
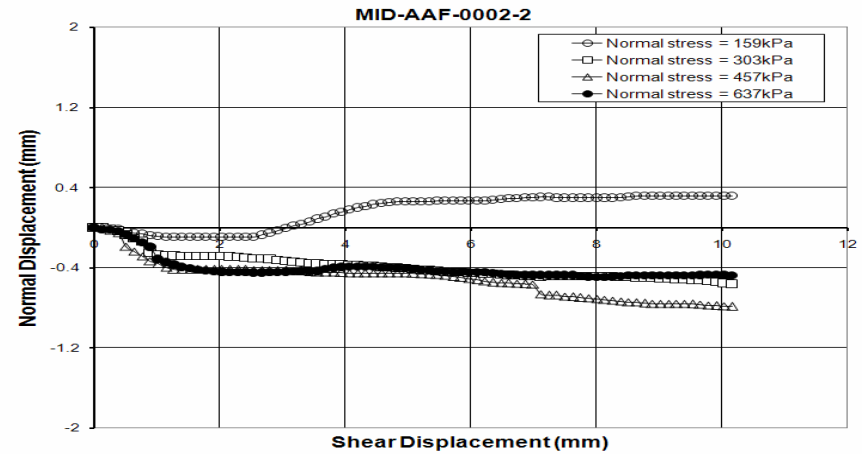
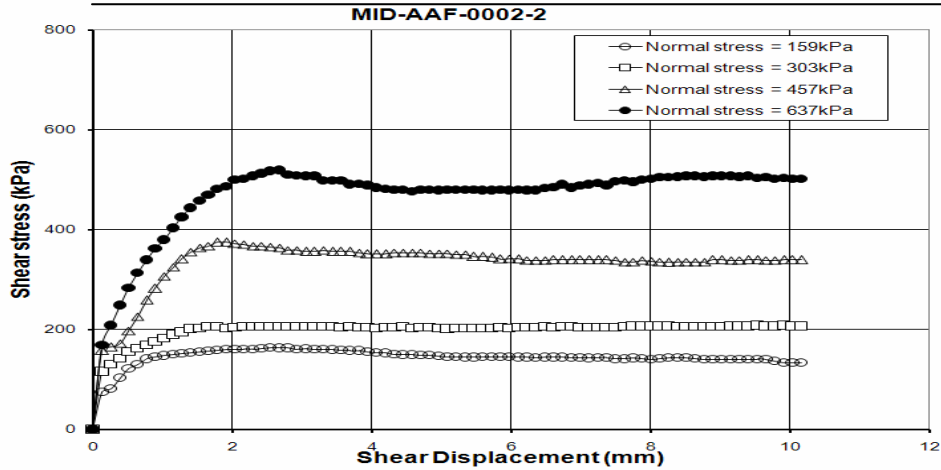
<b>Field id:</b>	MID-AAF-0002-2						
Measured Cohesion	6.07	Water Content	na	Shear box size	30	Peak Shear Stress	48.2
Intrinsic Cohesion	na	Wet Density	2240	Matric Suction	na	Post Peak Shear Stress	37.31
Max. Particle Size	unknown	Dry density	1960	Normal Stress	17.27	Elevation	na



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

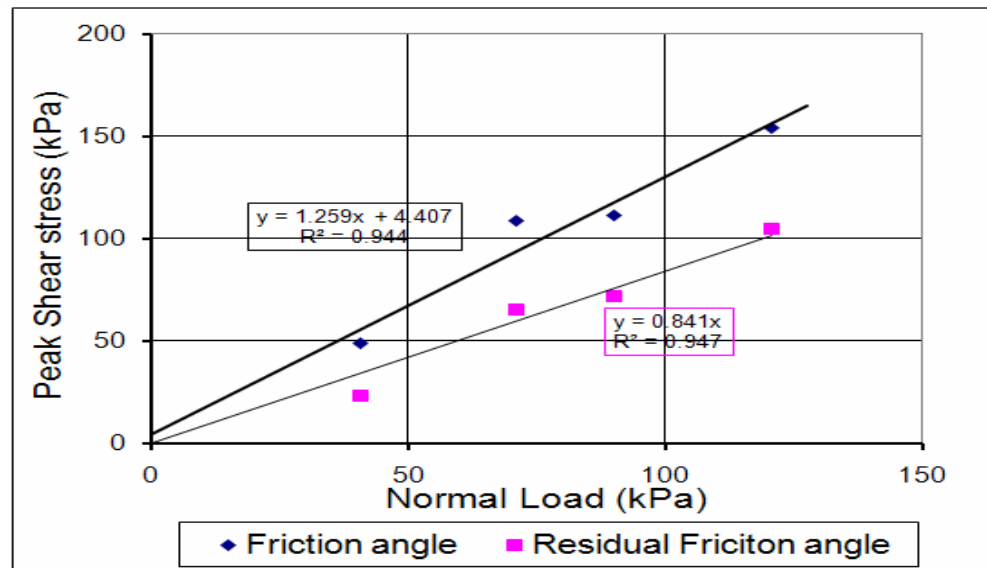
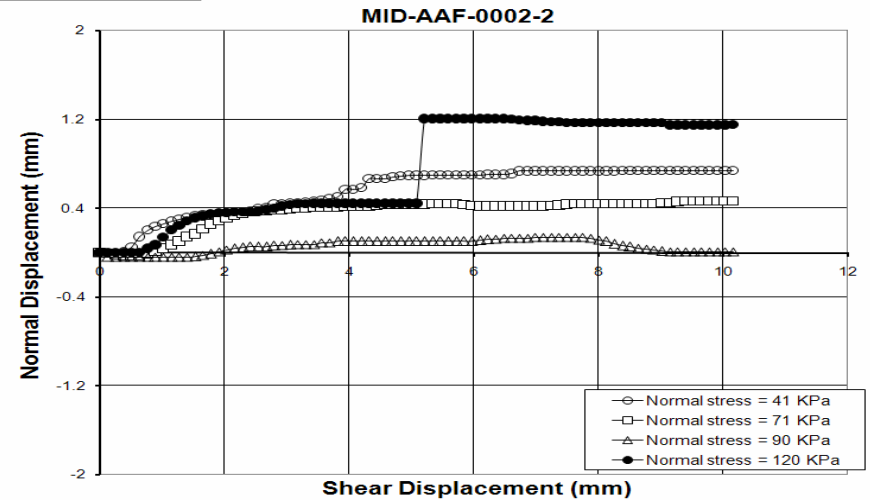
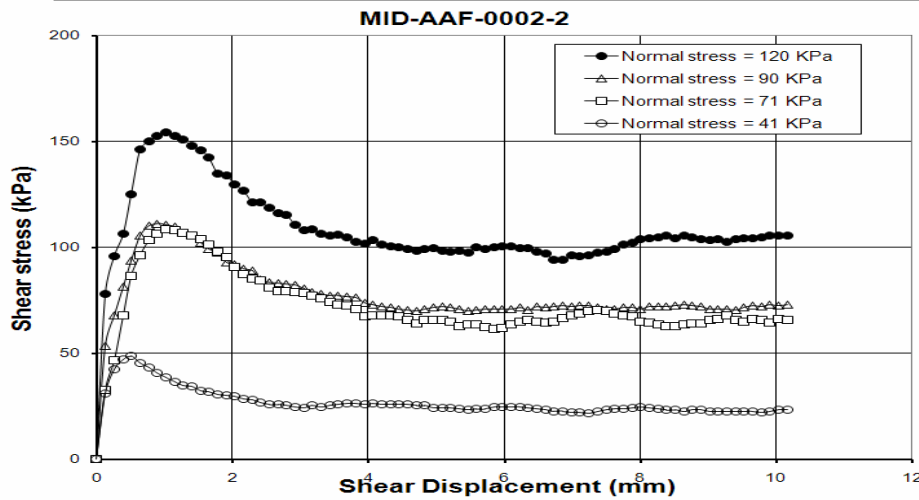
TEST NO: 3  
 TEST DATE: 9/29/2006



<b>Field id:</b>	MID-AAF-0002-2					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	163.93,208.50,375.01,519.40
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	137.77,206.52,337.90,503.03
Friction Angle	38.95	Dry density	1960	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 3  
 TEST DATE: 9/8/2007



<b>Field id:</b>	MID-AAF-0002-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	43.81,108.75,111.41,154.38
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.25,65.37,71.97,104.65
Friction Angle	51.55	Dry density	1960	Normal Stress	41,71,90,120	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

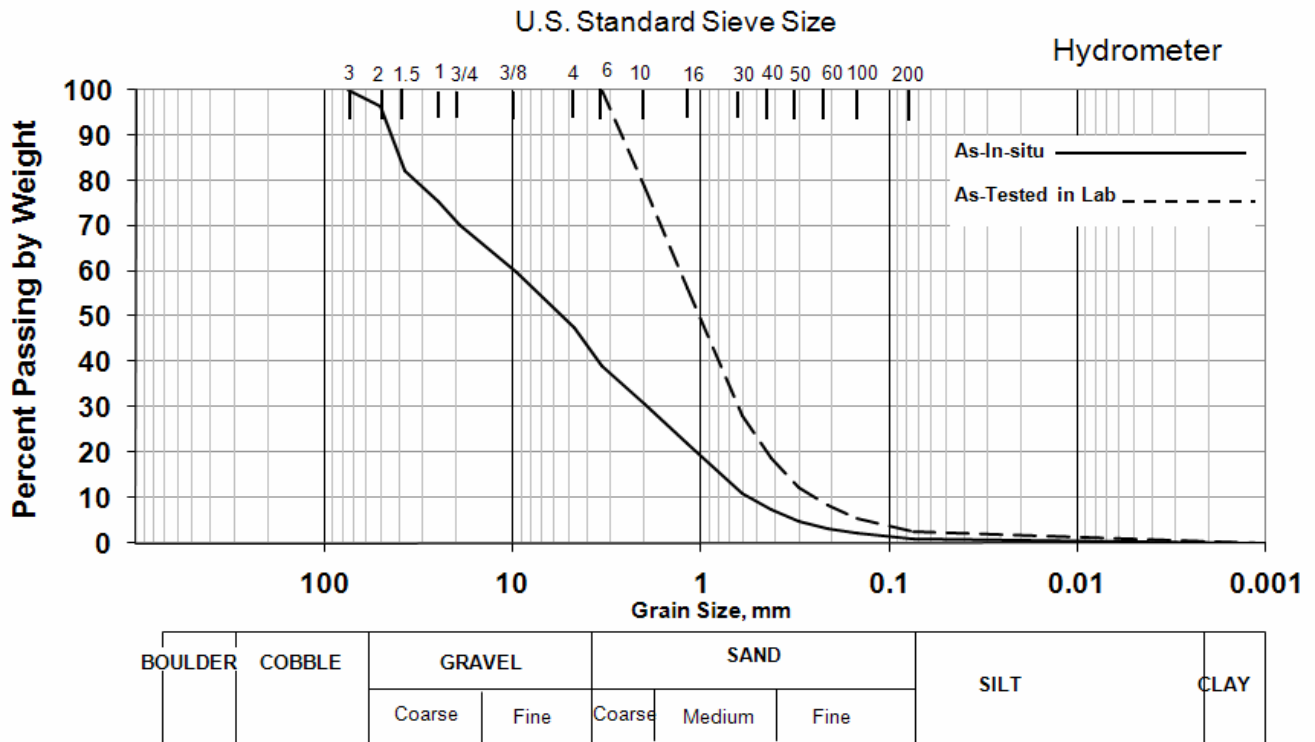
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 4  
 TEST DATE: 12/25/2006

SAMPLE: MID-VTM-0002-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 28.2	GRAVEL: 52.3
PLASTIC LIMIT: 26.3	SAND: 46.8
PLASTICITY INDEX: 1.9	FINE: 1.0
SPECIFIC GRAVITY: 2.83	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

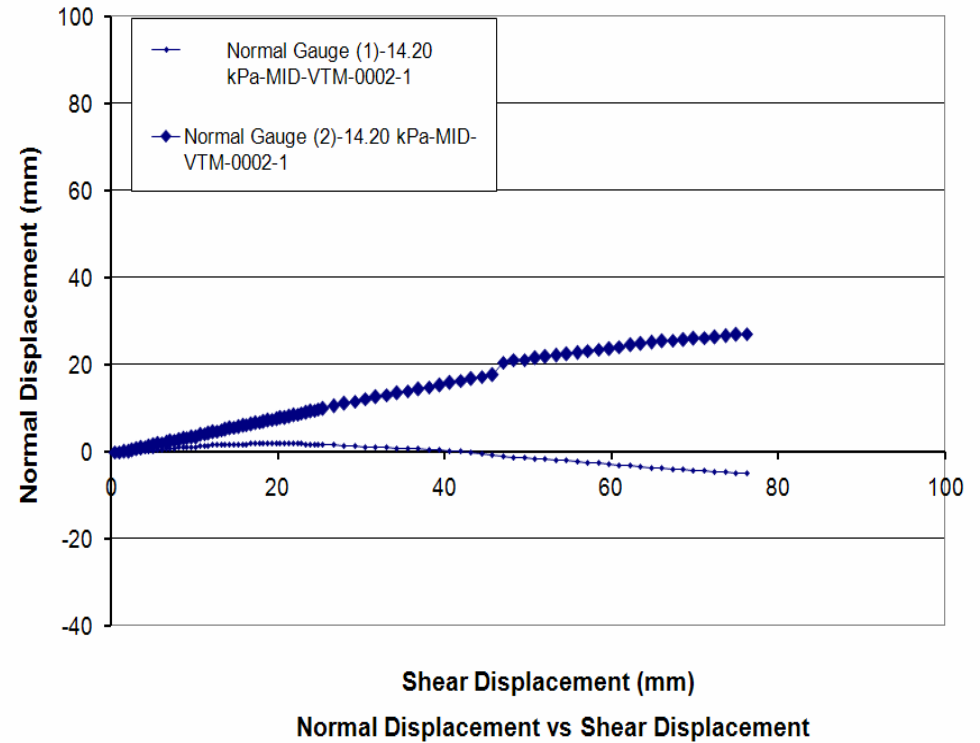
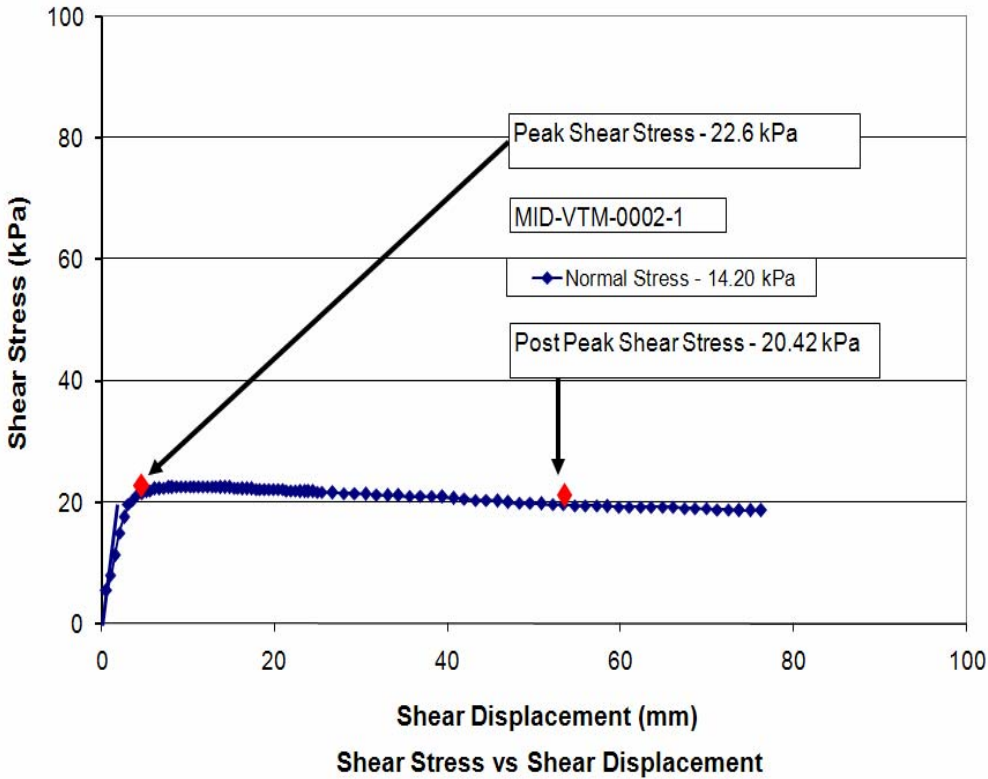
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	30.84	49.09	0.0419		0.0015	
2	50	96.40	16	22.10	41.86	0.0303		0.0013	
1-1/2	37.5	82.18	30	10.98	21.87	0.0217			
1	25	75.34	40	7.39	8.53	0.0157			
3/4	19	70.30	50	4.76	5.13	0.0114			
3/8	9.5	59.83	70	3.31	3.20	0.0082			
4	4.75	47.70	100	2.22	1.75	0.0058			
6	3.36	39.18	200	0.95	0.13	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 4  
 TEST DATE: N/A

UTM Northing: 4060899  
 UTM Easting: 454232

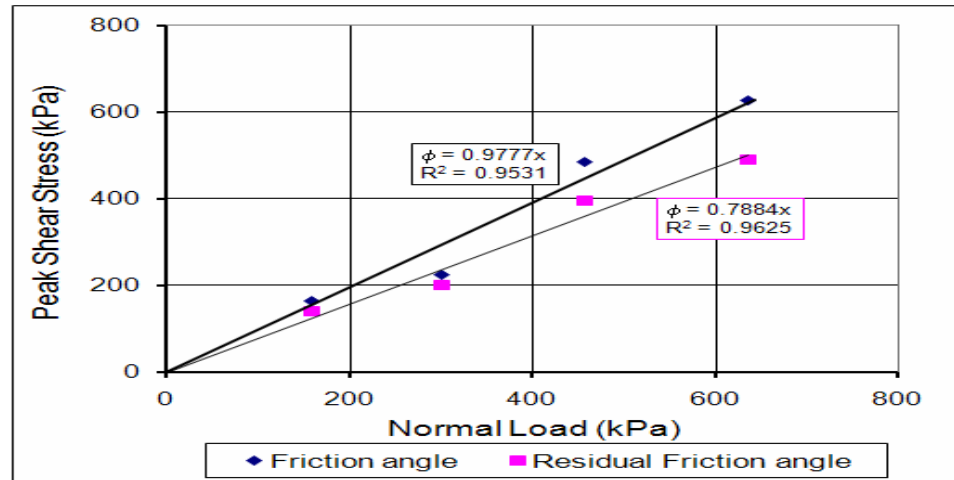
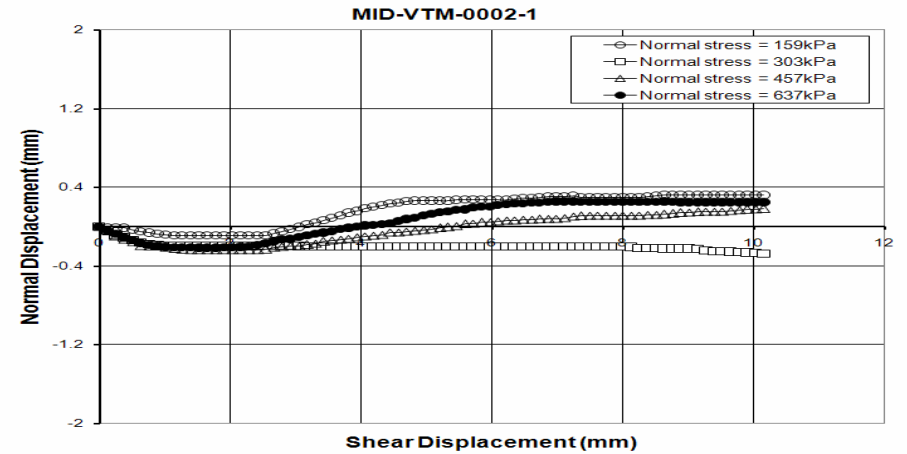
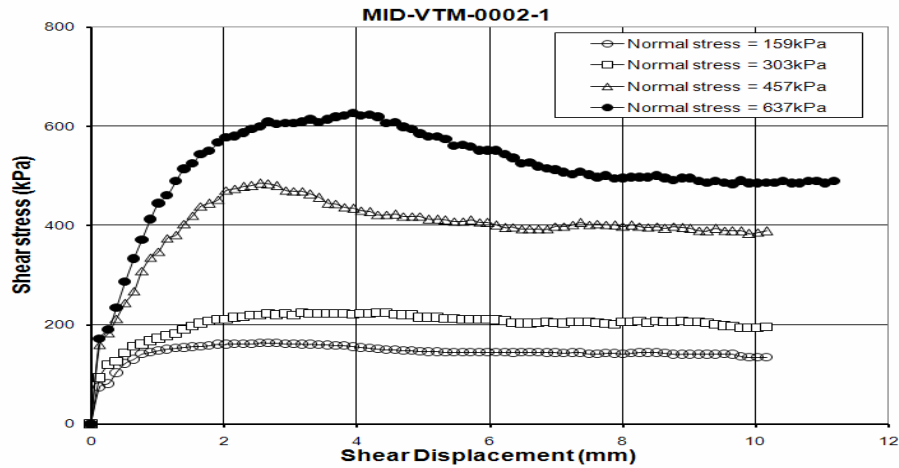


<b>Field id:</b>	MID-VTM-0002-1						
Measured Cohesion	0.45	Water Content	10.31	Shear Box Size	60	Peak Shear Stress	22.6
Intrinsic Cohesion	0.45	Wet Density	2960	Matric Suction	0.50	Post Peak Shear Stress	20.42
Max. Particle Size	12.7	Dry density	2680	Normal Stress	14.20	Elevation	2812.5

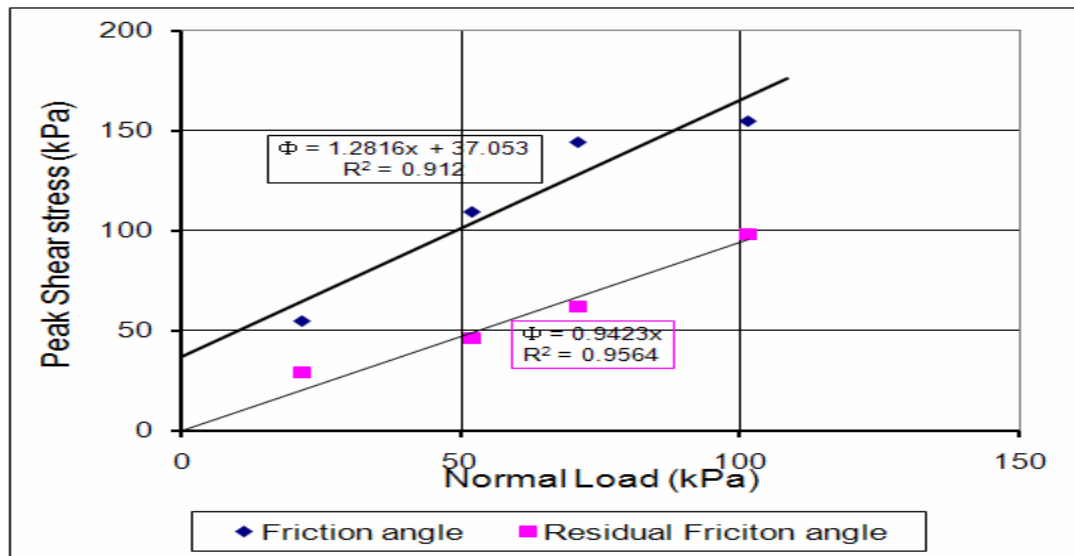
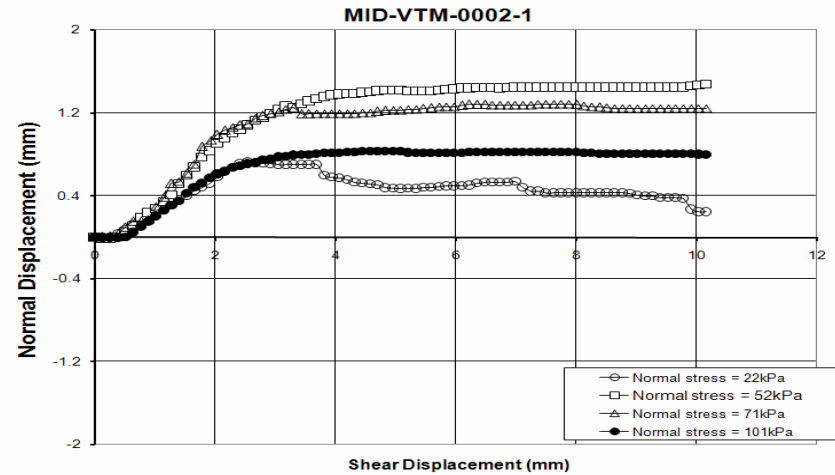
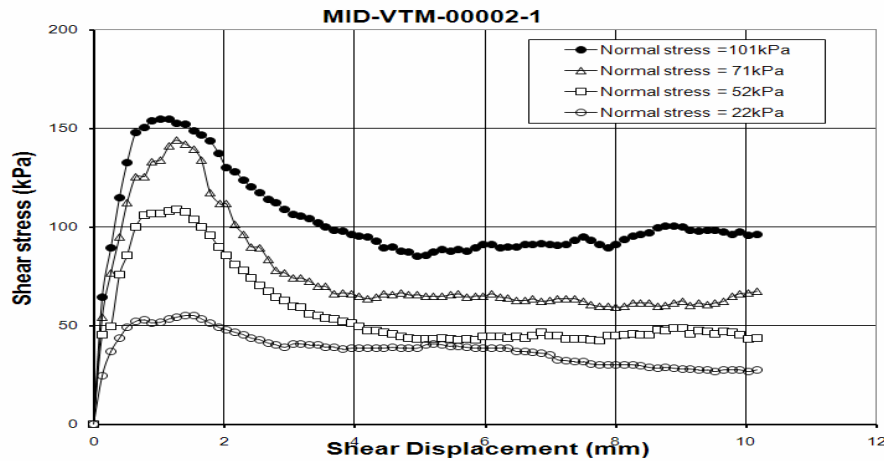
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 4  
 TEST DATE: 2/5/2007



<b>Field id:</b>	MID-AAF-0002-2					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	163.93,224.11,485.58,627.36
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	141.09,201.16,395.76,490.95
Friction Angle	44.35	Dry density	2160	Normal Stress	159,303,457,637	Elevation



<b>Field id:</b>	MID-VTM-0002-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		55.17,109.29,144.30,154.91
Friction Angle	52.04	Dry density	2120	Normal Stress	22,52,71,101	Post Peak Shear Stress
						29.20,46.68,62.18,98.25
						Elevation

## PARTICLE SIZE ANALYSIS REPORT

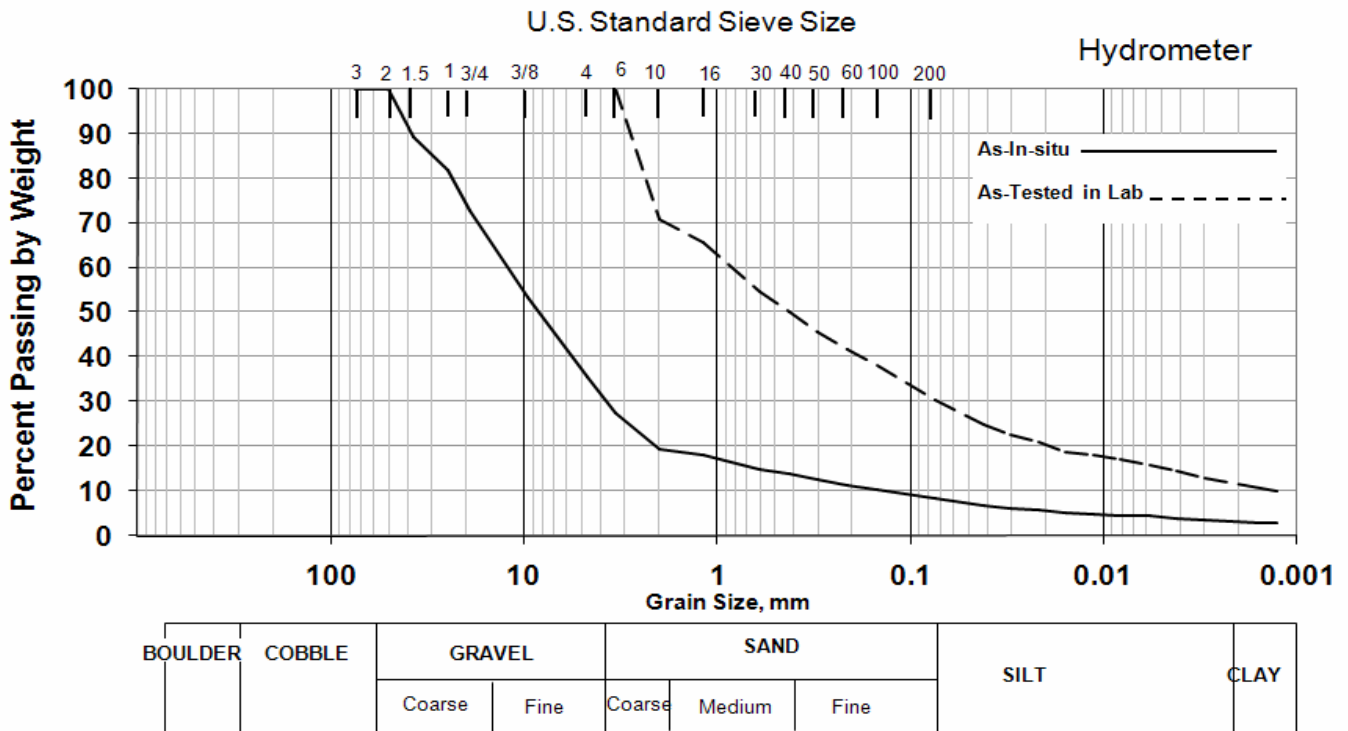
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 5  
 TEST DATE: 9/16/2006

SAMPLE: QPS-AAF-0001-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 35.7	GRAVEL: 64.4
PLASTIC LIMIT: 17.0	SAND: 27.3
PLASTICITY INDEX: 18.6	FINE: 8.4
SPECIFIC GRAVITY: 2.74	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

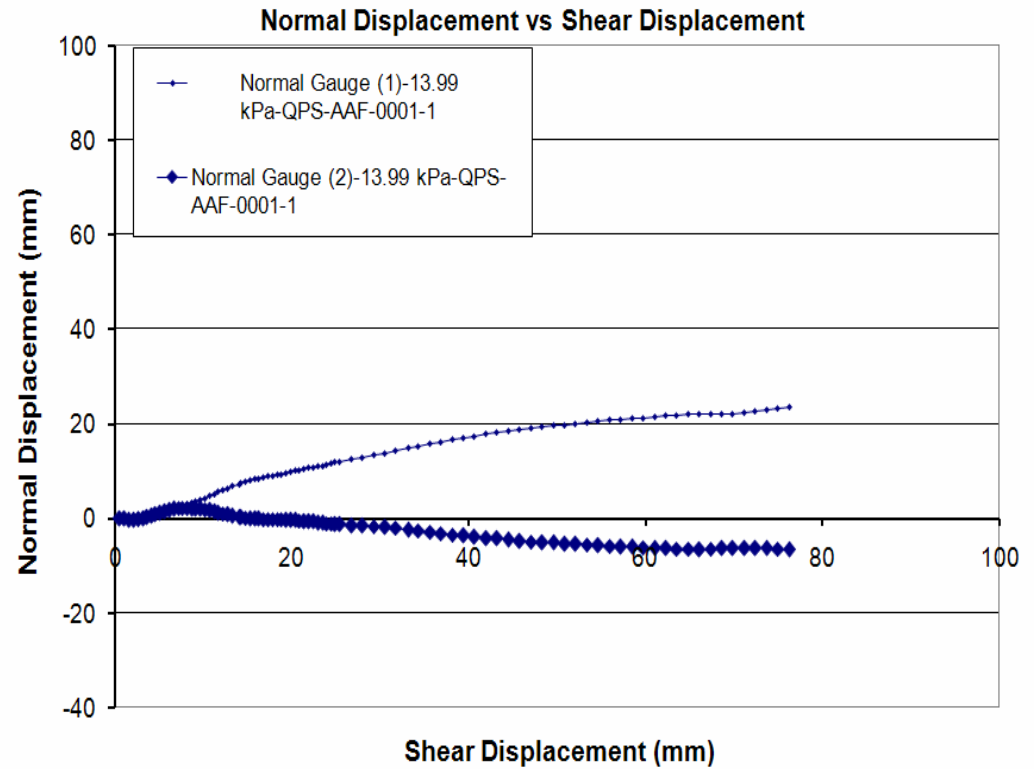
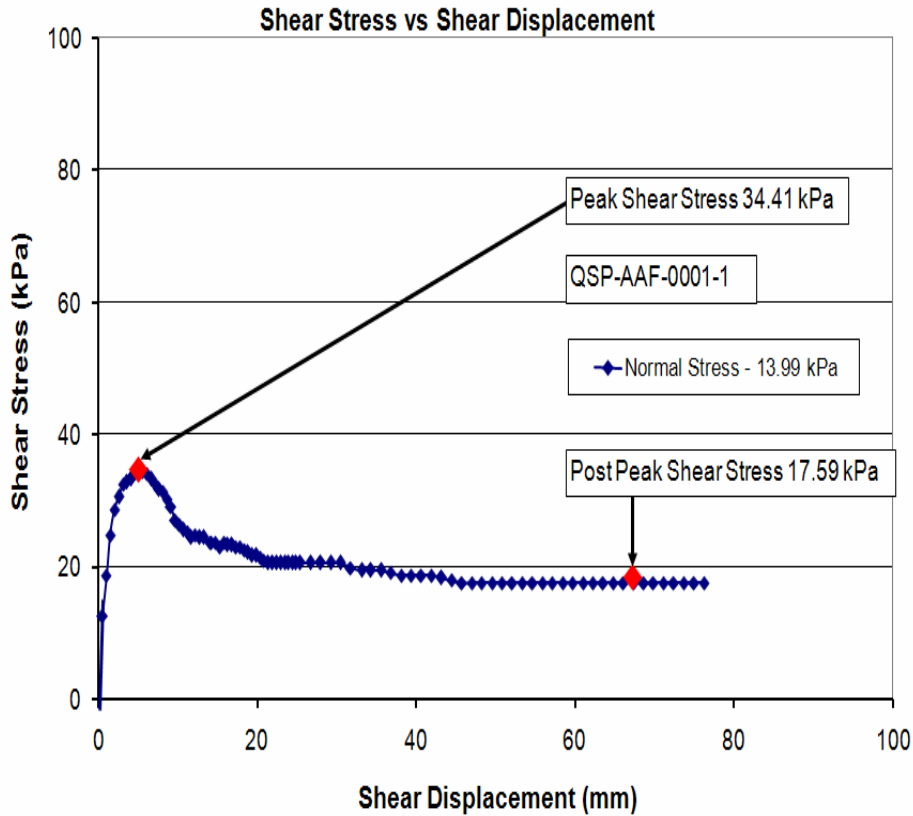
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	49.09	0.0419	6.85	0.0015	2.96
2	50	100.00	16	18.01	41.86	0.0303	6.25	0.0013	2.76
1-1/2	37.5	89.39	30	15.04	21.87	0.0217	5.75		
1	25	81.82	40	13.80	8.53	0.0157	5.15		
3/4	19	72.77	50	12.53	5.13	0.0114	4.99		
3/8	9.5	53.53	70	11.48	3.20	0.0082	4.69		
4	4.75	35.65	100	10.47	1.75	0.0058	4.39		
6	3.36	27.46	200	8.39	0.13	0.0042	3.99		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 5  
 TEST DATE: N/A

UTM Northing: 4062571  
 UTM Easting: 454144



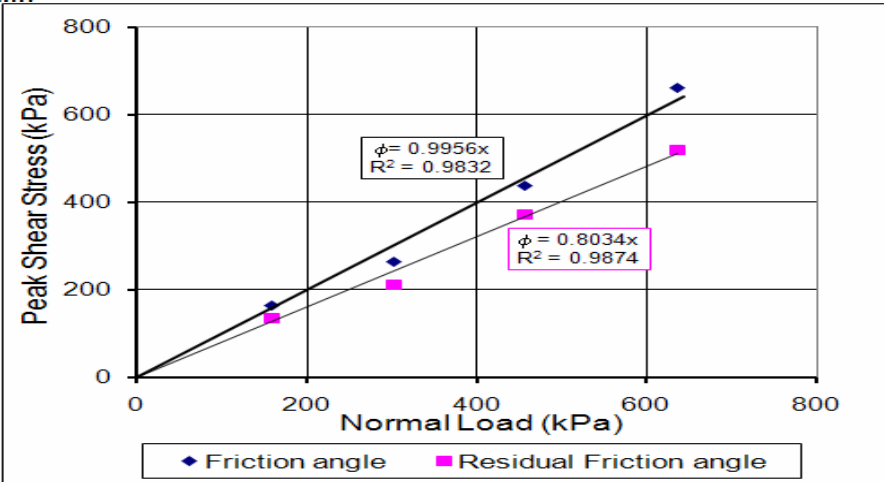
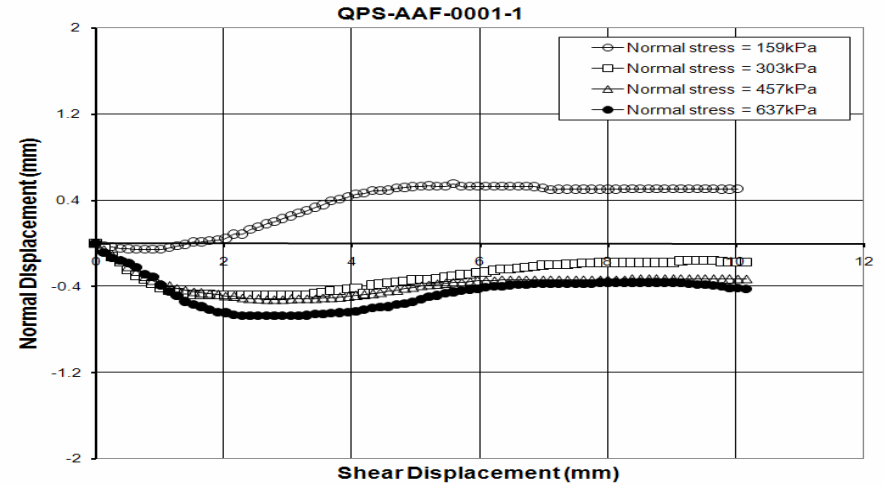
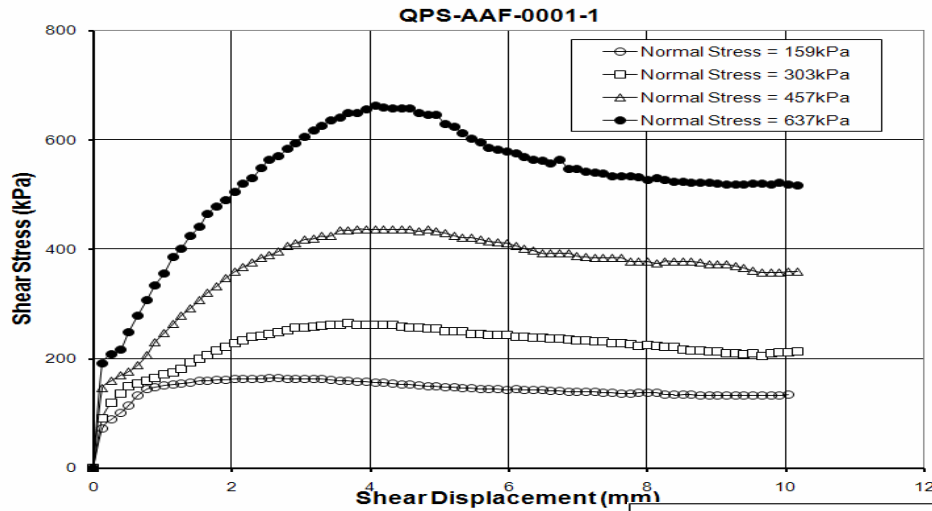
<b>Field id:</b>	QPS-AAF-0001-1						
Measured Cohesion	17.09	Water Content	10.15	Shear box size	30	Peak Shear Stress	34.41
Intrinsic Cohesion	17.09	Wet Density	1850	Matric Suction	0.00	Post Peak Shear Stress	17.59
Max. Particle Size	unknown	Dry density	1680	Normal Stress	13.99	Elevation	2906.4



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

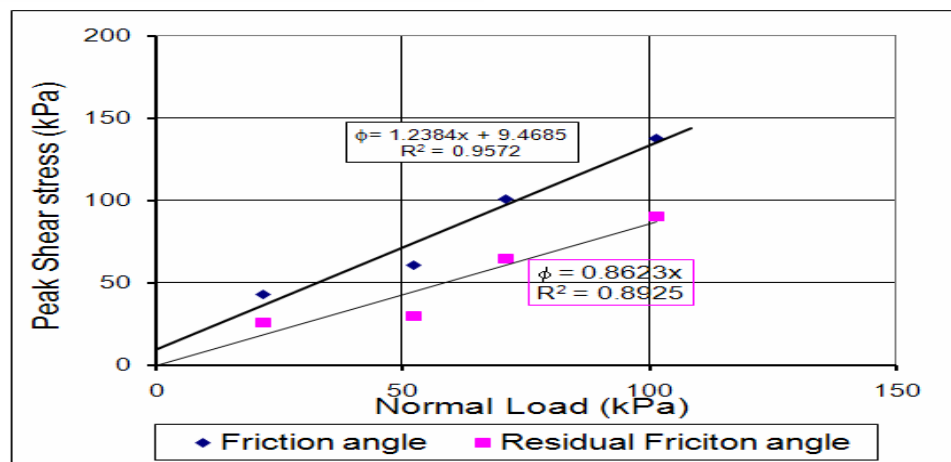
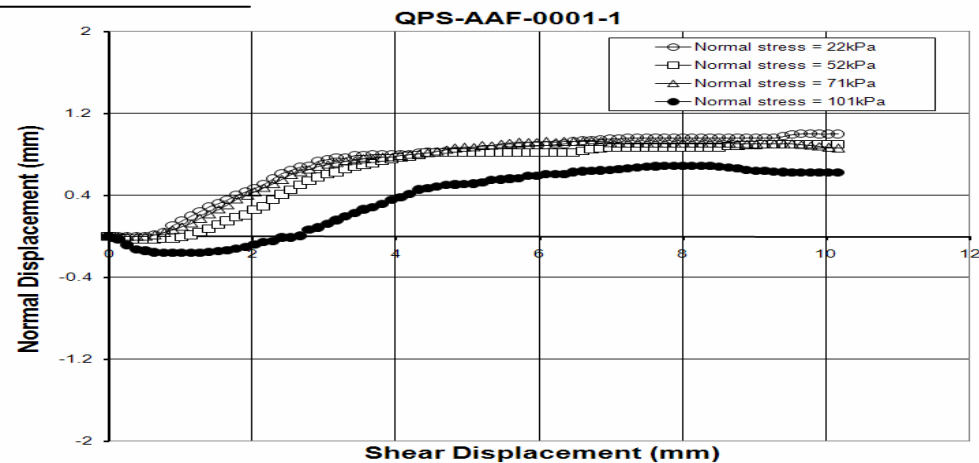
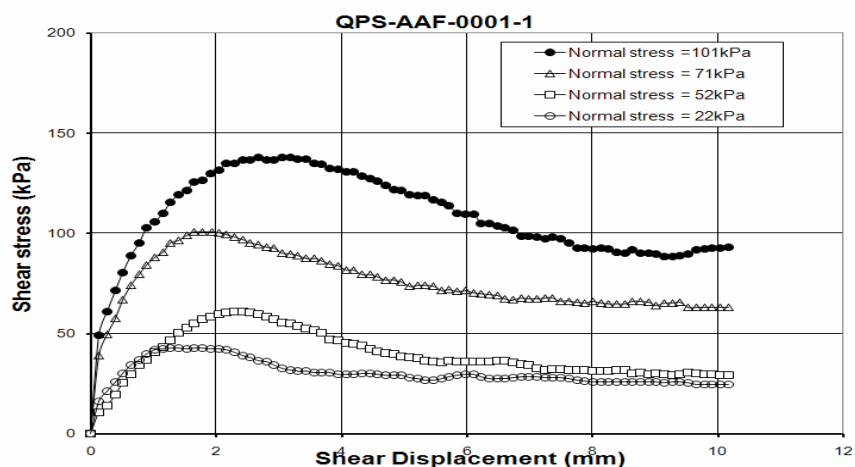
TEST NO: 5  
 TEST DATE: 9/15/2006



<b>Field id:</b>	QPS-AAF-0001-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	164.46,265.74,437.45,662.49
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	135.28,212.13,372.84,520.87
Friction Angle	44.87	Dry density	1680	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 5  
 TEST DATE: 4/30/2007



<b>Field id:</b>	QPS-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	42.97,61.01,100.80,137.93
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.18,30.01,65.12,90.79
Friction Angle	51.08	Dry density	1680	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

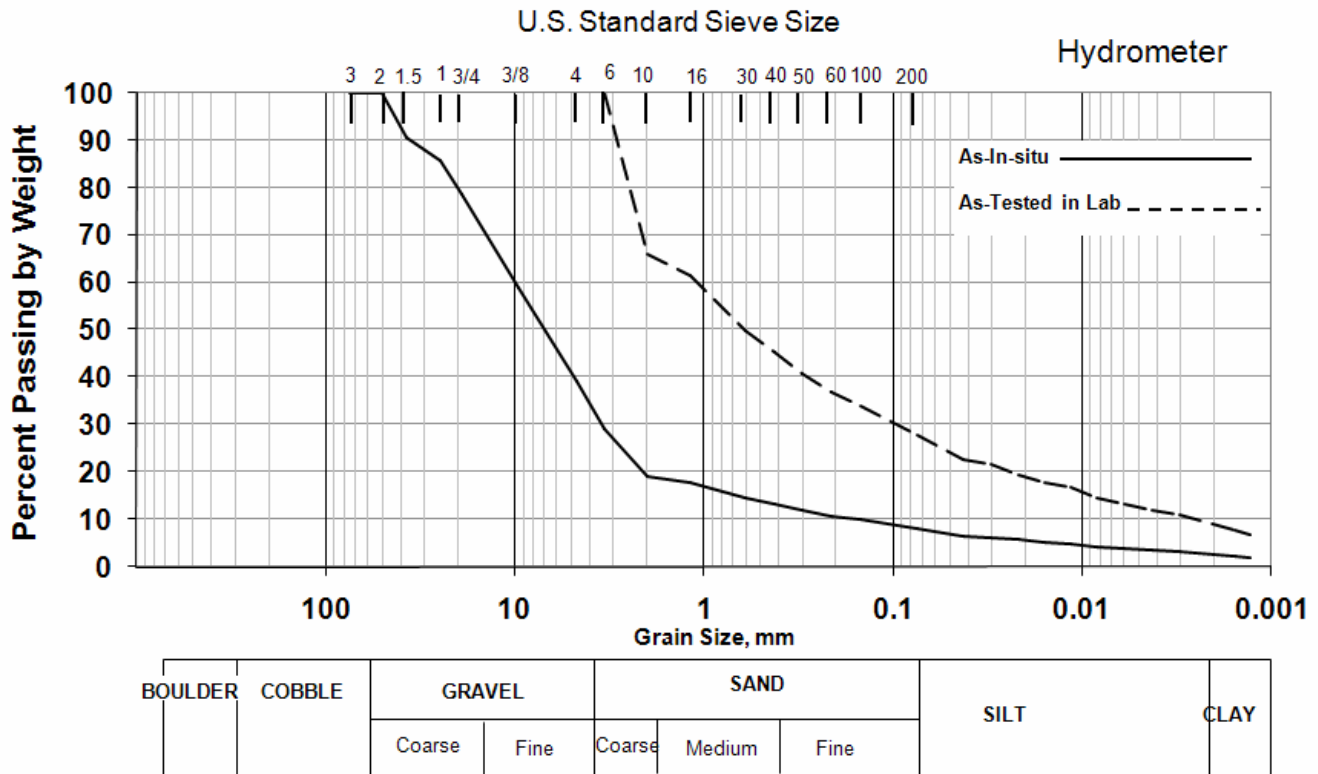
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 6  
 TEST DATE: 9/15/2006

SAMPLE: QPS-AAF-0001-2  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 34.8	GRAVEL: 60.8
PLASTIC LIMIT: 23.6	SAND: 31.2
PLASTICITY INDEX: 11.2	FINE: 8.1
SPECIFIC GRAVITY: 2.75	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	19.24	0.0419	6.61	0.0015	2.29
2	50	100.00	16	18.01	17.87	0.0303	6.30	0.0013	1.99
1-1/2	37.5	90.61	30	15.04	14.49	0.0217	5.68		
1	25	85.91	40	13.80	13.15	0.0157	5.17		
3/4	19	78.48	50	12.53	11.88	0.0114	4.86		
3/8	9.5	58.79	70	11.48	10.76	0.0082	4.28		
4	4.75	39.24	100	10.47	9.89	0.0058	3.87		
6	3.36	29.13	200	8.39	8.06	0.0042	3.50		

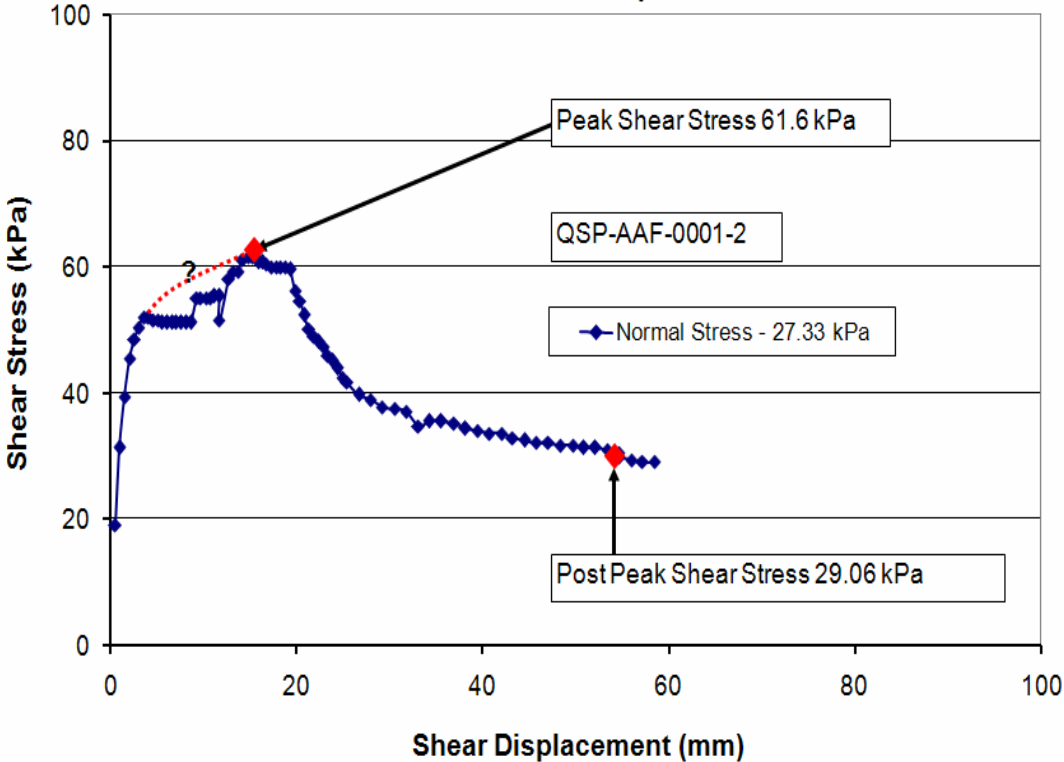
## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

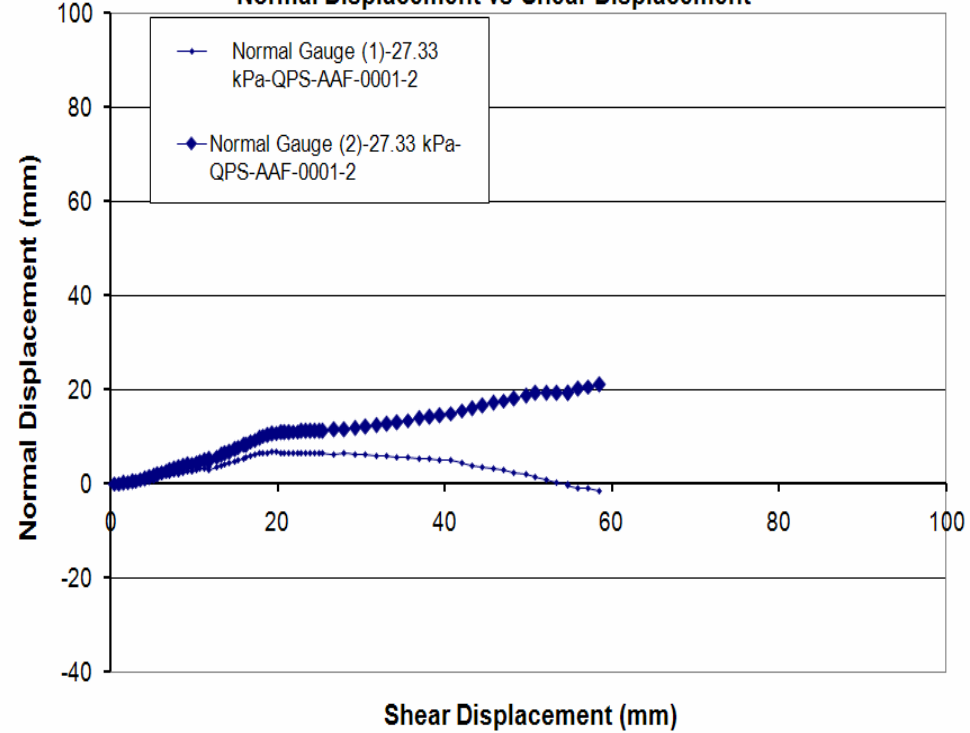
TEST NO: 6  
 TEST DATE: N/A

UTM Northing: 4062571  
 UTM Easting: 454144

**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

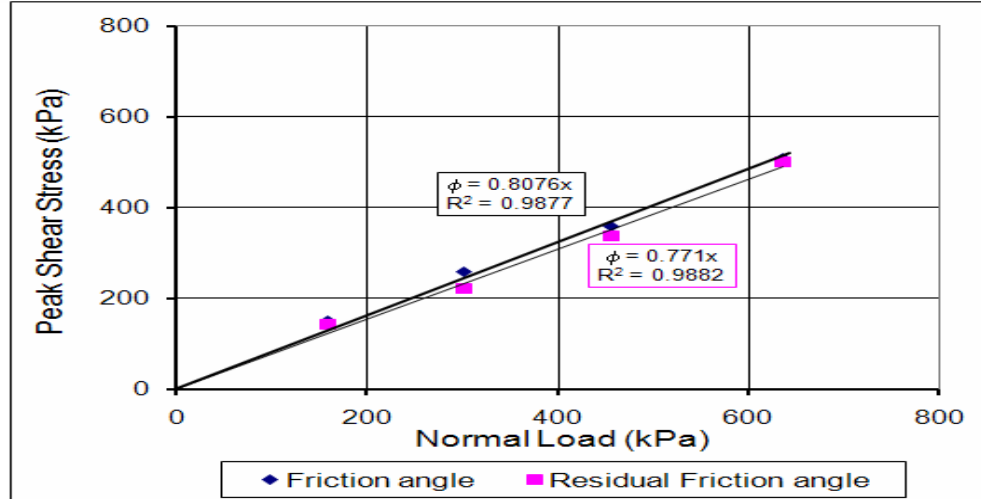
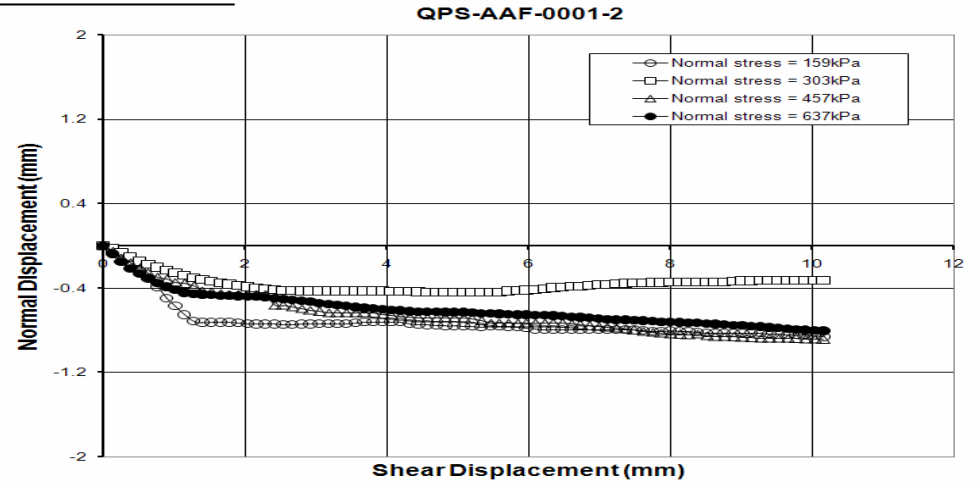
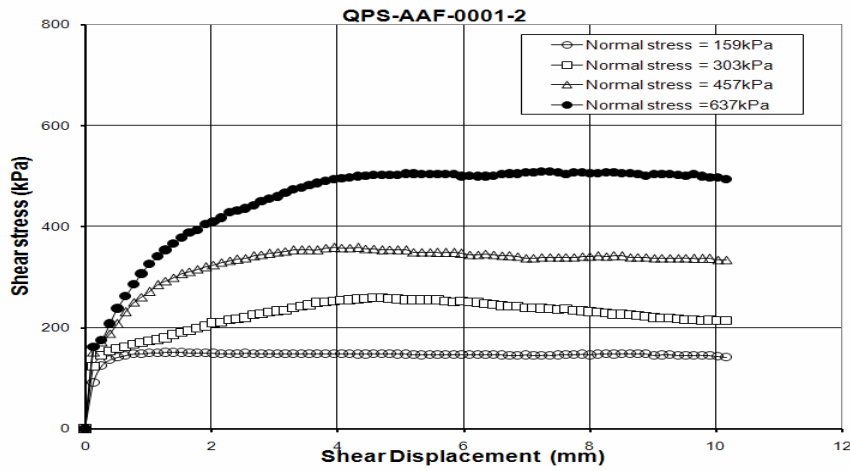


<b>Field id:</b>	QPS-AAF-0001-2						
Measured Cohesion	28.51	Water Content	11.08	Shear box size	30	Peak Shear Stress	61.6
Intrinsic Cohesion	28.51	Wet Density	2090	Matric Suction	0.00	Post Peak Shear Stress	29.06
Max. Particle Size	12.7	Dry density	1880	Normal Stress	27.33	Elevation	2906.4

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

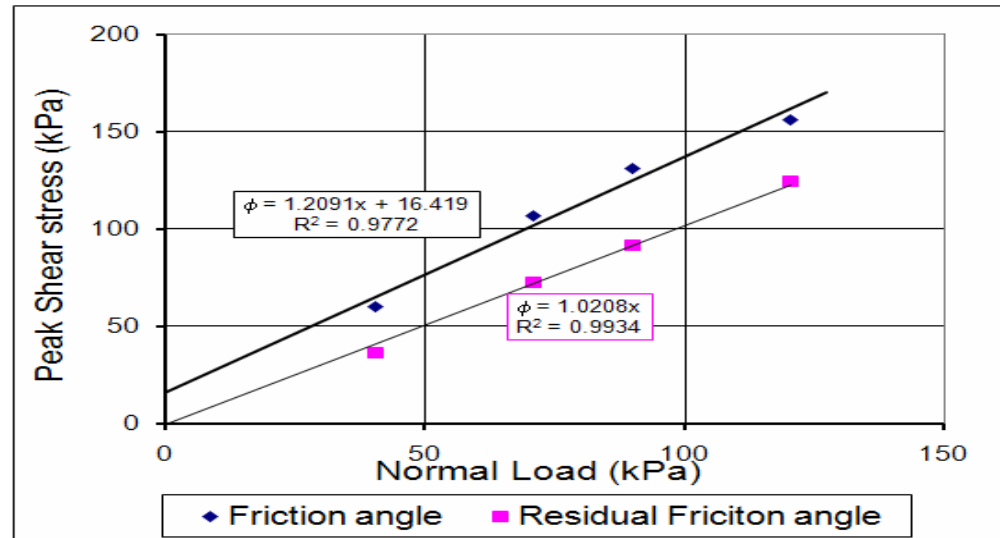
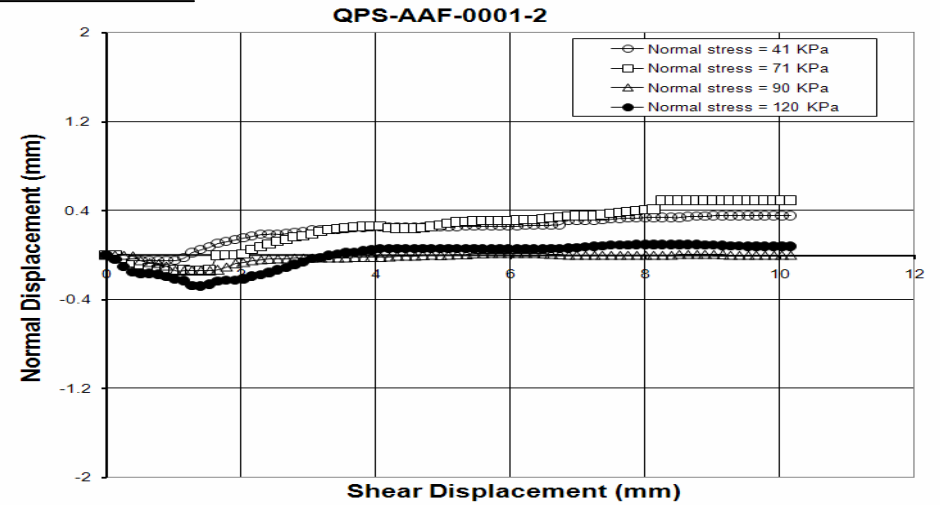
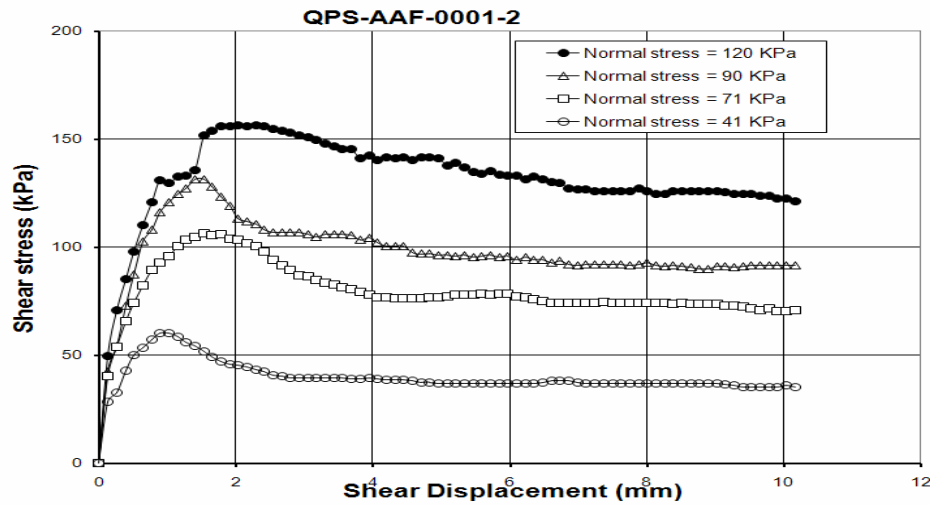
TEST NO: 6  
 TEST DATE: 9/13/2006



<b>Field id:</b>	QPS-AAF-0001-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	151.20,259.23,359.40,508.99
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	143.65,221.22,339.09,501.49
Friction Angle	38.9	Dry density	1860	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 6  
 TEST DATE: 2/21/2007



<b>Field id:</b>	QPS-AAF-0001-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	60.48,106.63,131.57,156.50
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	36.67,72.49,91.60,124.81
Friction Angle	50.41	Dry density	1890	Normal Stress	41,71,90,120	Elevation	

## PARTICLE -SIZE ANALYSIS REPORT

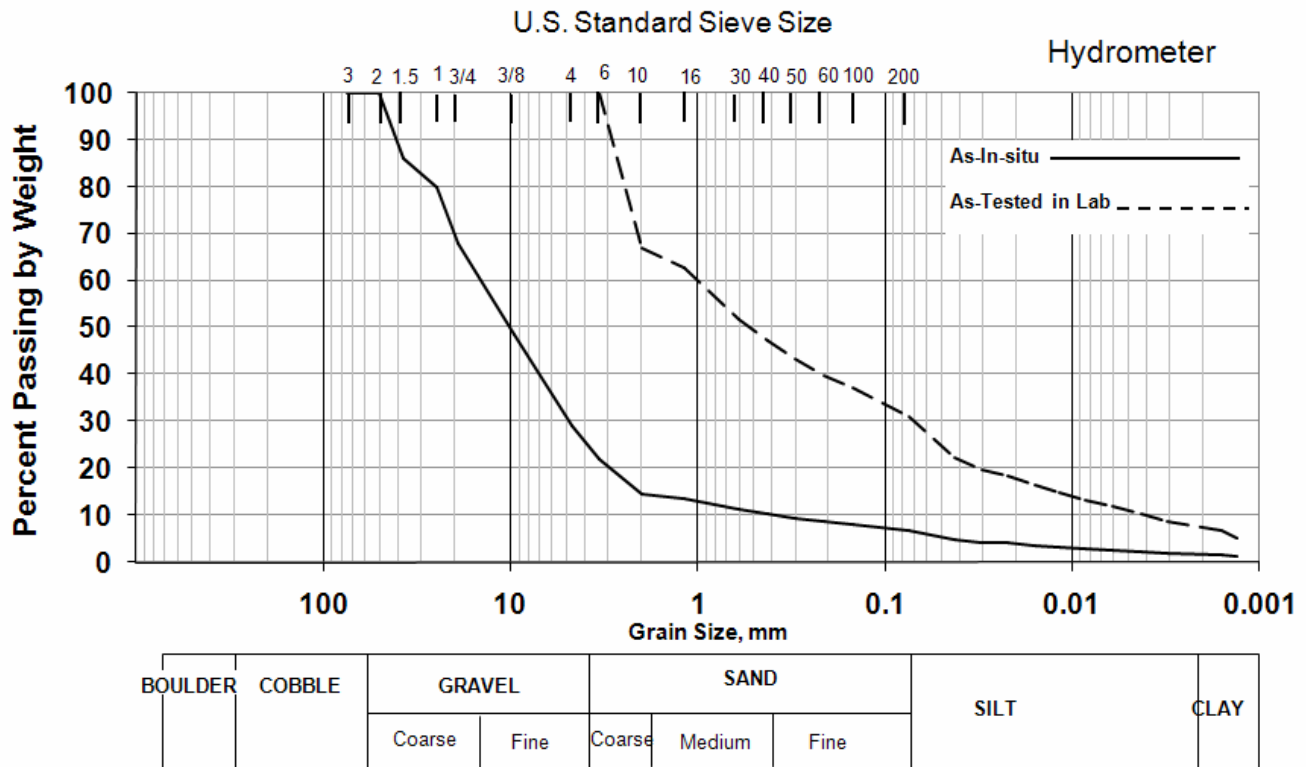
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 7  
 TEST DATE: 9/15/2006

SAMPLE: QPS-AAF-0001-3  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 34.3	GRAVEL: 70.6
PLASTIC LIMIT: 17.9	SAND: 22.4
PLASTICITY INDEX: 16.4	FINE: 6.8
SPECIFIC GRAVITY: 2.81	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

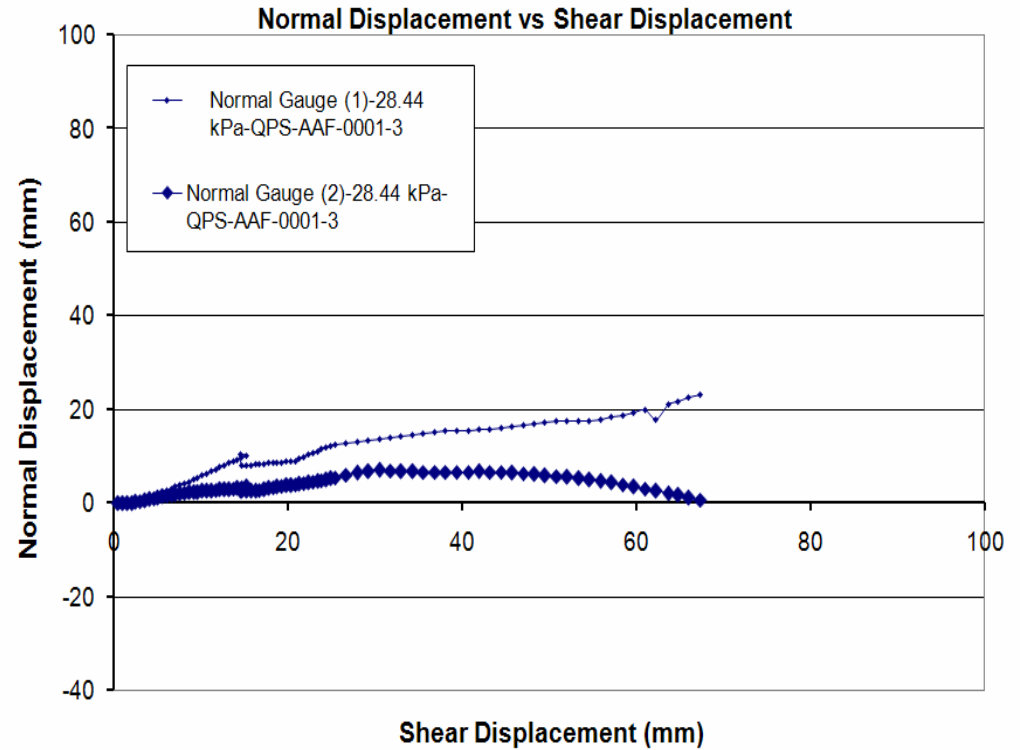
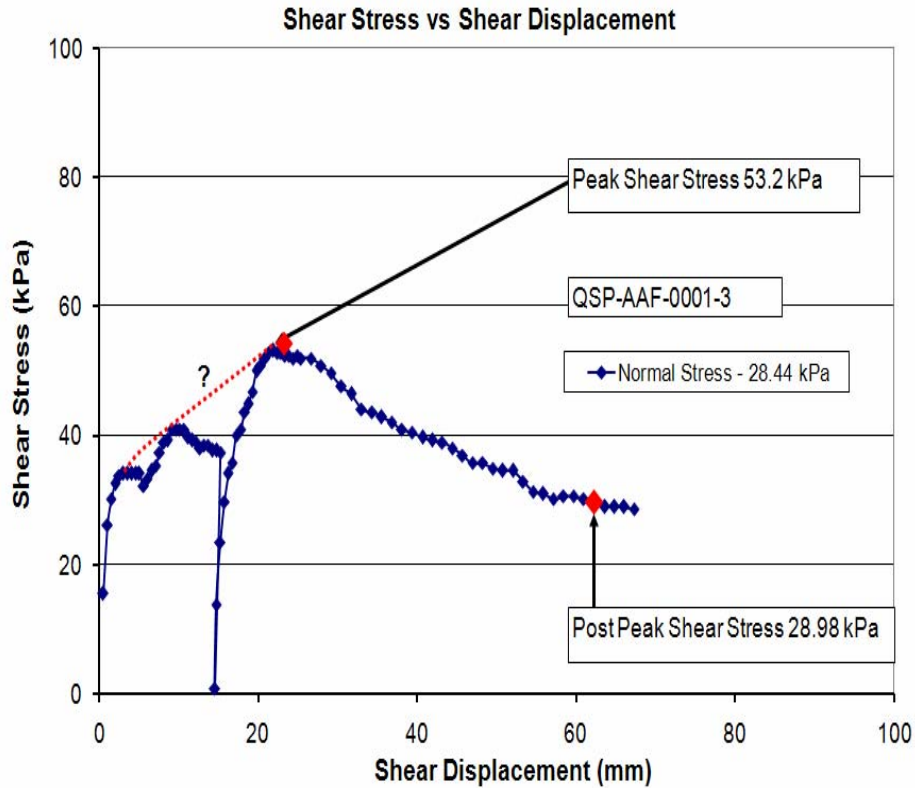
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	14.70	0.0419	4.87	0.0015	1.46
2	50	100.00	16	18.01	13.73	0.0303	4.35	0.0013	1.16
1-1/2	37.5	86.06	30	15.04	11.32	0.0217	4.05		
1	25	80.00	40	13.80	10.38	0.0157	3.59		
3/4	19	68.03	50	12.53	9.48	0.0114	3.29		
3/8	9.5	48.49	70	11.48	8.72	0.0082	2.92		
4	4.75	29.25	100	10.47	8.11	0.0058	2.61		
6	3.36	21.89	200	8.39	6.83	0.0042	2.27		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 7  
 TEST DATE: N/A

UTM Northing: 4062571  
 UTM Easting: 454144



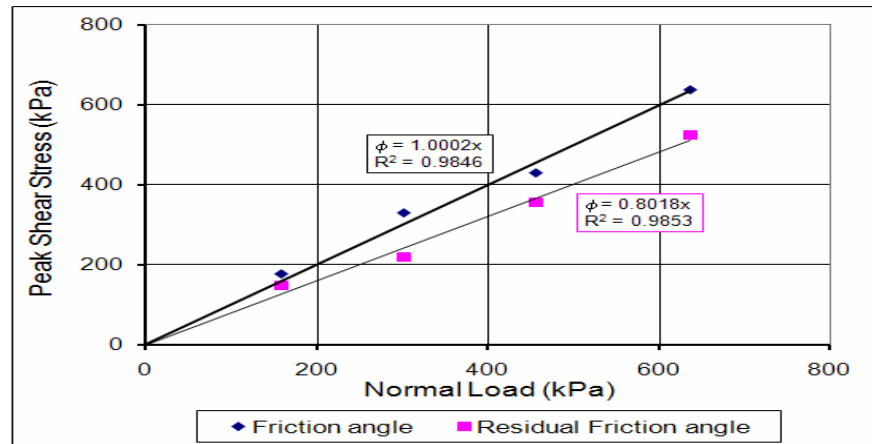
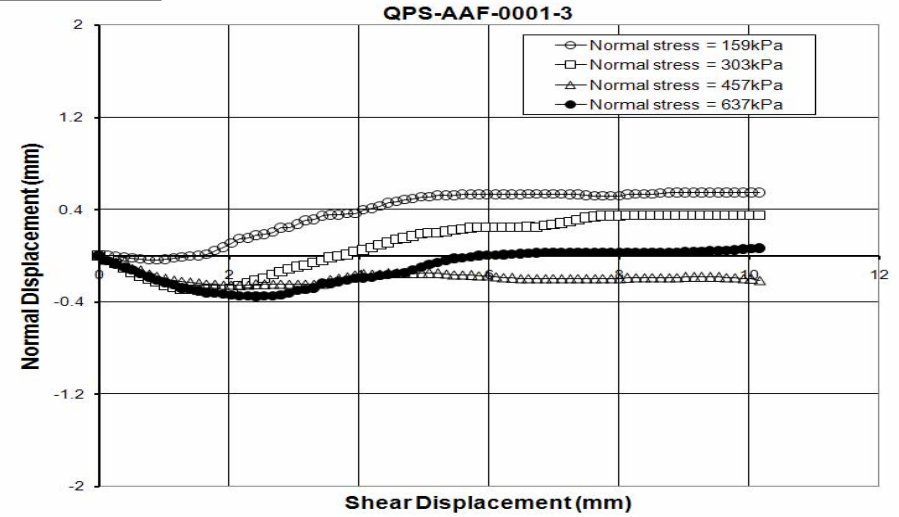
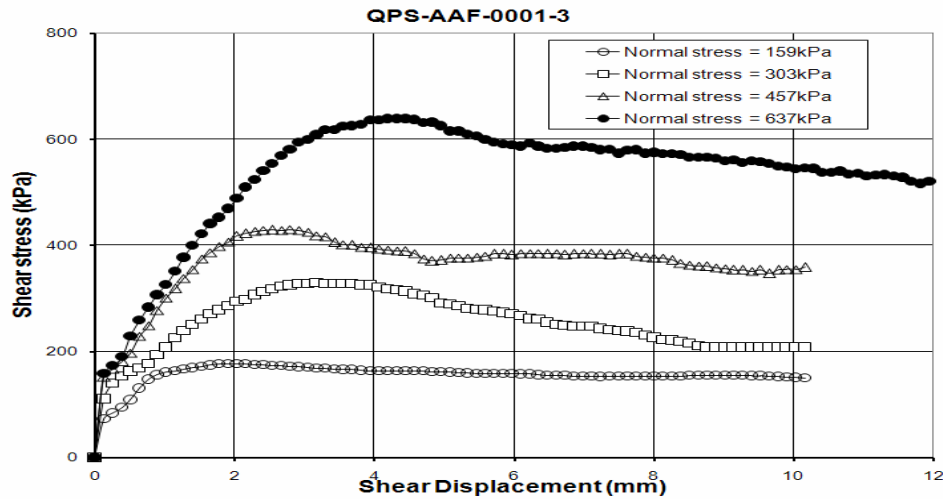
<b>Field id:</b>	QPS-AAF-0001-3						
Measured Cohesion	23.90	Water Content	14.93	Shear box size	30	Peak Shear Stress	53.2
Intrinsic Cohesion	23.90	Wet Density	1910	Matric Suction	0.00	Post Peak Shear Stress	28.44
Max. Particle Size	5.08	Dry density	1660	Normal Stress	28.44	Elevation	2906.4



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

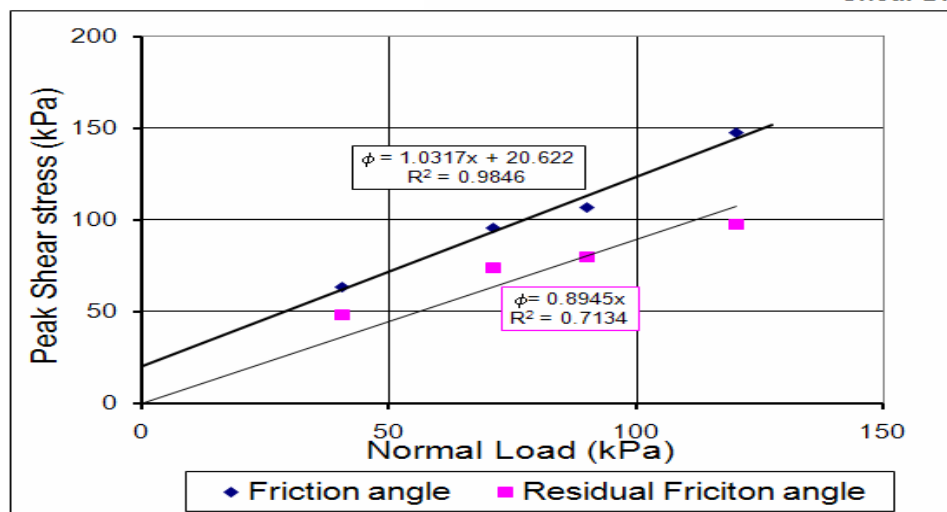
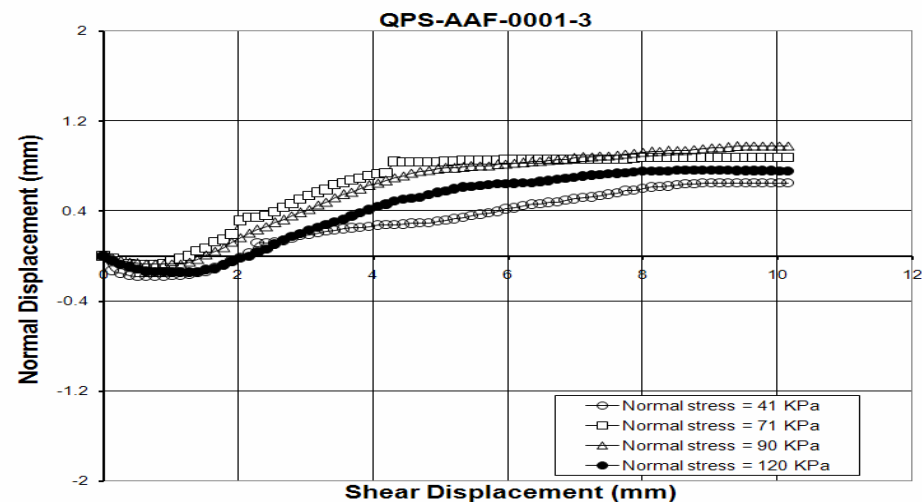
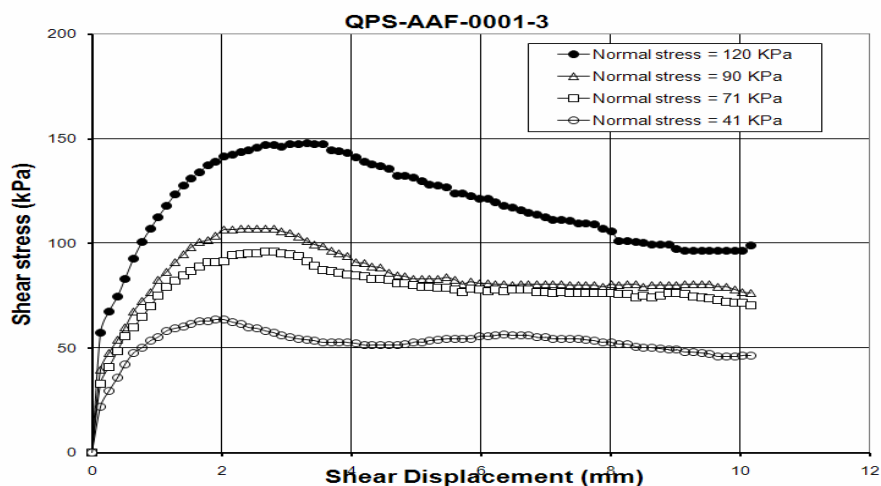
TEST NO: 7  
 TEST DATE: 9/18/2006



<b>Field id:</b>	QPS-AAF-0001-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	177.19,329.48,430.94,639.07
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	148.19,219.84,356.24,524.09
Friction Angle	45.01	Dry density	1670	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 7  
 TEST DATE: 1/9/2007



<b>Field id:</b>	QPS-AAF-0001-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	63.66,96.02,107.16,148.01
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	48.68,73.97,79.82,97.97
Friction Angle	45.89	Dry density	1660	Normal Stress	41,71,90,120	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

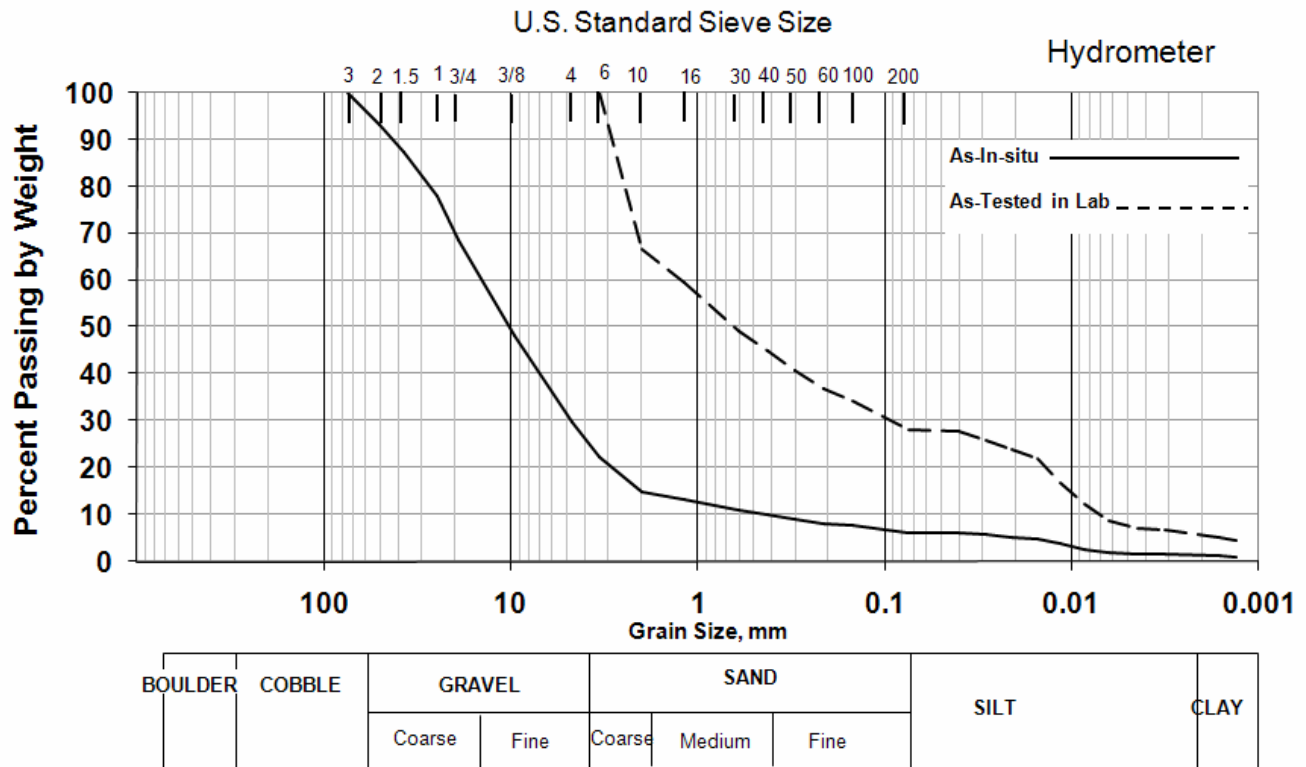
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 8  
 TEST DATE: 9/15/2006

SAMPLE: QPS-AAF-0008-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 36.4	GRAVEL: 70.1
PLASTIC LIMIT: 17.8	SAND: 23.6
PLASTICITY INDEX: 18.5	FINE: 6.3
SPECIFIC GRAVITY: 2.8	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

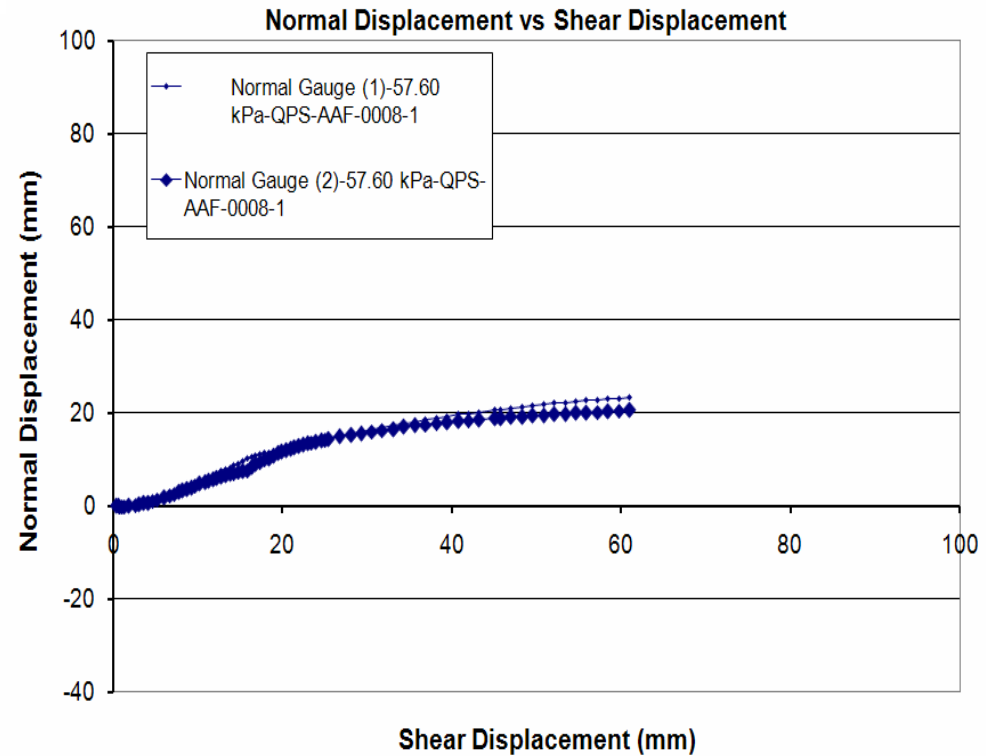
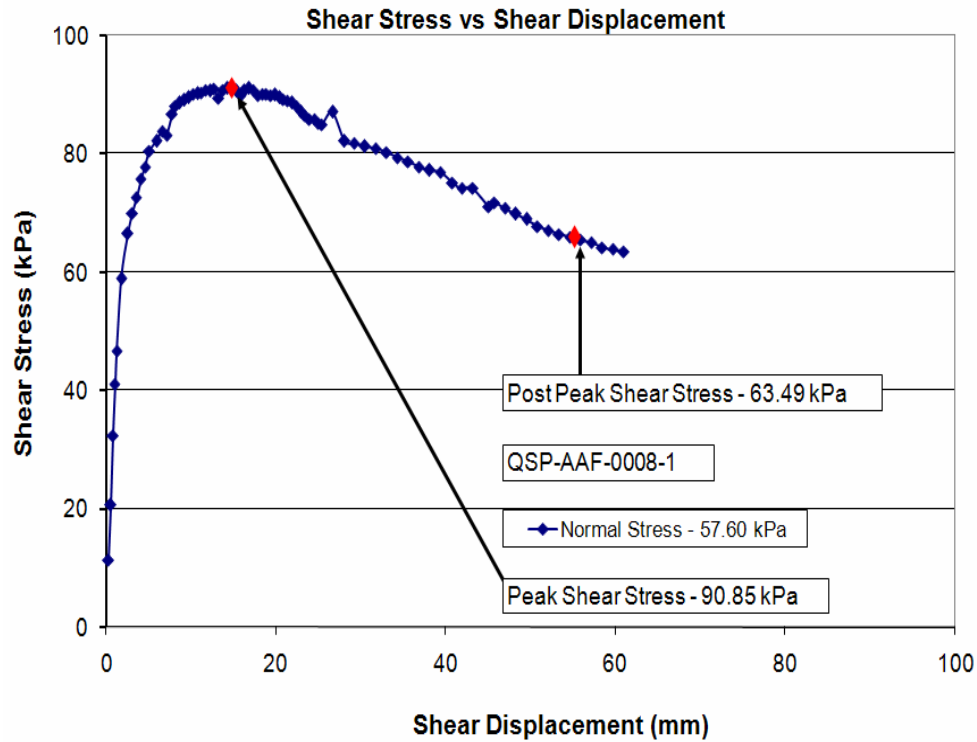
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	14.89	0.0419	6.19	0.0015	1.13
2	50	93.30	16	18.01	13.27	0.0303	5.79	0.0013	0.98
1-1/2	37.5	87.27	30	15.04	10.96	0.0217	5.32		
1	25	77.95	40	13.80	10.02	0.0157	4.92		
3/4	19	68.64	50	12.53	9.07	0.0114	3.77		
3/8	9.5	48.30	70	11.48	8.25	0.0082	2.74		
4	4.75	29.89	100	10.47	7.64	0.0058	1.95		
6	3.36	22.30	200	8.39	6.30	0.0042	1.58		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 8  
 TEST DATE: N/A

UTM Northing: 4062528  
 UTM Easting: 454138

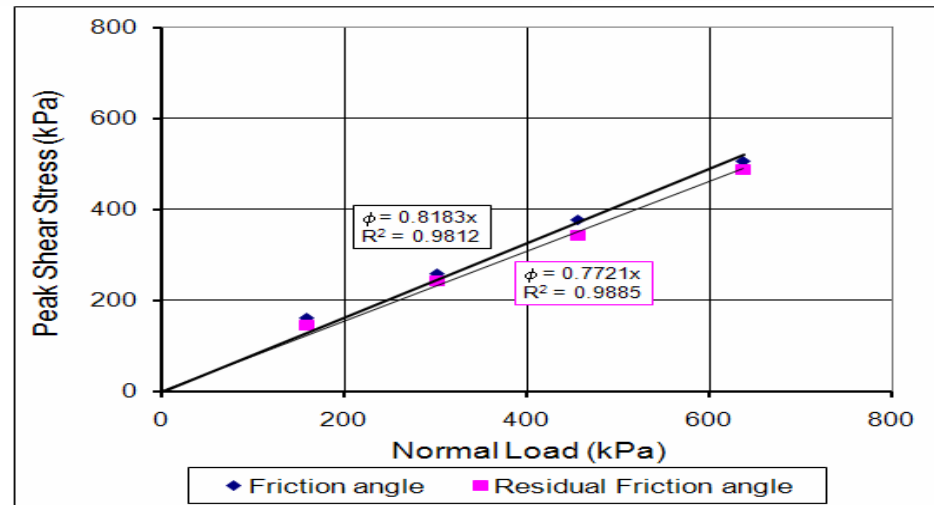
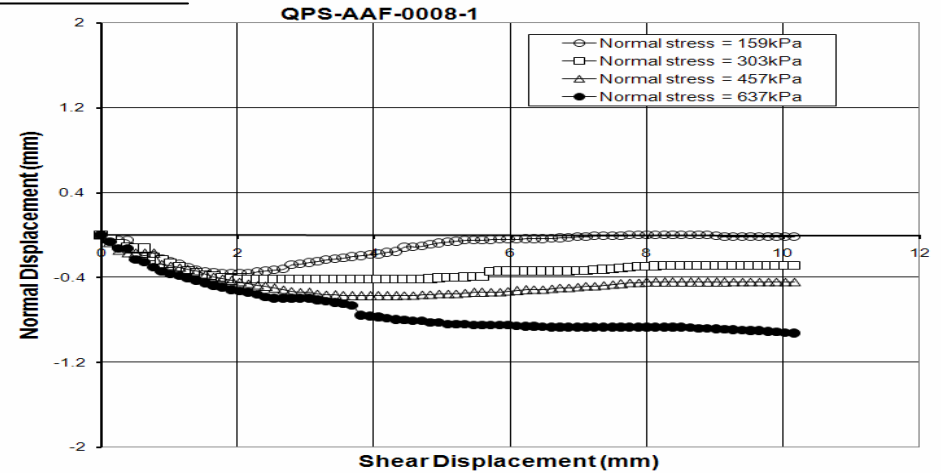
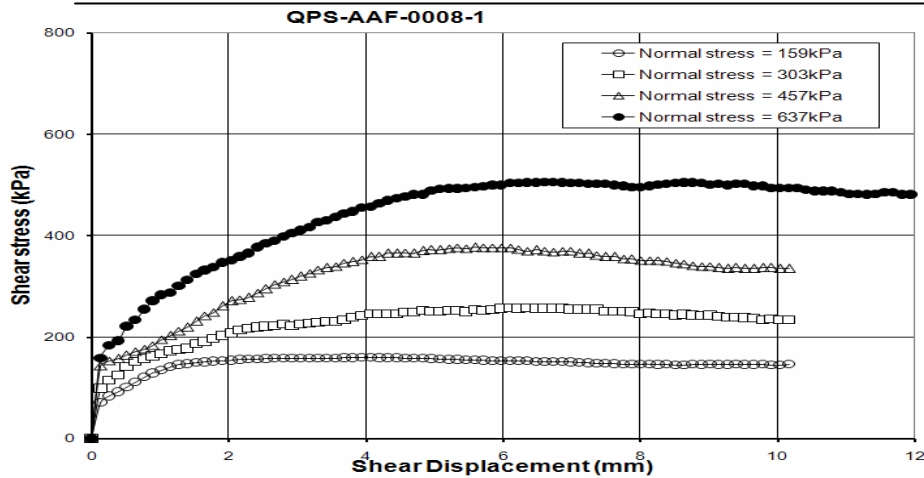


<b>Field id:</b>	QPS-AAF-0008-1						
Measured Cohesion	24.95	Water Content	13.31	Shear box size	60	Peak Shear Stress	90.85
Intrinsic Cohesion	21.73	Wet Density	1710	Matric Suction	12	Post Peak Shear Stress	63.49
Max. Particle Size	15.24	Dry density	1510	Normal Stress	57.60	Elevation	2923.5

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

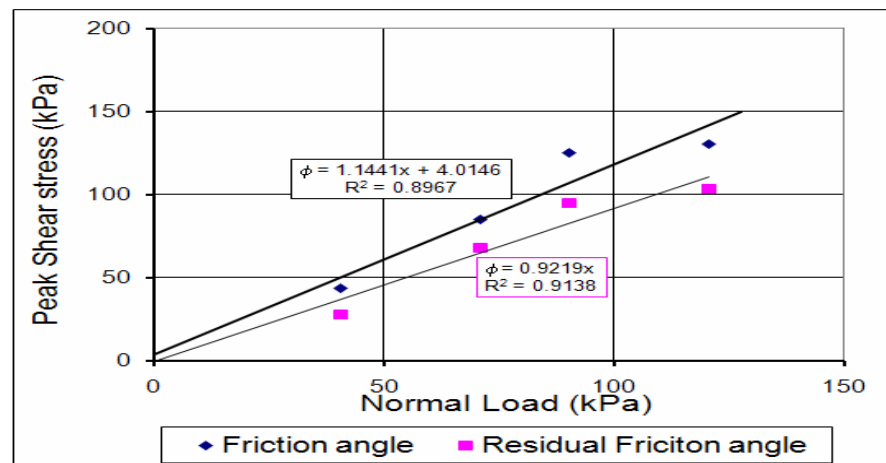
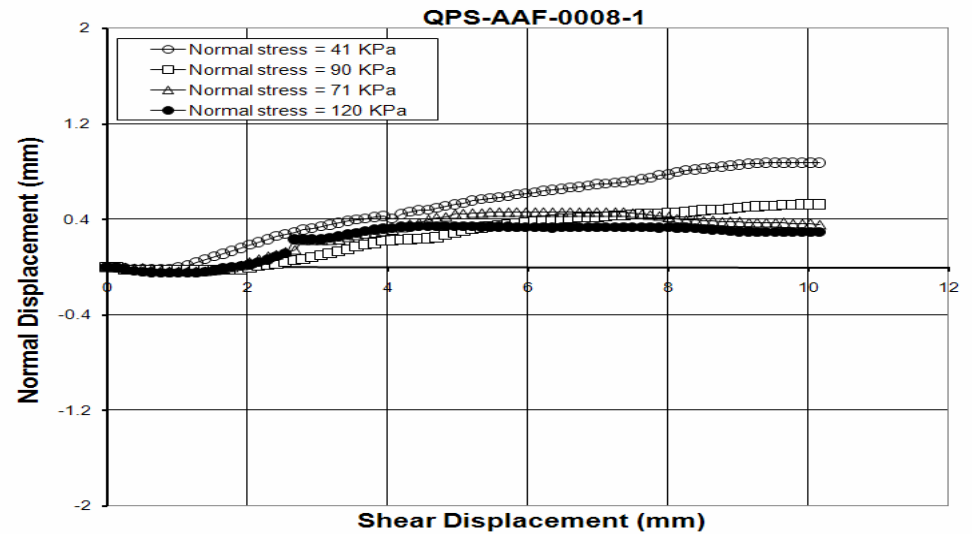
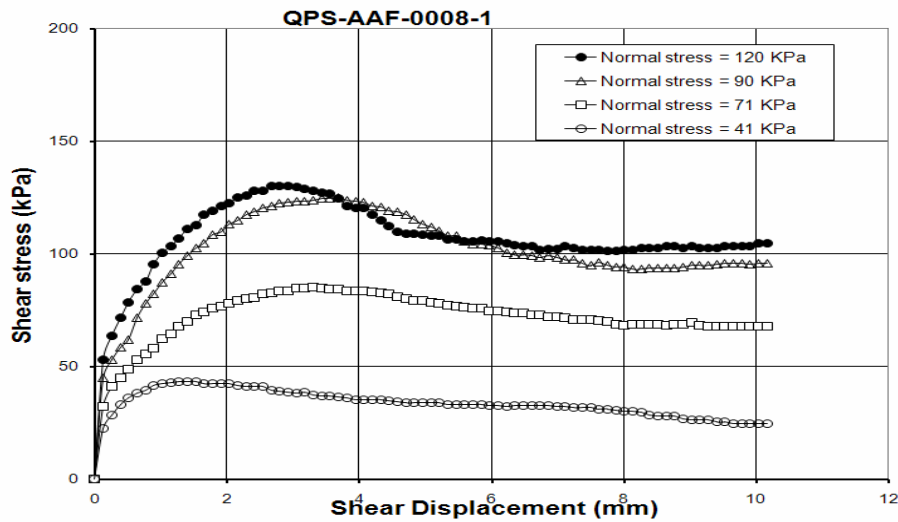
TEST NO: 8  
 TEST DATE: 9/28/2006



<b>Field id:</b>	QPS-AAF-0008-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	160.74,257.93,377.61,506.39
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	145.58,244.40,342.81,488.52
Friction Angle (°)	39.29	Dry density	1520	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 8  
 TEST DATE: 1/12/2007



<b>Field id:</b>	QPS-AAF-0008-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	43.50,85.41,125.20,130.51
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	28.23,68.32,95.03,103.45
Friction Angle (°)	48.84	Dry density	1550	Normal Stress	41,71,90,120	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

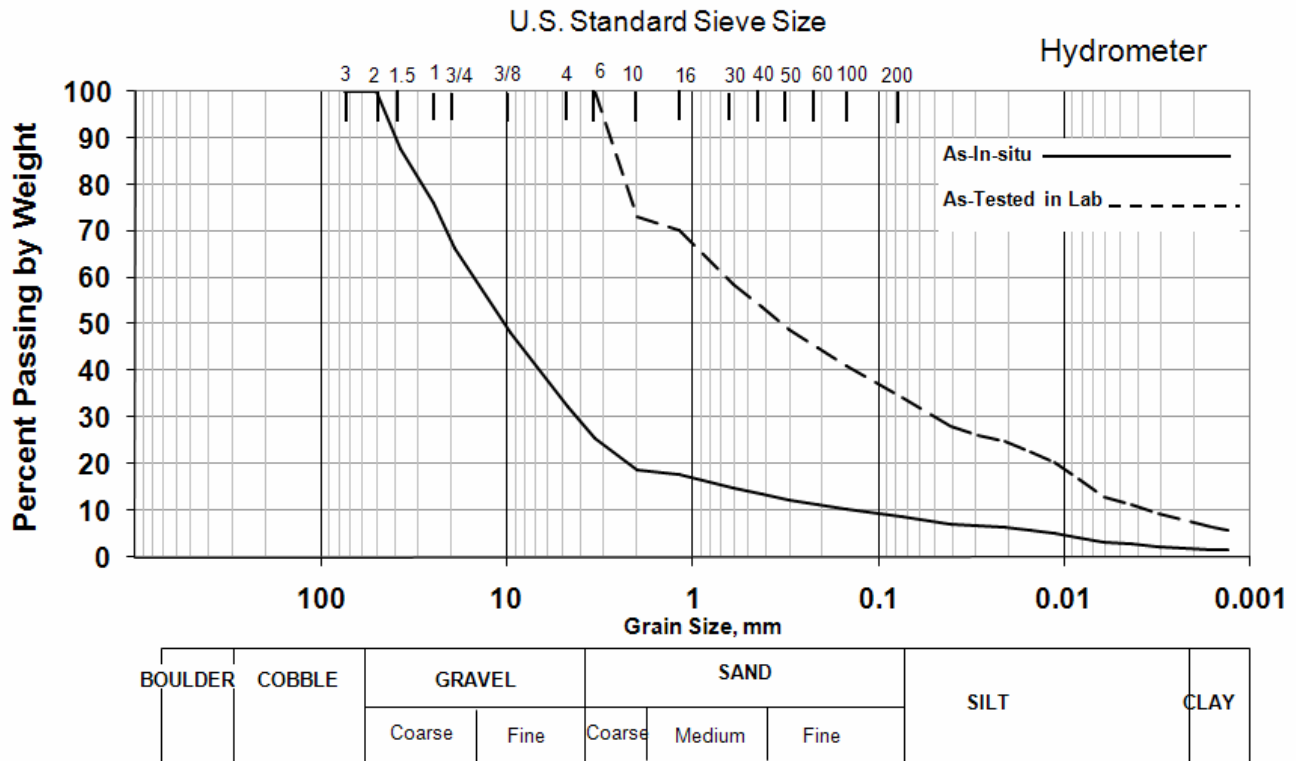
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 9  
 TEST DATE: 9/15/2006

SAMPLE: QPS-AAF-0009-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 35.5	GRAVEL: 67.6
PLASTIC LIMIT: 22.2	SAND: 23.6
PLASTICITY INDEX: 13.3	FINE: 8.8
SPECIFIC GRAVITY: 2.8	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

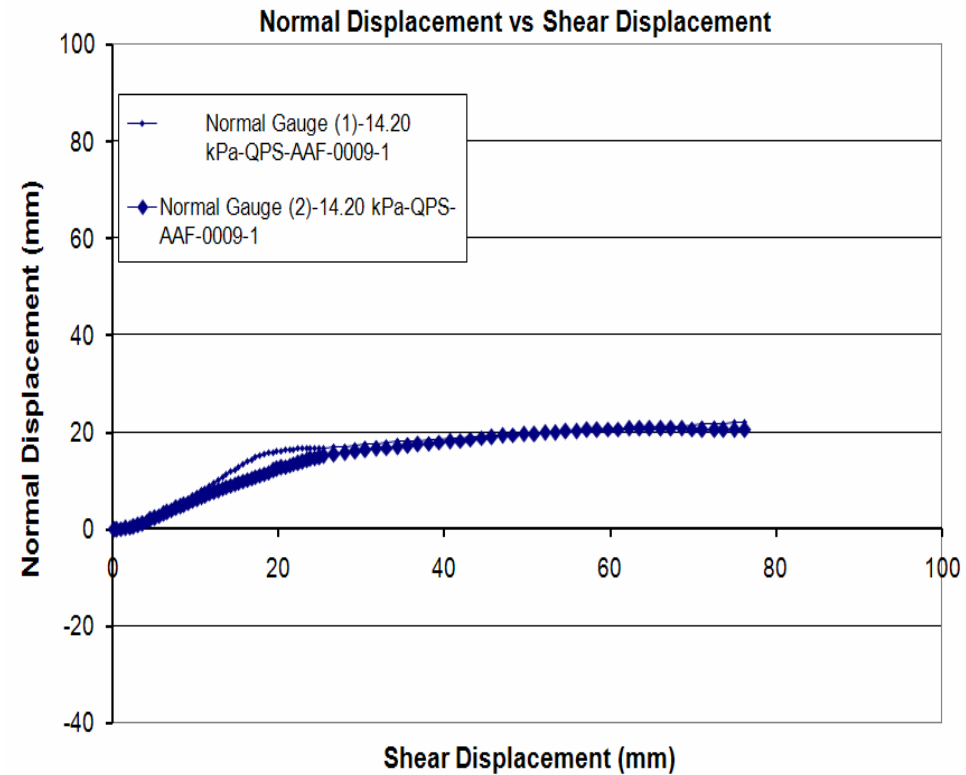
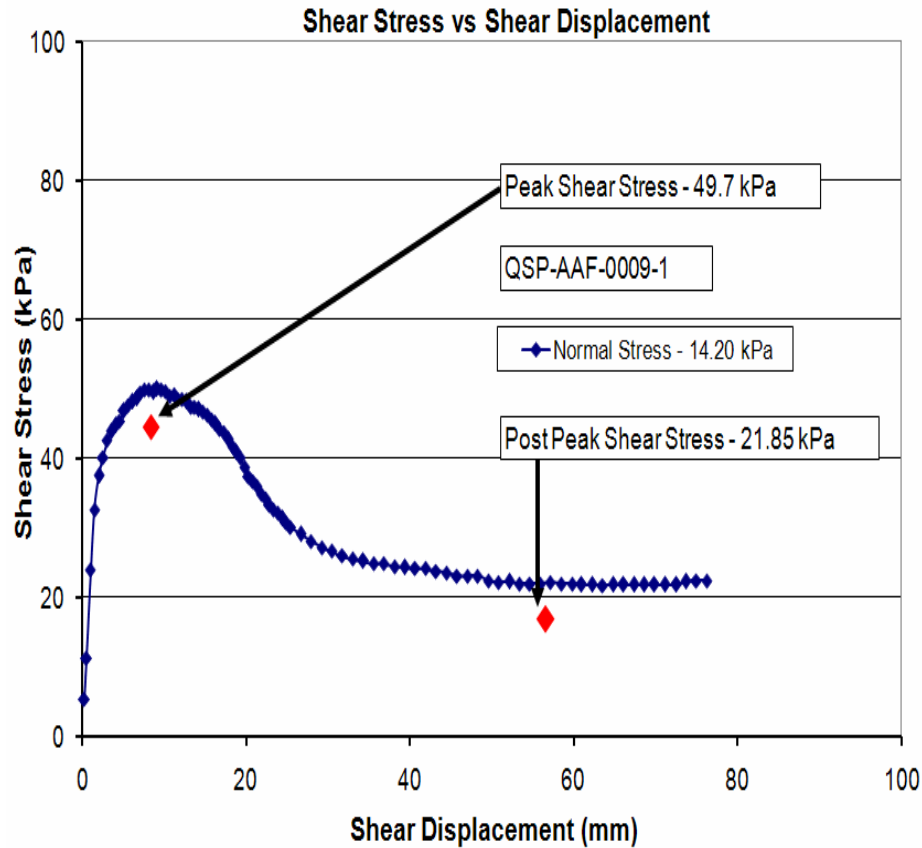
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	18.64	0.0419	7.18	0.0015	1.68
2	50	100.00	16	18.01	17.89	0.0303	6.70	0.0013	1.52
1-1/2	37.5	87.61	30	15.04	14.91	0.0217	6.31		
1	25	76.02	40	13.80	13.71	0.0157	5.73		
3/4	19	66.25	50	12.53	12.43	0.0114	5.15		
3/8	9.5	48.07	70	11.48	11.41	0.0082	4.28		
4	4.75	32.39	100	10.47	10.45	0.0058	3.26		
6	3.36	25.44	200	8.39	8.75	0.0042	2.87		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 9  
 TEST DATE: N/A

