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Geotechnical Data Report

Yosemite Slough Sediment Site
San Francisco, California

May 2012

ARCADIS

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Geotechnical Data Report

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San Francisco, California

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1. Introduction

ARCADIS U.S., Inc. (ARCADIS) has prepared this Geotechnical Data Report to present the results of a geotechnical subsurface investigation conducted in Yosemite Slough and South Basin at the Yosemite Slough Sediment Site (the site). The geotechnical investigation was implemented in general accordance with ARCADIS' proposal to Beveridge & Diamond dated February 15, 2012 and the Geotechnical Investigation Work Plan (ARCADIS 2012a), which was reviewed by the United States Environmental Protection Agency (USEPA) and approved on March 9, 2012. This work was completed to support the development of an Engineering Evaluation/Cost Analysis (EE/CA) for the site. In addition to the presentation of geotechnical data, some discussion of the data relative to their application to the engineering of remedial alternatives is provided at the end of this report.

2. Background

2.1 Site Description and Background

Yosemite Slough is an approximately 1,600-foot-long channel connected to central San Francisco Bay in southeastern San Francisco, California. The site is located in San Francisco's Bayview-Hunters Point neighborhood between the Hunters Point Naval Shipyard to the north and the Candlestick Point State Recreational Area (Candlestick Point) to the south. A site vicinity map is provided on Figure 1. The exact site boundary has yet to be established. The main contaminants of interest in the slough include: polychlorinated biphenyls (PCBs), various metals, and total petroleum hydrocarbons (TPHs) (Ecology and Environment, Inc. 2011). At low tide, the majority of the sediments in the inlet channel are exposed, creating a mudflat.

From the late 1800s until the late 1930s, Yosemite Slough consisted of natural open water marine habitat including wetlands, marshlands, and tidal mudflats (Dow, 1972). The shoreline remained relatively unchanged during this time period. Beginning in 1939, the area was transformed, becoming a part of the Hunters Point Naval Shipyard complex and was undergoing significant changes, including placement of fill soils and debris in wetlands and along the original edges of the slough.. By the 1950s, following the end of WWII, the area surrounding the slough had come to be characterized by mixed residential, commercial, and industrial uses. In 1958, a large area of South Basin was filled to construct a major league baseball stadium on the newly created peninsula of land currently referred to as Candlestick Point. Further development of Candlestick Point continued into the early 1970s. By 1972, the Yosemite Slough and

South Basin shorelines were similar to what they are today, with most of the areas elevated 5 to 20 feet above sea level.

2.2 Purpose of Geotechnical Investigation

The geotechnical investigation was conducted to support the evaluation of various remedial technologies and engineering components for potential remedial alternatives to be evaluated in the EE/CA for the site. These remedial technologies and engineering components may include capping, dredging, and/or use of a cofferdam or other structure to separate the site from other portions of San Francisco Bay. In accordance with the Geotechnical Investigation Work Plan (ARCADIS 2012a), subsurface information was to be collected to provide feasibility-level design information for the evaluation of remedial technologies and engineering components:

- Subsurface stratigraphy – particularly thickness of the sediment and bay mud, as well as depth to bedrock

- Sediment properties – particularly index parameters (i.e., moisture content, grain size, plasticity, and unit weight), stress history, compressibility, and undrained strength of the soft sediments

- Rock properties – particularly quality, hardness, and strength of rock

3. Scope of Geotechnical Investigation

In addition to activities associated with preparation for field work and demobilization following field activities, the scope of the geotechnical investigation included the following data collection activities:

- Geotechnical Borings – Six geotechnical borings were drilled in Yosemite Slough and South Basin, including standard penetration testing/split-spoon sampling. Shelby tube samples were collected from three of the borings, mainly within the soft bay mud deposit. Shelby tube samples were collected for advanced geotechnical laboratory testing on relatively undisturbed samples to determine compressibility and strength properties of the soft subsurface materials. The coordinates and completion information for each geotechnical boring are summarized in Table 1. The boring logs, along with descriptions of the field exploration methods, are presented in Appendix A.