UTM Northing: 4062528  
 UTM Easting: 454138



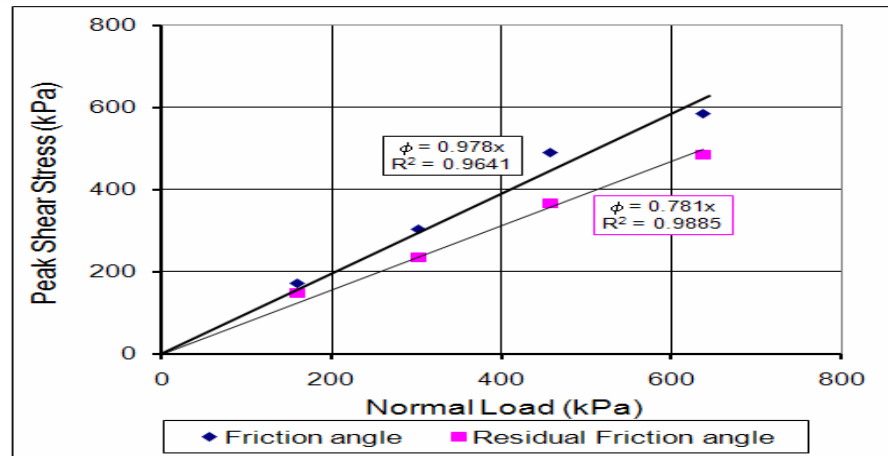
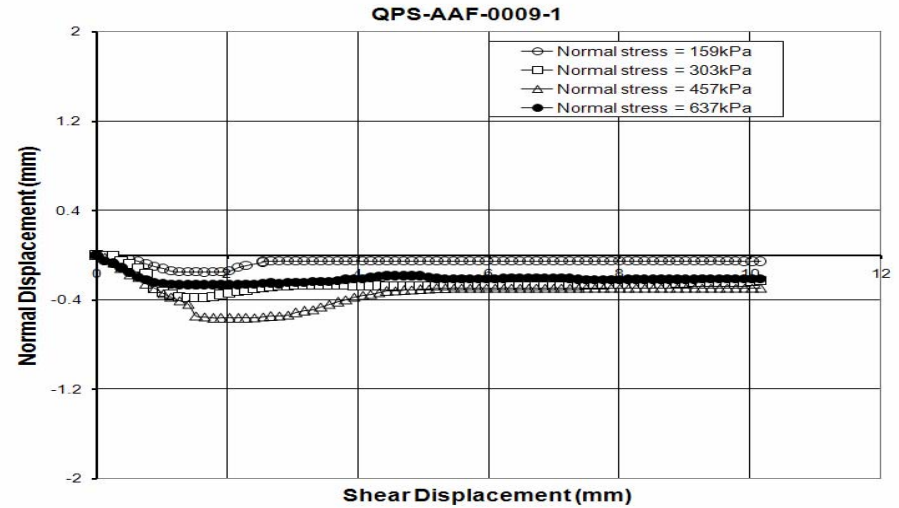
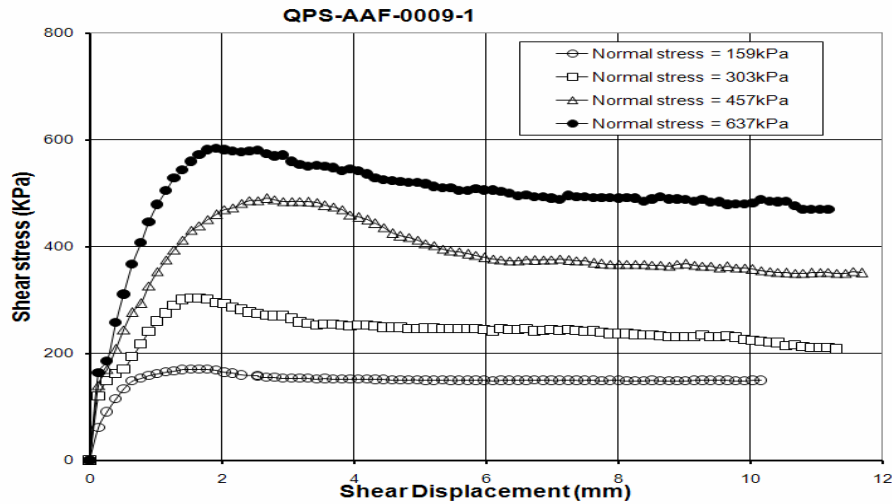
<b>Field id:</b>	QPS-AAF-0009-1						
Measured Cohesion	34.87	Water Content	12.37	Shear box size	60	Peak Shear Stress	49.7
Intrinsic Cohesion	33.53	Wet Density	2160	Matric Suction	5	Post Peak Shear Stress	21.85
Max. Particle Size	unknown	Dry density	1920	Normal Stress	14.20	Elevation	2923.5



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

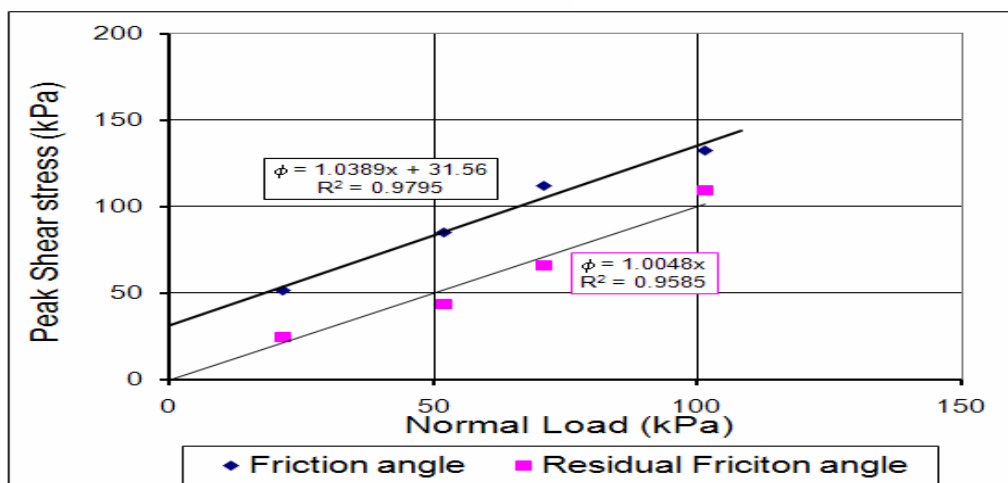
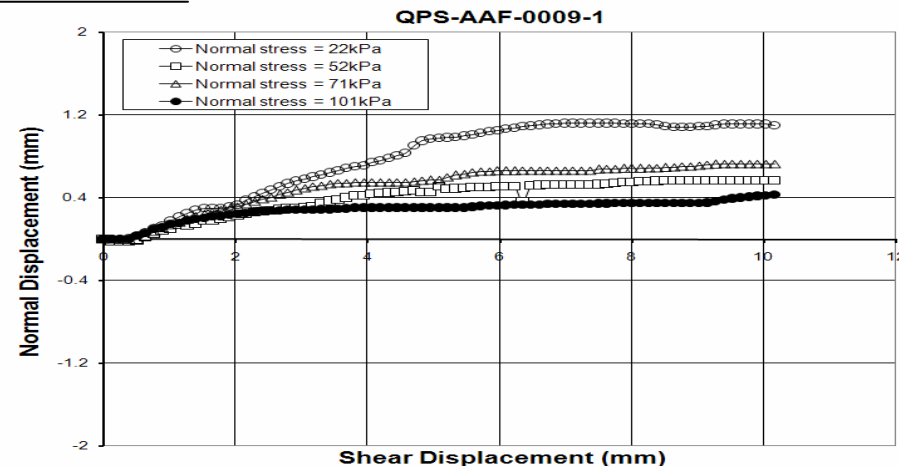
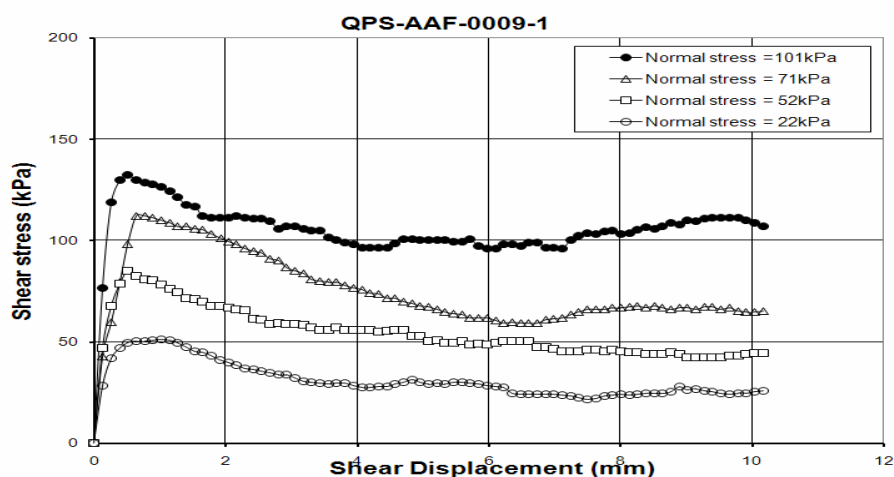
TEST NO: 9  
 TEST DATE: 1/25/2007



<b>Field id:</b>	QPS-AAF-0009-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	171.35,303.46,490.78,584.44
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	147.61,235.76,365.95,485.75
Friction Angle	44.36	Dry density	1970	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 9  
 TEST DATE: 4/27/2007



<b>Field id:</b>	QPS-AAF-0009-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	51.46,85.41,112.47,132.63
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	24.70,43.54,66.34,109.32
Friction Angle	46.09	Dry density	1930	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

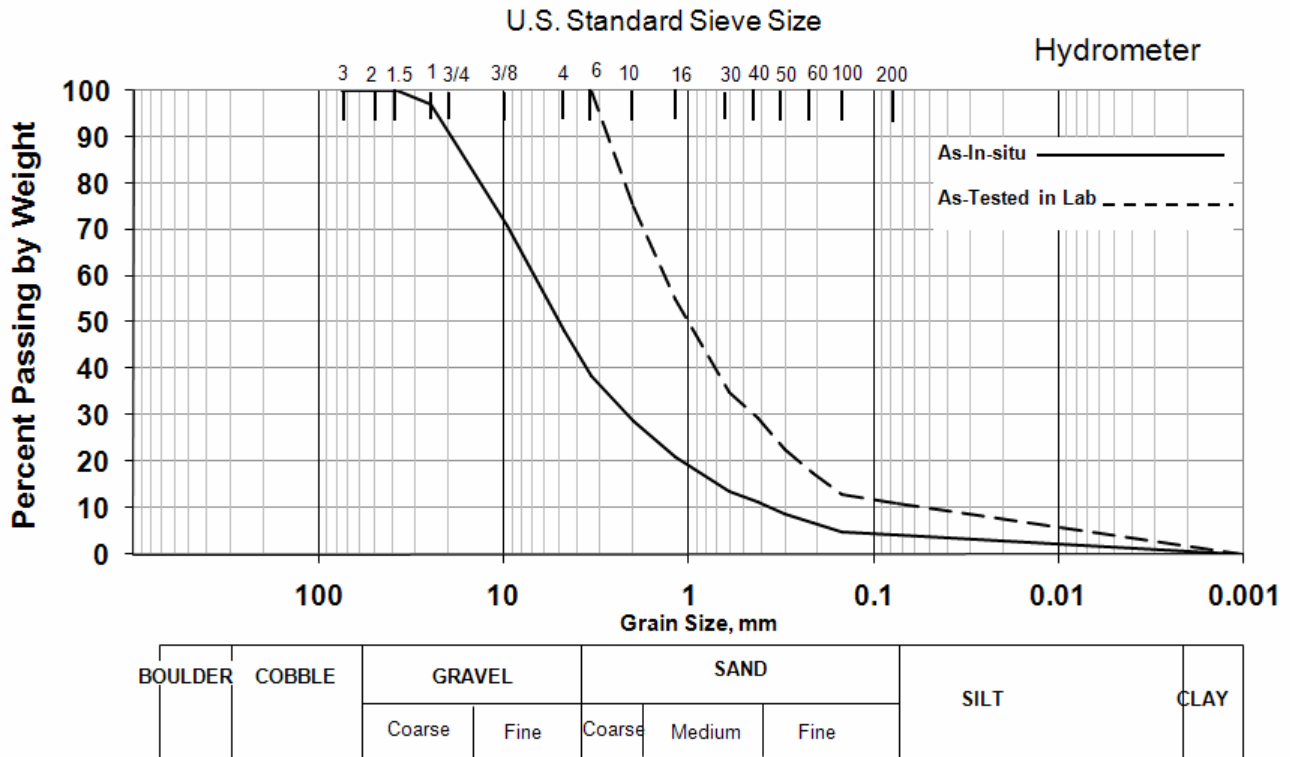
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 10  
 TEST DATE: 9/14/2007

SAMPLE: QPS-VTM-0001-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.9	GRAVEL: 51.8
PLASTIC LIMIT: 22.7	SAND: 43.9
PLASTICITY INDEX: 5.3	FINE: 4.2
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

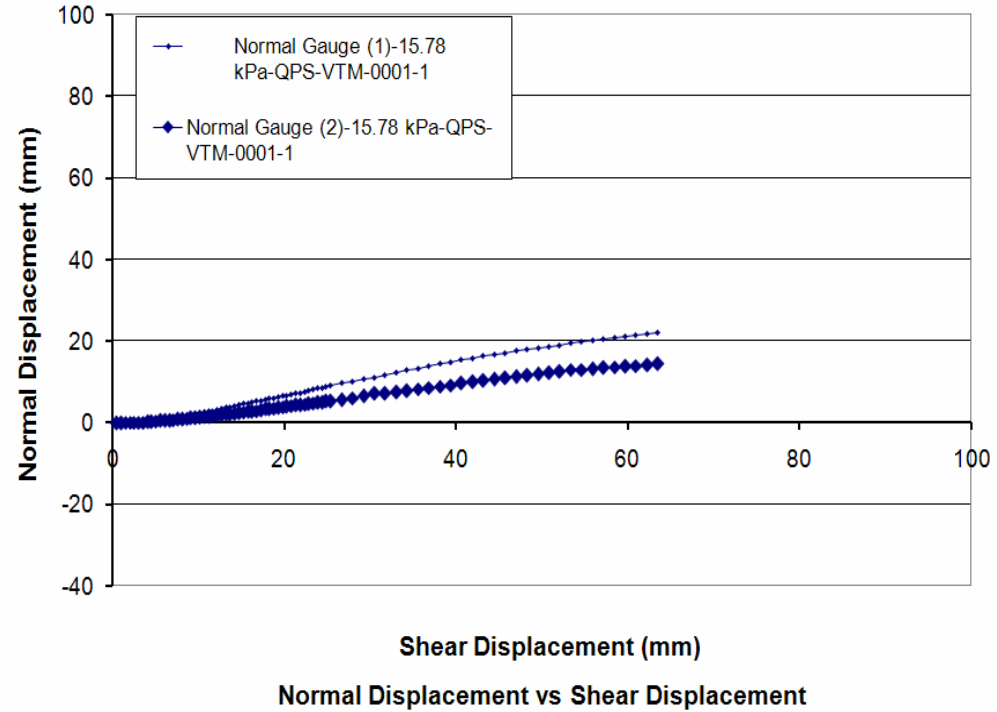
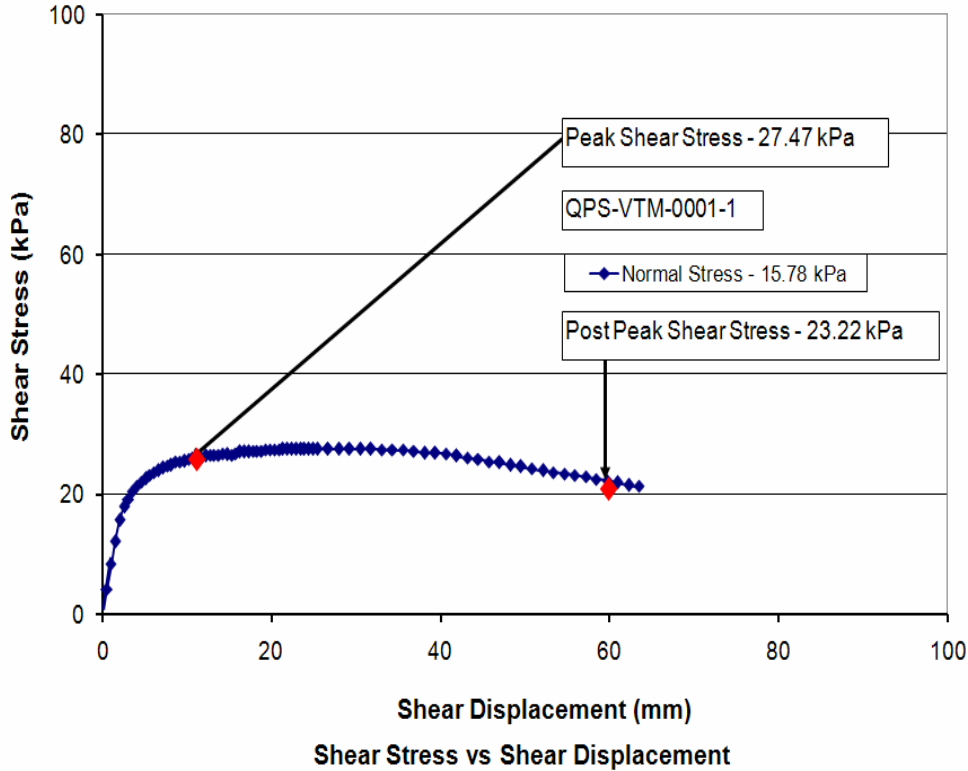
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	28.78	0.0419		0.0015	
2	50	100.00	16	18.01	21.11	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	13.47	0.0217			
1	25	97.20	40	13.80	11.30	0.0157			
3/4	19	90.08	50	12.53	8.69	0.0114			
3/8	9.5	70.90	70	11.48	6.67	0.0082			
4	4.75	48.18	100	10.47	4.94	0.0058			
6	3.36	38.37	200	8.39	4.24	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 10  
 TEST DATE: N/A

UTM Northing: 4062568  
 UTM Easting: 454122

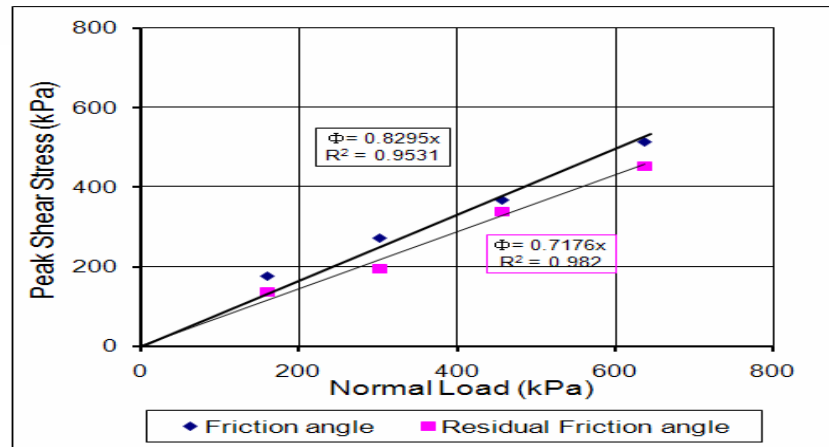
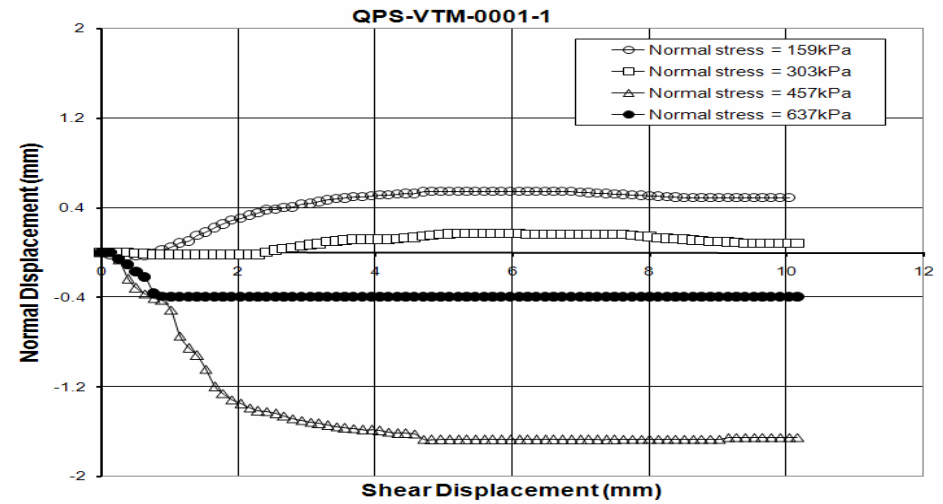
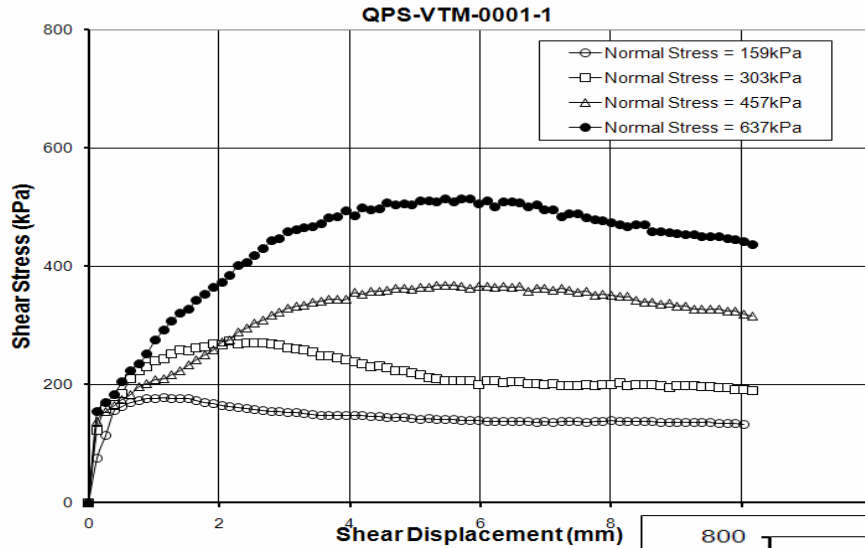


<b>Field id:</b>	QPS-VTM-0001-1						
Measured Cohesion	9.41	Water Content	12.37	Shear box size	60	Peak Shear Stress	27.47
Intrinsic Cohesion	6.41	Wet Density	2160	Matric Suction	11	Post Peak Shear Stress	23.22
Max. Particle Size	8.89	Dry density	1920	Normal Stress	15.78	Elevation	2885.1

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

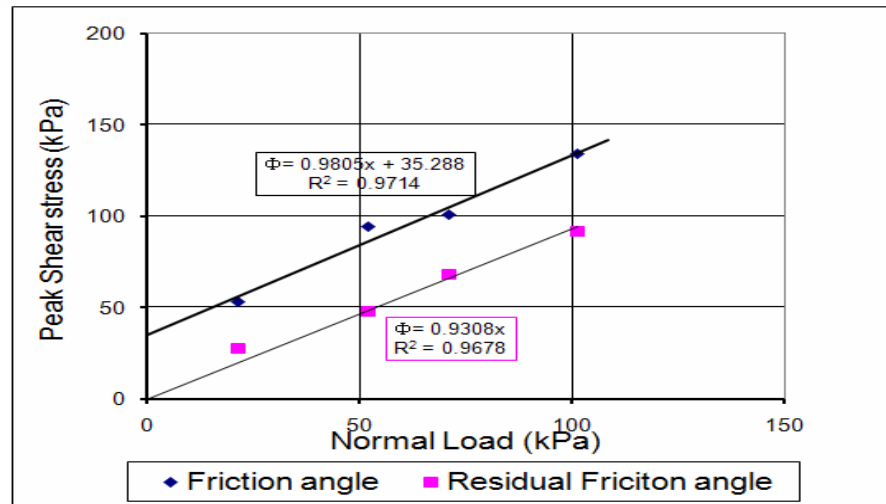
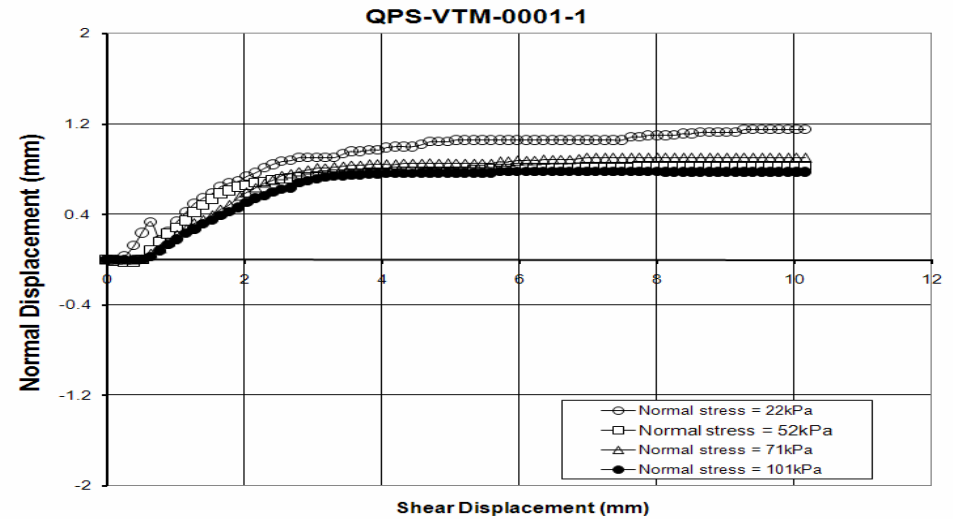
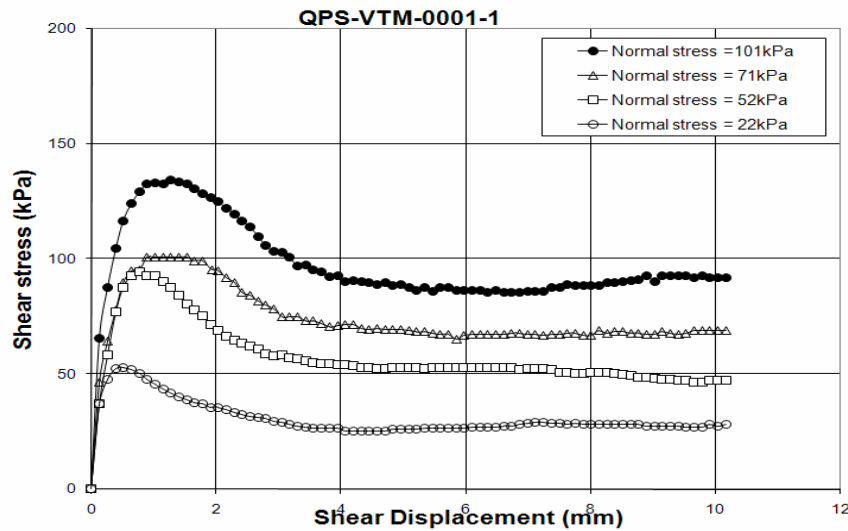
TEST NO: 10  
 TEST DATE 9/10/2007



<b>Field id:</b>	QPS-VTM-0001-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	177.72,273.54,368.50,514.19
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	136.92,195.87,339.45,453.58
Friction Angle	39.68	Dry density	1840	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 10  
 TEST DATE: 9/13/2007



<b>Field id:</b>	QPS-VTM-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	53.05,94.43,100.80,134.22
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.96,47.86,67.99,91.74
Friction Angle	44.44	Dry density	1800	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

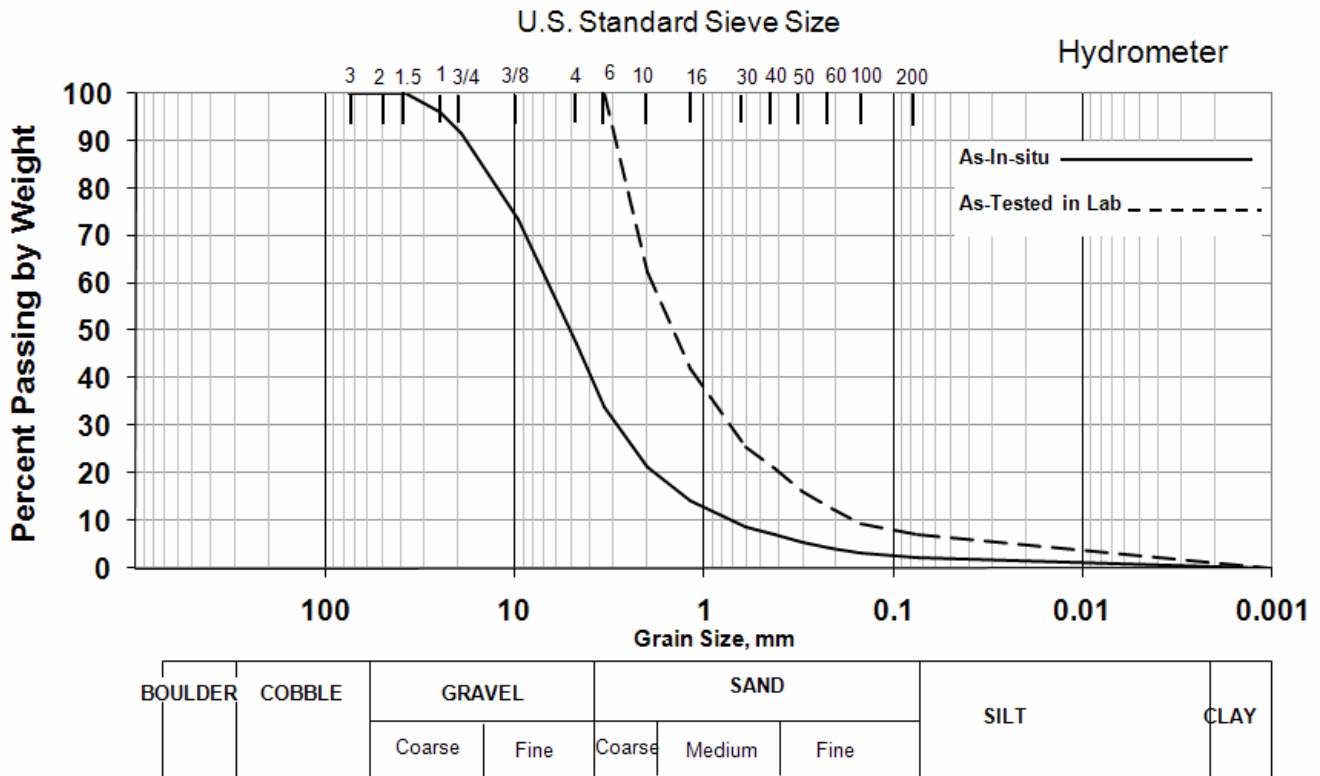
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 11  
 TEST DATE: 9/14/2007

SAMPLE: QPS-AAF-0020-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 29.8	GRAVEL: 52.9
PLASTIC LIMIT: 21.5	SAND: 44.7
PLASTICITY INDEX: 8.3	FINE: 2.4
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION:	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

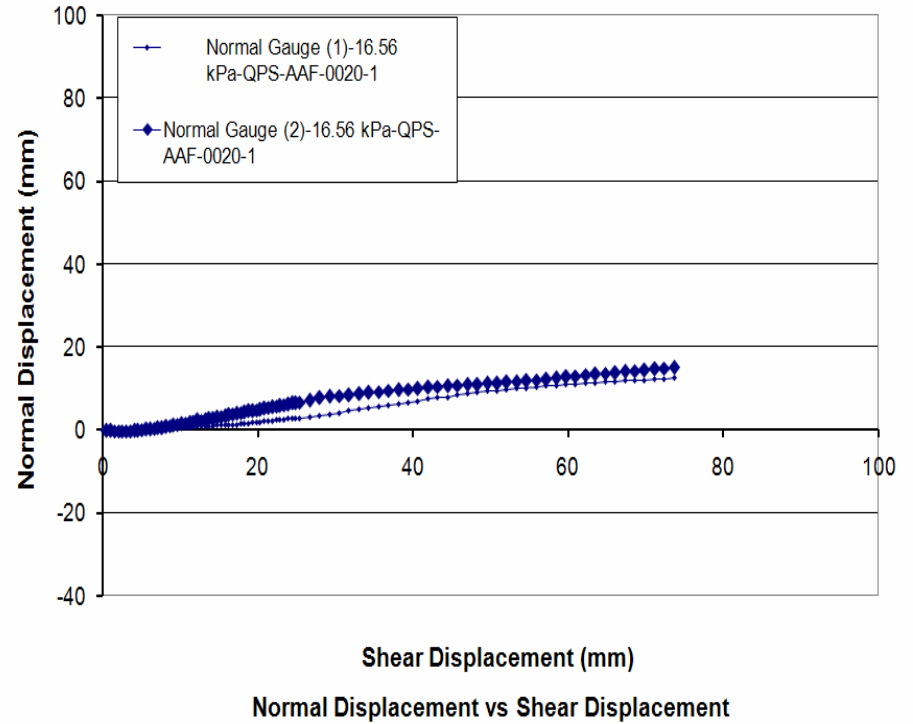
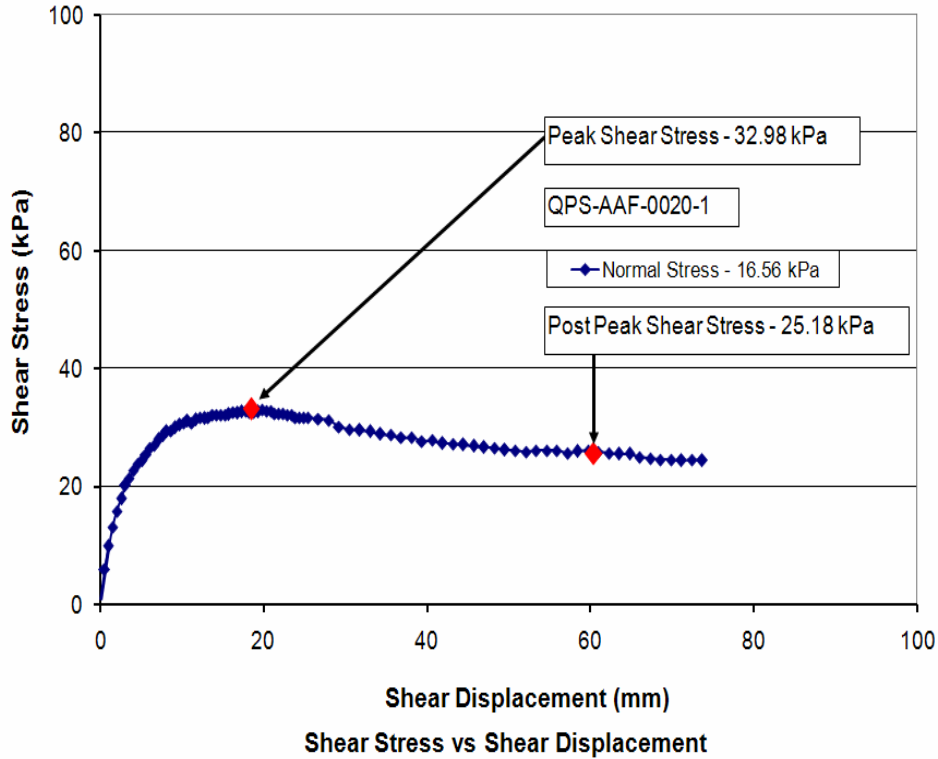
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	21.25	0.0419		0.0015	
2	50	100.00	16	18.01	14.35	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	8.67	0.0217			
1	25	96.06	40	13.80	7.17	0.0157			
3/4	19	91.58	50	12.53	5.52	0.0114			
3/8	9.5	73.38	70	11.48	4.25	0.0082			
4	4.75	47.09	100	10.47	3.20	0.0058			
6	3.36	34.03	200	8.39	2.41	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 11  
 TEST DATE: N/A

UTM Northing: 4062582  
 UTM Easting: 454135



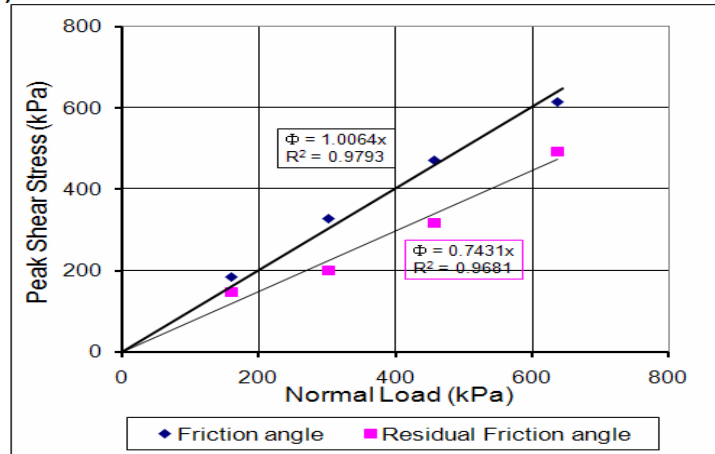
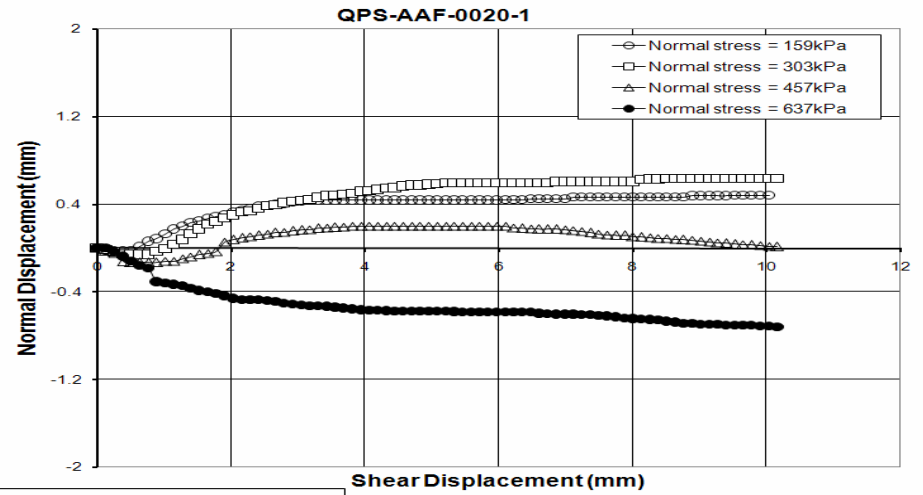
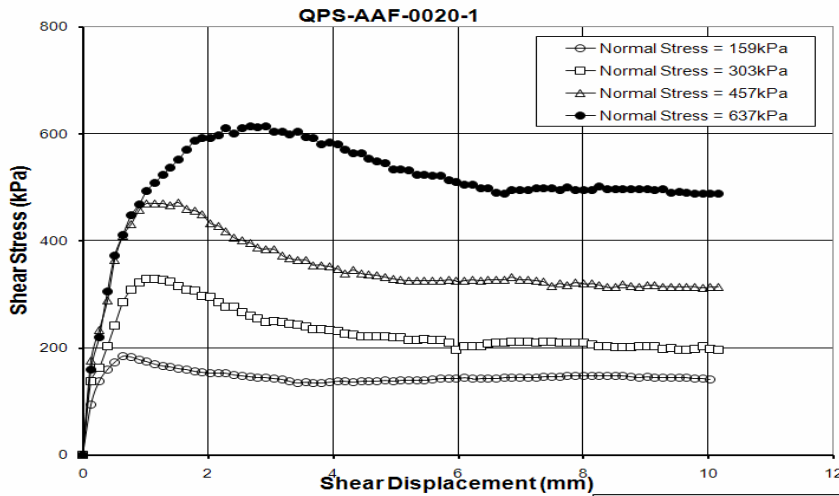
<b>Field id:</b>	QPS-AAF-0020-1						
Measured Cohesion	13.96	Water Content	10.10	Shear box size	60	Peak Shear Stress	32.98
Intrinsic Cohesion	10.48	Wet Density	2150	Matric Suction	11	Post Peak Shear Stress	25.18
Max. Particle Size	13.97	Dry density	1960	Normal Stress	16.56	Elevation	2886.3



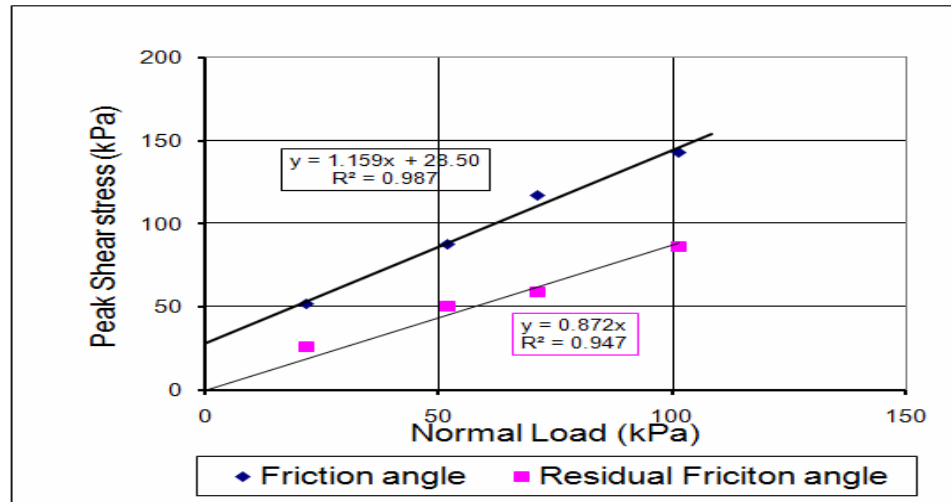
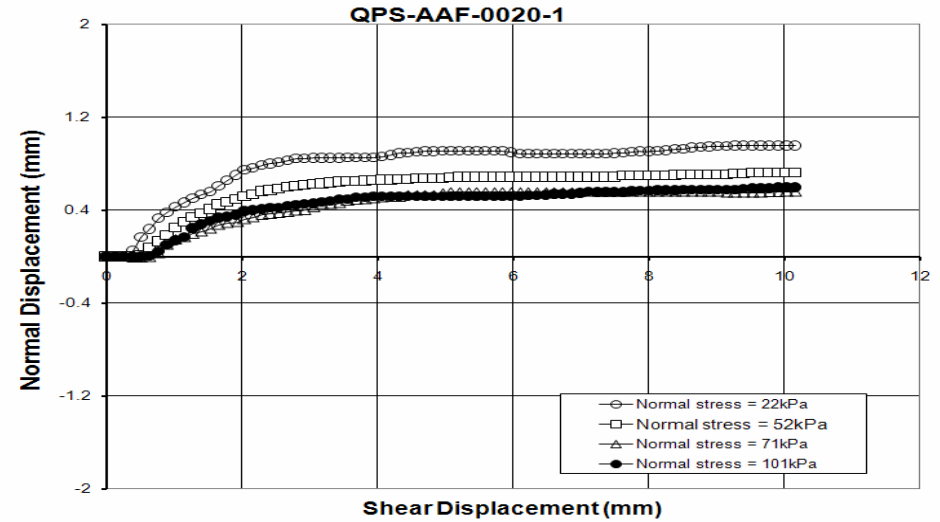
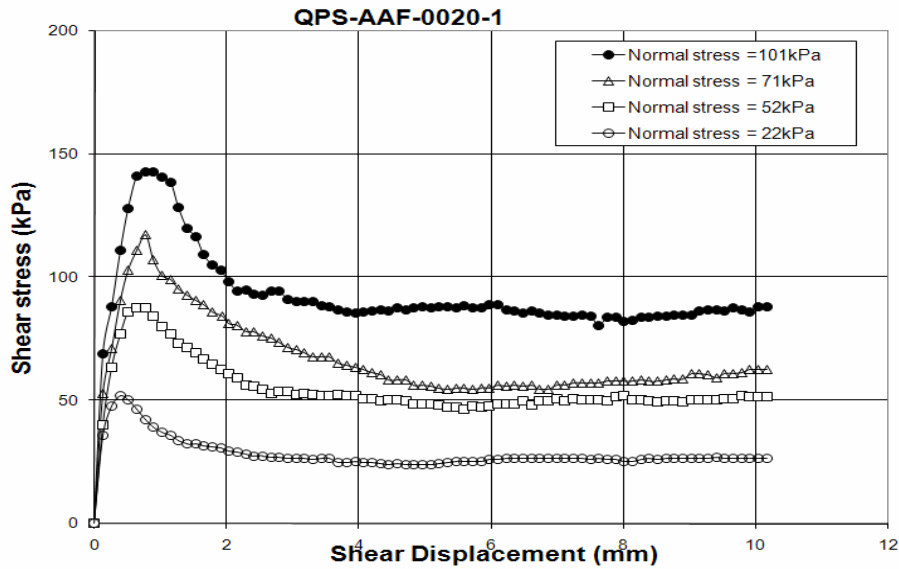
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 11  
 TEST DATE: 7/24/2007



<b>Field id:</b>	QPS-AAF-0020-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	185.09,329.48,472.57,614.36
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	146.33,200.79,317.45,493.90
Friction Angle	45.18	Dry density	1950	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	QPS-AAF-0020-1					
Measured Cohesion		Water Content		Shear box test	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle ( <sup>o</sup> )	49.23	Dry density	1960	Normal Stress	22,52,71,101	Elevation

## PARTICLE SIZE ANALYSIS REPORT

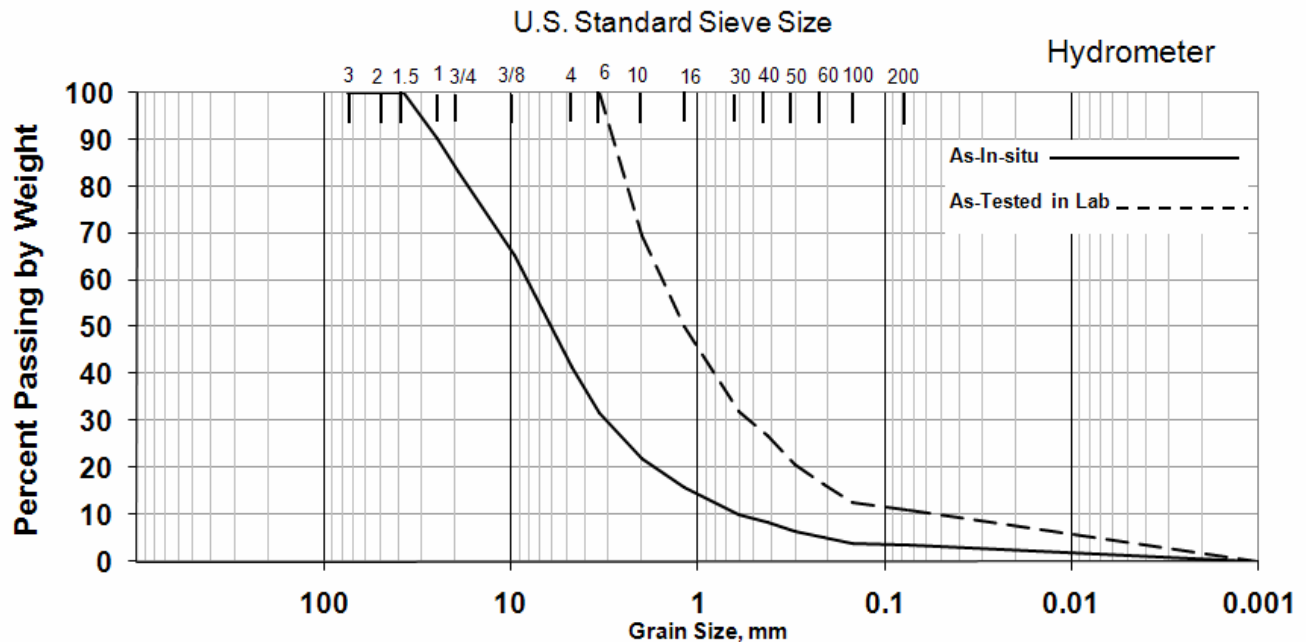
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 12  
 TEST DATE: 9/14/2007

SAMPLE: QPS-AAF-0022-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 31.2	GRAVEL: 58.6
PLASTIC LIMIT: 23.6	SAND: 37.9
PLASTICITY INDEX: 7.7	FINE: 3.5
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION:	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

### UNIFIED SOIL CLASSIFICATION:

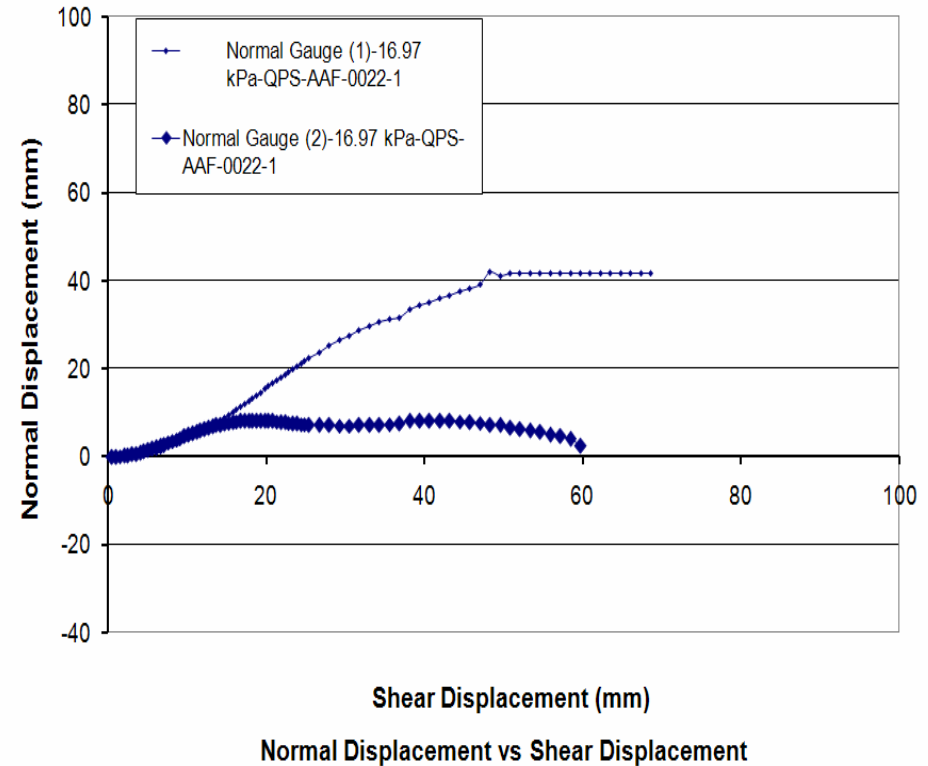
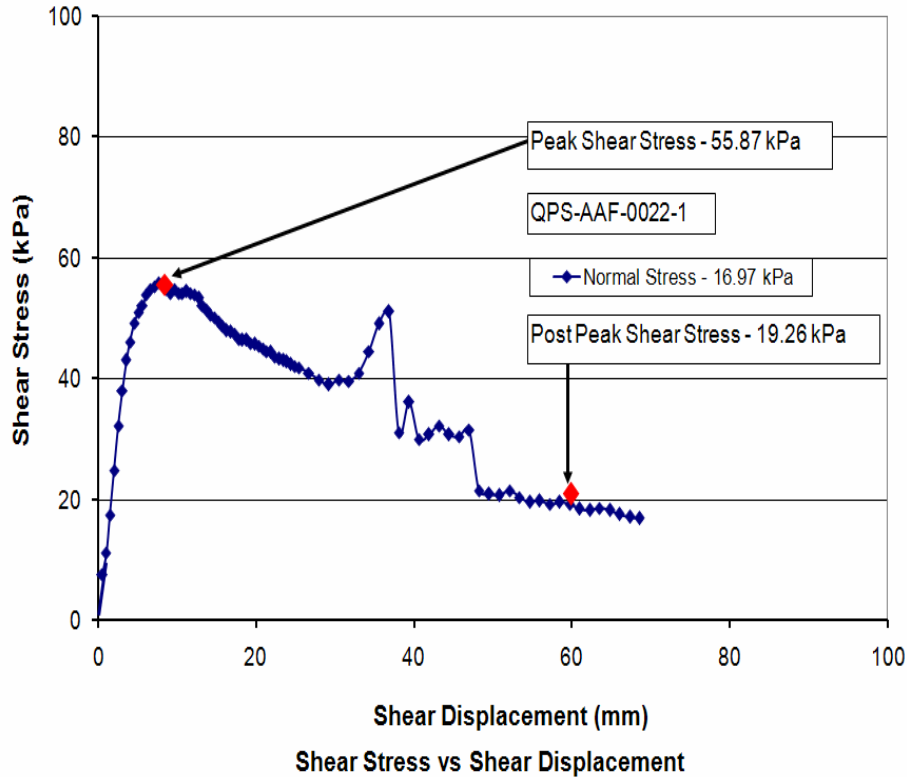
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	21.93	0.0419		0.0015	
2	50	100.00	16	18.01	15.87	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	10.08	0.0217			
1	25	90.37	40	13.80	8.46	0.0157			
3/4	19	83.02	50	12.53	6.58	0.0114			
3/8	9.5	65.23	70	11.48	5.21	0.0082			
4	4.75	41.39	100	10.47	4.01	0.0058			
6	3.36	31.55	200	8.39	3.47	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 12  
 TEST DATE: N/A

UTM Northing: 4062582  
 UTM Easting: 454135

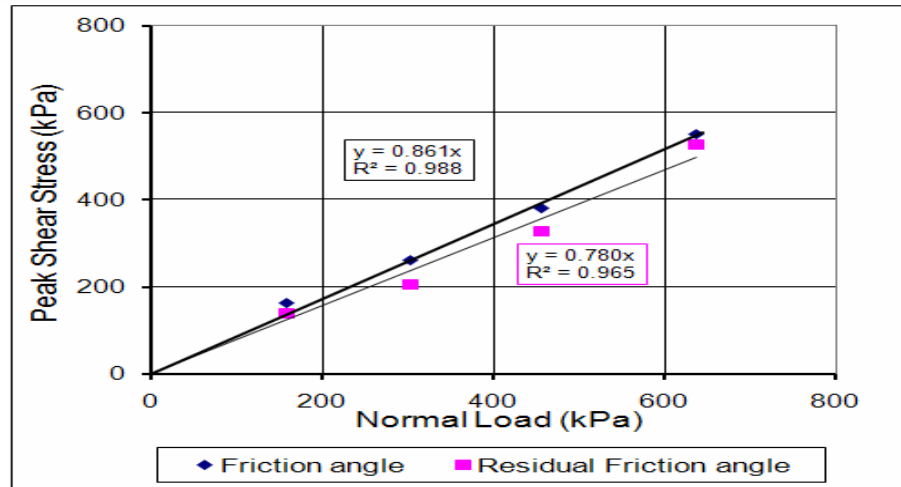
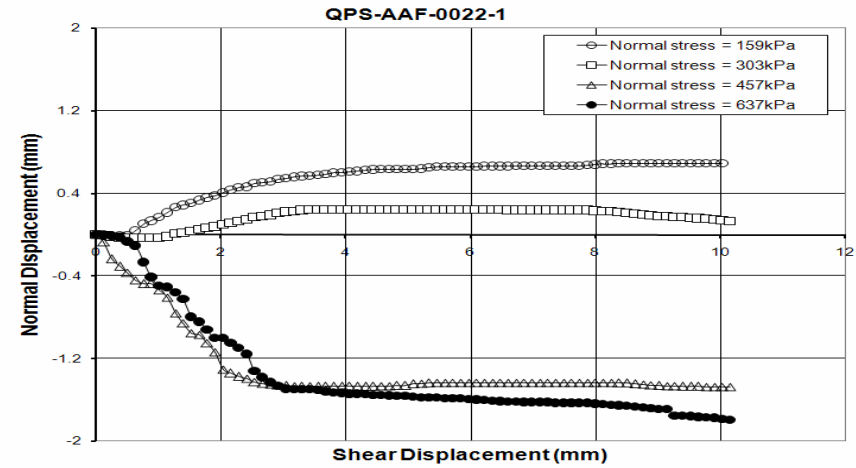
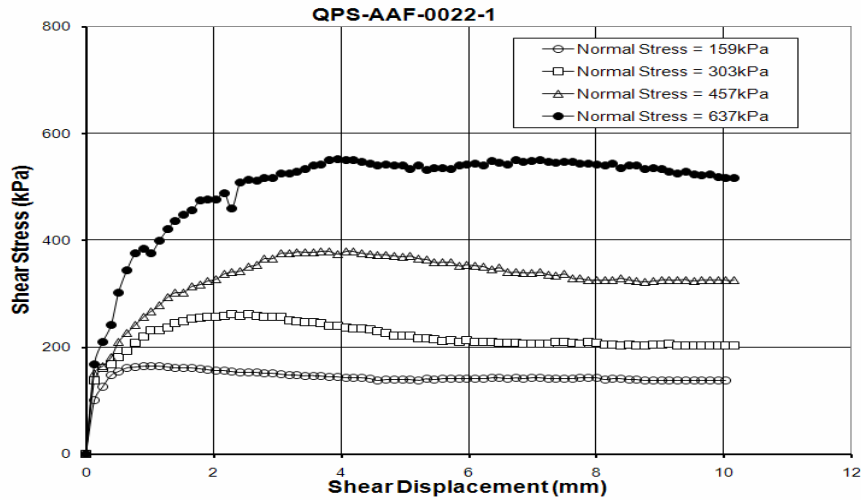


<b>Field id:</b>	QPS-AAF-0022-1						
Measured Cohesion	40.62	Water Content	9.00	Shear box size	60	Peak Shear Stress	55.87
Intrinsic Cohesion	37.67	Wet Density	2030	Matric Suction	11	Post Peak Shear Stress	19.26
Max. Particle Size	25.4	Dry density	1860	Normal Stress	16.97	Elevation	2886.3

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

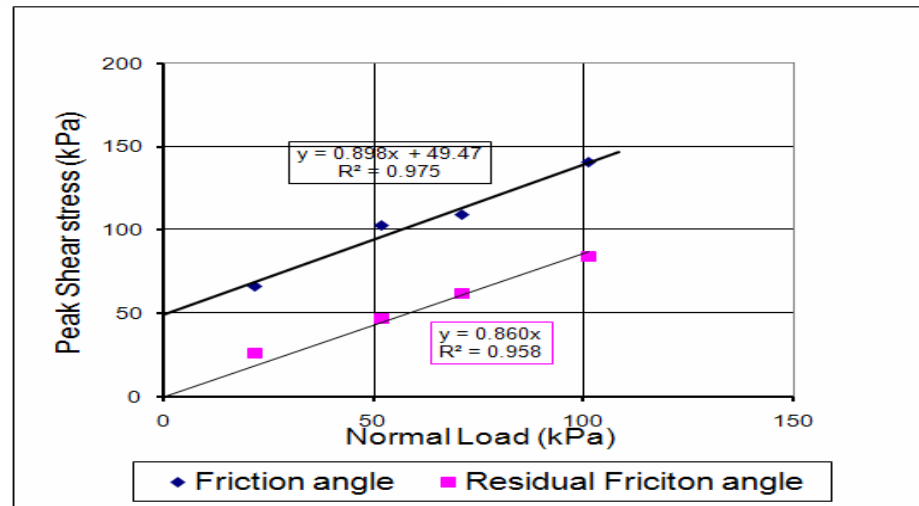
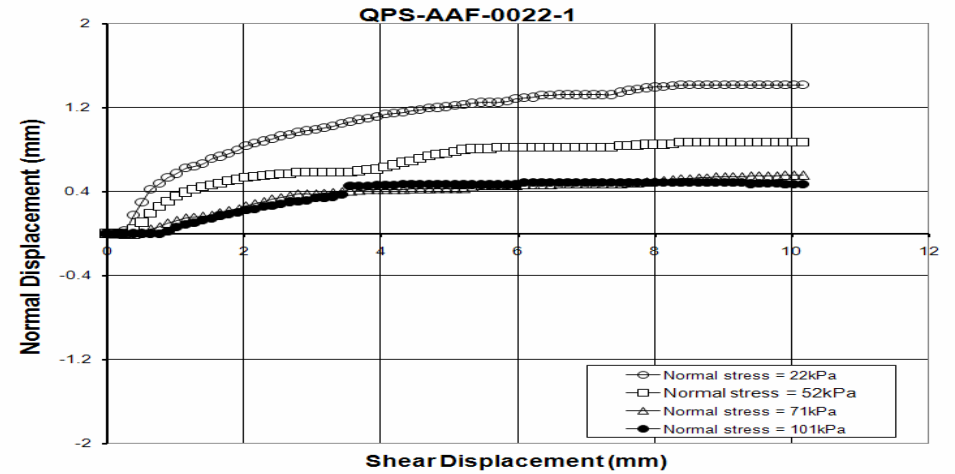
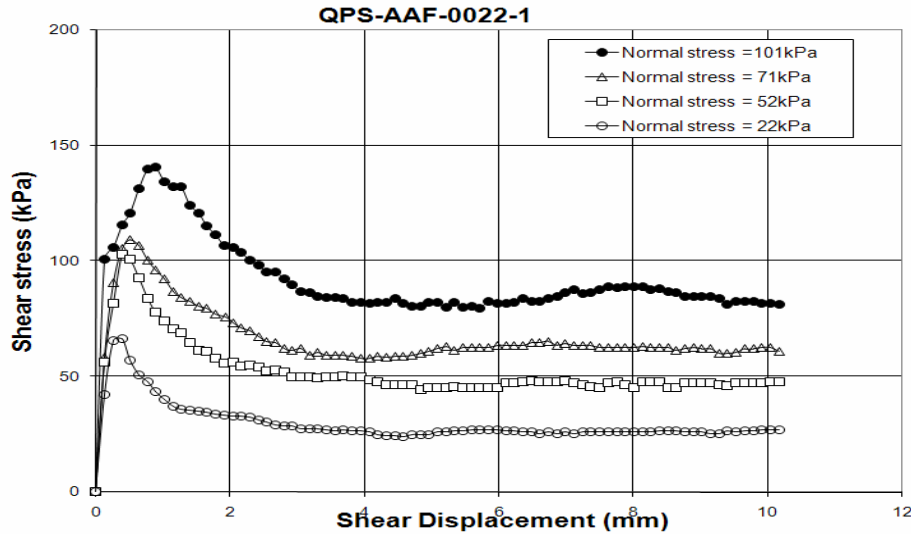
TEST NO: 12  
 TEST DATE: 9/10/2007



<b>Field id:</b>	QPS-AAF-0022-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	164.46,261.84,380.21,551.92
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	140.29,204.69,327.69,528.76
Friction Angle	40.76	Dry density	1860	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 12  
 TEST DATE: 7/27/2007



<b>Field id:</b>	QPS-AAF-0022-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	66.31,102.92,109.29,140.59
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.18,46.87,62.18,83.93
Friction Angle	41.95	Dry density	1860	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

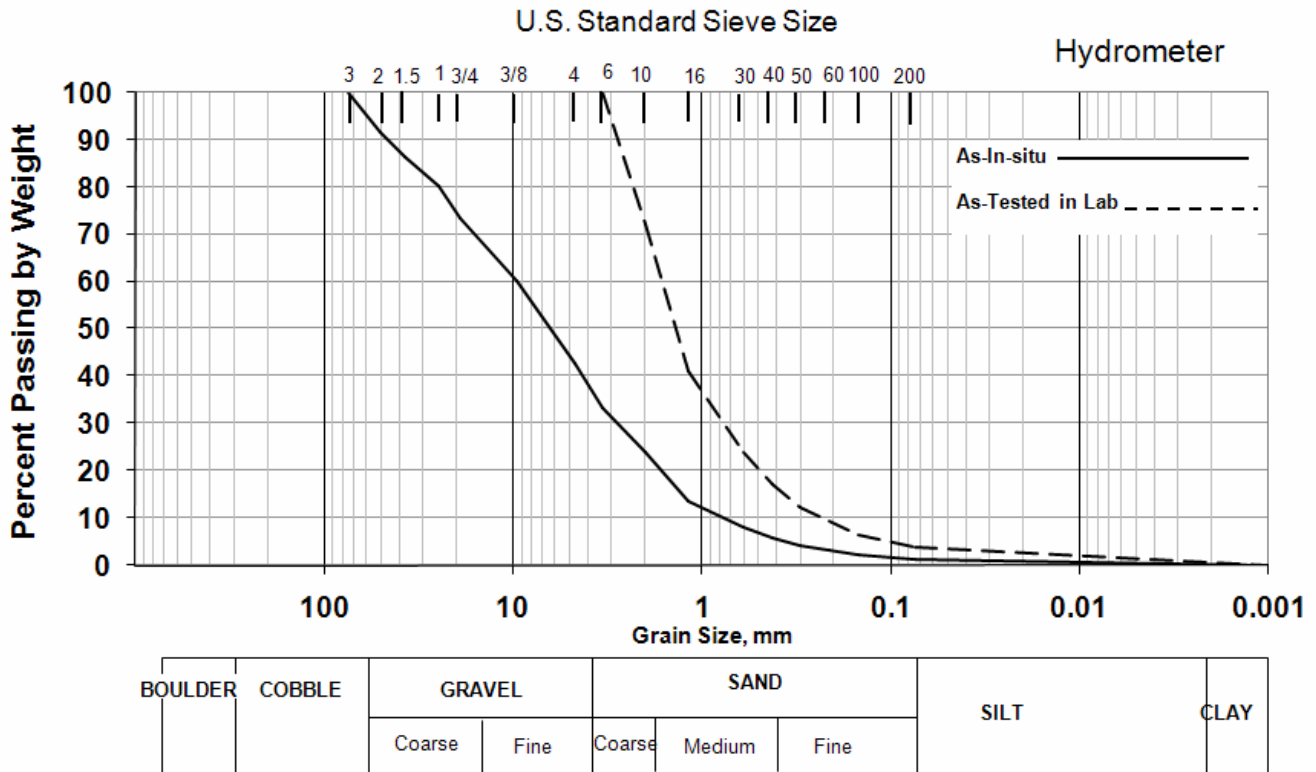
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 13  
 TEST DATE: 5/28/2007

SAMPLE: **SPR-AAF-0001-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 23.4	GRAVEL: 57.2
PLASTIC LIMIT: 22.1	SAND: 41.5
PLASTICITY INDEX: 1.4	FINE: 1.3
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

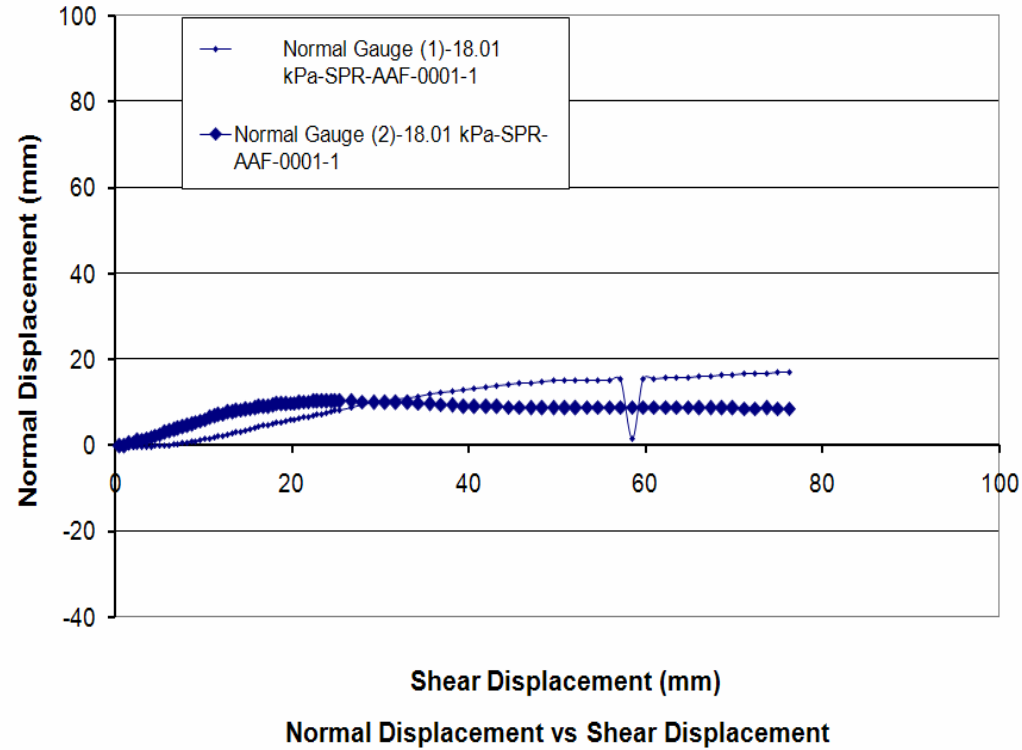
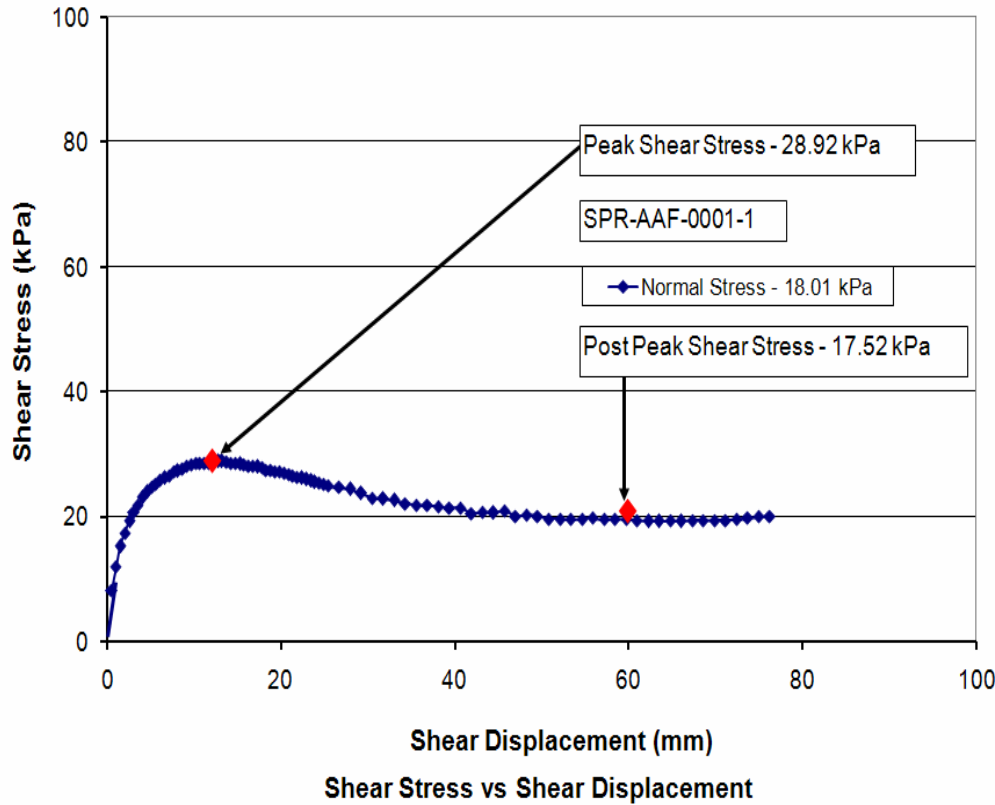
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	24.06	0.0419		0.0015	
2	50	91.70	16	18.01	13.72	0.0303		0.0013	
1-1/2	37.5	86.42	30	15.04	7.98	0.0217			
1	25	80.29	40	13.80	5.71	0.0157			
3/4	19	73.48	50	12.53	4.11	0.0114			
3/8	9.5	60.17	70	11.48	3.18	0.0082			
4	4.75	42.80	100	10.47	2.21	0.0058			
6	3.36	33.33	200	8.39	1.33	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 13  
 TEST DATE: N/A

UTM Northing: 4062313  
 UTM Easting: 455245



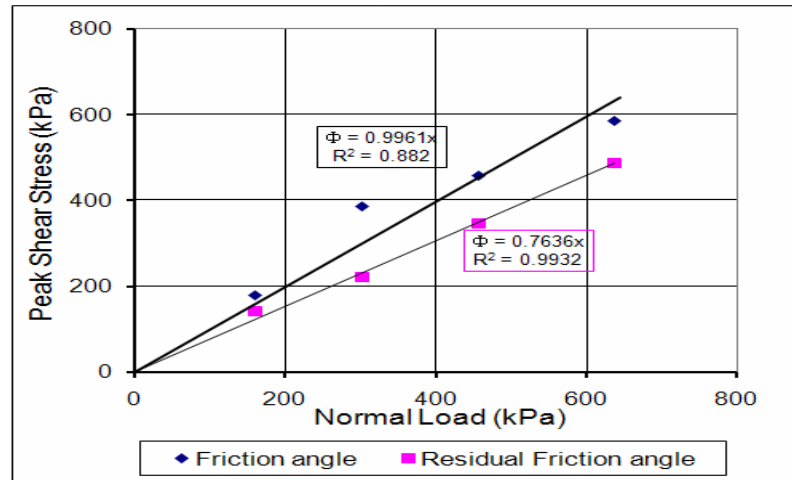
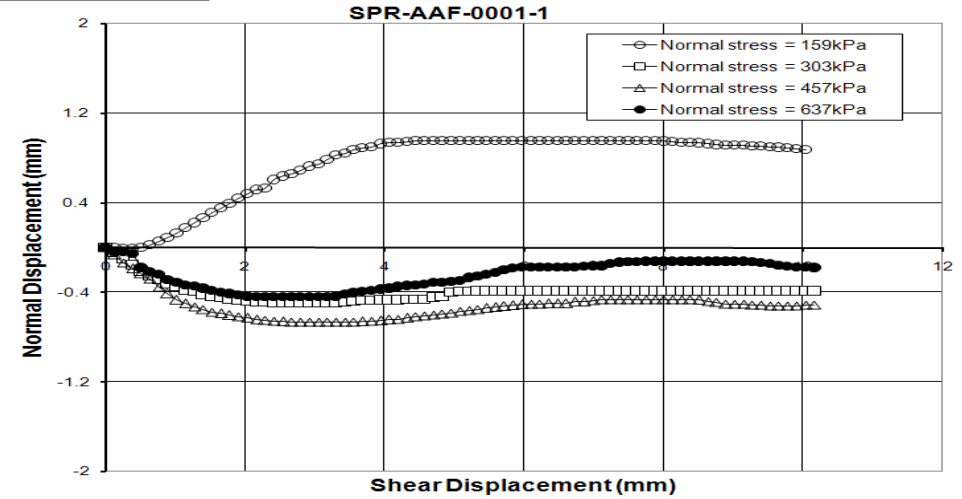
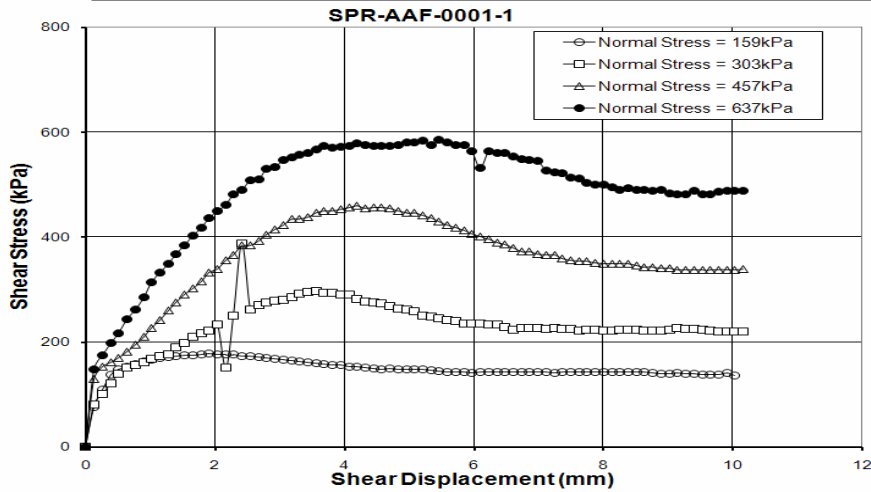
<b>Field id:</b>	SPR-AAF-0001-1						
Measured Cohesion	8.10	Water Content	8.46	Shear box size	60	Peak Shear Stress	28.92
Intrinsic Cohesion	5.52	Wet Density	1980	Matric Suction	10	Post Peak Shear Stress	17.52
Max. Particle Size	10.16	Dry density	1830	Normal Stress	18.01	Elevation	2812.5



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

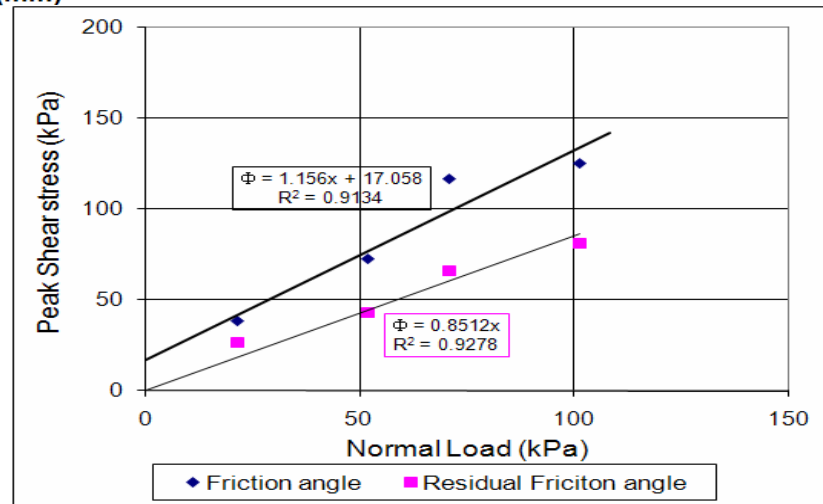
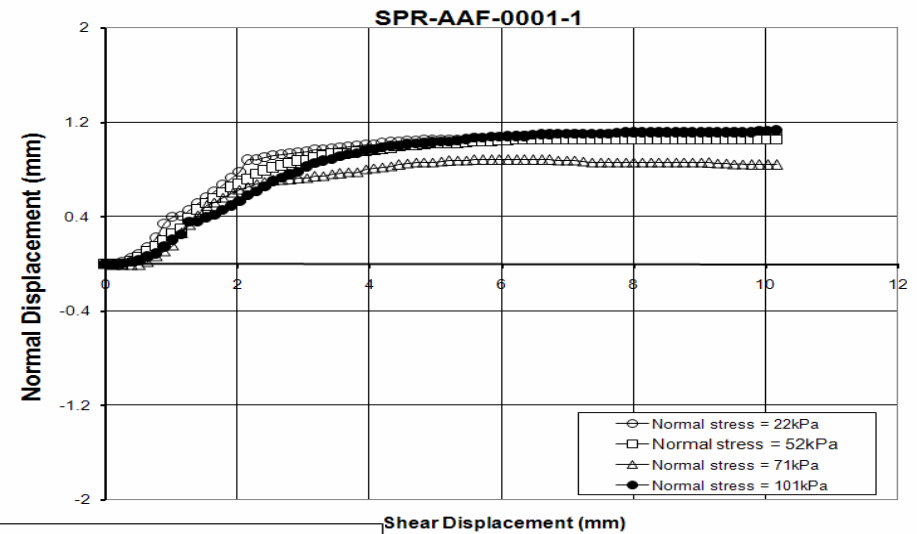
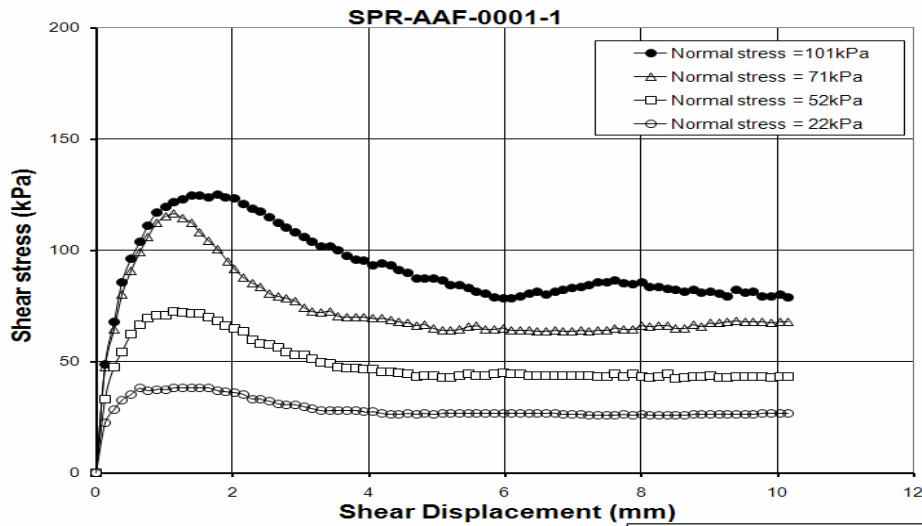
TEST NO: 13  
 TEST DATE: 9/25/2007



<b>Field id:</b>	SPR-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	178.25,388.01,459.56,585.74
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	141.58,223.00,346.06,487.57
Friction Angle	44.87	Dry density	1830	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 13  
 TEST DATE: 7/27/2007



<b>Field id:</b>	SPR-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	38.20,72.68,116.71,125.20
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.36,43.31,66.36,81.03
Friction Angle	49.14	Dry density	1.80	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

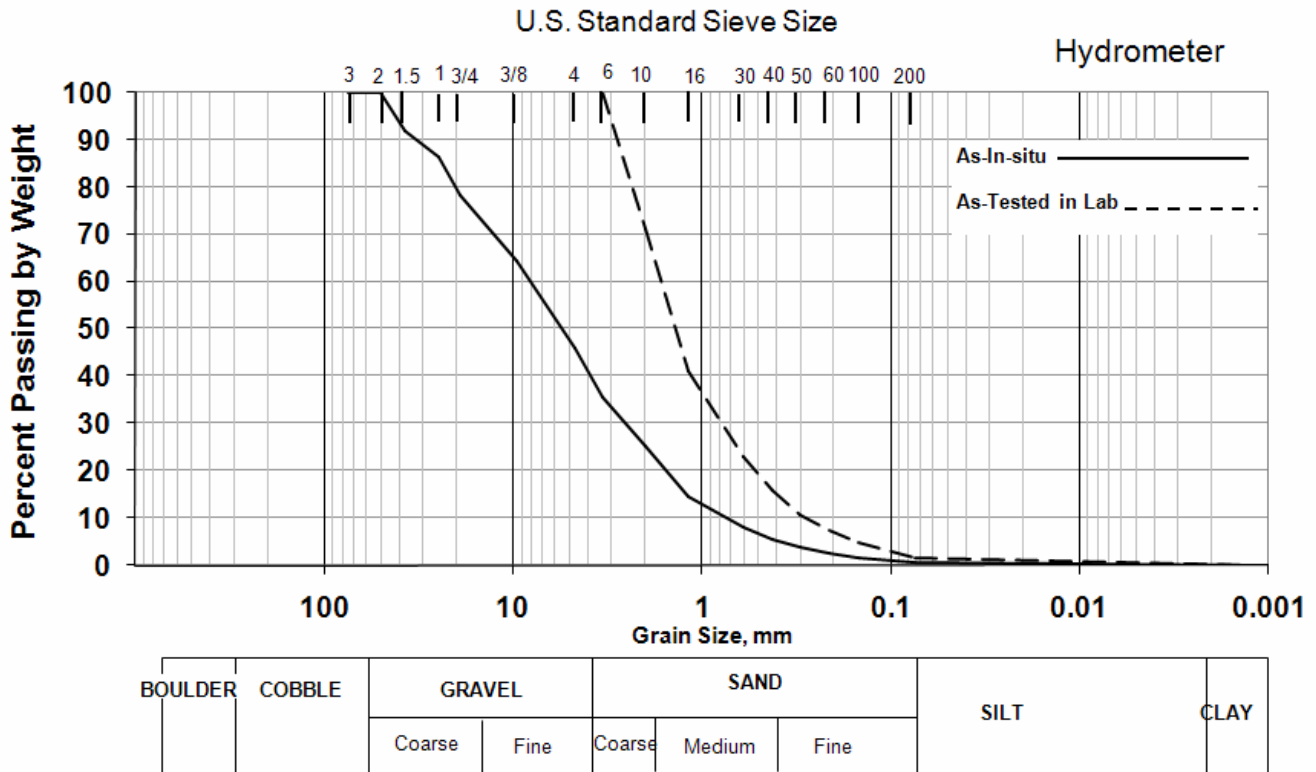
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 14  
 TEST DATE: 5/26/2007

SAMPLE: SPR-AAF-0001-2  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.8	GRAVEL: 54.7
PLASTIC LIMIT: 16.3	SAND: 45.3
PLASTICITY INDEX: 9.5	FINE: 0.6
SPECIFIC GRAVITY: 2.70	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

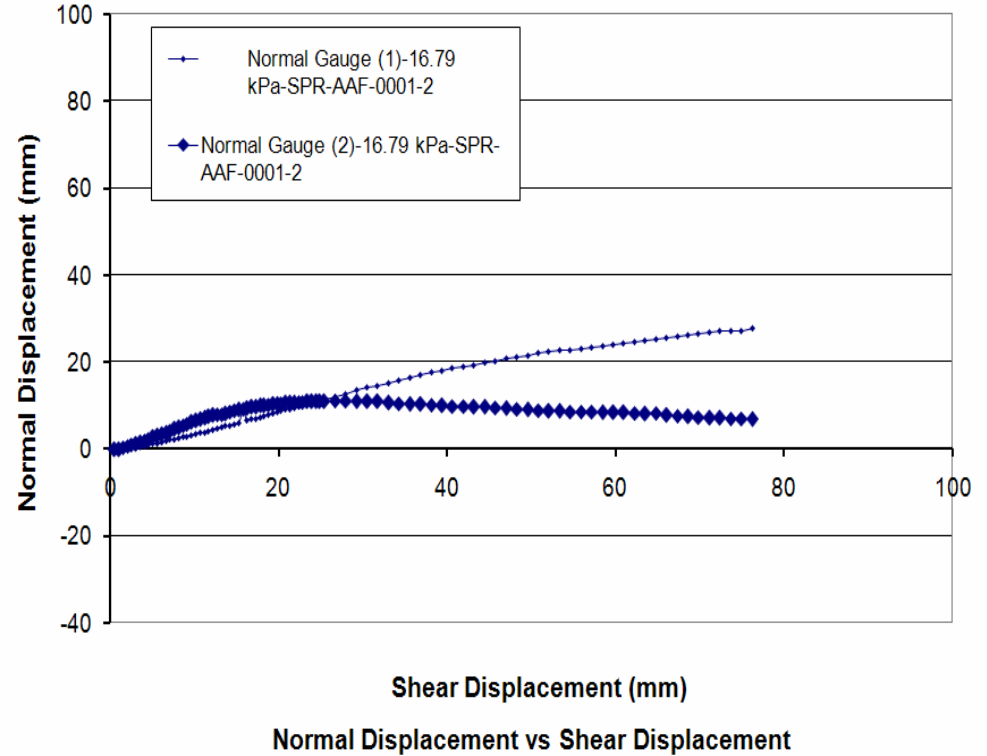
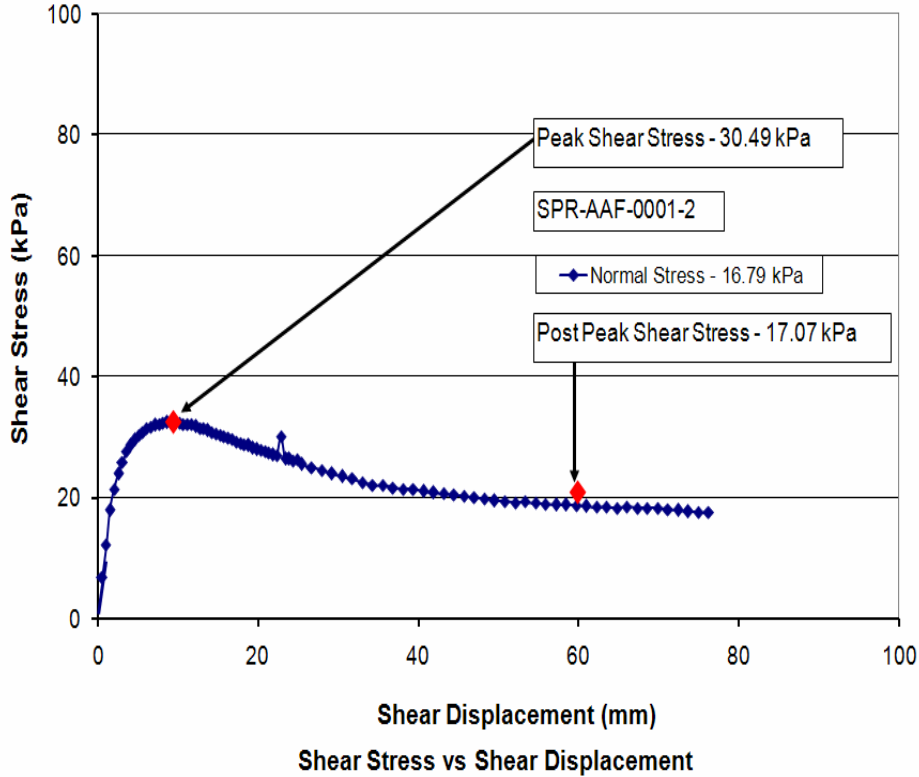
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	25.24	0.0419		0.0015	
2	50	100.00	16	18.01	14.63	0.0303		0.0013	
1-1/2	37.5	91.93	30	15.04	8.14	0.0217			
1	25	86.33	40	13.80	5.62	0.0157			
3/4	19	78.24	50	12.53	3.76	0.0114			
3/8	9.5	64.40	70	11.48	2.61	0.0082			
4	4.75	45.93	100	10.47	1.73	0.0058			
6	3.36	35.47	200	8.39	0.62	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 14  
 TEST DATE: N/A

UTM Northing: 4062313  
 UTM Easting: 455245

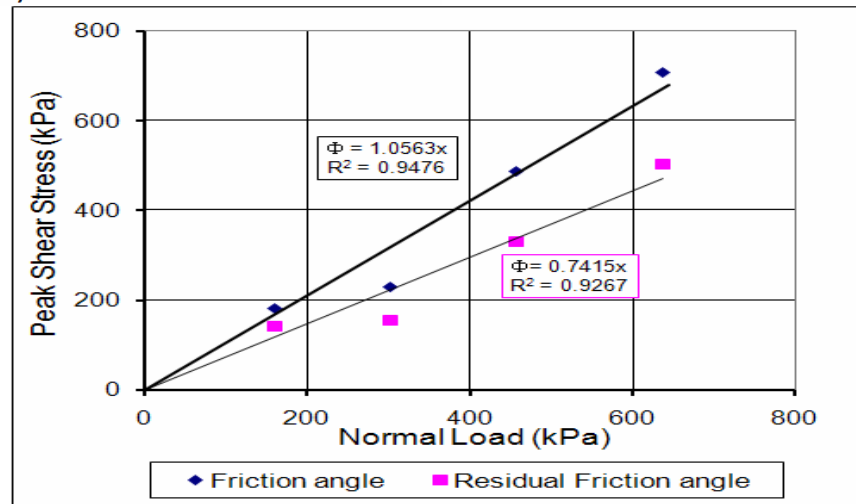
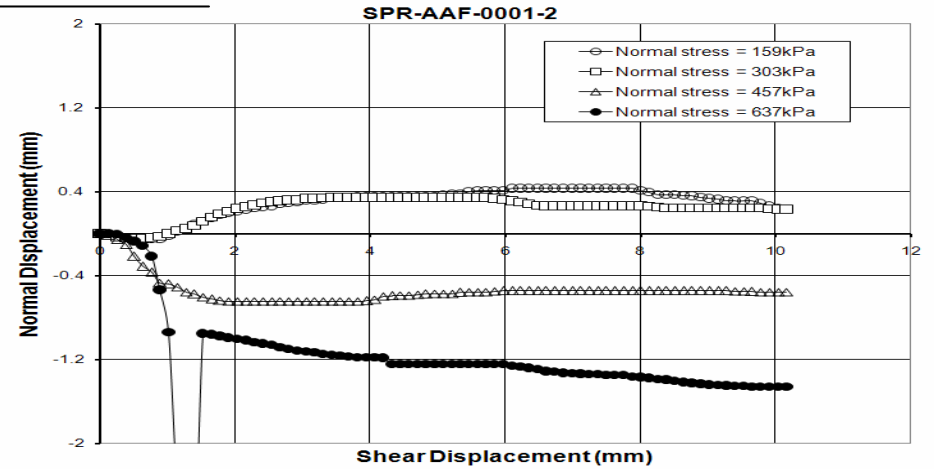
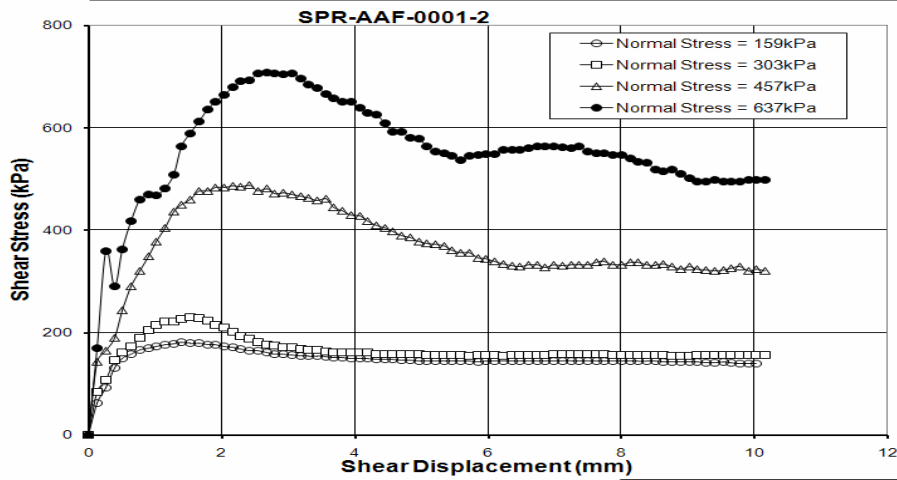


<b>Field id:</b>	SPR-AAF-0001-2						
Measured Cohesion	12.27	Water Content	8.83	Shear box size	60	Peak Shear Stress	30.49
Intrinsic Cohesion	10.36	Wet Density	2350	Matric Suction	9	Post Peak Shear Stress	17.07
Max. Particle Size	7.62	Dry density	2160	Normal Stress	16.79	Elevation	2812.5

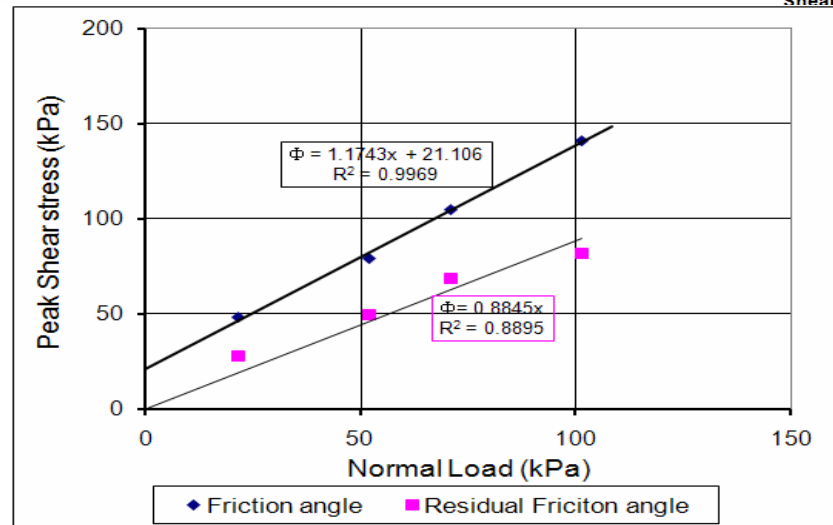
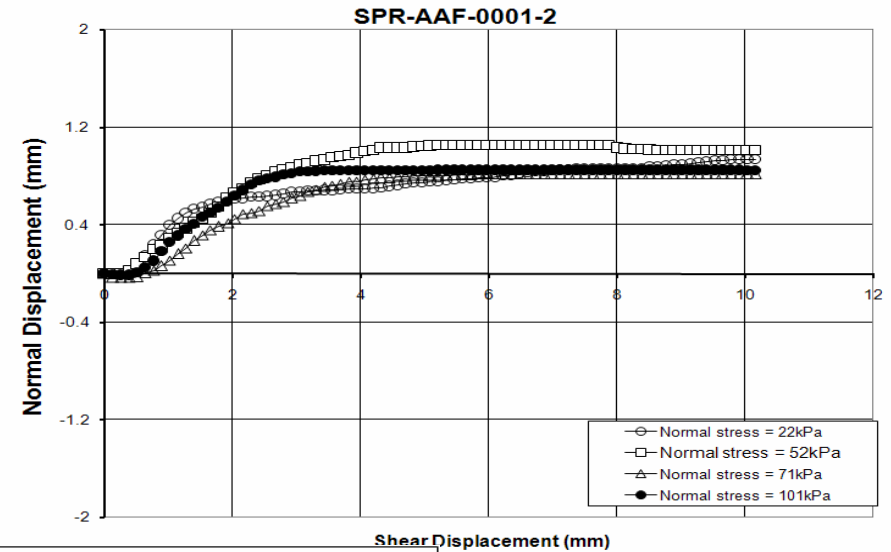
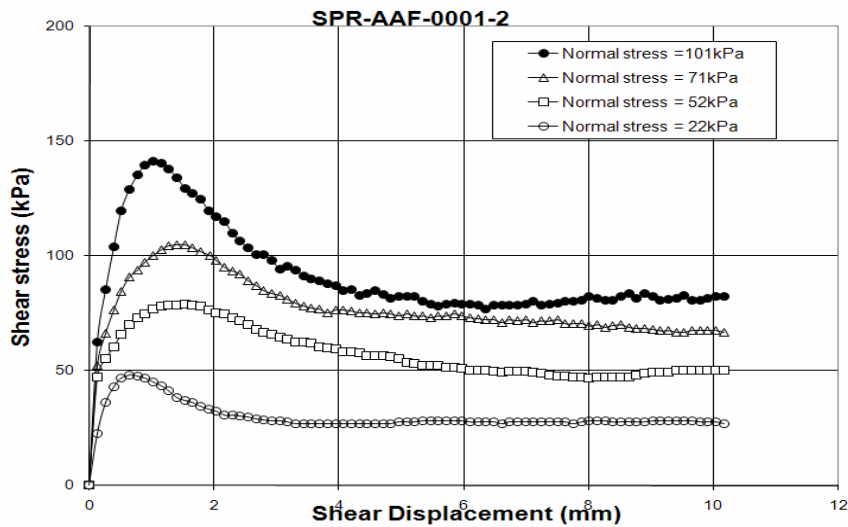
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 14  
 TEST DATE: 9/5/2007



<b>Field id:</b>	SPR-AAF-0001-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	182.49,230.62,488.18,708.01
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	143.45,156.46,329.86,504.91
Friction Angle	44.87	Dry density	2170	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SPR-AAF-0001-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	48.28,79.05,105.04,141.12
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.77,49.45,68.90,81.88
Friction Angle	49.58	Dry density	1800	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

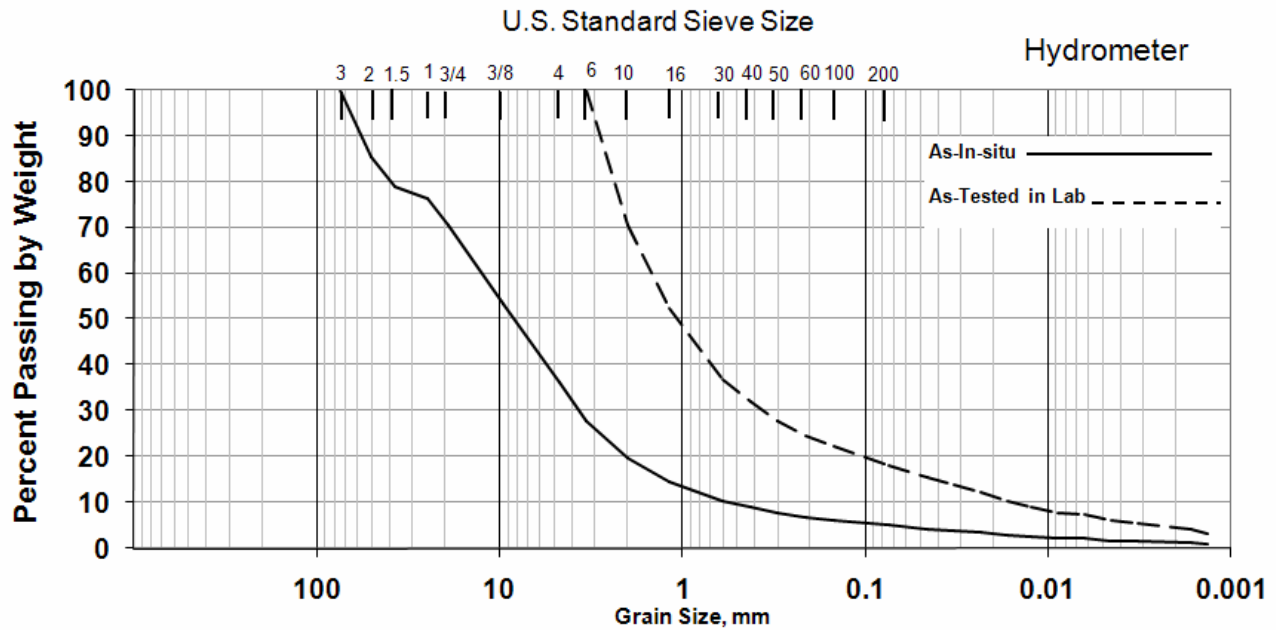
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 15  
 TEST DATE: 9/30/2006

SAMPLE: **SPR-VTM-0005-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.2	GRAVEL: 63.6
PLASTIC LIMIT: 22.9	SAND: 31.3
PLASTICITY INDEX: 2.3	FINE: 5.1
SPECIFIC GRAVITY: 2.73	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

#### UNIFIED SOIL CLASSIFICATION:

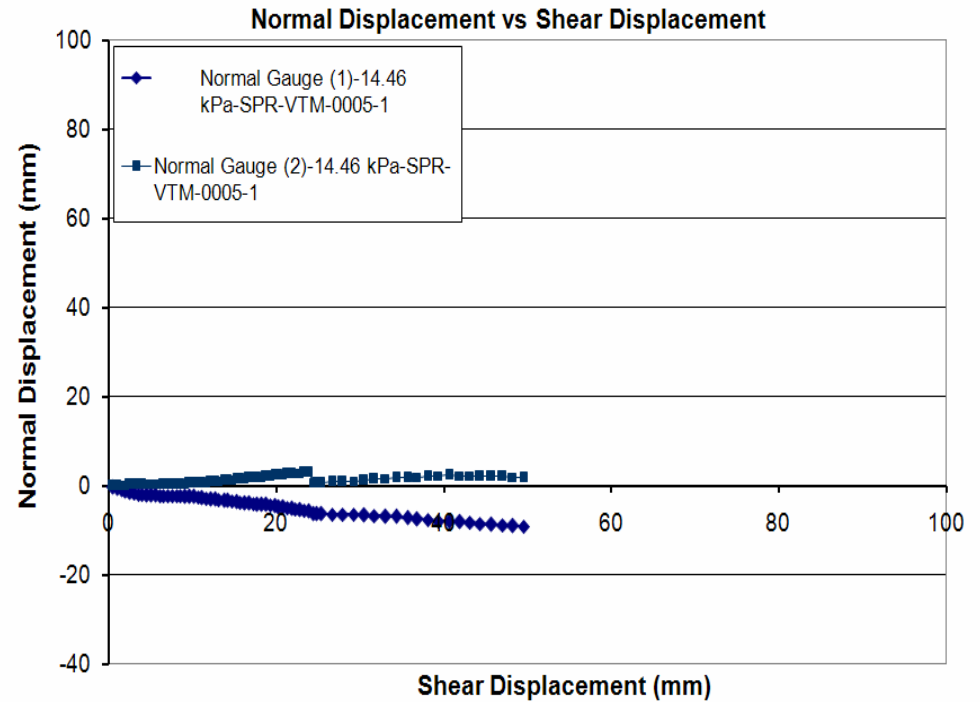
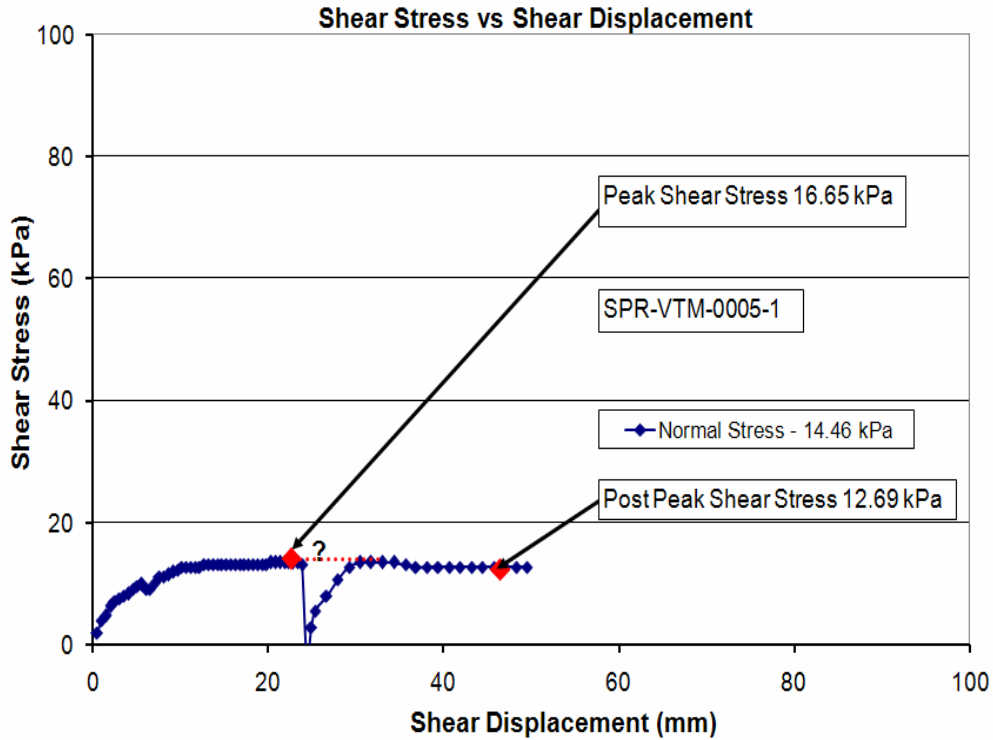
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	19.77	0.0419	4.31	0.0015	1.17
2	50	85.34	16	18.01	14.64	0.0303	3.91	0.0013	0.87
1-1/2	37.5	79.09	30	15.04	10.32	0.0217	3.41		
1	25	76.48	40	13.80	8.95	0.0157	2.91		
3/4	19	70.57	50	12.53	7.79	0.0114	2.51		
3/8	9.5	53.41	70	11.48	6.86	0.0082	2.20		
4	4.75	36.36	100	10.47	6.21	0.0058	2.10		
6	3.36	27.98	200	8.39	5.05	0.0042	1.70		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 15  
 TEST DATE: N/A

UTM Northing: 4062367  
 UTM Easting: 455245



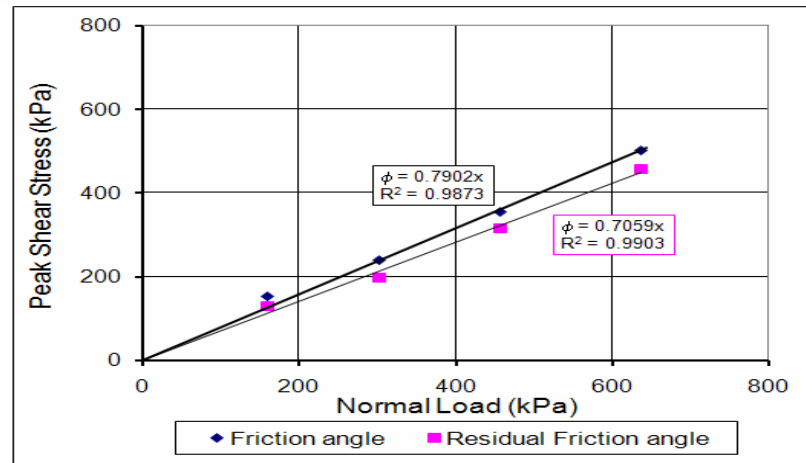
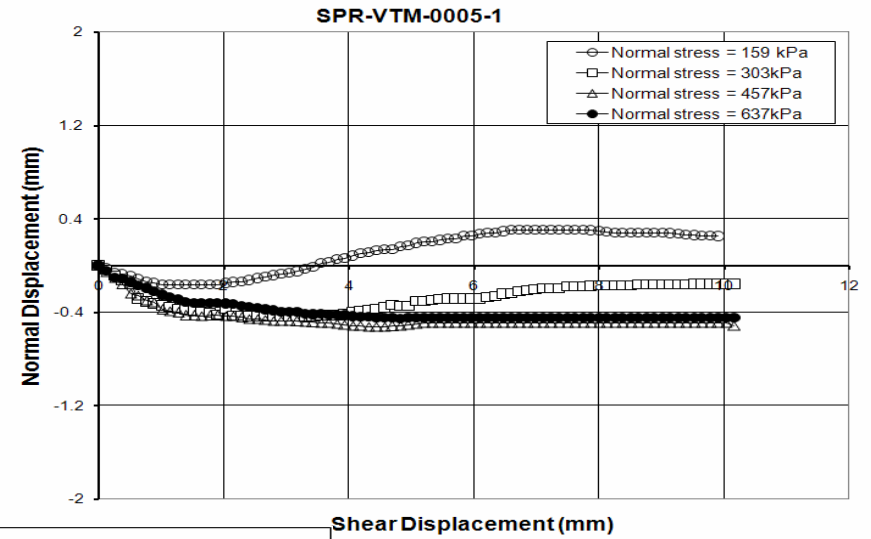
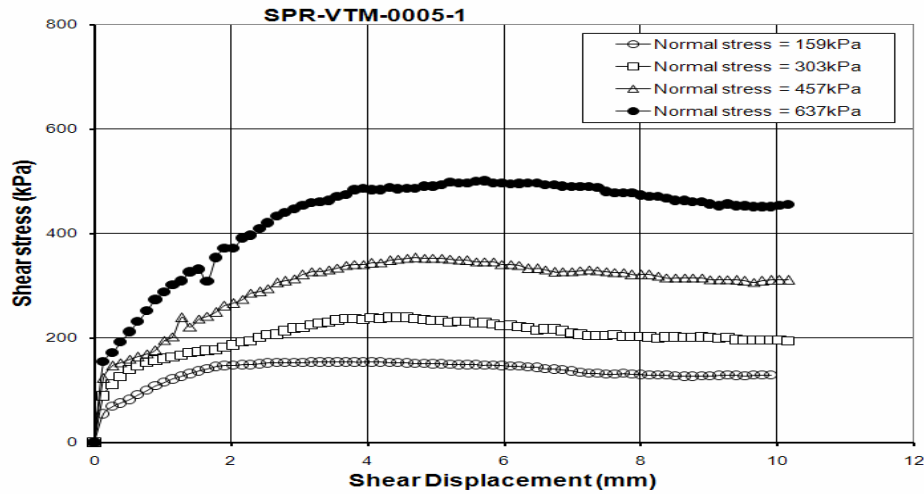
<b>Field id:</b>	SPR-VTM-0005-1						
<b>Measured Cohesion</b>	0.00	Water Content	7.68	Shear box size	30	Peak Shear Stress	16.65
Intrinsic Cohesion	na	Wet Density	1690	Matric Suction	0.00	Post Peak Shear Stress	12.69
Max. Particle Size	12.7	Dry density	1570	Normal Stress	14.46	Elevation	2841.5