- Rock Coring – Rock coring was performed in one boring where bedrock was encountered at a relatively shallow depth. Originally, rock coring was planned to be performed at two locations. However, the bedrock surface was generally deeper than anticipated at many of the boring locations. The rock was also generally of poor quality and rock coring did not provide anticipated data. The results of the rock coring are presented on the boring logs in Appendix A.

- Vane Shear Tests (VSTs) – Vane shear testing was performed at three locations to measure undrained shear strength in the soft bay mud deposit. The VSTs were co-located with the three geotechnical borings that included Shelby tube sampling. The coordinates and completion information for each VST are summarized in Table 1. The vane shear test data report is provided in Appendix B.

- Geotechnical Laboratory Testing – Laboratory testing was performed on selected soil samples to confirm field classifications and to characterize the subsurface materials in terms of physical and engineering properties. More detailed information regarding the types of tests that were performed and a summary of the test results are presented in subsequent sections of this report. The laboratory test results, along with descriptions of the laboratory test methods, are provided in Appendix C.

Photographs of the field equipment and photographs of the samples collected during the field work are presented in Appendix D.

4. Generalized Subsurface Conditions

The following descriptions of the subsurface conditions are based on materials encountered in seven borings drilled by ARCADIS' subcontractor, Taber Drilling. The locations of the borings are shown on Figure 2. Details of the conditions observed at the boring locations are shown on the logs included in Appendix A and should be referred to for specific information.

The following geologic units were encountered in the borings:

- Young Bay Mud. Very soft clay was encountered in the upper portion of each boring. The thickness of the Young Bay Mud unit ranged from approximately 8 feet to 34 feet, with thickness typically being less in proximity to Double Rock (refer to Figure 2). Trace to little amounts of fine-grained sand, silt, shell fragments, and organics were observed within the soft clay unit. Layers of fine-grained sand with lesser amounts of clay, gravel and silt were encountered within the Young Bay Mud in AUS-B-01A/B and AUS-B-06.

- Older Bay Sediments – Sand. The Young Bay Mud was underlain by predominantly medium dense sand with some very dense sand layers that may present hard driving conditions during sheet pile installation. The thickness of the sand unit ranged from approximately 12 feet to 40 feet, with thickness typically being less in proximity to Double Rock. Trace to little amounts of silt, clay, gravel, and trace organics were observed within the sand unit. Layers of stiff to very stiff clay were encountered within the Older Bay Sediments Sand unit in all borings except AUS-B-05.

- Older Bay Sediments – Clay. The sand unit was underlain by predominantly medium stiff to stiff clay in all borings except AUS-B-05. Some stiffer clay layers in the very stiff to hard range were also encountered within this unit. Where the borings extended beyond the base of the clay unit, tit was found to range from approximately 15 feet to 30 feet thick, with thickness typically being less in proximity to Double Rock. Trace amounts of organics and fine sand were observed within the clay unit. Layers of dense fine- to coarse-grained sand or gravel were encountered near the center or base of the Older Bay Sediments Clay.

- Sandstone Bedrock (Franciscan Complex). The Younger Bay Mud and Older Bay Sediments are underlain by Franciscan Complex bedrock (Bonilla 1998). Fine-grained sandstone bedrock of the Franciscan Complex was encountered at the base of borings AUS-B-02, AUS-B-03, and AUS-B-05 beneath the Older Bay Sediments. It was generally possible to drill the rock using mud-rotary drilling equipment. However, the standard penetration test (SPT) N values were significantly greater than 50 (blows per foot), indicating that embedment of piles into the rock using driving techniques would be impractical or not feasible. Rock coring to 15 feet below the bedrock surface was performed at AUS-B-05. The rock was generally highly fractured with a very low rock quality designation (RQD) ranging from 0 to 17 percent.