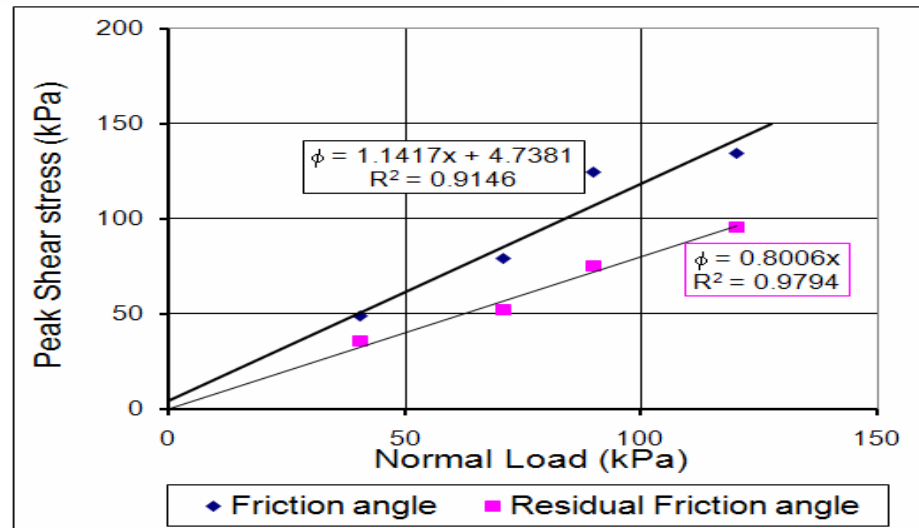
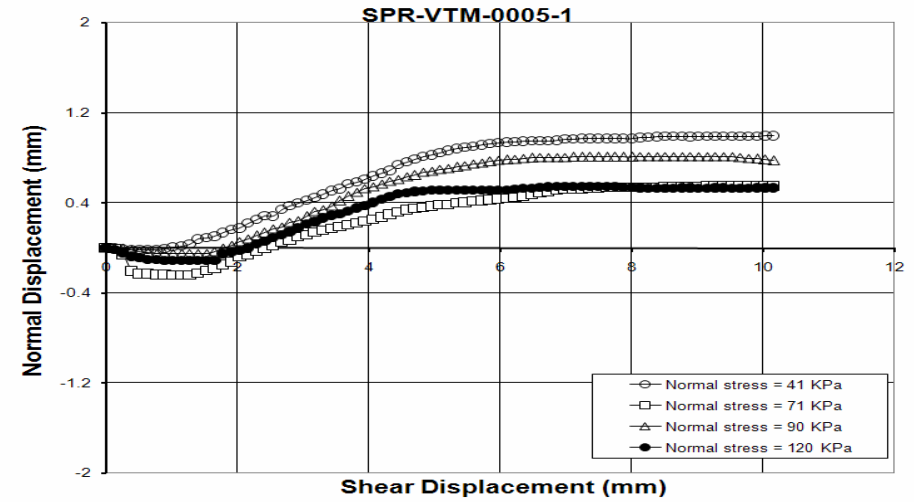
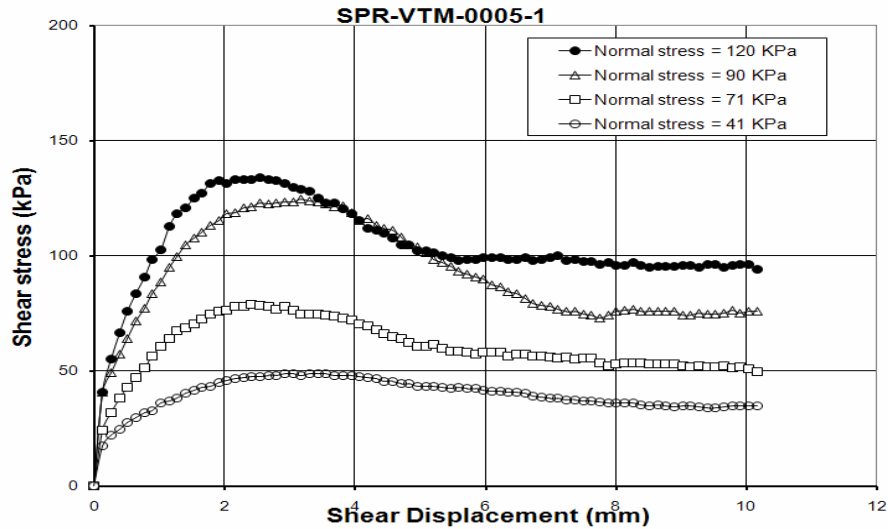
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 15  
 TEST DATE: 9/15/2006



<b>Field id:</b>	SPR-VTM-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	154.38,239.72,354.19,501.19
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	129.37,198.19,317.07,456.96
Friction Angle	38.36	Dry density	1570	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SPR-VTM-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	48.81,79.05,124.67,134.22
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	35.57,52.14,75.38,95.74
Friction Angle	48.79	Dry density	1580	Normal Stress	41,71,90,120	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

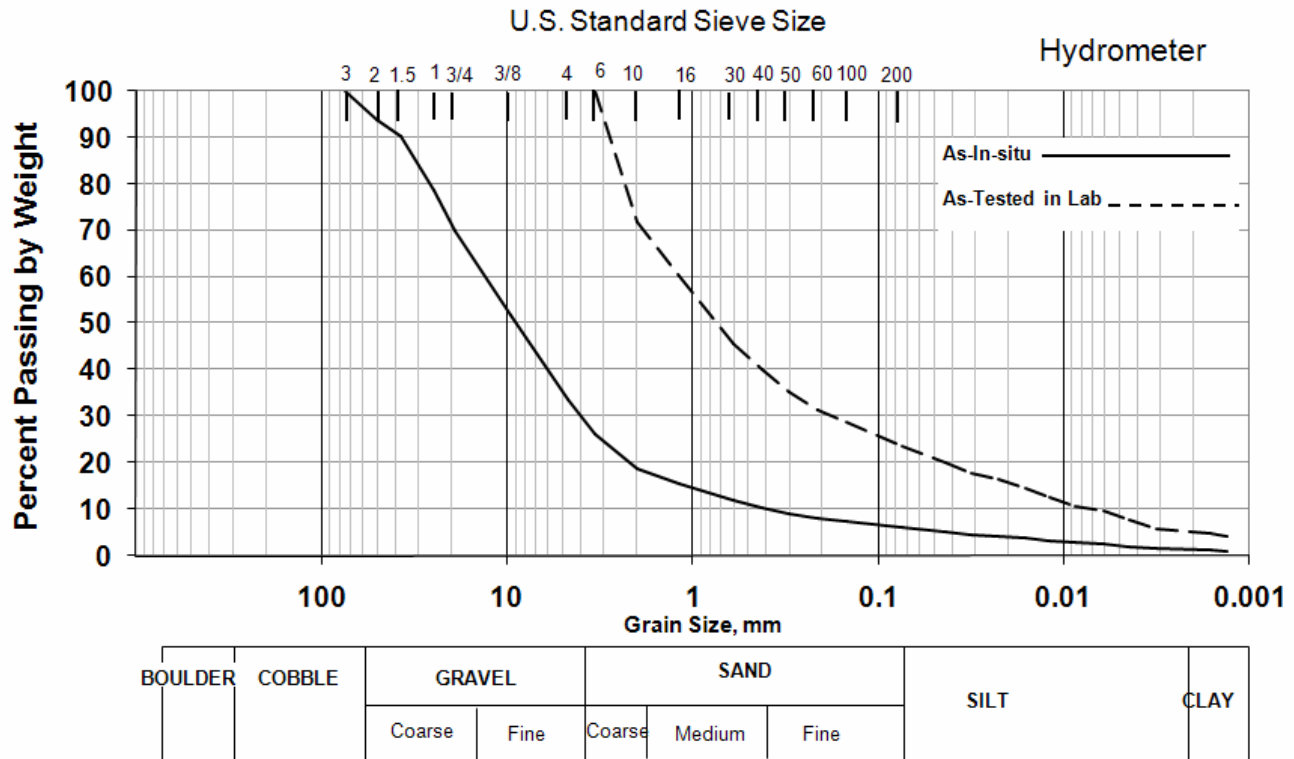
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 16  
 TEST DATE: 9/24/2006

SAMPLE: **SPR-VTM-0008-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.9	GRAVEL: 66.5
PLASTIC LIMIT: 25.7	SAND: 27.4
PLASTICITY INDEX: 0.2	FINE: 6.1
SPECIFIC GRAVITY: 2.76	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

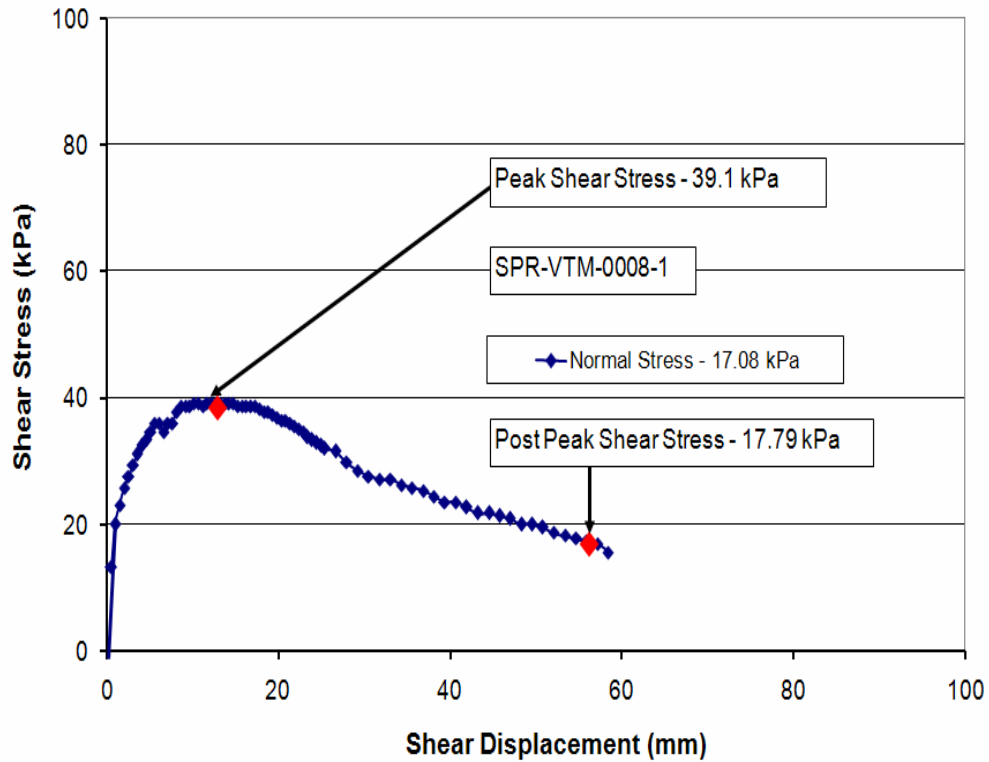
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	18.75	0.0419	5.24	0.0015	1.29
2	50	93.86	16	18.01	15.65	0.0303	4.66	0.0013	1.10
1-1/2	37.5	90.34	30	15.04	11.86	0.0217	4.27		
1	25	78.64	40	13.80	10.45	0.0157	3.78		
3/4	19	70.00	50	12.53	9.20	0.0114	3.30		
3/8	9.5	51.70	70	11.48	8.20	0.0082	2.81		
4	4.75	33.52	100	10.47	7.51	0.0058	2.52		
6	3.36	26.06	200	8.39	6.13	0.0042	2.03		

## IN-SITU DIRECT SHEAR TEST REPORT

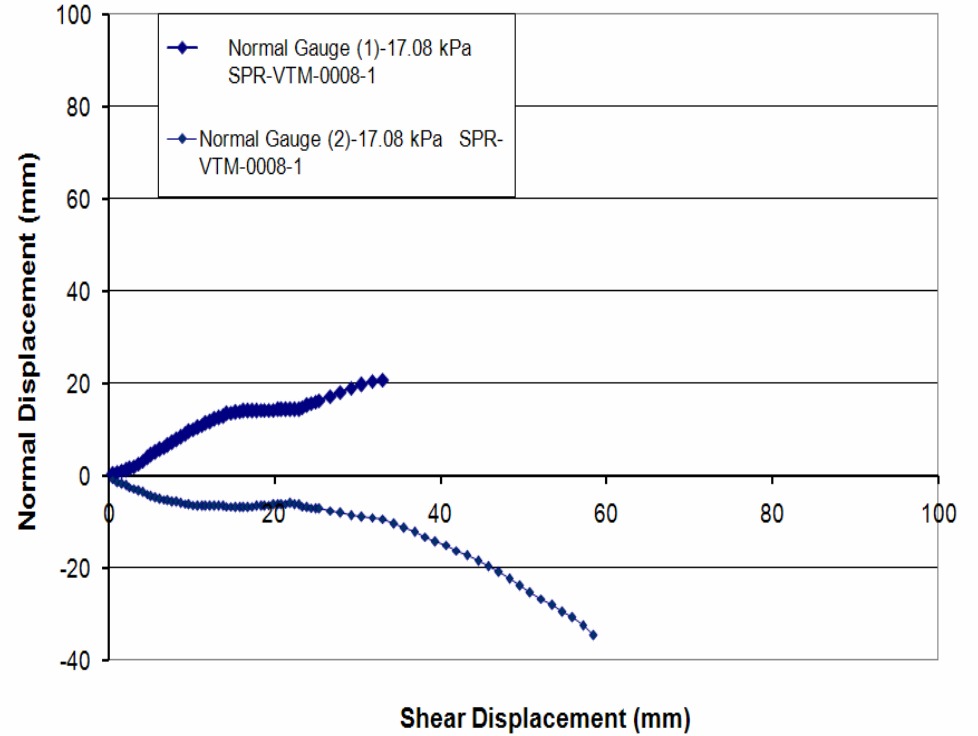
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 16  
 TEST DATE: N/A

UTM Northing: 4062287  
 UTM Easting: 455257



**Shear Stress vs Shear Displacement**



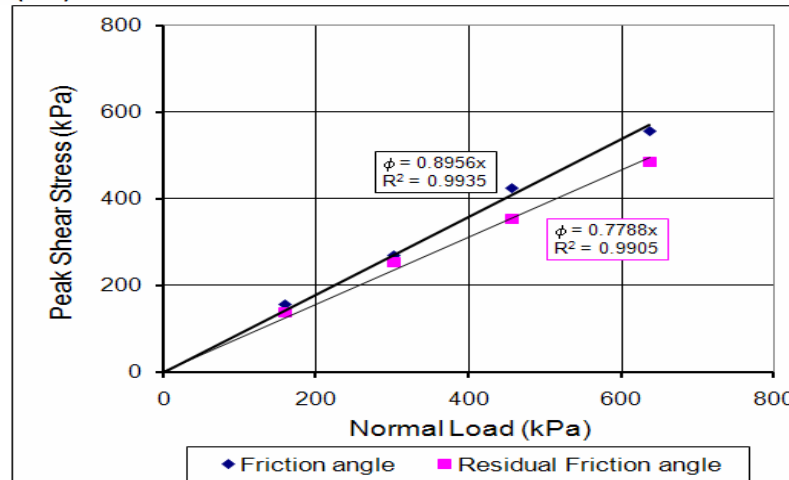
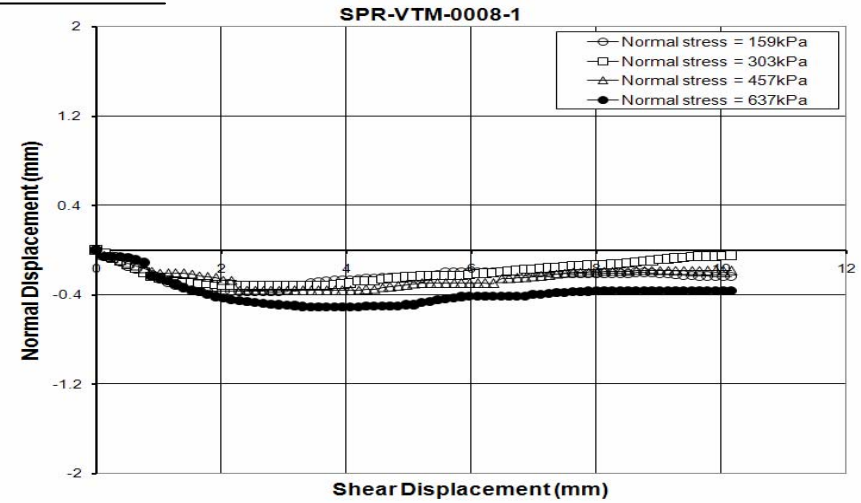
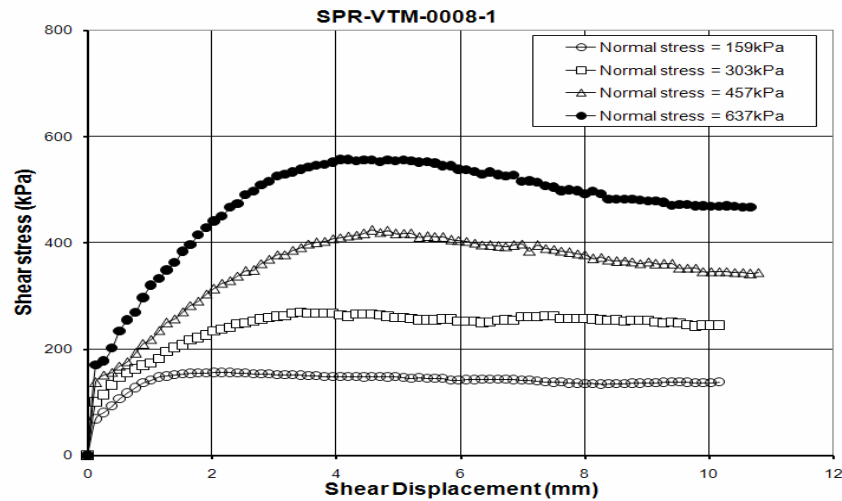
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SPR-VTM-0008-1						
Measured Cohesion	18.61	Water Content	8.72	Shear box size	30	Peak Shear Stress	39.1
Intrinsic Cohesion	17.80	Wet Density	2040	Matric Suction	3	Post Peak Shear Stress	17.79
Max. Particle Size	10.16	Dry density	1570	Normal Stress	17.08	Elevation	2842.1

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

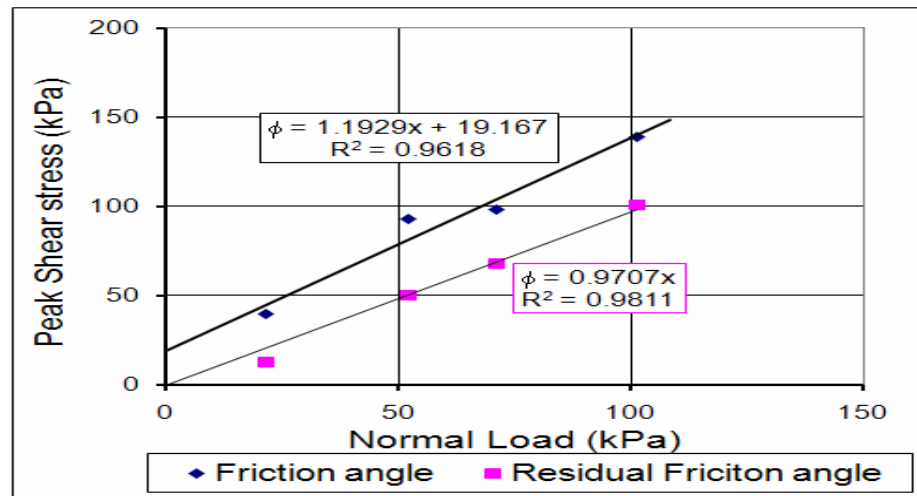
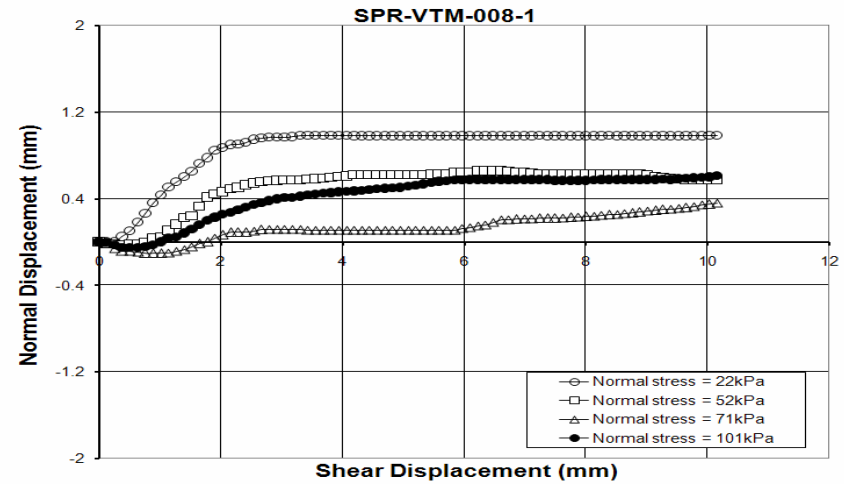
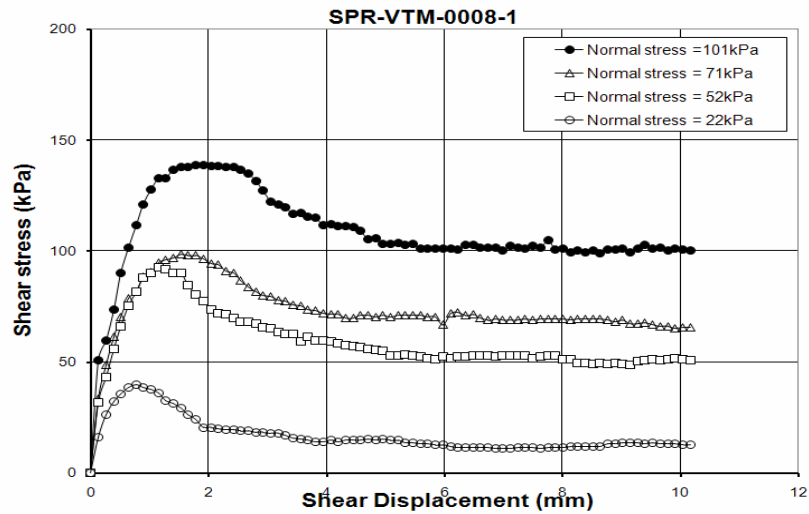
TEST NO: 16  
 TEST DATE: 11/8/2006



<b>Field id:</b>	SPR-VTM-0008-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	156.50,269.64,424.44,557.12
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	137.36,253.61,354.84,485.25
Friction Angle ( $^{\circ}$ )	41.85	Dry density	1900	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 16  
 TEST DATE: 3/20/2007



<b>Field id:</b>	SPR-VTM-0008-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	39.79,92.84,98.67,138.99
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	12.59,50.44,68.24,100.80
Friction Angle ( $^{\circ}$ )	50.23	Dry density	1880	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

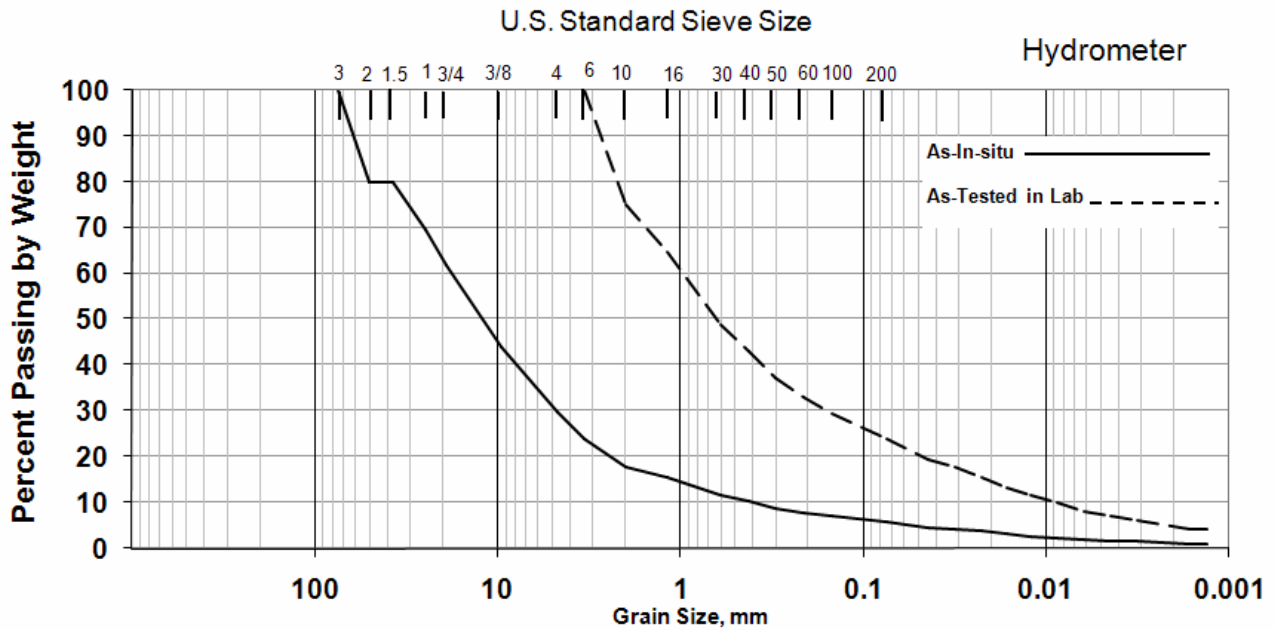
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 17  
 TEST DATE: 9/23/2006

SAMPLE: **SPR-VTM-0008-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.8	GRAVEL: 70.1
PLASTIC LIMIT: 24.4	SAND: 24.2
PLASTICITY INDEX: 1.4	FINE: 5.7
SPECIFIC GRAVITY: 2.79	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

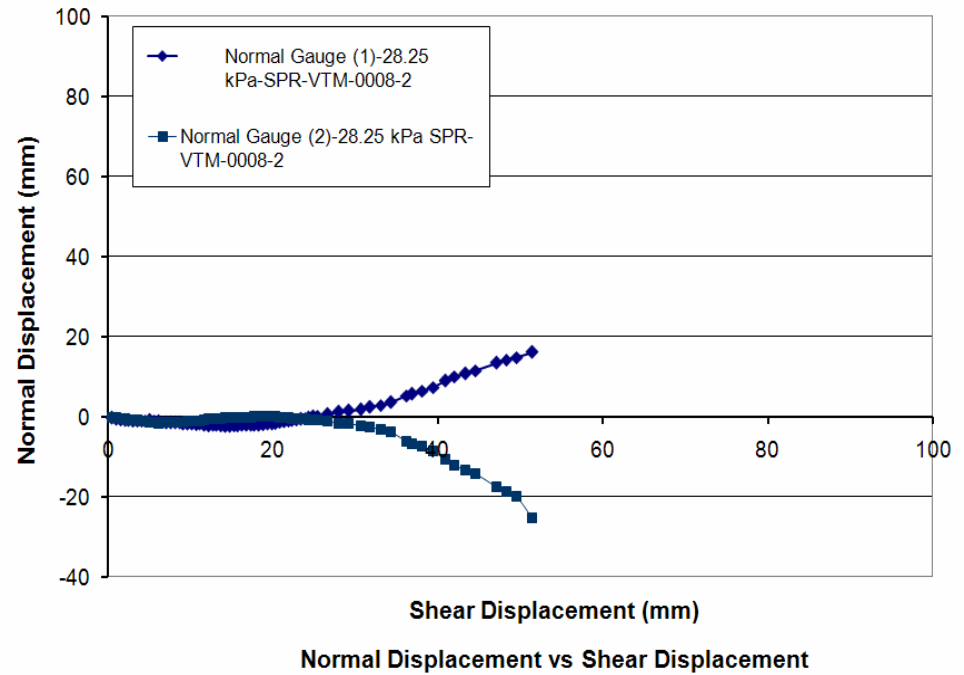
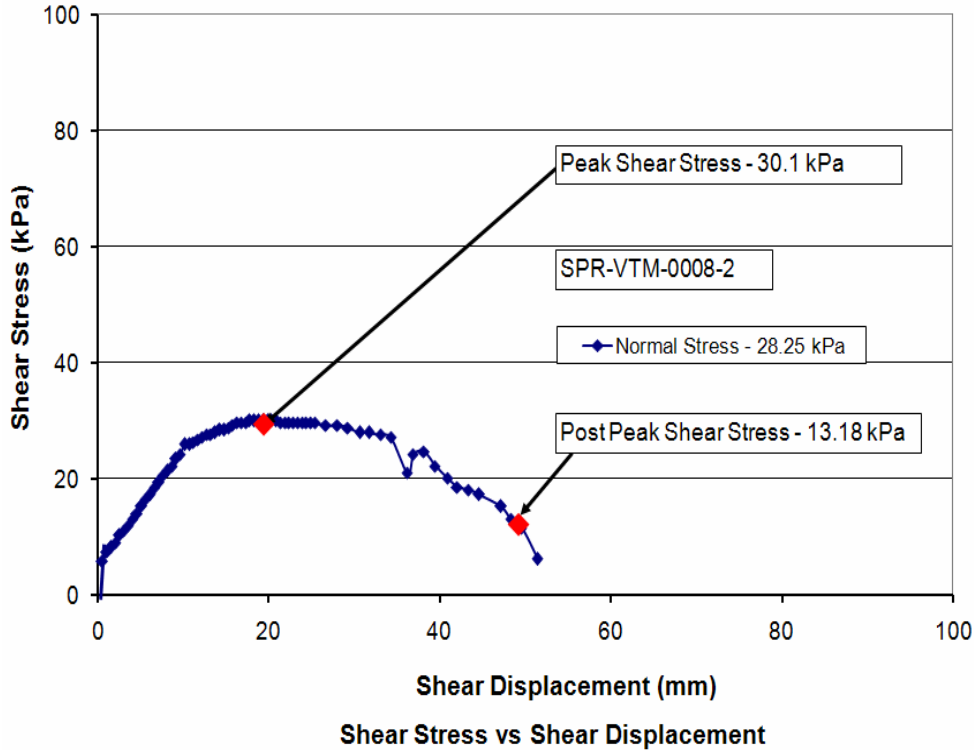
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	17.84	0.0419	4.62	0.0015	1.01
2	50	80.00	16	18.01	15.43	0.0303	4.26	0.0013	1.01
1-1/2	37.5	80.00	30	15.04	11.61	0.0217	3.73		
1	25	69.55	40	13.80	10.21	0.0157	3.19		
3/4	19	61.70	50	12.53	8.85	0.0114	2.74		
3/8	9.5	44.09	70	11.48	7.84	0.0082	2.38		
4	4.75	29.89	100	10.47	6.99	0.0058	1.96		
6	3.36	23.80	200	8.39	5.69	0.0042	1.69		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 17  
 TEST DATE: N/A

UTM Northing: 4062287  
 UTM Easting: 455257



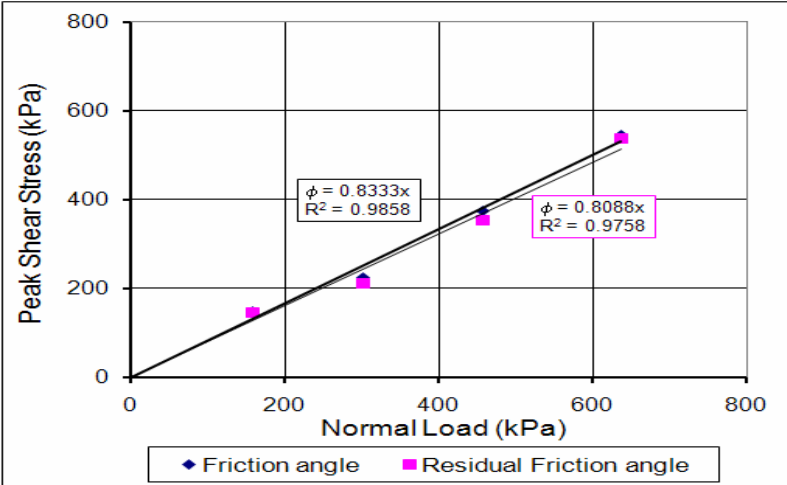
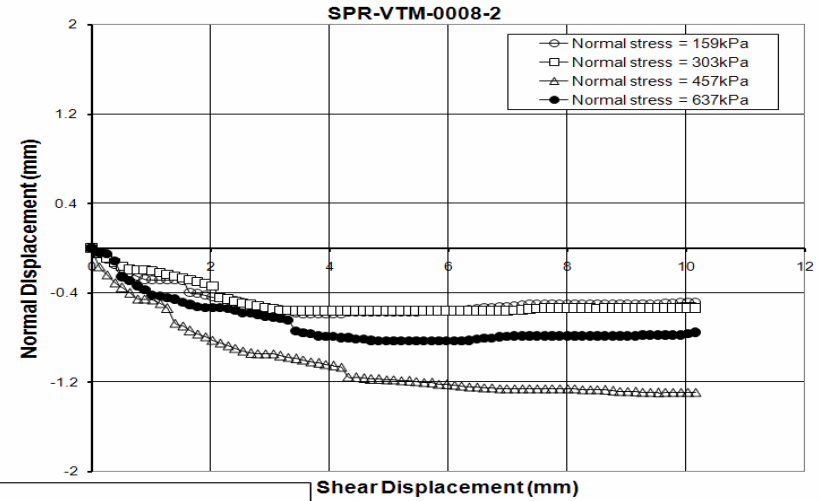
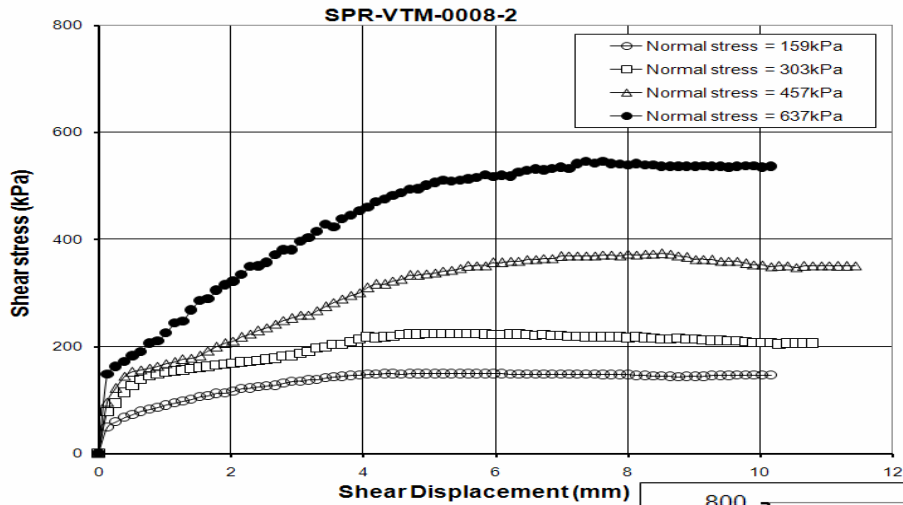
<b>Field id:</b>	SPR-VTM-0008-2						
Measured Cohesion	4.35	Water Content	8.25	Shear box size	5.08	Peak Shear Stress	30.10
Intrinsic Cohesion	3.01	Wet Density	1550	Matric Suction	5	Post Peak Shear Stress	13.18
Max. Particle Size	15.24	Dry density	1430	Normal Stress	28.25	Elevation	2842.1



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

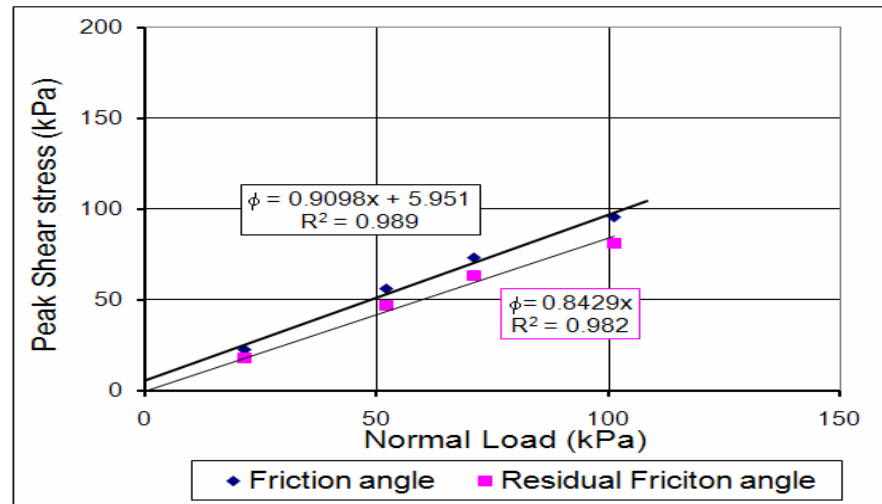
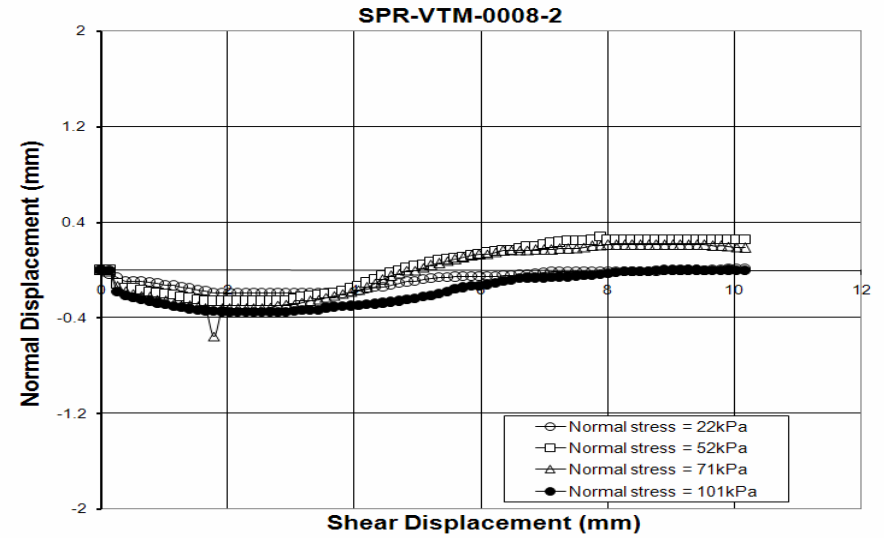
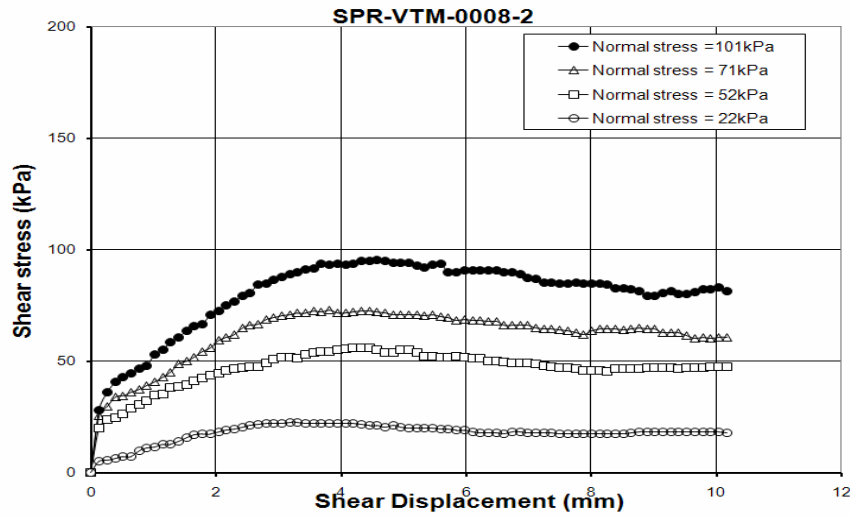
TEST NO: 17  
 TEST DATE: 11/10/2006



<b>Field id:</b>	SPR-VTM-0008-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	149.07,224.11,373.71,545.41
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	146.69,212.45,352.66,538.53
Friction Angle	39.8	Dry density	1460	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 17  
 TEST DATE: 3/22/2007



<b>Field id:</b>	SPR-VTM-0008-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	22.81,56.23,73.21,95.49
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	18.08,47.18,63.29,81.45
Friction Angle	42.3	Dry density	1500	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

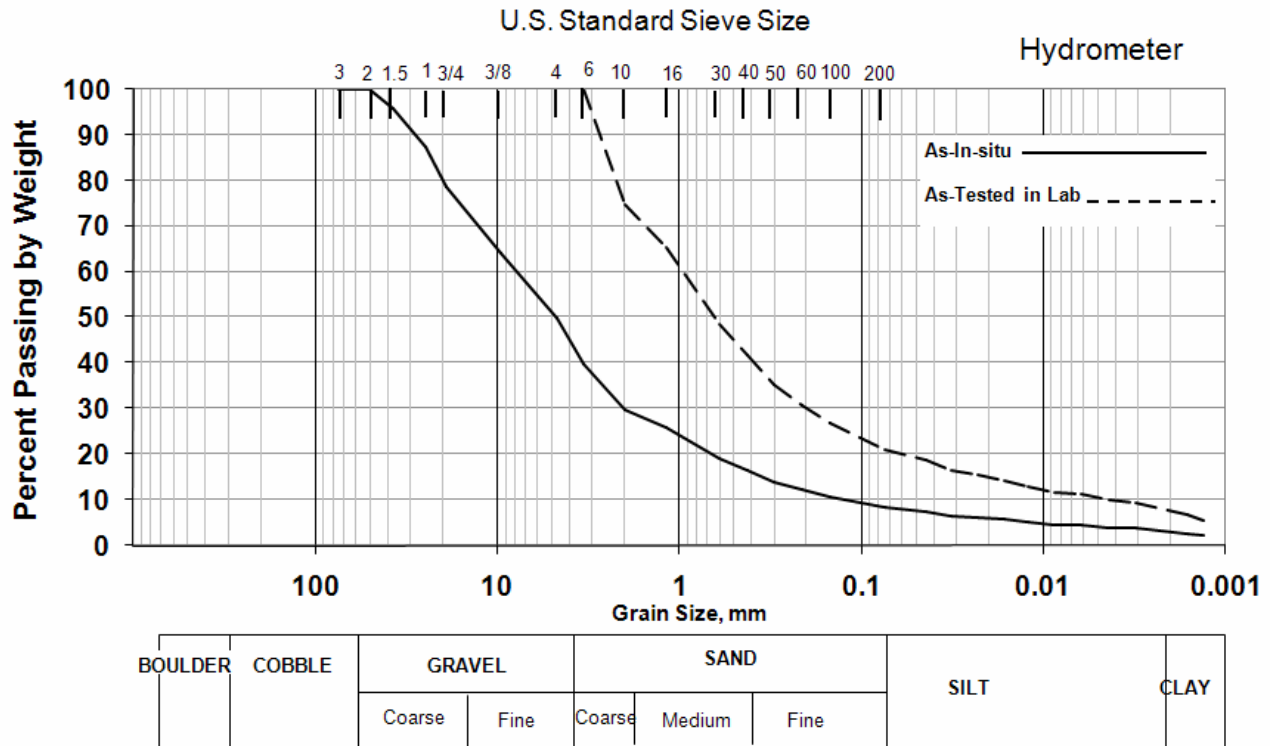
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 18  
 TEST DATE: 9/30/2006

SAMPLE: SPR-VTM-0012-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 19.4	GRAVEL: 50.0
PLASTIC LIMIT: 17.0	SAND: 41.6
PLASTICITY INDEX: 2.5	FINE: 8.4
SPECIFIC GRAVITY: 2.75	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

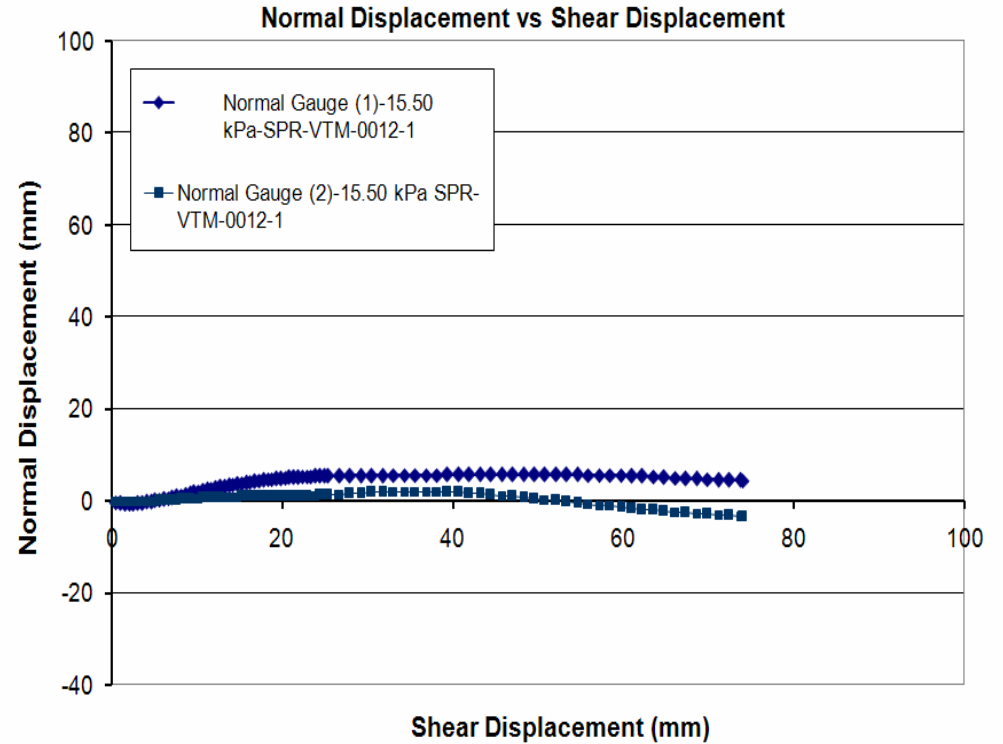
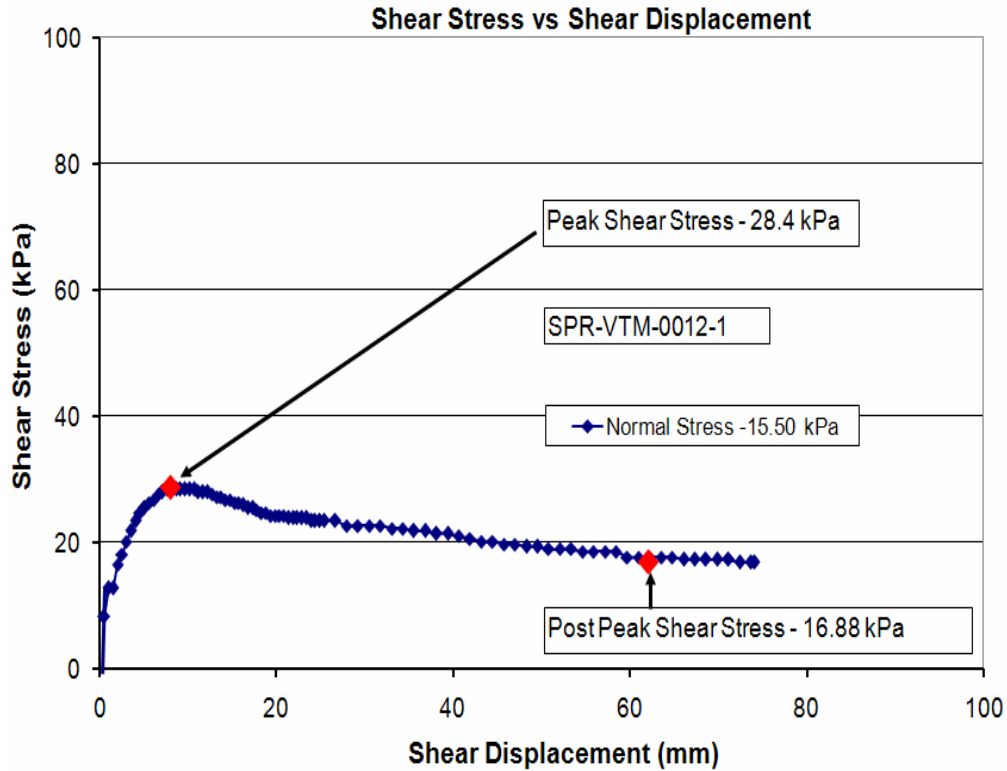
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	29.67	0.0419	7.48	0.0015	2.64
2	50	100.00	16	18.01	25.94	0.0303	6.58	0.0013	2.19
1-1/2	37.5	95.76	30	15.04	19.24	0.0217	6.13		
1	25	87.27	40	13.80	16.56	0.0157	5.68		
3/4	19	78.61	50	12.53	14.03	0.0114	5.09		
3/8	9.5	64.22	70	11.48	12.20	0.0082	4.64		
4	4.75	49.97	100	10.47	10.68	0.0058	4.49		
6	3.36	39.71	200	8.39	8.38	0.0042	4.04		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 18  
 TEST DATE: N/A

UTM Northing: 4062735  
 UTM Easting: 454439

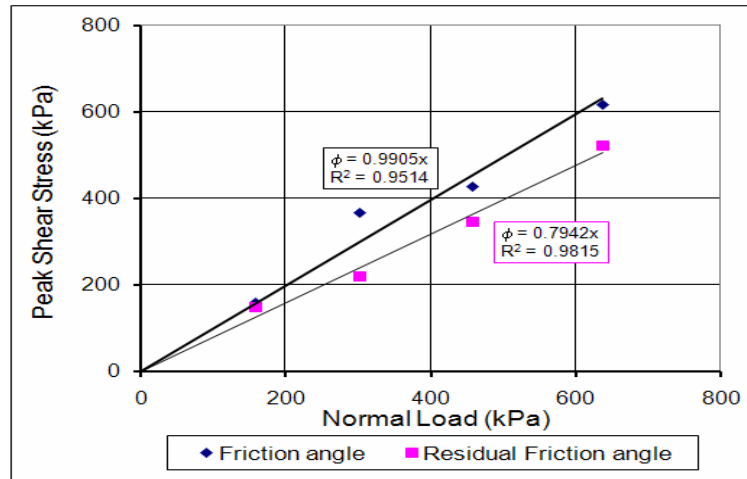
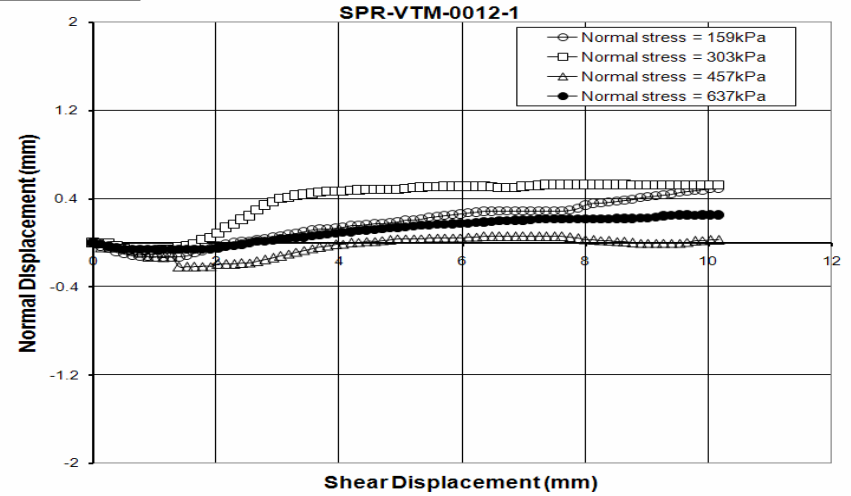
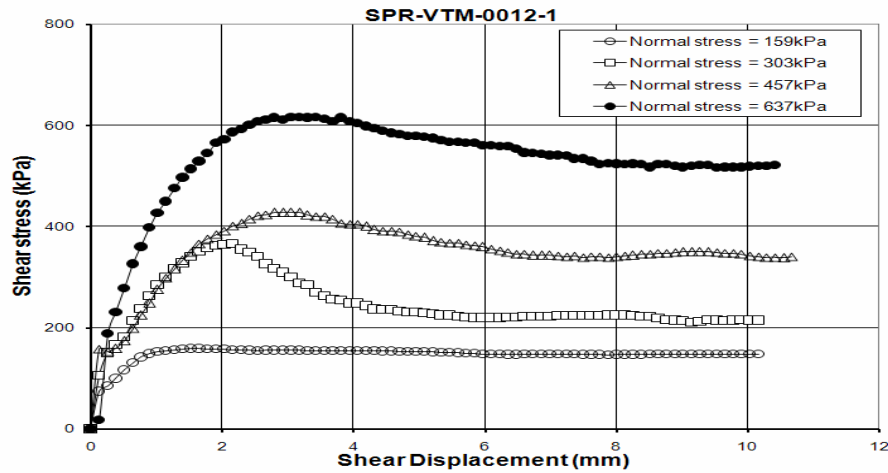


<b>Field id:</b>	SPR-VTM-0012-1						
Measured Cohesion	12.68	Water Content	6.57	Shear box size	30	Peak Shear Stress	28.4
Intrinsic Cohesion	12.14	Wet Density	2100	Matric Suction	2	Post Peak Shear Stress	16.88
Max. Particle Size	2.54	Dry density	1970	Normal Stress	15.50	Elevation	2908.2

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

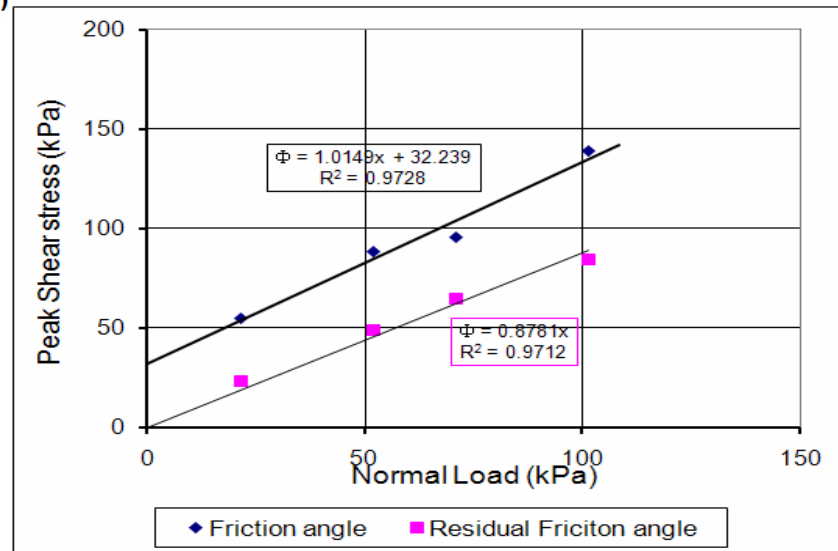
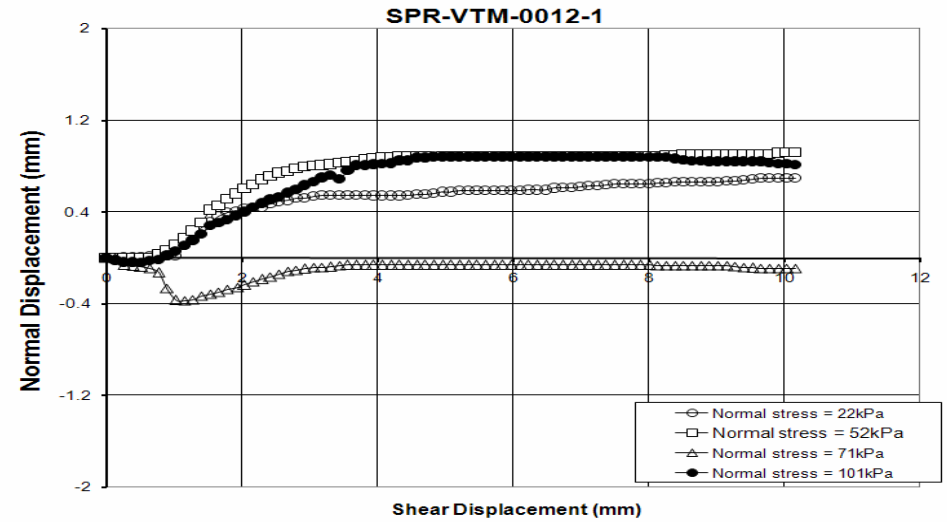
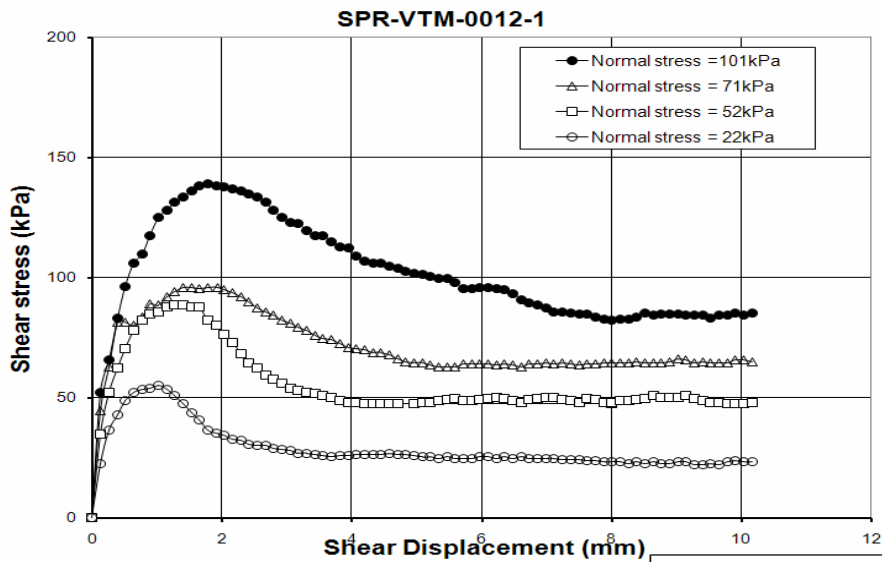
TEST NO: 18  
 TEST DATE: 11/15/2006



<b>Field id:</b>	SPR-VTM-0012-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	159.15,356.90,428.34,616.96
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	147.99,219.38,345.44,523.35
Friction Angle	44.73	Dry density	1830	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 18  
 TEST DATE: 8/9/2007



<b>Field id:</b>	SPR-VTM-0012-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	45.42	Dry density	1970	Normal Stress	22,52,71,101	Elevation

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

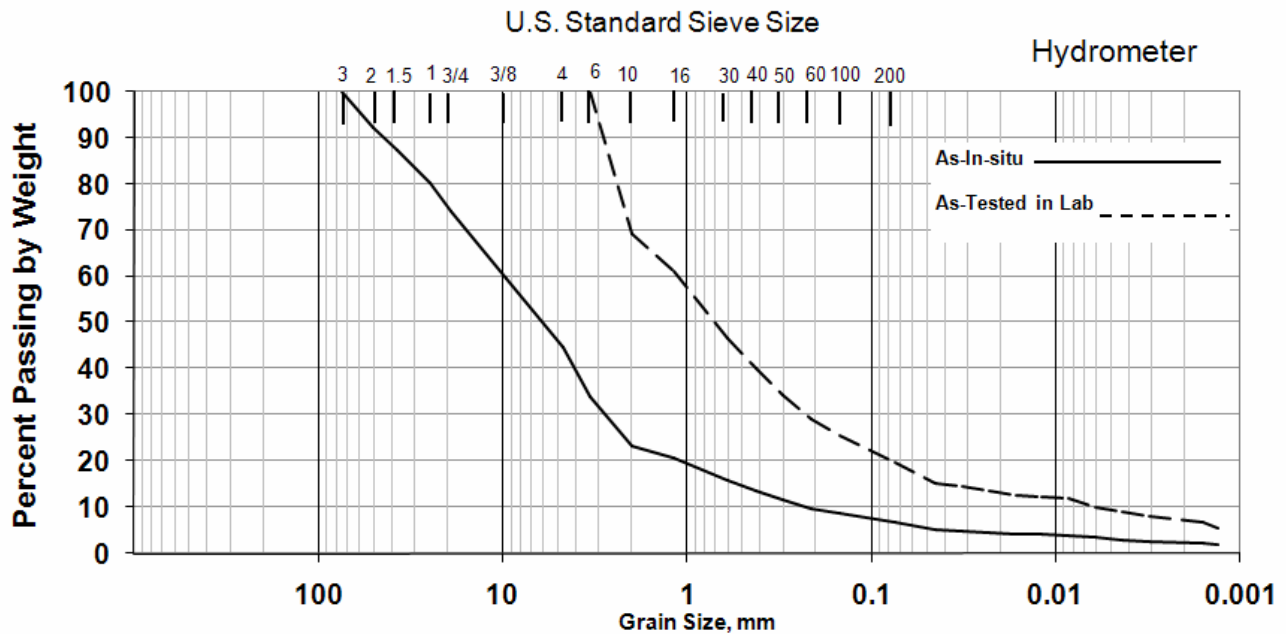
TEST NO: 19  
 TEST DATE: 9/24/2006

SAMPLE: **SPR-VTM-0012-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 20.0  
 PLASTIC LIMIT: 13.9  
 PLASTICITY INDEX: 6.2  
 SPECIFIC GRAVITY: 2.72  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 55.5  
 SAND: 37.9  
 FINE: 6.7

### Particle Size Distribution



ROUNDER	CORRIE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

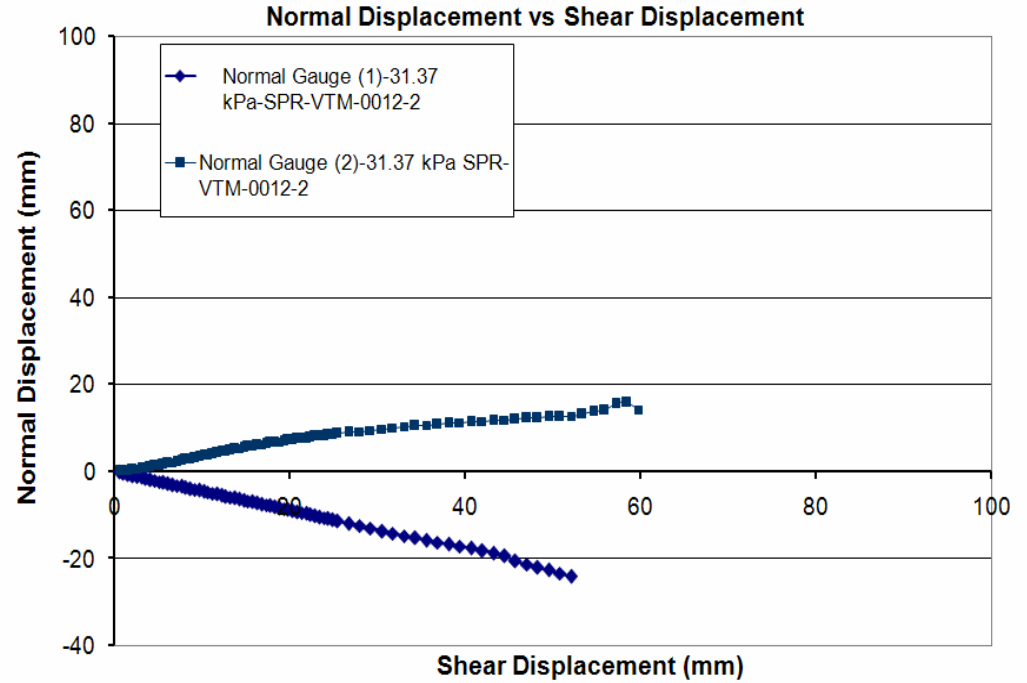
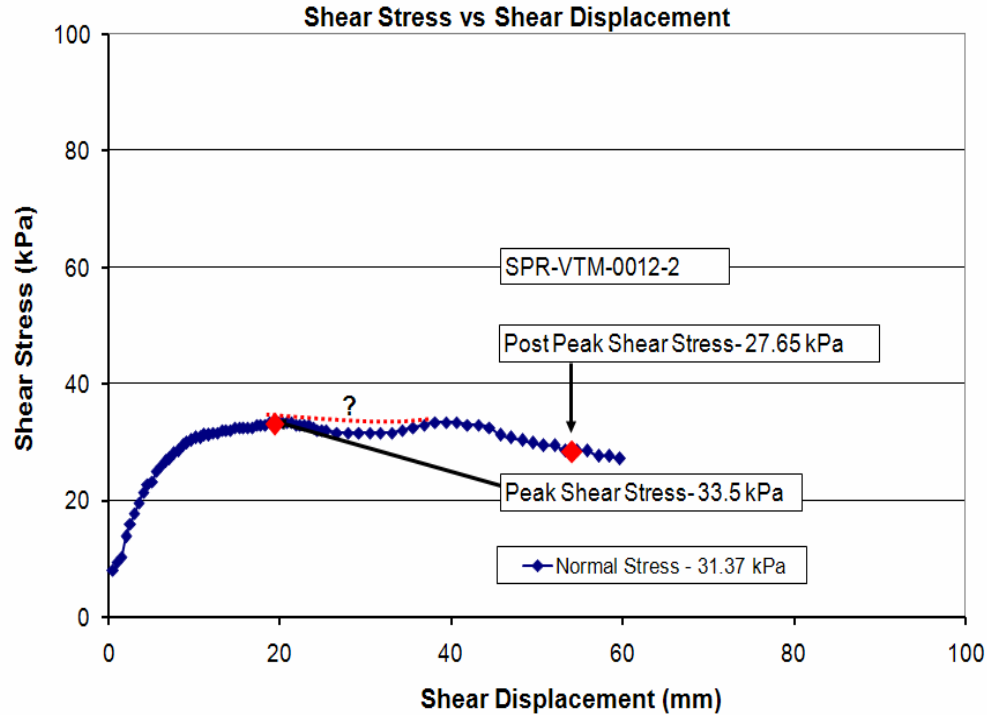
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	23.41	0.0419	5.20	0.0015	2.30
2	50	92.27	16	18.01	20.74	0.0303	4.96	0.0013	1.82
1-1/2	37.5	87.27	30	15.04	15.77	0.0217	4.61		
1	25	80.11	40	13.80	13.63	0.0157	4.25		
3/4	19	74.09	50	12.53	11.57	0.0114	4.13		
3/8	9.5	59.55	70	11.48	9.86	0.0082	4.01		
4	4.75	44.55	100	10.47	8.68	0.0058	3.41		
6	3.36	33.86	200	8.39	6.65	0.0042	3.05		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 19  
 TEST DATE: N/A

UTM Northing: 4062735  
 UTM Easting: 454439



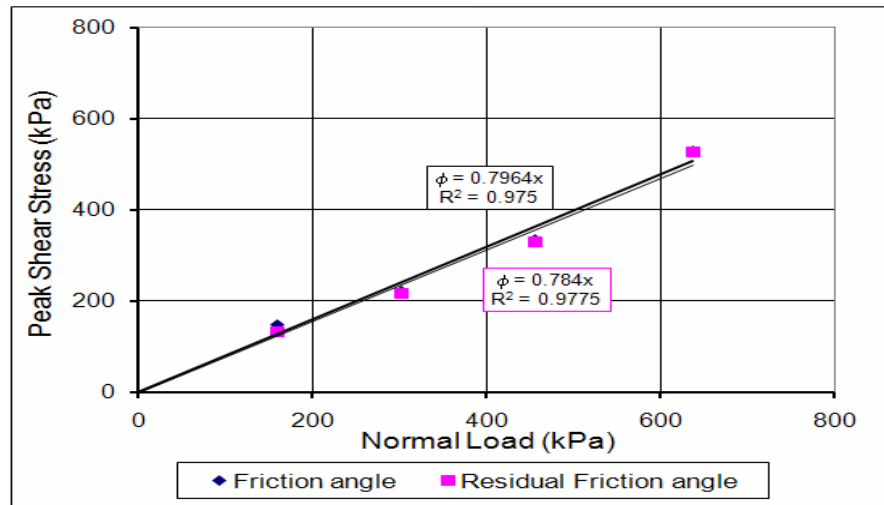
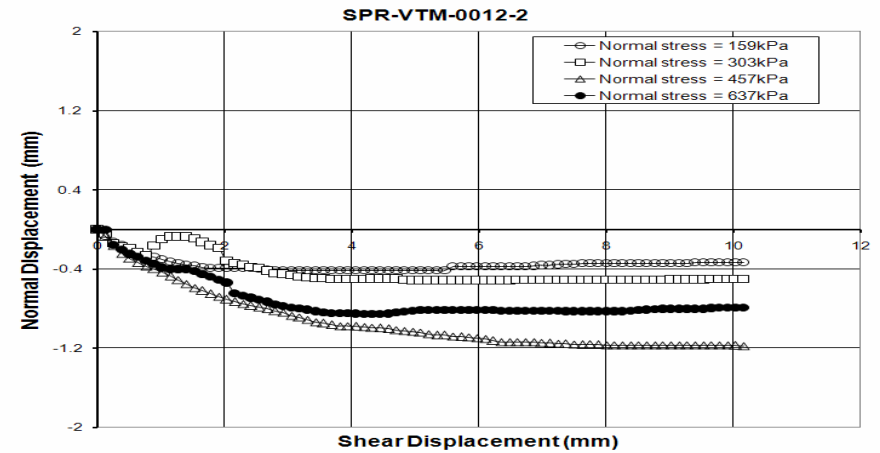
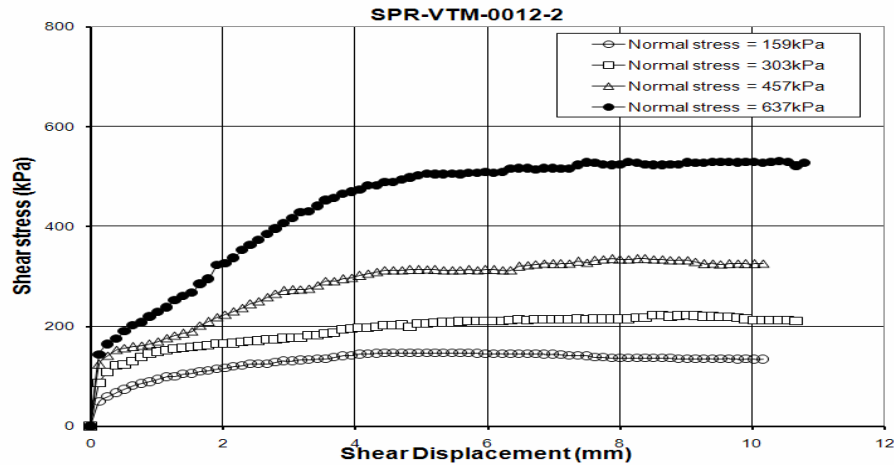
<b>Field id:</b>	SPR-VTM-0012-2						
Measured Cohesion	3.96	Water Content	na	Shear box size	30	Peak Shear Stress	33.5
Intrinsic Cohesion	3.96	Wet Density	2110	Matric Suction	0.0	Post Peak Shear Stress	27.65
Max. Particle Size	2.54	Dry density	1510	Normal Stress	31.37	Elevation	2908.2



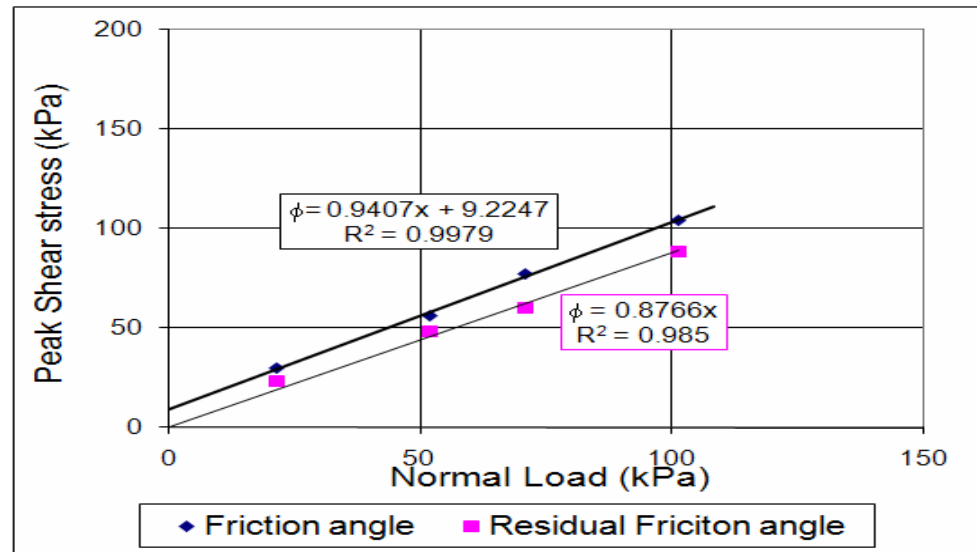
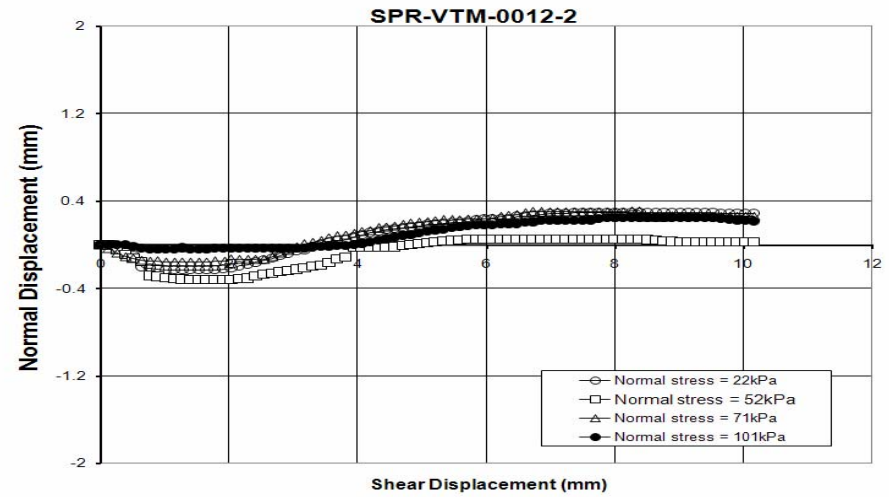
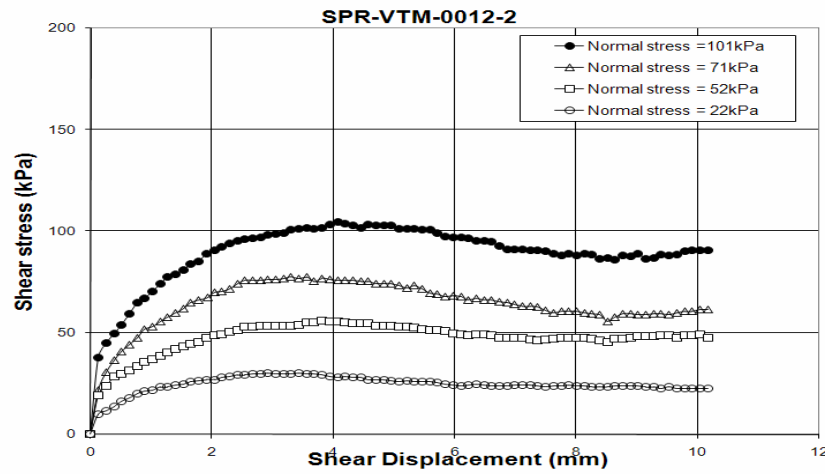
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 19  
 TEST DATE: 11/21/2006



<b>Field id:</b>	SPR-VTM-0012-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	147.48,222.81,335.98,531.10
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	131.93,217.35,330.71,527.20
Friction Angle	38.53	Dry density	1500	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SPR-VTM-0012-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	30.24,56.23,77.45,104.51
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.53,48.05,59.93,88.35
Friction Angle	43.25	Dry density	1540	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

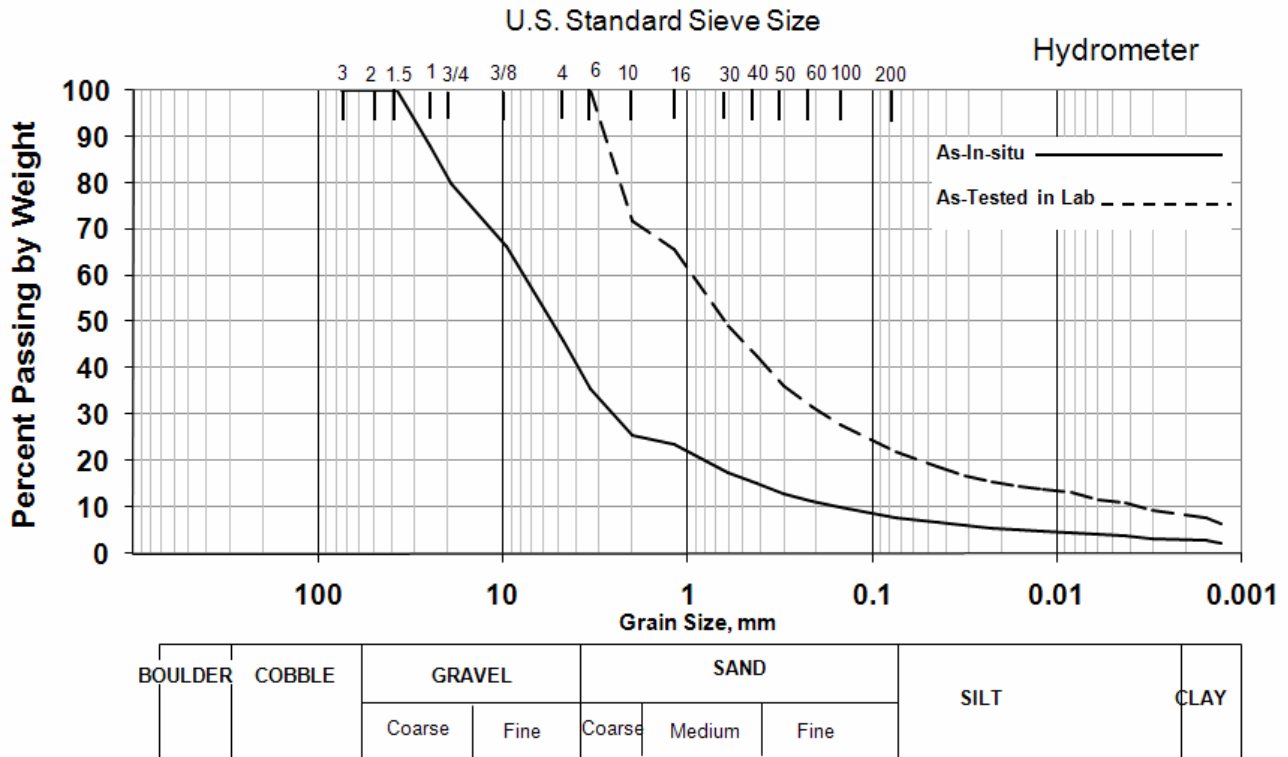
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 20  
 TEST DATE: 9/23/2006

SAMPLE: SPR-VTM-0012-3  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 21.1	GRAVEL: 54.1
PLASTIC LIMIT: 16.7	SAND: 38.0
PLASTICITY INDEX: 4.3	FINE: 7.9
SPECIFIC GRAVITY: 2.79	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

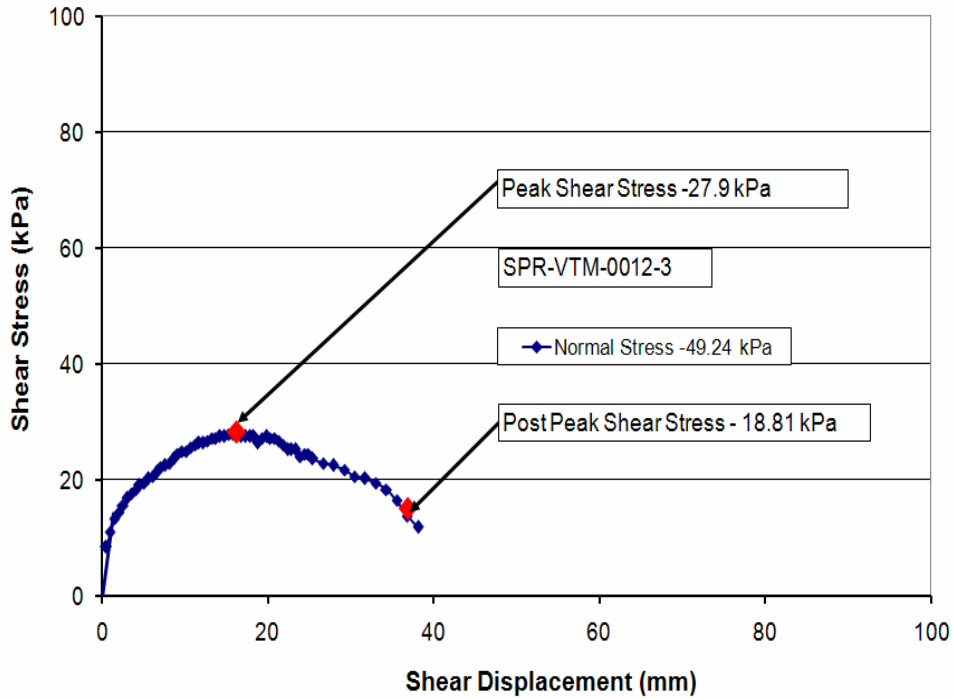
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	25.68	0.0419	6.65	0.0015	2.80
2	50	100.00	16	18.01	23.47	0.0303	5.99	0.0013	2.27
1-1/2	37.5	100.00	30	15.04	17.56	0.0217	5.60		
1	25	87.95	40	13.80	15.22	0.0157	5.21		
3/4	19	80.00	50	12.53	12.96	0.0114	4.94		
3/8	9.5	66.36	70	11.48	11.30	0.0082	4.68		
4	4.75	45.91	100	10.47	9.93	0.0058	4.15		
6	3.36	35.68	200	8.39	7.86	0.0042	3.89		

## IN-SITU DIRECT SHEAR TEST REPORT

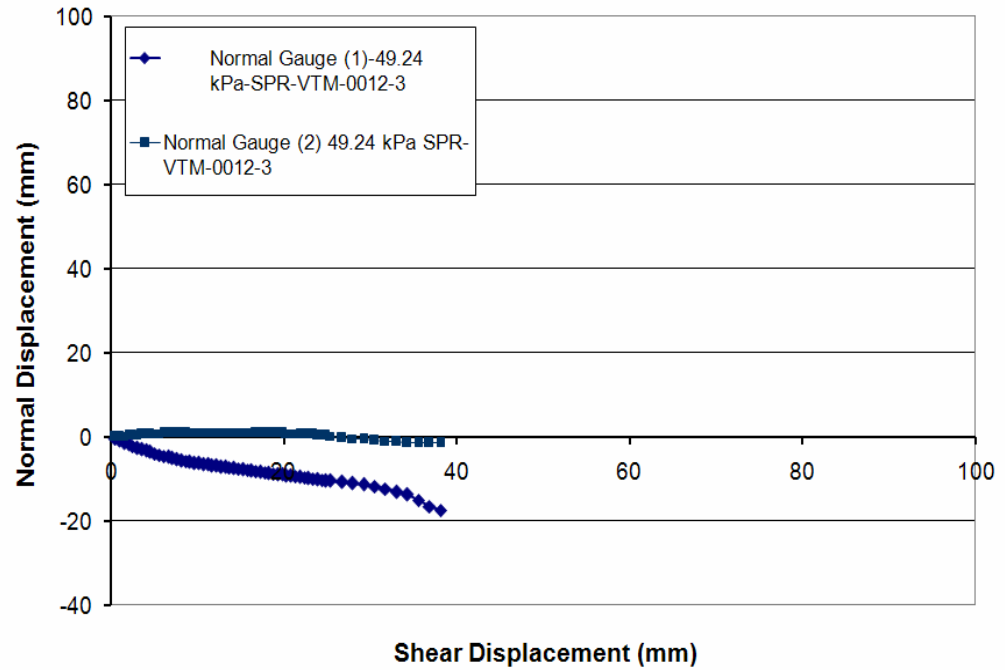
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 20  
 TEST DATE: N/A

UTM Northing: 4062735  
 UTM Easting: 454439



**Shear Stress vs Shear Displacement**



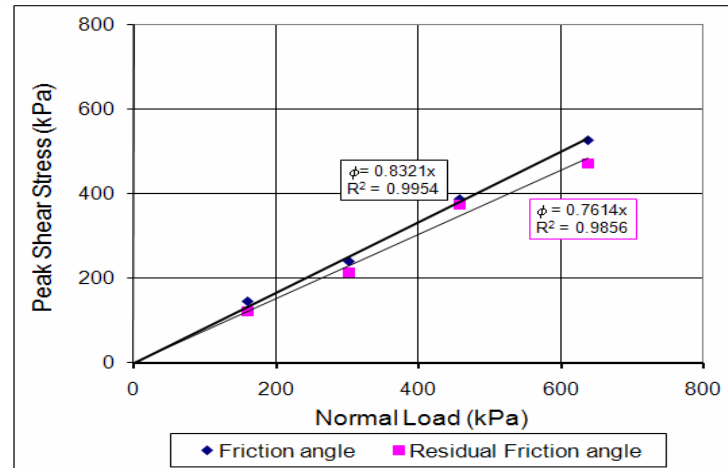
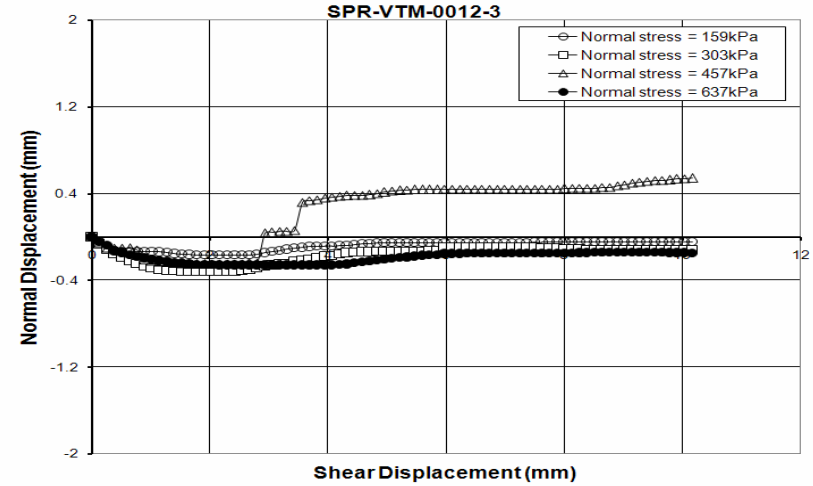
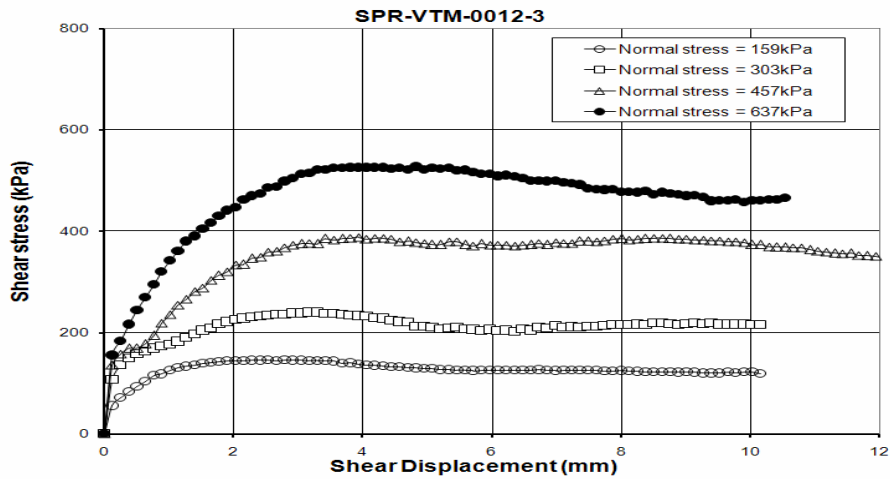
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SPR-VTM-0012-3						
Measured Cohesion	0.00	Water Content		Shear box size	5.08	Peak Shear Stress	27.9
Intrinsic Cohesion	0.00	Wet Density	2690	Matric Suction	0.3	Post Peak Shear Stress	18.81
Friction Angle	48.37	Dry density	1940	Normal Stress	49.24	Elevation	2908.2

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

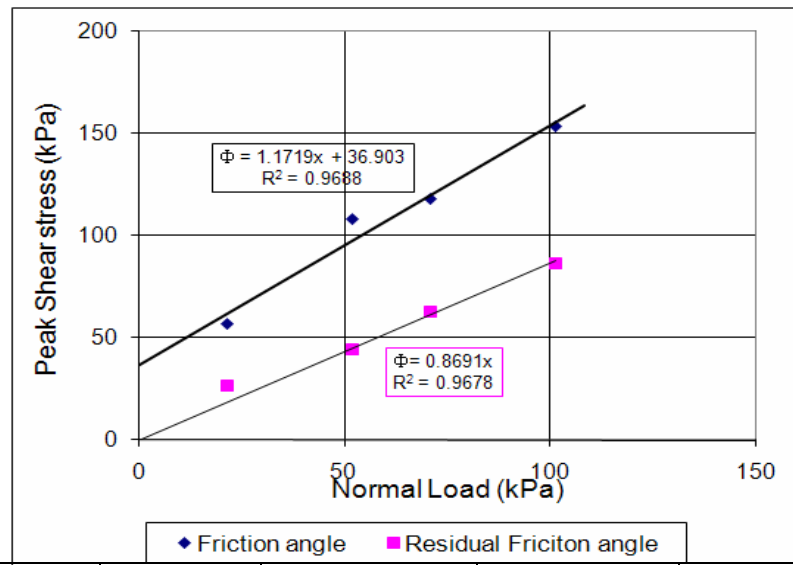
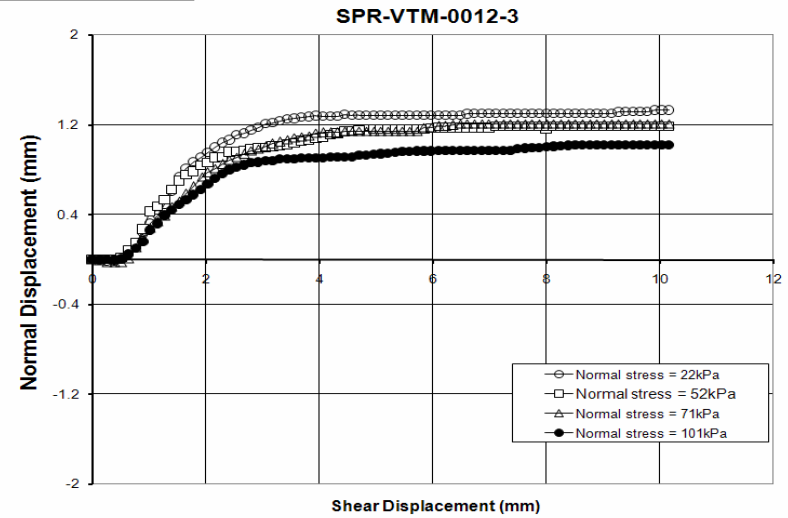
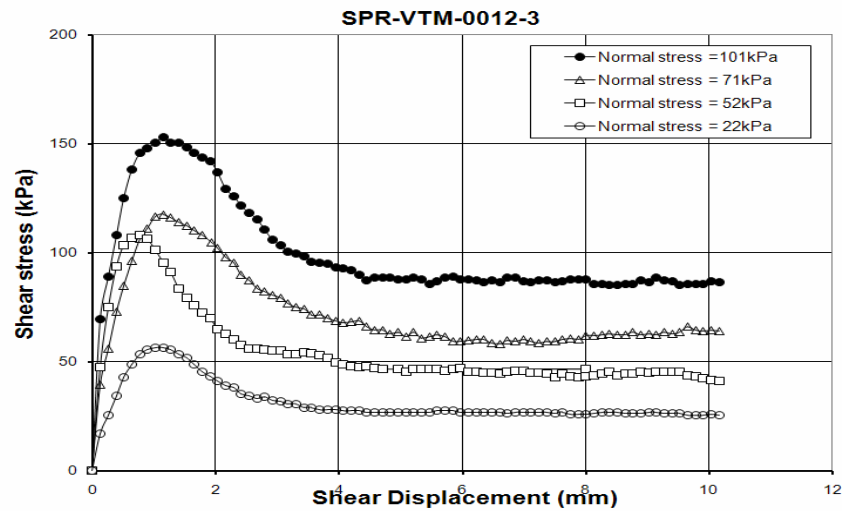
TEST NO: 20  
 TEST DATE: 11/27/2006



<b>Field id:</b>	SPR-VTM-0012-3					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle <sup>(o)</sup>	39.76	Dry density	1920	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 20  
 TEST DATE: 8/9/2007



<b>Field id:</b>	SPR-VTM-0012-3					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle ( $^{\circ}$ )	49.53	Dry density	1990	Normal Stress	22,52,71,101	Elevation

## PARTICLE SIZE ANALYSIS REPORT

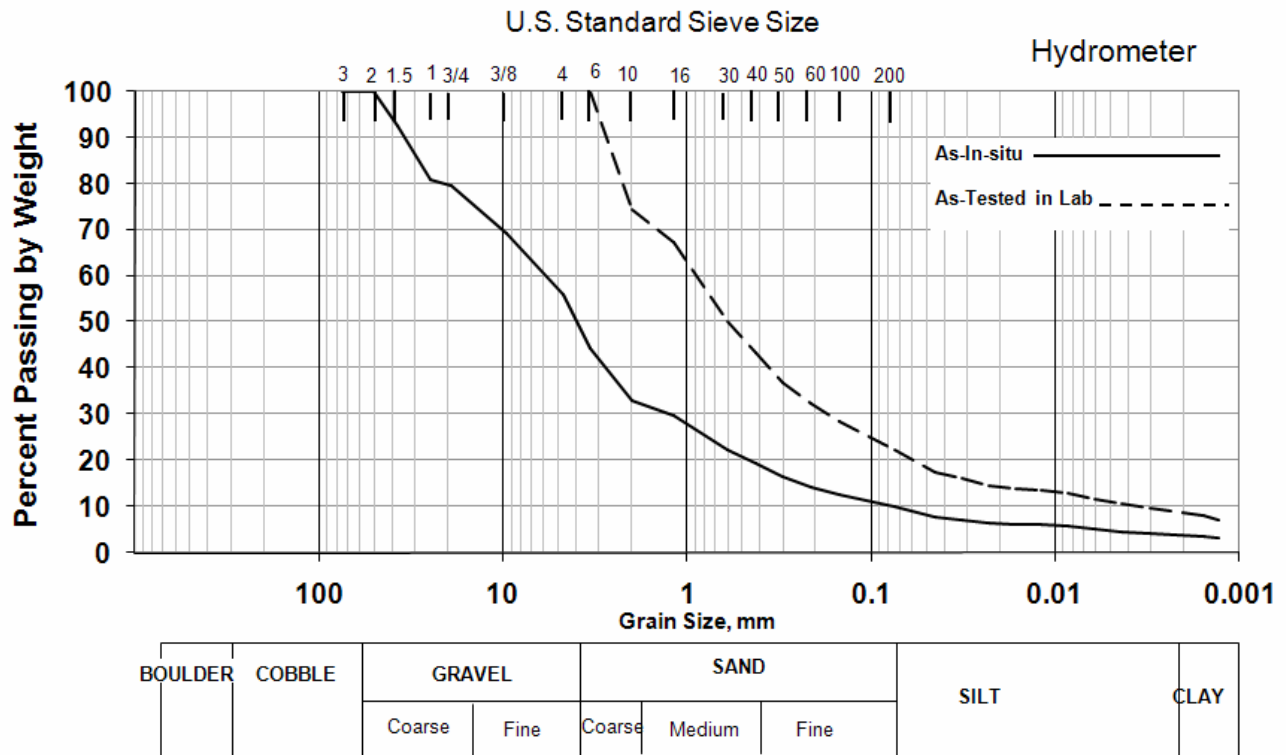
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 21  
 TEST DATE: 9/23/2006

SAMPLE: **SPR-VTM-0019-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 20.6	GRAVEL: 44.1
PLASTIC LIMIT: 13.3	SAND: 46.0
PLASTICITY INDEX: 7.3	FINE: 10.0
SPECIFIC GRAVITY: 2.75	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

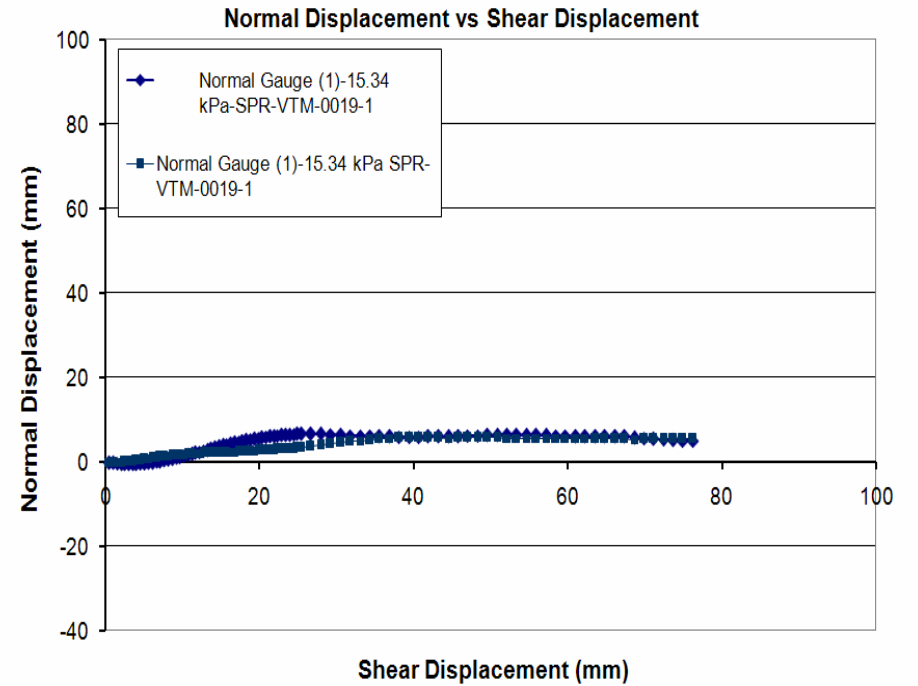
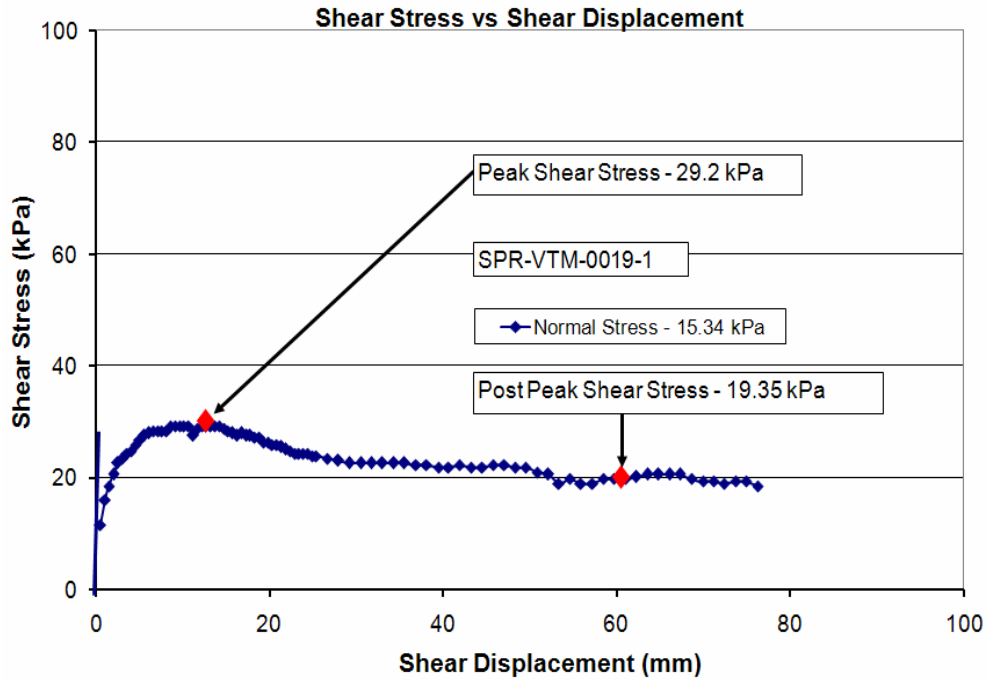
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	33.03	0.0419	7.69	0.0015	3.63
2	50	100.00	16	18.01	29.79	0.0303	7.19	0.0013	3.12
1-1/2	37.5	92.58	30	15.04	22.27	0.0217	6.53		
1	25	80.76	40	13.80	19.30	0.0157	6.19		
3/4	19	79.55	50	12.53	16.43	0.0114	6.02		
3/8	9.5	69.39	70	11.48	14.32	0.0082	5.69		
4	4.75	55.91	100	10.47	12.58	0.0058	5.19		
6	3.36	44.34	200	8.39	9.95	0.0042	4.69		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 21  
 TEST DATE: N/A

UTM Northing: 4062735  
 UTM Easting: 454440



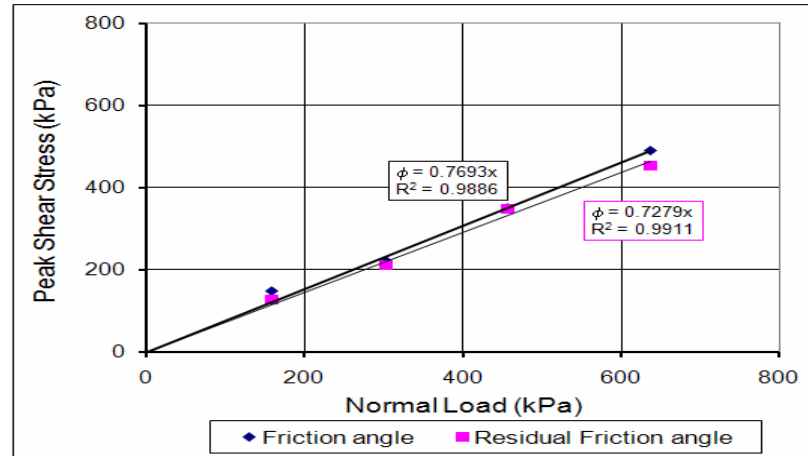
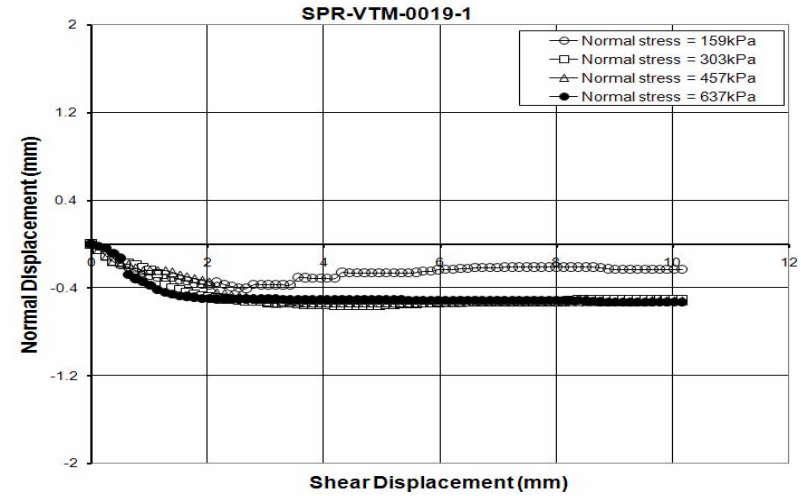
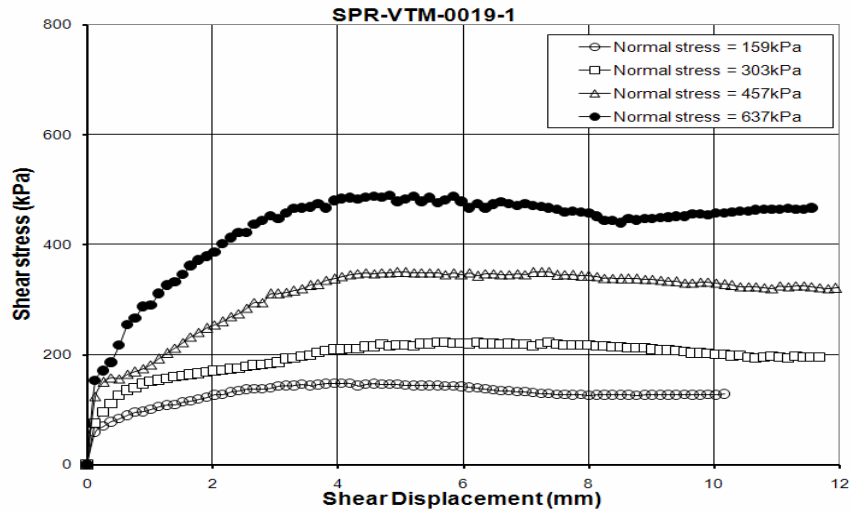
<b>Field id:</b>	SPR-VTM-0019-1						
Measured Cohesion	14.51	Water Content	12.16	Shear box size	30	Peak Shear Stress	29.2
Intrinsic Cohesion	13.17	Wet Density	1870	Matric Suction	5	Post Peak Shear Stress	19.35
Max. Particle Size	1.27	Dry density	1670	Normal Stress	15.34	Elevation	2908.2



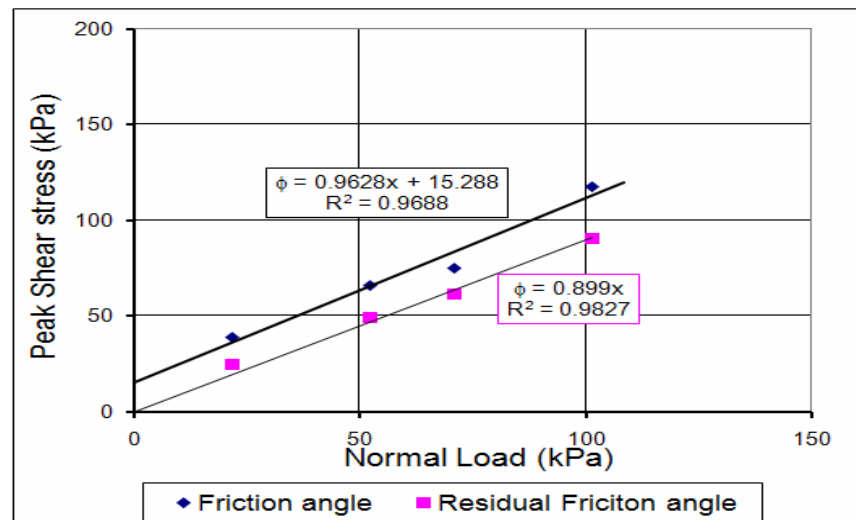
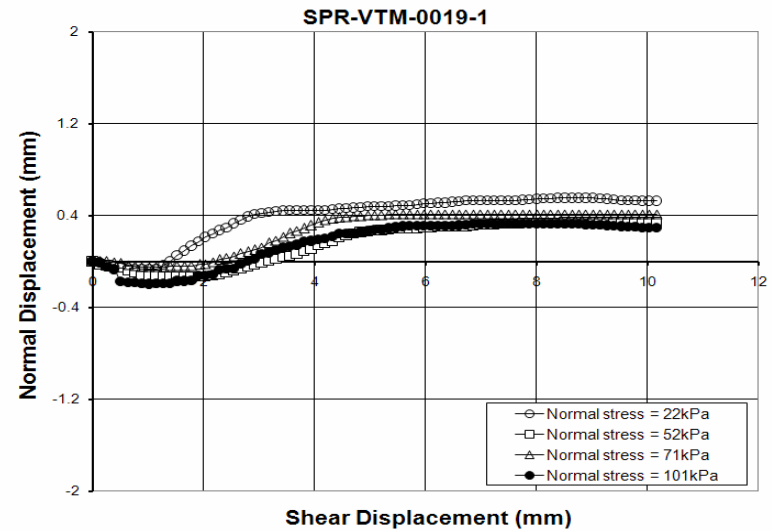
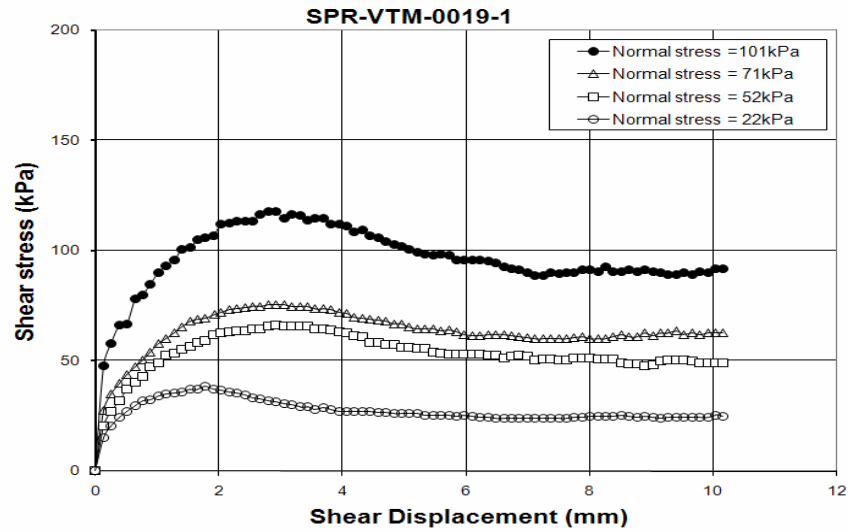
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 21  
 TEST DATE: 11/29/2006



<b>Field id:</b>	SPR-VTM-0019-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	148.54,222.81,350.29,489.48
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	128.74,211.78,347.69,453.92
Friction Angle	37.57	Dry density	1680	Normal Stress	159,303,457,637	Elevation



<b>Field id:</b>	SPR-VTM-0019-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	38.73,66.31,75.33,117.77
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	24.52,49.38,61.41,90.51
Friction Angle	43.91	Dry density	1670	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

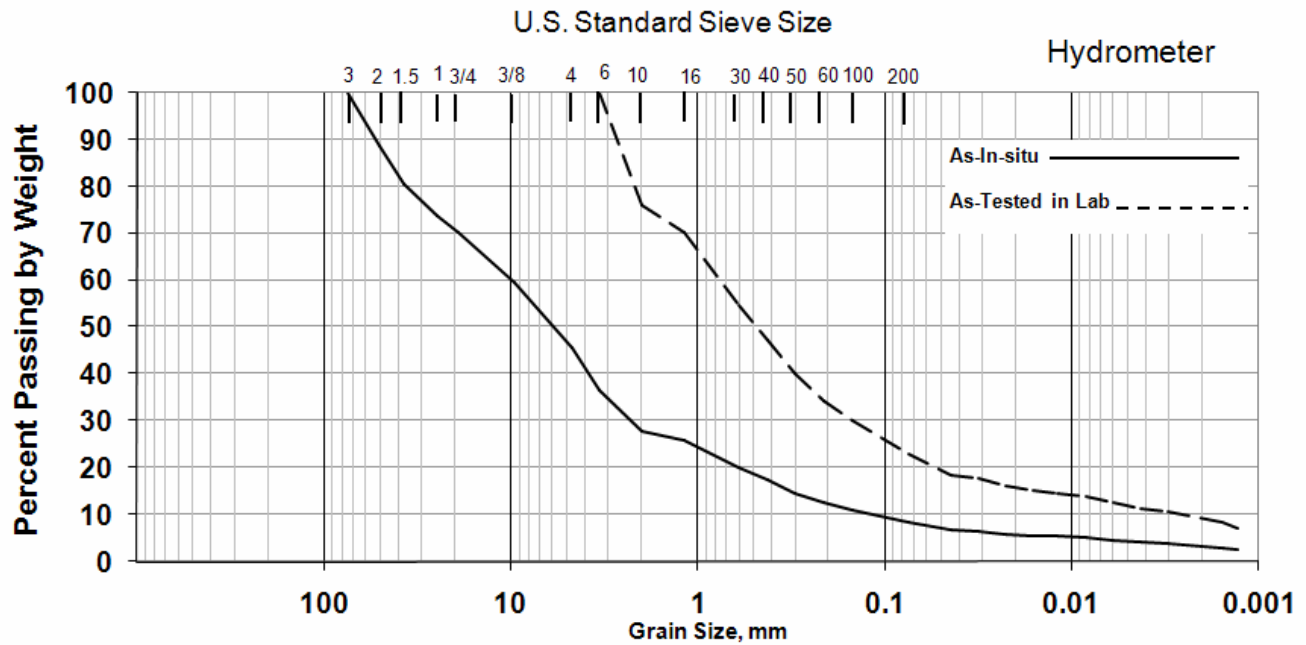
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 22  
 TEST DATE: 9/23/2006

SAMPLE: **SPR-VTM-0019-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 19.9	GRAVEL: 54.3
PLASTIC LIMIT: 13.1	SAND: 37.2
PLASTICITY INDEX: 6.9	FINE: 8.5
SPECIFIC GRAVITY: 2.75	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

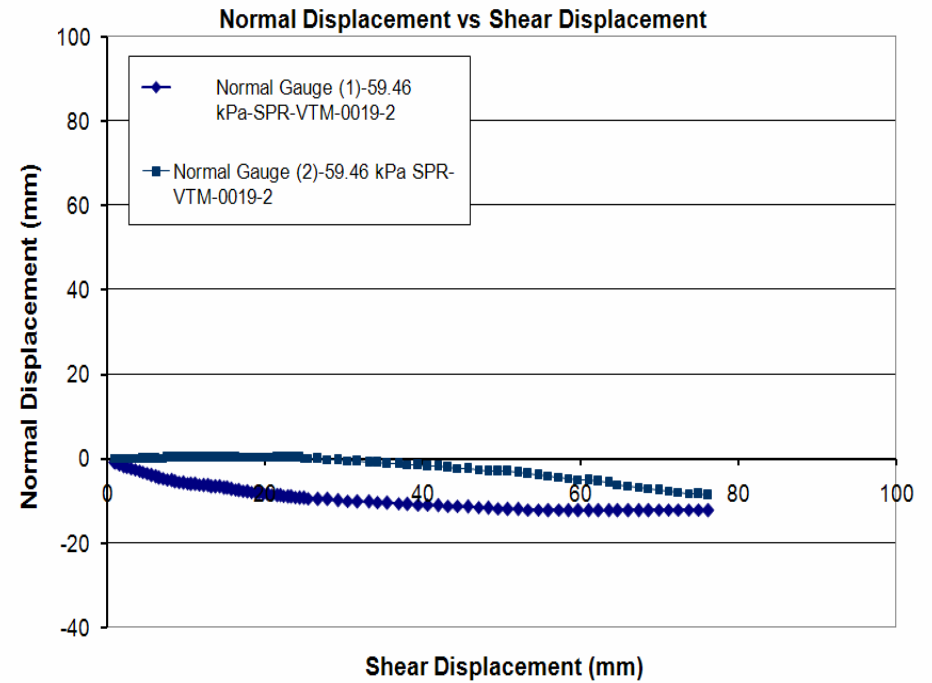
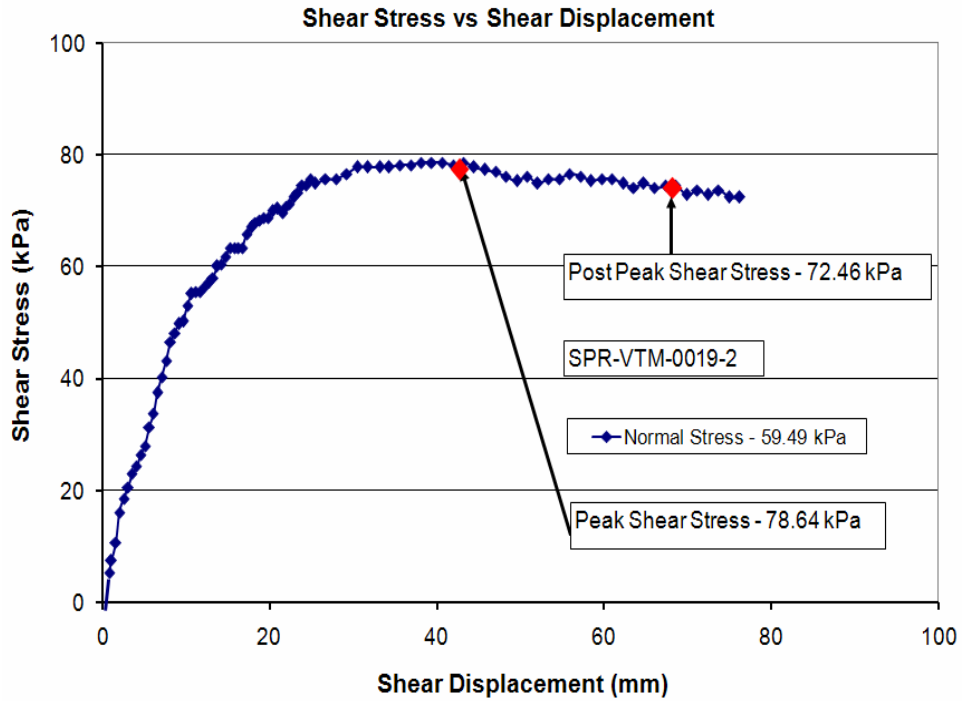
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	27.95	0.0419	6.78	0.0015	3.03
2	50	88.52	16	18.01	25.79	0.0303	6.50	0.0013	2.61
1-1/2	37.5	80.68	30	15.04	20.06	0.0217	5.93		
1	25	73.75	40	13.80	17.35	0.0157	5.64		
3/4	19	70.11	50	12.53	14.68	0.0114	5.36		
3/8	9.5	59.66	70	11.48	12.55	0.0082	5.07		
4	4.75	45.68	100	10.47	11.05	0.0058	4.65		
6	3.36	36.72	200	8.39	8.45	0.0042	4.22		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 22  
 TEST DATE: N/A

UTM Northing: 4062735  
 UTM Easting: 454440

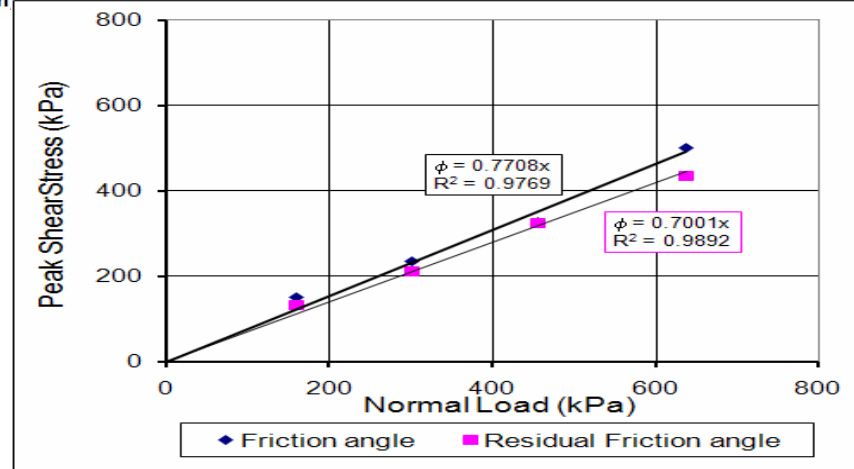
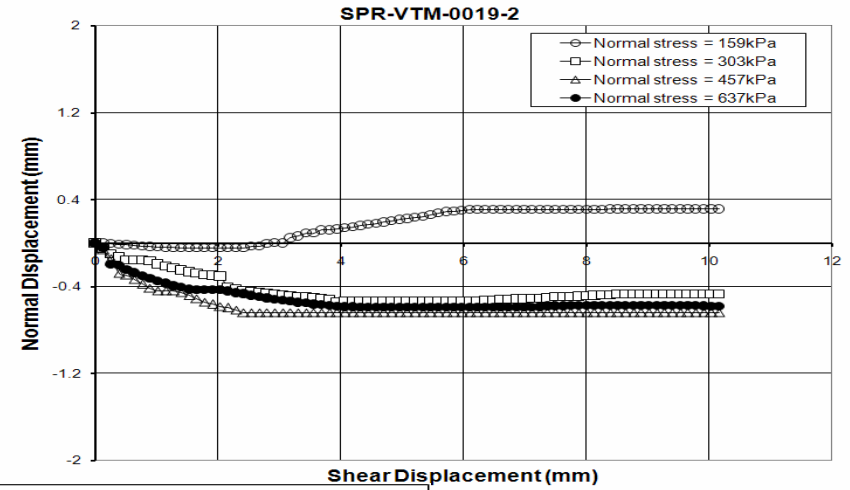
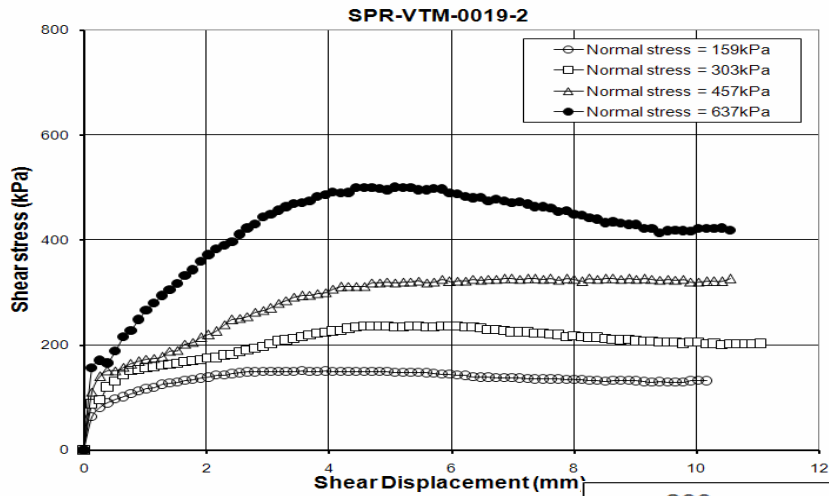


<b>Field id:</b>	SPR-VTM-0019-2						
Measured Cohesion	16.80	Water Content	8.96	Shear box size	30	Peak Shear Stress	29.2
Intrinsic Cohesion	16.27	Wet Density	1.73	Matric Suction	2	Post Peak Shear Stress	19.35
Max. Particle Size	2.54	Dry density	1.6	Normal Stress	15.34	Elevation	2908.2

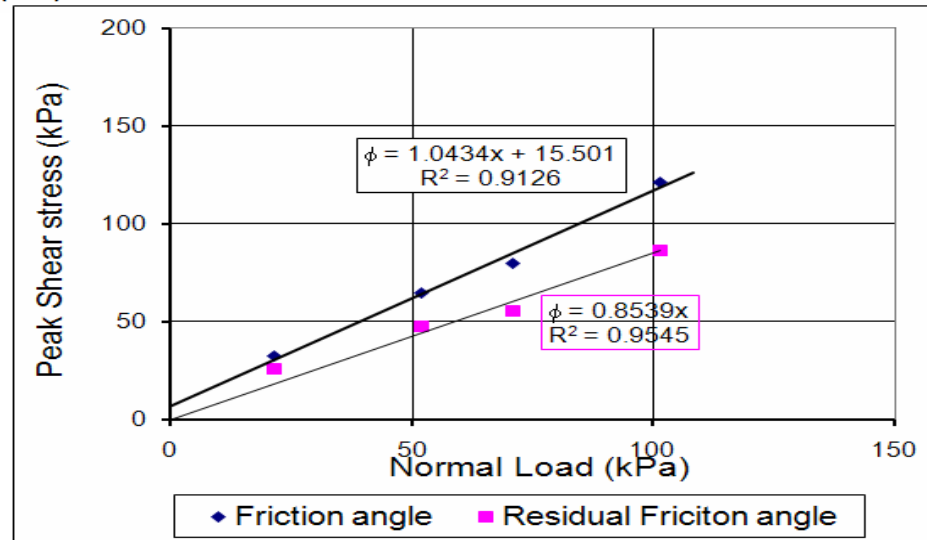
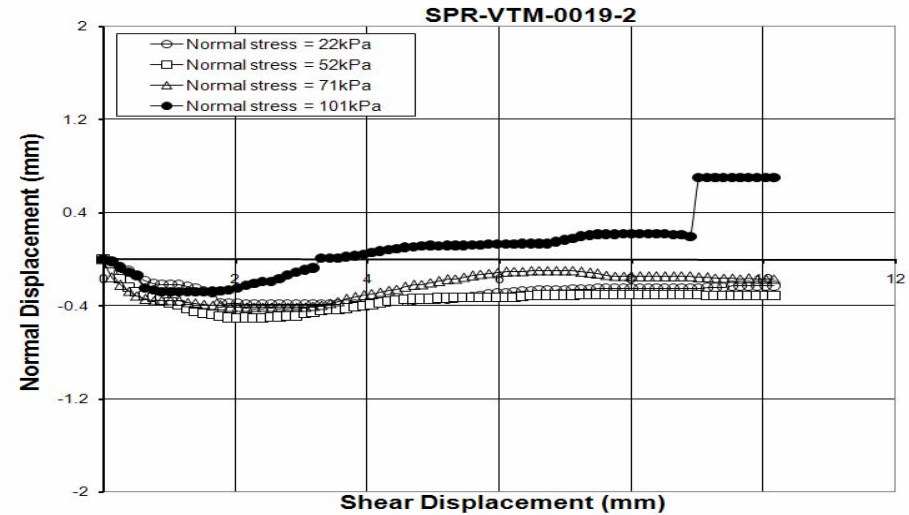
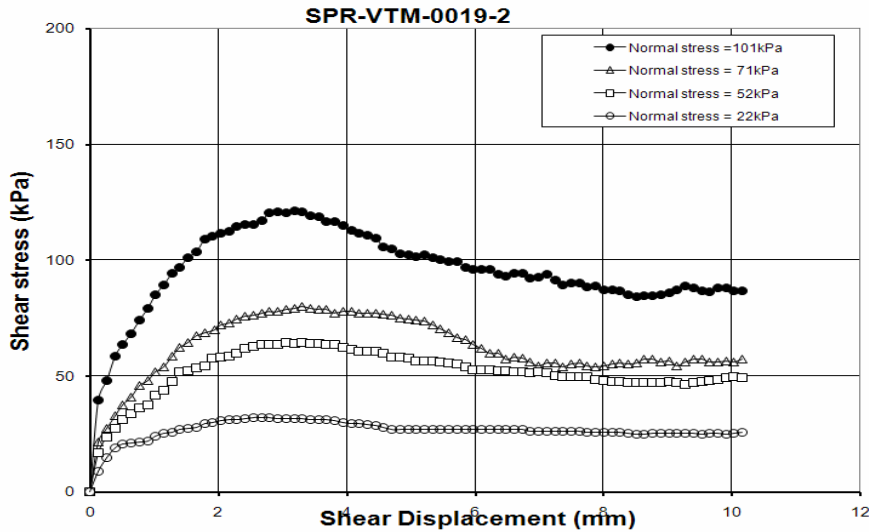
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 22  
 TEST DATE: 12/1/2006



<b>Field id:</b>	SPR-VTM-0019-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	151.20,235.82,326.88,501.19
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	132.89,212.82,325.14,436.63
Friction Angle	37.63	Dry density	1620	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SPR-VTM-0019-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	32.36,64.72,80.11,121.46
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	25.67,47.94,55.90,86.61
Friction Angle	46.22	Dry density	1.61	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

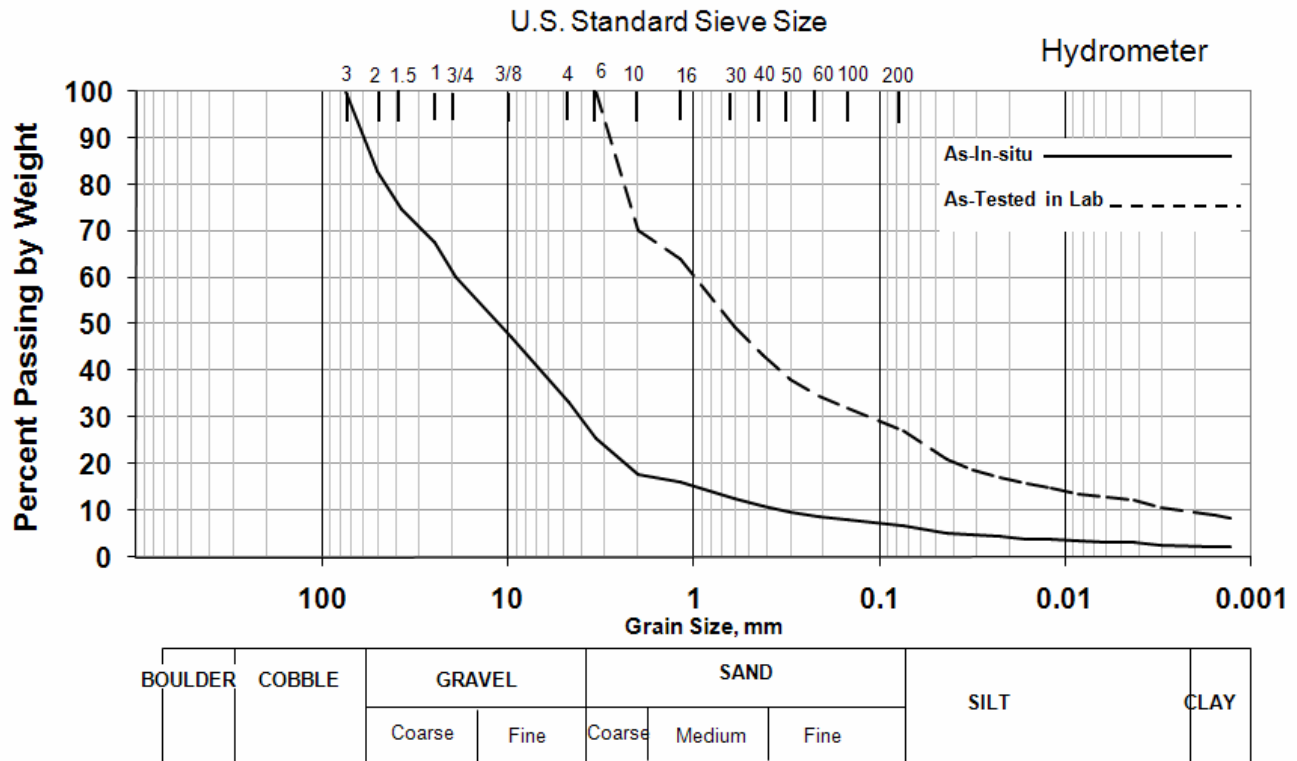
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 23  
 TEST DATE: 9/30/2006

SAMPLE: **SSS-VTM-0600-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 28.0	GRAVEL: 66.8
PLASTIC LIMIT: 19.3	SAND: 26.6
PLASTICITY INDEX: 8.7	FINE: 6.6
SPECIFIC GRAVITY: 2.75	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

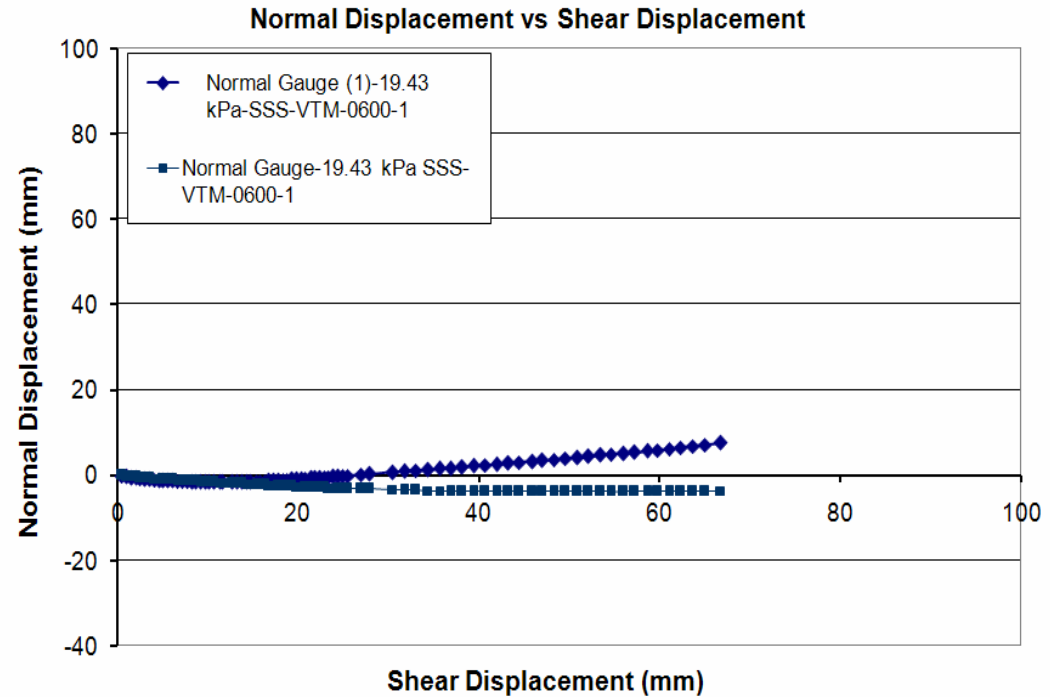
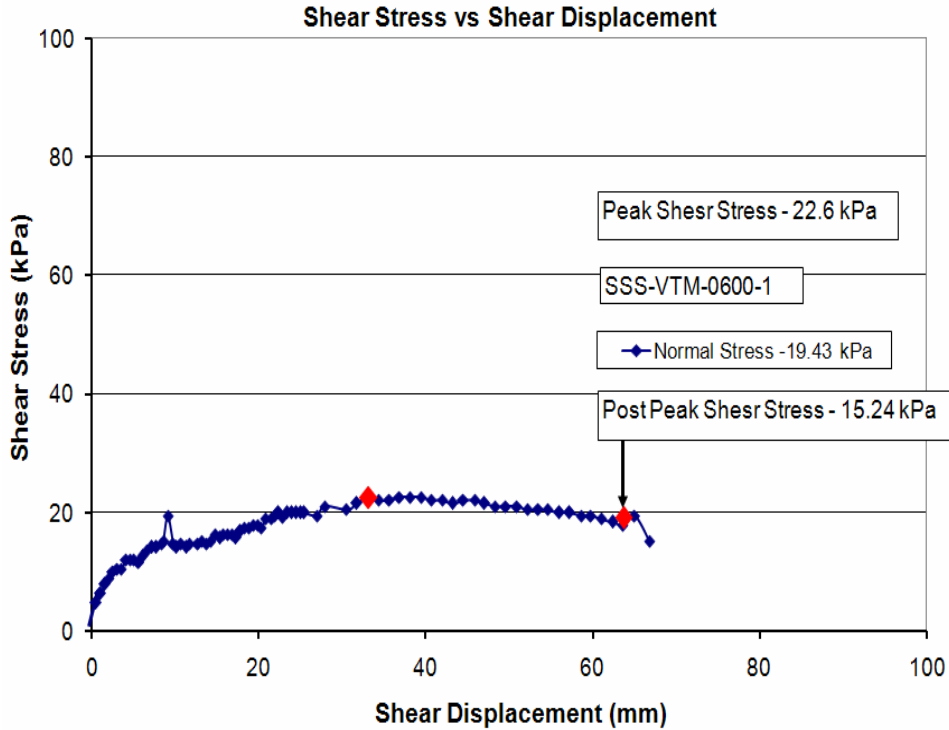
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	17.84	0.0419	5.33	0.0015	2.32
2	50	82.84	16	18.01	16.33	0.0303	4.77	0.0013	2.10
1-1/2	37.5	74.77	30	15.04	12.62	0.0217	4.40		
1	25	67.73	40	13.80	11.03	0.0157	4.03		
3/4	19	60.23	50	12.53	9.73	0.0114	3.75		
3/8	9.5	47.16	70	11.48	8.80	0.0082	3.47		
4	4.75	33.18	100	10.47	8.15	0.0058	3.29		
6	3.36	25.43	200	8.39	6.91	0.0042	3.10		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 23  
 TEST DATE: N/A

UTM Northing: 4060712  
 UTM Easting: 454120



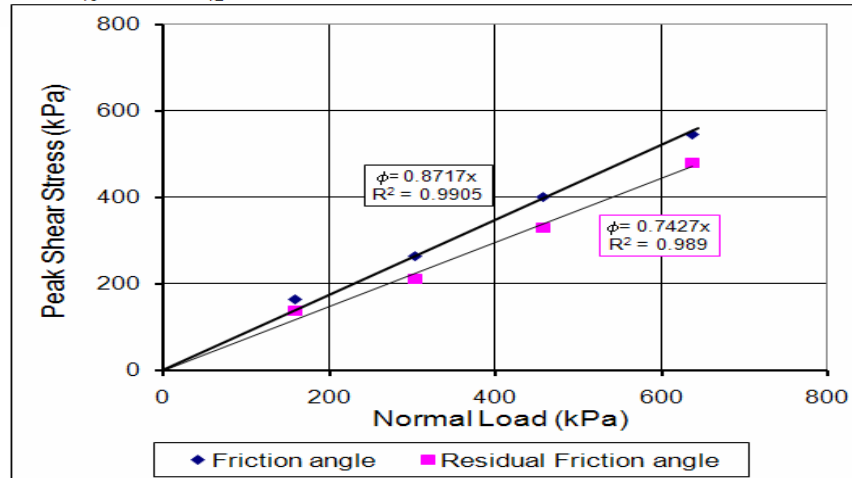
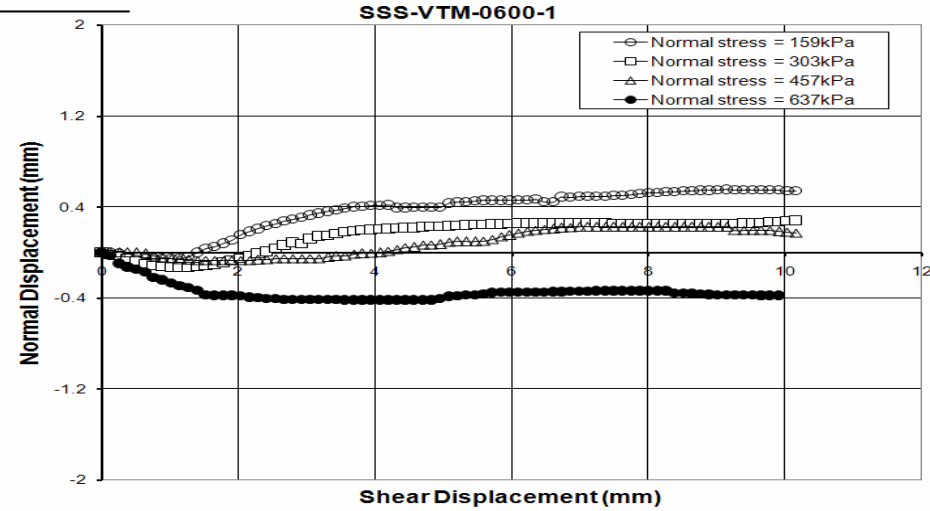
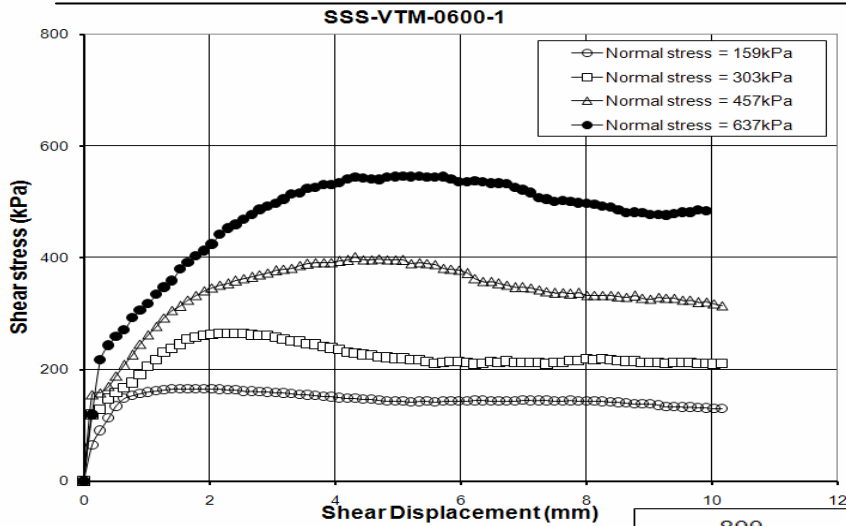
<b>Field id:</b>	SSS-VTM-0600-1						
Measured Cohesion	1.81	Water Content	9.48	Shear box size	30	Peak Shear Stress	22.6
Intrinsic Cohesion	1.52	Wet Density	2030	Matric Suction	1	Post Peak Shear Stress	15.24
Max. Particle Size	2.54	Dry density	1860	Normal Stress	19.43	Elevation	2958.2



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

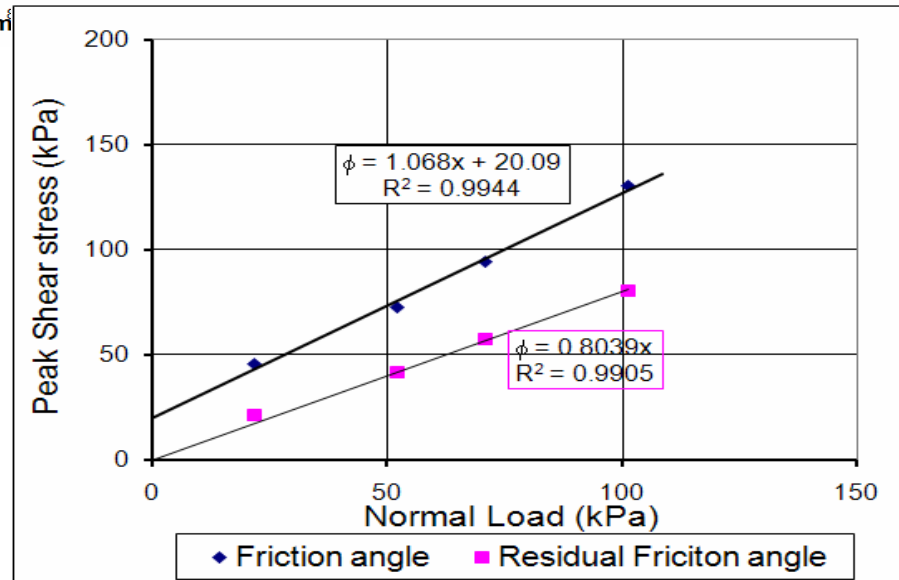
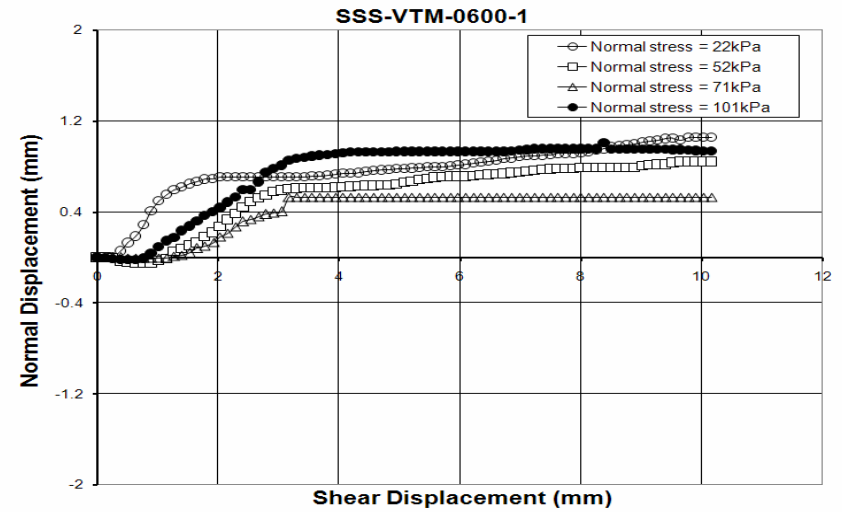
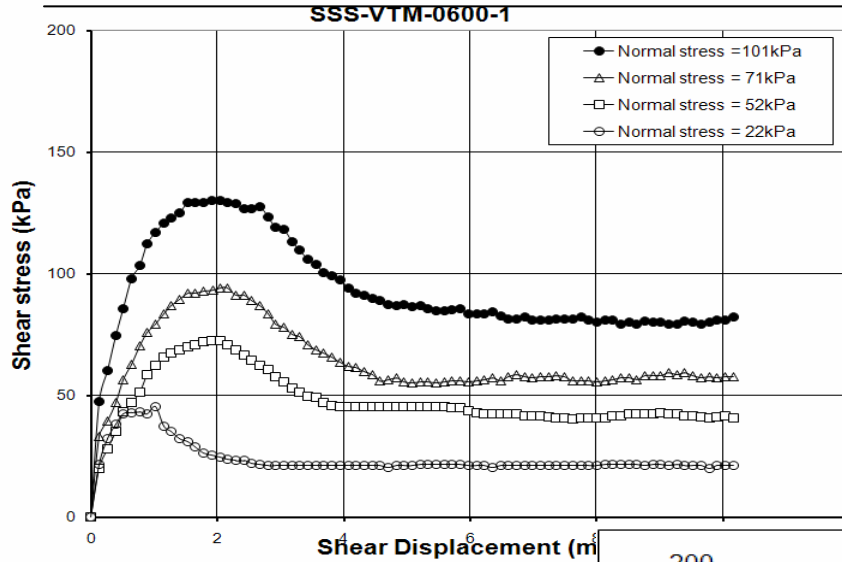
TEST NO: 23  
 TEST DATE: 1/9/2007



<b>Field id:</b>	SSS-VTM-0600-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	165.52,264.44,401.02,546.71
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	138.90,211.69,330.13,481.02
Friction Angle	41.08	Dry density	1840	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 23  
 TEST DATE: 3/30/2007



<b>Field id:</b>	SSS-VTM-0600-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	45.62,72.68,94.43,130.51
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	21.36,41.99,57.58,80.28
Friction Angle	46.88	Dry density	1840	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

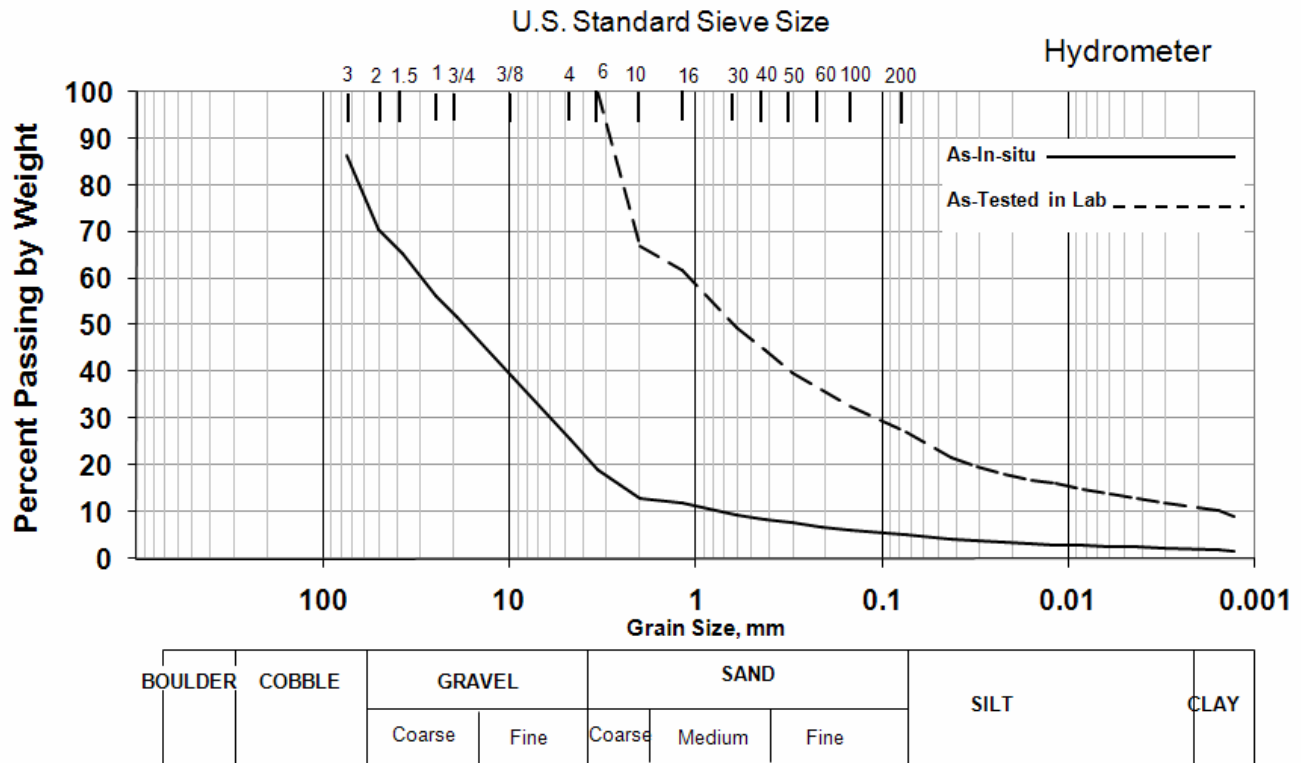
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 24  
 TEST DATE: 9/30/2006

SAMPLE: **SSS-VTM-0601-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.3	GRAVEL: 74.4
PLASTIC LIMIT: 18.3	SAND: 20.4
PLASTICITY INDEX: 9.0	FINE: 5.2
SPECIFIC GRAVITY: 2.82	
ATTERBERG CLASSIFICATION: CL	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

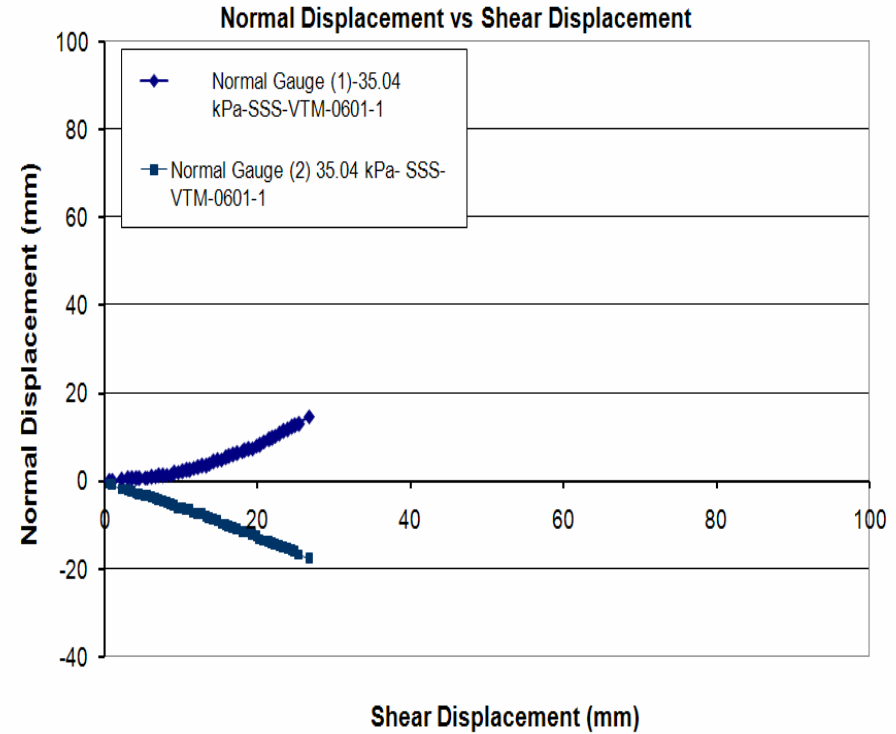
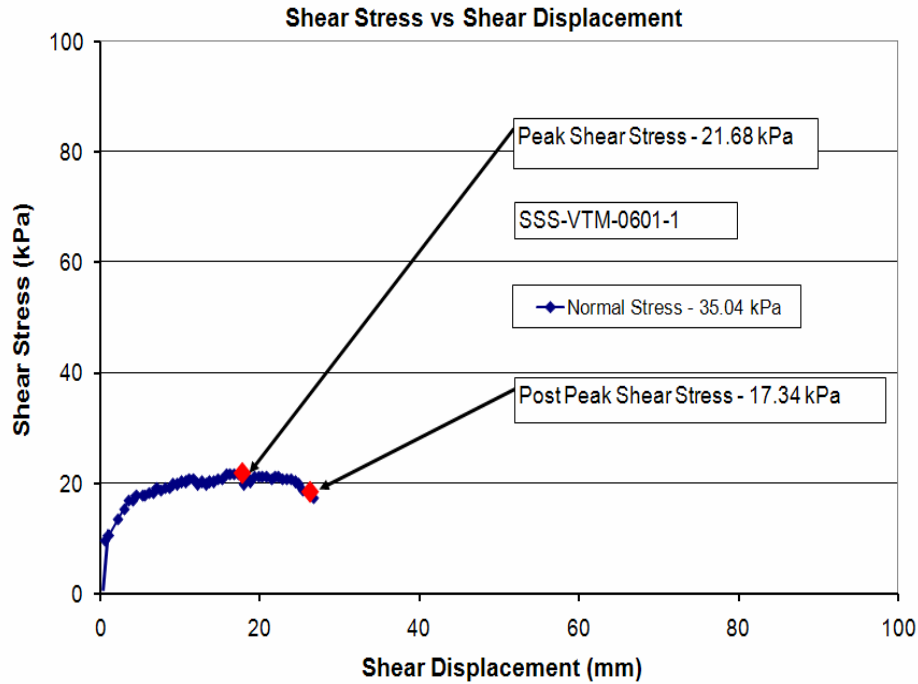
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	86.36	10	19.44	12.79	0.0419	4.16	0.0015	1.96
2	50	70.45	16	18.01	11.82	0.0303	3.75	0.0013	1.74
1-1/2	37.5	65.29	30	15.04	9.49	0.0217	3.48		
1	25	56.35	40	13.80	8.55	0.0157	3.21		
3/4	19	51.73	50	12.53	7.63	0.0114	3.07		
3/8	9.5	38.93	70	11.48	6.92	0.0082	2.87		
4	4.75	25.59	100	10.47	6.28	0.0058	2.67		
6	3.36	19.12	200	8.39	5.19	0.0042	2.46		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 24  
 TEST DATE: N/A

UTM Northing: 4060712  
 UTM Easting: 454110

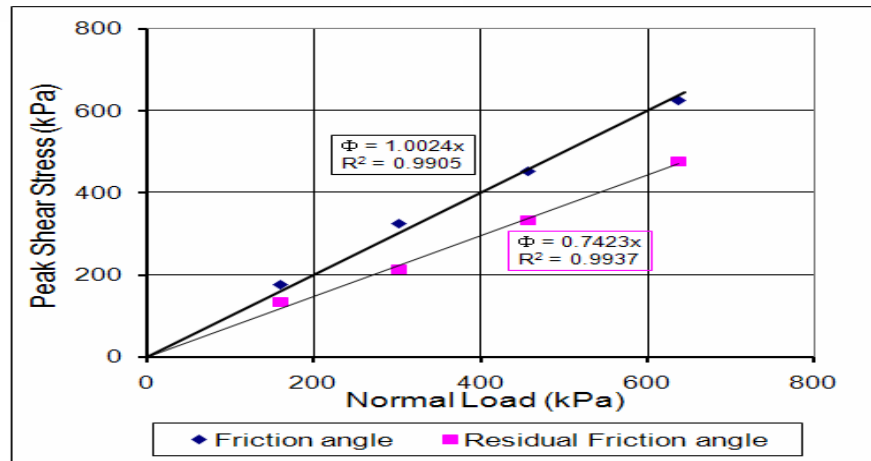
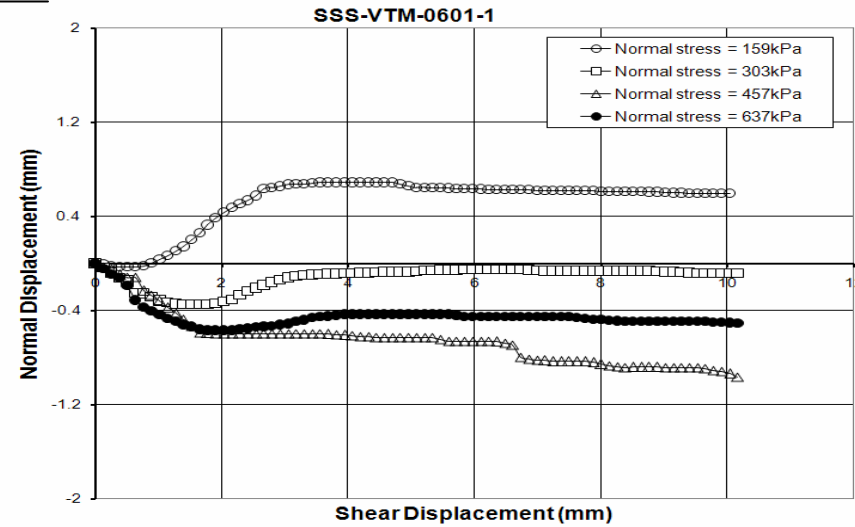
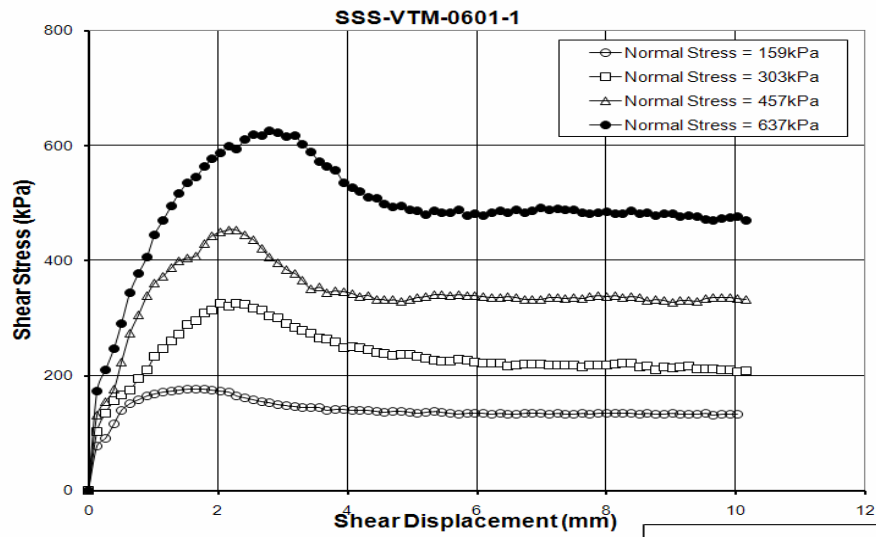


<b>Field id:</b>	SSS-VTM-0601-1						
Measured Cohesion	0.00	Water Content	4.7	Void Ratio		Peak Shear Stress	21.68
Intrinsic Cohesion	0.00	Wet Density		Matric Suction		Post Peak Shear Stress	17.34
Max. Particle Size	10.16	Dry density		Normal Stress	35.04	Elevation	2956.1

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

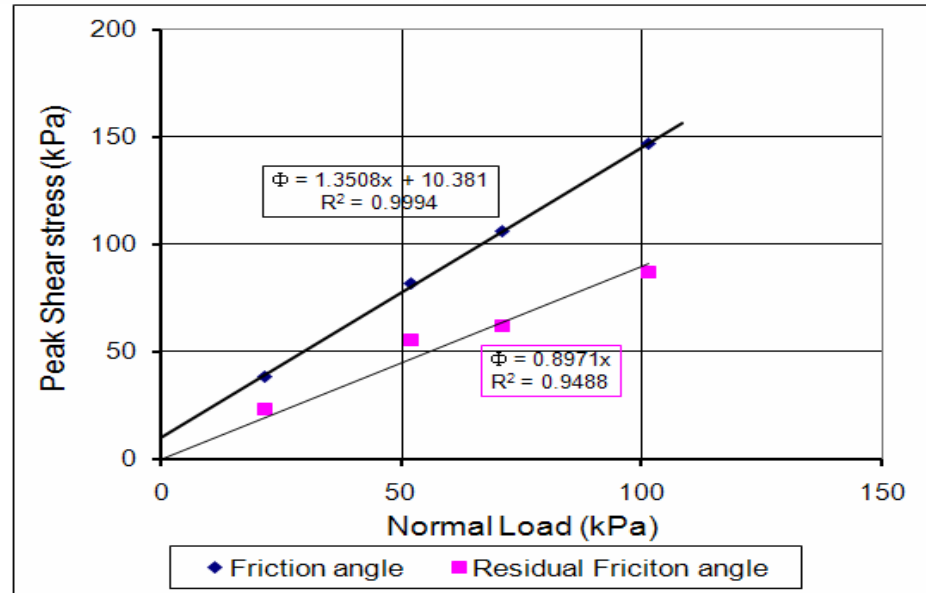
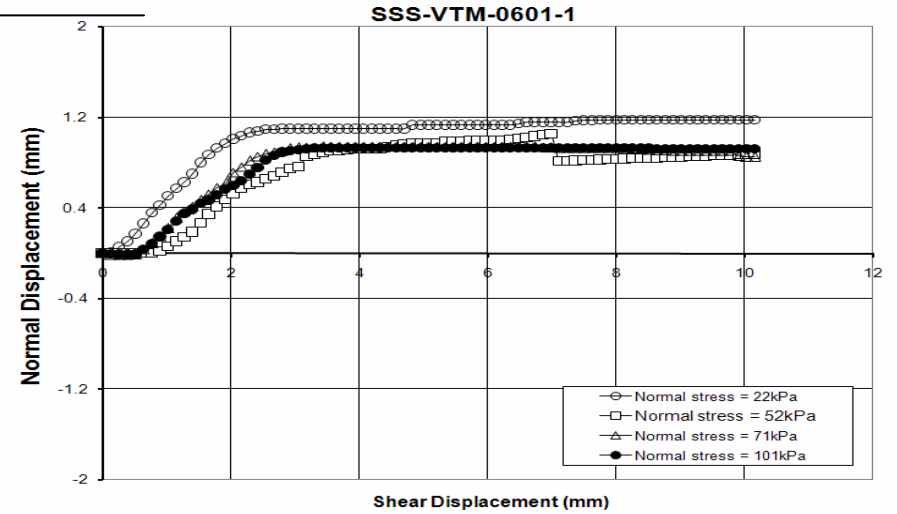
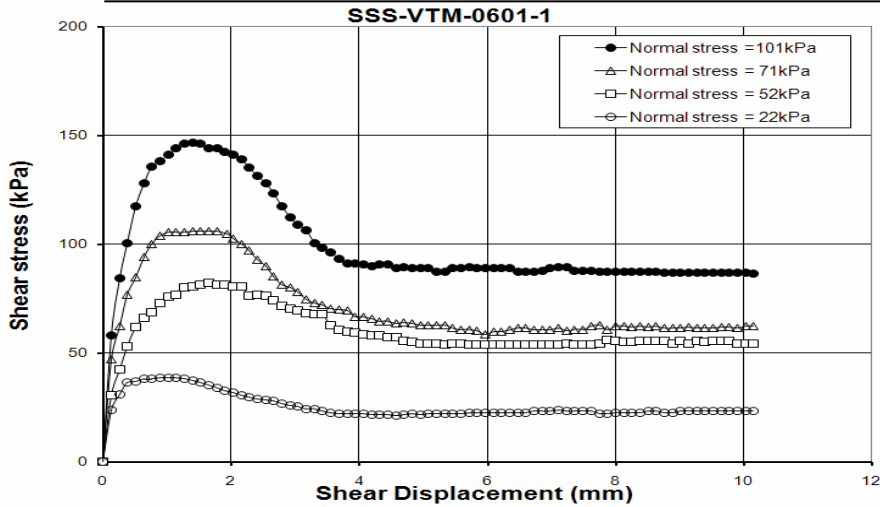
TEST NO: 24  
 TEST DATE: 7/16/2007



<b>Field id:</b>	SSS-VTM-0601-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	177.19,326.88,454.36,626.06
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	133.87,212.96,334.57,478.03
Friction Angle	45.07	Dry density	1840	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 24  
 TEST DATE: 7/24/2007



<b>Field id:</b>	SSS-VTM-0601-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	38.73,82.23,106.10,146.95
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.11,55.29,61.92,87.07
Friction Angle	53.49	Dry density	1900	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

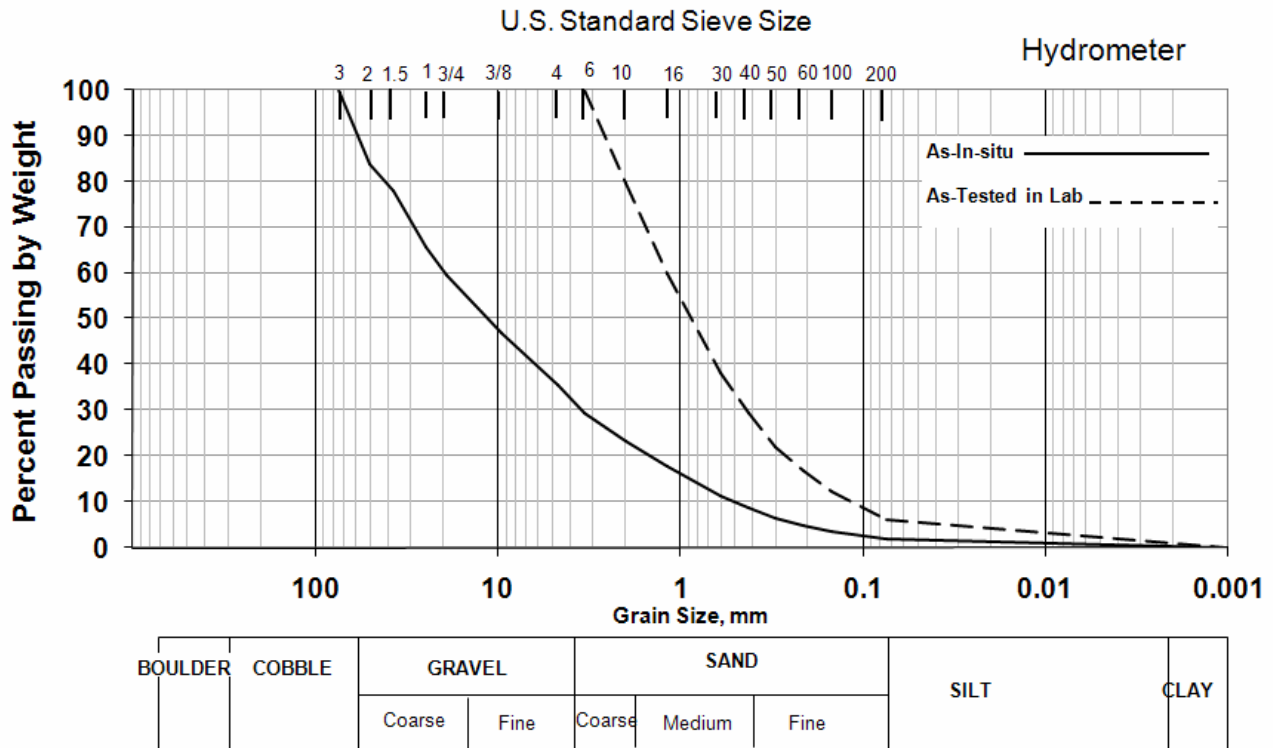
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 25  
 TEST DATE: 12/24/2006

SAMPLE: **SSS-AAF-0001-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 34.5	GRAVEL: 64.4
PLASTIC LIMIT: 27.2	SAND: 33.9
PLASTICITY INDEX: 7.3	FINE: 1.8
SPECIFIC GRAVITY: 2.85	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

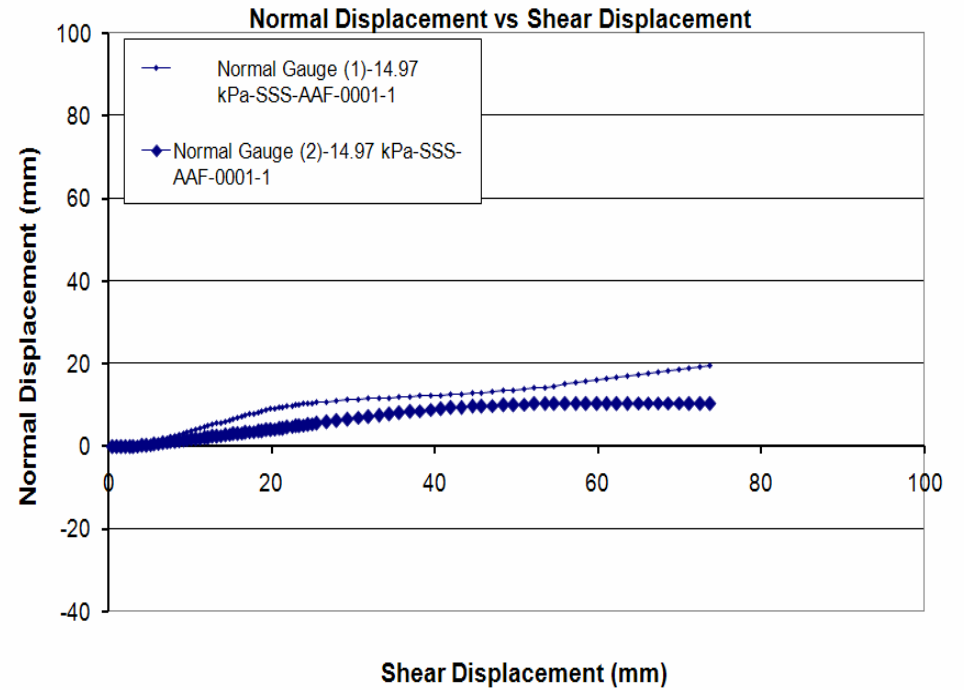
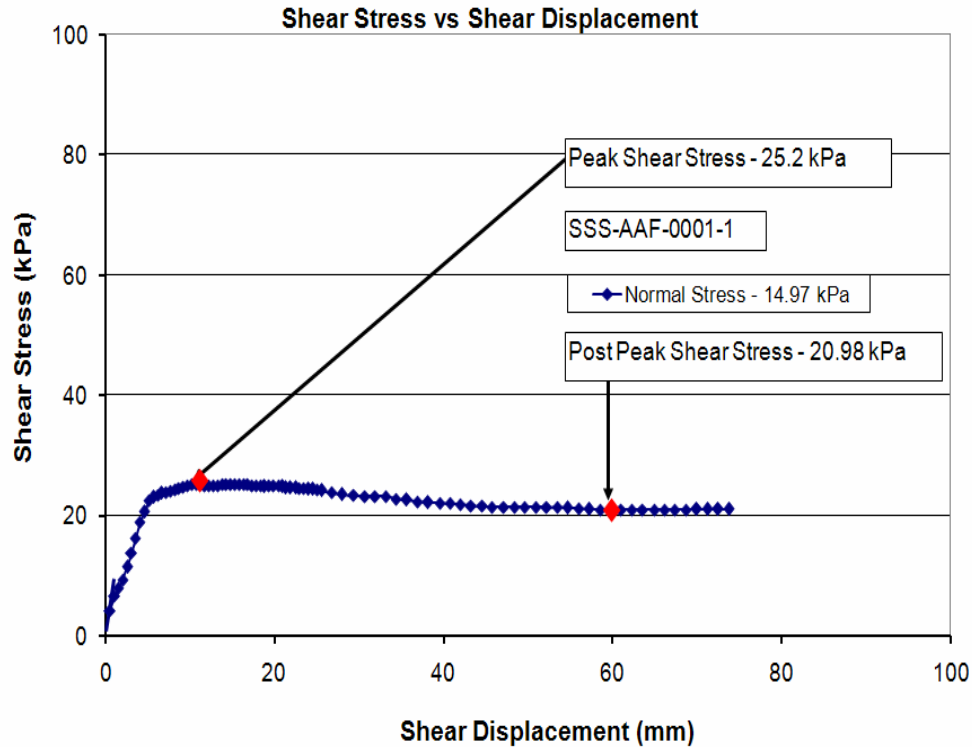
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	23.43	0.0419		0.0015	
2	50	83.81	16	18.01	17.65	0.0303		0.0013	
1-1/2	37.5	77.94	30	15.04	11.22	0.0217			
1	25	65.85	40	13.80	8.68	0.0157			
3/4	19	59.44	50	12.53	6.50	0.0114			
3/8	9.5	46.92	70	11.48	5.00	0.0082			
4	4.75	35.65	100	10.47	3.66	0.0058			
6	3.36	29.47	200	8.39	1.79	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 25  
 TEST DATE: N/A

UTM Northing: 4060898  
 UTM Easting: 454131



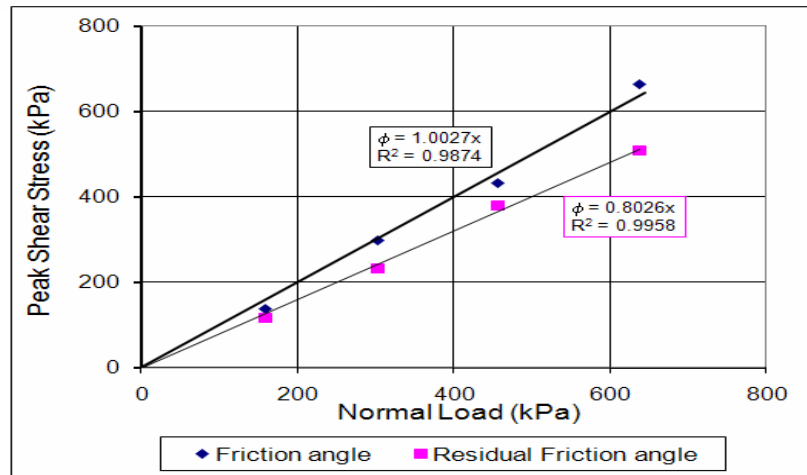
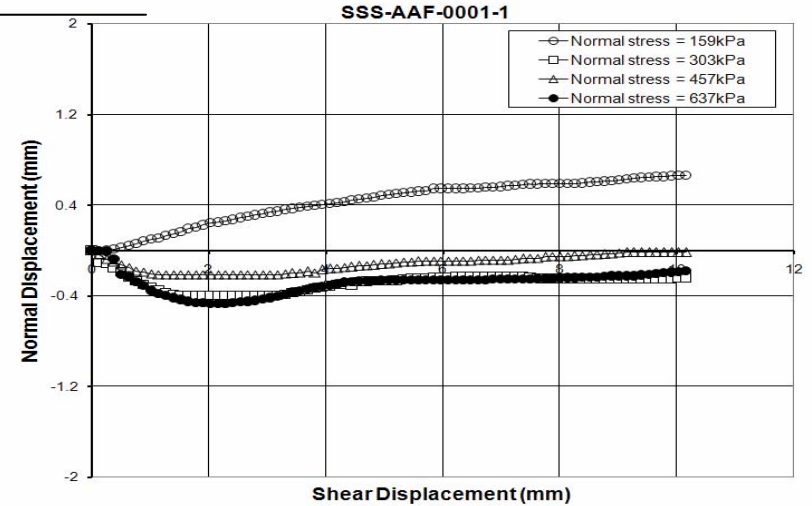
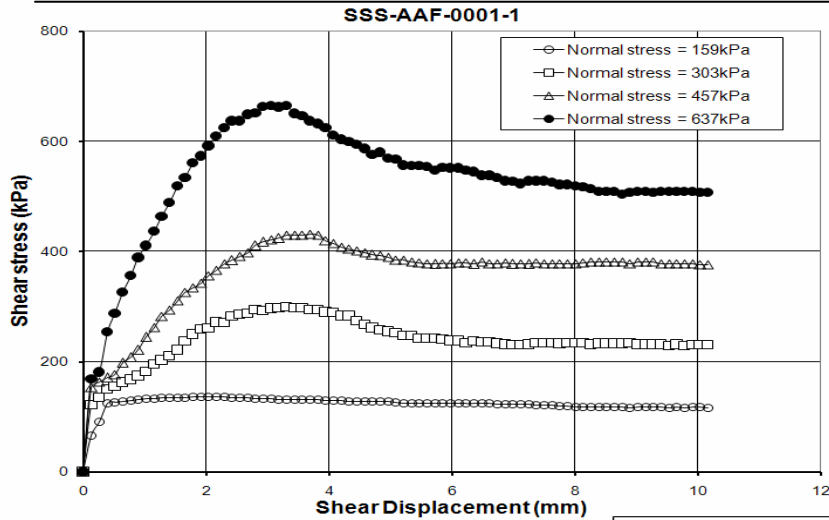
<b>Field id:</b>	SSS-AAF-0001-1						
Measured Cohesion	6.73	Water Content	12.03	Shear box size	60	Peak Shear Stress	36.70
Intrinsic Cohesion	6.46	Wet Density	2100	Matric Suction	1	Post Peak Shear Stress	22.17
Max. Particle Size	8.89	Dry density	1940	Normal Stress	16.23	Elevation	2937.8



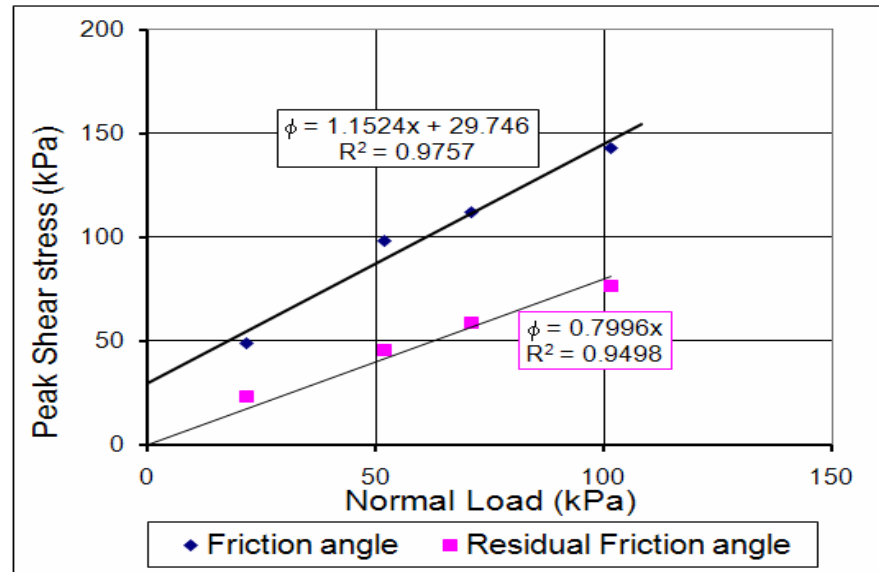
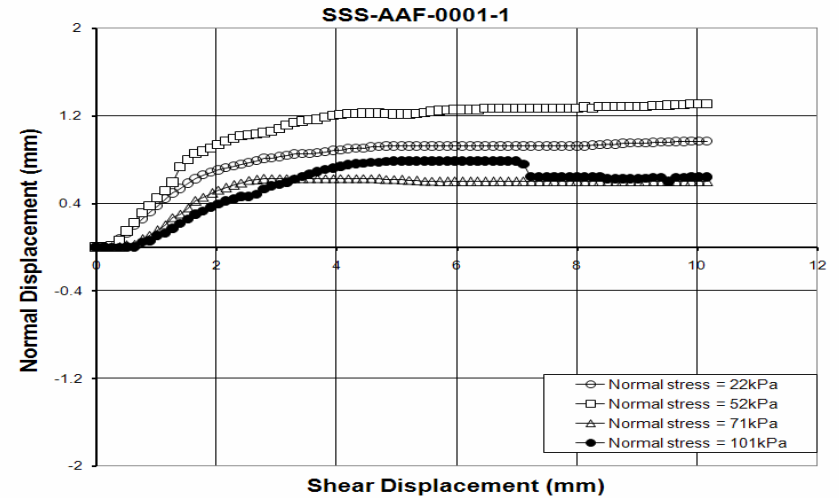
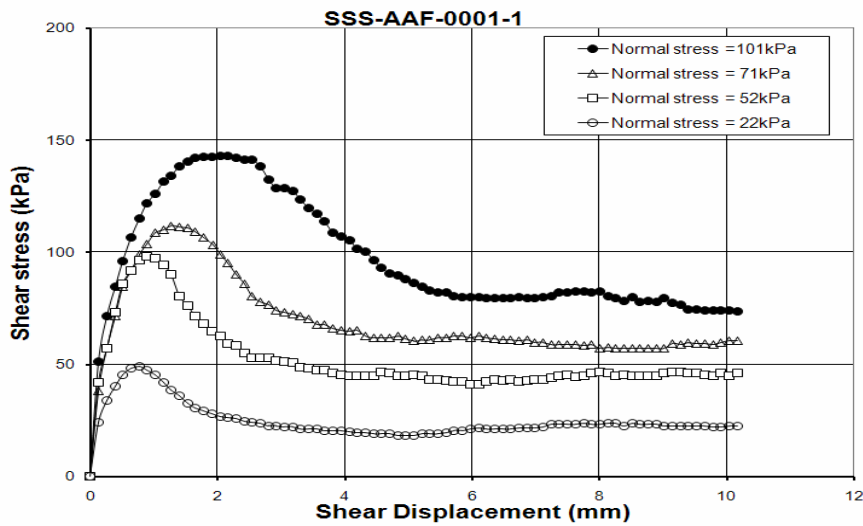
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 25  
 TEST DATE: 1/10/2007



<b>Field id:</b>	SSS-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	137.40,299.56,432.24,665.09
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	117.83,232.60,379.61,509.79
Friction Angle	45.08	Dry density	1940	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSS-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	49.34,98.14,111.94,143.24
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.16,45.74,58.58,76.50
Friction Angle	49.04	Dry density	1930	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

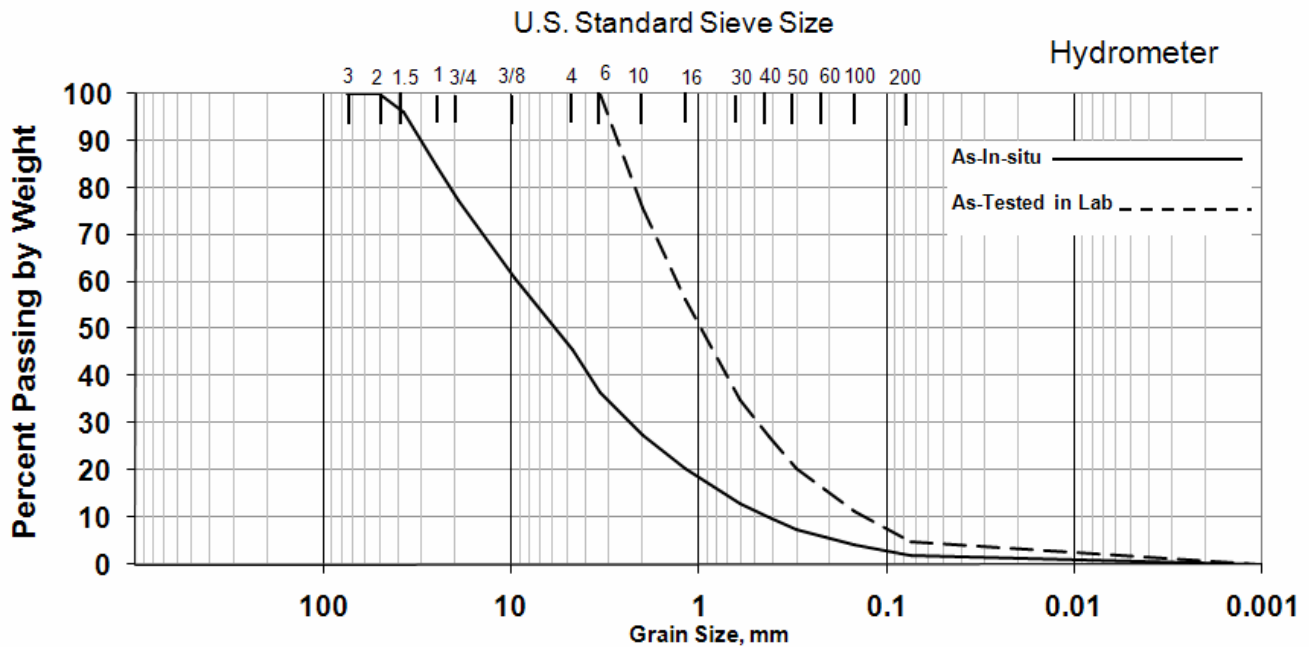
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 26  
 TEST DATE: 12/24/2006

SAMPLE: **SSS-AAF-0001-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 35.2	GRAVEL: 54.4
PLASTIC LIMIT: 27.6	SAND: 43.8
PLASTICITY INDEX: 7.6	FINE: 1.8
SPECIFIC GRAVITY: 2.88	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

### UNIFIED SOIL CLASSIFICATION:

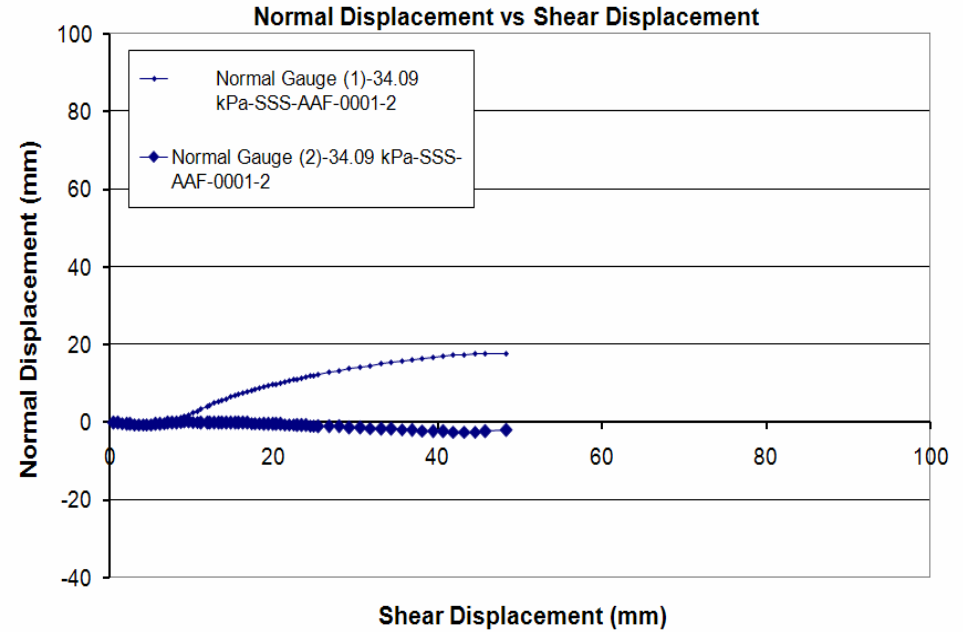
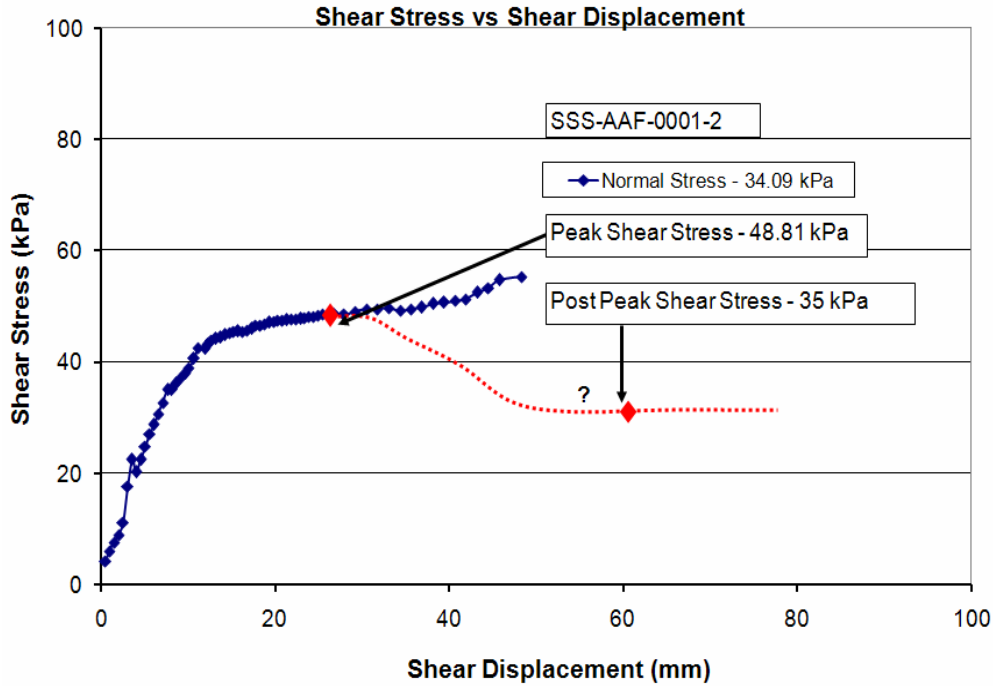
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	27.62	0.0419		0.0015	
2	50	100.00	16	18.01	20.54	0.0303		0.0013	
1-1/2	37.5	96.21	30	15.04	12.79	0.0217			
1	25	84.42	40	13.80	9.89	0.0157			
3/4	19	77.37	50	12.53	7.42	0.0114			
3/8	9.5	60.91	70	11.48	5.75	0.0082			
4	4.75	45.56	100	10.47	4.08	0.0058			
6	3.36	36.49	200	8.39	1.79	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 26  
 TEST DATE: N/A

UTM Northing: 4060898  
 UTM Easting: 454131

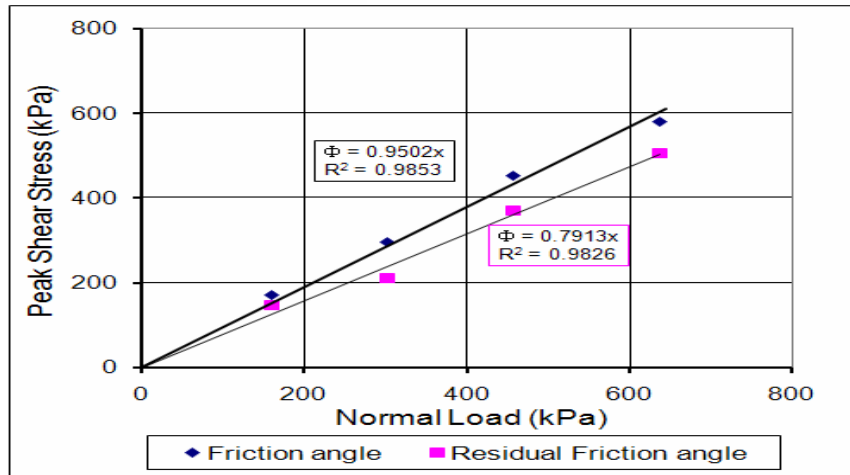
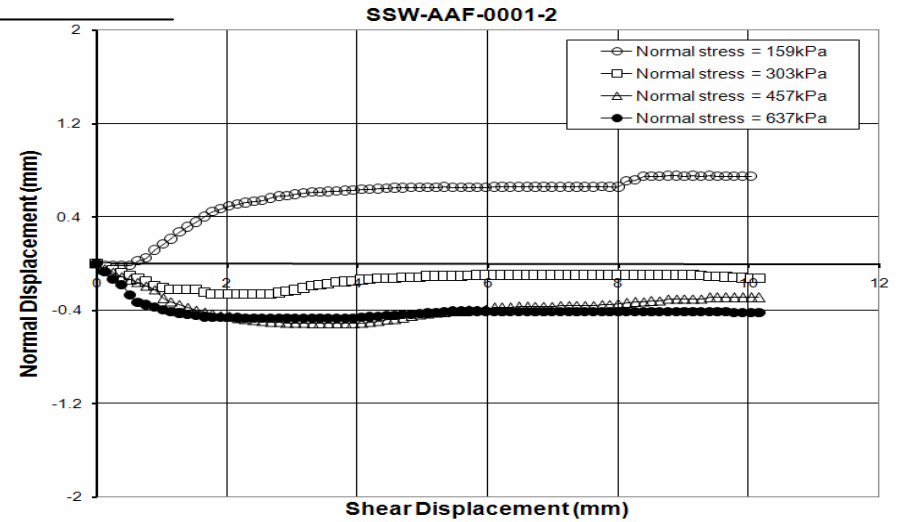
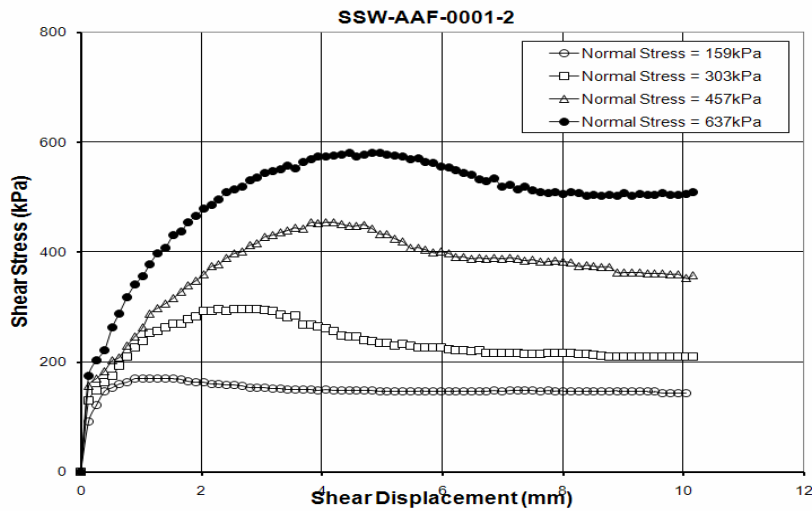


<b>Field id:</b>	SSS-AAF-0001-2						
Measured Cohesion	9.15	Water Content	13.33	Shear box size	60	Peak Shear Stress	48.81
Intrinsic Cohesion	n/a	Wet Density	1910	Matric Suction		Post Peak Shear Stress	35
Max. Particle Size	19.05	Dry density	1680	Normal Stress	34.09	Elevation	2937.8

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

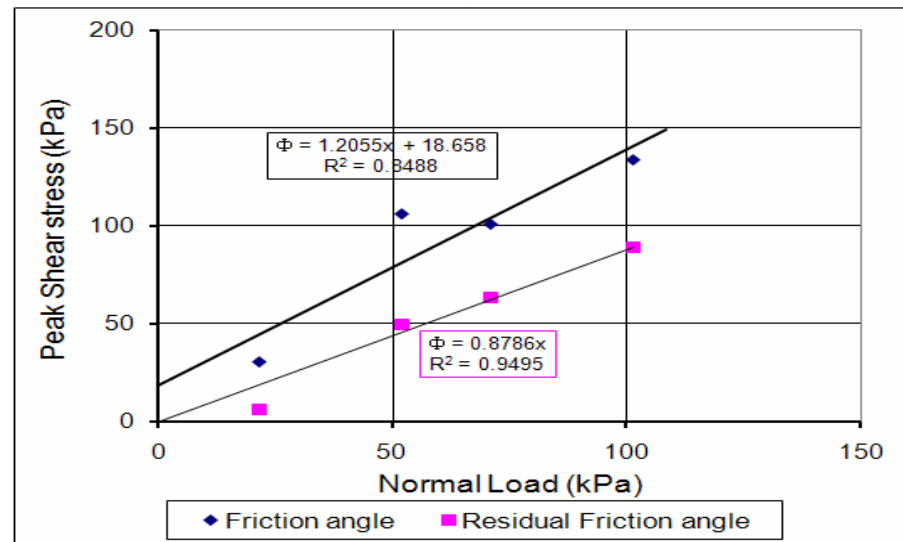
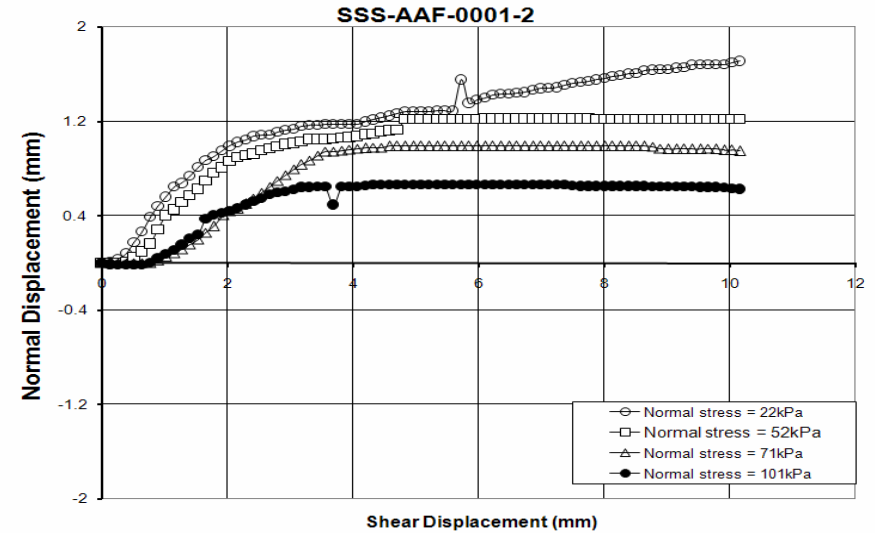
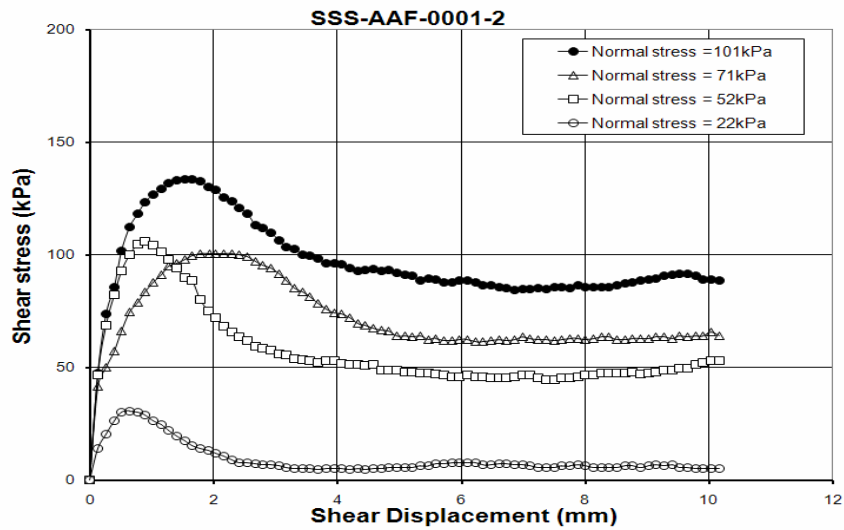
TEST NO: 26  
 TEST DATE: 7/23/2007



<b>Field id:</b>	SSS-AAF-0001-2					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	43.54	Dry density	1810	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 26  
 TEST DATE: 7/25/2007



<b>Field id:</b>	SSS-AAF-0001-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	30.77,106.10,100.80,133.69
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	6.07,49.60,63.35,89.23
Friction Angle	50.32	Dry density	1840	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

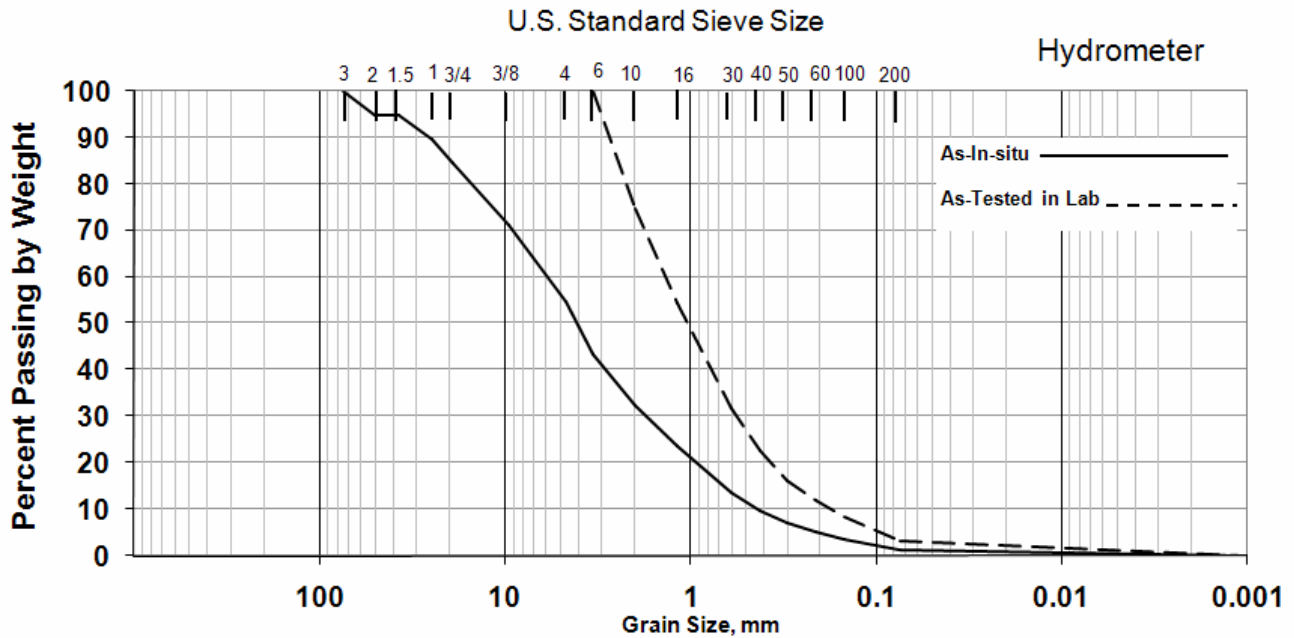
TEST NO: 27  
 TEST DATE: 12/25/2006

SAMPLE: SSS-AAF-0005-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.4  
 PLASTIC LIMIT: 22.6  
 PLASTICITY INDEX: 4.7  
 SPECIFIC GRAVITY: 2.79  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 45.3  
 SAND: 53.3  
 FINE: 1.4

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

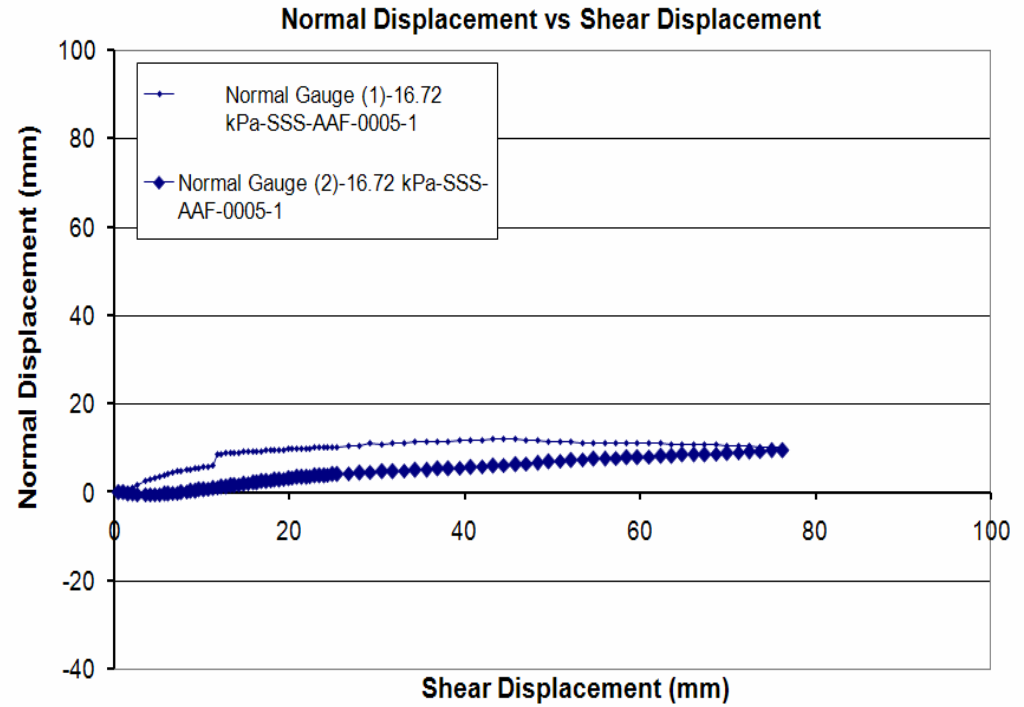
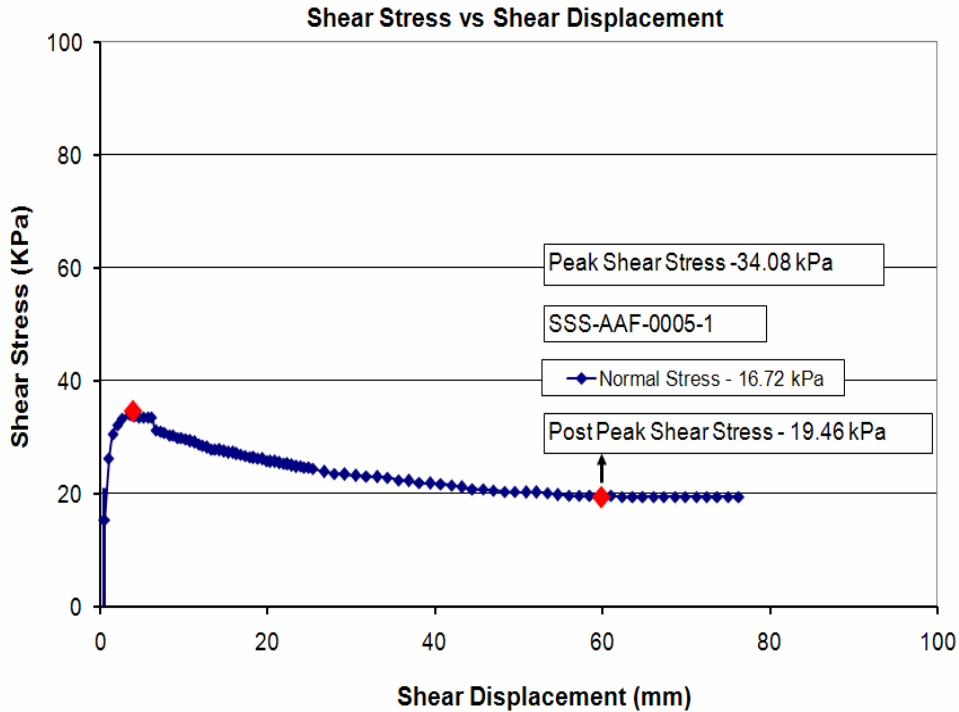
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	32.40	0.0419		0.0015	
2	50	94.82	16	18.01	23.62	0.0303		0.0013	
1-1/2	37.5	94.82	30	15.04	13.74	0.0217			
1	25	89.68	40	13.80	9.84	0.0157			
3/4	19	84.42	50	12.53	7.01	0.0114			
3/8	9.5	71.28	70	11.48	5.25	0.0082			
4	4.75	54.69	100	10.47	3.61	0.0058			
6	3.36	43.42	200	8.39	1.43	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 27  
 TEST DATE: N/A

UTM Northing: 4060901  
 UTM Easting: 454132



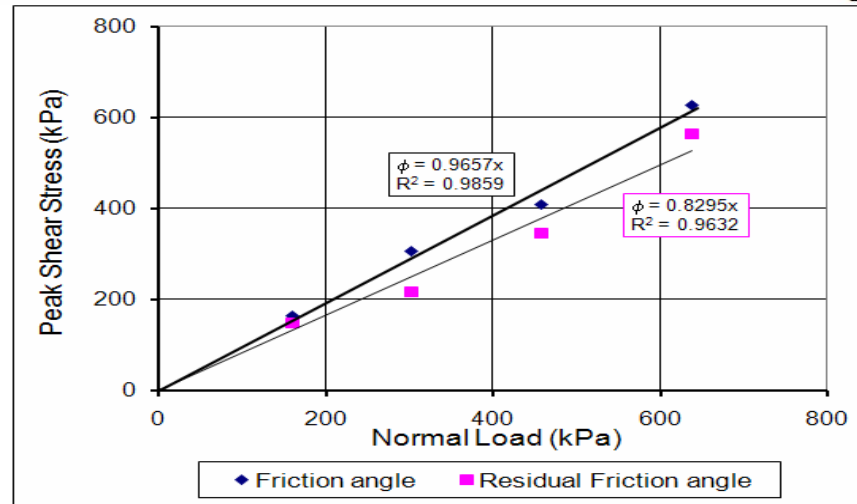
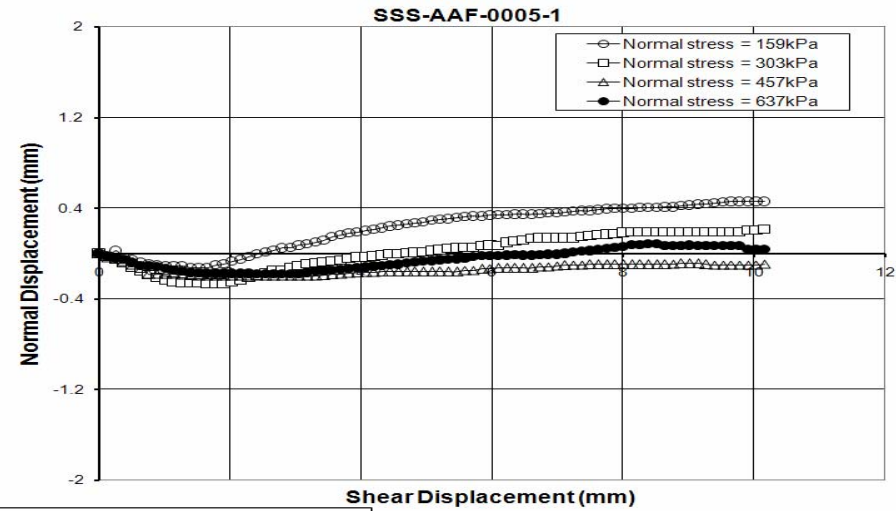
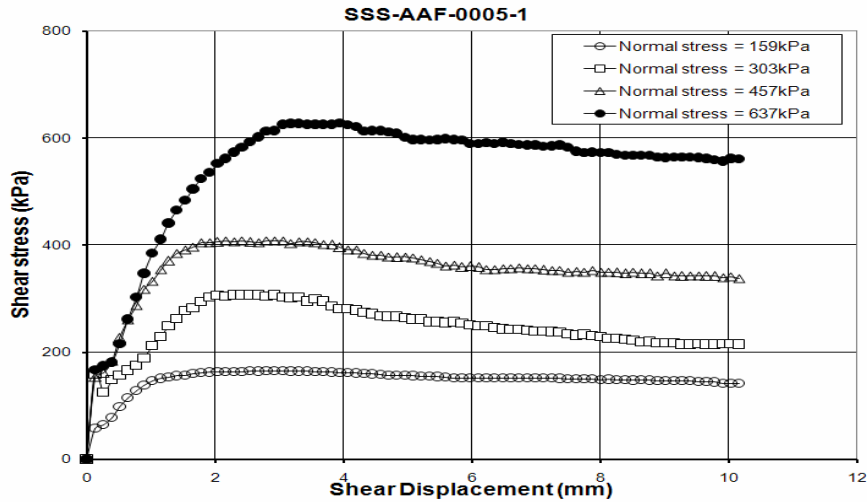
<b>Field id:</b>	SSS-AAF-0005-1						
Measured Cohesion	17.20	Water Content	15.09	Shear box size	60	Peak Shear Stress	34.08
Intrinsic Cohesion	14.78	Wet Density	2210	Matric Suction	9	Post Peak Shear Stress	19.46
Max. Particle Size	2.54	Dry density	1920	Normal Stress	16.72	Elevation	2941.2



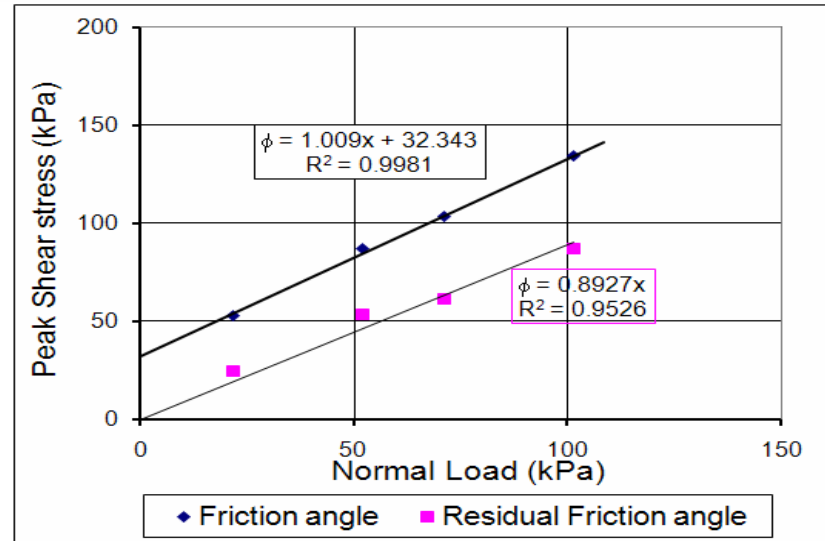
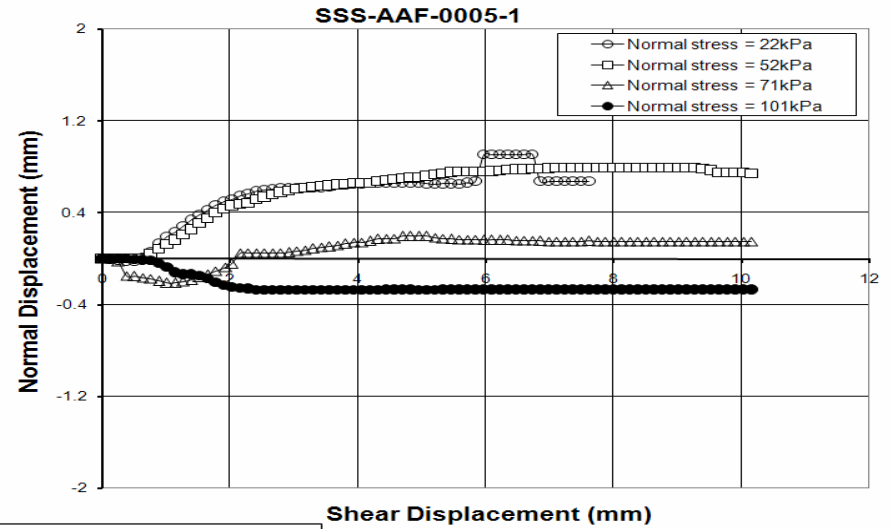
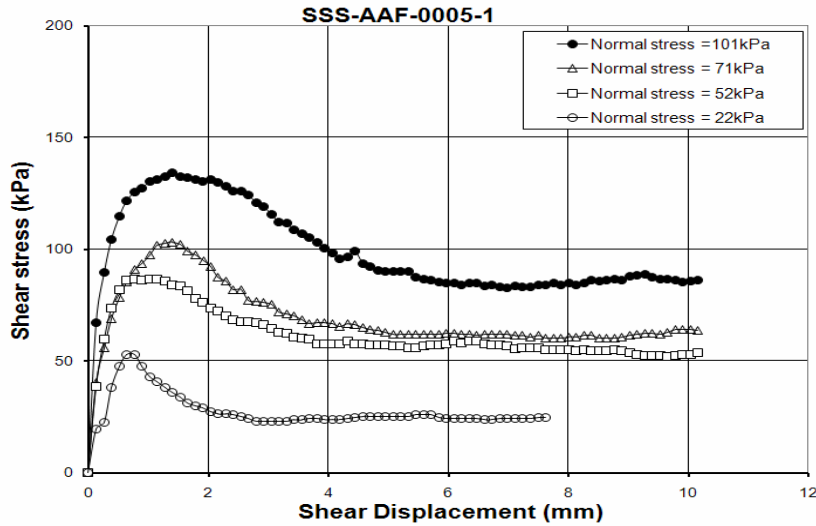
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 27  
 TEST DATE: 1/12/2007



<b>Field id:</b>	SSS-AAF-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	165.52,307.36,408.83,628.67
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	147.90,217.05,346.82,563.97
Friction Angle	43.99	Dry density	1910	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSS-AAF-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	53.05,87.00,103.45,134.22
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	24.67,53.47,61.80,86.93
Friction Angle	45.27	Dry density	1840	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

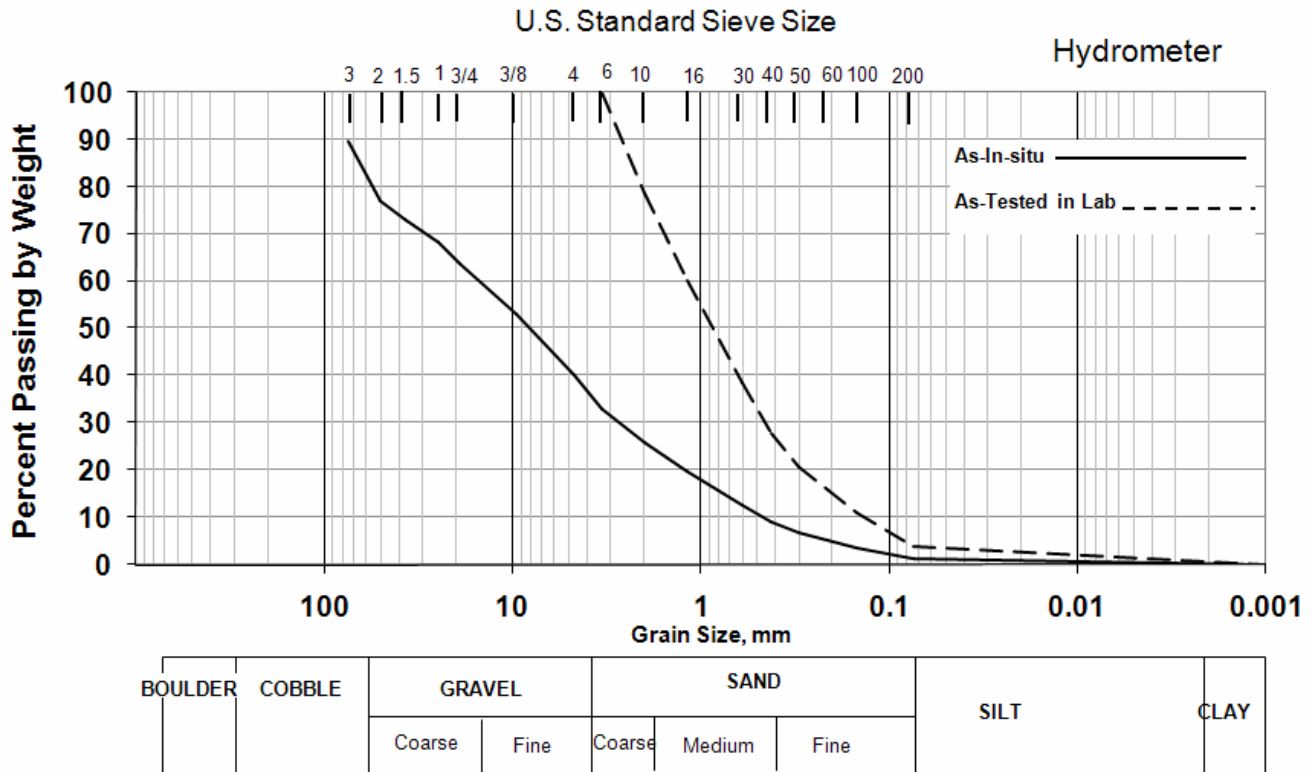
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 28  
 TEST DATE: 12/25/2006