Figure 2 shows the locations of three generalized subsurface cross sections. The cross sections are presented on Figures 3 through 5.

5. Summary of Geotechnical Testing Data

To obtain engineering properties of the subsurface materials, geotechnical testing was performed in situ during field work activities and on selected samples in the laboratory. In-situ testing consisted of SPTs performed at the time of split-spoon sampling during drilling of the borings and VST explorations performed in separate boreholes. Geotechnical laboratory testing was performed on selected disturbed split-spoon samples and relatively undisturbed thin-wall tube (Shelby tube) samples. The laboratory testing consisted of index property testing to determine basic physical properties and more advanced testing on the relatively undisturbed samples to obtain shear strength, stress history, and compressibility of some of the subsurface materials. Laboratory testing on rock samples was planned originally. However, the rock was too highly fractured to allow for meaningful laboratory testing. The test results obtained from in-situ and laboratory testing of sediment samples are presented below.

5.1 In-Situ Testing

5.1.1 Standard Penetration Test Data

SPTs were performed in the borings at regular intervals as part of split-spoon sampling. SPT results can be used to estimate the density of cohesionless materials and the consistency of cohesive materials. In this report, the SPT results were used to describe the relative density and consistency of the subsurface materials. The SPT results (N values) are provided on the cross sections presented on Figures 3 through 5 and on the boring logs in Appendix A. Appendix A also provides additional information regarding the SPT method and how relative density/consistency were estimated for the description of the subsurface materials.

5.1.2 Vane Shear Test Data

VSTs were performed to measure the undrained strength of the Young Bay Mud at various depths. The VST explorations were co-located with three of the borings to allow comparison with laboratory test results:

- Boring AUS-B-01A/B co-located with VST Exploration AUS-V-01
- Boring AUS-B-02A/B co-located with VST Exploration AUS-V-02
- Boring AUS-B-03 co-located with VST Exploration AUS-V-03

The VST results consisting of peak and remolded undrained shear strength are summarized in Table 2. The VSTs were performed by Fugro Consultants, which performed the work as a subcontractor to Taber Drilling. Fugro's vane shear test report is provided in Appendix B. Based on the VST results, the undrained shear strength of the Young Bay Mud ranges from very soft to soft and appears to generally increase with depth.

5.2 Laboratory Testing

5.2.1 Index Property and Classification Test Data

Index property and classification tests were performed on selected sediment samples to determine basic physical properties of the sediments and to verify classifications performed in the field. The laboratory testing program included the following tests:

- Moisture content determination (ASTM D 2216)
- Moisture and density determination (ASTM D 2937)
- Grain size distribution (sieve only) (ASTM D 422)
- Atterberg limits (ASTM D 4318)
- Specific gravity (ASTM D 854)

The index property and classification test results are summarized in Table 3. The laboratory test data provided by the geotechnical laboratory (Cooper Testing Laboratories), along with descriptions of the test methods, are provided in Appendix C. The moisture content data presented in Table 3 is not comprehensive. The full moisture content data set is provided in Appendix C.

5.2.2 Laboratory Undrained Strength Test Data

Unconsolidated, undrained triaxial compressive shear strength (TXUU) tests were performed to measure the laboratory undrained strength of the cohesive sediments. The majority of the tests were performed on samples of the Young Bay Mud. The laboratory undrained strength of the Young Bay Mud is generally in the very soft to soft range and compares reasonably well with results obtained using the VST. It should be noted that the undrained strength of soil is in part dependent on the mode of failure (or stress path). Sample disturbance can also affect shear strength measurements and should be considered. Therefore, the results presented herein may need to be adjusted for a more accurate comparison between TXUU and VST results. TXUU tests were also performed on two clay samples of the Older Bay Sediments, which are significantly stronger than the Young Bay Mud. A summary of the TXUU test results is provided in Table 4. The testing data for each test, along with a brief description of the test method, are provided in Appendix C.