SAMPLE: **SSS-AAF-0005-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 36.4	GRAVEL: 59.8
PLASTIC LIMIT: 29.3	SAND: 39.0
PLASTICITY INDEX: 7.2	FINE: 1.2
SPECIFIC GRAVITY: 2.89	
ATTERBERG CLASSIFICATION: ML	

### Particle Size Distribution



**UNIFIED SOIL CLASSIFICATION:**

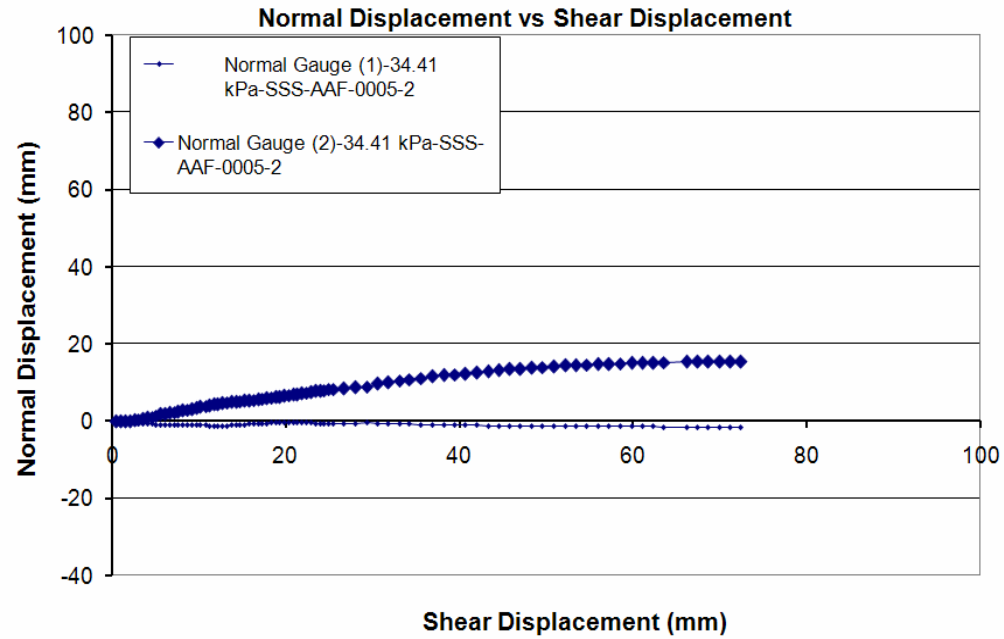
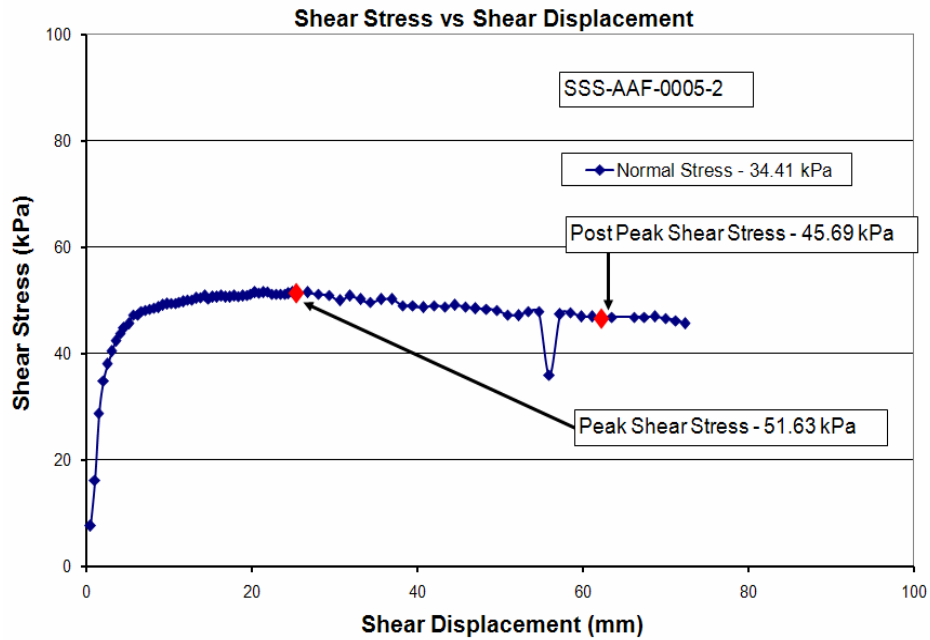
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	89.68	10	19.44	26.00	0.0419		0.0015	
2	50	76.87	16	18.01	19.87	0.0303		0.0013	
1-1/2	37.5	73.13	30	15.04	12.72	0.0217			
1	25	68.29	40	13.80	9.22	0.0157			
3/4	19	63.65	50	12.53	6.81	0.0114			
3/8	9.5	53.00	70	11.48	5.23	0.0082			
4	4.75	40.24	100	10.47	3.68	0.0058			
6	3.36	33.04	200	8.39	1.23	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 28  
 TEST DATE: N/A

UTM Northing: 4060901  
 UTM Easting: 454132

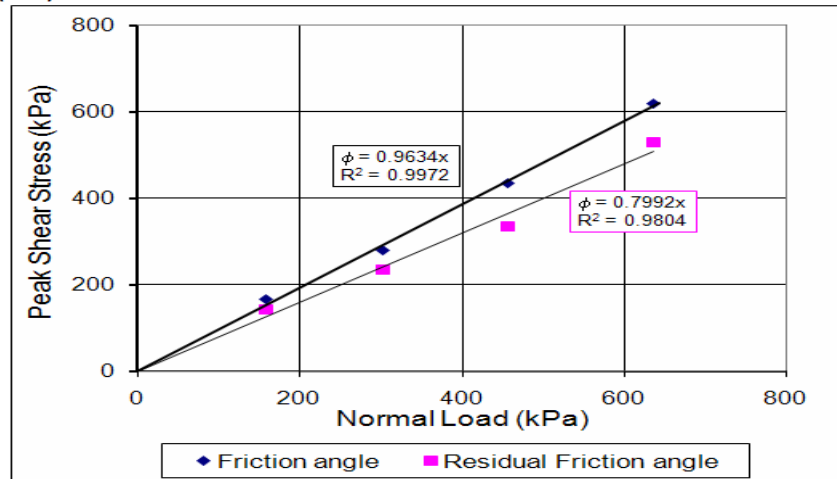
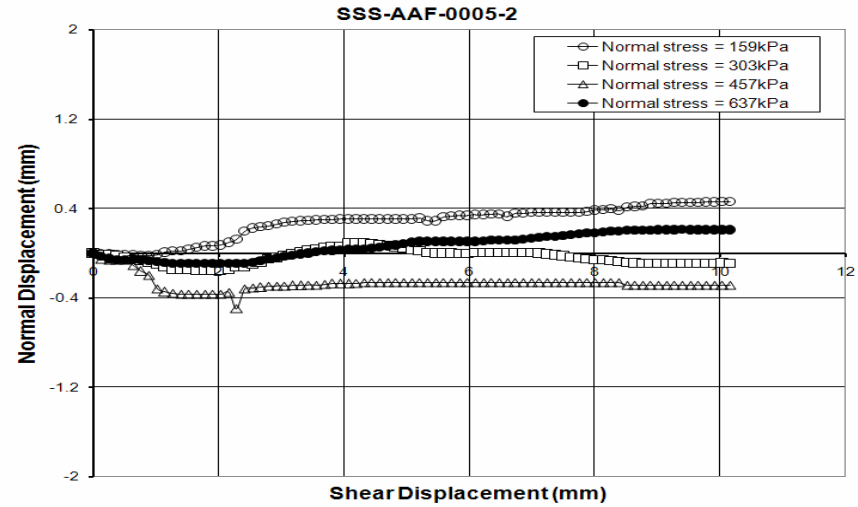
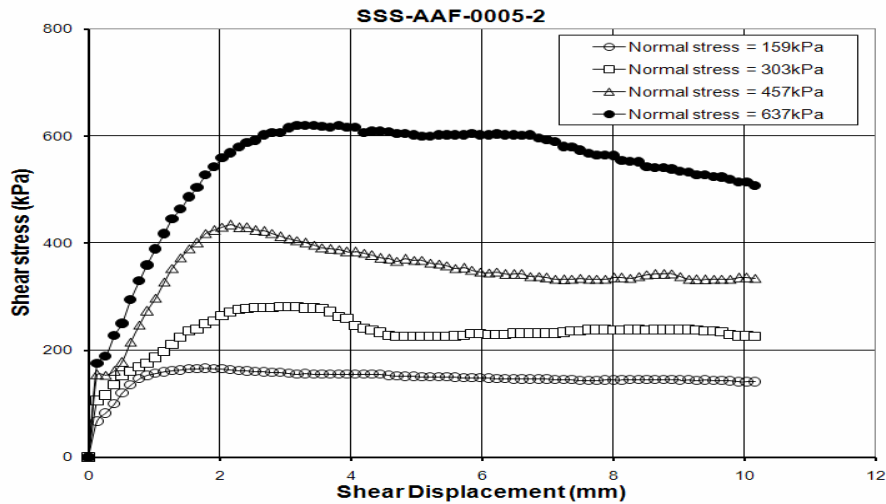


<b>Field id:</b>	SSS-AAF-0005-2						
Measured Cohesion	4.10	Water Content		Shear box size	60	Peak Shear Stress	51.63
Intrinsic Cohesion		Wet Density	1990	Matric Suction	5	Post Peak Shear Stress	45.69
Max. Particle Size	22.86	Dry density	1850	Normal Stress	34.41	Elevation	2941.2

# LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

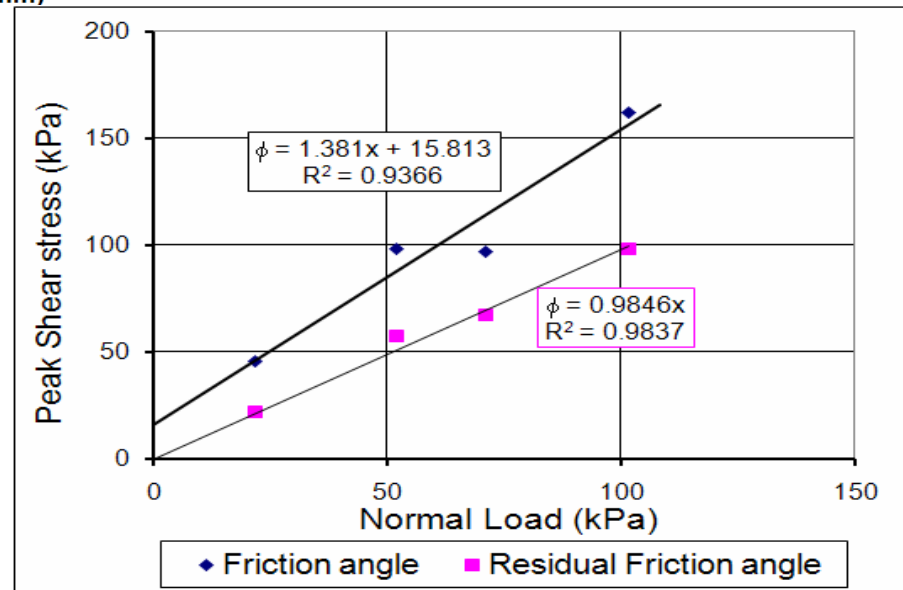
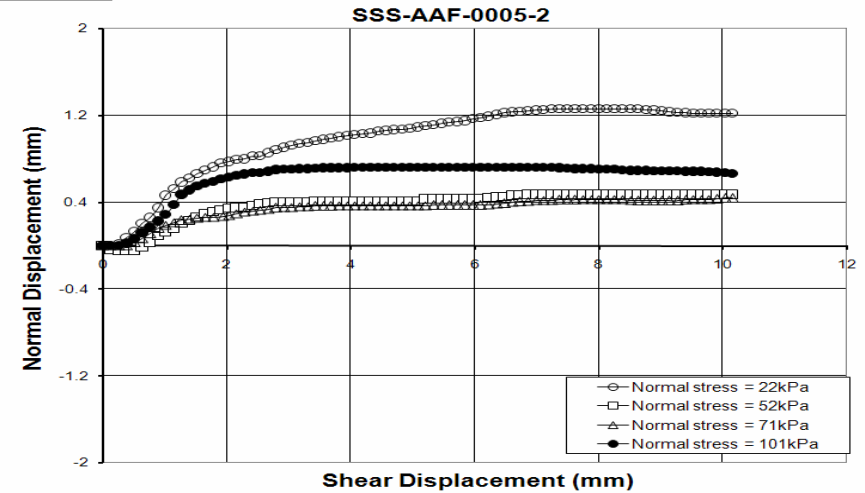
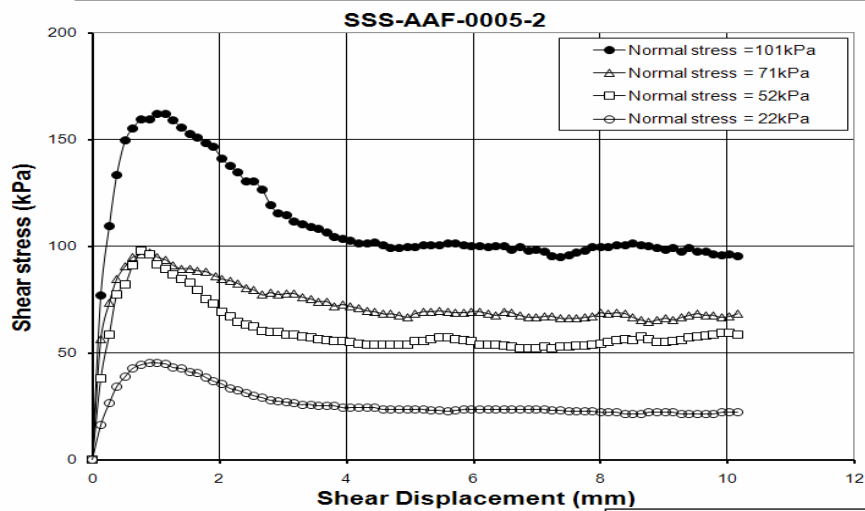
TEST NO: 28  
 TEST DATE: 1/15/2007



<b>Field id:</b>	SSS-AAF-0005-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	166.05,281.35,434.84,619.56
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	144.21,235.27,335.76,529.46
Friction Angle	43.93	Dry density	1890	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 28  
 TEST DATE: 4/12/2007



<b>Field id:</b>	SSS-AAF-0005-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	45.62,98.14,97.08,162.34
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	22.28,57.37,61.18,98.46
Friction Angle	54.09	Dry density	1860	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

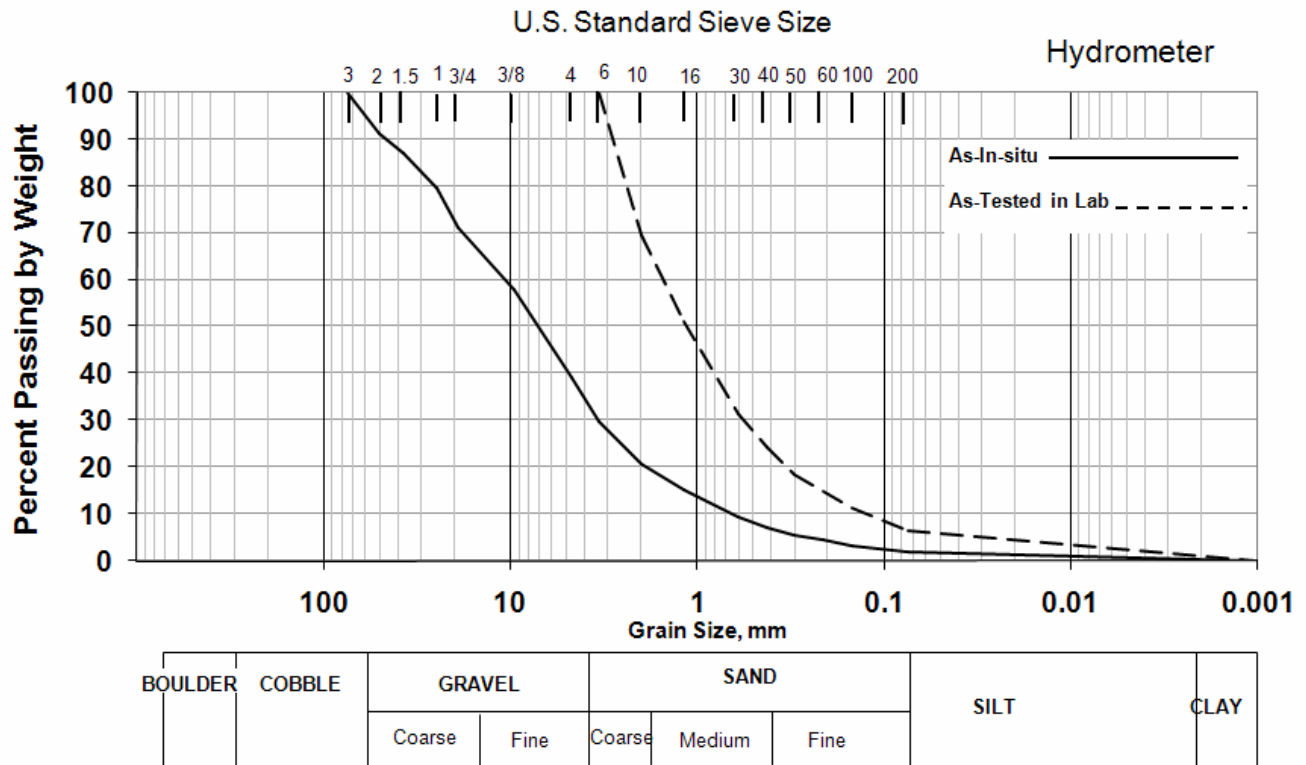
TEST NO: 29  
 TEST DATE: 12/25/2006

SAMPLE: **SSS-AAF-0009-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 31.6  
 PLASTIC LIMIT: 21.1  
 PLASTICITY INDEX: 10.5  
 SPECIFIC GRAVITY: 2.82  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 60.8  
 SAND: 37.2  
 FINE: 2.0

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

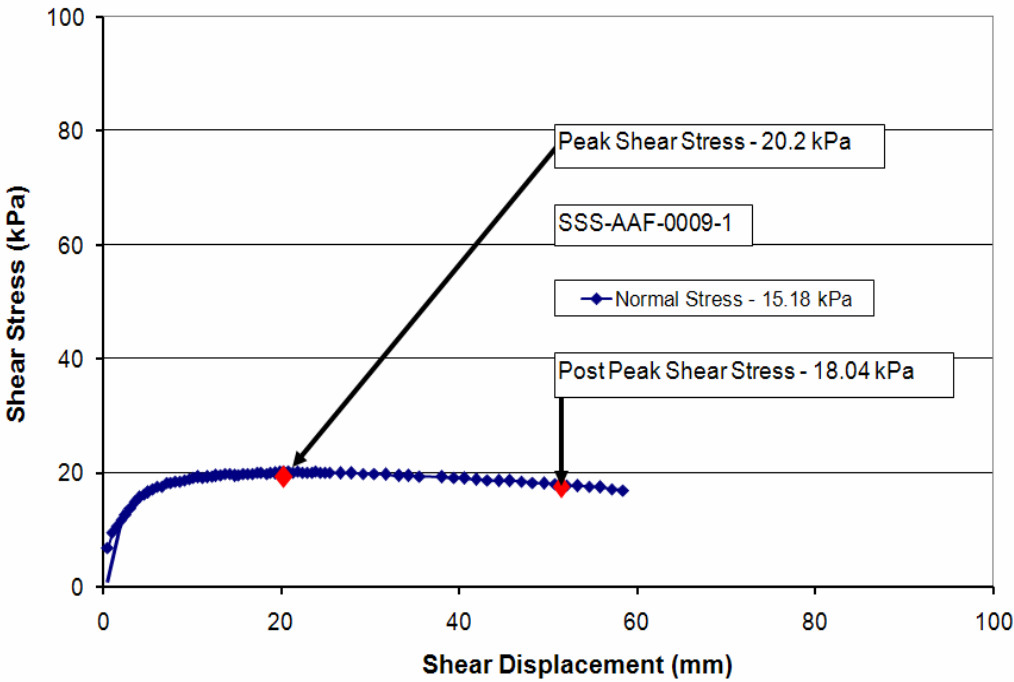
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	20.86	0.0419		0.0015	
2	50	91.35	16	18.01	15.29	0.0303		0.0013	
1-1/2	37.5	87.09	30	15.04	9.39	0.0217			
1	25	79.70	40	13.80	7.25	0.0157			
3/4	19	71.24	50	12.53	5.53	0.0114			
3/8	9.5	57.88	70	11.48	4.41	0.0082			
4	4.75	39.16	100	10.47	3.38	0.0058			
6	3.36	29.91	200	8.39	1.97	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

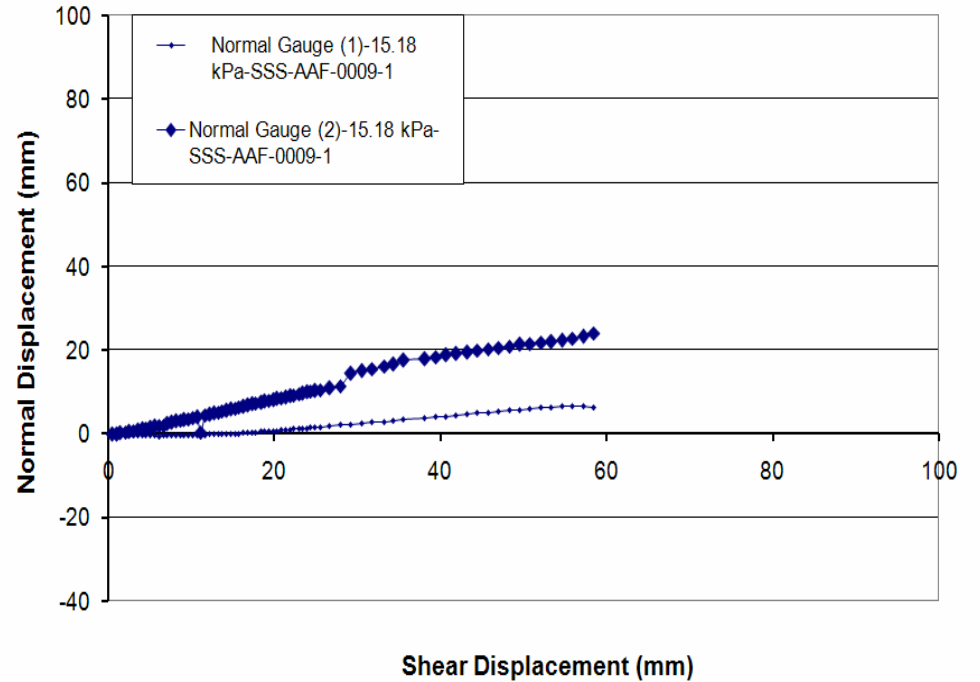
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 29  
 TEST DATE: N/A

UTM Northing: 4060902  
 UTM Easting: 454132



**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

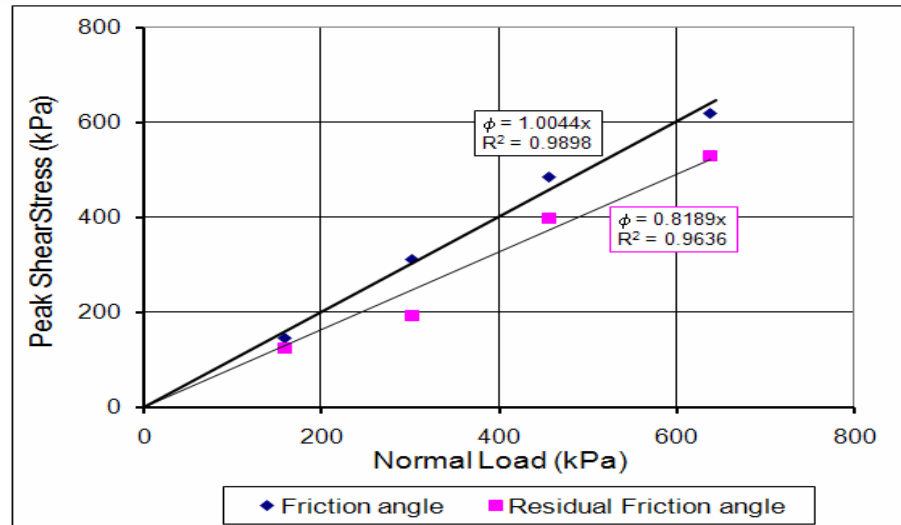
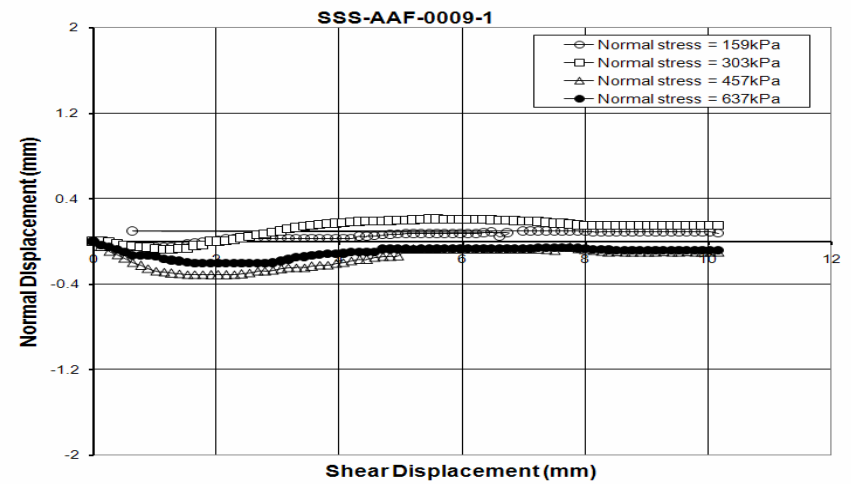
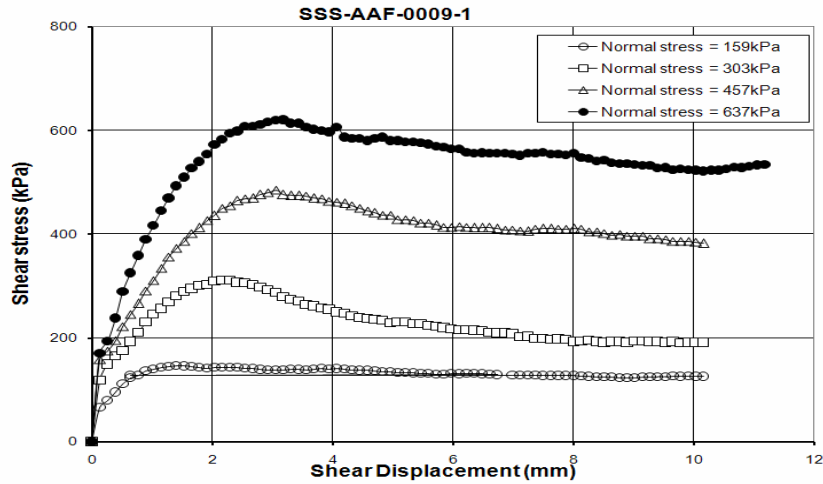
<b>Field id:</b>	SSS-AAF-0009-1						
Measured Cohesion	2.01	Water Content	9.46	Shear box size	60	Peak Shear Stress	20.2
Intrinsic Cohesion	2.01	Wet Density	2120	Matric Suction	0.00	Post Peak Shear Stress	18.04
Max. Particle Size	10.16	Dry density	1940	Normal Stress	15.18	Elevation	2934.2



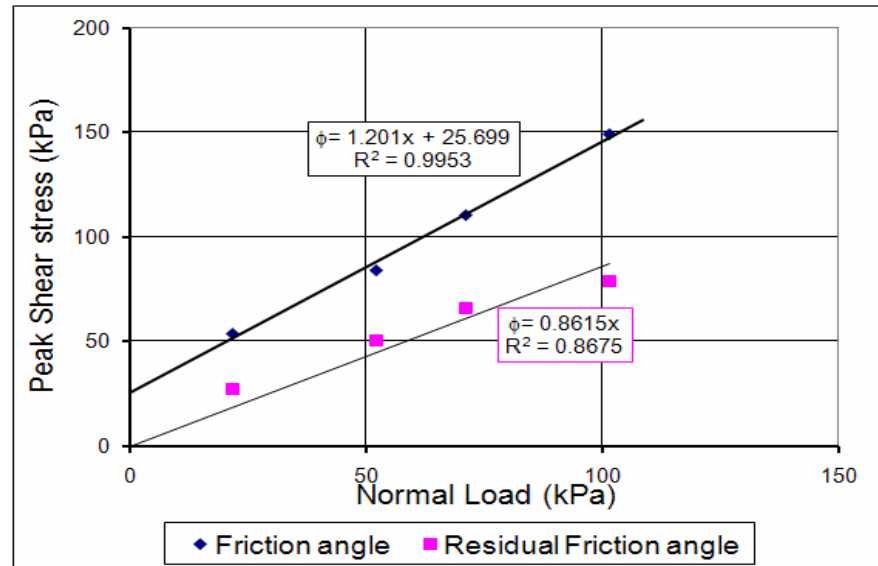
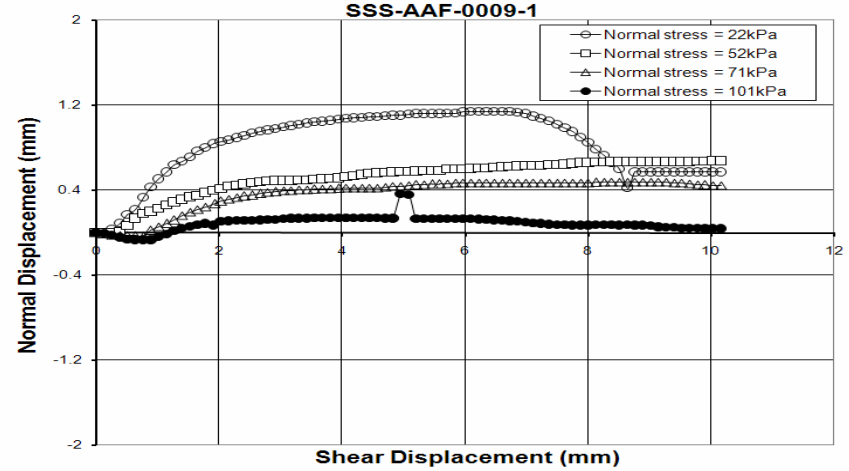
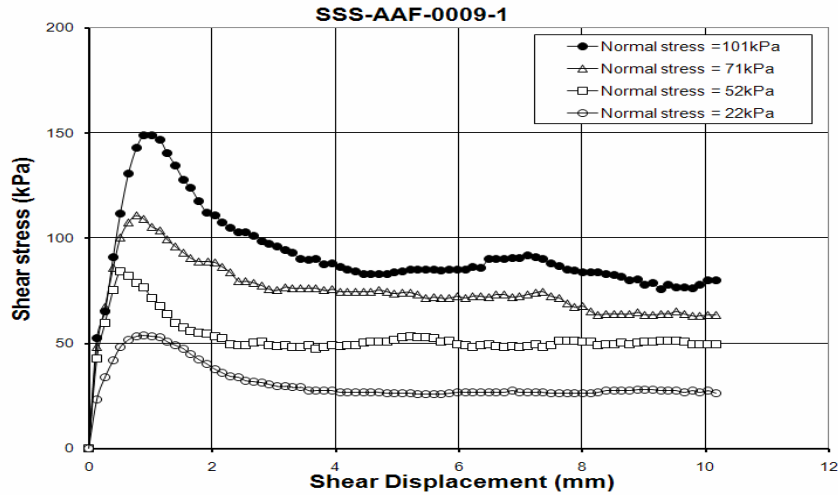
# LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 29  
 TEST DATE: 1/16/2007



Field id:	SSS-AAF-0009-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	146.95,311.27,485.58,620.86
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	126.08,192.33,399.40,531.36
Friction Angle	45.13	Dry density	1930	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSS-AAF-0009-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	54.11,84.35,110.88,149.07
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.26,50.51,66.11,79.19
Friction Angle	50.22	Dry density	1920	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

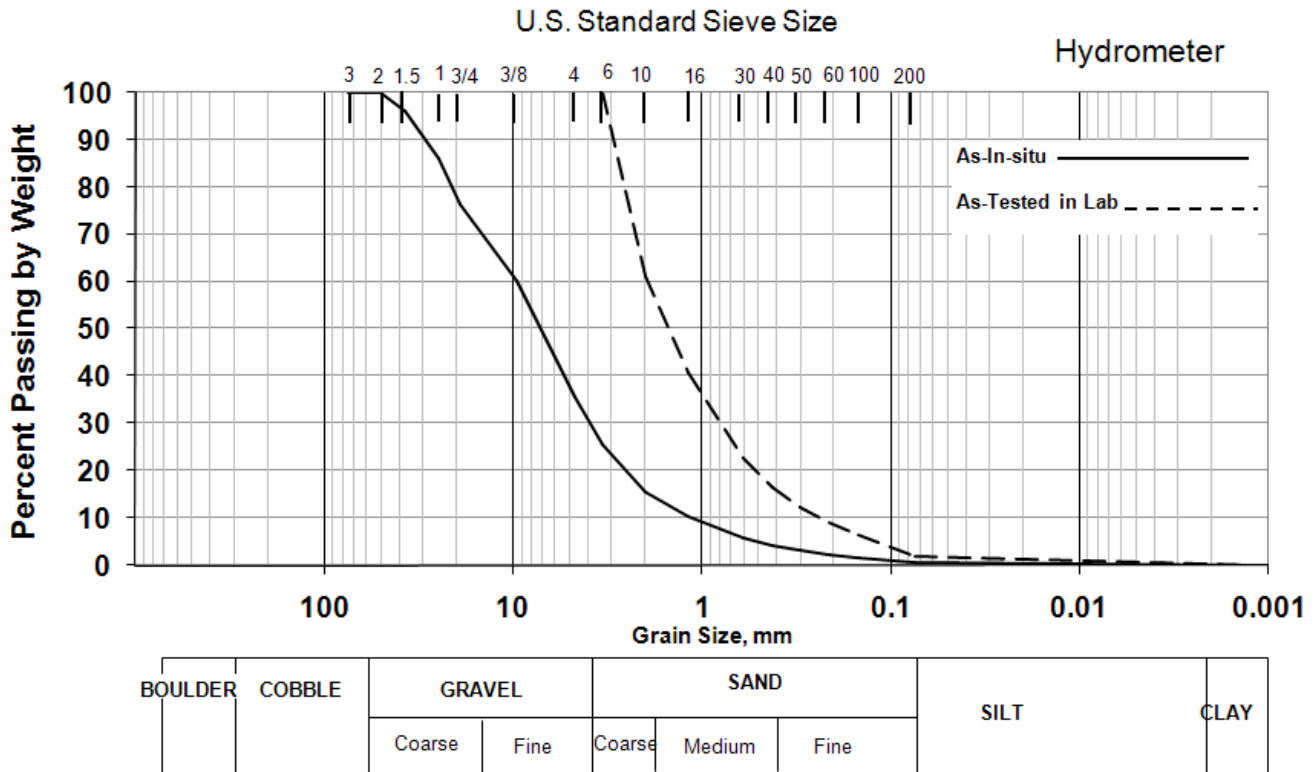
TEST NO: 30  
 TEST DATE: 12/25/2006

SAMPLE: **SSS-AAF-0009-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 31.3  
 PLASTIC LIMIT: 21.5  
 PLASTICITY INDEX: 9.9  
 SPECIFIC GRAVITY: 2.82  
 ATTERBERG CLASSIFICATION: **CL**

GRAVEL: 64.00  
 SAND: 35.0  
 FINE: 1.0

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

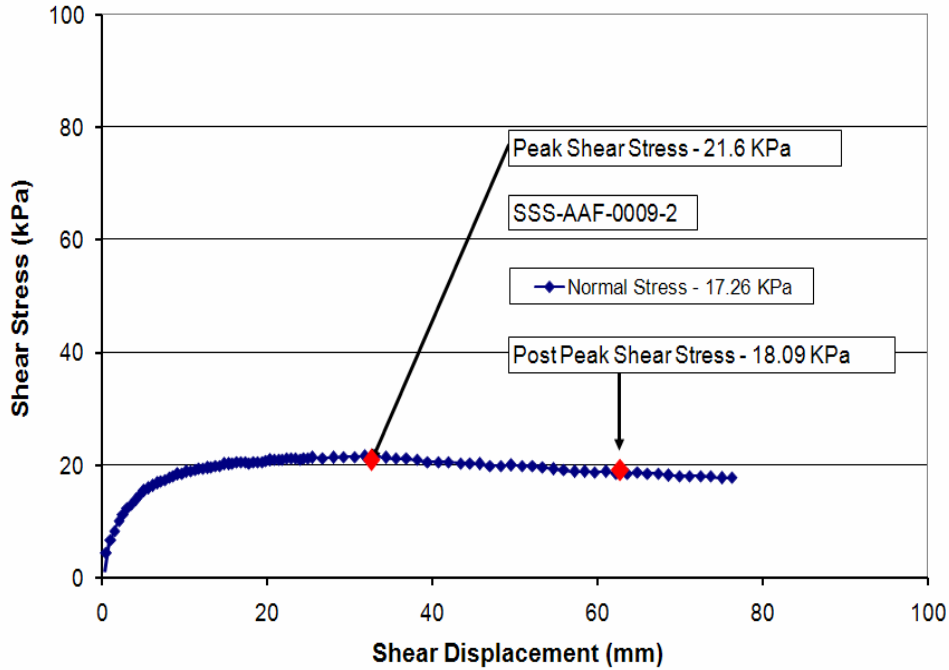
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	15.59	0.0419		0.0015	
2	50	100.00	16	18.01	10.41	0.0303		0.0013	
1-1/2	37.5	95.98	30	15.04	5.79	0.0217			
1	25	86.21	40	13.80	4.24	0.0157			
3/4	19	76.29	50	12.53	3.10	0.0114			
3/8	9.5	60.33	70	11.48	2.32	0.0082			
4	4.75	35.58	100	10.47	1.62	0.0058			
6	3.36	25.48	200	8.39	0.54	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

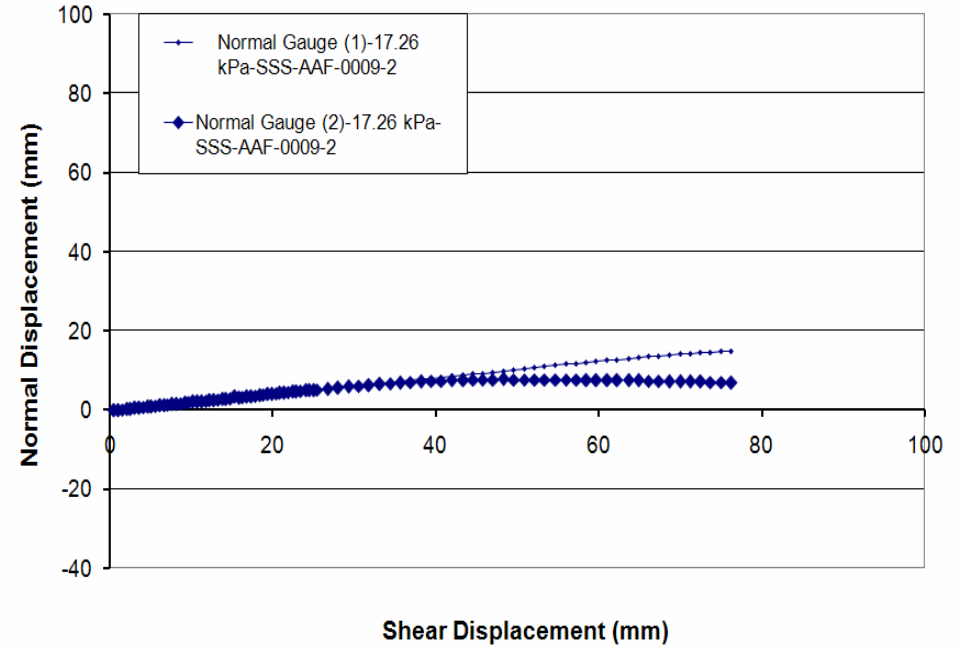
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 30  
 TEST DATE: N/A

UTM Northing: 4060902  
 UTM Easting: 454132



**Shear Stress vs Shear Displacement**



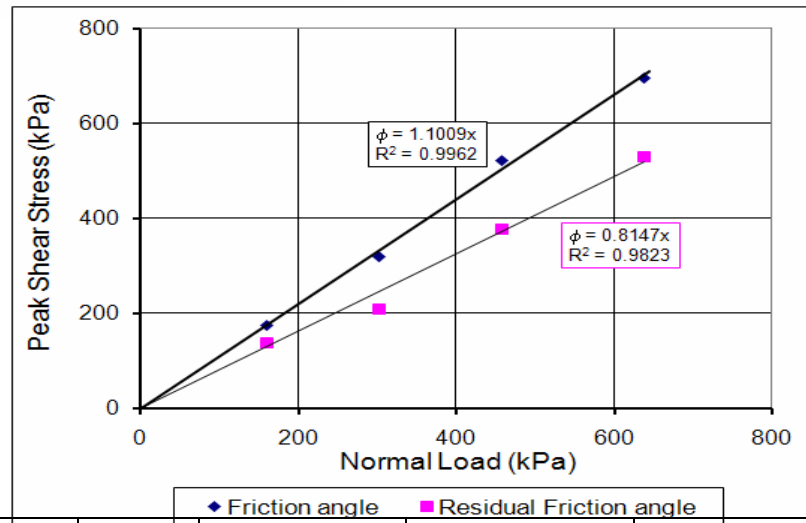
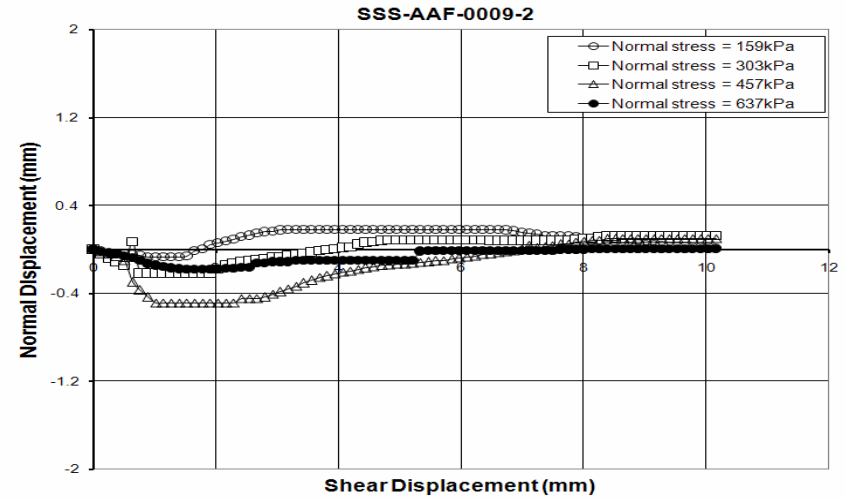
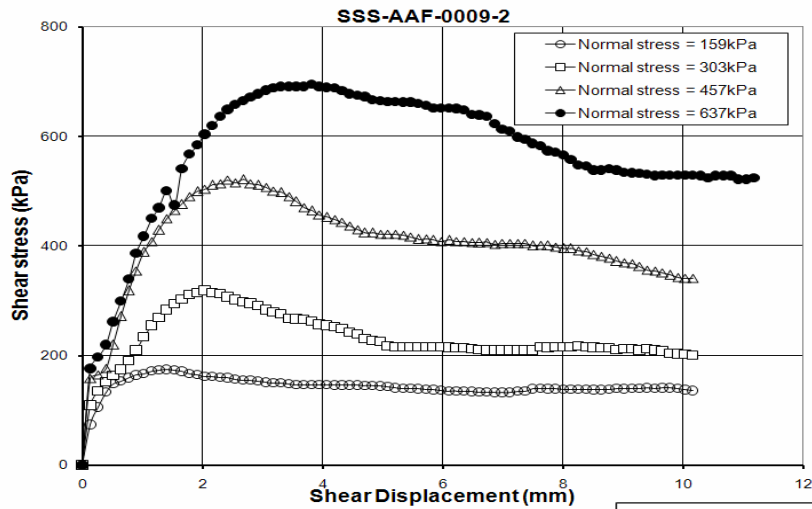
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSS-AAF-0009-2						
Measured Cohesion	1.54	Water Content	11.08	Shear box size	60	Peak Shear Stress	21.6
Intrinsic Cohesion	1.54	Wet Density	2330	Matric Suction	0.00	Post Peak Shear Stress	18.09
Max. Particle Size	15.24	Dry density	2090	Normal Stress	17.26	Elevation	2933.8

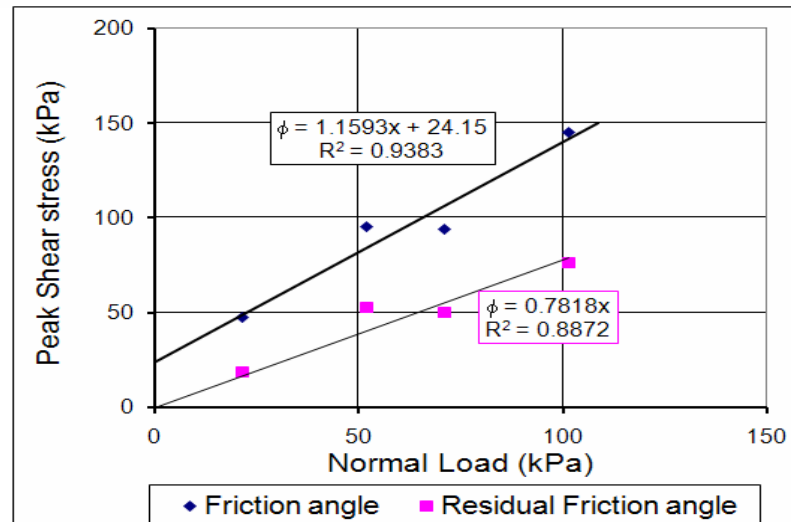
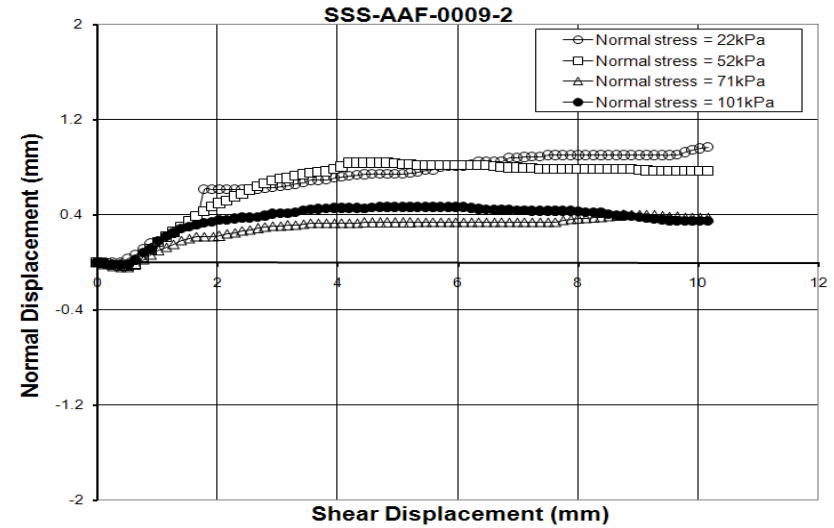
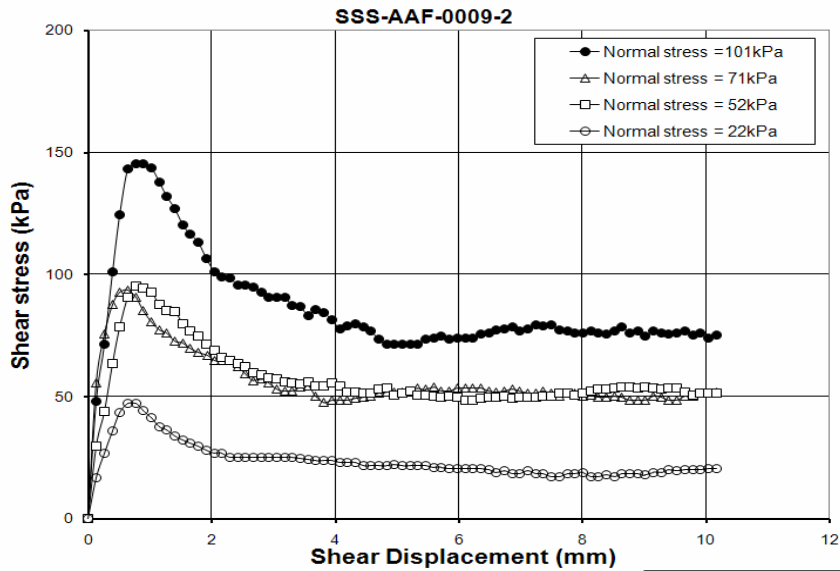
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 30  
 TEST DATE: 1/17/2007



<b>Field id:</b>	SSS-AAF-0009-2					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	174.54,319.07,522.00,695.01
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	139.22,209.25,376.85,531.39
Friction Angle	47.75	Dry density	1960	Normal Stress	159,303,457,637	Elevation



<b>Field id:</b>	SSS-AAF-0009-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	47.22,95.49,93.90,145.36
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	18.78,52.90,50.42,76.22
Friction Angle	49.22	Dry density	2.00	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

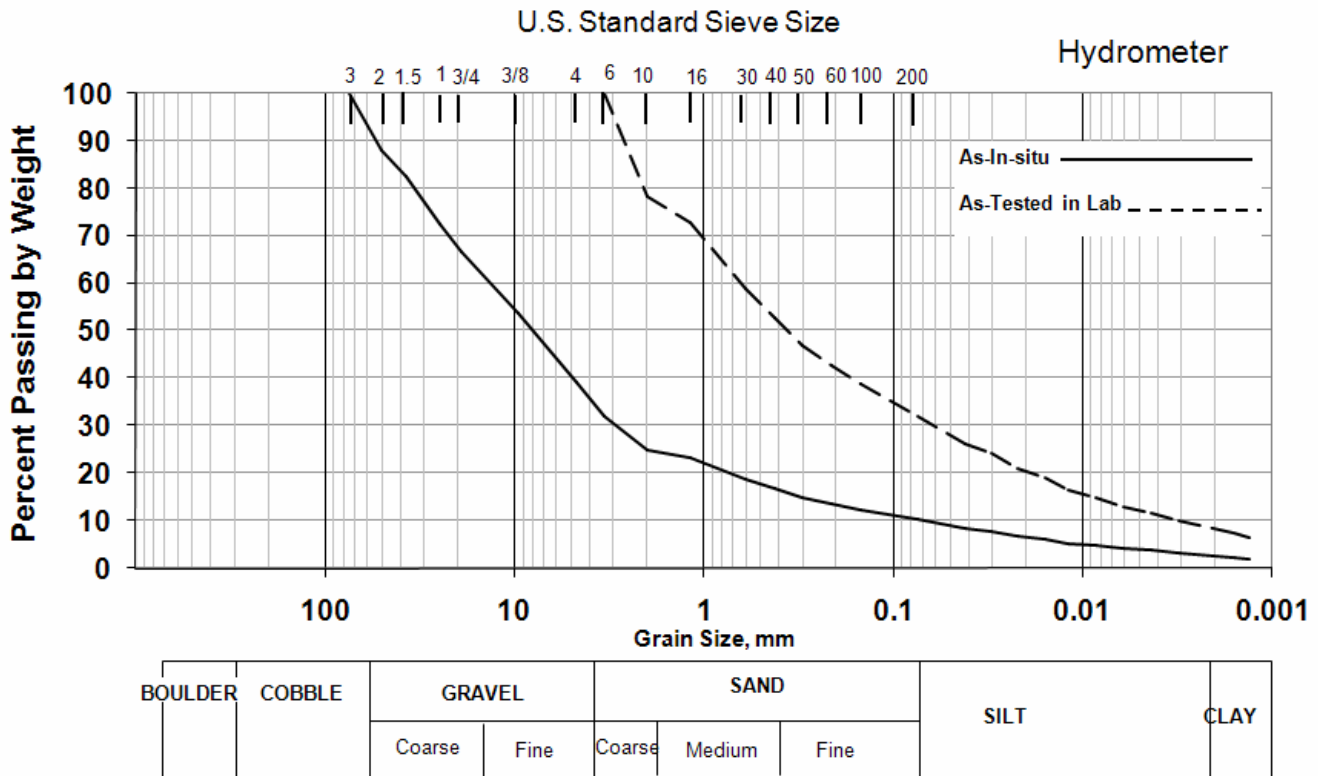
TEST NO: 31  
 TEST DATE: 9/30/2006

SAMPLE: **SSW-AAF-0001-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 31.0  
 PLASTIC LIMIT: 23.2  
 PLASTICITY INDEX: 7.8  
 SPECIFIC GRAVITY: 2.85  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 60.9  
 SAND: 28.9  
 FINE: 10.2

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

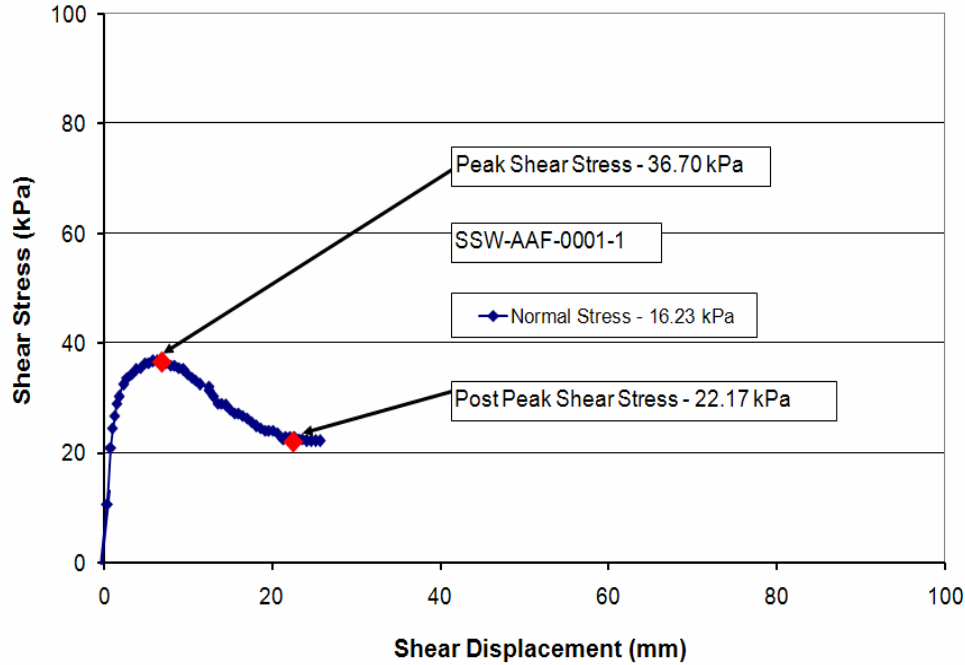
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	25.00	0.0419	8.39	0.0015	2.41
2	50	88.07	16	18.01	23.26	0.0303	7.74	0.0013	2.02
1-1/2	37.5	82.39	30	15.04	18.84	0.0217	6.71		
1	25	72.50	40	13.80	16.87	0.0157	6.07		
3/4	19	66.82	50	12.53	15.01	0.0114	5.29		
3/8	9.5	53.64	70	11.48	13.63	0.0082	4.77		
4	4.75	39.09	100	10.47	12.42	0.0058	4.13		
6	3.36	31.97	200	8.39	10.23	0.0042	3.74		

## IN-SITU DIRECT SHEAR TEST REPORT

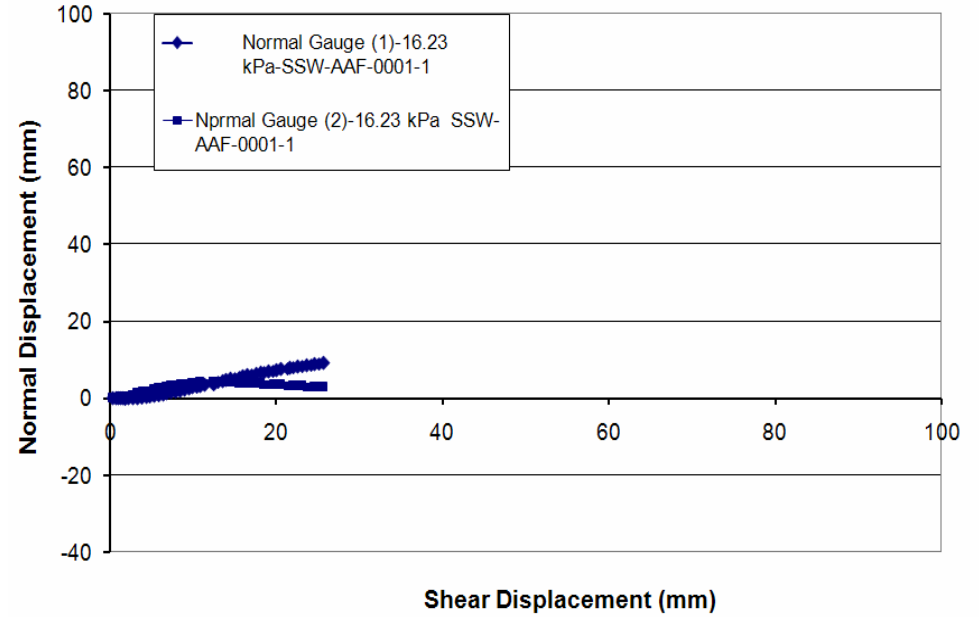
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 31  
 TEST DATE: N/A

UTM Northing: 4060616  
 UTM Easting: 453672



**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

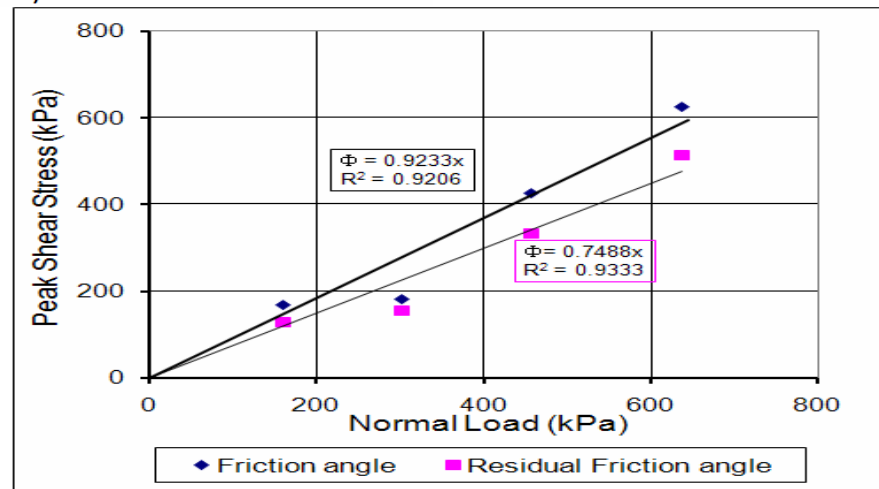
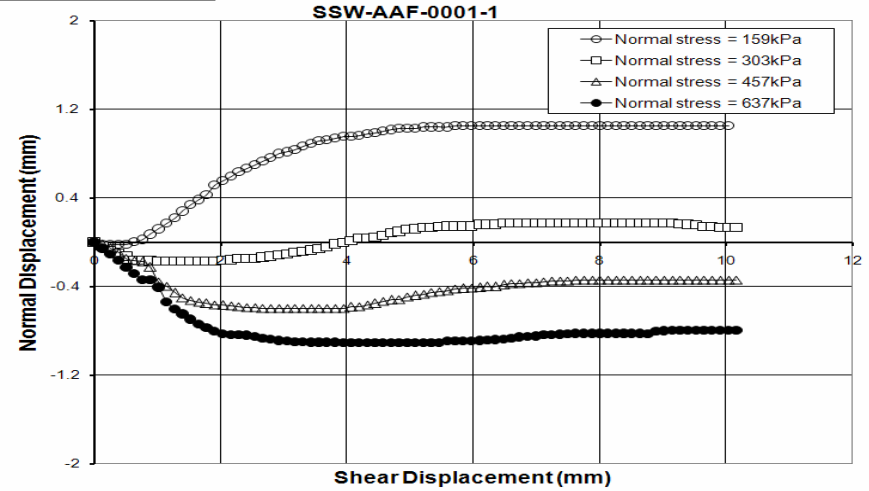
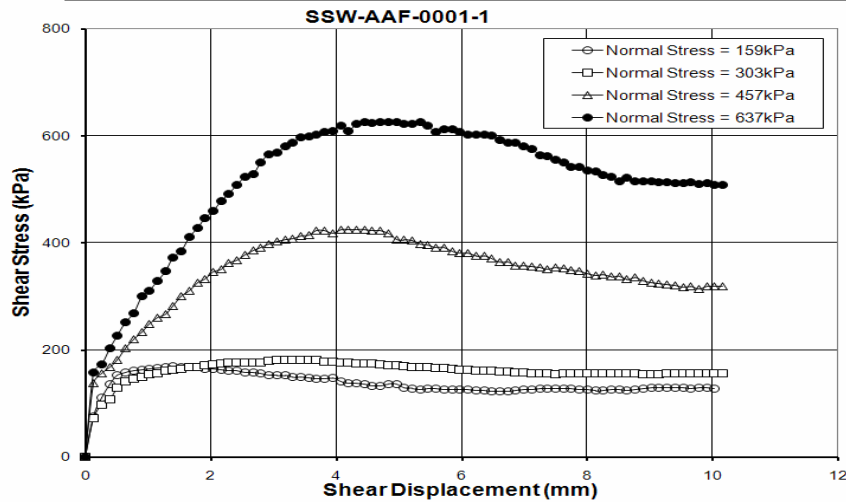
<b>Field id:</b>	SSW-AAF-0001-1						
Measured Cohesion	14.90	Water Content	5.40	Shear box size	30	Peak Shear Stress	36.70
Intrinsic Cohesion	6.86	Wet Density	1880	Matric Suction	30	Post Peak Shear Stress	22.17
Max. Particle Size	unknown	Dry density	1780	Normal Stress	16.23	Elevation	2750.6



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

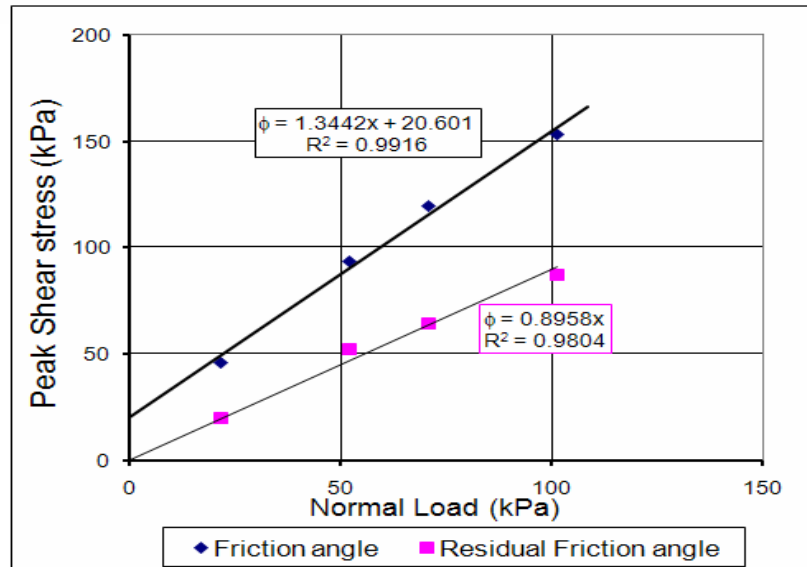
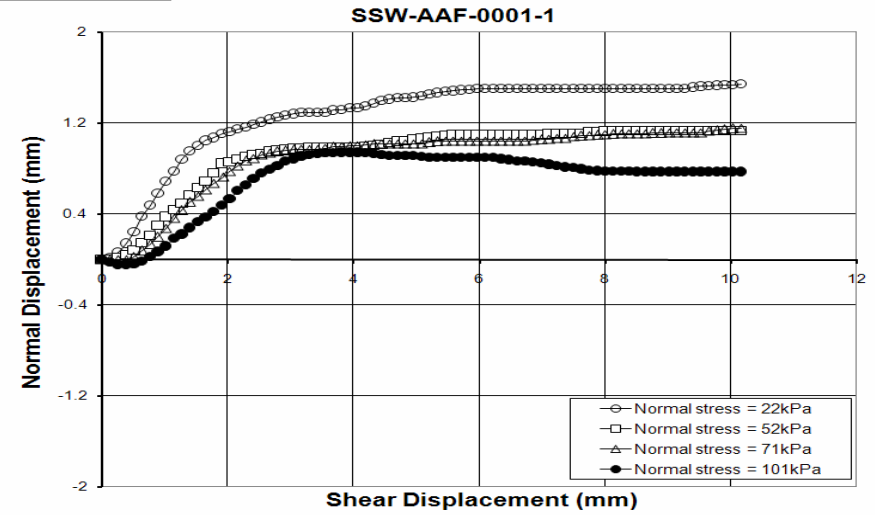
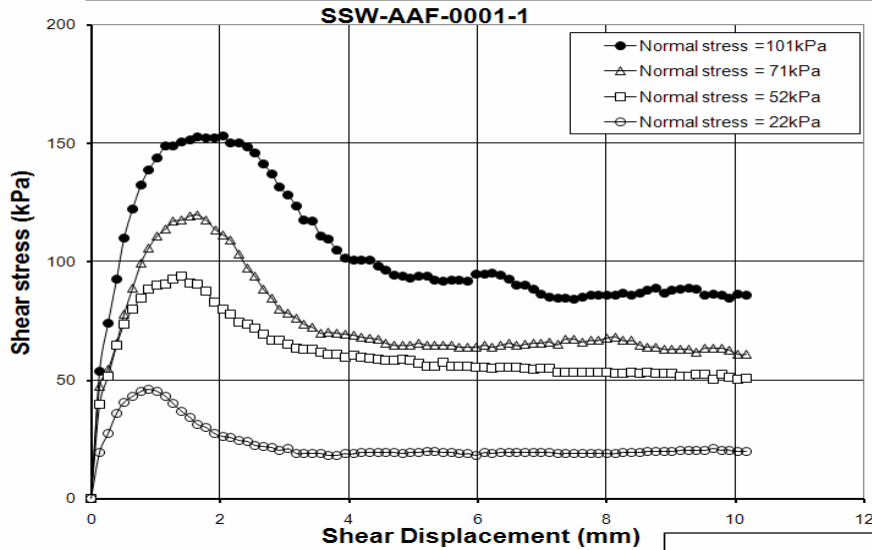
TEST NO: 31  
 TEST DATE: 9/4/2007



<b>Field id:</b>	SSW-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	169.76,182.49,425.74,626.06
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	127.95,156.61,333.81,514.28
Friction Angle	42.72	Dry density	1820	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 31  
 TEST DATE: 5/1/2007



<b>Field id:</b>	SSW-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	46.15,93.90,119.90,153.32
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	19.91,52.18,64.72,87.15
Friction Angle	53.35	Dry density	1790	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

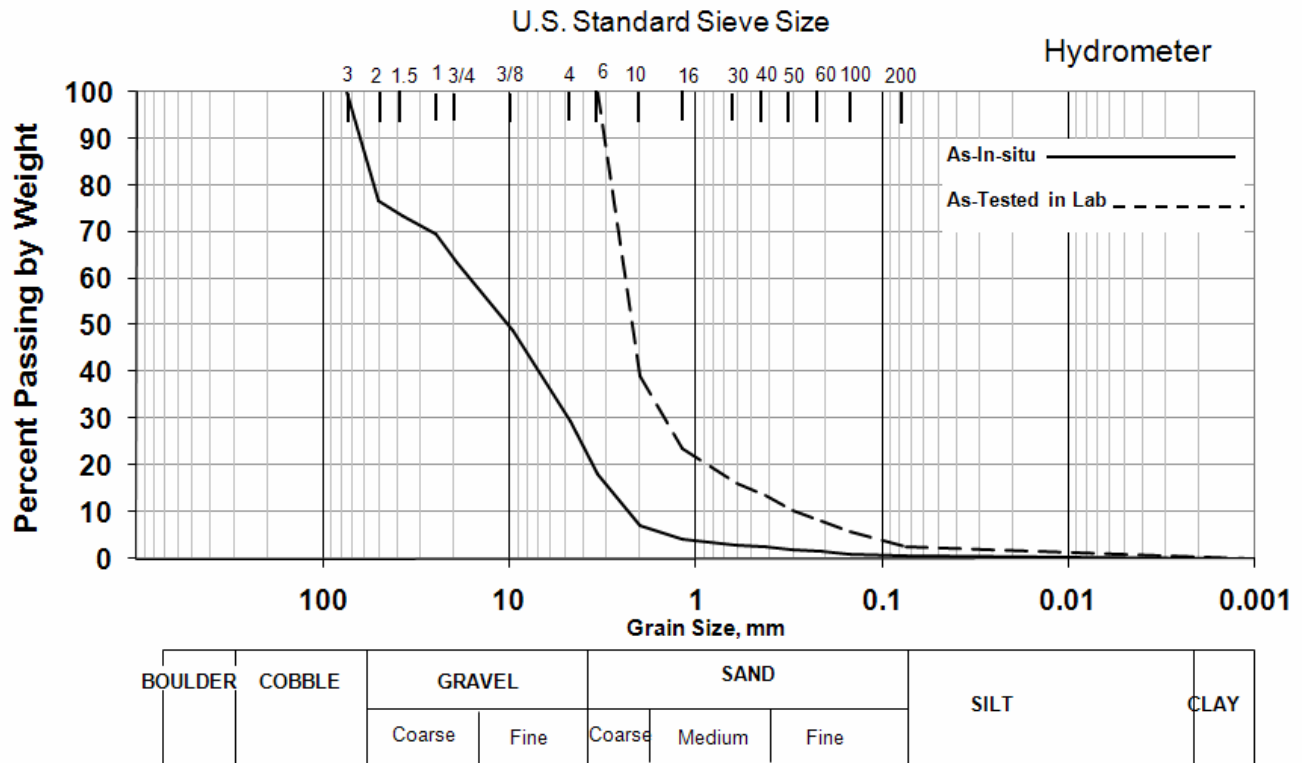
TEST NO: 32  
 TEST DATE: 12/24/2006

SAMPLE: **SSW-AAF-0002-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 39.3  
 PLASTIC LIMIT: 23.9  
 PLASTICITY INDEX: 15.5  
 SPECIFIC GRAVITY: 2.83  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 70.6  
 SAND: 28.9  
 FINE: 0.5

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

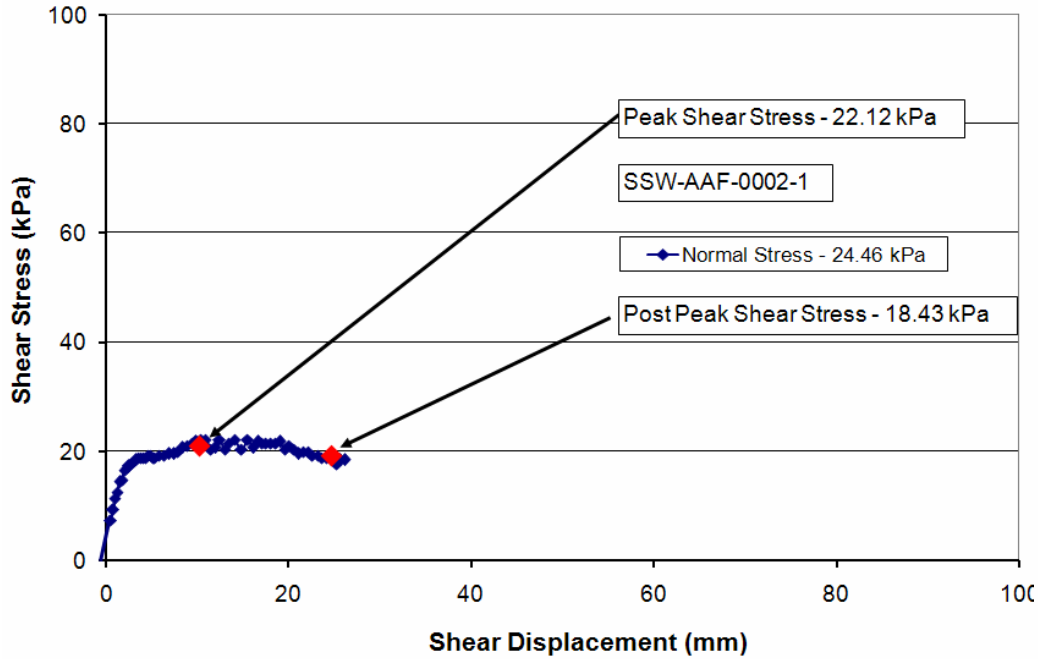
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	7.12	0.0419		0.0015	
2	50	76.54	16	18.01	4.27	0.0303		0.0013	
1-1/2	37.5	73.46	30	15.04	2.92	0.0217			
1	25	69.54	40	13.80	2.44	0.0157			
3/4	19	63.28	50	12.53	1.88	0.0114			
3/8	9.5	49.02	70	11.48	1.46	0.0082			
4	4.75	29.37	100	10.47	1.06	0.0058			
6	3.36	18.12	200	8.39	0.49	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

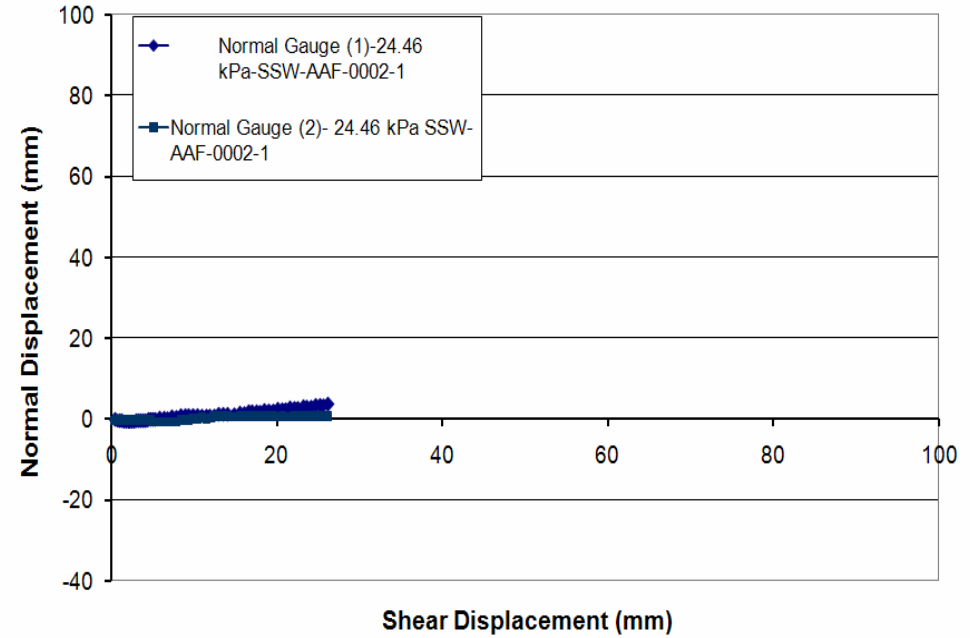
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 32  
 TEST DATE: N/A

UTM Northing: 4060617  
 UTM Easting: 453672



**Shear Stress vs Shear Displacement**



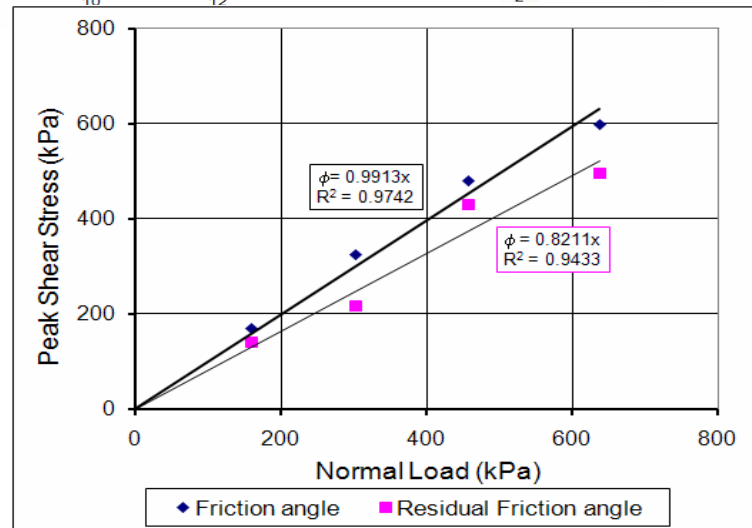
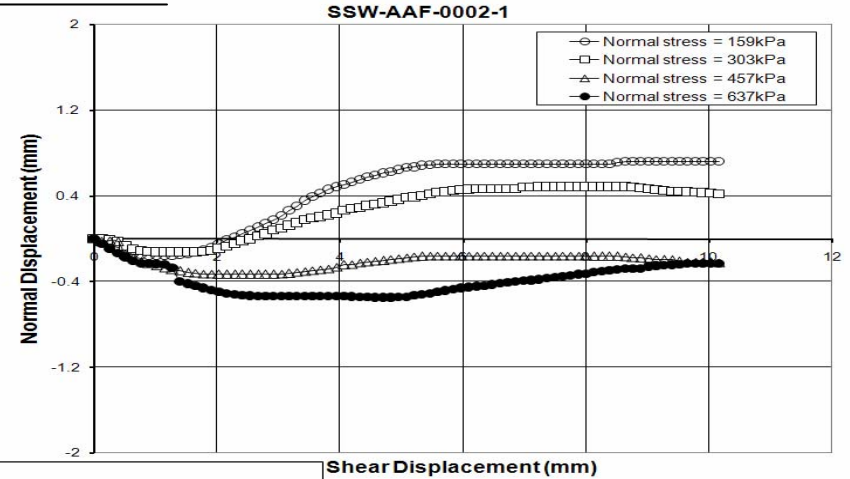
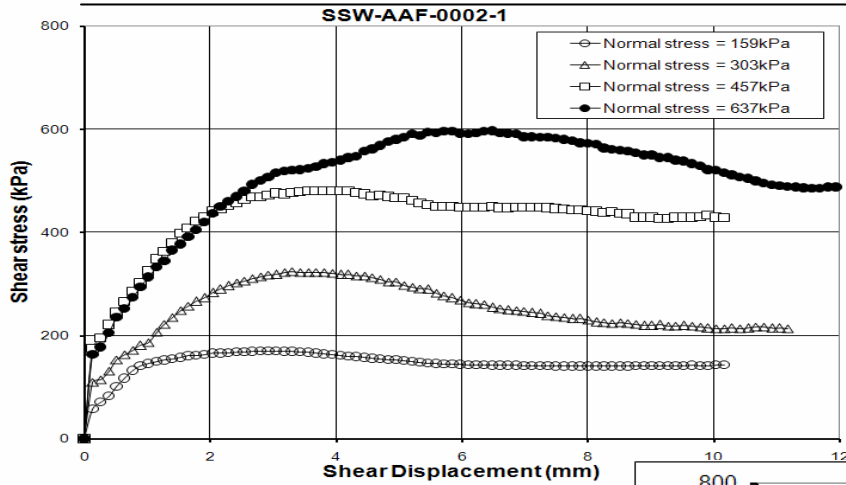
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-AAF-0002-1						
Measured Cohesion	0.00	Water Content	5.40	Shear box size	30	Peak Shear Stress	22.12
Intrinsic Cohesion	0.00	Wet Density	2660	Matric Suction	0.30	Post Peak Shear Stress	18.43
Max. Particle Size	7.62	Dry density	1780	Normal Stress	24.46	Elevation	2752.4

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

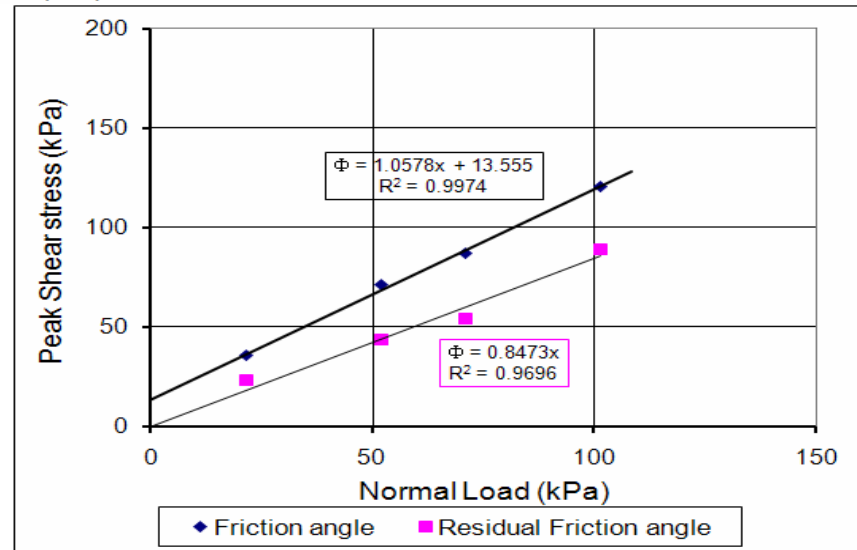
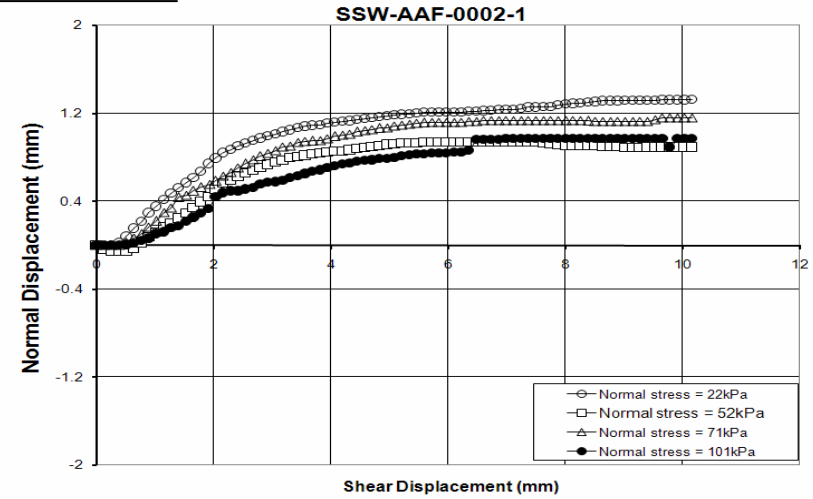
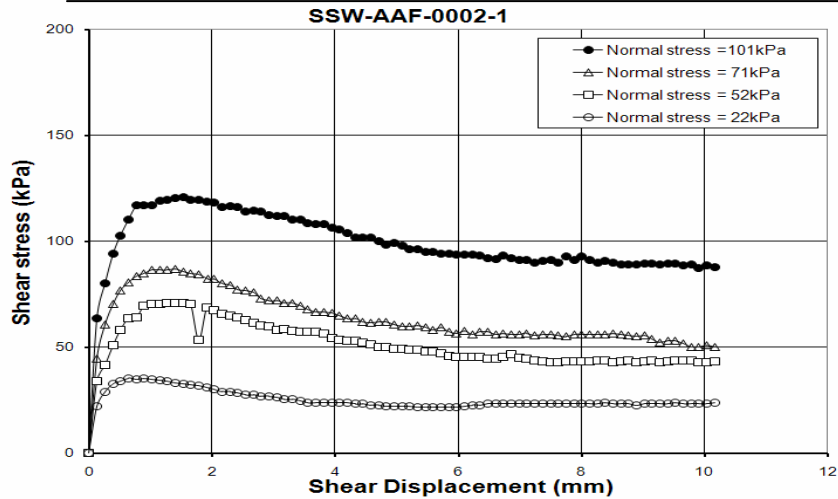
TEST NO: 32  
 TEST DATE: 9/4/2007



<b>Field id:</b>	SSW-AAF-0002-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	44.75	Dry density	1670	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 32  
 TEST DATE: 7/30/2007



<b>Field id:</b>	SSW-AAF-0002-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	35.54,71.09,87.00,120.96
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.37,43.50,54.44,89.20
Friction Angle	46.6	Dry density	1680	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

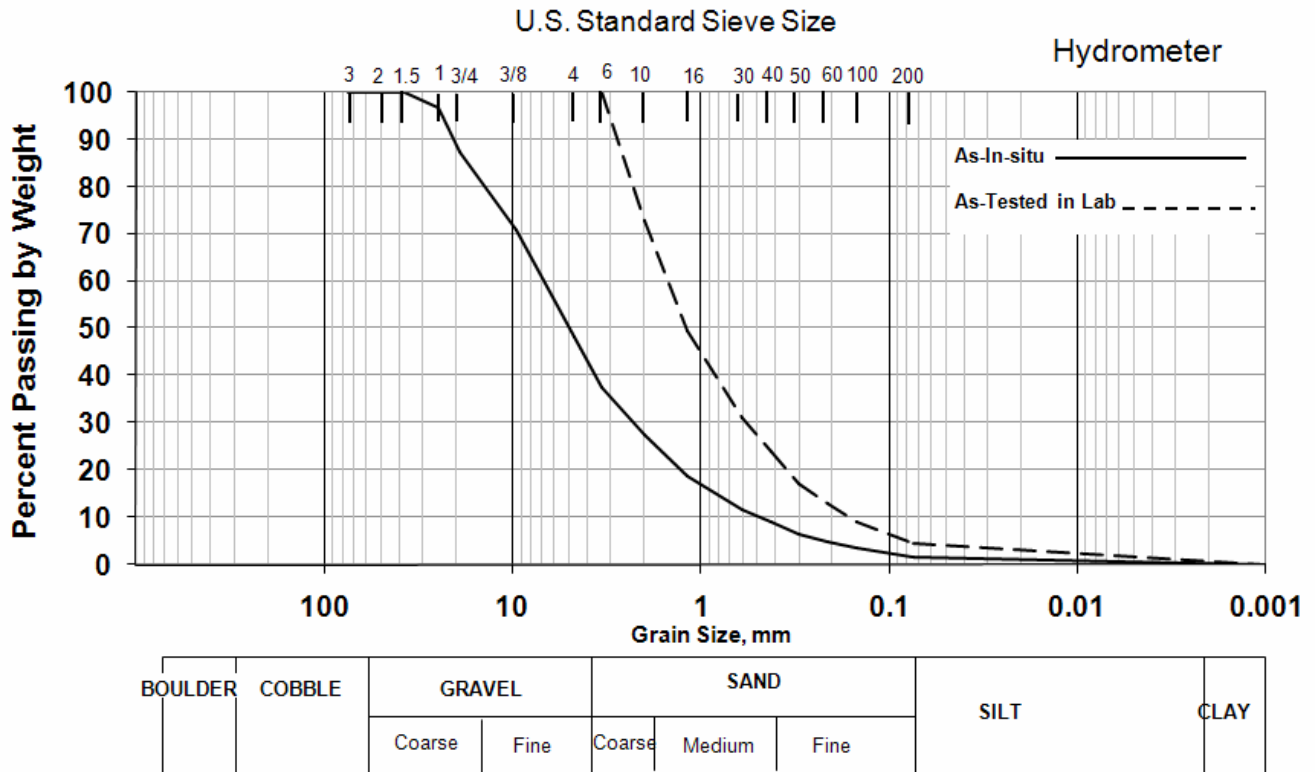
TEST NO: 33  
 TEST DATE: 7/19/2007

SAMPLE: **SSW-AAF-0002-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.0  
 PLASTIC LIMIT: 15.9  
 PLASTICITY INDEX: 14.1  
 SPECIFIC GRAVITY: 2.7  
 ATTERBERG CLASSIFICATION: **CL**

GRAVEL: 53.1  
 SAND: 45.4  
 FINE: 1.5

### Particle Size Distribution



#### UNIFIED SOIL CLASSIFICATION:

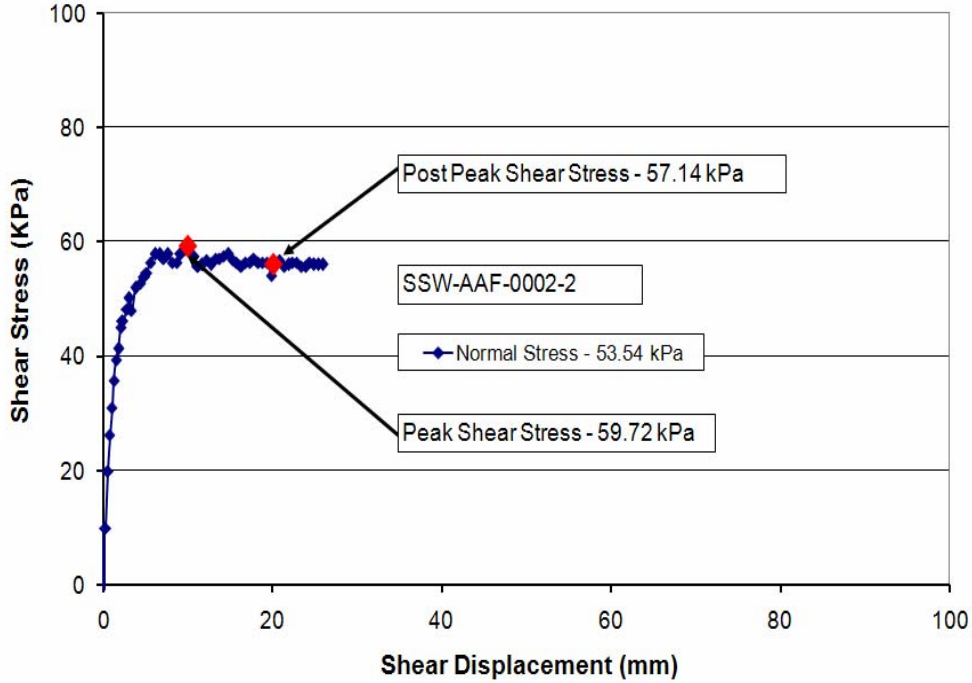
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	27.45	0.0419		0.0015	
2	50	100.00	16	18.01	18.71	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	11.75	0.0217			
1	25	96.83	40	13.80	9.03	0.0157			
3/4	19	87.44	50	12.53	6.50	0.0114			
3/8	9.5	70.73	70	11.48	4.92	0.0082			
4	4.75	48.08	100	10.47	3.44	0.0058			
6	3.36	37.66	200	8.39	1.65	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

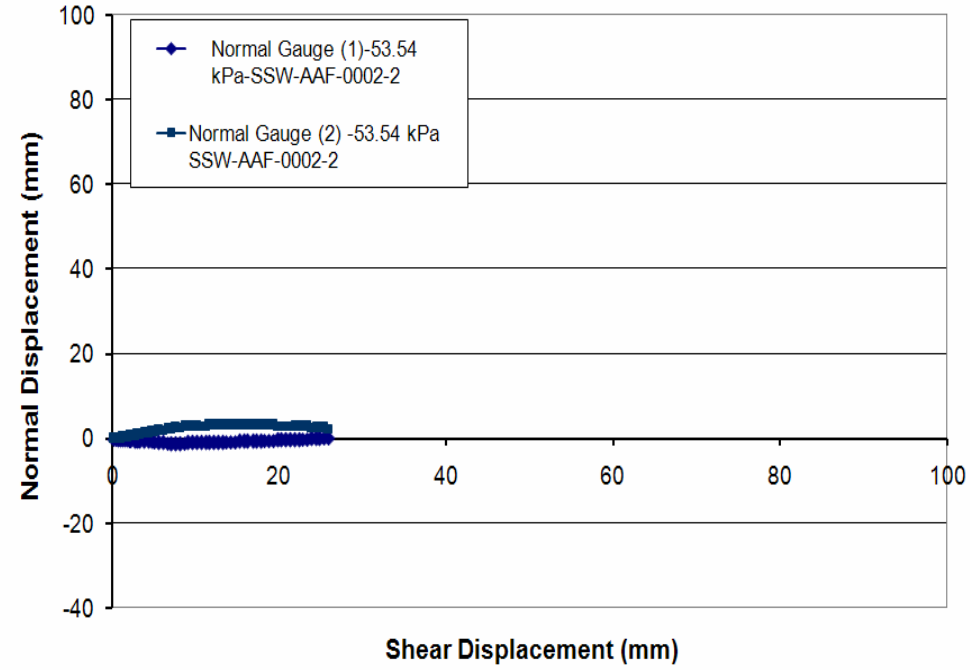
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 33  
 TEST DATE: N/A

UTM Northing: 4060617  
 UTM Easting: 453672



**Shear Stress vs Shear Displacement**



**Normal Displacement vs Shear Displacement**

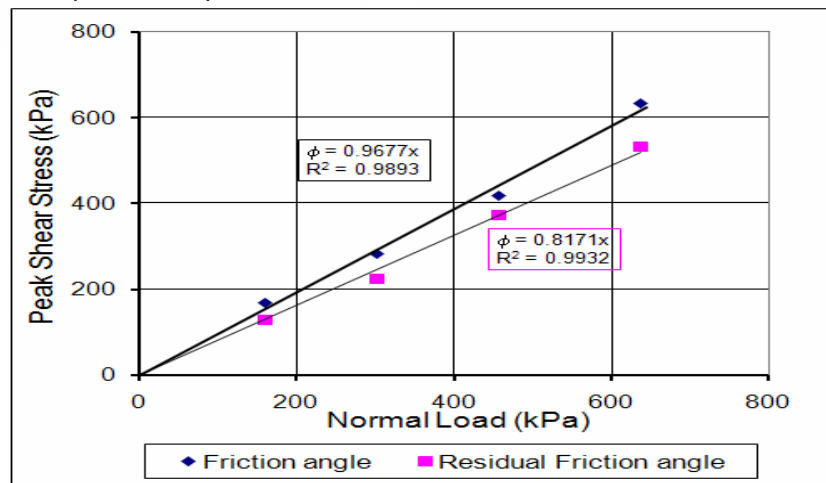
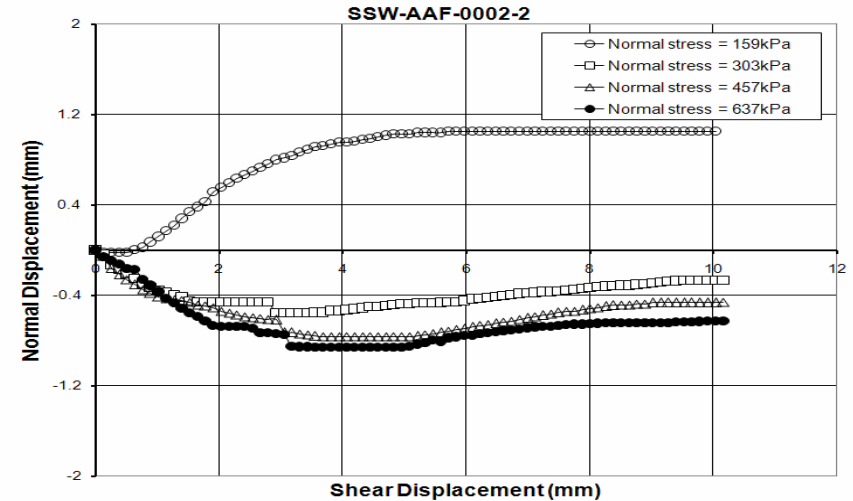
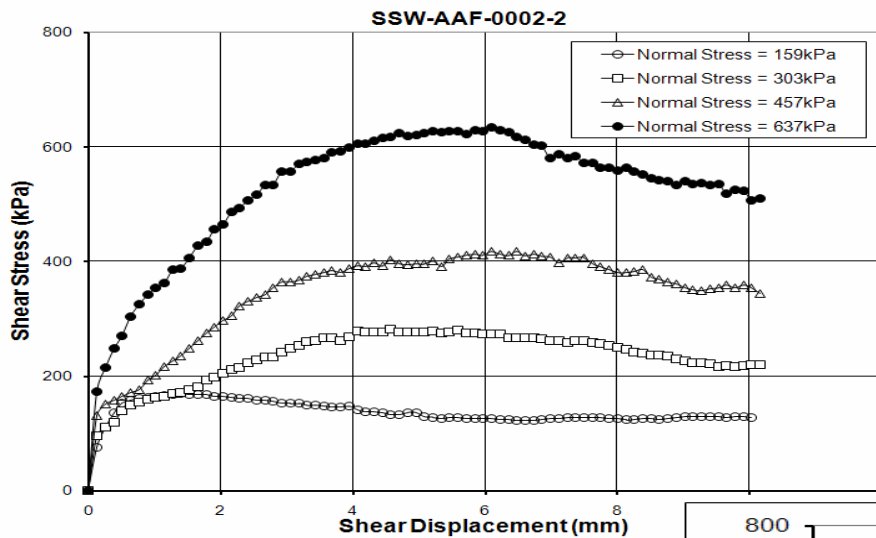
<b>Field id:</b>	SSW-AAF-0002-2						
Measured Cohesion	14.88	Water Content	na	Shear box size	30	Peak Shear Stress	59.72
Intrinsic Cohesion	na	Wet Density	na	Matric Suction		Post Peak Shear Stress	57.14
Max. Particle Size	7.62	Dry density	1670	Normal Stress	53.54	Elevation	2750.6



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

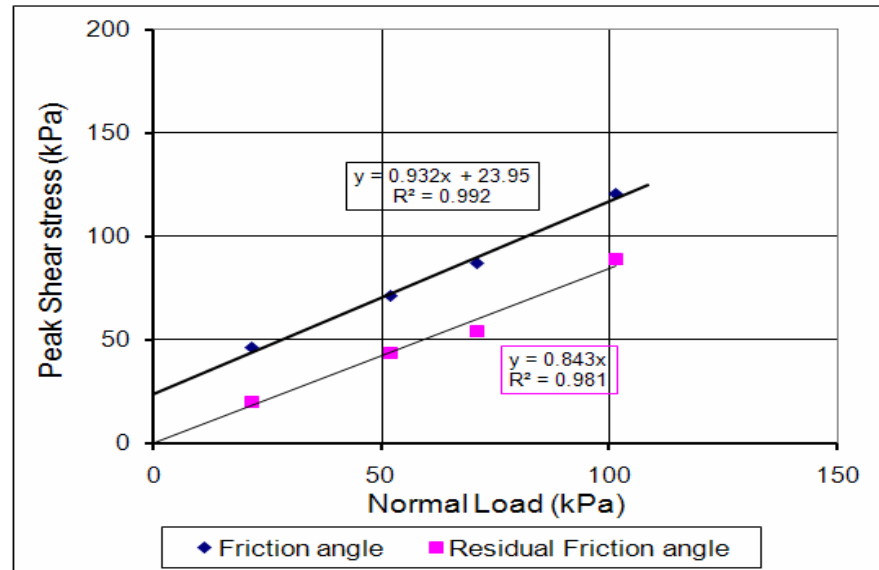
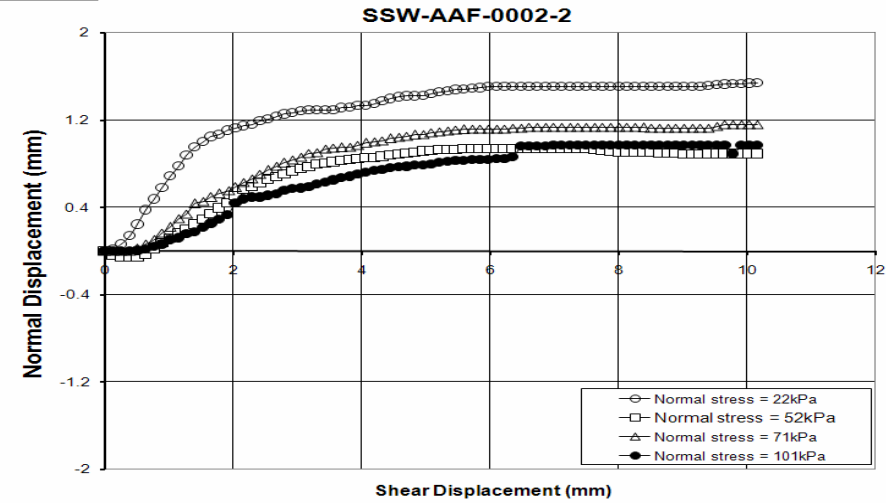
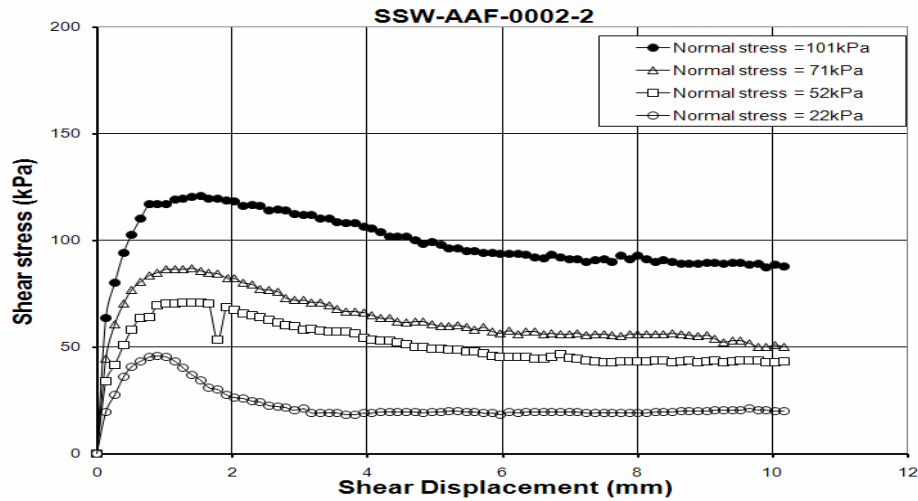
TEST NO: 33  
 TEST DATE: 7/23/2007



<b>Field id:</b>	SSW-AAF-0002-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	169.76,282.65,417.93,635.17
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	127.95,225.13,372.35,532.58
Friction Angle	44.06	Dry density	1670	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 33  
 TEST DATE: 7/31/2007



<b>Field id:</b>	SSW-AAF-0002-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	46.15,71.09,87.00,120.96
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	19.91,43.50,54.44,89.20
Friction Angle	42.98	Dry density	1680	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

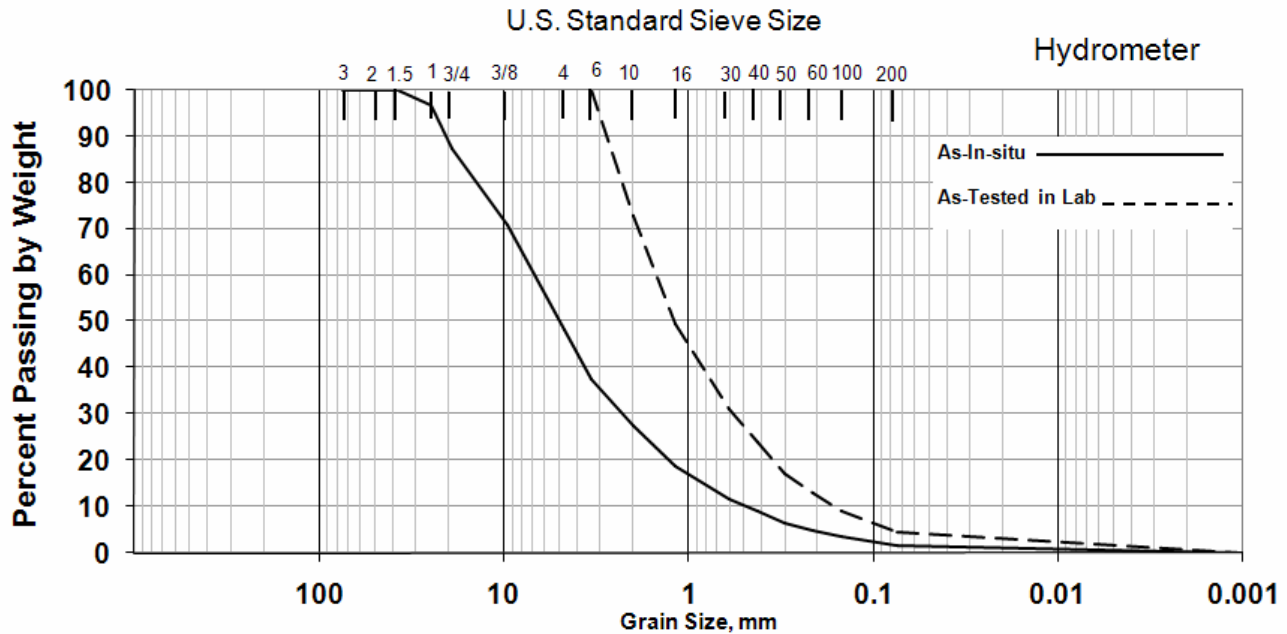
TEST NO: 34  
 TEST DATE: 9/30/2006

SAMPLE: **SSW-AAF-0002-3**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 35.4  
 PLASTIC LIMIT: 23.1  
 PLASTICITY INDEX: 12.3  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 49.1  
 SAND: 47.8  
 FINE: 3.1

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

#### UNIFIED SOIL CLASSIFICATION:

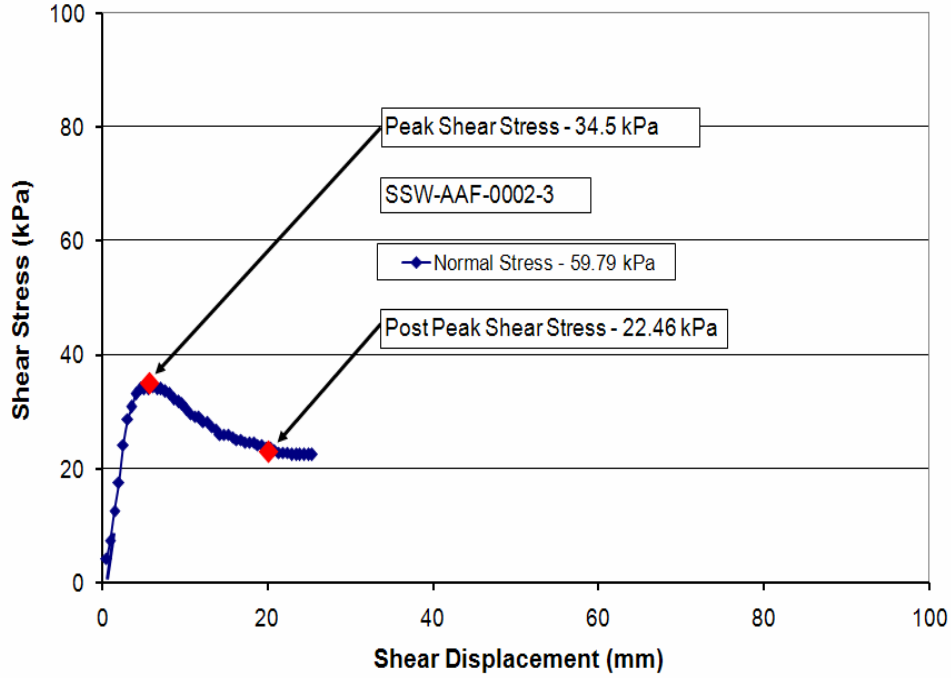
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	27.45	0.0419		0.0015	
2	50	100.00	16	18.01	18.71	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	11.75	0.0217			
1	25	96.83	40	13.80	9.03	0.0157			
3/4	19	87.44	50	12.53	6.50	0.0114			
3/8	9.5	70.73	70	11.48	4.92	0.0082			
4	4.75	48.08	100	10.47	3.44	0.0058			
6	3.36	37.66	200	8.39	1.65	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

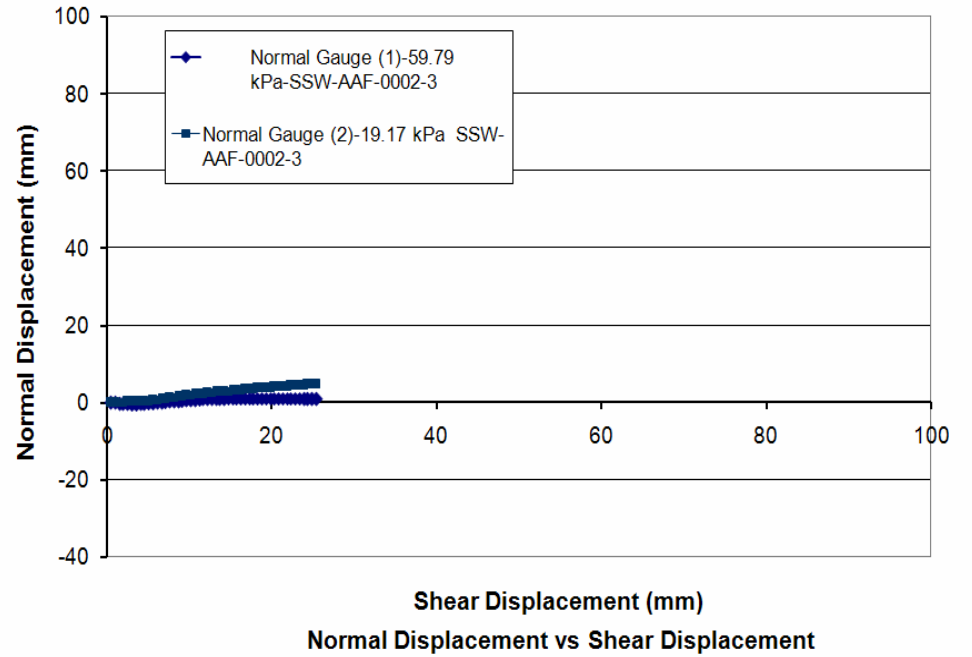
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 34  
 TEST DATE: N/A

UTM Northing: 4060617  
 UTM Easting: 453672



**Shear Stress vs Shear Displacement**



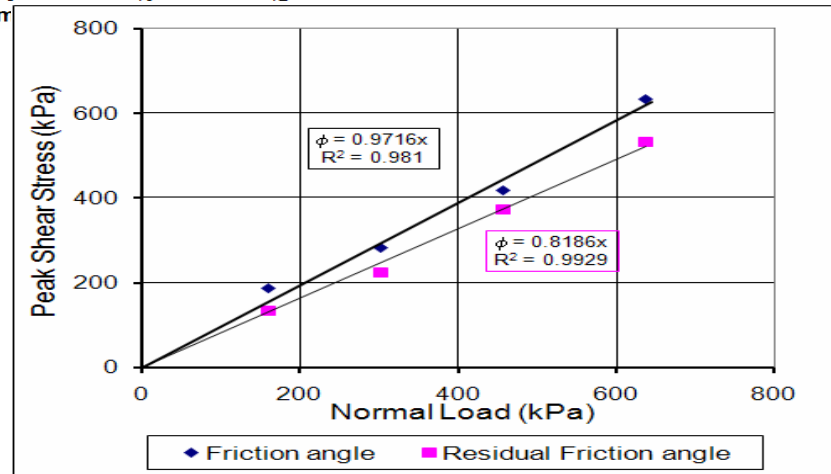
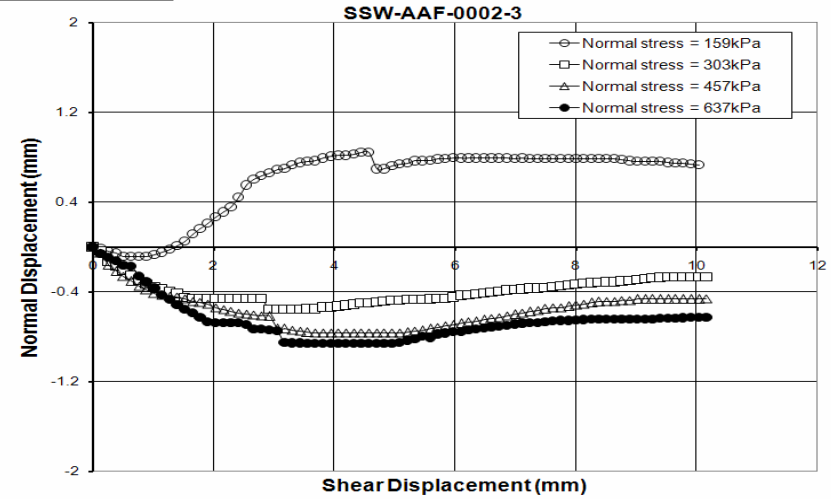
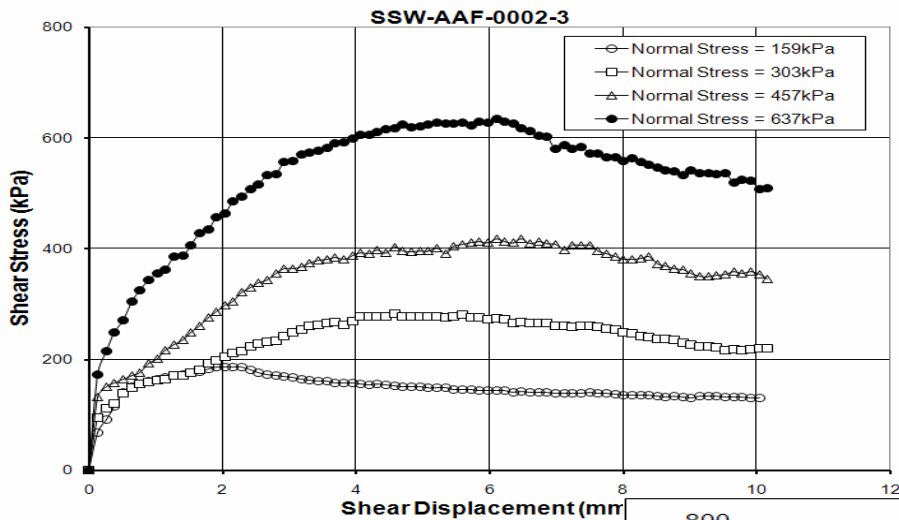
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-AAF-0002-3						
Measured Cohesion	0	Water Content	na	Shear box size	30	Peak Shear Stress	34.5
Intrinsic Cohesion	0	Wet Density		Matric Suction		Post Peak Shear Stress	22.46
Max. Particle Size	7.62	Dry density	1680	Normal Stress	59.79	Elevation	2752.4

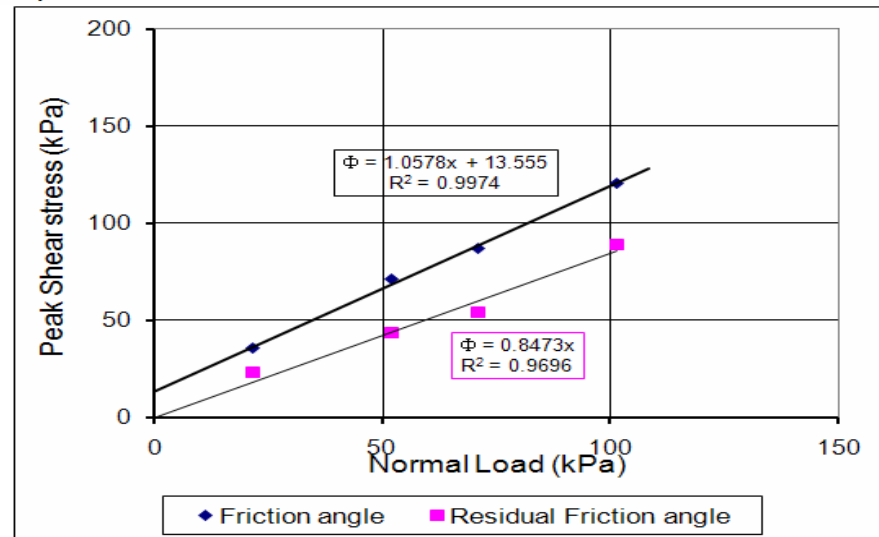
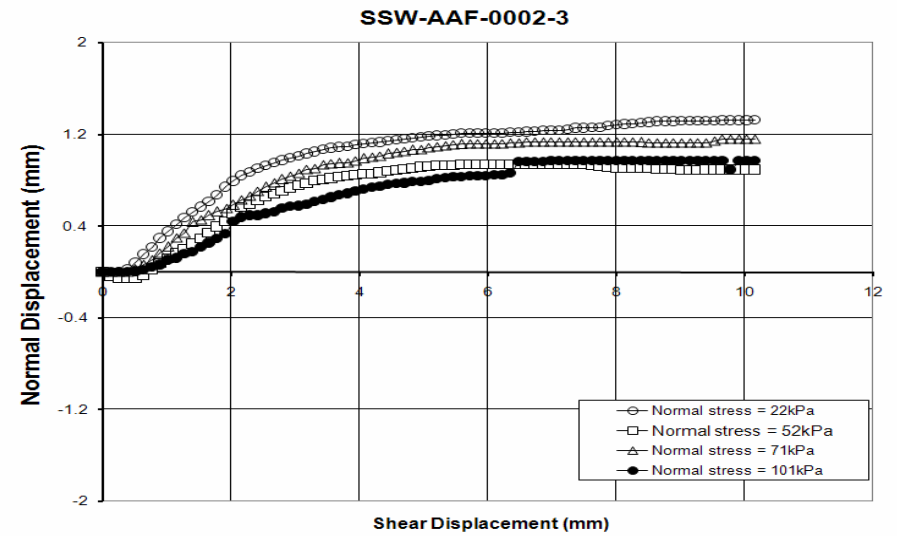
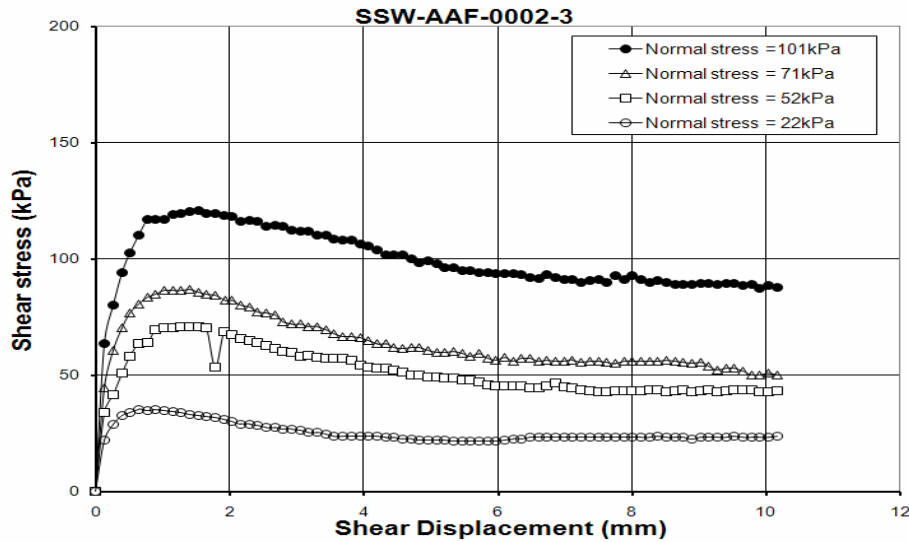
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 34  
 TEST DATE: 7/24/2007



<b>Field id:</b>	SSW-AAF-0002-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	187.69,282.65,417.93,635.17
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	135.12,225.13,372.35,532.58
Friction Angle	44.17	Dry density	1670	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSW-AAF-0002-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	35.54,71.09,87.00,120.96
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.37,43.50,54.44,89.20
Friction Angle	46.6	Dry density	1680	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

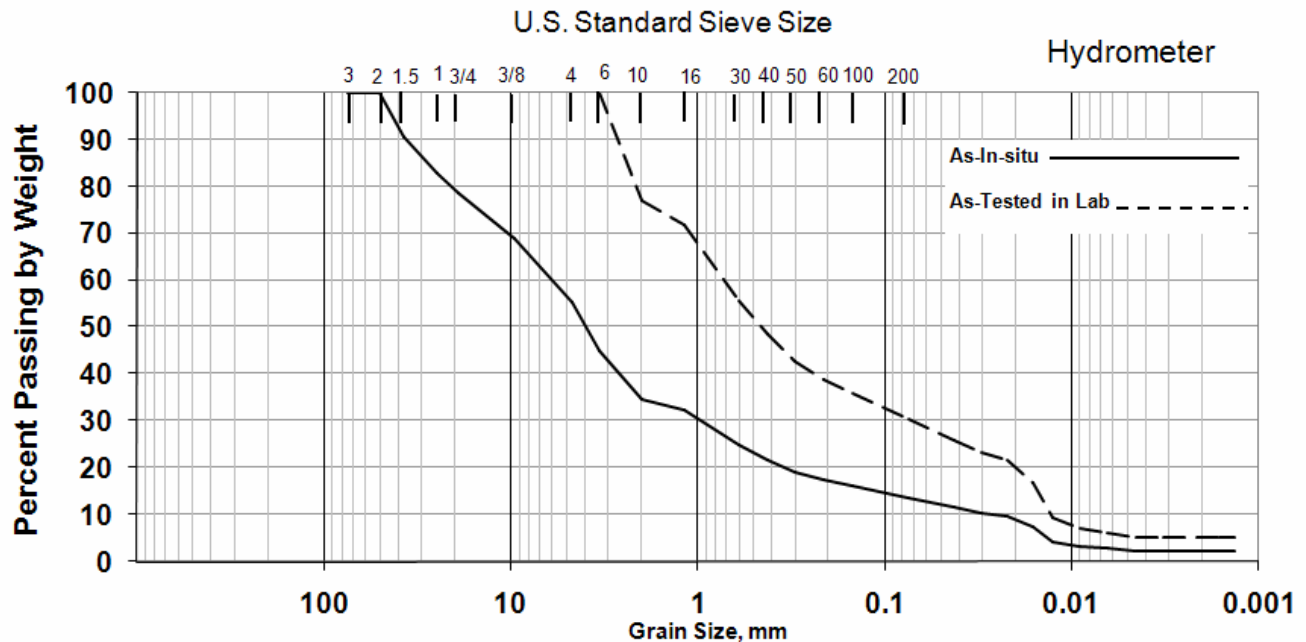
TEST NO: 35  
 TEST DATE: 9/30/2006

SAMPLE: **SSW-AAF-0004-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 38.2  
 PLASTIC LIMIT: 23.9  
 PLASTICITY INDEX: 14.3  
 SPECIFIC GRAVITY: 2.85  
 ATTERBERG CLASSIFICATION: **CL**

GRAVEL: 44.6  
 SAND: 41.8  
 FINE: 13.6

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

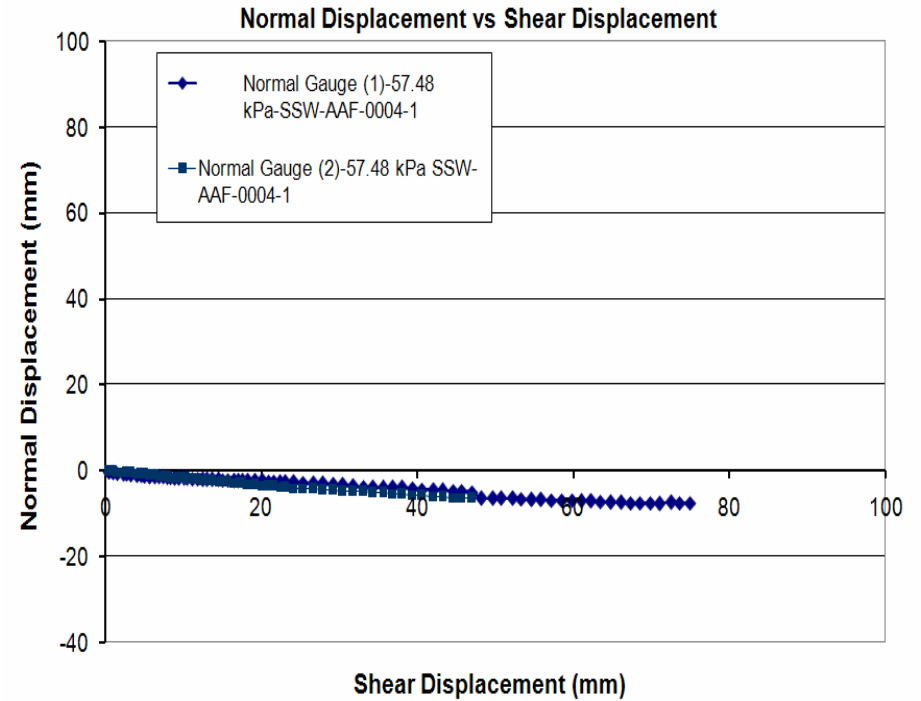
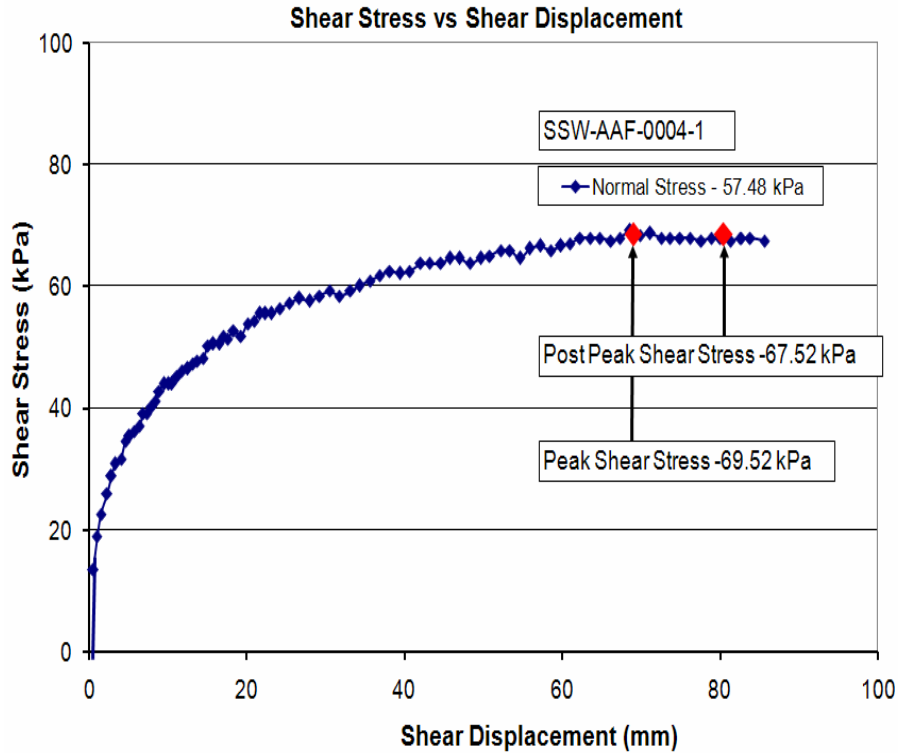
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	34.55	0.0419	11.60	0.0015	2.33
2	50	100.00	16	18.01	32.30	0.0303	10.50	0.0013	2.33
1-1/2	37.5	90.76	30	15.04	24.94	0.0217	9.76		
1	25	82.88	40	13.80	21.79	0.0157	7.55		
3/4	19	78.64	50	12.53	19.21	0.0114	4.23		
3/8	9.5	68.94	70	11.48	17.36	0.0082	3.13		
4	4.75	55.45	100	10.47	16.08	0.0058	2.76		
6	3.36	44.89	200	8.39	13.62	0.0042	2.39		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 35  
 TEST DATE: N/A

UTM Northing: 4060616  
 UTM Easting: 453677



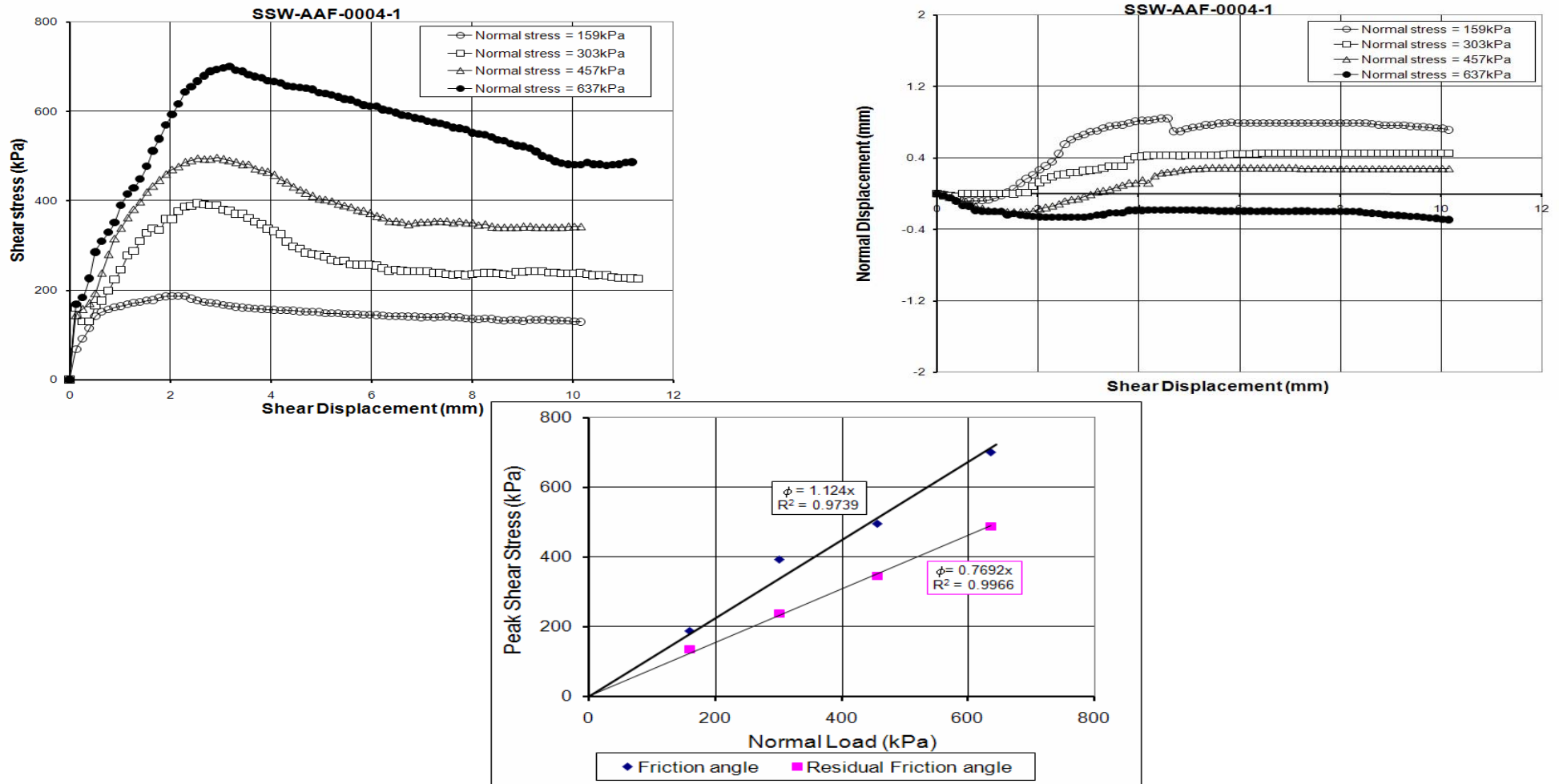
<b>Field id:</b>	SSW-AAF-0004-1						
Measured Cohesion	8.65	Water Content	5.19	Shear box size	30	Peak Shear Stress	69.52
Intrinsic Cohesion	na	Wet Density	1870	Matric Suction	21	Post Peak Shear Stress	67.52
Max. Particle Size	2.54	Dry density	1870	Normal Stress	57.48	Elevation	2751.5



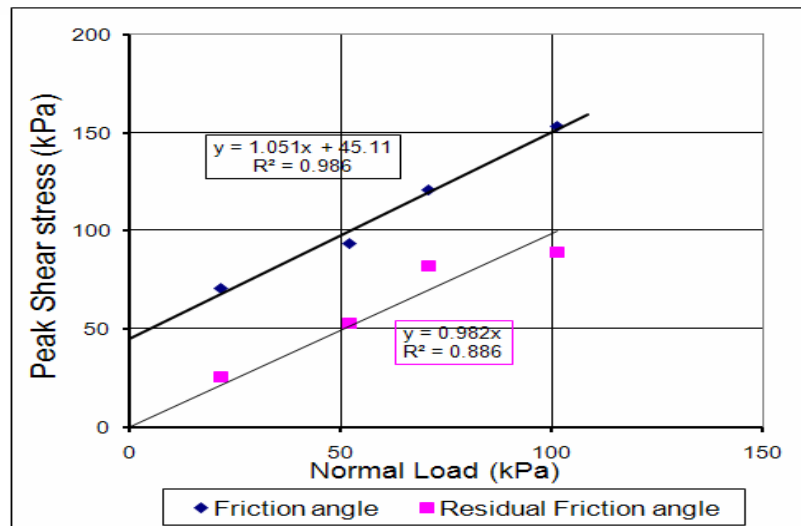
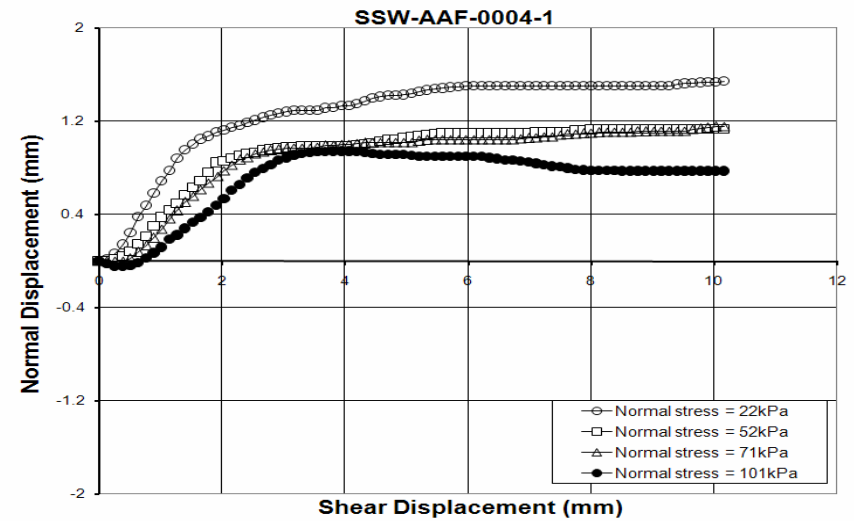
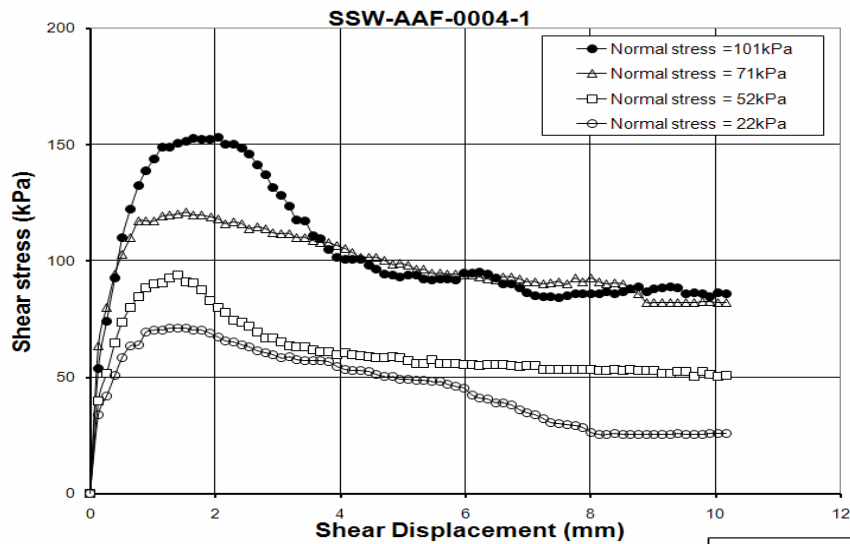
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 35  
 TEST DATE: 1/23/2007



<b>Field id:</b>	SSW-AAF-0004-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	189.69,394.52,497.28,700.21
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	135.12,238.98,345.74,488.33
Friction Angle	48.34	Dry density	1840	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSW-AAF-0004-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	71.09,93.90,120.96,153.32
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	25.62,52.91,82.33,89.11
Friction Angle	46.48	Dry density	1790	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

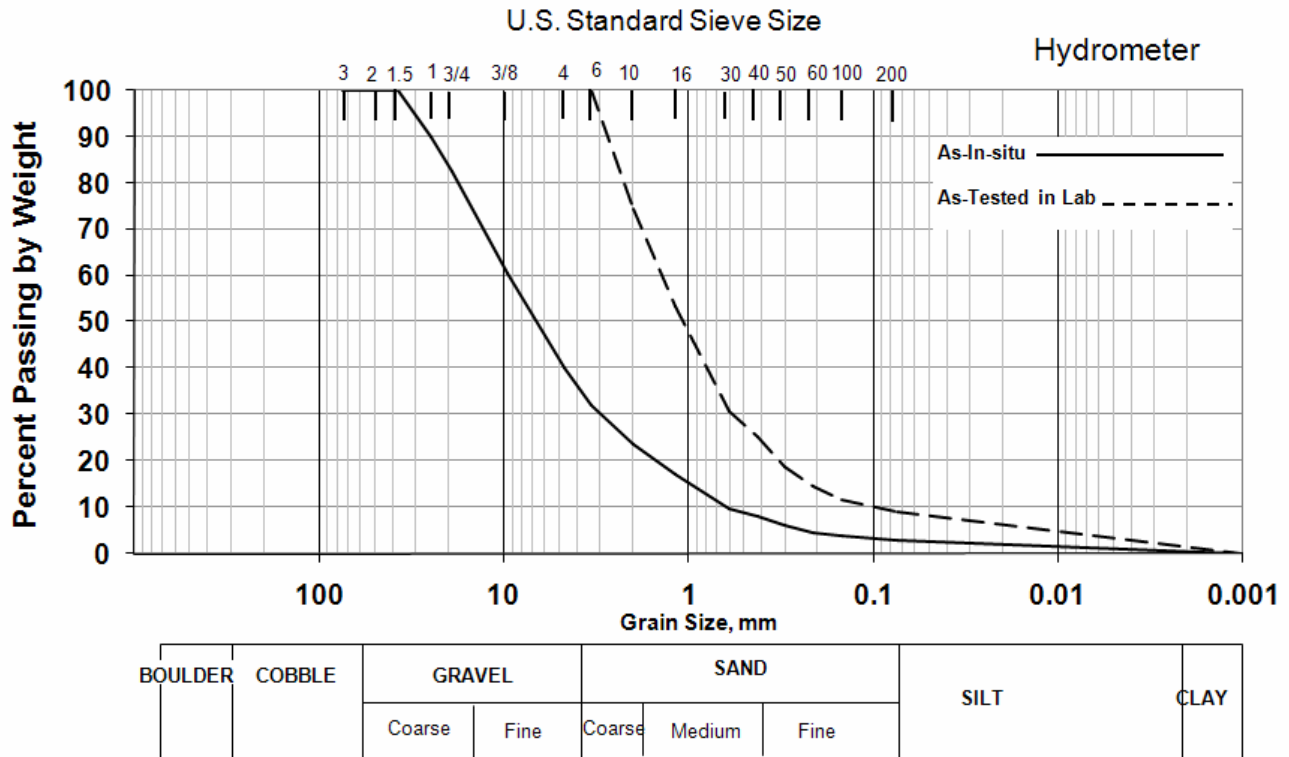
TEST NO: 36  
 TEST DATE: 9/14/2007

SAMPLE: **SSW-AAF-0005-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.2  
 PLASTIC LIMIT: 19.0  
 PLASTICITY INDEX: 8.2  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 59.8  
 SAND: 37.3  
 FINE: 2.9

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

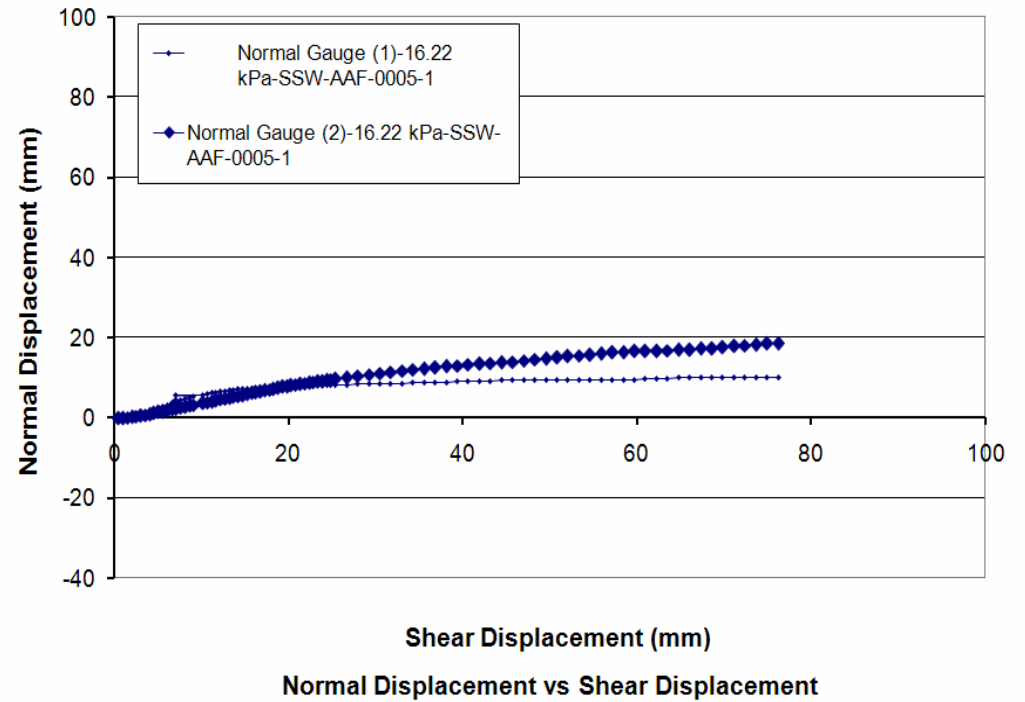
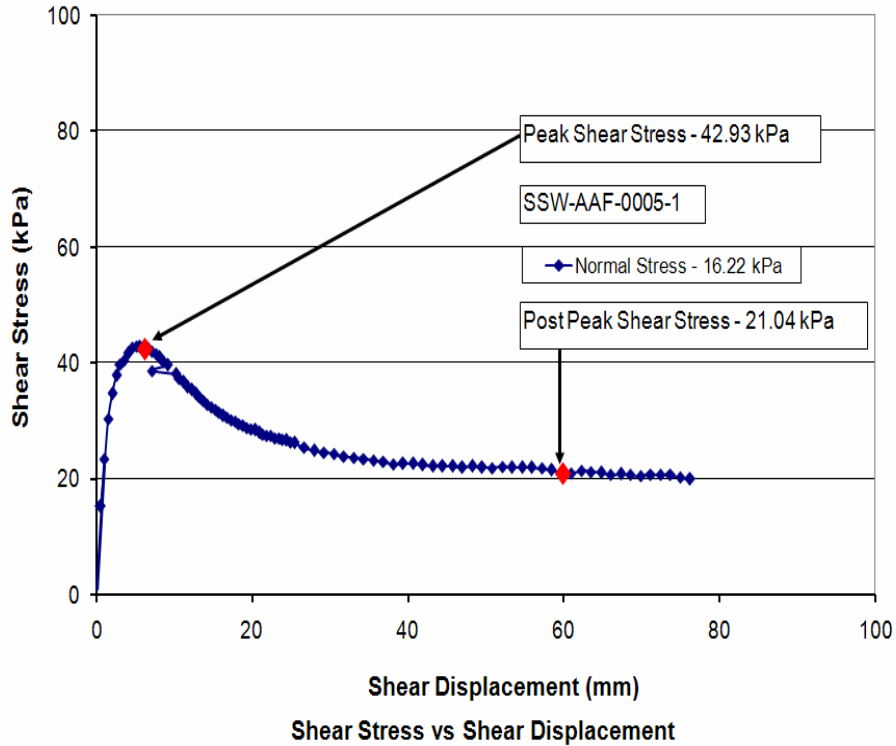
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	23.76	0.0419		0.0015	
2	50	100.00	16	18.01	17.03	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	9.85	0.0217			
1	25	90.00	40	13.80	8.03	0.0157			
3/4	19	82.53	50	12.53	6.01	0.0114			
3/8	9.5	60.60	70	11.48	4.69	0.0082			
4	4.75	40.18	100	10.47	3.76	0.0058			
6	3.36	31.88	200	8.39	2.85	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 36  
 TEST DATE: N/A

UTM Northing: 4060554  
 UTM Easting: 453699

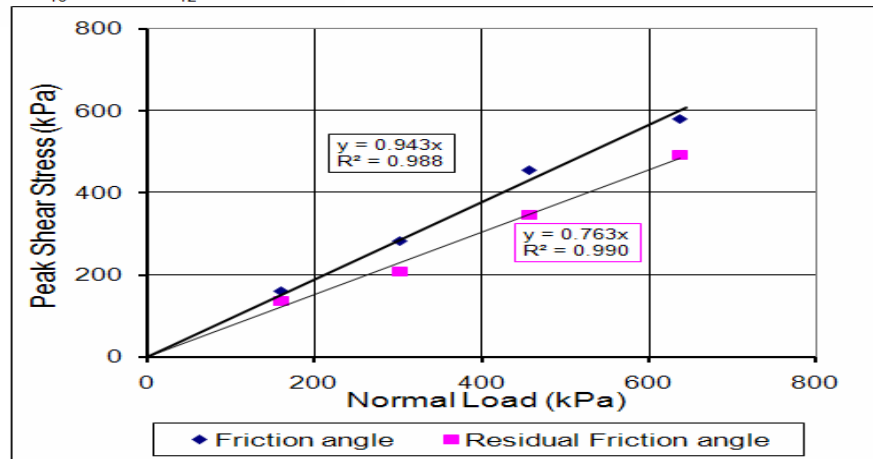
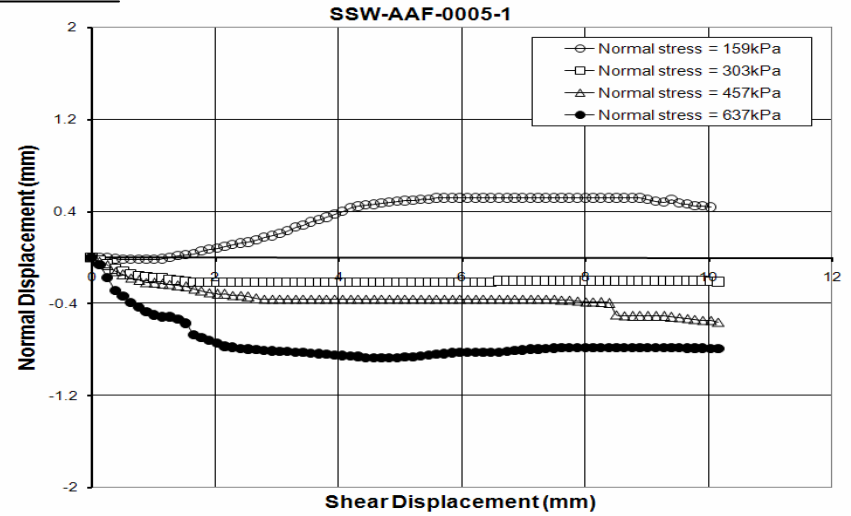
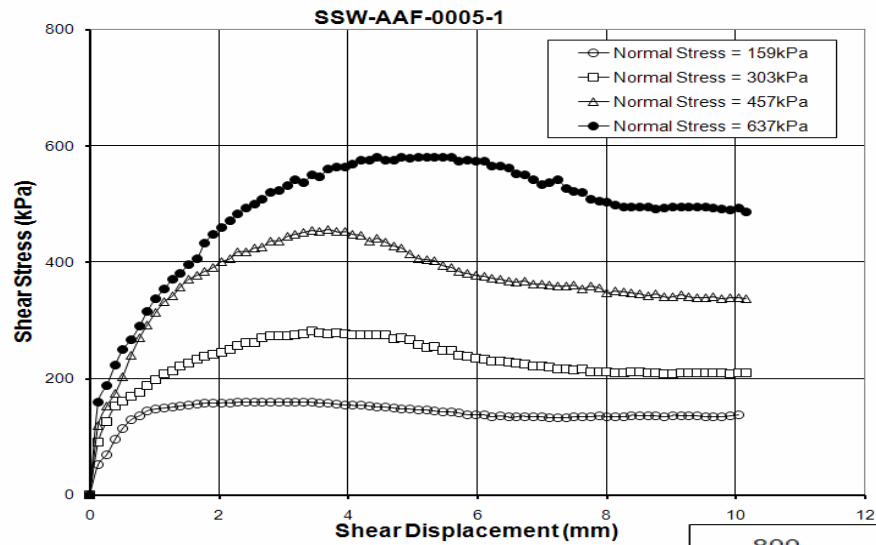


<b>Field id:</b>	SSW-AAF-0005-1						
Measured Cohesion	25.68	Water Content	9.13	Shear box size	60	Peak Shear Stress	42.93
Intrinsic Cohesion	25.59	Wet Density	1890	Matric Suction	5	Post Peak Shear Stress	21.04
Max. Particle Size	10.16	Dry density	1730	Normal Stress	16.22	Elevation	2755.5

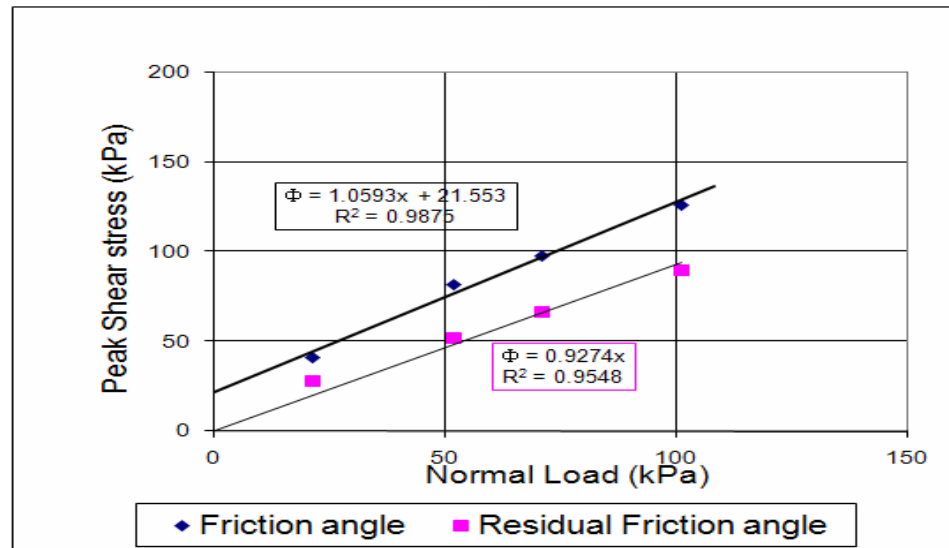
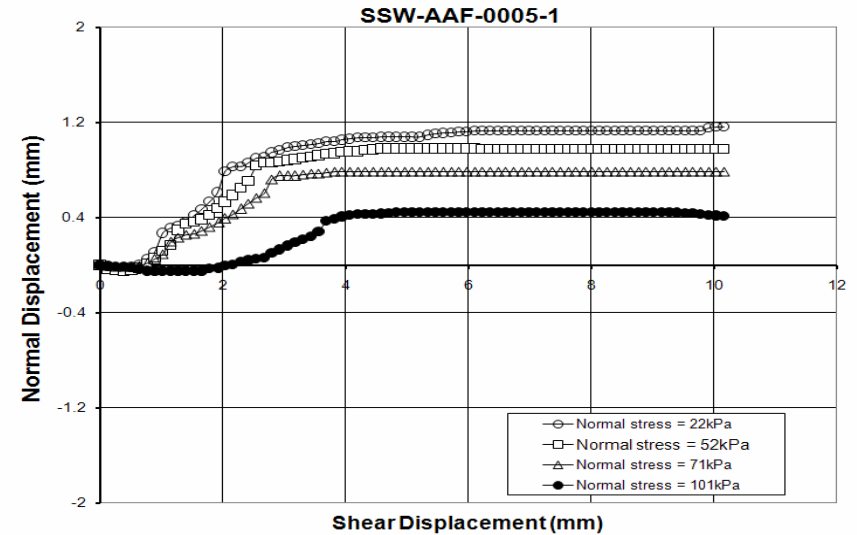
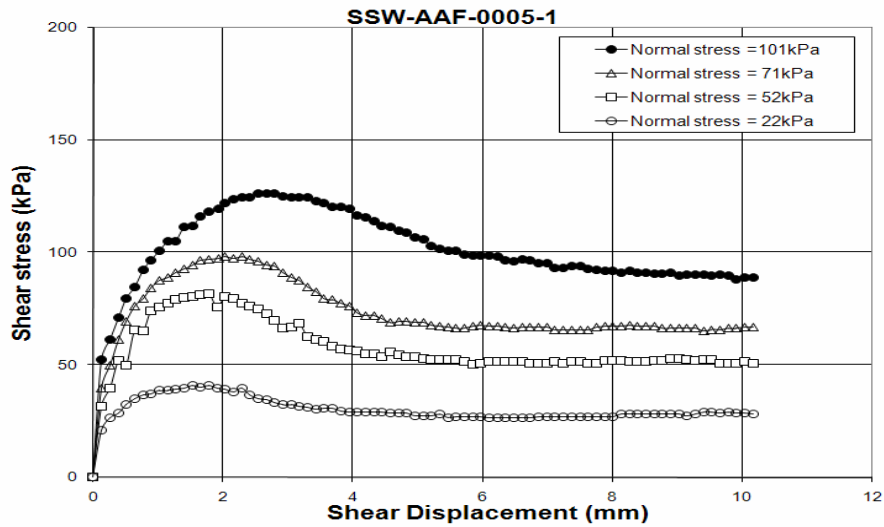
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 36  
 TEST DATE: 9/11/2007



<b>Field id:</b>	SSW-AAF-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	160.74,282.65,456.96,581.84
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	135.90,209.71,347.09,494.07
Friction Angle	43.34	Dry density	1760	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSW-AAF-0005-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	40.85,81.70,98.14,126.26
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.98,51.88,66.53,90.08
Friction Angle	46.65	Dry density	1740	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

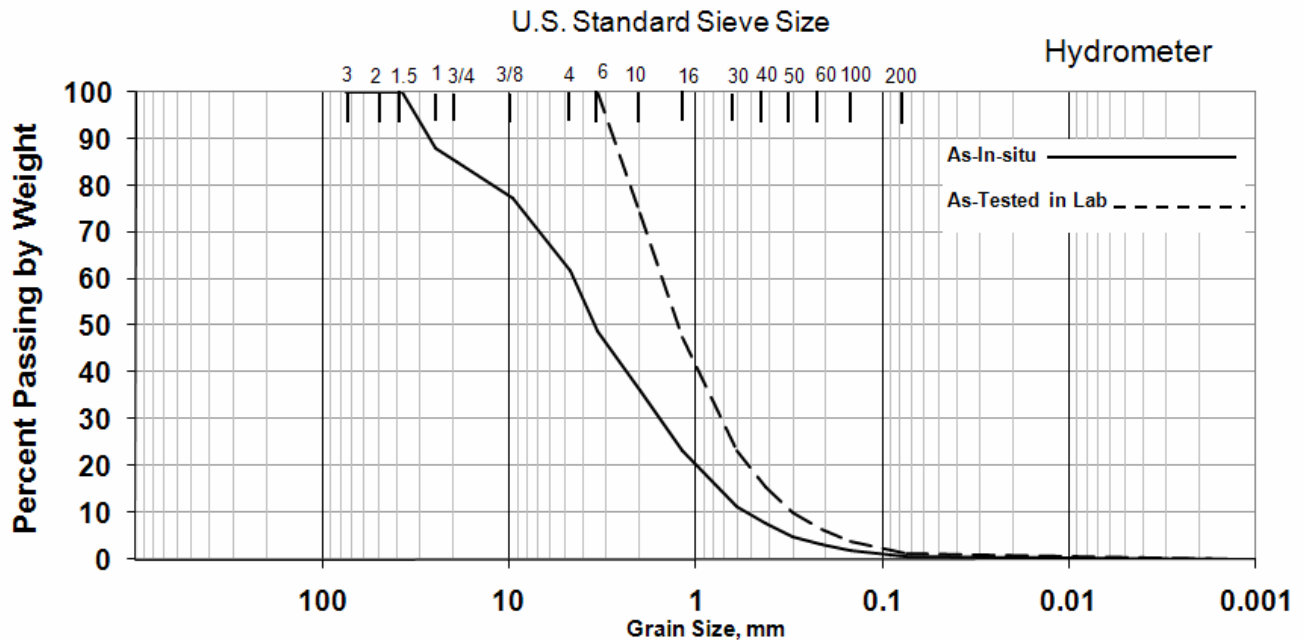
TEST NO: 37  
 TEST DATE: 7/19/2007

SAMPLE: **SSW-AAF-0007-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.9  
 PLASTIC LIMIT: 20.7  
 PLASTICITY INDEX: 7.2  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 38.0  
 SAND: 61.4  
 FINE: 0.6

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

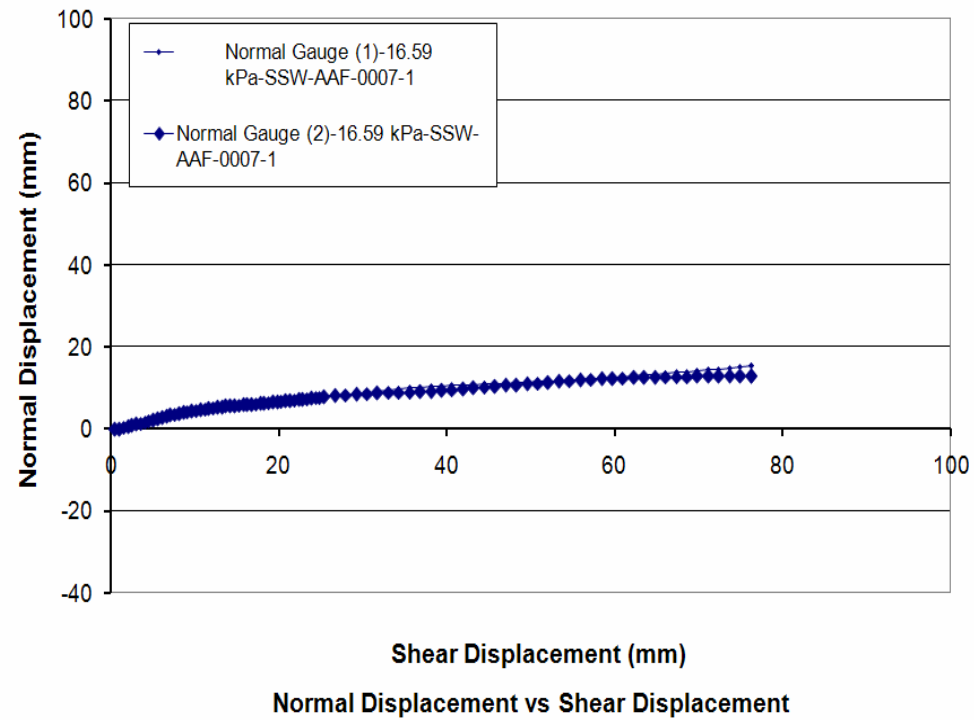
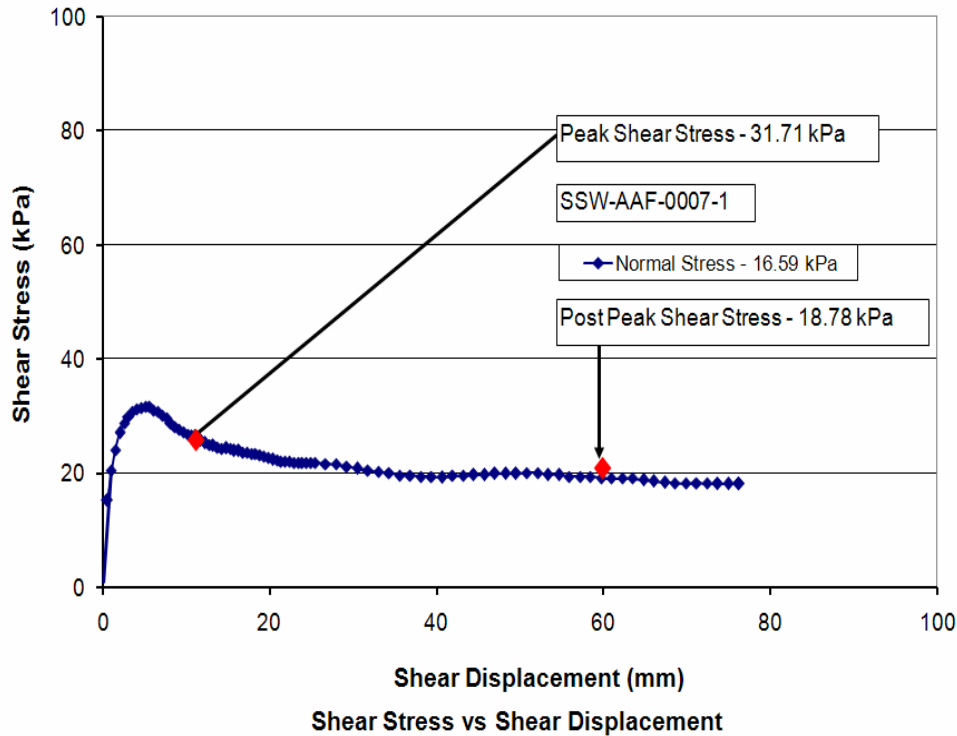
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	36.21	0.0419		0.0015	
2	50	100.00	16	18.01	23.30	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	11.44	0.0217			
1	25	88.03	40	13.80	7.68	0.0157			
3/4	19	84.98	50	12.53	4.91	0.0114			
3/8	9.5	77.37	70	11.48	3.11	0.0082			
4	4.75	61.97	100	10.47	1.93	0.0058			
6	3.36	48.95	200	8.39	0.58	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 37  
 TEST DATE: N/A

UTM Northing: 4060551  
 UTM Easting: 453687



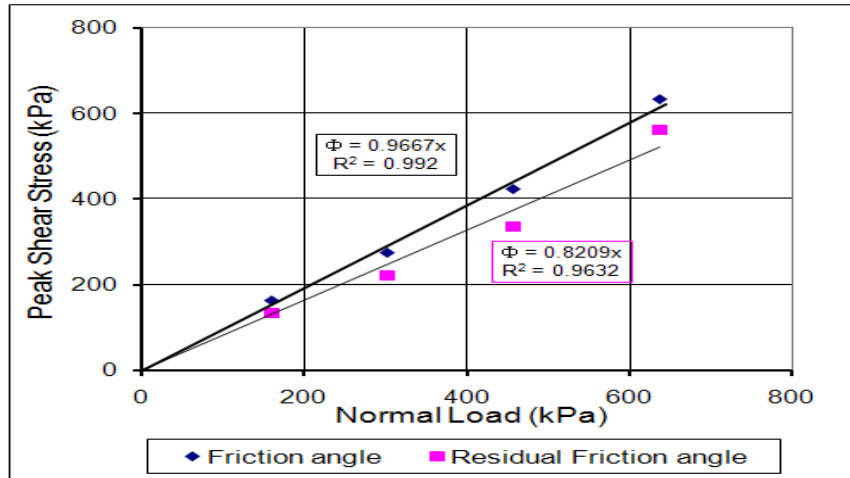
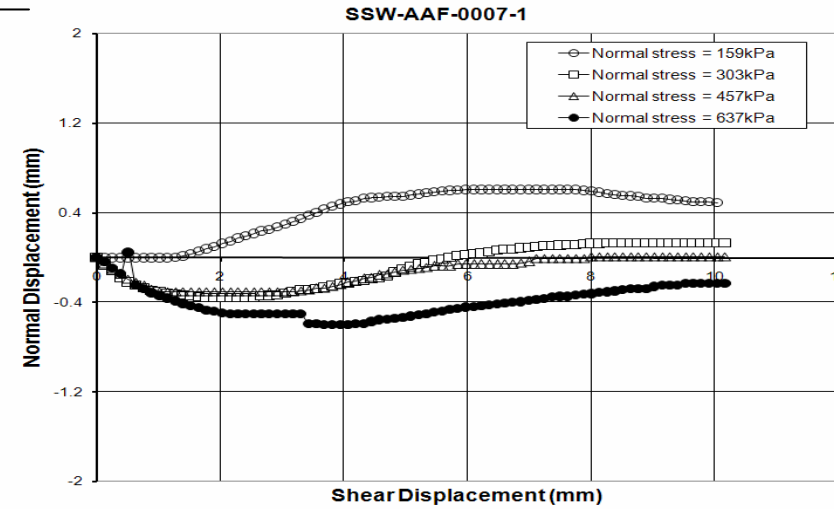
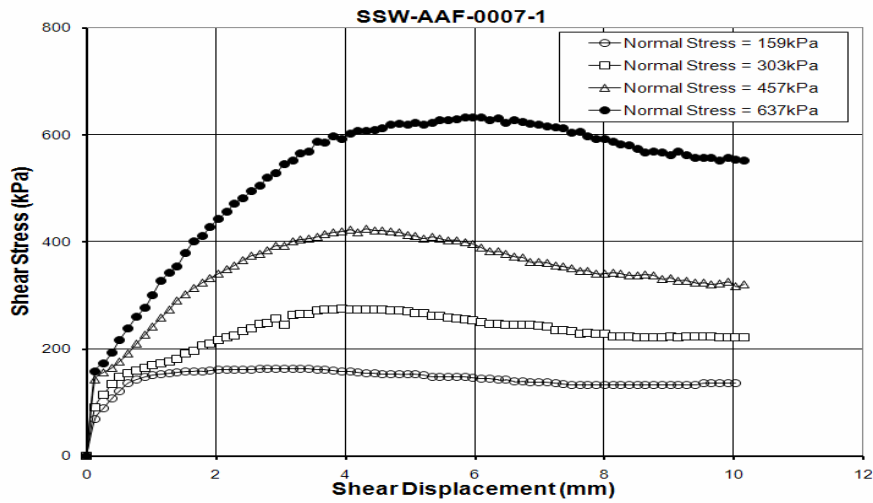
<b>Field id:</b>	SSW-AAF-0007-1						
Measured Cohesion	13.16	Water Content	7.76	Shear box size	60	Peak Shear Stress	31.71
Intrinsic Cohesion	12.89	Wet Density	2	Matric Suction	9	Post Peak Shear Stress	18.78
Max. Particle Size	10.16	Dry density	1.86	Normal Stress	16.59	Elevation	2743.0



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

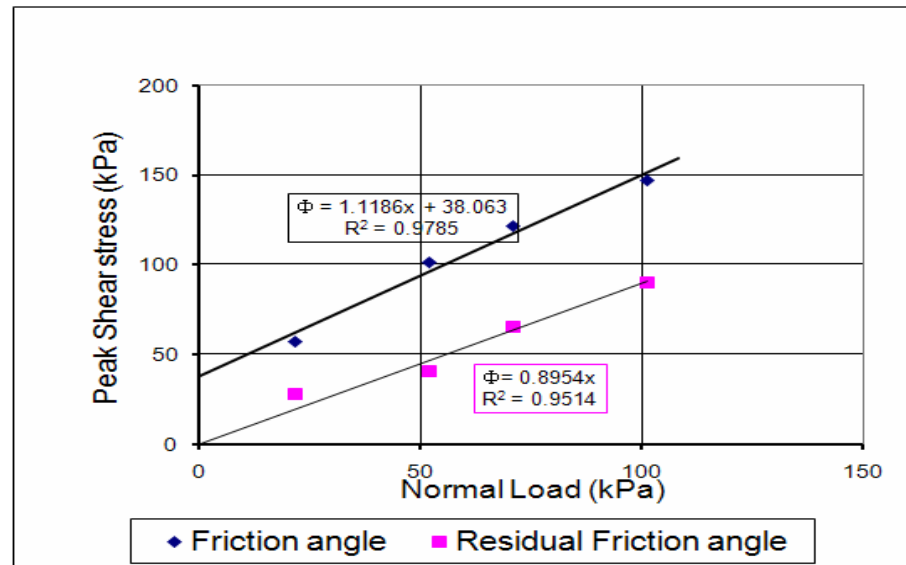
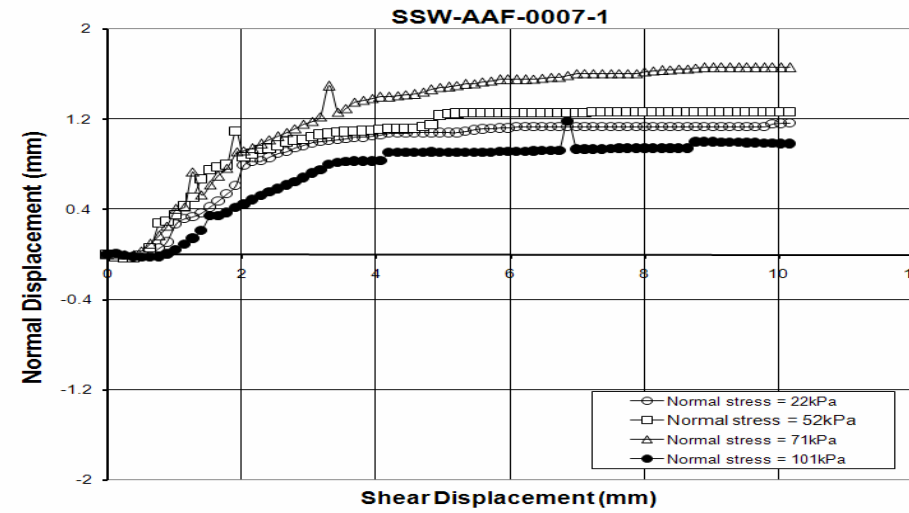
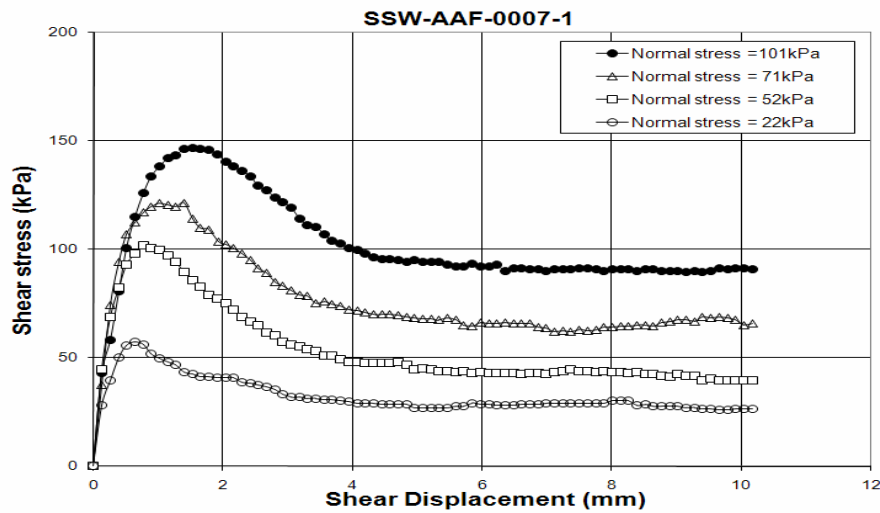
TEST NO: 37  
 TEST DATE: 9/14/2007



<b>Field id:</b>	SSW-AAF-0007-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	163.93,276.14,424.44,633.87
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	134.13,223.09,335.66,562.76
Friction Angle	44.03	Dry density	1860	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 37  
 TEST DATE: 9/1/2007



<b>Field id:</b>	SSW-AAF-0007-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	57.30,101.86,121.49,146.95
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	28.05,40.96,65.61,90.47
Friction Angle	48.2	Dry density	1890	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

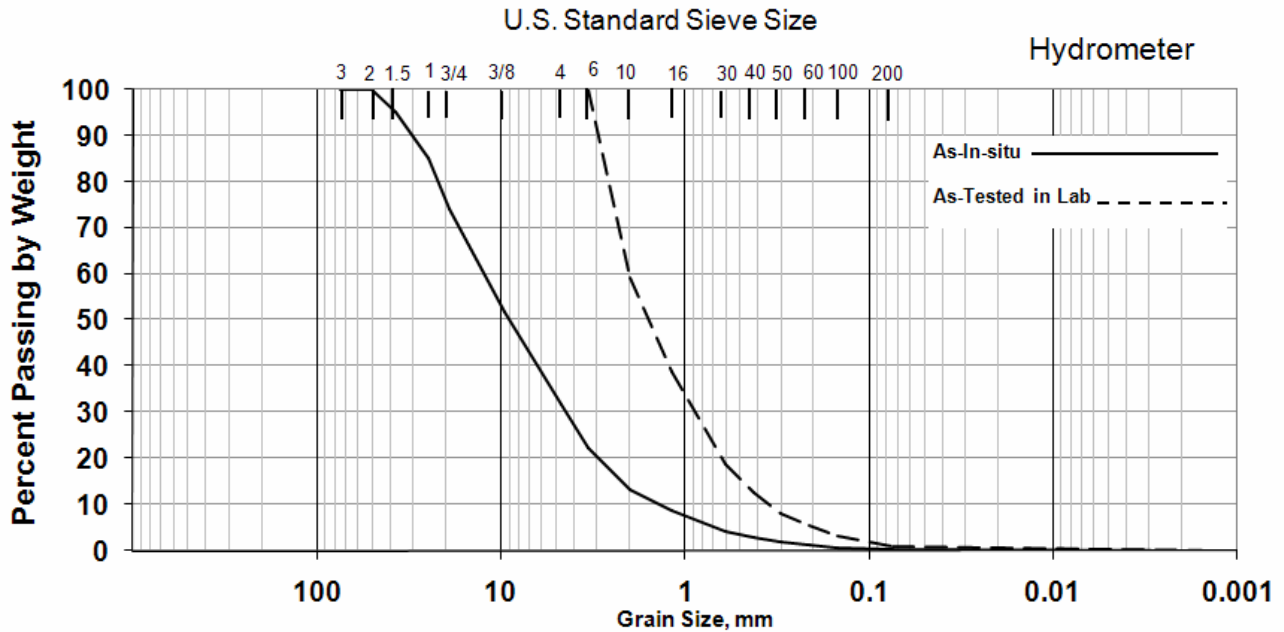
TEST NO: 38  
 TEST DATE: 7/19/2007

SAMPLE: **SSW-VTM-0600-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.3  
 PLASTIC LIMIT: 17.6  
 PLASTICITY INDEX: 7.7  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 68.3  
 SAND: 31.5  
 FINE: 0.2

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

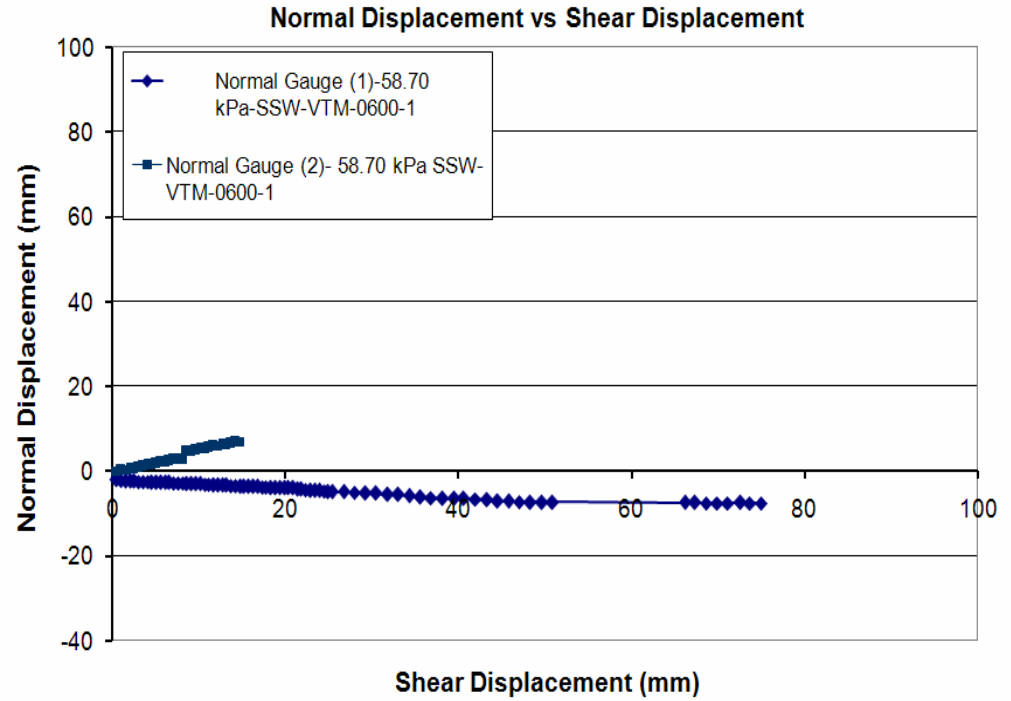
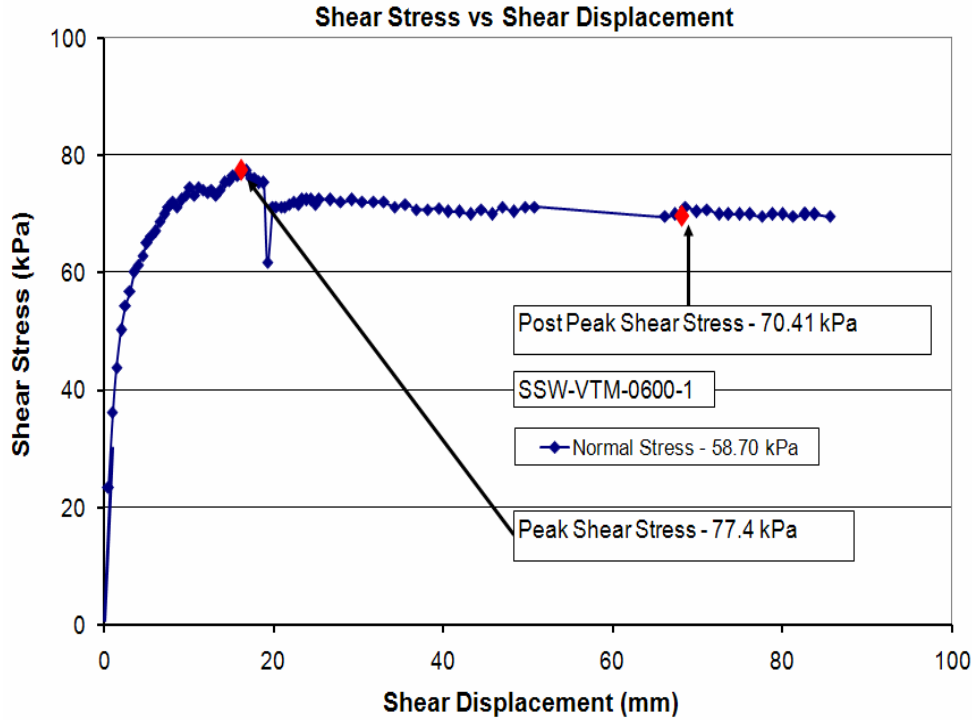
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	13.27	0.0419		0.0015	
2	50	100.00	16	18.01	8.68	0.0303		0.0013	
1-1/2	37.5	95.01	30	15.04	4.19	0.0217			
1	25	85.09	40	13.80	2.84	0.0157			
3/4	19	74.27	50	12.53	1.84	0.0114			
3/8	9.5	51.64	70	11.48	1.20	0.0082			
4	4.75	31.71	100	10.47	0.70	0.0058			
6	3.36	22.39	200	8.39	0.18	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 38  
 TEST DATE: N/A

UTM Northing: 4060829  
 UTM Easting: 453963

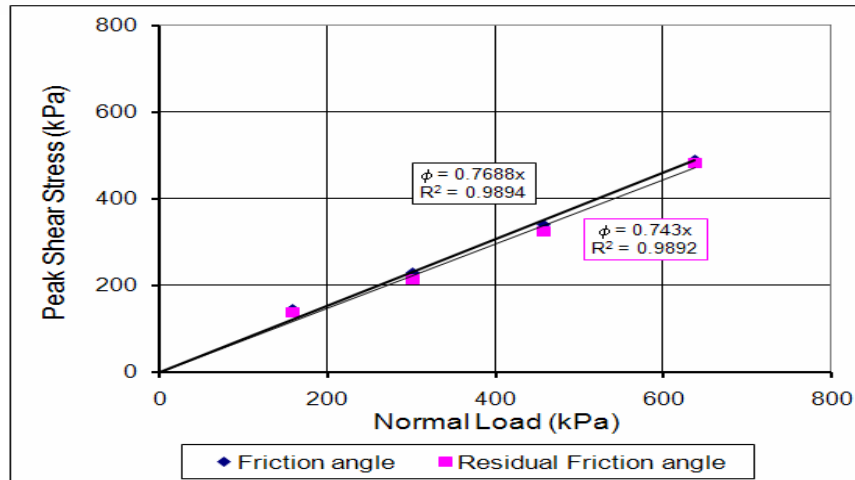
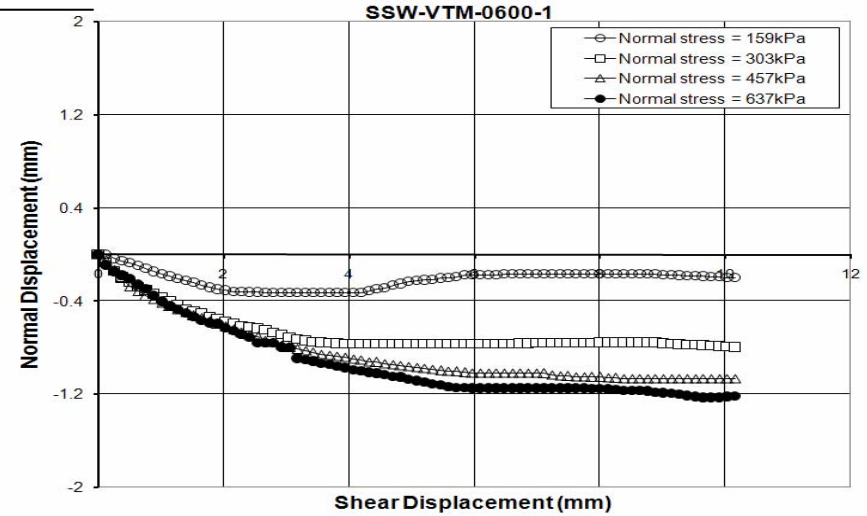
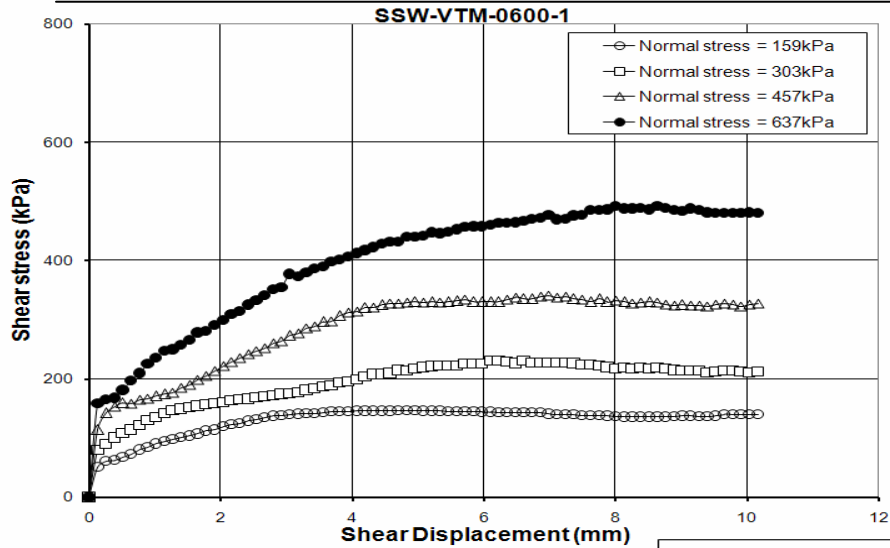


<b>Field id:</b>	SSW-VTM-0600-1						
Measured Cohesion	19.29	Water Content	6.26	Shear box size	30	Peak Shear Stress	77.4
Intrinsic Cohesion	na	Wet Density	1.49	Matric Suction	9	Post Peak Shear Stress	70.41
Max. Particle Size	2.54	Dry density	1.4	Normal Stress	58.70	Elevation	2943.9

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

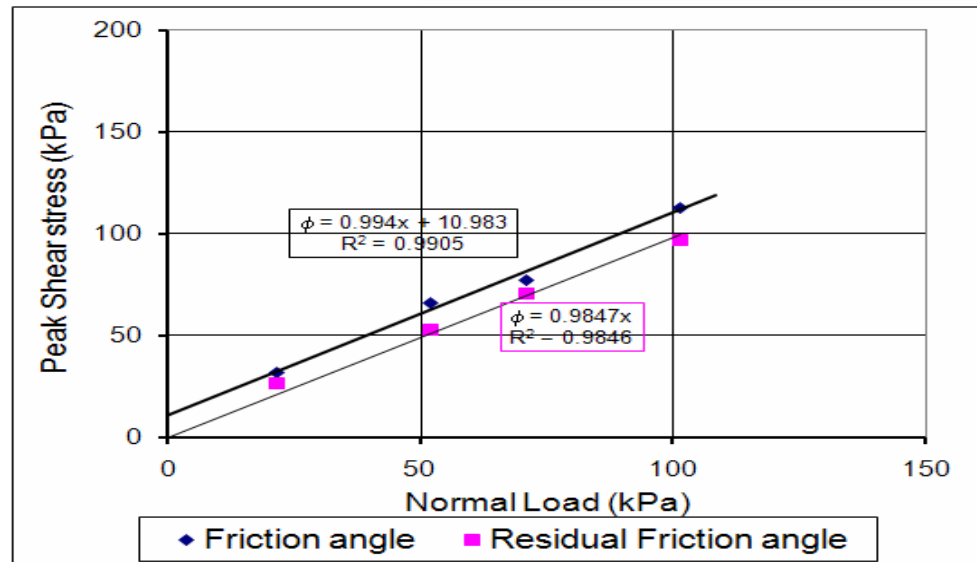
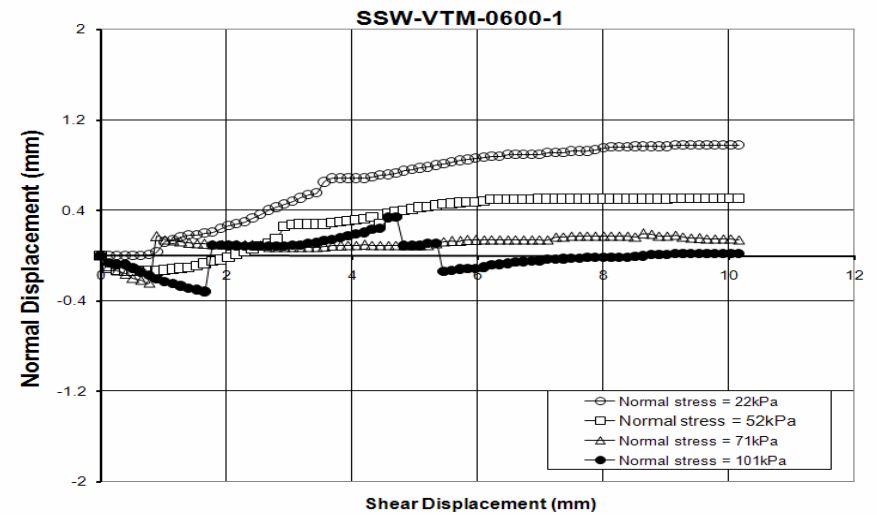
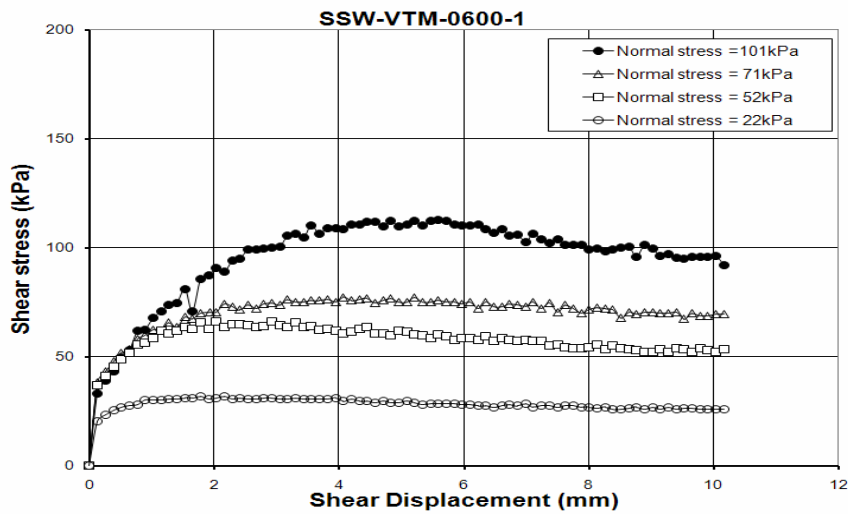
TEST NO: 38  
 TEST DATE: 9/29/2006



<b>Field id:</b>	SSW-VTM-0600-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	37.55	Dry density	1410	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 38  
 TEST DATE: 7/26/2007



<b>Field id:</b>	SSW-VTM-0600-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	31.83,66.31,77.45,113.00
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.69,53.24,70.65,97.22
Friction Angle	44.83	Dry density	1410	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

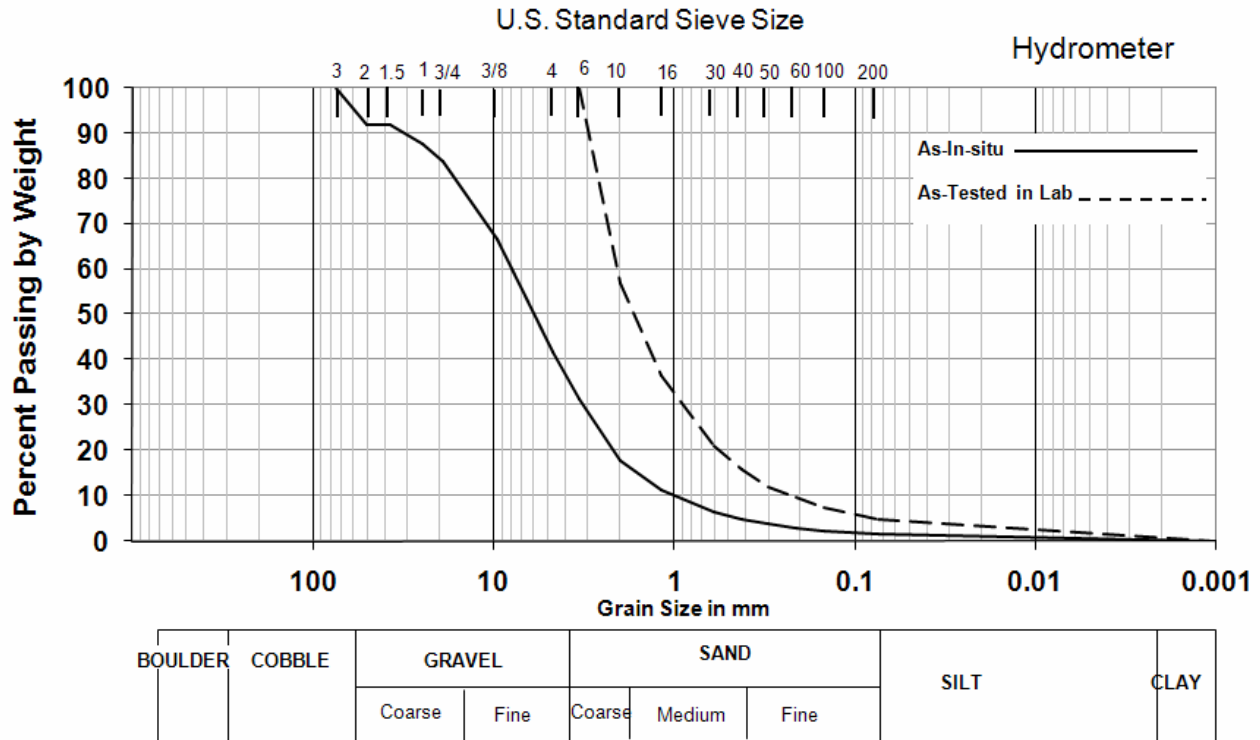
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 39  
 TEST DATE: 5/26/2007

SAMPLE: SSW-VTM-0600-2  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 24.6	GRAVEL: 58.2
PLASTIC LIMIT: 18.4	SAND: 40.4
PLASTICITY INDEX: 6.2	FINE: 1.4
SPECIFIC GRAVITY: 2.79	
ATTERBERG CLASSIFICATION: CL-ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

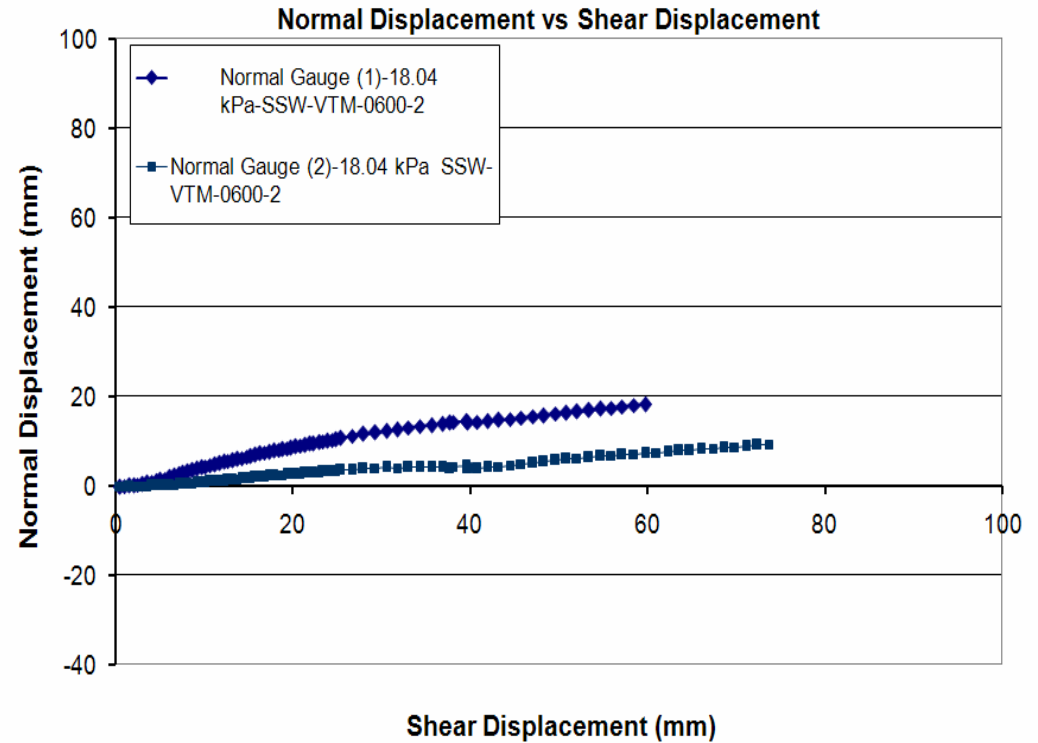
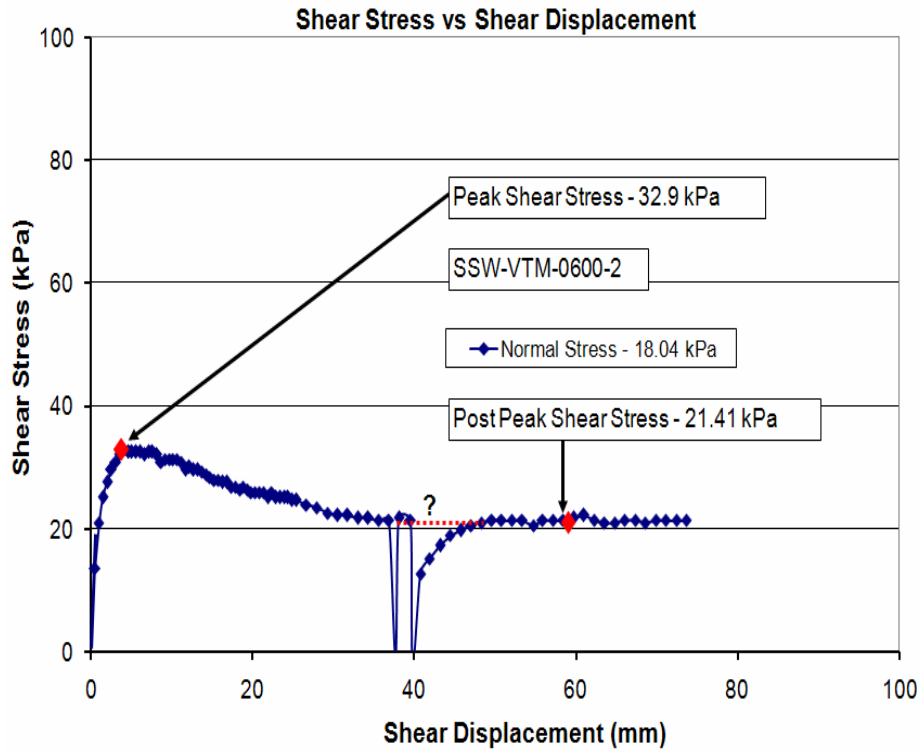
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	17.82	0.0419		0.0015	
2	50	91.82	16	18.01	11.47	0.0303		0.0013	
1-1/2	37.5	91.82	30	15.04	6.58	0.0217			
1	25	87.71	40	13.80	4.93	0.0157			
3/4	19	83.87	50	12.53	3.78	0.0114			
3/8	9.5	66.81	70	11.48	3.00	0.0082			
4	4.75	41.84	100	10.47	2.36	0.0058			
6	3.36	31.32	200	8.39	1.47	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 39  
 TEST DATE: N/A

UTM Northing: 4060829  
 UTM Easting: 453963



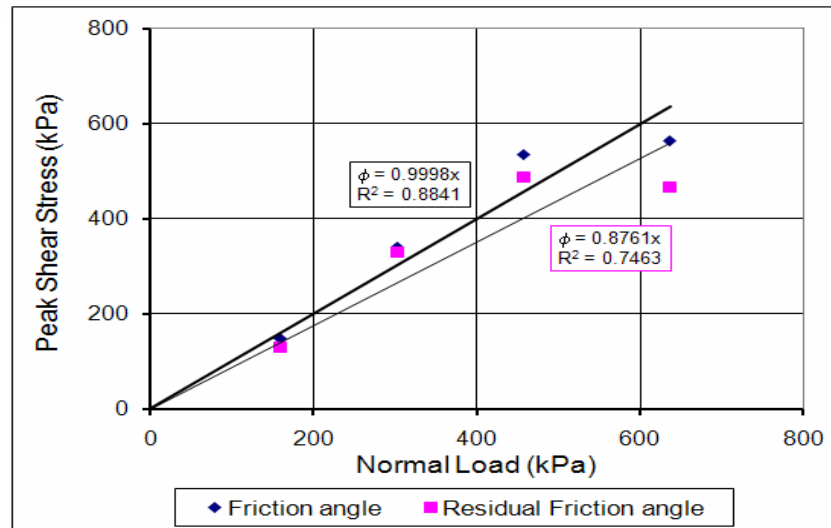
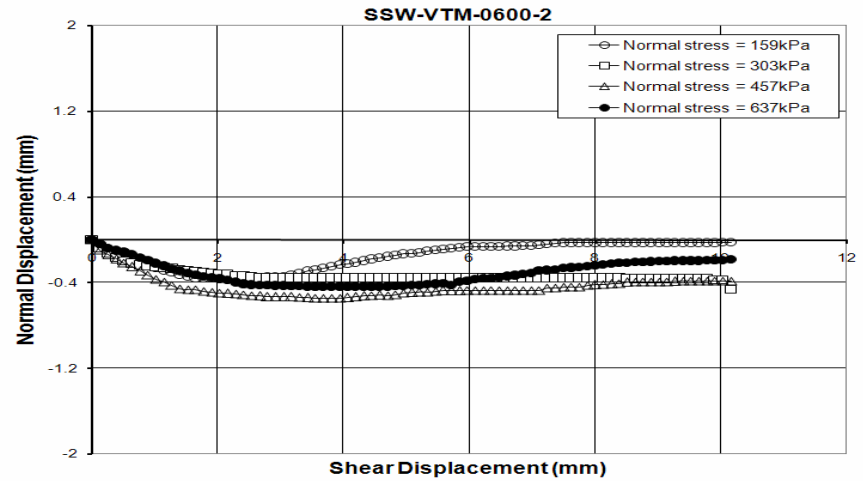
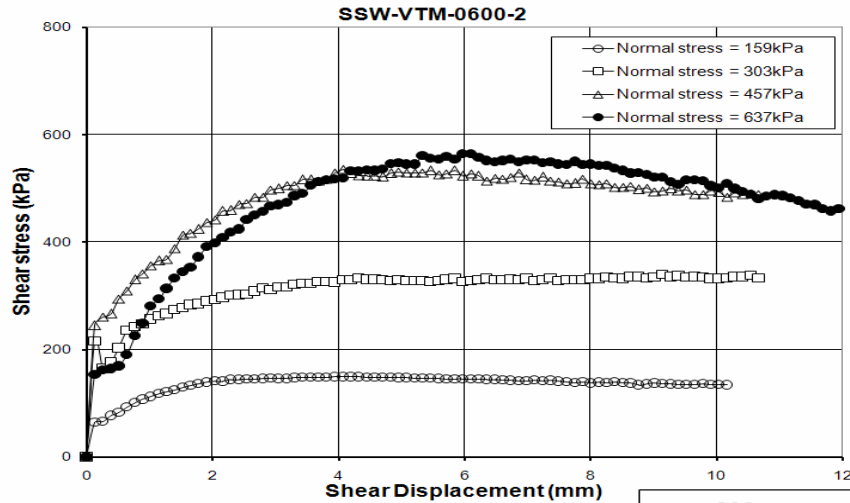
<b>Field id:</b>	SSW-VTM-0600-2						
Measured Cohesion	13.64	Water Content	9.81	Void Ratio	0.68	Peak Shear Stress	32.9
Intrinsic Cohesion	13.53	Wet Density	1830	Matric Suction	0.40	Post Peak Shear Stress	21.41
Max. Particle Size	2.54	Dry density	1660	Normal Stress	18.04	Elevation	2943.9



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

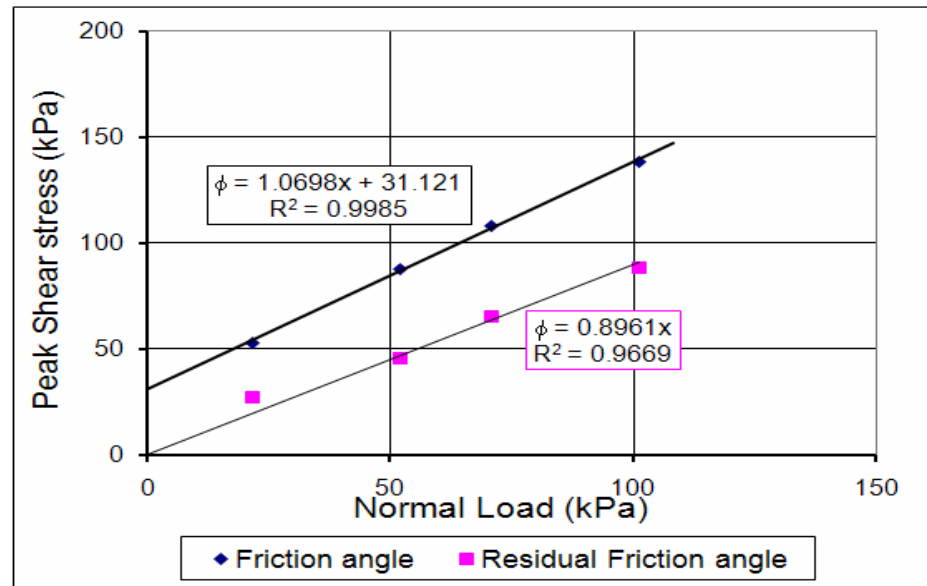
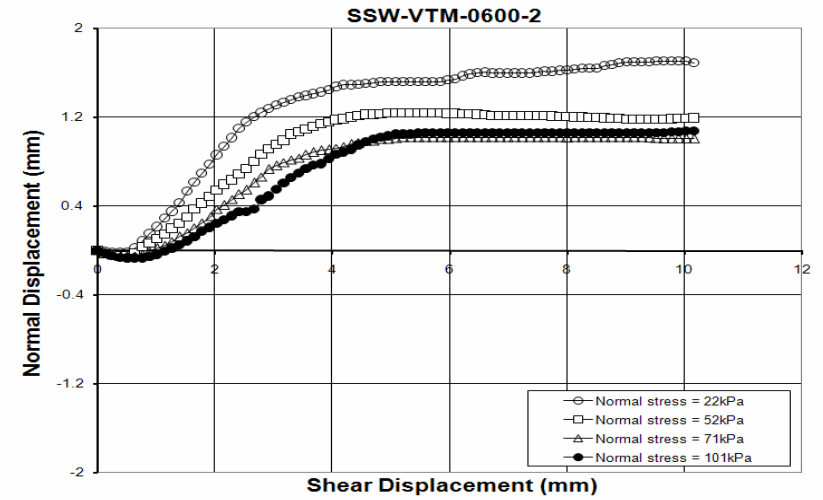
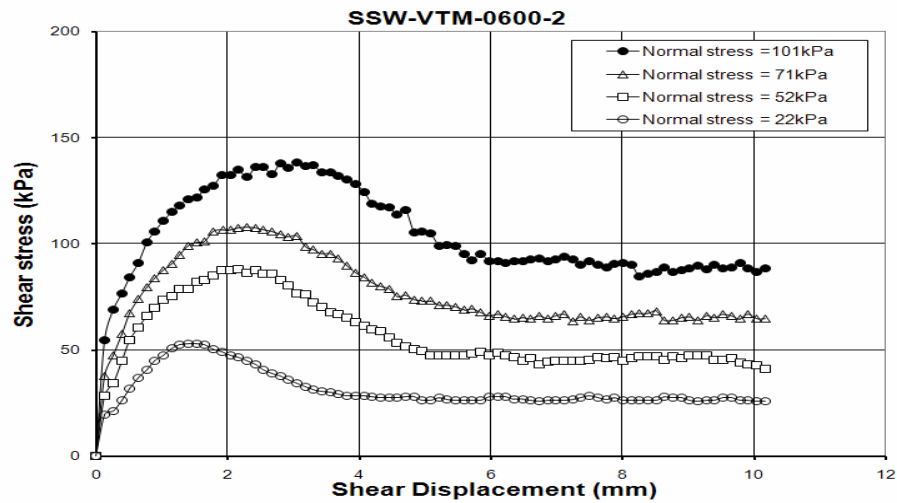
TEST NO: 39  
 TEST DATE: 9/30/2006



<b>Field id:</b>	SSW-VTM-0600-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	149.60,339.88,536.31,564.93
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	131.41,329.33,489.22,466.21
Friction Angle	44.99	Dry density	1750	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 39  
 TEST DATE: 5/16/2007



<b>Field id:</b>	SSW-VTM-0600-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	53.05,88.06,108.22,138.46
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.01,45.62,65.61,88.42
Friction Angle	46.93	Dry density	1680	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

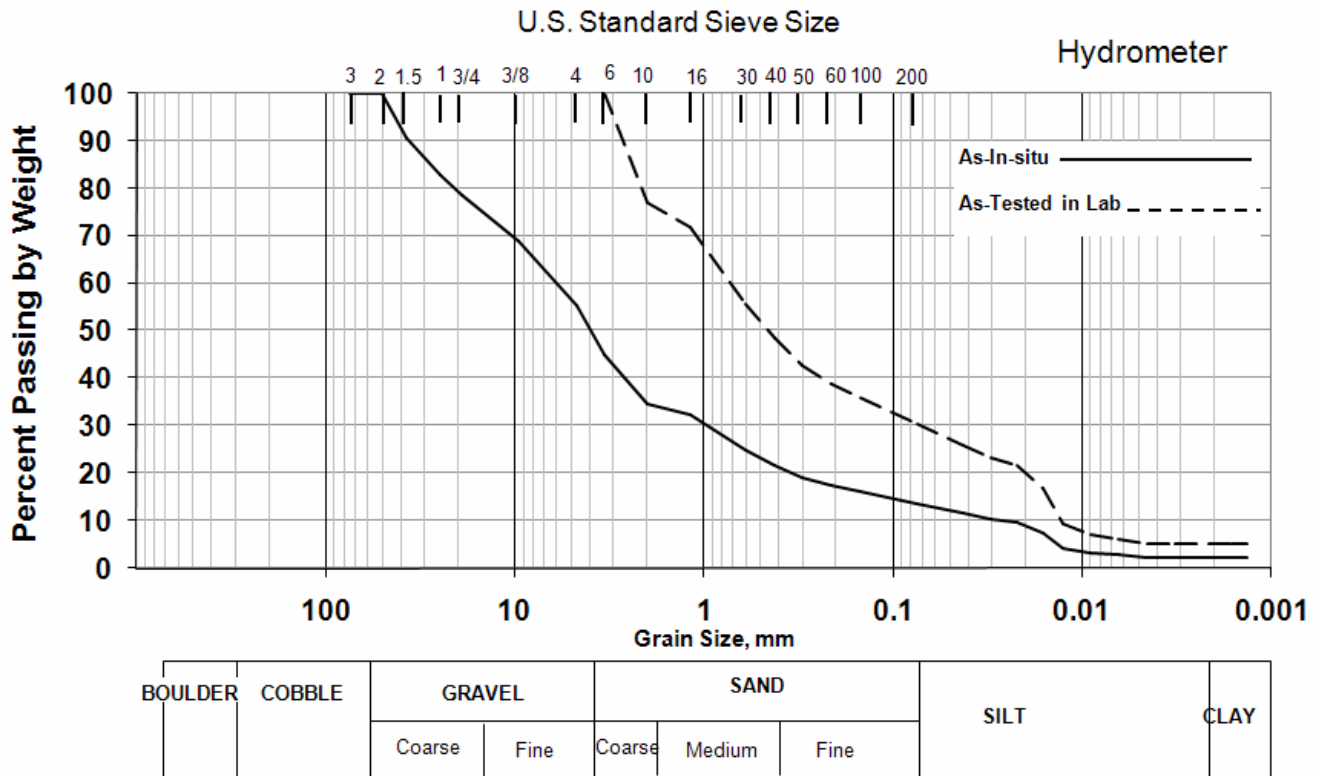
TEST NO: 40  
 TEST DATE: 9/30/2006

SAMPLE: **SSW-VTM-0600-3**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.0  
 PLASTIC LIMIT: 20.8  
 PLASTICITY INDEX: 9.2  
 SPECIFIC GRAVITY: 2.80  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 44.6  
 SAND: 41.8  
 FINE: 13.6

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

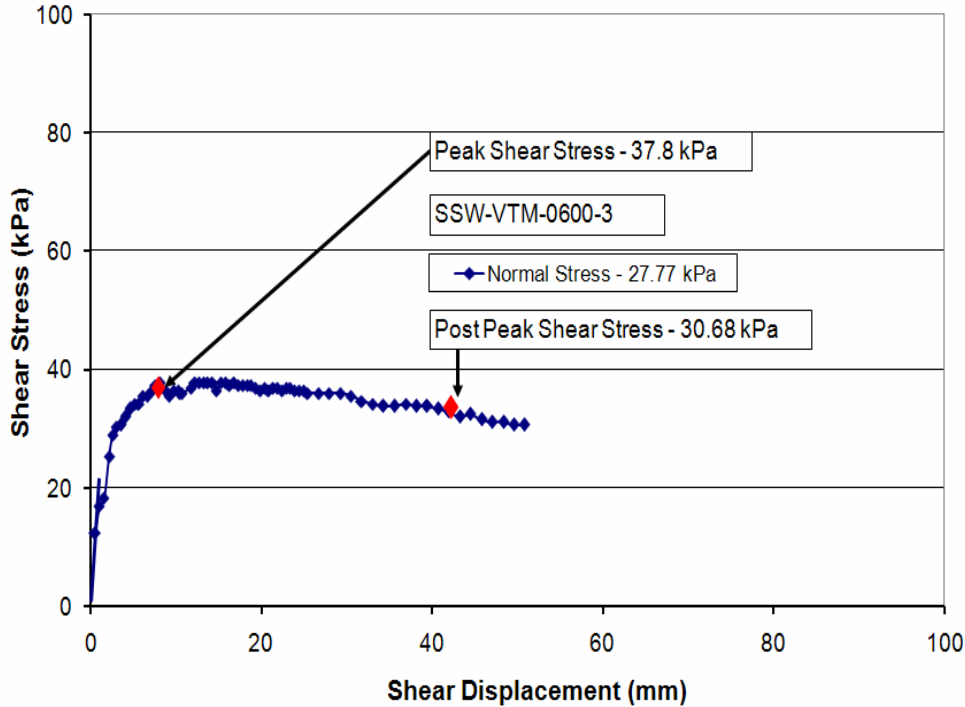
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	34.55	0.0419	11.60	0.0015	2.33
2	50	100.00	16	18.01	32.30	0.0303	10.50	0.0013	2.33
1-1/2	37.5	90.76	30	15.04	24.94	0.0217	9.76		
1	25	82.88	40	13.80	21.79	0.0157	7.55		
3/4	19	78.64	50	12.53	19.21	0.0114	4.23		
3/8	9.5	68.94	70	11.48	17.36	0.0082	3.13		
4	4.75	55.45	100	10.47	16.08	0.0058	2.76		
6	3.36	44.89	200	8.39	13.62	0.0042	2.39		

## IN-SITU DIRECT SHEAR TEST REPORT

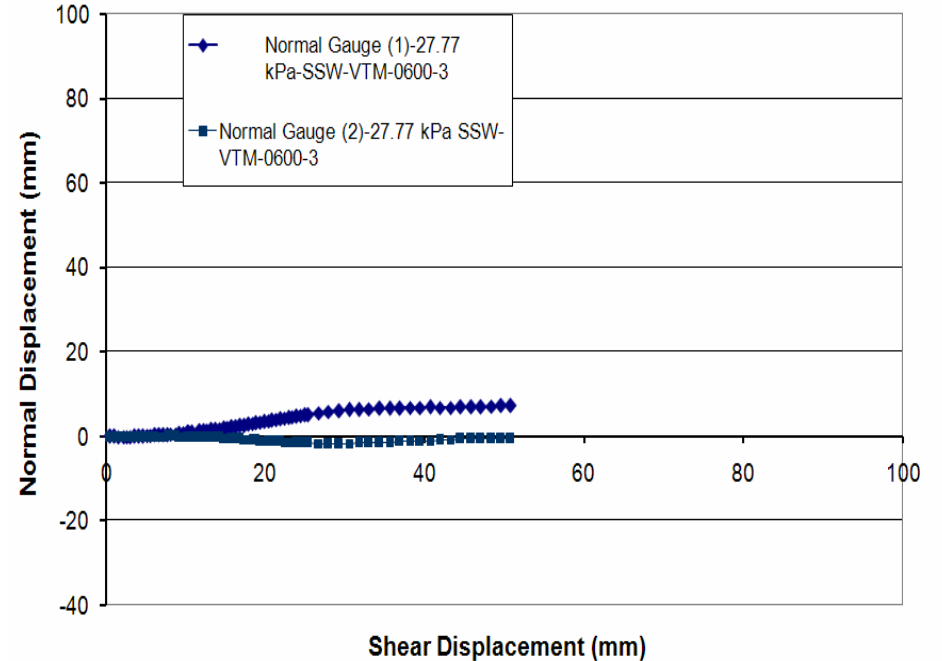
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 40  
 TEST DATE: N/A

UTM Northing: 4060578  
 UTM Easting: 453691



**Shear Stress vs Shear Displacement**



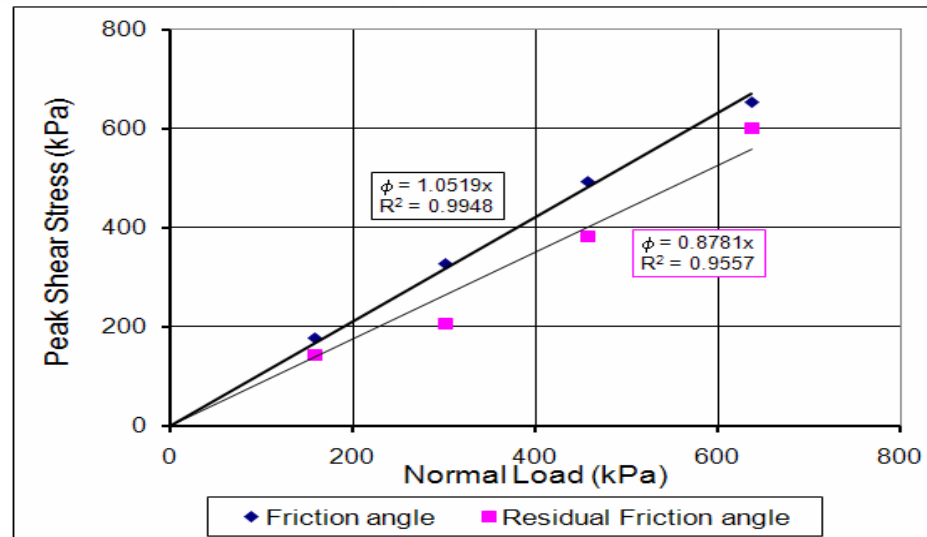
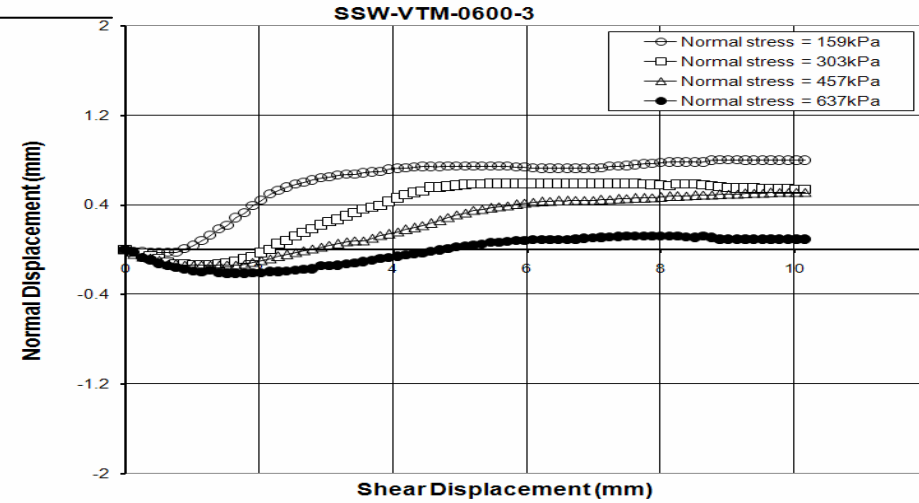
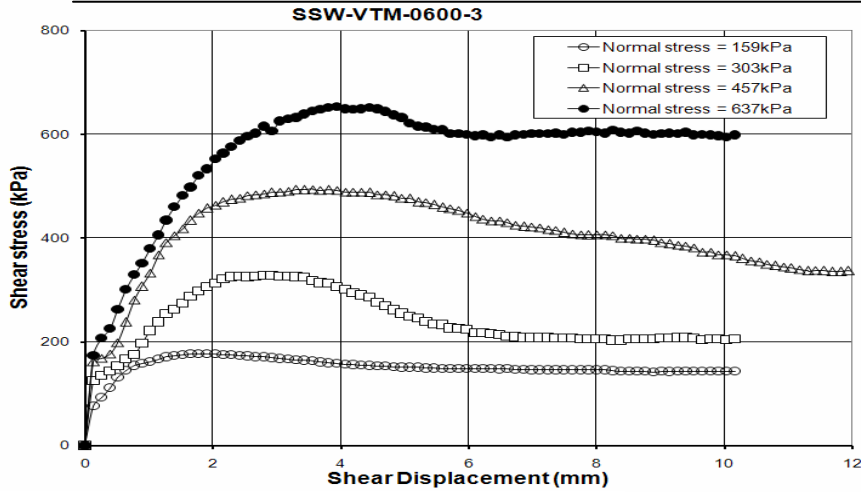
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-VTM-0600-3						
Measured Cohesion	2.30	Water Content	10.20	Shear box size	30	Peak Shear Stress	37.8
Intrinsic Cohesion	1.50	Wet Density	2090	Matric Suction	3	Post Peak Shear Stress	30.68
Max. Particle Size	2.54	Dry density	1900	Normal Stress	27.77	Elevation	2748.5