5.2.3 Consolidation Test Data

Consolidation tests were performed to allow for estimation of compressibility, time-rate of consolidation, and stress history parameters of the soft Young Bay Mud. These parameters should be assessed by the design engineer based on the consolidation test data provided in Appendix C. Generally, based on ARCADIS' review of the results, the Young Bay Mud appears to be highly compressible and only slightly overconsolidated. These observations are generally in line with the relatively low undrained shear strength measured using the VST and the TXUU test.

6. Discussion

This report provides feasibility-level geotechnical data for the engineering evaluation of remedial technologies and design elements. In terms of specific design elements, the primary focus of the data collection effort was on the feasibility of a cofferdam structure near the mouth of the slough to potentially allow dredging within an enclosed area. The focus of the investigation in terms of remedial technologies was on sediment removal and capping. This section of the report provides initial discussion and possible implications of the investigation results in regard to each of these elements and technologies. Further assessment of the data and technologies will be necessary during preparation of the EE/CA for the site.

6.1 Cofferdam

The possibility of using a sheet pile cofferdam to separate the remedial action area from the tidal influence of San Francisco Bay was suggested relatively early on in the development of remedial alternatives (Environmental Quality Management, Inc. [EQM] 2007). A relatively simple cofferdam may consist of a cantilever sheet pile structure. Cantilever sheet pile structures rely on embedment into subsurface materials for stability. Because sheet piles cannot be driven into bedrock, a minimum thickness of sediment or soil is required above bedrock to achieve stability. The required thickness of sediment/soil depends on the strength of the subsurface material and the loading conditions. A cantilever sheet pile structure may be feasible if the following conditions exist:

- Relatively small lateral loading from earth pressures, hydrostatic pressure, and wave loading
- Sufficient sediment/soil thickness above bedrock to allow for sufficient embedment of the sheet piles to develop lateral resistance
- Subsurface sediment/soil that consists of sufficiently competent material and that is not too dense/hard to allow for penetration of the sheet piles during driving

Based on the geotechnical subsurface information presented herein, at least the latter two of the above conditions will present significant challenges in some areas of the site. More specifically, the following conditions present significant challenges for the design and installation of a cantilever sheet pile cofferdam:

- Highly variable bedrock surface elevation (sheet piles cannot be driven into the bedrock) and associated highly variable sediment thickness available for sheet pile embedment
- Significant thickness of low-strength material in the upper sediment profile

As a result of the above conditions, a cantilever wall may only be feasible in some areas (i.e., in the areas where the bedrock surface is relatively deep below the sediment surface[1] along the entire wall alignment). The feasibility and challenges of installing a sheet pile cofferdam will depend greatly on the location of the cofferdam. Shallow bedrock (approximately 20 feet below sediment surface at boring location AUS-B-05) exists near Double Rock in South Basin (refer to Figures 2 and 4). A cofferdam alignment relatively close to Double Rock likely would require a combination

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[1] The required sheet pile embedment to provide adequate cofferdam stability depends on a number of factors: the type of cofferdam, the strength of the sediment, the design criteria for the wall including the excavation depth, the water depth it needs to support, whether it allows equalization or is watertight, etc. These are details that need to be evaluated in the EE/CA and incorporated into the design.

of a cantilever system and a laterally supported system (e.g., a sheet pile structure laterally supported by drilled batter piles embedded in the bedrock). A relatively short cantilever sheet pile cofferdam directly at the mouth of the slough, where the depth to bedrock is much deeper (refer to Figure 3) or within the slough may be possible.

Cofferdam structures other than a sheet pile structure (e.g., gravity structures or earthen berm) have not been evaluated but may also be affected by the presence of very soft to soft, highly compressible Young Bay Mud. For relatively small removal areas, it may not be necessary to install an elaborate cofferdam structure. For small areas, excavation at low tide may be feasible or a Portadam structure (www.portadam.com), which can be used in open water up to 10 feet deep, could be considered to keep water out of the excavation. Based on the water depths at the site, this approach may be feasible for a variety of potential cofferdam alignments.