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

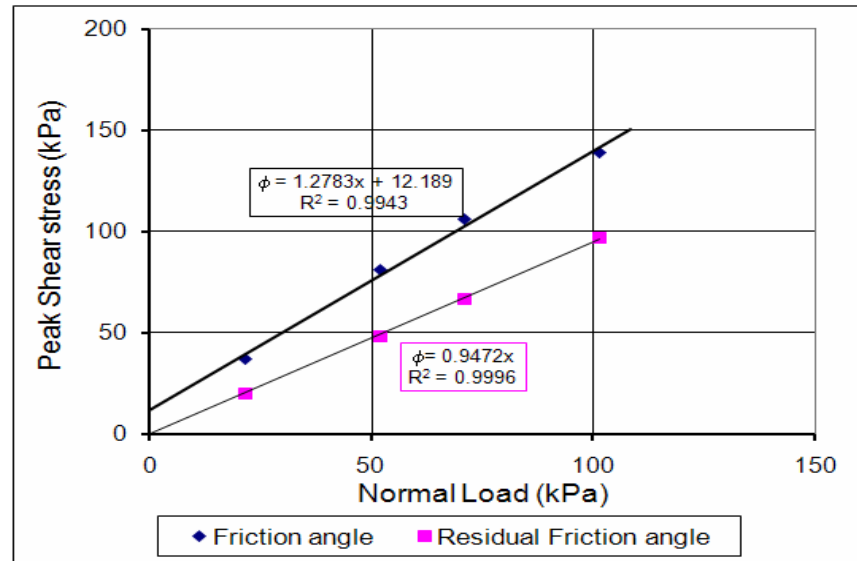
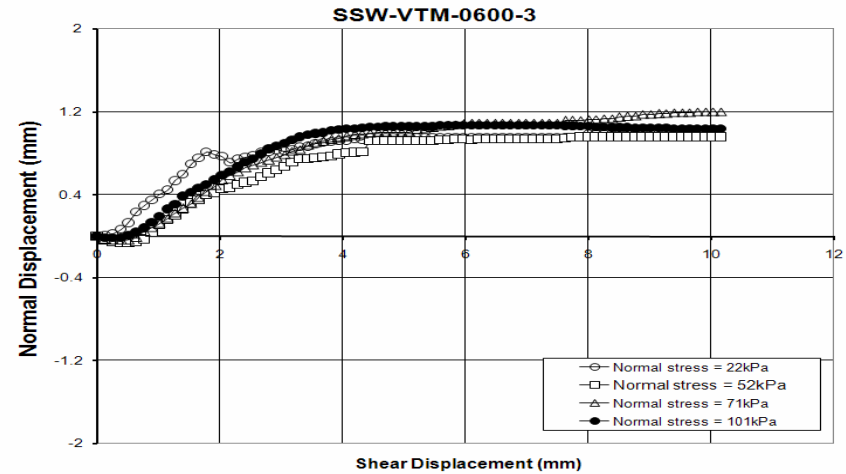
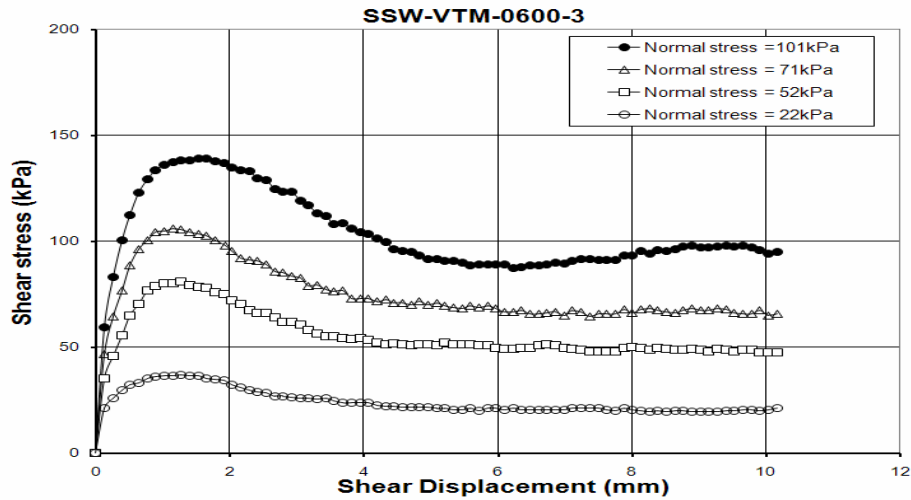
TEST NO: 40  
 TEST DATE: 9/29/2006



<b>Field id:</b>	SSW-VTM-0600-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	177.19,328.18,494.68,653.38
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	144.36,205.97,382.91,600.05
Friction Angle	46.45	Dry density	1800	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 40  
 TEST DATE: 7/26/2007



<b>Field id:</b>	SSW-VTM-0600-3						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	37.14,81.17,106.10,138.99
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	20.32,48.62,66.80,96.80
Friction Angle	51.96	Dry density	1800	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

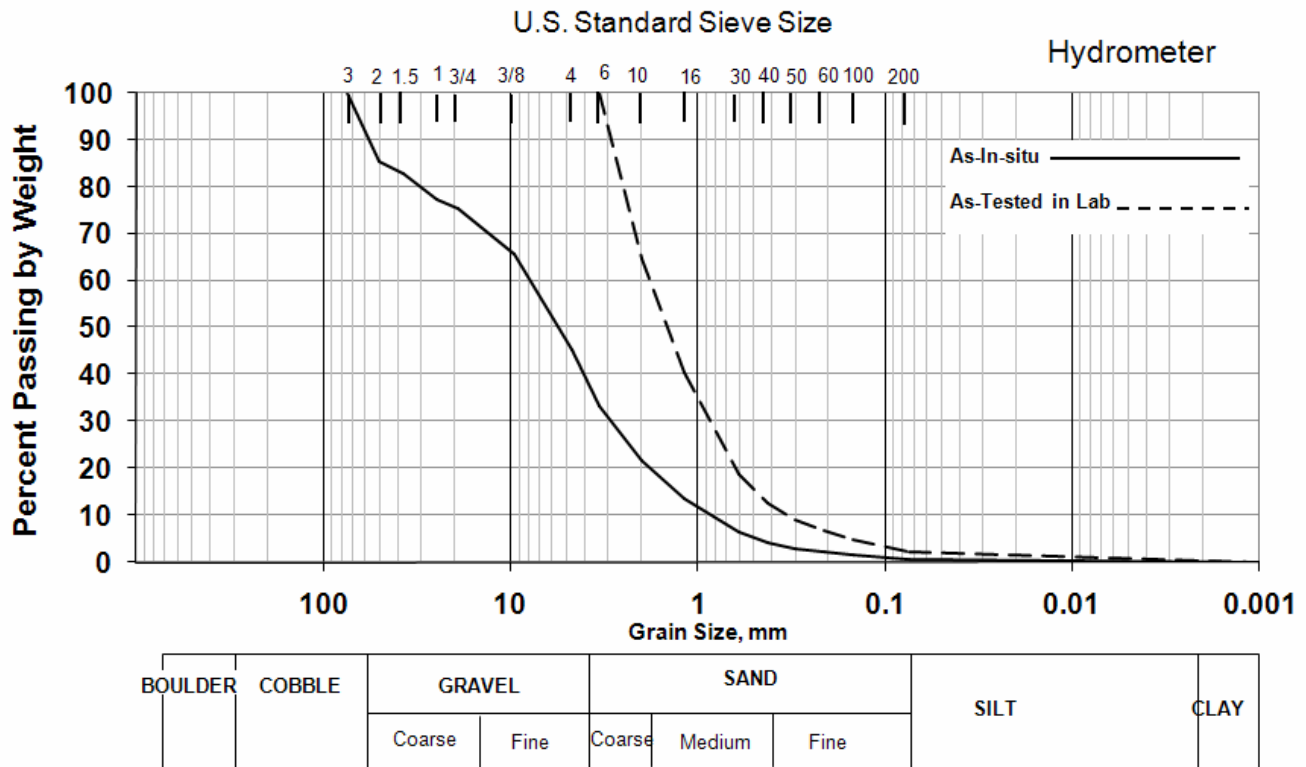
TEST NO: 41  
 TEST DATE: 12/25/2006

SAMPLE: **SSW-VTM-0016-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.2  
 PLASTIC LIMIT: 25.2  
 PLASTICITY INDEX: 2.0  
 SPECIFIC GRAVITY: 2.79  
 ATTERBERG CLASSIFICATION: **ML**

GRAVEL: 54.6  
 SAND: 44.7  
 FINE: 0.7

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

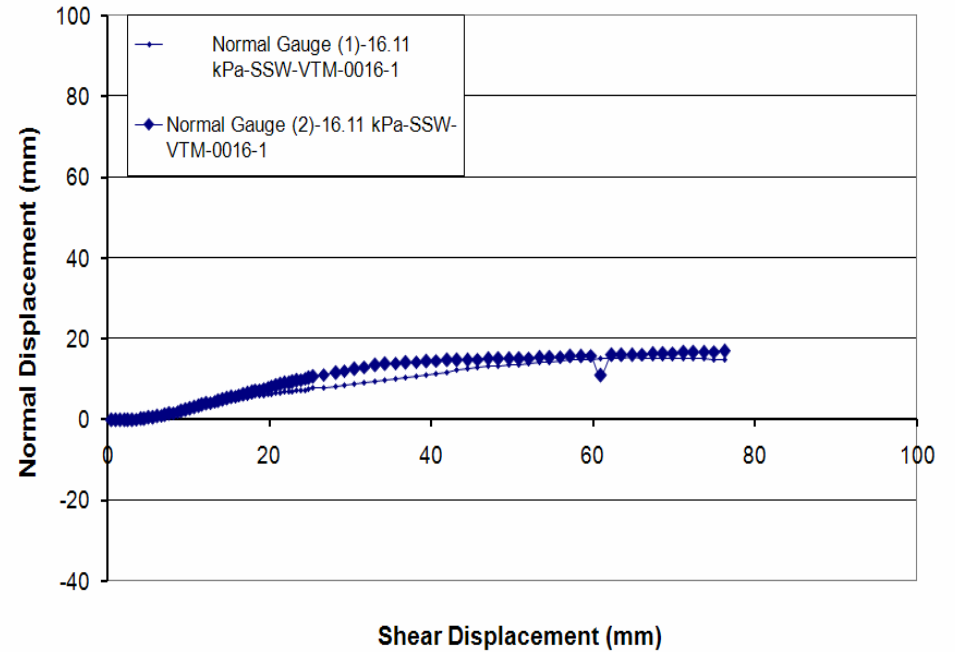
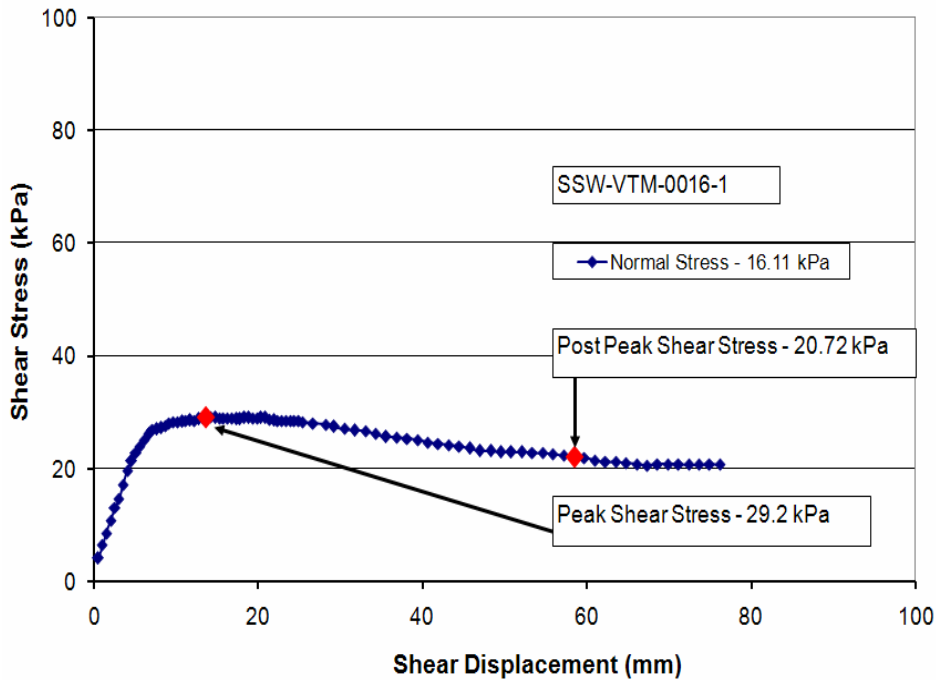
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	21.66	0.0419		0.0015	
2	50	85.44	16	18.01	13.48	0.0303		0.0013	
1-1/2	37.5	82.80	30	15.04	6.32	0.0217			
1	25	77.41	40	13.80	4.19	0.0157			
3/4	19	75.57	50	12.53	2.98	0.0114			
3/8	9.5	65.54	70	11.48	2.25	0.0082			
4	4.75	45.37	100	10.47	1.61	0.0058			
6	3.36	33.38	200	8.39	0.71	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 41  
 TEST DATE: N/A

UTM Northing: 4060491  
 UTM Easting: 453841



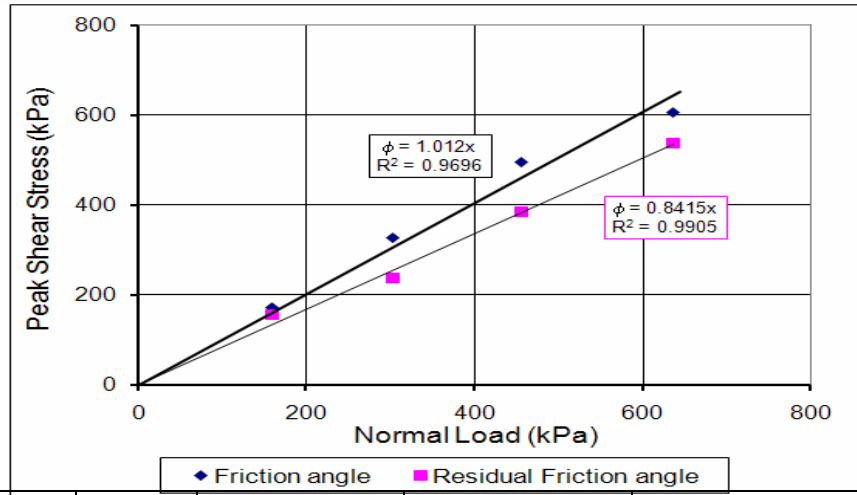
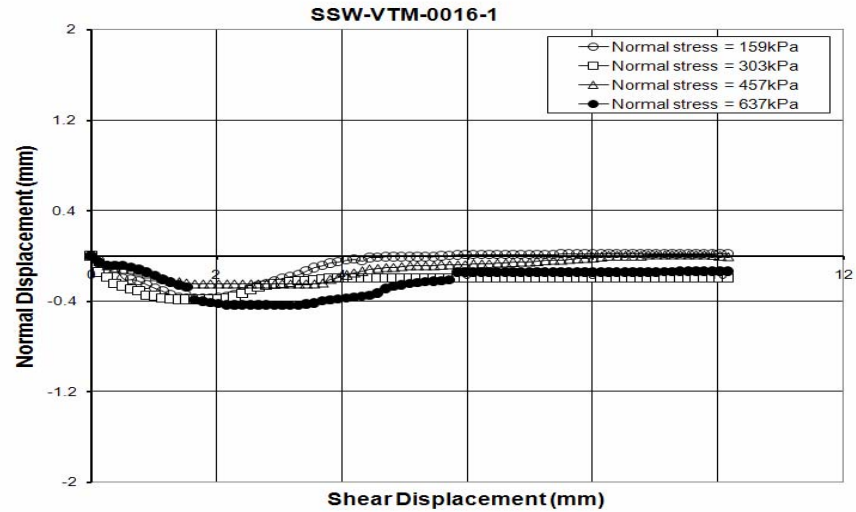
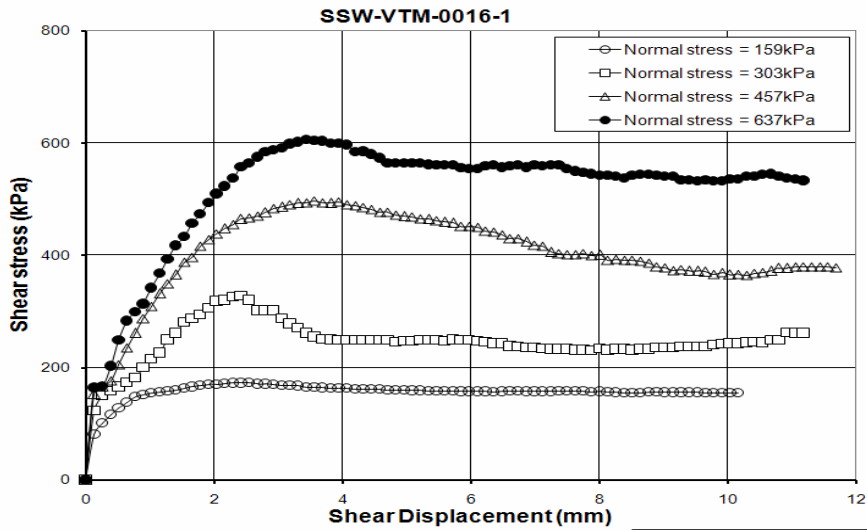
<b>Field id:</b>	SSW-VTM-0016-1						
Measured Cohesion	9.34	Water Content	6.54	Shear box size	60	Peak Shear Stress	29.2
Intrinsic Cohesion	8.54	Wet Density	2260	Matric Suction	3	Post Peak Shear Stress	20.72
Max. Particle Size	27.94	Dry density	2090	Normal Stress	16.11	Elevation	2843.3



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

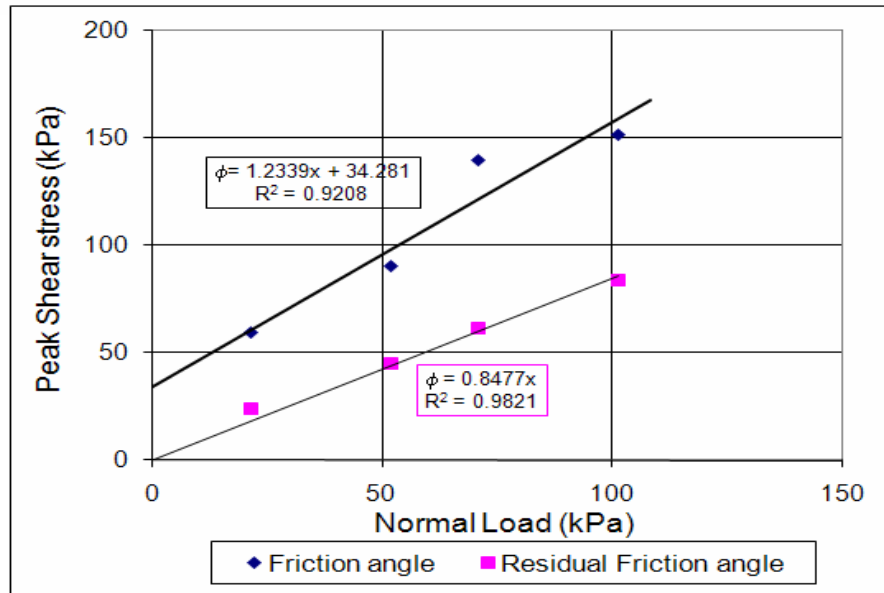
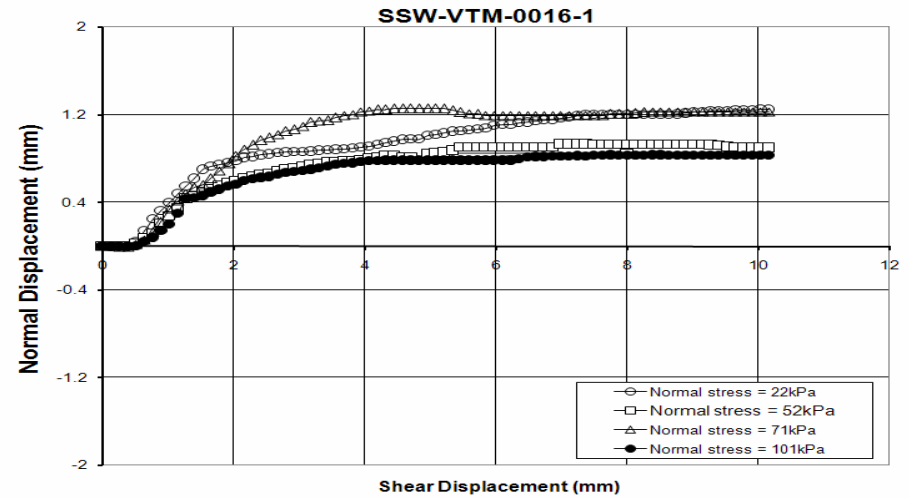
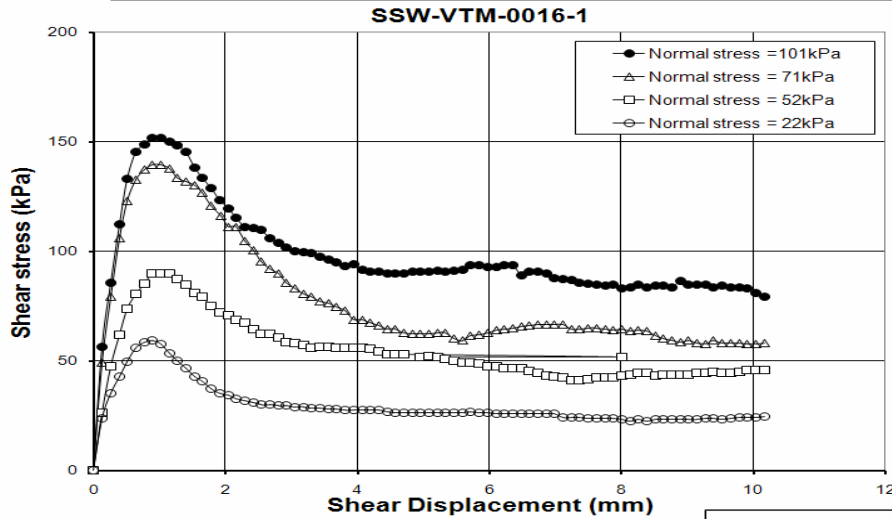
TEST NO: 41  
 TEST DATE: 1/24/2007



<b>Field id:</b>	SSW-VTM-0016-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	173.48,328.18,497.28,606.55
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	156.75,237.49,385.79,537.95
Friction Angle	45.34	Dry density	2	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 41  
 TEST DATE: 8/8/2007



<b>Field id:</b>	SSW-VTM-0016-1						
Measured Cohesion		Water Content		Shear box size	5.04	Peak Shear Stress	59.42,90.19,139.52,151.73
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.69,44.75,61.23,83.82
Friction Angle	50.98	Dry density	2080	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

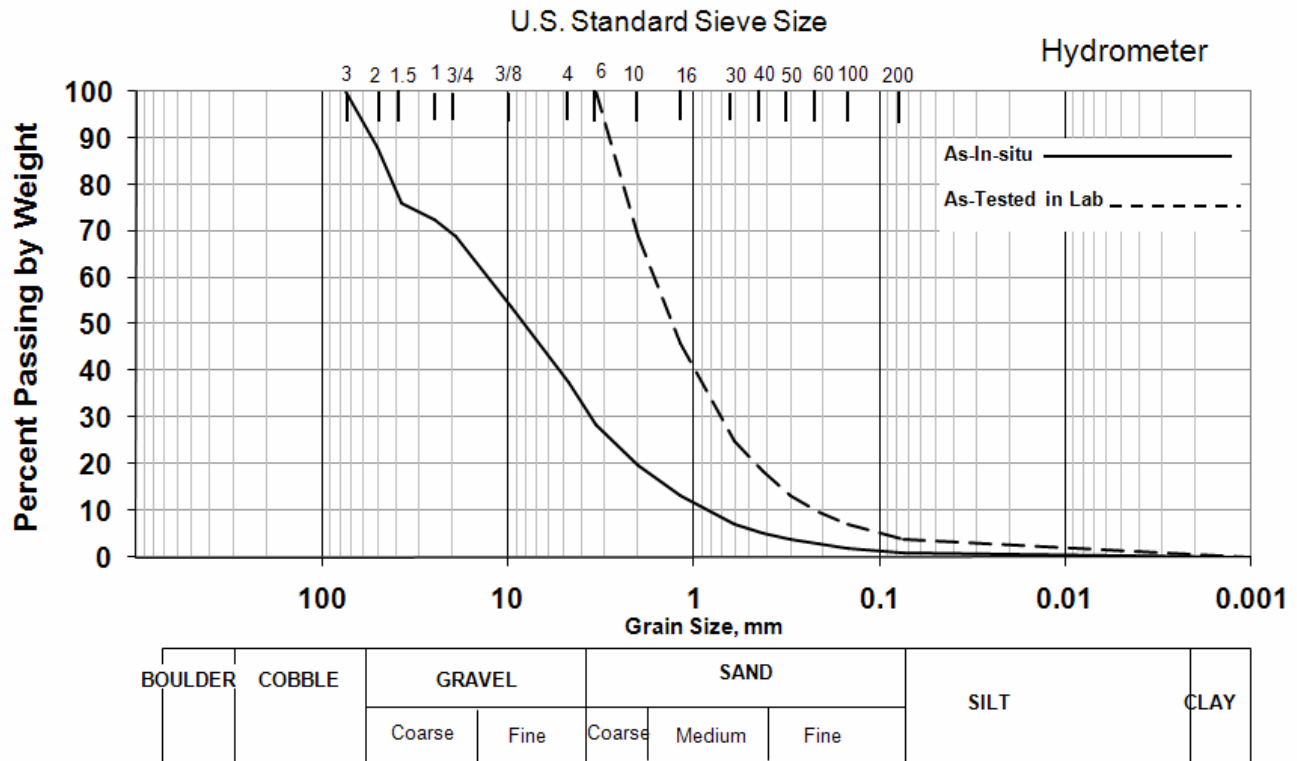
TEST NO: 42  
 TEST DATE: 12/25/2006

SAMPLE: **SSW-VTM-0016-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.8  
 PLASTIC LIMIT: 22.1  
 PLASTICITY INDEX: 8.6  
 SPECIFIC GRAVITY: 2.79  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 62.4  
 SAND: 36.5  
 FINE: 1.1

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

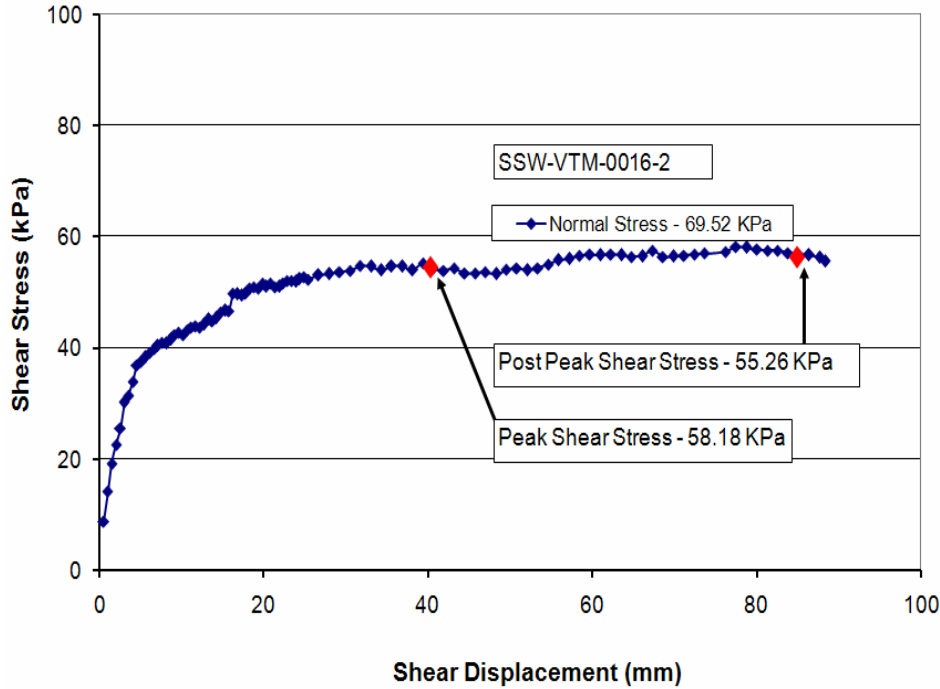
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	19.72	0.0419		0.0015	
2	50	87.93	16	18.01	13.18	0.0303		0.0013	
1-1/2	37.5	76.18	30	15.04	7.14	0.0217			
1	25	72.59	40	13.80	5.27	0.0157			
3/4	19	69.04	50	12.53	3.76	0.0114			
3/8	9.5	53.61	70	11.48	2.79	0.0082			
4	4.75	37.64	100	10.47	2.03	0.0058			
6	3.36	28.58	200	8.39	1.12	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

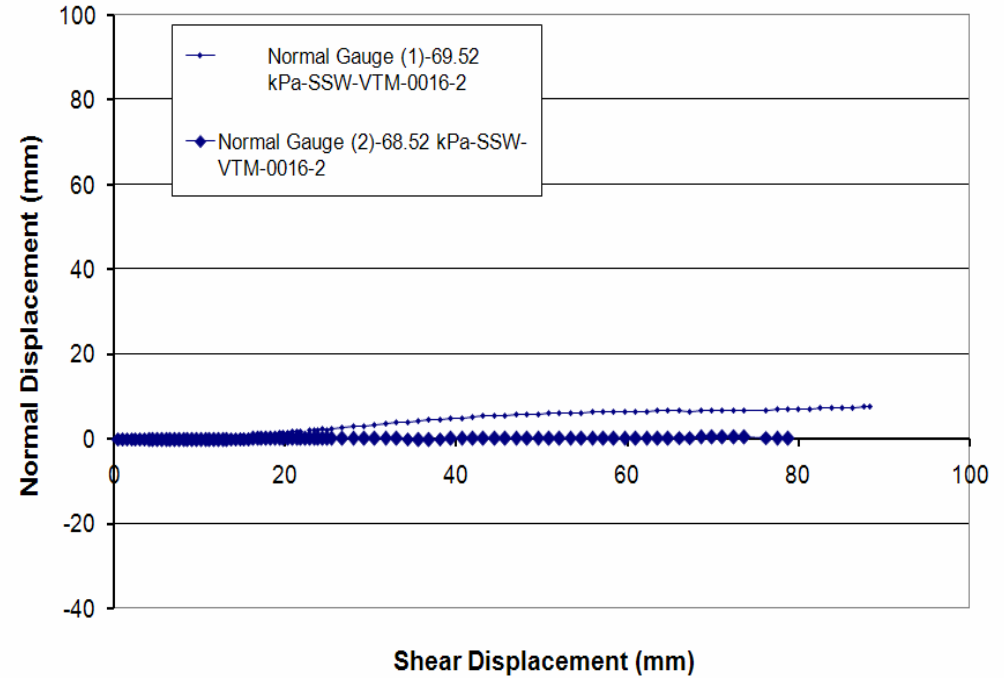
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 42  
 TEST DATE: N/A

UTM Northing: 4060491  
 UTM Easting: 453841



**Shear Stress vs Shear Displacement**



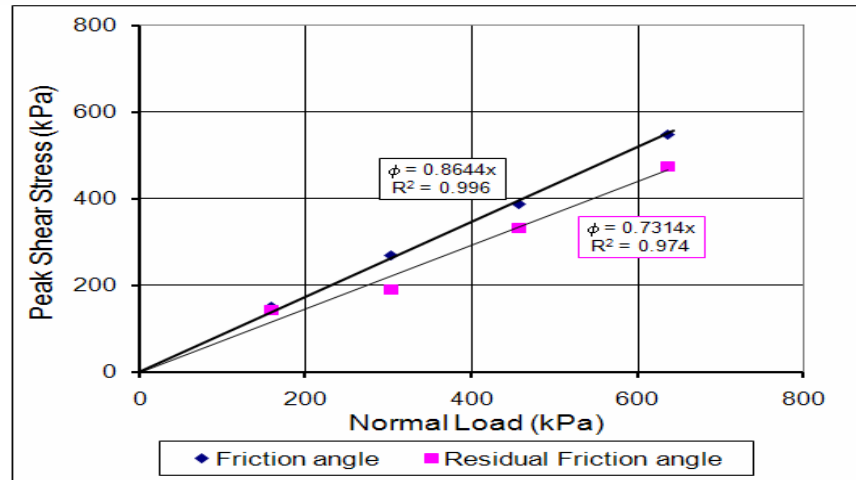
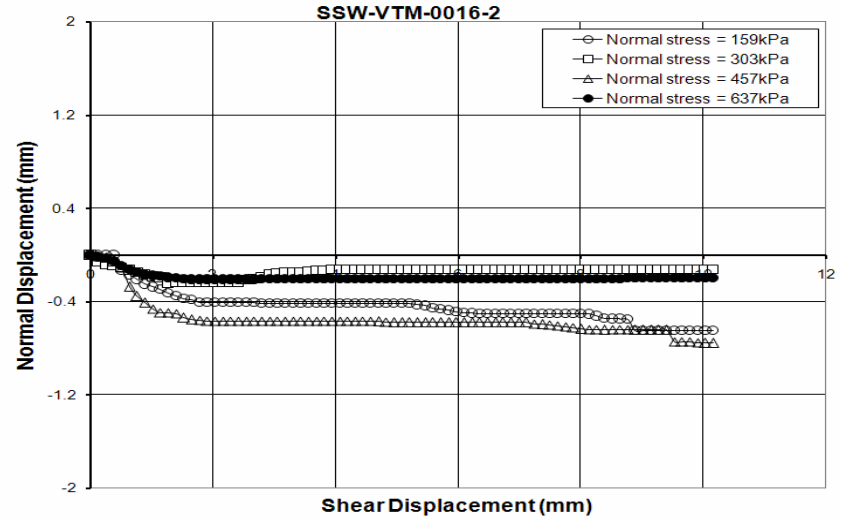
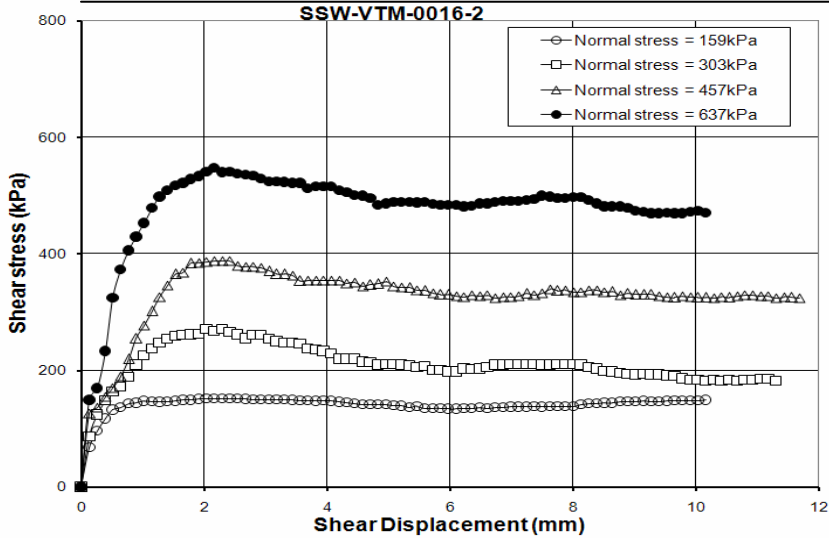
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-VTM-0016-2						
Measured Cohesion	0.00	Water Content	11.20	Shear box size	0.15	Peak Shear Stress	58.18
Intrinsic Cohesion	0.00	Wet Density	2700	Matric Suction	1	Post Peak Shear Stress	55.26
Max. Particle Size	17.78	Dry density	2430	Normal Stress	69.52	Elevation	2843.3

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

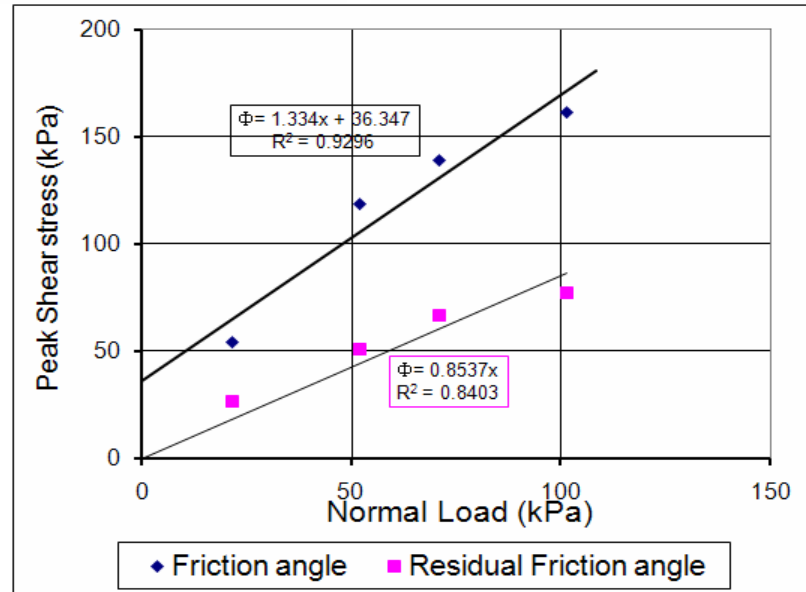
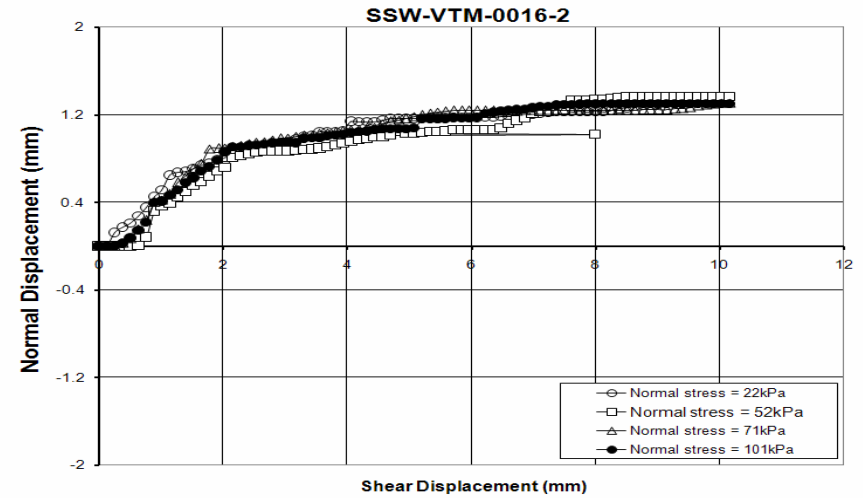
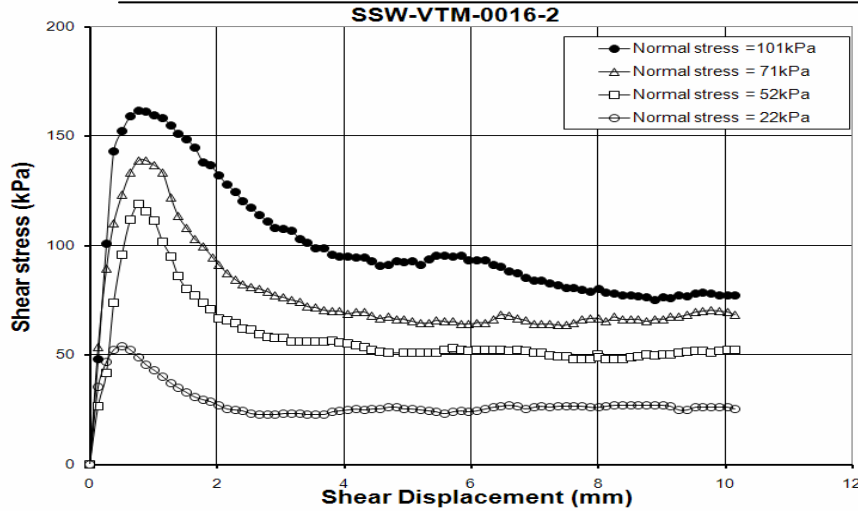
TEST NO: 42  
 TEST DATE: 1/29/2007



<b>Field id:</b>	SSW-VTM-0016-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	151.73,270.94,388.01,548.01
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	144.14,191.31,332.02,475.08
Friction Angle	40.84	Dry density	2040	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 42  
 TEST DATE: 8/8/2007



<b>Field id:</b>	SSW-VTM-0016-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	54.11,118.83,138.99,161.81
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.36,50.97,66.95,77.14
Friction Angle	53.14	Dry density	2050	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

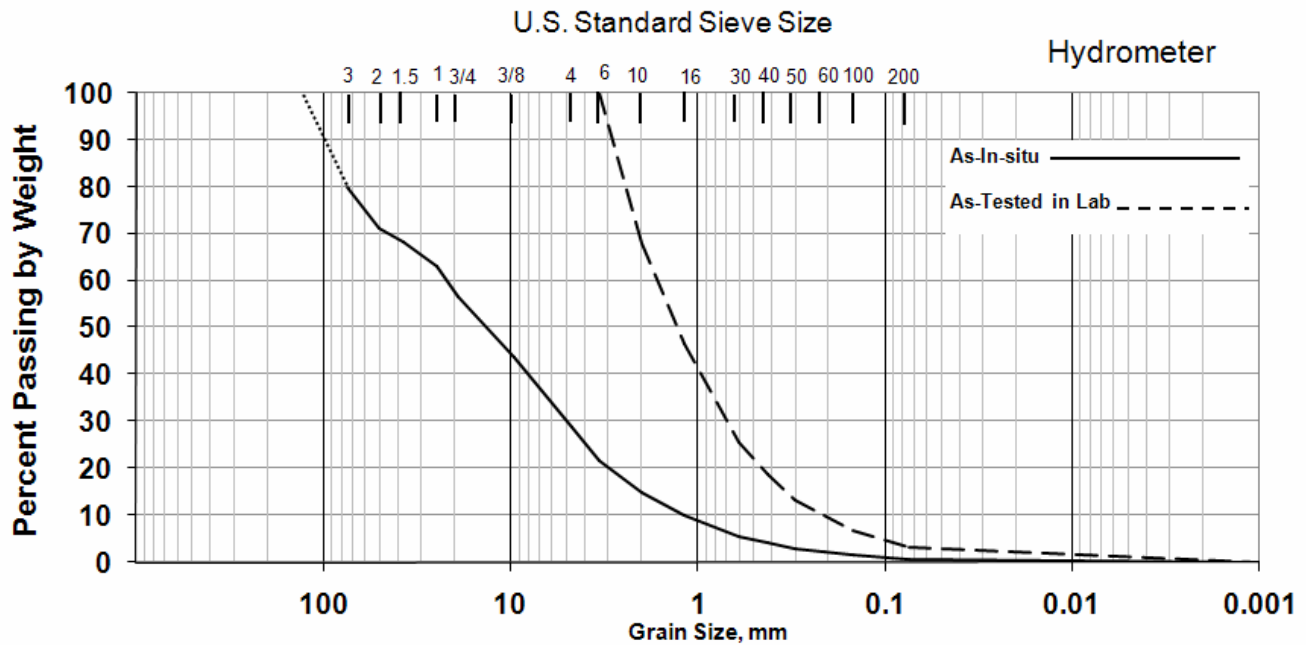
TEST NO: 43  
 TEST DATE: 12/25/2006

SAMPLE: **SSW-VTM-0023-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.1  
 PLASTIC LIMIT: 23.0  
 PLASTICITY INDEX: 7.1  
 SPECIFIC GRAVITY: 2.80  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 71.30  
 SAND: 28.0  
 FINE: 0.7

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

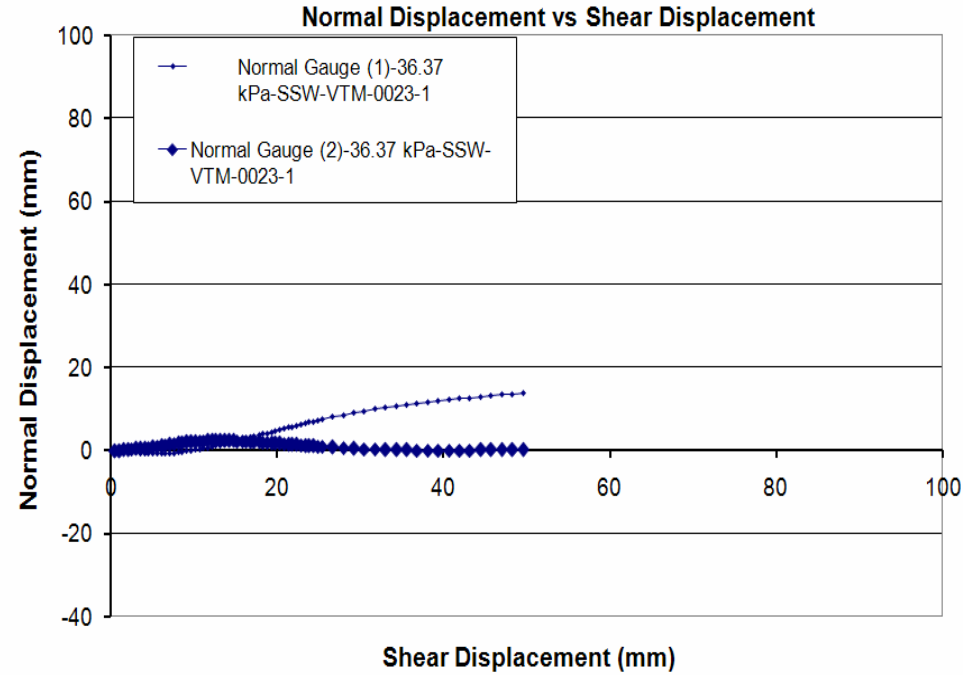
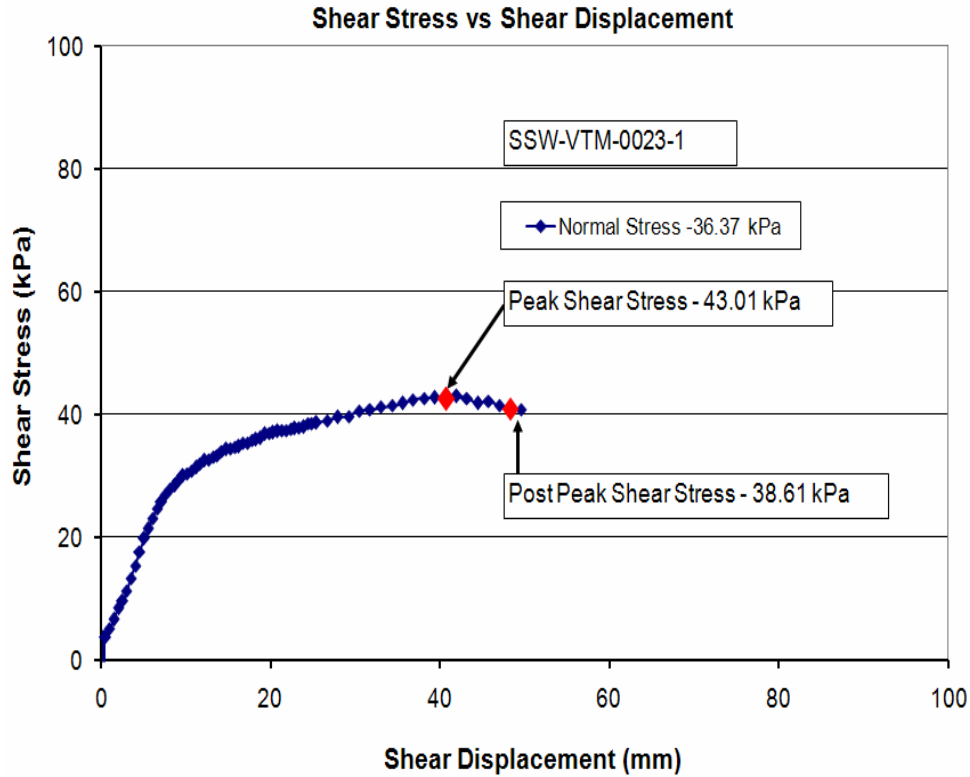
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	79.89	10	19.44	14.73	0.0419		0.0015	
2	50	71.14	16	18.01	10.06	0.0303		0.0013	
1-1/2	37.5	68.27	30	15.04	5.53	0.0217			
1	25	63.01	40	13.80	4.07	0.0157			
3/4	19	56.69	50	12.53	2.88	0.0114			
3/8	9.5	43.53	70	11.48	2.14	0.0082			
4	4.75	28.69	100	10.47	1.50	0.0058			
6	3.36	21.64	200	8.39	0.70	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 43  
 TEST DATE: N/A

UTM Northing: 4060499  
 UTM Easting: 453838



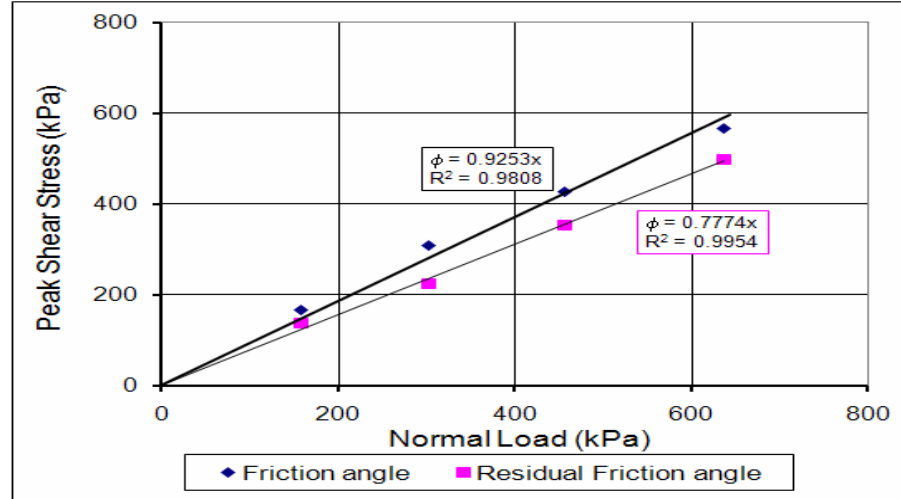
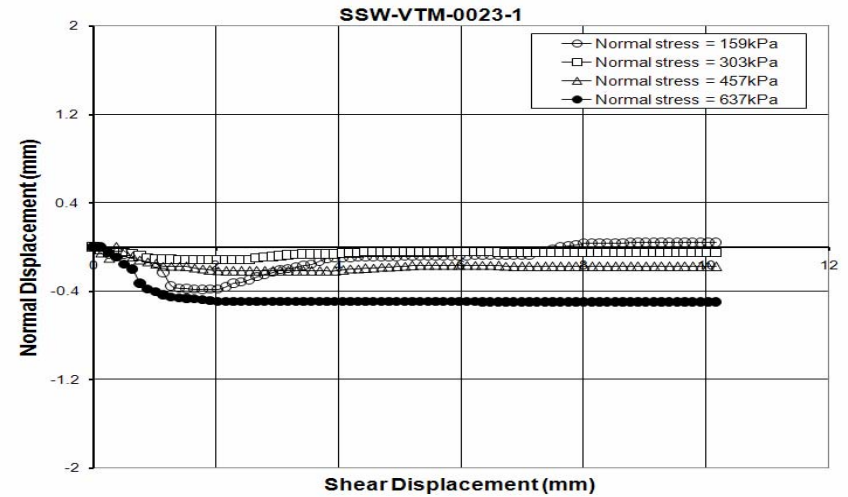
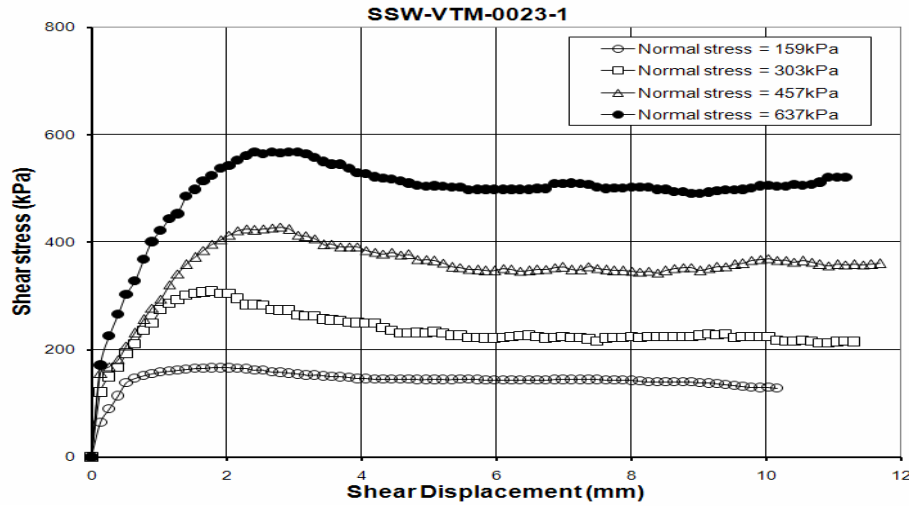
<b>Field id:</b>	SSW-VTM-0023-1						
Measured Cohesion	2.09	Water Content	11.80	Shear box size	60	Peak Shear Stress	43.01
Intrinsic Cohesion	2.09	Wet Density	2.46	Matric Suction	0.00	Post Peak Shear Stress	38.61
Max. Particle Size	17.78	Dry density	2.2	Normal Stress	36.37	Elevation	2842.1



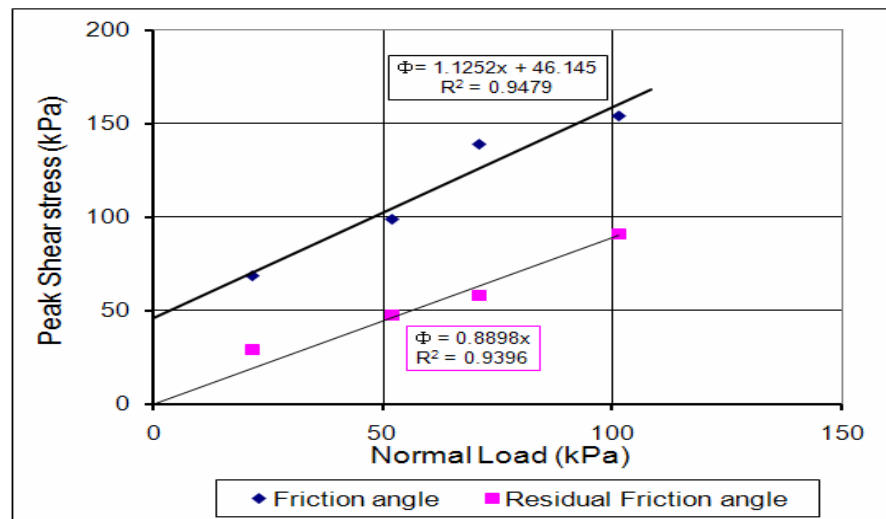
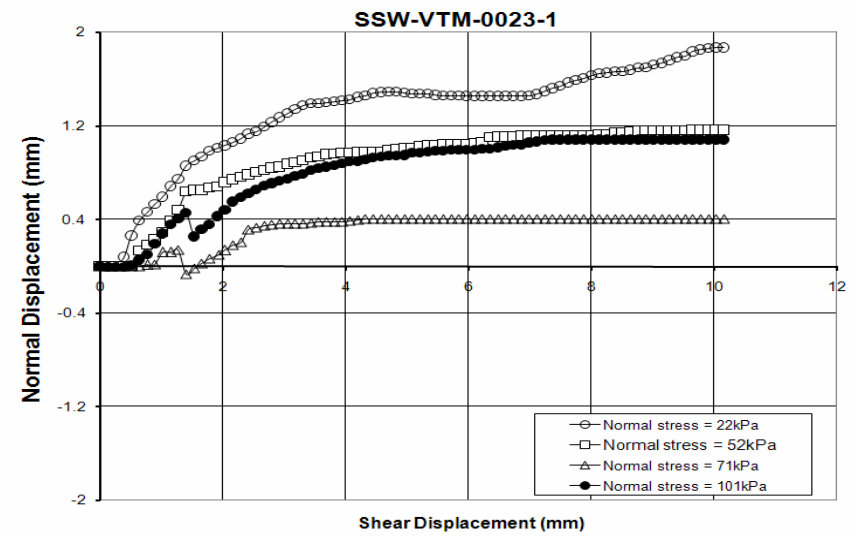
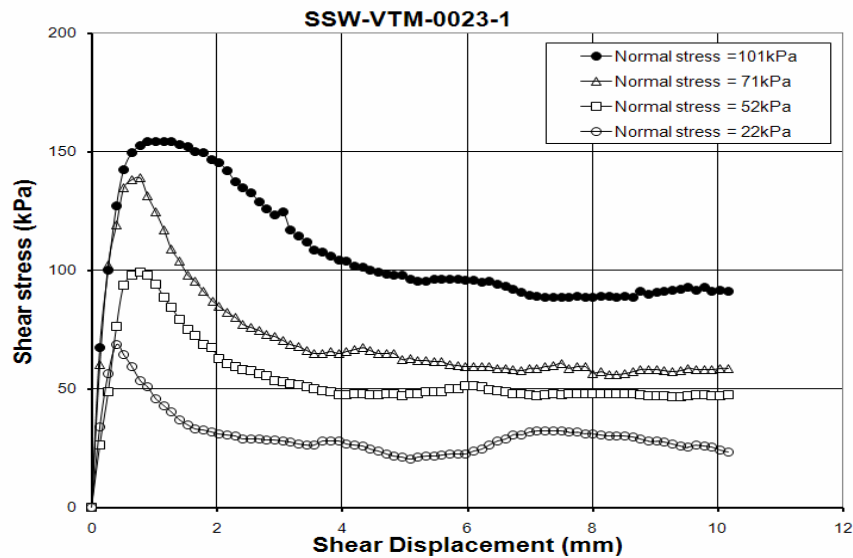
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 43  
 TEST DATE: 1/26/2007



<b>Field id:</b>	SSW-VTM-0023-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	166.05,308.66,428.34,567.53
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	138.81,224.76,353.71,497.80
Friction Angle	42.78	Dry density	2080	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	SSW-VTM-0023-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	68.97,99.21,138.99,154.38
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	29.06,47.44,58.27,91.04
Friction Angle	48.37	Dry density	2060	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

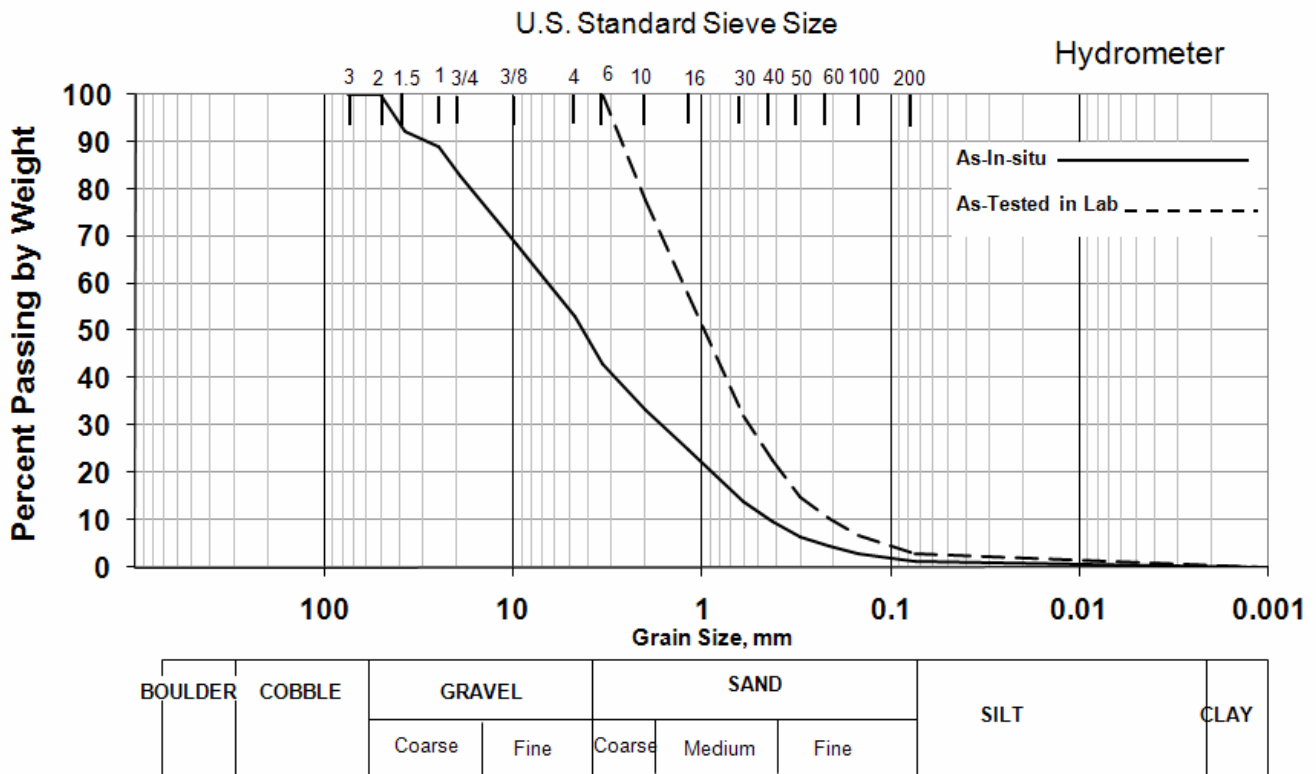
TEST NO: 44  
 TEST DATE: 12/25/2006

SAMPLE: **SSW-VTM-0026-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 27.5  
 PLASTIC LIMIT: 23.3  
 PLASTICITY INDEX: 4.2  
 SPECIFIC GRAVITY: 2.80  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 47.0  
 SAND: 51.7  
 FINE: 1.3

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

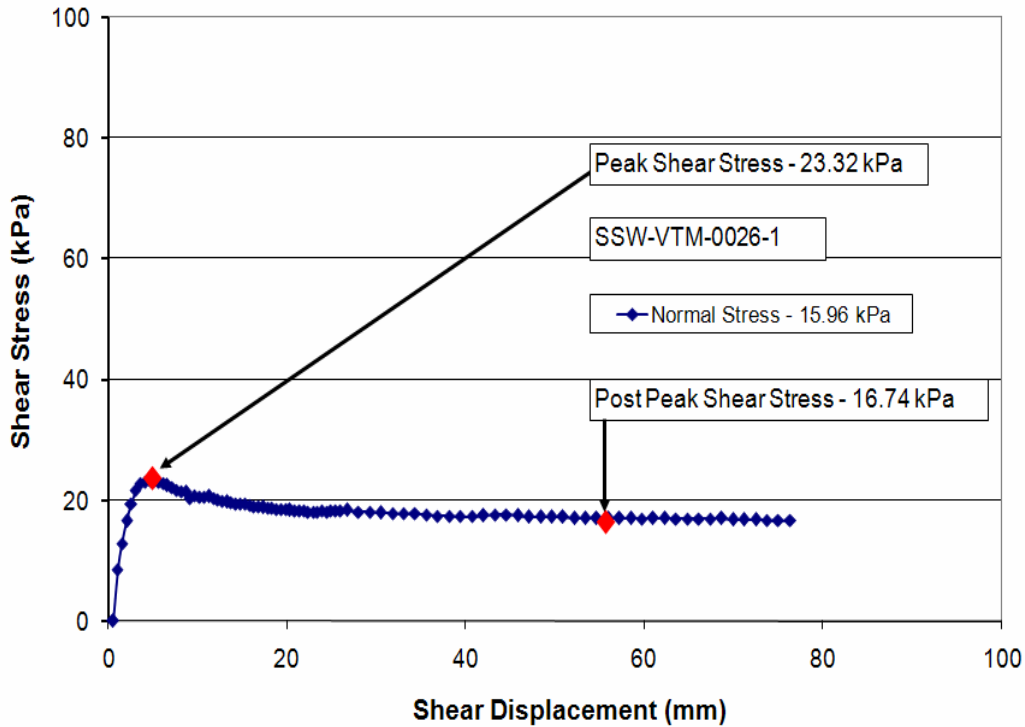
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	33.48	0.0419		0.0015	
2	50	100.00	16	18.01	24.77	0.0303		0.0013	
1-1/2	37.5	92.17	30	15.04	13.83	0.0217			
1	25	88.90	40	13.80	9.74	0.0157			
3/4	19	82.85	50	12.53	6.45	0.0114			
3/8	9.5	68.19	70	11.48	4.50	0.0082			
4	4.75	52.95	100	10.47	2.99	0.0058			
6	3.36	43.11	200	8.39	1.28	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

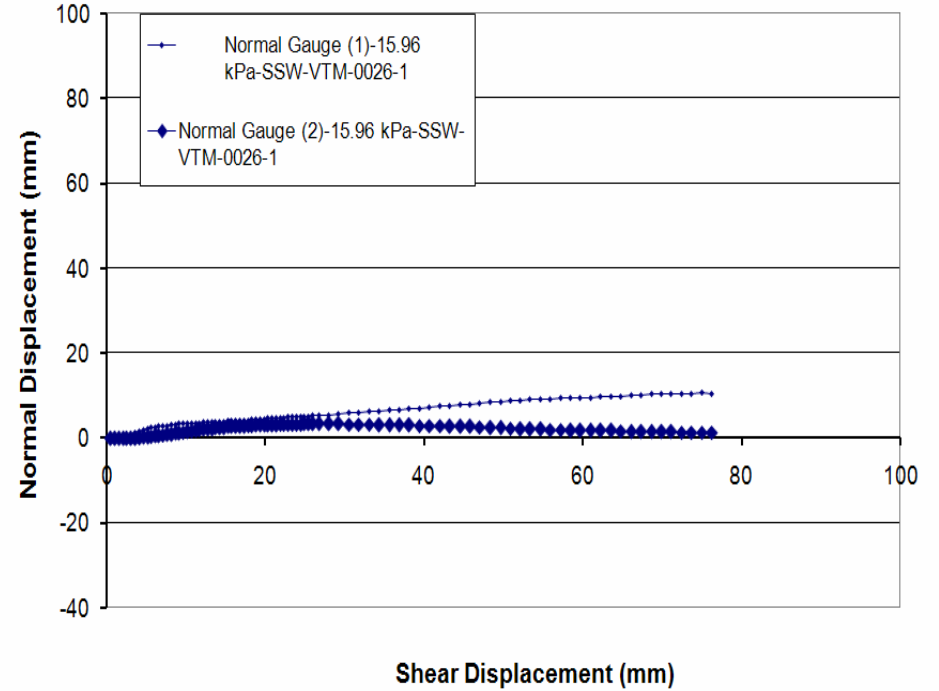
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 44  
 TEST DATE: N/A

UTM Northing: 4060592  
 UTM Easting: 453832



**Shear Stress vs Shear Displacement**



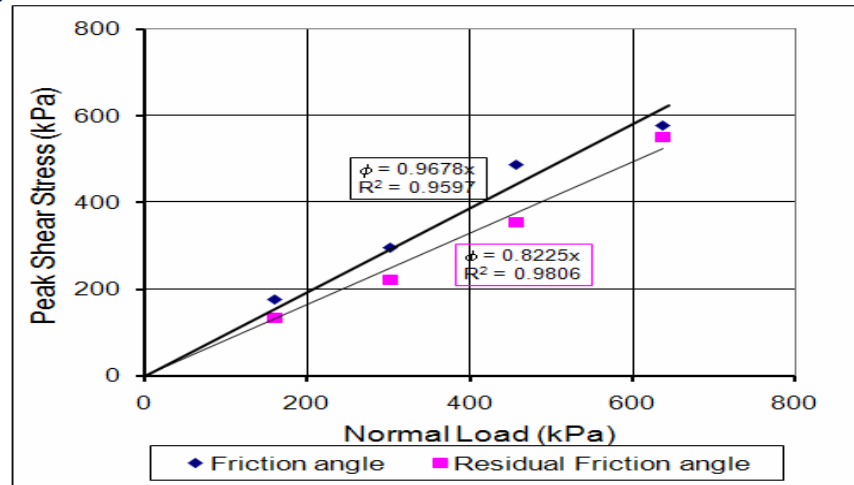
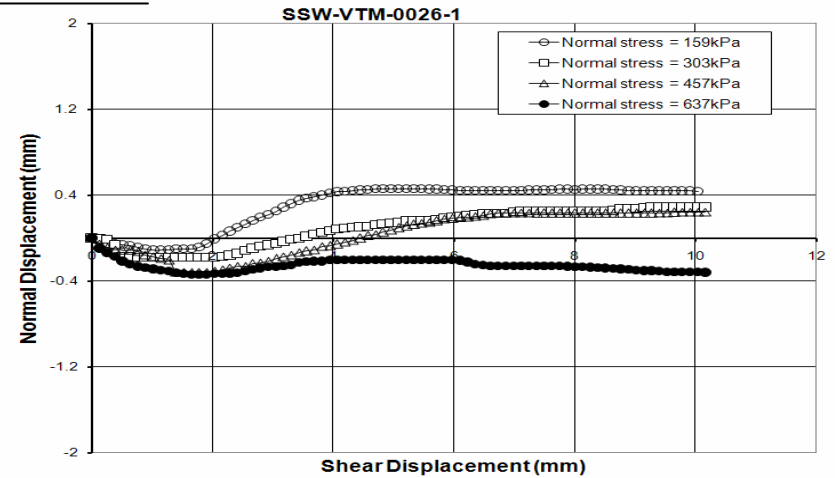
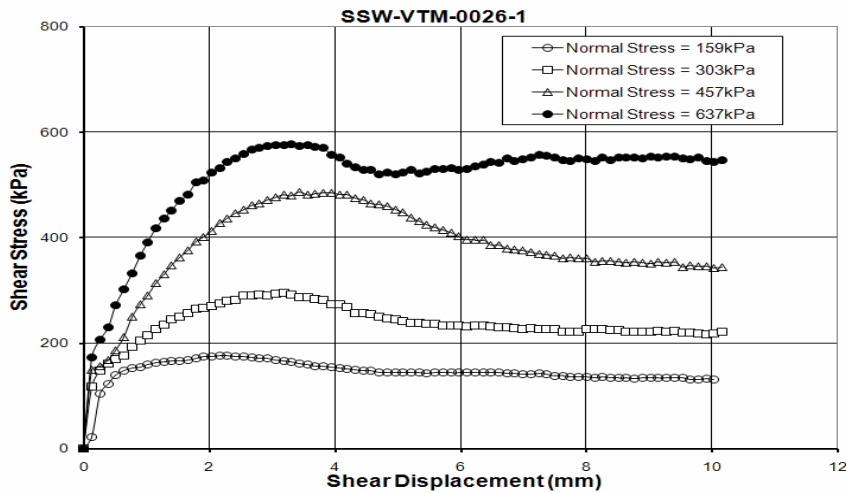
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-VTM-0026-1						
Measured Cohesion	0.32	Water Content	7.45	Shear box size	60	Peak Shear Stress	23.32
Intrinsic Cohesion	0.00	Wet Density	2190	Matric Suction	13	Post Peak Shear Stress	38.61
Max. Particle Size	7.62	Dry density	2040	Normal Stress	15.96	Elevation	2902.4

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

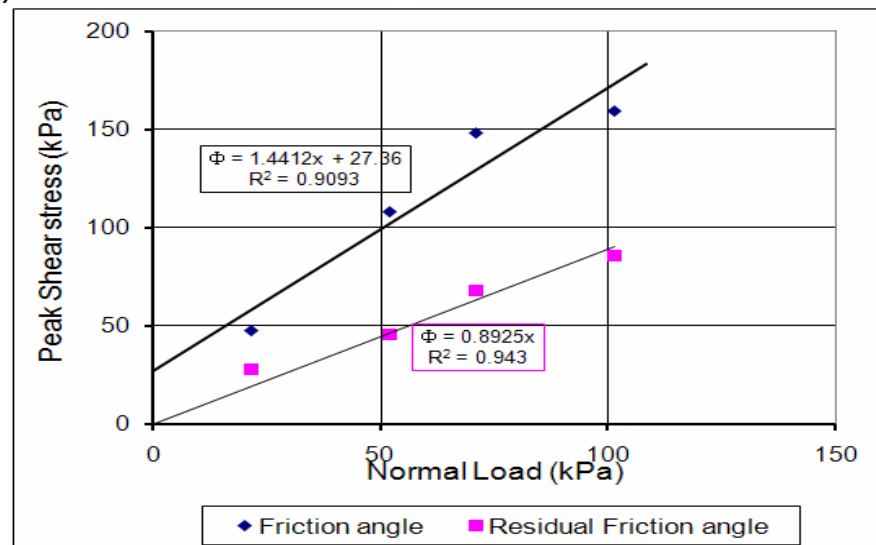
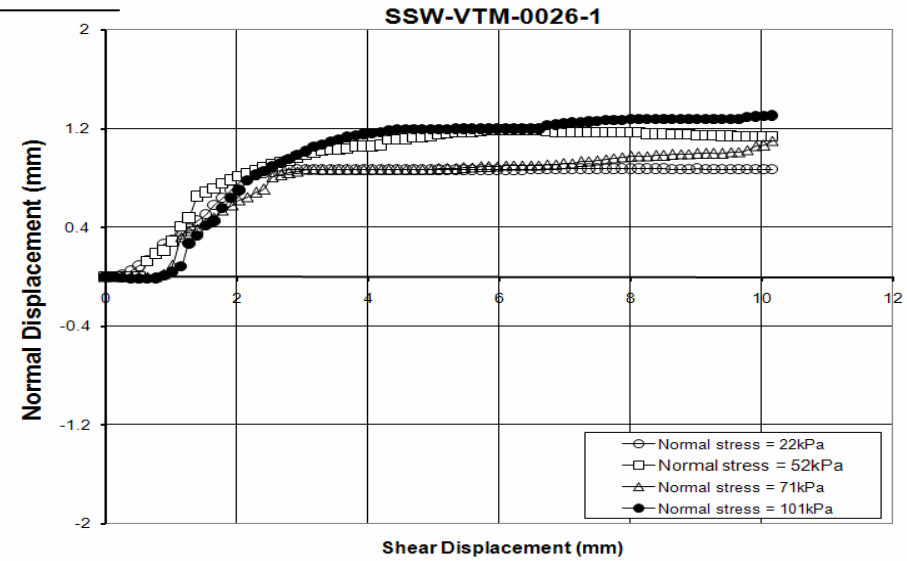
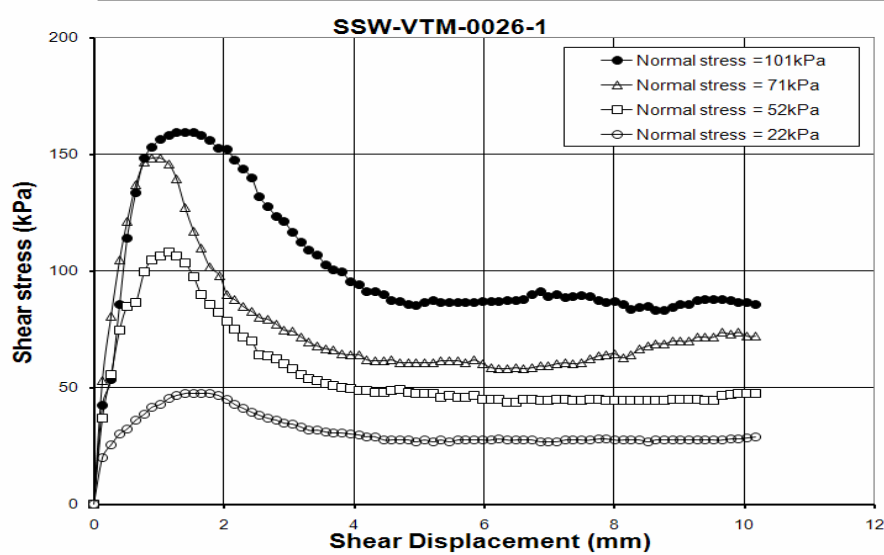
TEST NO: 44  
 TEST DATE: 7/16/2007



<b>Field id:</b>	SSW-VTM-0026-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	176.66,295.66,486.88,577.93
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	135.53,221.60,355.28,550.88
Friction Angle	44.06	Dry density	1980	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 44  
 TEST DATE: 8/7/2007



<b>Field id:</b>	SSW-VTM-0026-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	47.75,108.22,148.54,159.68
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	27.70,45.74,67.82,86.01
Friction Angle	55.24	Dry density	2010	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

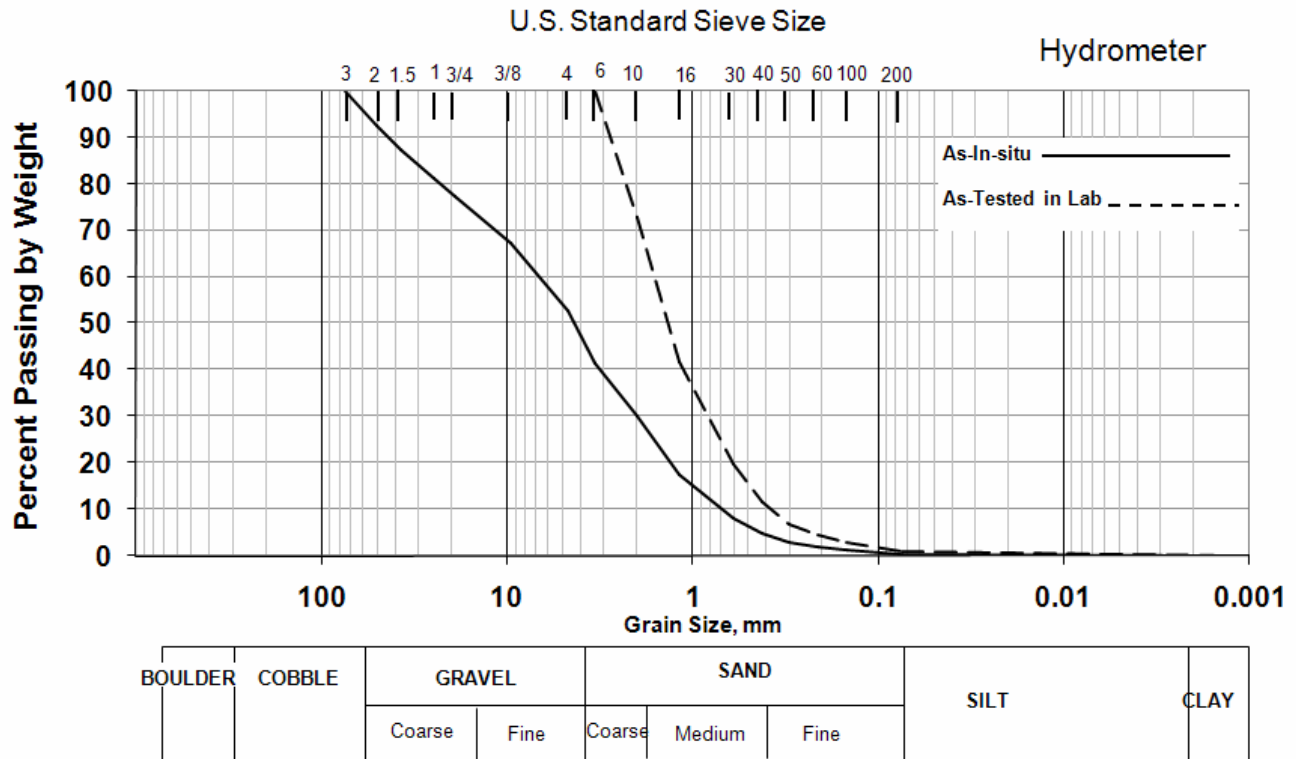
TEST NO: 45  
 TEST DATE: 5/6/2007

SAMPLE: **SSW-VTM-0026-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 25.5  
 PLASTIC LIMIT: 20.1  
 PLASTICITY INDEX: 5.4  
 SPECIFIC GRAVITY: 2.77  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 47.1  
 SAND: 52.5  
 FINE: 0.4

### Particle Size Distribution



**UNIFIED SOIL CLASSIFICATION:**

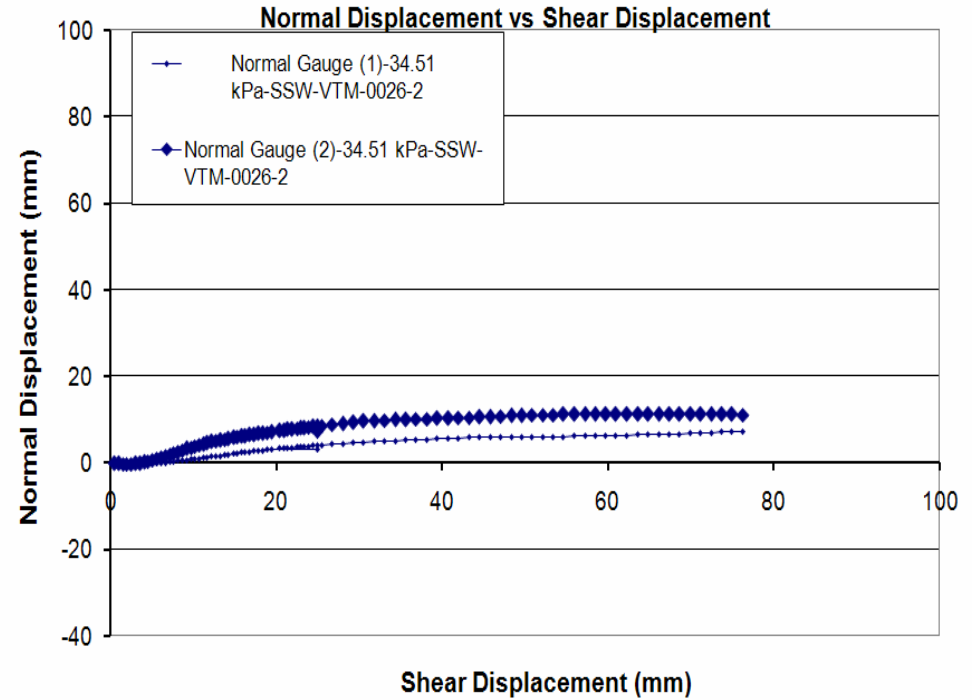
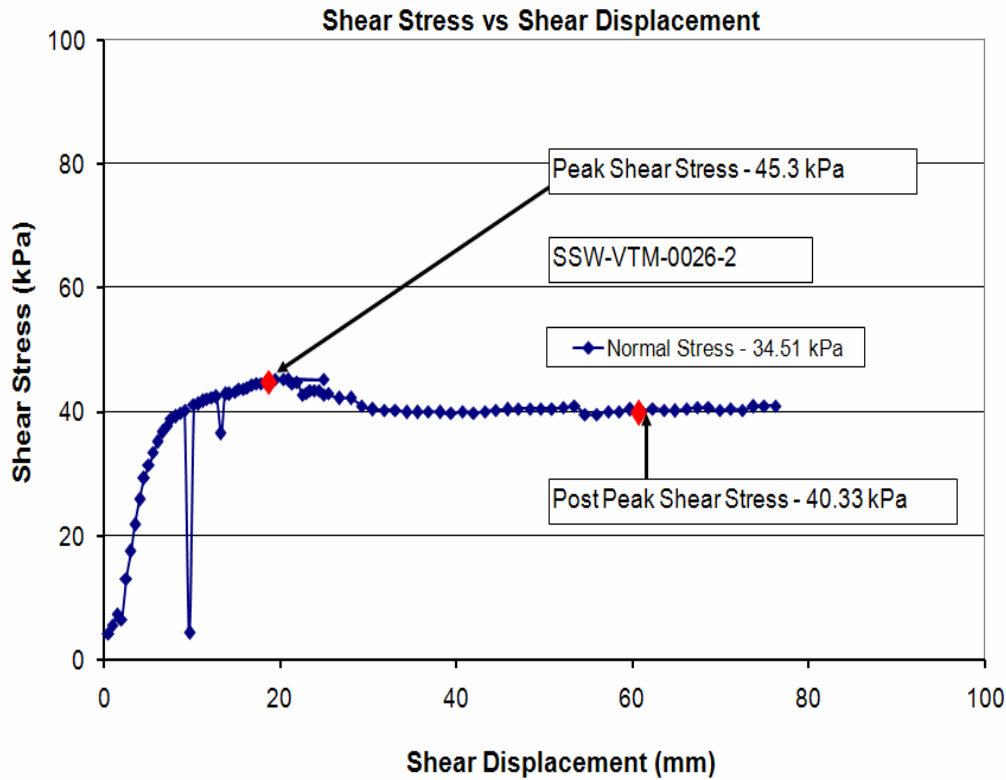
Gravel Size		%	Sand Size		%	Hydrometer		Hydrometer	
Inches	mm		Passing	Inches		mm	mm	% Passing	mm
3	75	100.00	10	19.44	30.12	0.0419		0.0015	
2	50	92.70	16	18.01	17.32	0.0303		0.0013	
1-1/2	37.5	87.48	30	15.04	8.18	0.0217			
1	25	81.29	40	13.80	4.87	0.0157			
3/4	19	77.35	50	12.53	2.84	0.0114			
3/8	9.5	67.47	70	11.48	1.85	0.0082			
4	4.75	52.89	100	10.47	1.15	0.0058			
6	3.36	41.38	200	8.39	0.43	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 45  
 TEST DATE: N/A

UTM Northing: 4060592  
 UTM Easting: 453832



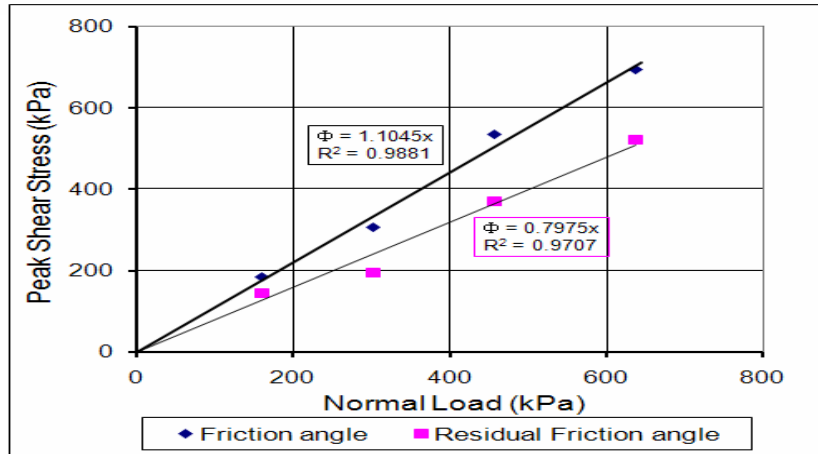
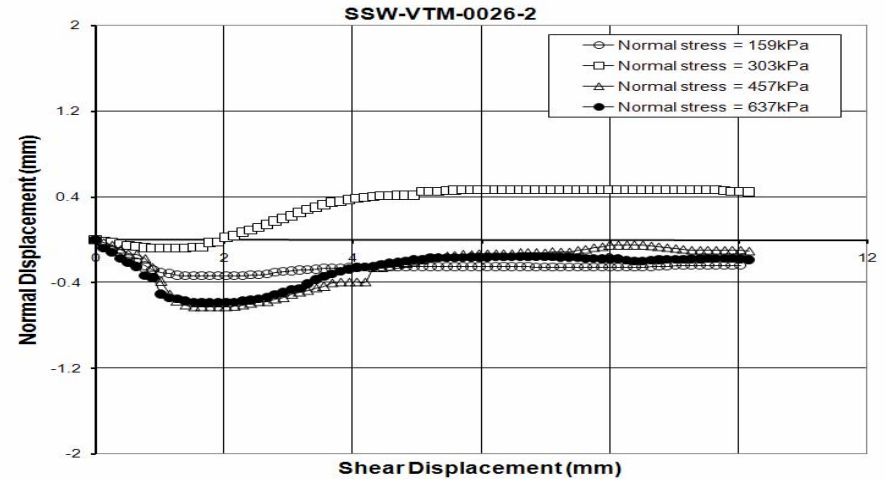
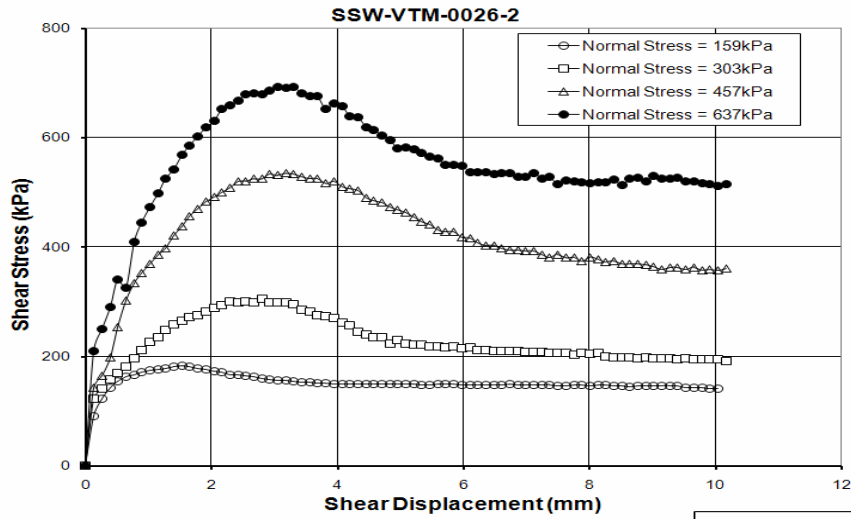
<b>Field id:</b>	SSW-VTM-0026-2						
Measured Cohesion	2.66	Water Content	4.67	Shear box size	60	Peak Shear Stress	45.3
Intrinsic Cohesion	0.25	Wet Density	2.4	Matric Suction	9	Post Peak Shear Stress	40.33
Max. Particle Size	17.78	Dry density	2.30	Normal Stress	34.51	Elevation	2902.4



## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 45  
 TEST DATE: 7/18/2007



<b>Field id:</b>	SSW-VTM-0026-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	183.79,306.06,535.01,693.71
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	145.78,196.14,370.02,521.04
Friction Angle	47.84	Dry density	2020	Normal Stress	159,303,457,637	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

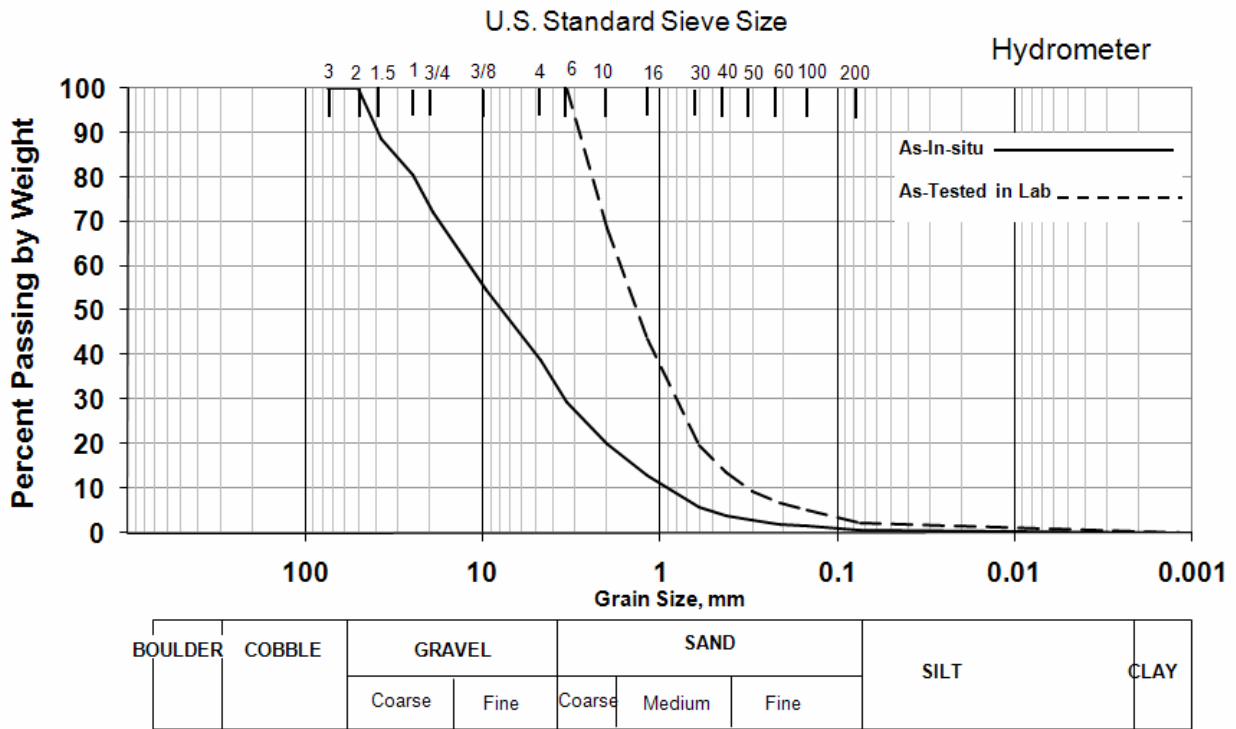
TEST NO: 46  
 TEST DATE: 2/17/2007

SAMPLE: SSW-VTM-0030-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.7  
 PLASTIC LIMIT: 23.6  
 PLASTICITY INDEX: 7.1  
 SPECIFIC GRAVITY: 2.82  
 ATTERBERG CLASSIFICATION: ML

GRAVEL: 61.2  
 SAND: 38.1  
 FINE: 0.7

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

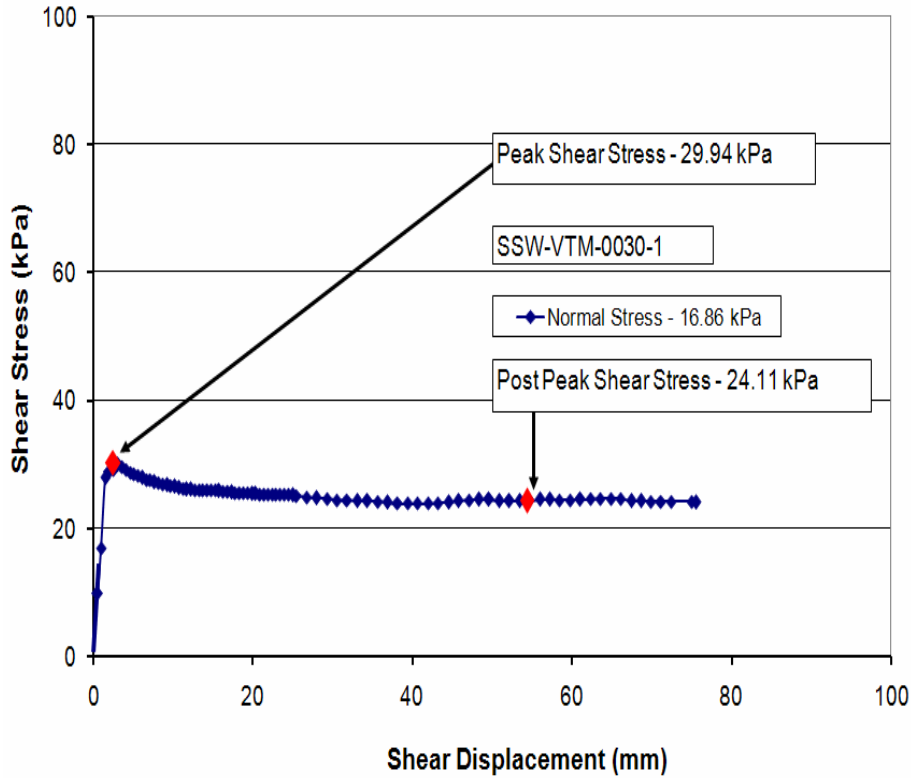
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	20.13	0.0419		0.0015	
2	50	100.00	16	18.01	12.87	0.0303		0.0013	
1-1/2	37.5	88.64	30	15.04	5.81	0.0217			
1	25	80.53	40	13.80	4.01	0.0157			
3/4	19	72.17	50	12.53	2.76	0.0114			
3/8	9.5	54.68	70	11.48	2.04	0.0082			
4	4.75	38.80	100	10.47	1.49	0.0058			
6	3.36	29.36	200	8.39	0.67	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

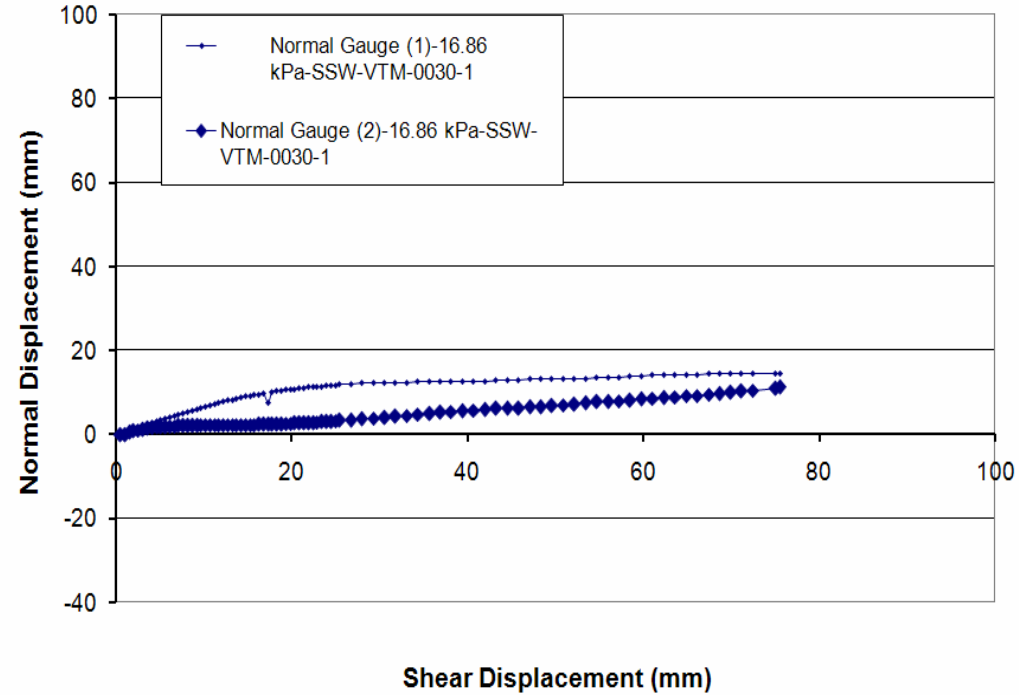
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 46  
 TEST DATE: N/A

UTM Northing: 4060588  
 UTM Easting: 453831



**Shear Stress vs Shear Displacement**



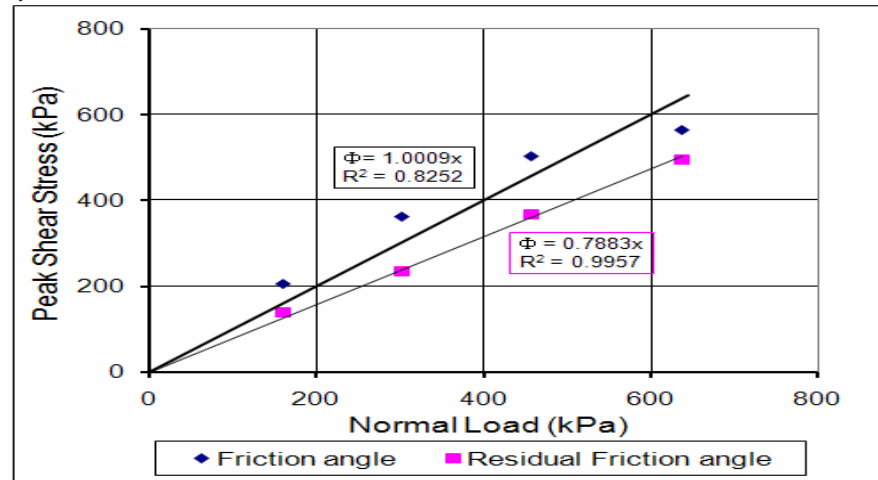
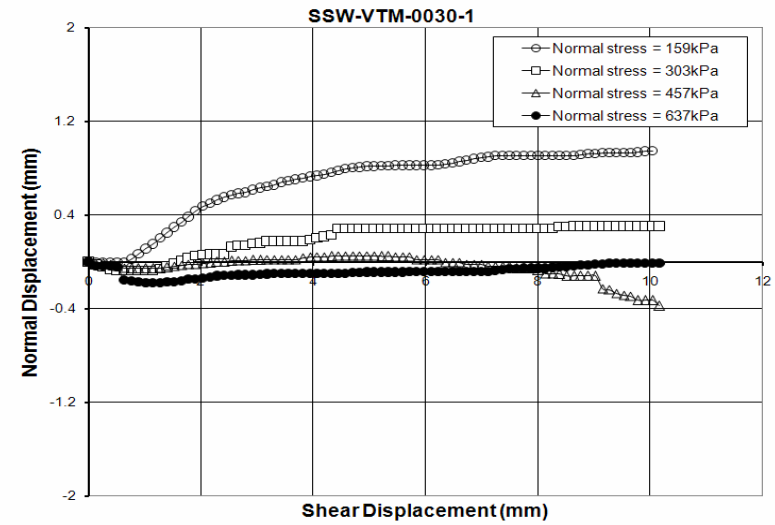
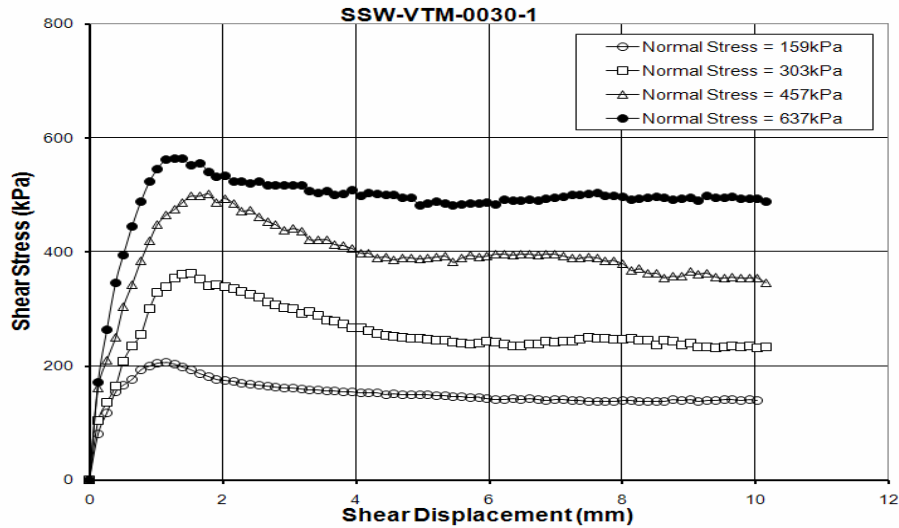
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-VTM-0030-1						
Measured Cohesion	12.18	Water Content	8.76	Shear box size	60	Peak Shear Stress	29.94
Intrinsic Cohesion	11.38	Wet Density	2320	Matric Suction	3	Post Peak Shear Stress	24.11
Max. Particle Size	11.43	Dry density	2120	Normal Stress	16.86	Elevation	2902.4

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

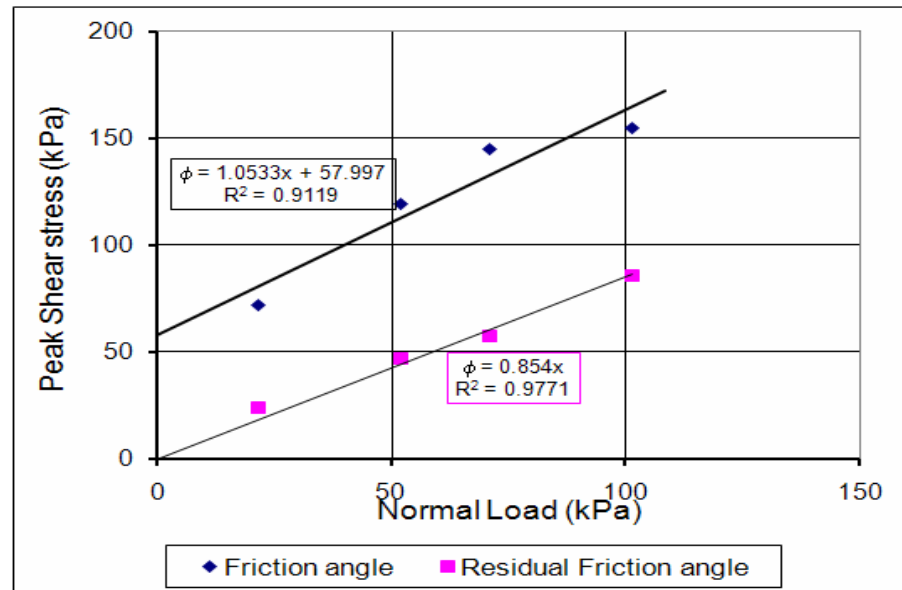
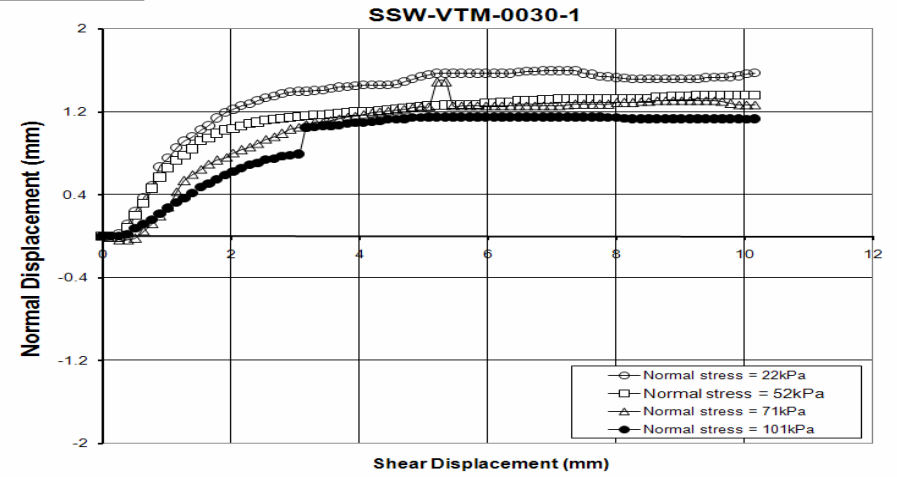
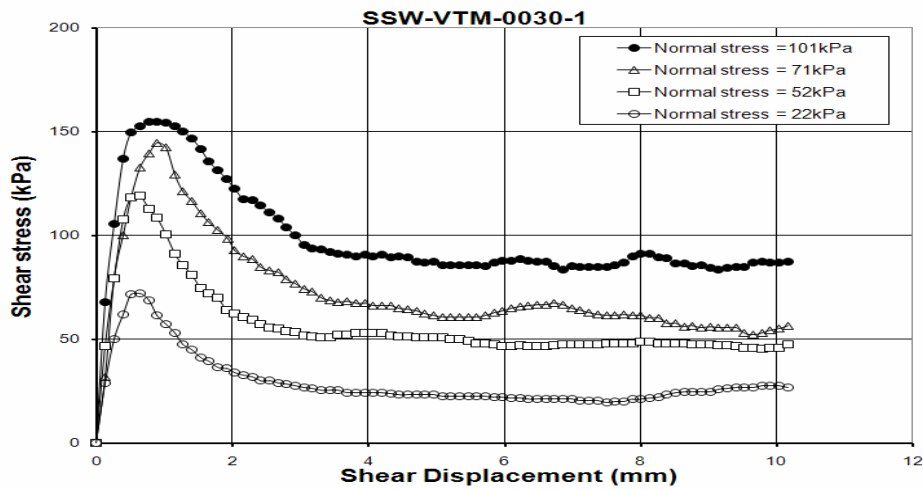
TEST NO: 46  
 TEST DATE: 7/16/2007



<b>Field id:</b>	SSW-VTM-0030-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	207.20,363.30,502.49,564.93
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	139.71,236.47,367.53,494.68
Friction Angle	45.03	Dry density	2110	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 46  
 TEST DATE: 8/7/2007



<b>Field id:</b>	SSW-VTM-0030-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	72.15,119.36,144.83,154.91
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	23.99,47.06,57.80,86.12
Friction Angle	46.49	Dry density	1920	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

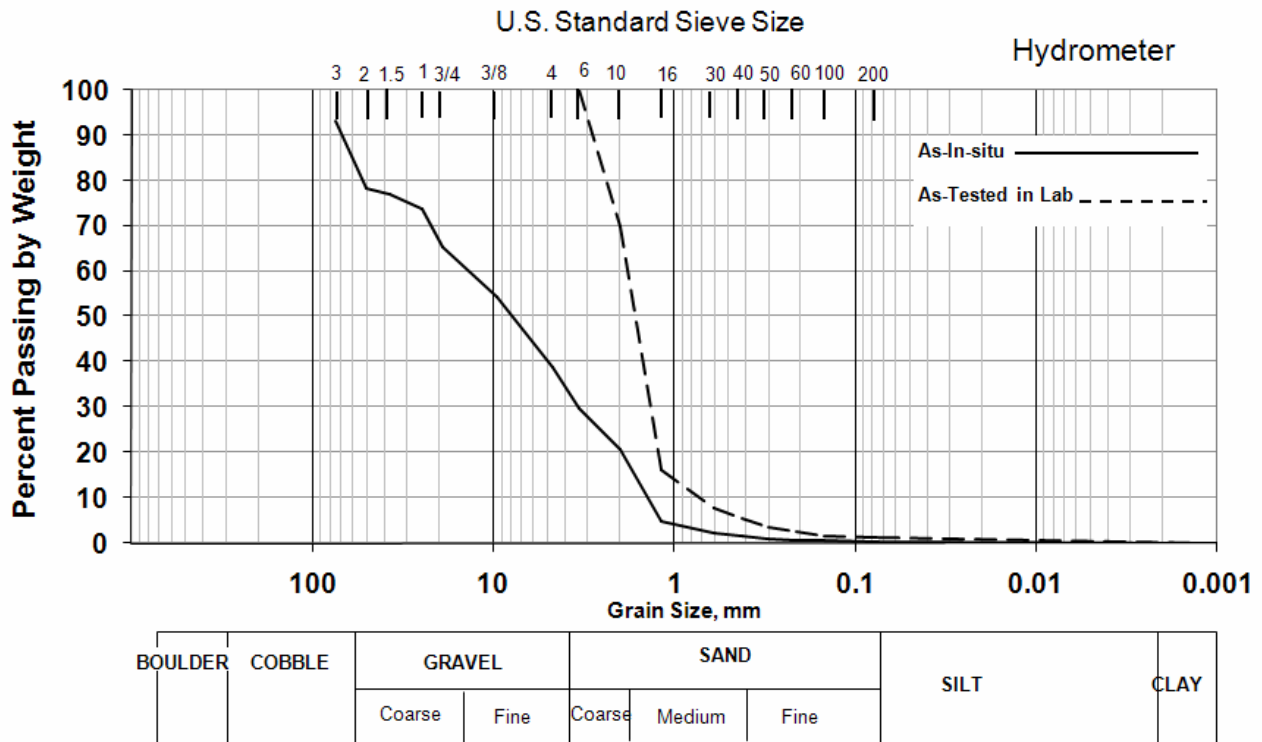
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 47  
 TEST DATE: 2/19/2007

SAMPLE: **SSW-VTM-0030-2**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 26.4	GRAVEL: 61.0
PLASTIC LIMIT: 20.3	SAND: 38.6
PLASTICITY INDEX: 6.1	FINE: 0.4
SPECIFIC GRAVITY: 2.84	
ATTERBERG CLASSIFICATION: CL-ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

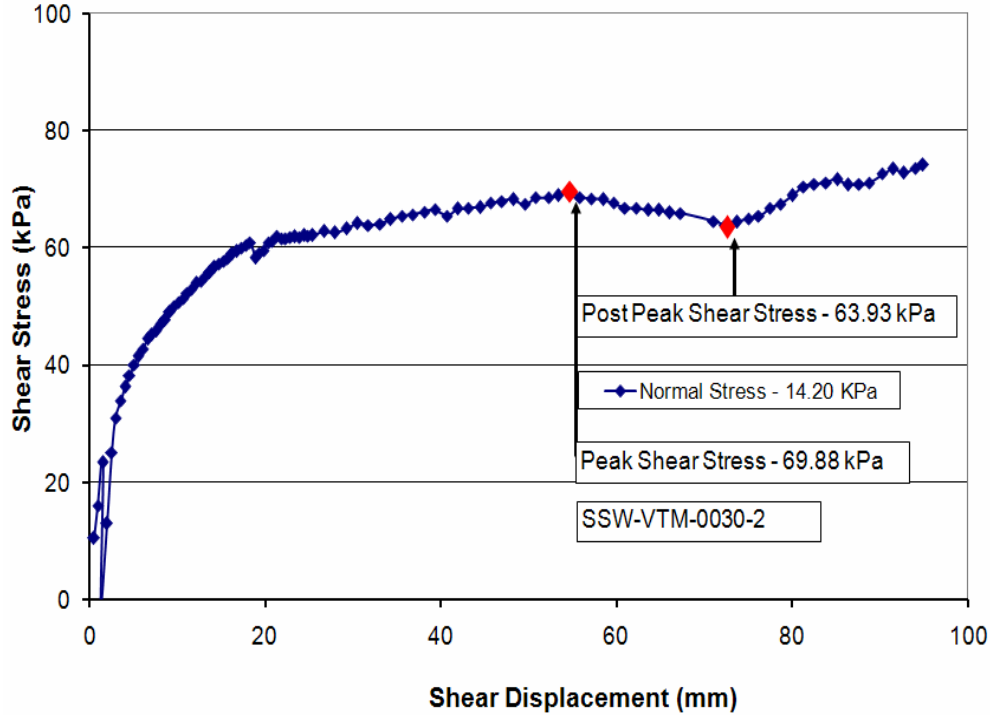
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	93.26	10	19.44	20.86	0.0419		0.0015	
2	50	78.36	16	18.01	4.83	0.0303		0.0013	
1-1/2	37.5	76.87	30	15.04	2.32	0.0217			
1	25	73.64	40	13.80	1.68	0.0157			
3/4	19	65.52	50	12.53	1.03	0.0114			
3/8	9.5	54.41	70	11.48	0.73	0.0082			
4	4.75	38.95	100	10.47	0.52	0.0058			
6	3.36	29.81	200	8.39	0.35	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

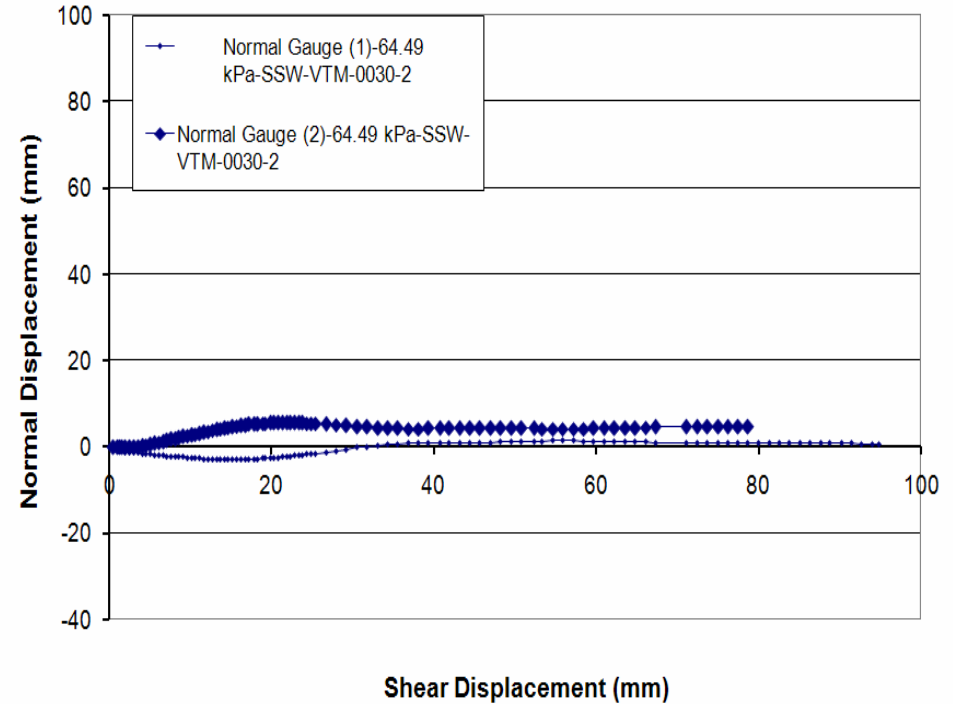
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 47  
 TEST DATE: N/A

UTM Northing: 4060588  
 UTM Easting: 453831



**Shear Stress vs Shear Displacement**



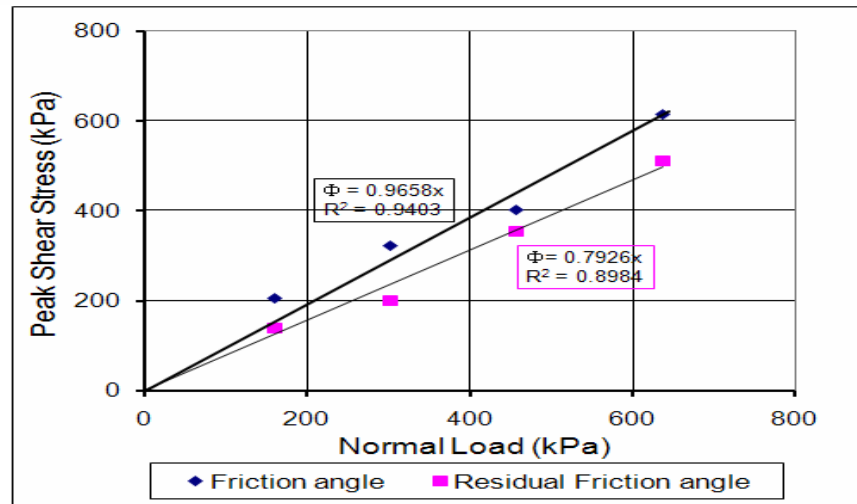
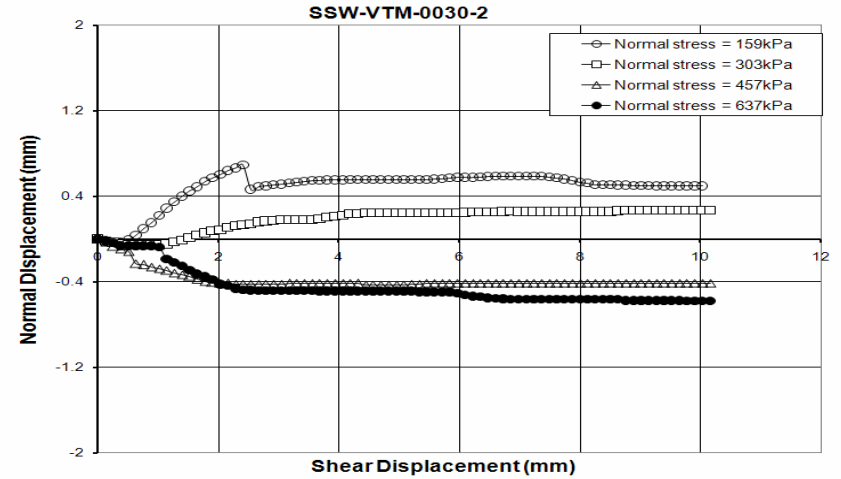
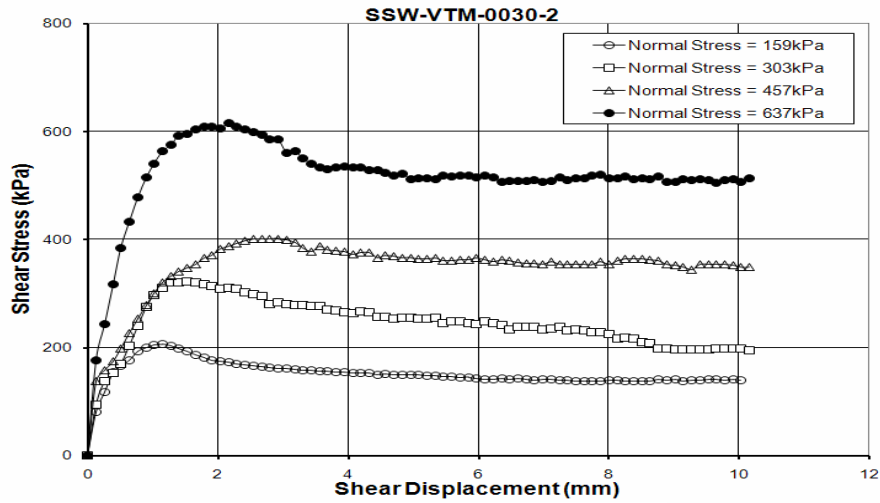
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	SSW-VTM-0030-2						
Measured Cohesion	0.00	Water Content	5.25	Shear box size	60	Peak Shear Stress	69.88
Intrinsic Cohesion	0.00	Wet Density	2220	Matric Suction	2	Post Peak Shear Stress	63.93
Max. Particle Size	16.51	Dry density	2110	Normal Stress	14.20	Elevation	2902.4

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 47  
 TEST DATE: 7/16/2007

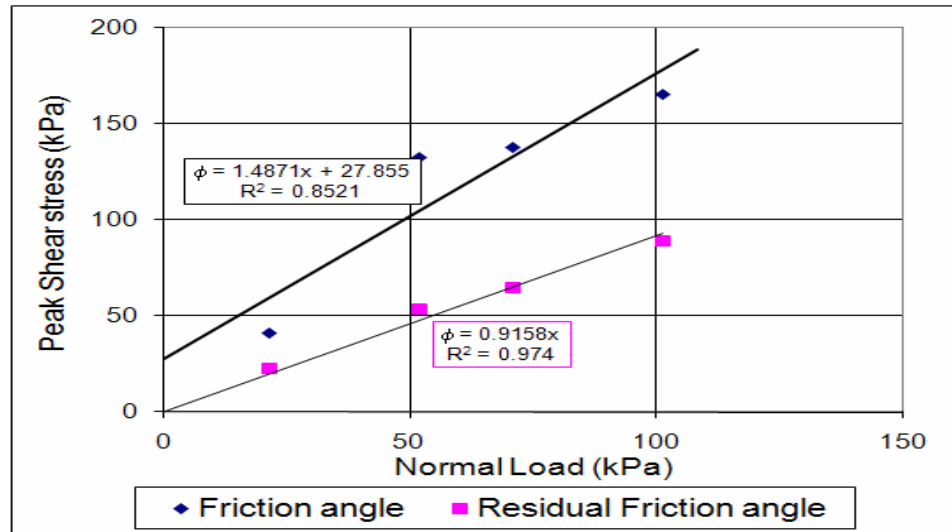
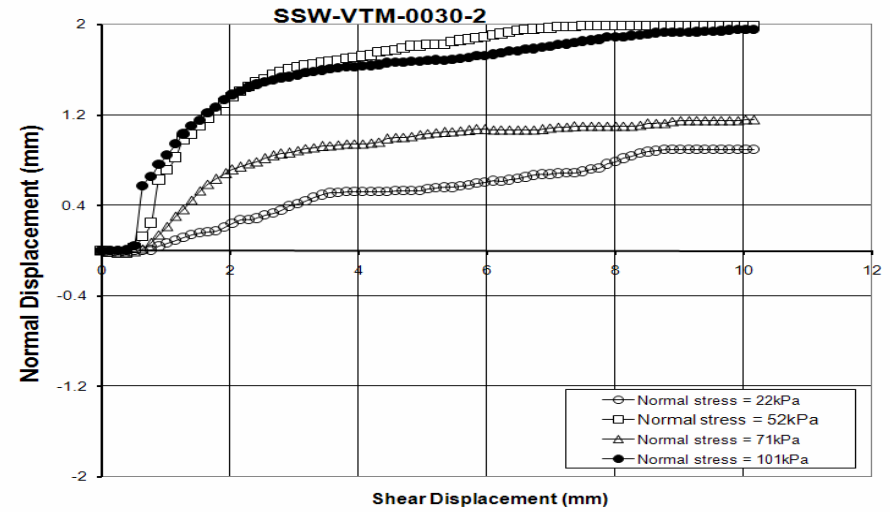
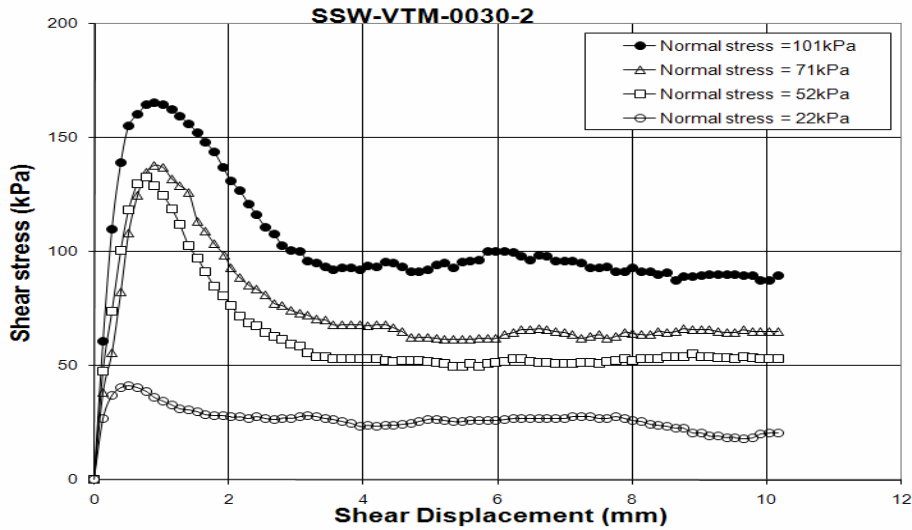


<b>Field id:</b>	SSW-VTM-0030-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	207.20,322.97,402.32,615.66
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	139.71,199.49,355.71,511.07
Friction Angle	44	Dry density	2100	Normal Stress	159,303,457,637	Elevation	



PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 47  
 TEST DATE: 8/7/2007



<b>Field id:</b>	SSW-VTM-0030-2						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	41.38,132.63,137.93,165.52
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	22.90,53.77,64.61,89.41
Friction Angle	56.08	Dry density	2040	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

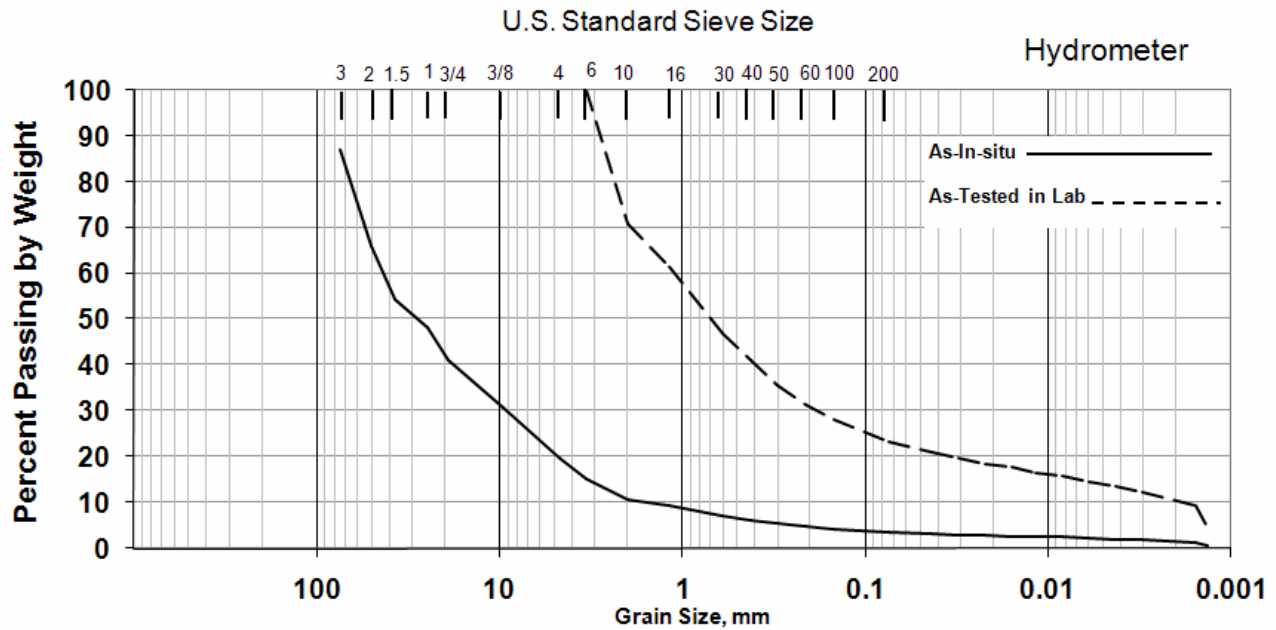
TEST NO: 48  
 TEST DATE: 9/30/2006

SAMPLE: **MIN-AAF-0001-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 22.47  
 PLASTIC LIMIT: 18.87  
 PLASTICITY INDEX: 3.61  
 SPECIFIC GRAVITY: 2.72  
 ATTERBERG CLASSIFICATION: **ML**

GRAVEL: 80.15  
 SAND: 16.28  
 FINE: 3.57

### Particle Size Distribution



BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY
		Coarse	Fine	Coarse	Medium	Fine		

UNIFIED SOIL CLASSIFICATION:

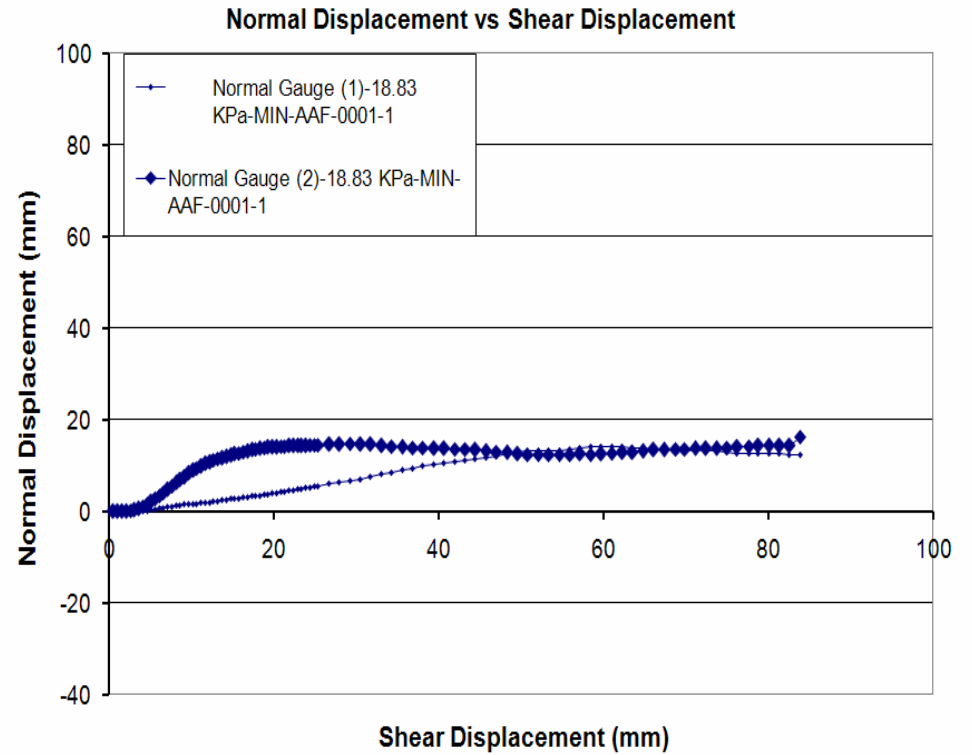
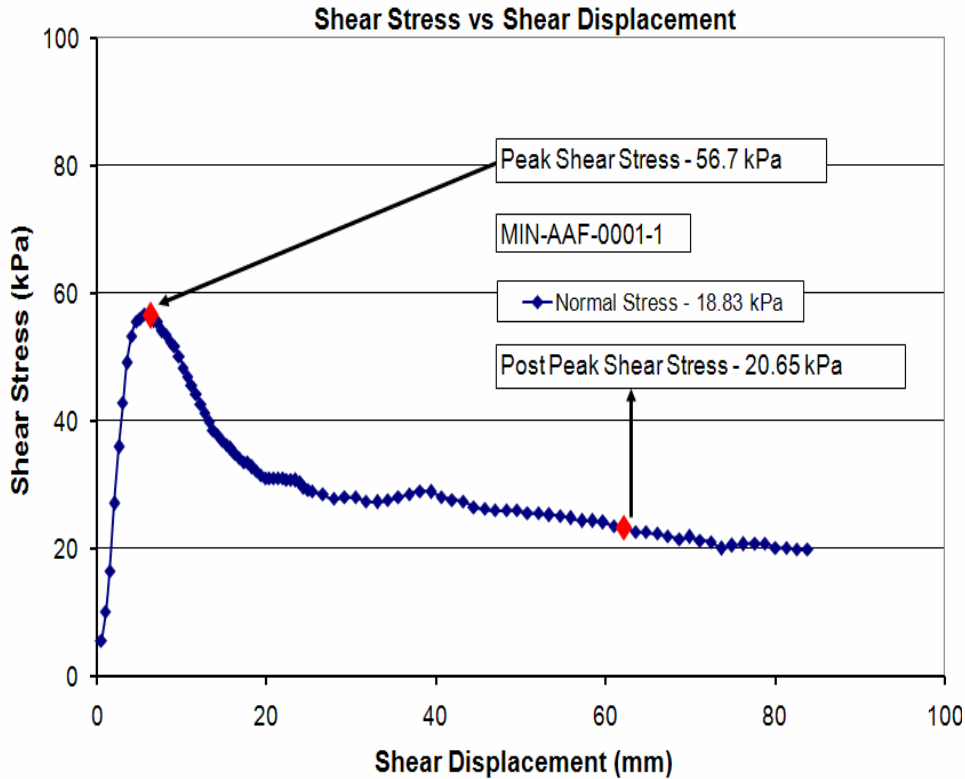
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	86.97	10	19.44	10.83	0.0419	3.22	0.0015	1.45
2	50	65.98	16	18.01	9.39	0.0303	3.00	0.0013	0.70
1-1/2	37.5	54.39	30	15.04	7.19	0.0217	2.83		
1	25	48.11	40	13.80	6.30	0.0157	2.71		
3/4	19	41.14	50	12.53	5.46	0.0114	2.54		
3/8	9.5	30.83	70	11.48	4.79	0.0082	2.43		
4	4.75	19.85	100	10.47	4.32	0.0058	2.20		
6	3.36	15.29	200	8.39	3.57	0.0042	2.09		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 48  
 TEST DATE: N/A

UTM Northing: 4059911  
 UTM Easting: 452374

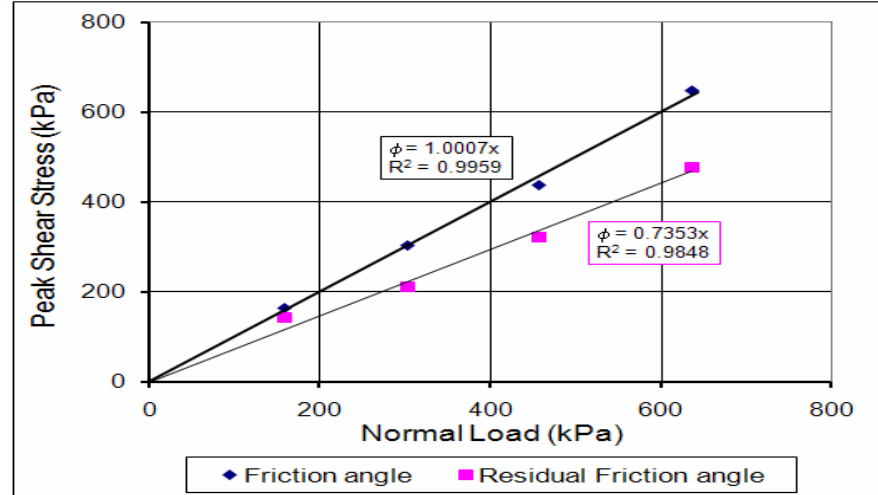
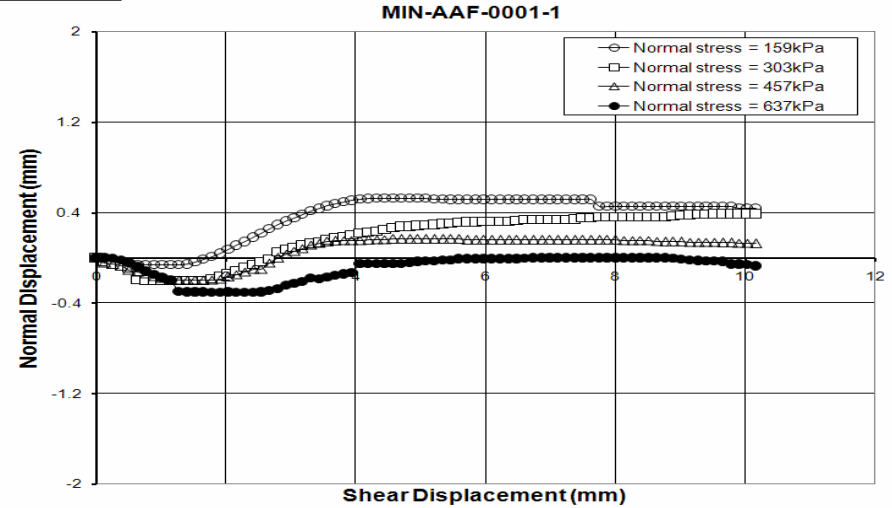
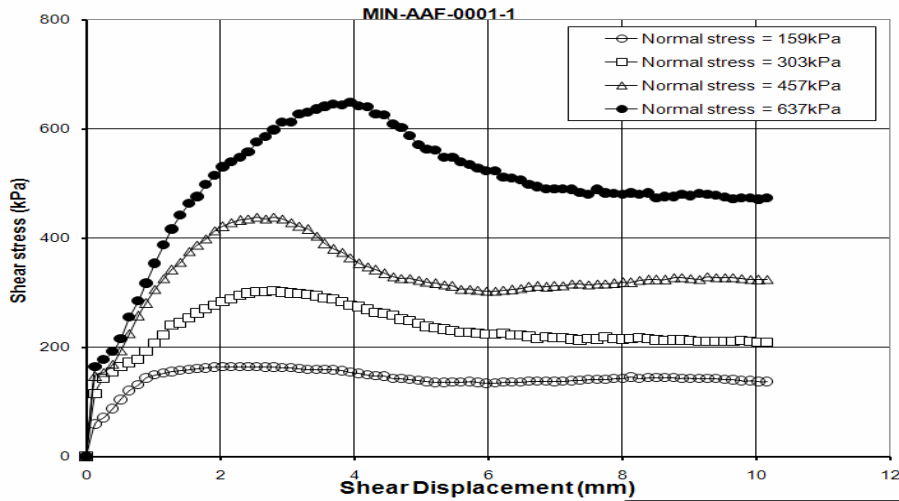


<b>Field id:</b>	MIN-AAF-0001-1						
Measured Cohesion	31.39	Water Content	5.63	Shear box size	60	Peak Shear Stress	56.7
Intrinsic Cohesion	24.69	Wet Density	2600	Matric Suction	25	Post Peak Shear Stress	20.65
Max particle size	12.7	Dry density	2460	Normal Stress	18.83	Elevation	7904

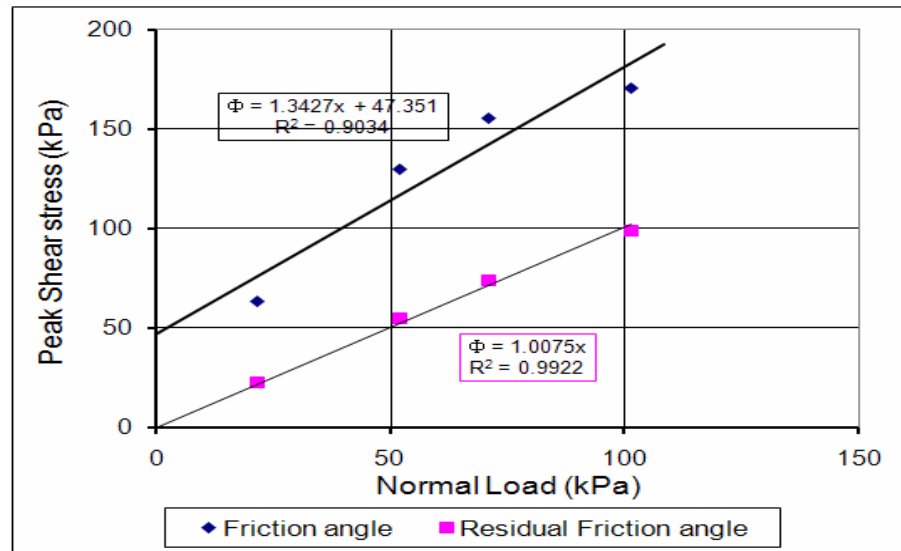
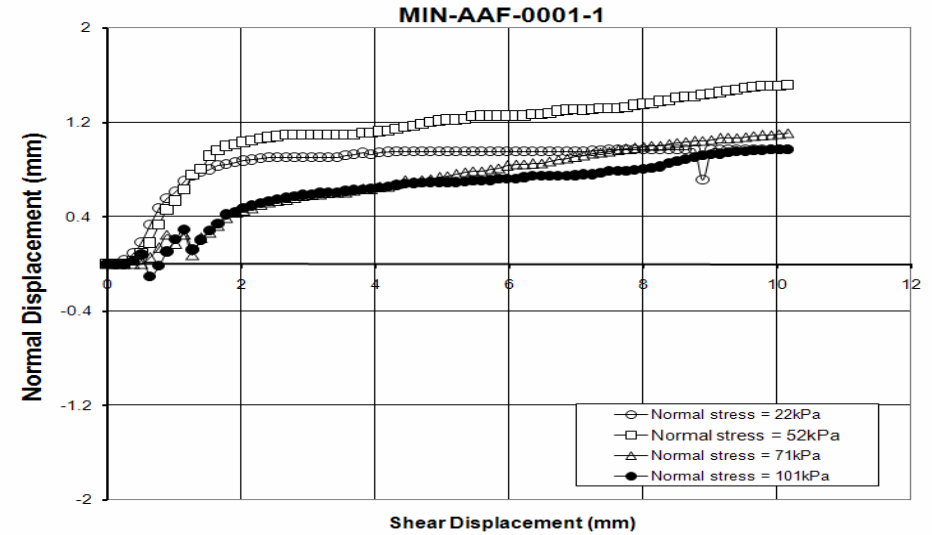
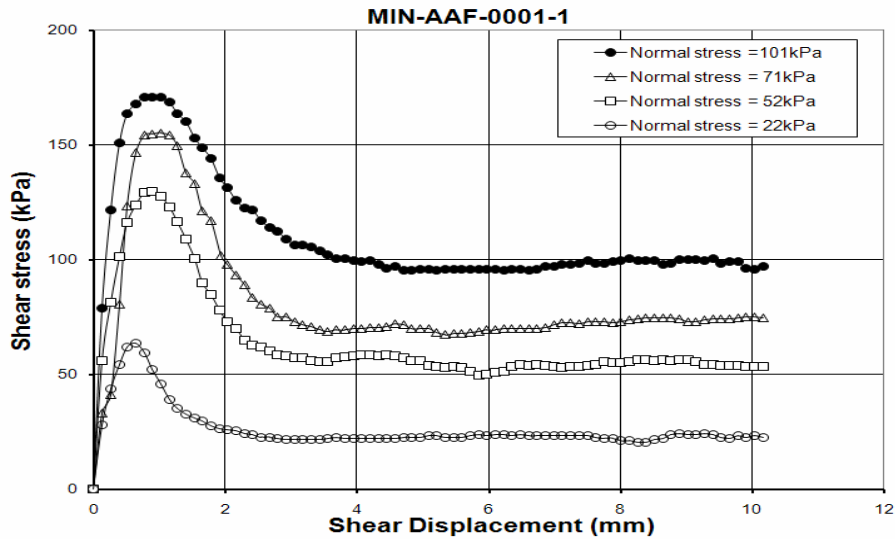
## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 48  
 TEST DATE: 12/19/2006



<b>Field id:</b>	MIN-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	164.99,303.46,438.75,649.48
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	142.27,211.75,323.24,476.64
Friction Angle	45.2	Dry density	1850	Normal Stress	159,303,457,637	Elevation	



<b>Field id:</b>	MIN-AAF-0001-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	63.66,129.98,155.44,170.82
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	22.79,55.06,73.96,98.96
Friction Angle	53.32	Dry density	2050	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

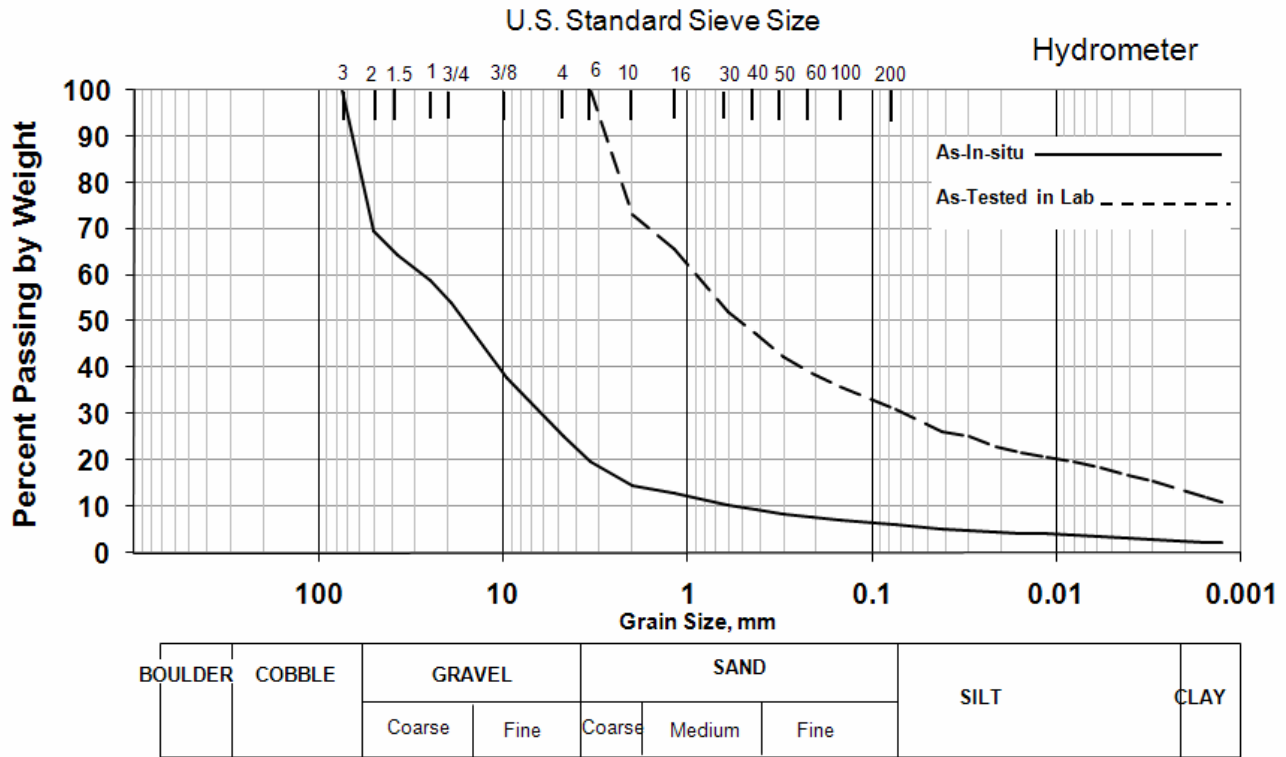
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

TEST NO: 49  
 TEST DATE: 9/30/2006

SAMPLE: **MIN-AAF-0004-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 22.8	GRAVEL: 74.9
PLASTIC LIMIT: 18.3	SAND: 19.0
PLASTICITY INDEX: 4.5	FINE: 6.1
SPECIFIC GRAVITY: 2.74	
ATTERBERG CLASSIFICATION: CL-ML	

### Particle Size Distribution



UNIFIED SOIL CLASSIFICATION:

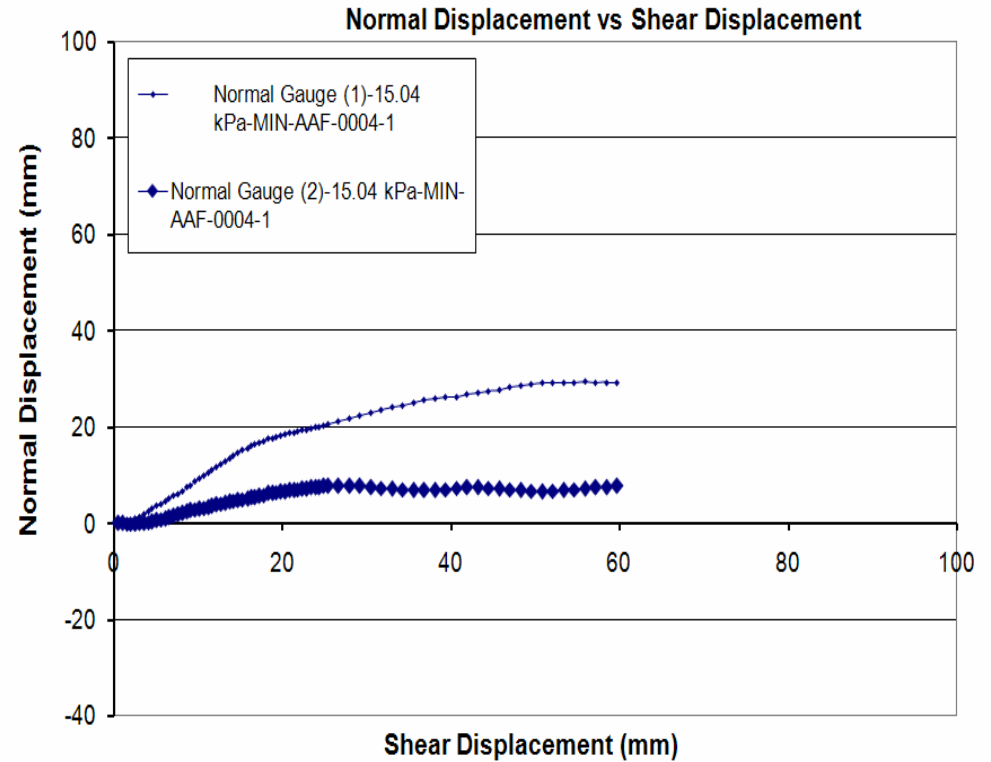
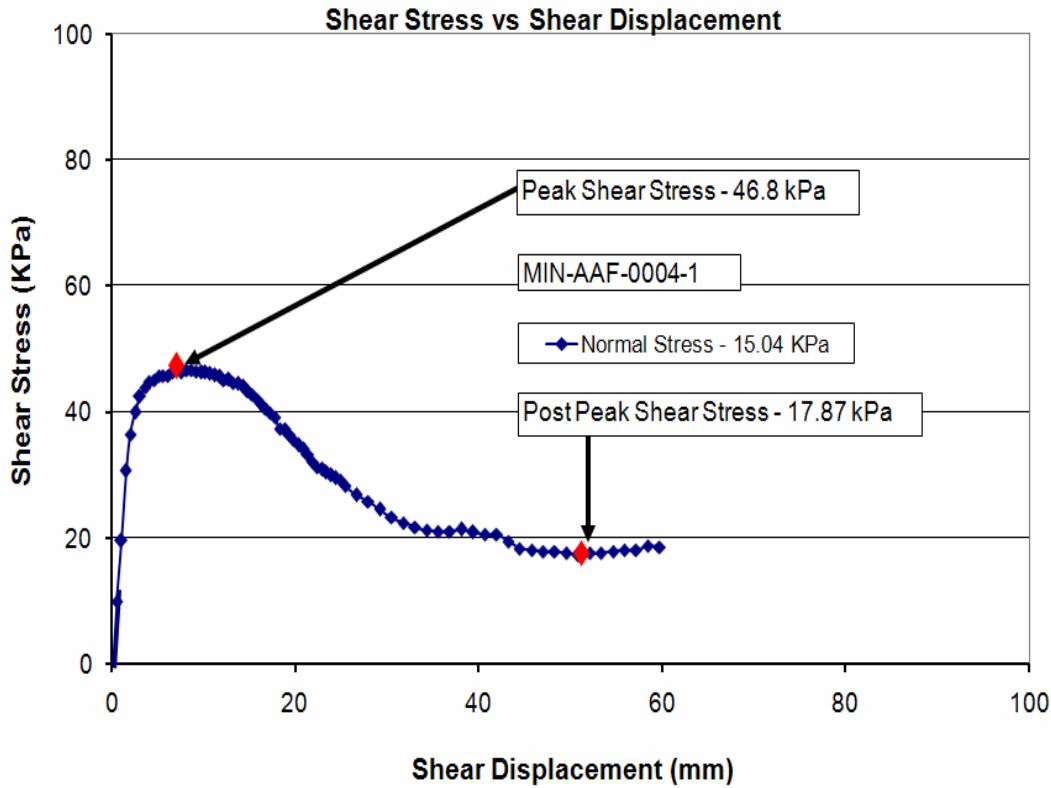
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	14.43	0.0419	5.14	0.0015	2.35
2	50	69.43	16	18.01	12.93	0.0303	4.99	0.0013	2.20
1-1/2	37.5	64.43	30	15.04	10.29	0.0217	4.53		
1	25	58.98	40	13.80	9.32	0.0157	4.30		
3/4	19	54.20	50	12.53	8.39	0.0114	4.07		
3/8	9.5	37.73	70	11.48	7.68	0.0082	3.91		
4	4.75	25.11	100	10.47	7.10	0.0058	3.61		
6	3.36	19.71	200	8.39	6.14	0.0042	3.30		

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 49  
 TEST DATE: N/A

UTM Northing: 4059912  
 UTM Easting: 452374

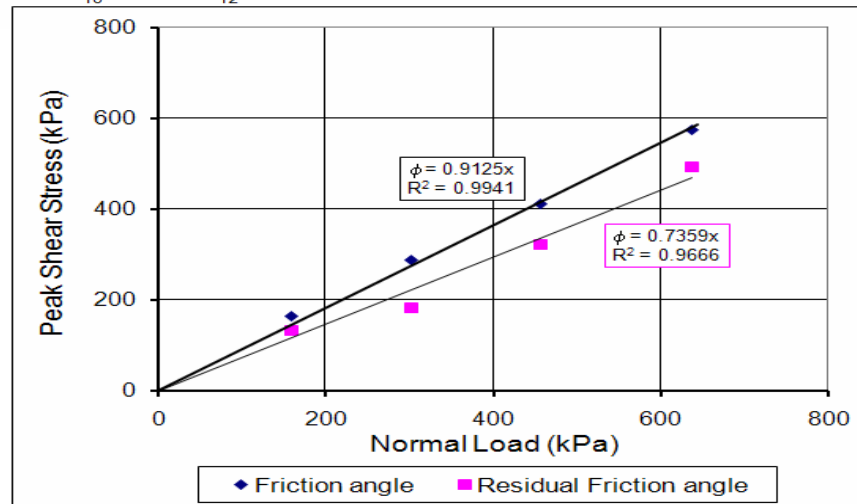
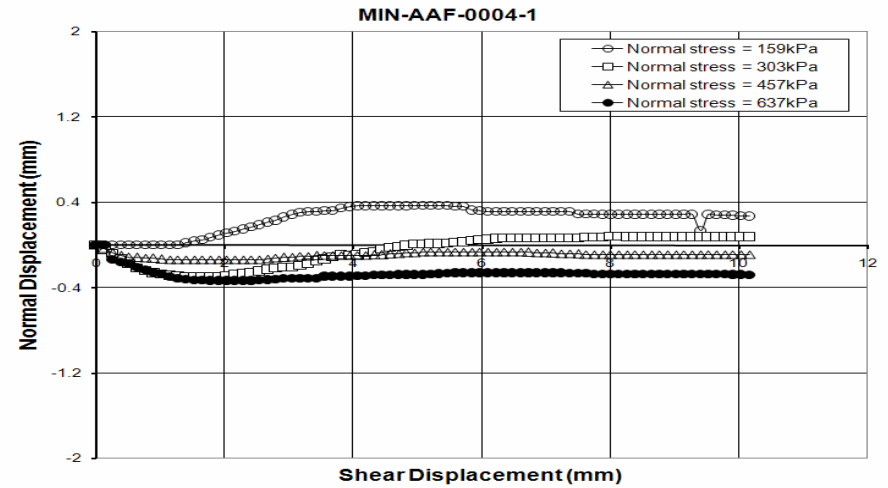
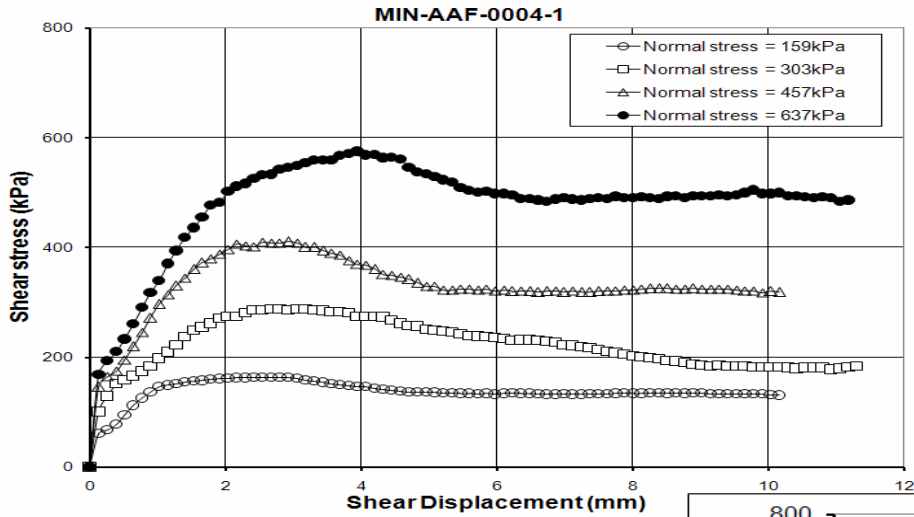


<b>Field id:</b>	MIN-AAF-0004-1						
Measured Cohesion	25.72	Water Content	7.79	Shear box size	60	Peak Shear Stress	46.8
Intrinsic Cohesion	18.75	Wet Density	2030	Matric Suction	26	Post Peak Shear Stress	17.87
Max. Particle Size	13.97	Dry density	1890	Normal Stress	15.04	Elevation	2409.76

## LABORATORY DIRECT SHEAR TEST REPORT

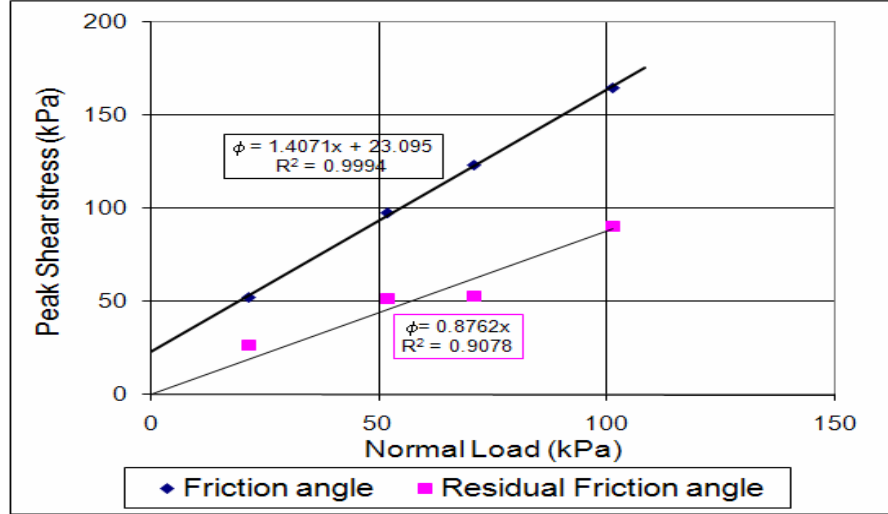
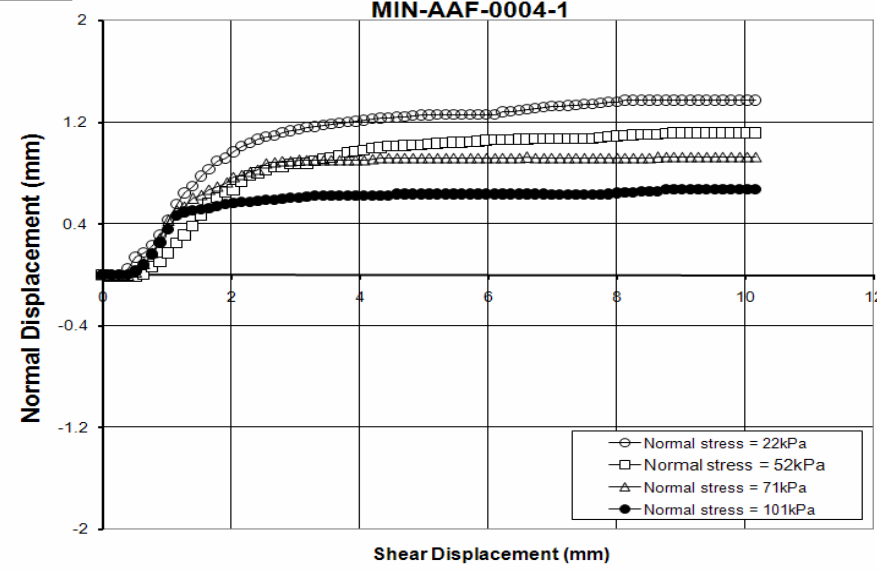
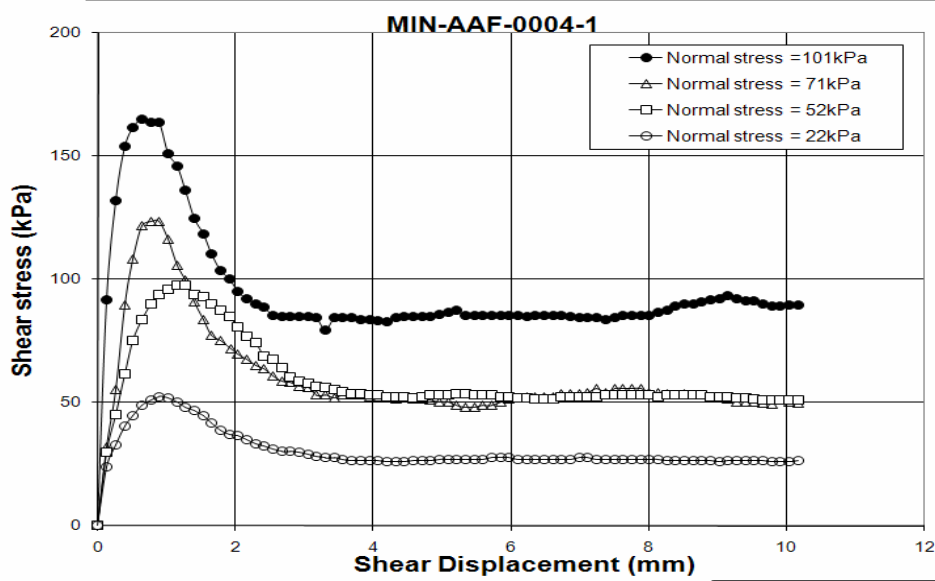
PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 49  
 TEST DATE: 1/18/2007



<b>Field id:</b>	MIN-AAF-0004-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	163.93,287.85,411.43,575.33
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	131.91,182.60,322.65,494.23
Friction Angle	42.38	Dry density	1830	Normal Stress	159,303,457,637	Elevation	





<b>Field id:</b>	MIN-AAF-0004-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	54.6	Dry density	1980	Normal Stress	22,52,71,101	Elevation

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

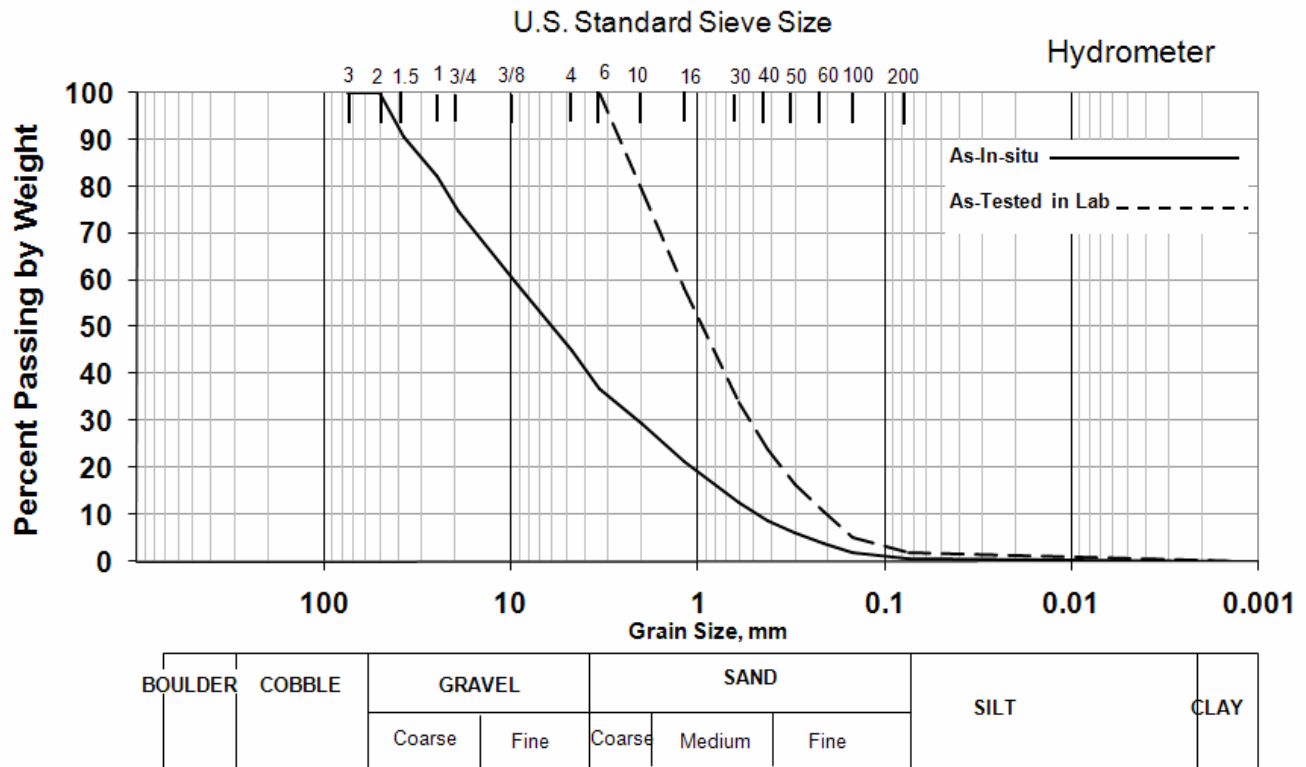
TEST NO: 50  
 TEST DATE: 8/10/2007

SAMPLE: **MIN-AAF-0010-1**  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.2  
 PLASTIC LIMIT: 16.4  
 PLASTICITY INDEX: 13.8  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION: CL

GRAVEL: 64.8  
 SAND: 34.9  
 FINE: 0.3

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

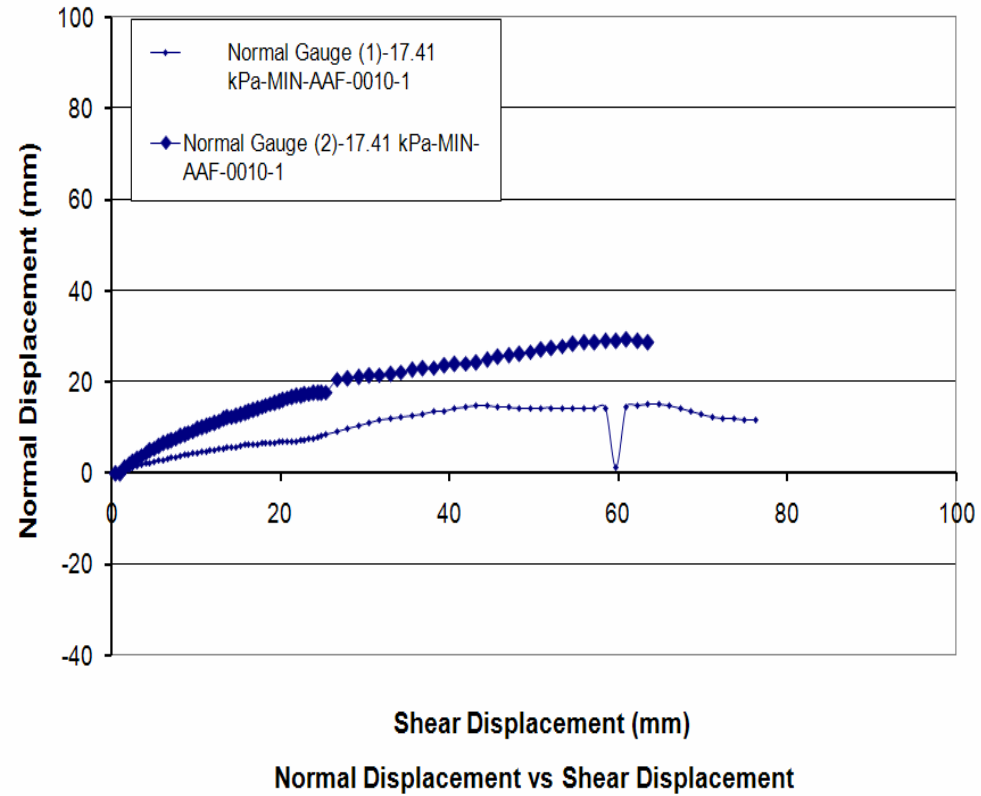
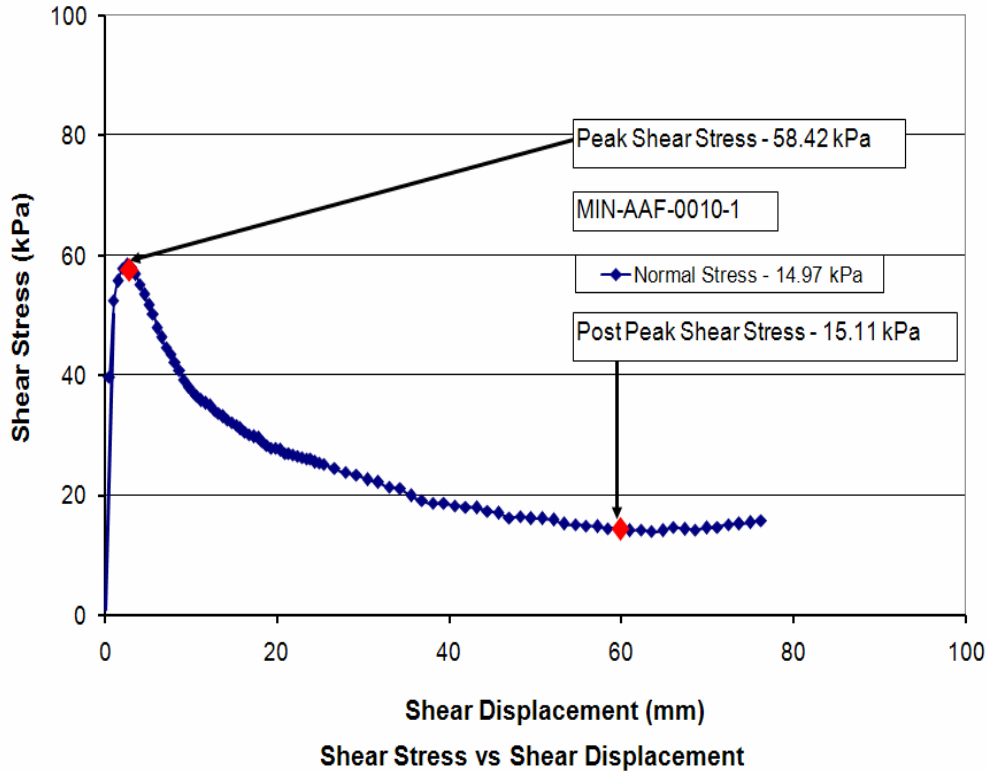
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	29.38	0.0419		0.0015	
2	50	100.00	16	18.01	21.52	0.0303		0.0013	
1-1/2	37.5	90.51	30	15.04	12.63	0.0217			
1	25	82.10	40	13.80	8.89	0.0157			
3/4	19	74.79	50	12.53	6.06	0.0114			
3/8	9.5	59.84	70	11.48	3.93	0.0082			
4	4.75	44.83	100	10.47	1.97	0.0058			
6	3.36	37.02	200	8.39	0.69	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 50  
 TEST DATE: N/A

UTM Northing: 4059925  
 UTM Easting: 452366

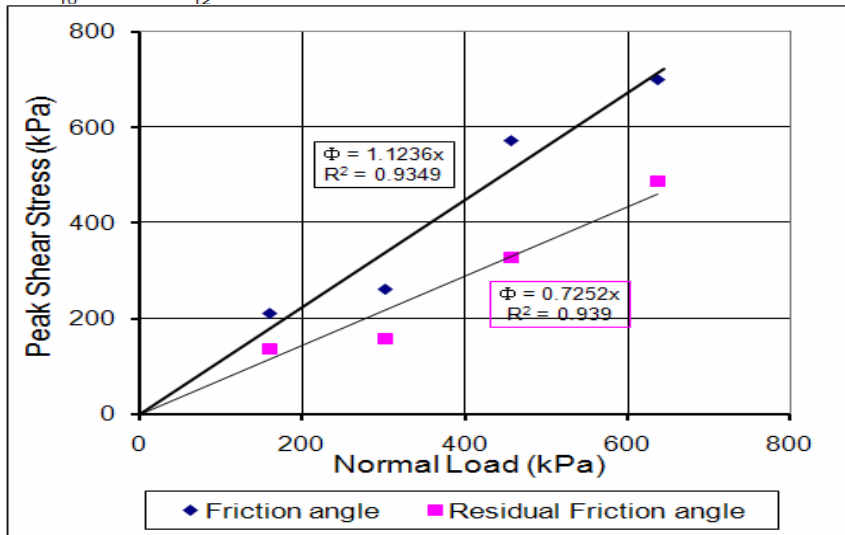
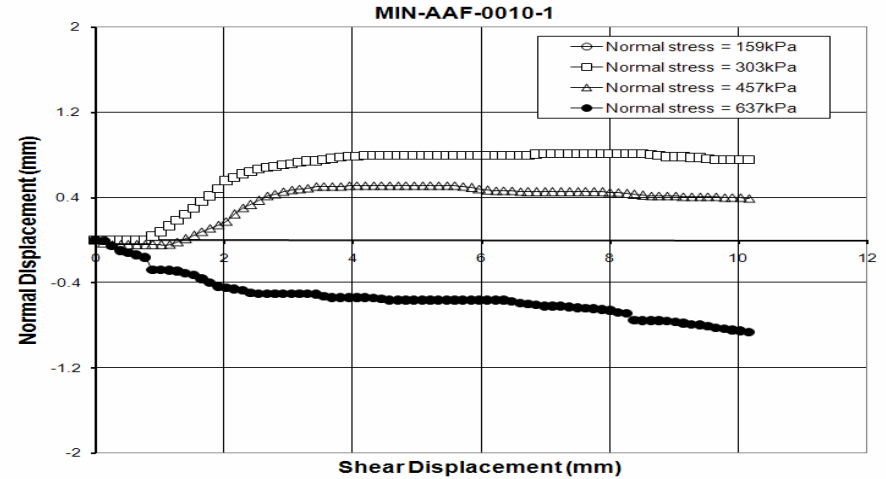
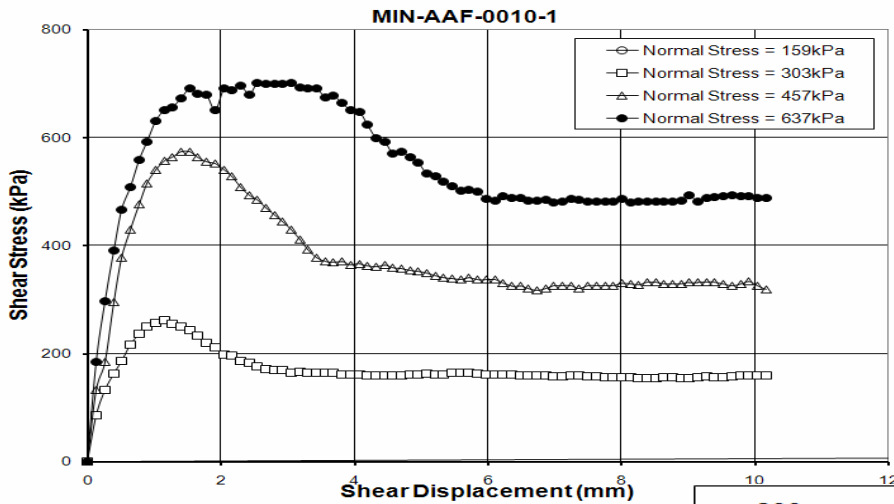


<b>Field id:</b>	MIN-AAF-0010-1						
Measured Cohesion	39.83	Water Content	4.38	Shear box size	60	Peak Shear Stress	58.92
Intrinsic Cohesion	27.77	Wet Density	2170	Matric Suction	45	Post Peak Shear Stress	15.11
Max. Particle Size	13.97	Dry density	2080	Normal Stress	14.97	Elevation	2408.5

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

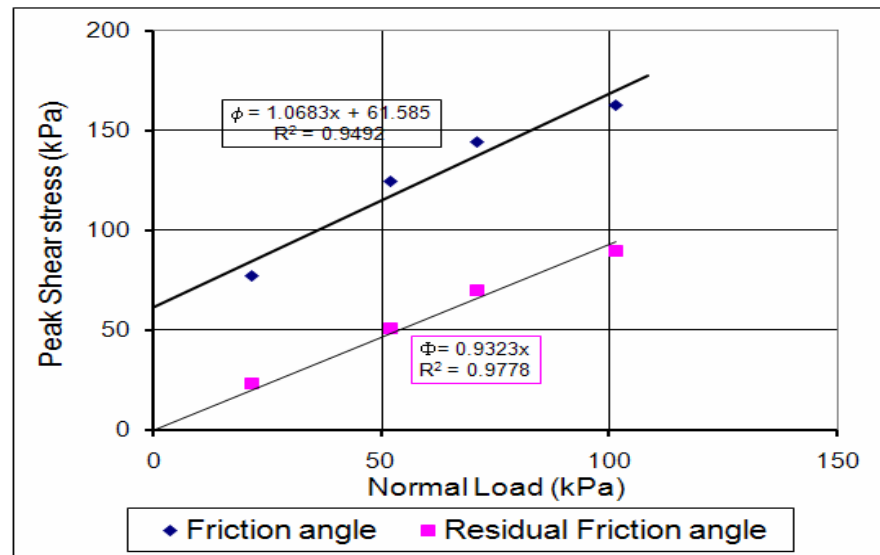
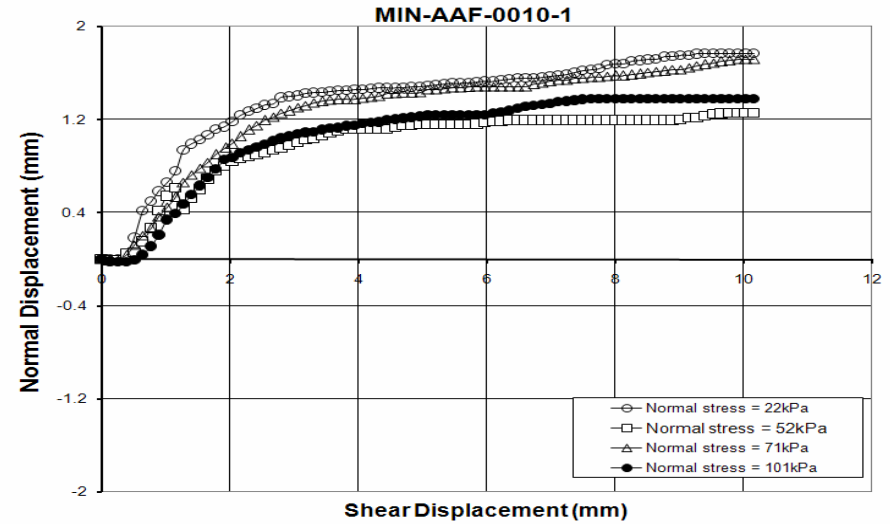
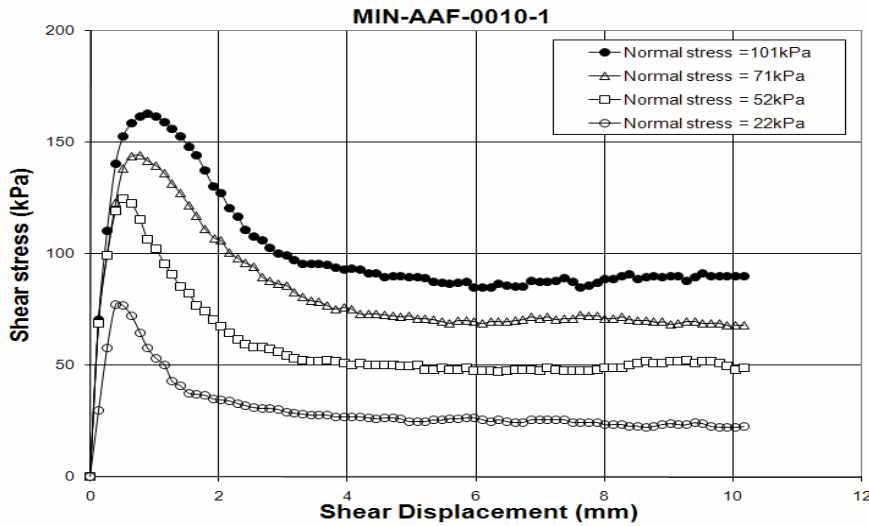
TEST NO: 50  
 TEST DATE: 9/6/2007



<b>Field id:</b>	MIN-AAF-0010-1					
Measured Cohesion		Water Content	Shear box size	5.08	Peak Shear Stress	212.40,261.84,574.03,701.51
Intrinsic Cohesion		Wet Density	Matric Suction		Post Peak Shear Stress	137.10,157.71,328.83,488.00
Friction Angle	48.33	Dry density	2030	Normal Stress	159,303,457,637	Elevation

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 50  
 TEST DATE: 8/27/2007



<b>Field id:</b>	MIN-AAF-0010-1					
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress
Friction Angle	46.89	Dry density	2090	Normal Stress	22,52,71,101	Elevation

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

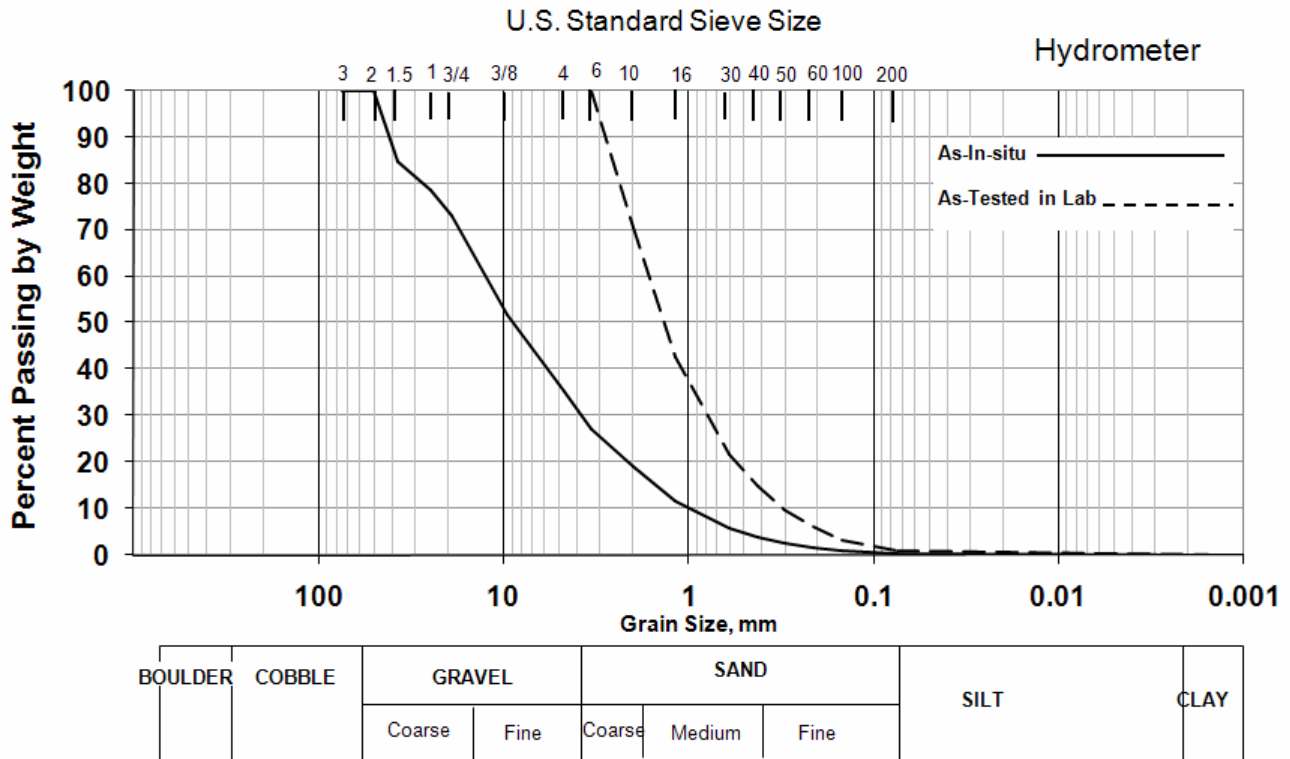
TEST NO: 51  
 TEST DATE: 8/10/2007

SAMPLE: MIN-AAF-0012-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.5  
 PLASTIC LIMIT: 21.6  
 PLASTICITY INDEX: 8.9  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION:

GRAVEL: 55.2  
 SAND: 44.1  
 FINE: 0.7

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

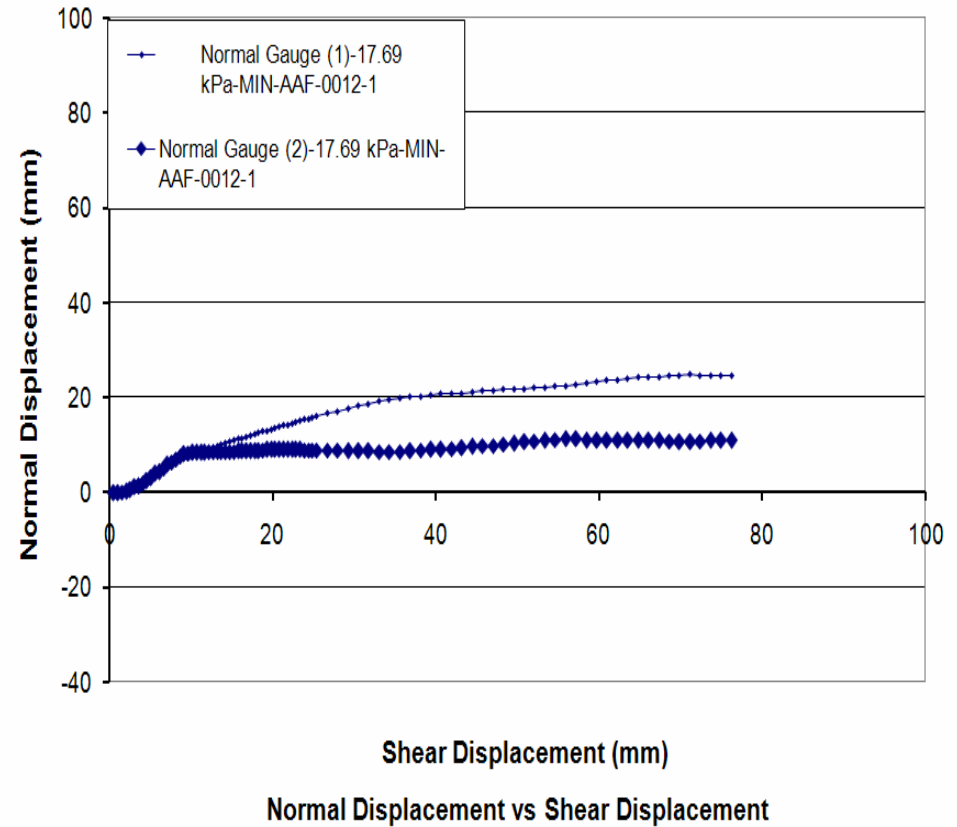
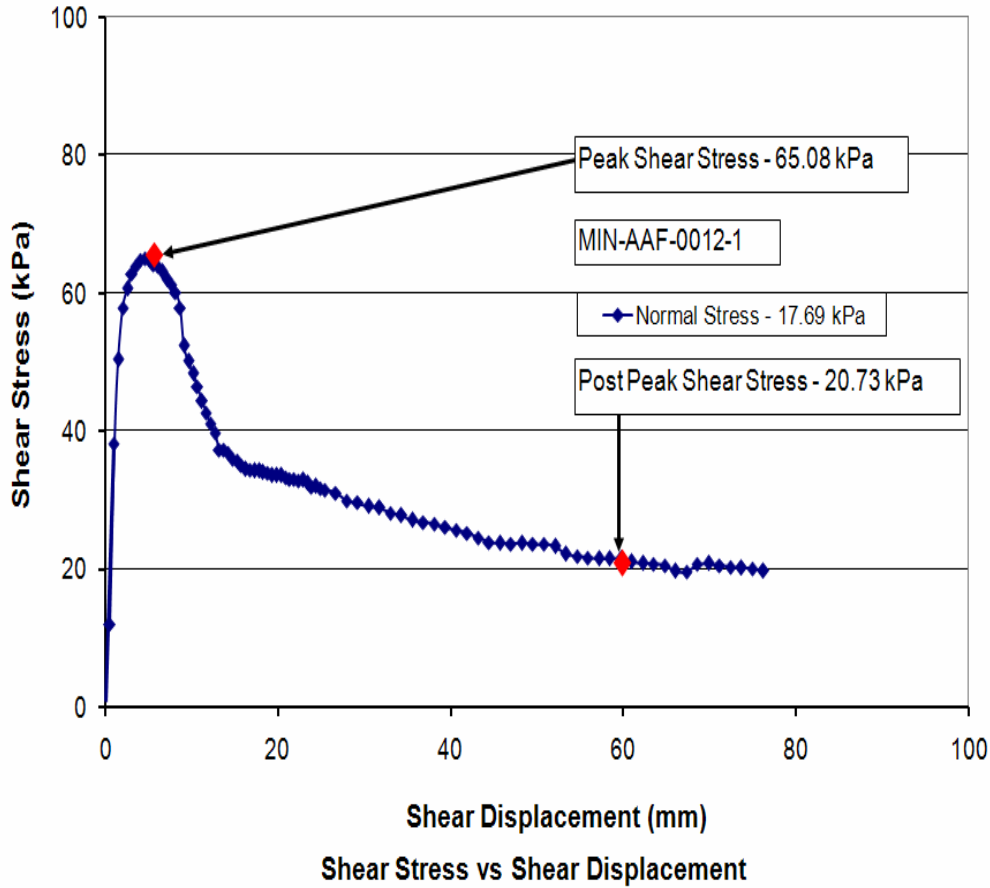
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	19.10	0.0419		0.0015	
2	50	100.00	16	18.01	11.56	0.0303		0.0013	
1-1/2	37.5	84.70	30	15.04	5.90	0.0217			
1	25	78.70	40	13.80	3.99	0.0157			
3/4	19	73.17	50	12.53	2.64	0.0114			
3/8	9.5	51.75	70	11.48	1.68	0.0082			
4	4.75	35.19	100	10.47	0.86	0.0058			
6	3.36	37.02	200	8.39	0.69	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 51  
 TEST DATE: N/A

UTM Northing: 4059922  
 UTM Easting: 452363

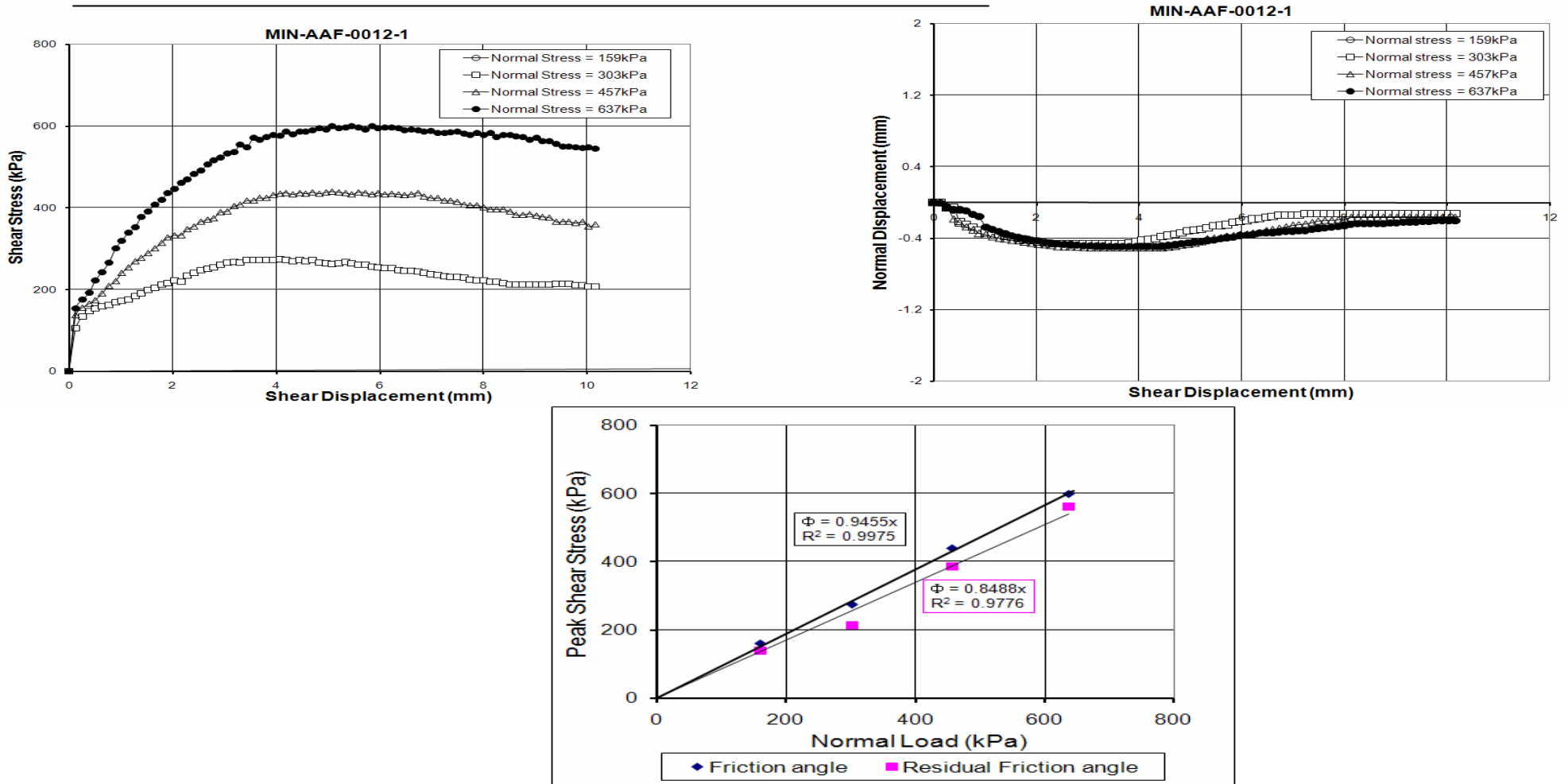


<b>Field id:</b>	MIN-AAF-0012-1						
Measured Cohesion	46.11	Water Content	5.42	Shear box size	60	Peak Shear Stress	65.08
Intrinsic Cohesion	37.27	Wet Density	1800	Matric Suction	31	Post Peak Shear Stress	20.73
Max. Particle Size	12.70	Dry density	1710	Normal Stress	17.69	Elevation	2396.7

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 51  
 TEST DATE: 9/6/2007

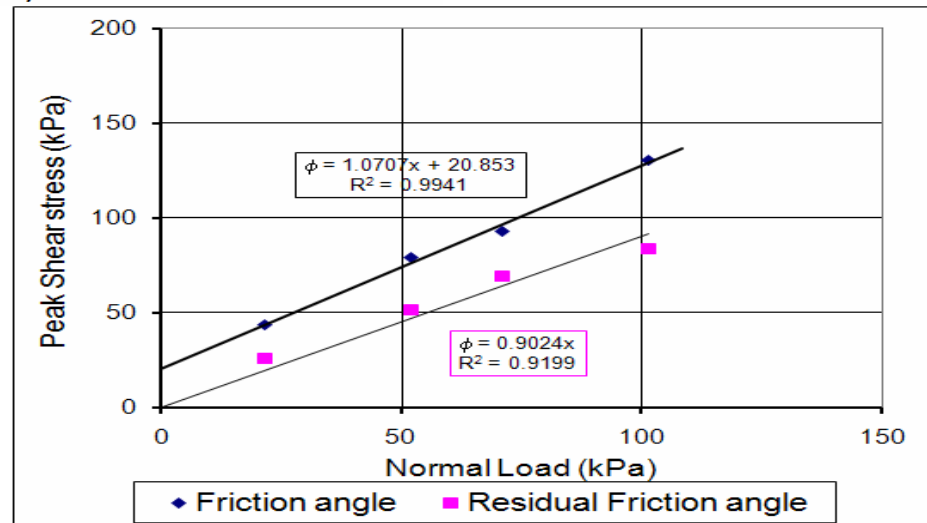
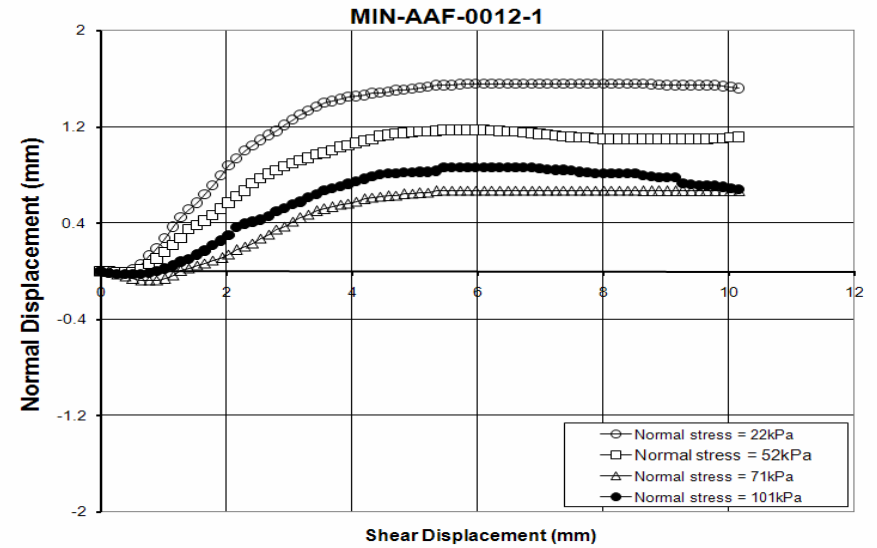
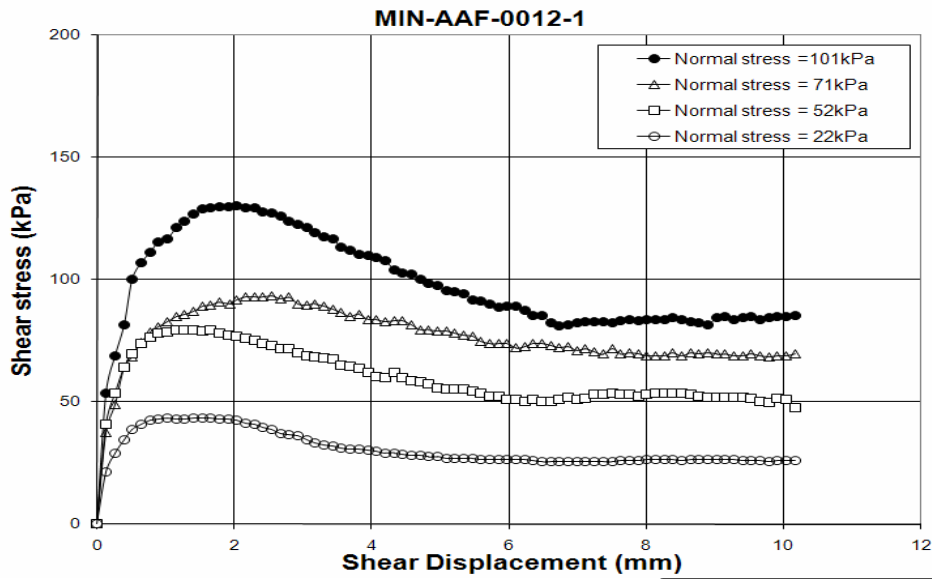


<b>Field id:</b>	MIN-AAF-0012-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	159.68,274.84,440.05,600.05
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	140.30,212.78,387.04,561.28
Friction Angle	43.4	Dry density	1880	Normal Stress	159,303,457,637	Elevation	



PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 51  
 TEST DATE: 8/30/2007



<b>Field id:</b>	MIN-AAF-0012-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	43.50,79.58,93.37,130.51
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	26.13,51.50,69.47,84.03
Friction Angle	47	Dry density	1730	Normal Stress	22,52,71,101	Elevation	

## PARTICLE SIZE ANALYSIS REPORT

PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **NMT Soil Lab**

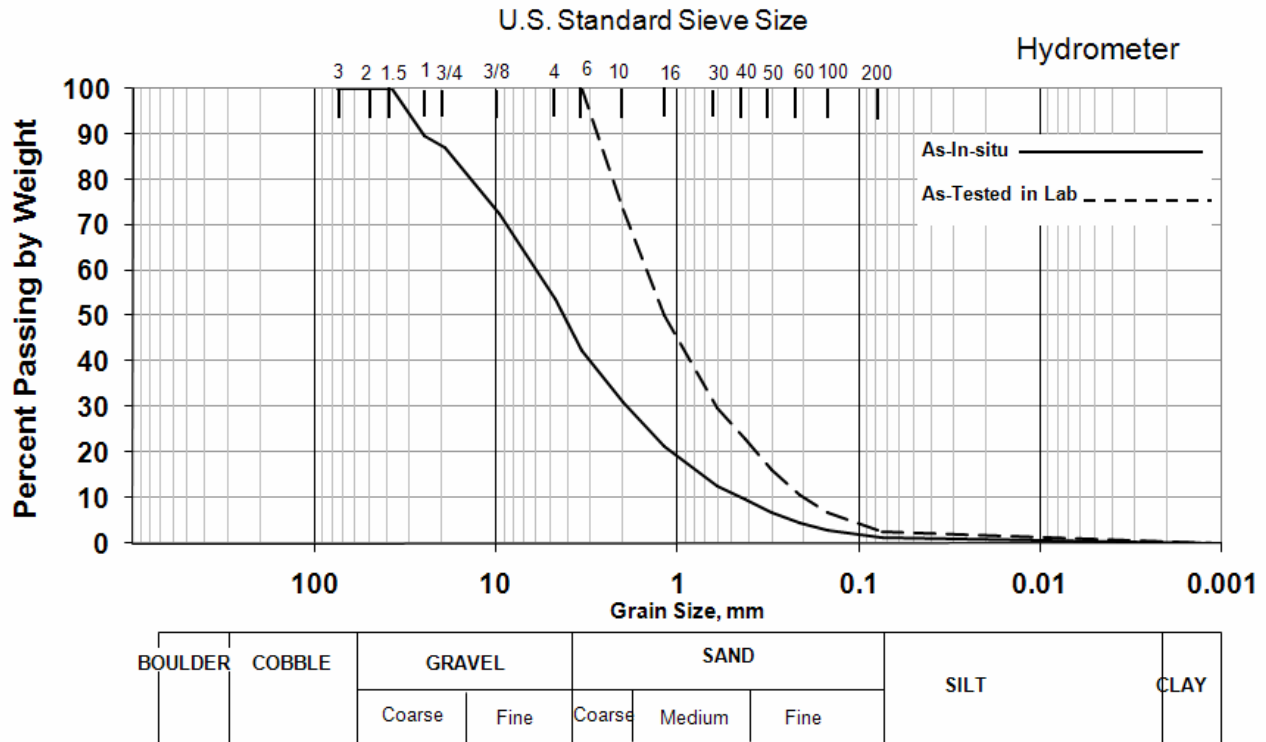
TEST NO: 52  
 TEST DATE: 7/26/2007

SAMPLE: MIN-AAF-0015-1  
 SOURCE: **Rock Pile Material Collected before In-situ Test**  
 TEST METHOD: **Dry Sieving (ASTM D-422)**

LIQUID LIMIT: 30.2  
 PLASTIC LIMIT: 16.4  
 PLASTICITY INDEX: 13.8  
 SPECIFIC GRAVITY: 2.70  
 ATTERBERG CLASSIFICATION:

GRAVEL: 46.3  
 SAND: 52.5  
 FINE: 6.2

### Particle Size Distribution



### UNIFIED SOIL CLASSIFICATION:

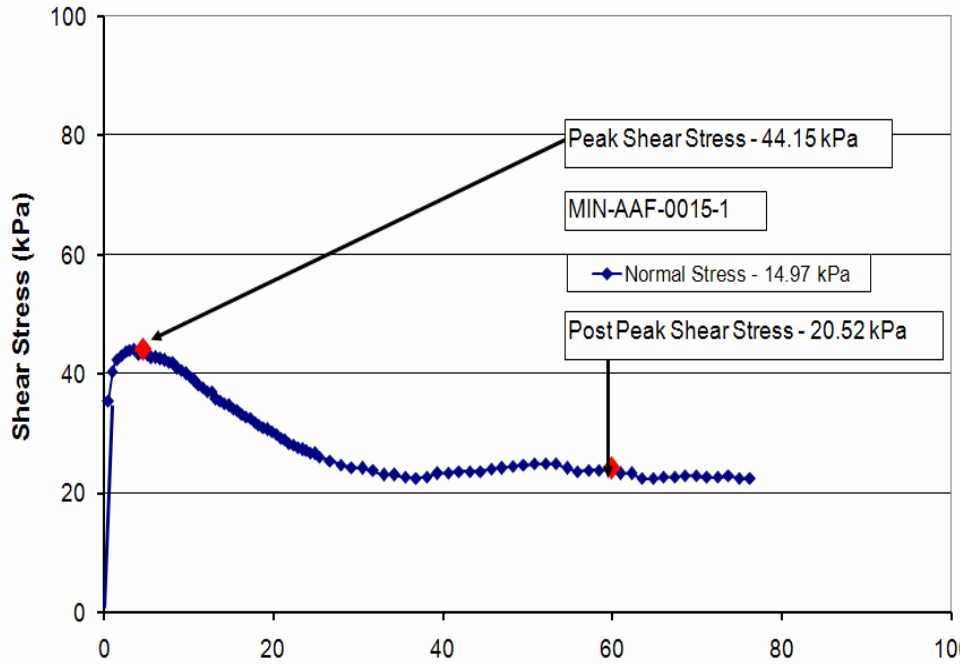
Gravel Size		% Passing	Sand Size		% Passing	Hydrometer		Hydrometer	
Inches	mm		Inches	mm		mm	% Passing	mm	% Passing
3	75	100.00	10	19.44	31.07	0.0419		0.0015	
2	50	100.00	16	18.01	21.25	0.0303		0.0013	
1-1/2	37.5	100.00	30	15.04	12.61	0.0217			
1	25	89.74	40	13.80	9.69	0.0157			
3/4	19	86.90	50	12.53	6.82	0.0114			
3/8	9.5	72.45	70	11.48	4.50	0.0082			
4	4.75	53.68	100	10.47	2.92	0.0058			
6	3.36	42.25	200	8.39	0.69	0.0042			

## IN-SITU DIRECT SHEAR TEST REPORT

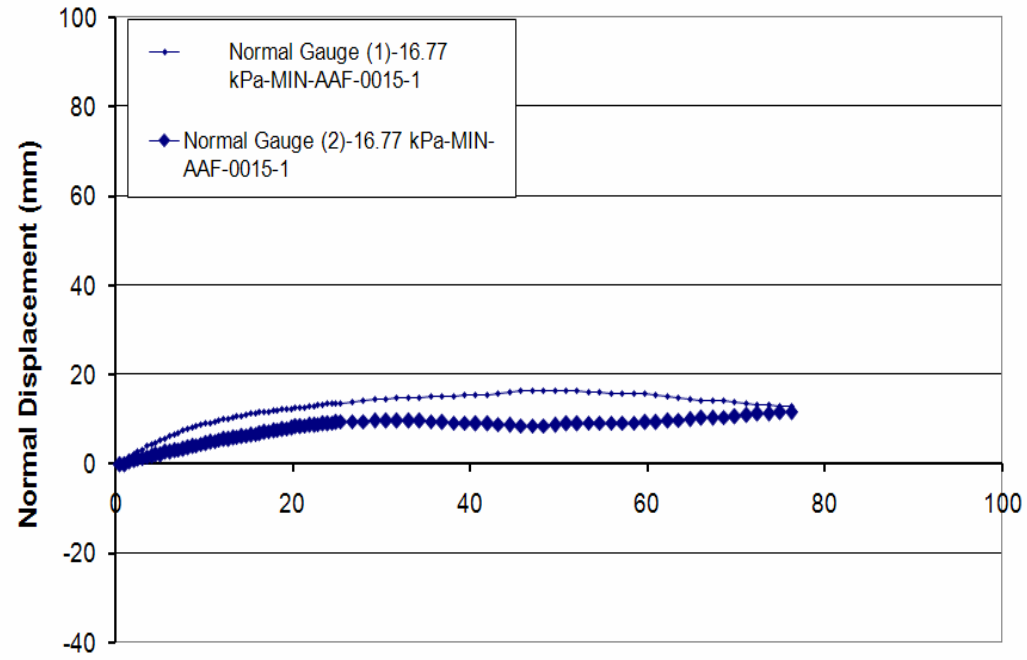
PROJECT: **Molycorp In-situ Direct Shear Test**  
 AREA PERFORMED: **Questa Mine Site**

TEST NO: 52  
 TEST DATE: N/A

UTM Northing: 4059925  
 UTM Easting: 452366



**Shear Stress vs Shear Displacement**



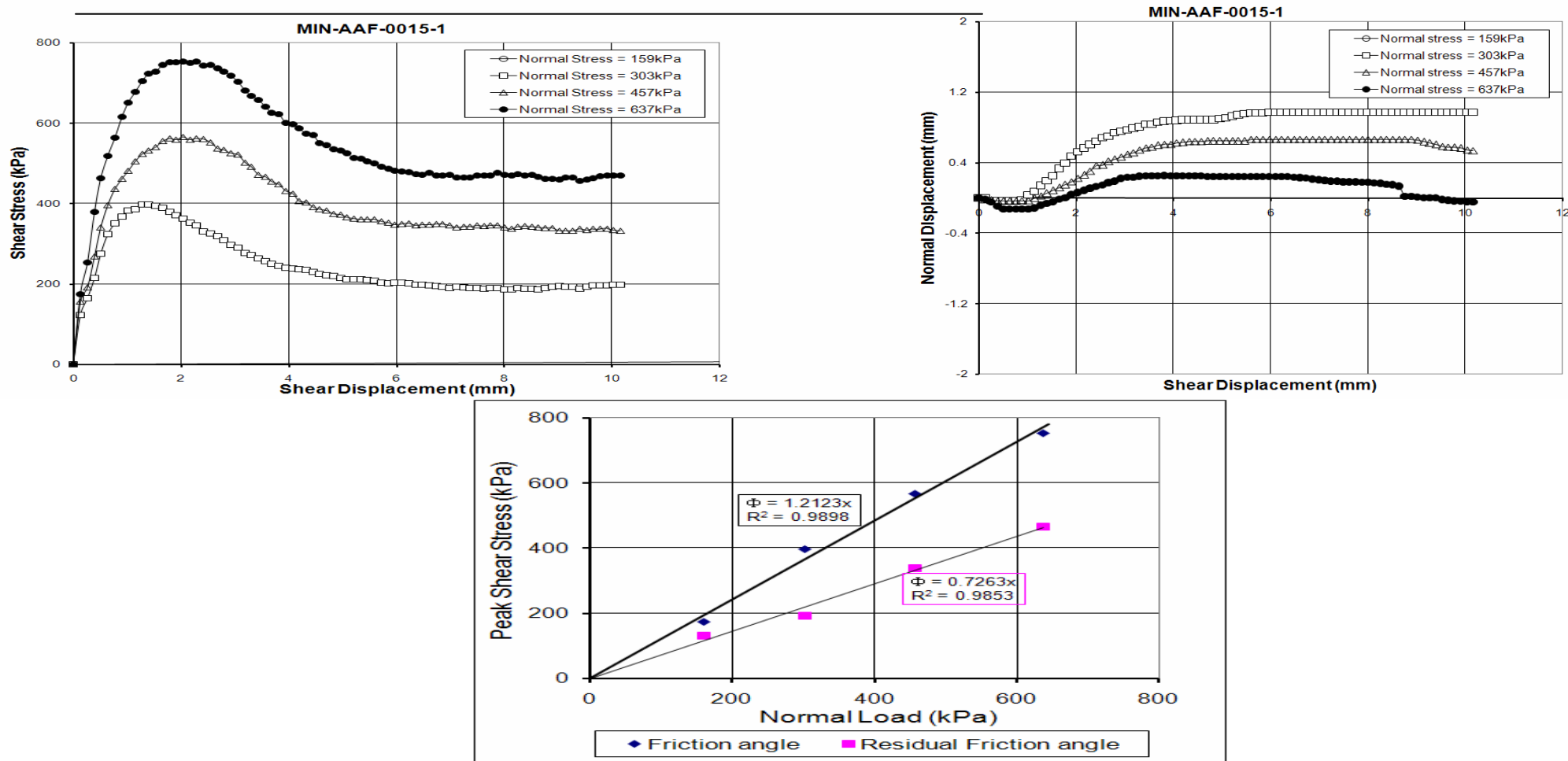
**Normal Displacement vs Shear Displacement**

<b>Field id:</b>	MIN-AAF-0015-1						
Measured Cohesion	25.52	Water Content	1.95	Shear box size	60	Peak Shear Stress	44.15
Intrinsic Cohesion	19.09	Wet Density	1980	Matric Suction	24	Post Peak Shear Stress	20.52
Max. Particle Size	17.78	Dry density	1940	Normal Stress	14.97	Elevation	2408.5

## LABORATORY DIRECT SHEAR TEST REPORT

PROJECT: NMT Lab Direct Shear Test (High Normal Load)  
 AREA PERFORMED: NMT Soil Lab

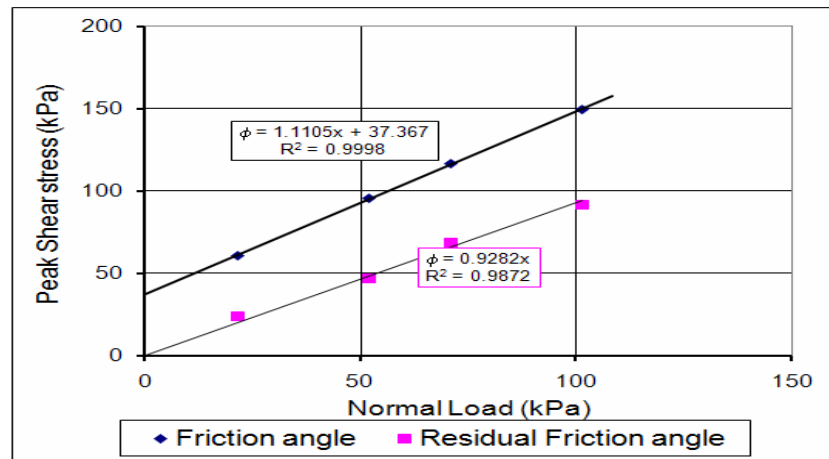
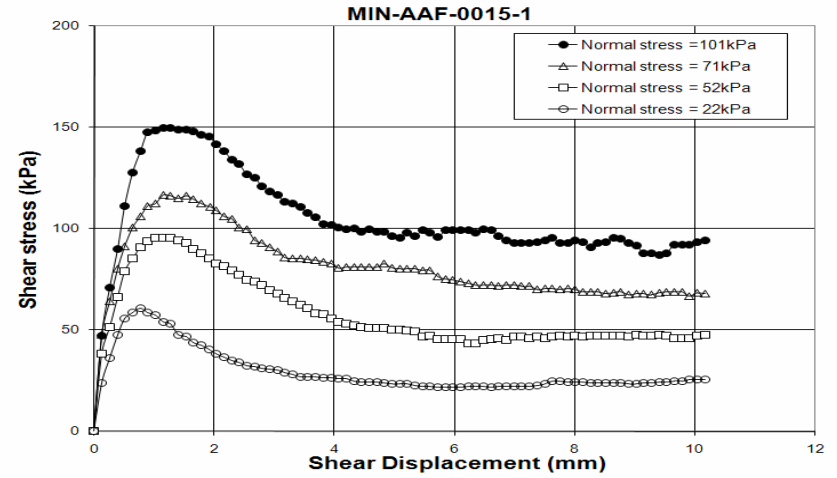
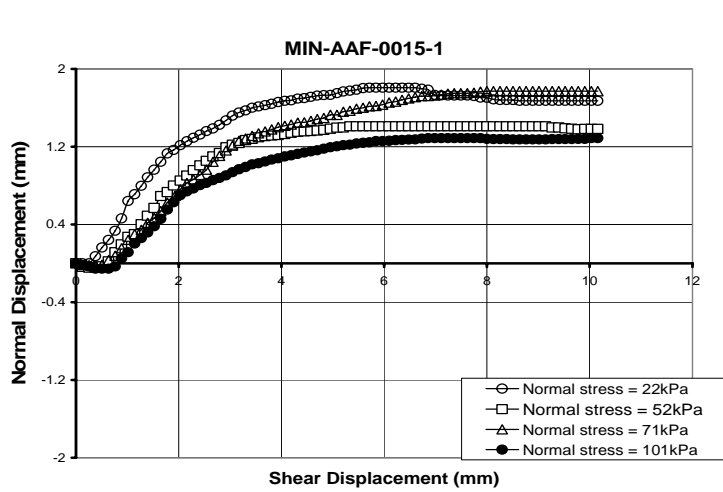
TEST NO: 52  
 TEST DATE: 9/7/2007



<b>Field id:</b>	MIN-AAF-0015-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	174.54,398.72,566.23,753.54
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	131.41,193.64,339.78,465.80
Friction Angle	50.48	Dry density	1980	Normal Stress	159,303,457,637	Elevation	

PROJECT: NMT Lab Direct Shear Test (Low Normal Load)  
 AREA PERFORMED: NMT Soil Lab

TEST NO: 52  
 TEST DATE: 8/31/2007



<b>Field id:</b>	MIN-AAF-0015-1						
Measured Cohesion		Water Content		Shear box size	5.08	Peak Shear Stress	61.01,95.49,116.71,149.60
Intrinsic Cohesion		Wet Density		Matric Suction		Post Peak Shear Stress	24.13,47.06,68.94,91.81
Friction Angle	48	Dry density	1880	Normal Stress	22,52,71,101	Elevation	