6.2 Sediment Removal

The original implementation work plan for the site (EQM 2007) called for excavation of the contaminated sediments in a relatively dry environment. This was to be achieved by installation of a sheet pile cofferdam near the mouth of the slough and removal of remaining standing water from the enclosed area before excavation of the sediments. Due to the very soft and mucky nature of the surficial sediments, this approach may encounter some challenges in terms of equipment access. Regular excavators placed along the banks of the slough would not be able to reach across the slough to remove sediment from areas near the center of the slough. Because of the low bearing capacity of the surficial sediment, equipment likely would sink into the mud, unless special precautions are taken such as placement of crane mats or construction of stabilized access roads. Prior to excavation “in the dry”, the removal area behind the cofferdam structure would need to be dewatered. This would require treatment of the surface water before discharge to San Francisco Bay. A water treatment system likely would need to be installed at the site, which would require some space in the upland areas surrounding the slough. Space for on-site treatment is very limited and will affect the feasibility of some of the technologies. Odor also may become an issue during excavation “in the dry.”

If a cofferdam structure is considered feasible, another method of removing sediment could be considered. The cofferdam could be used to keep water in the enclosed remedial action area, thereby eliminating the tidal influence of San Francisco Bay and creating a pond. The pond could be used to facilitate sediment removal “in the wet” by floating barge-mounted dredging equipment.

6.3 Sediment Capping

A sediment cap would be placed on the very soft surficial sediments in the slough, after an initial thickness of sediment is removed so that the final grade remains unchanged after the cap is installed. Although the bearing capacity of the Young Bay Mud sediments is relatively low, past experience at similar sites indicates that a carefully designed and installed sediment cap should be feasible from a geotechnical engineering standpoint. To reduce mud waving and bearing capacity issues, a sediment cap likely would need to be placed in thin lifts and carefully built up to its required thickness. Consideration needs to be given to the logistics of sediment removal, cap placement, and water management during construction for capping activities, similar to sediment removal activities, in assessing the overall feasibility of sediment capping.

7. References

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Ecology and Environment, Inc. (EEI). 2011. Yosemite Creek Sediment Removal Assessment Report. Final report prepared by Ecology and Environment, Inc. for U.S. Environmental Protection Agency, dated May 2011.

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Tables

Table 1
Summary of Exploration Locations

Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Exploration Location ID	Date	Location (WGS84) Latitude	Location (WGS84) Longitude	Sediment Surface Elevation (ft NGVD29)	Termination Depth (bss)
Geotechnical Boring Locations					
AUS-B-01A	3/20/2012	37.722712463° N	-122.383705252° W	-0.7	82.0
AUS-B-01B [1)]	3/21/2012	37.722699824° N	-122.383635342° W	-0.5	24.0
AUS-B-02A	3/16/2012	37.721406463° N	-122.381520524° W	-1.7	64.0
AUS-B-02B [1)]	3/17/2012	37.721391227° N	-122.381539176° W	-1.7	87.0
AUS-B-03	3/15/2012	37.719871293° N	-122.380642698° W	-5.3	60.5
AUS-B-04	3/19/2012	37.722071643° N	-122.382418554° W	-2.0	96.5
AUS-B-05	3/18/2012	37.720964937° N	-122.382443731° W	-1.7	36.0
AUS-B-06	3/17/2012	37.721069390° N	-122.380414612° W	-3.9	82.0
Vane Shear Test Locations					
AUS-V-01	3/21/2012	37.722650028° N	-122.383534467° W	-0.5	22.5
AUS-V-02	3/22/2012	37.721347450° N	-122.381457462° W	-2.1	22.5
AUS-V-03	3/23/2012	37.719905501° N	-122.380677071° W	-4.1	22.5

Notes:
[1)] Offset boring. Refer to Appendix A for details describing why offset borings were drilled.
bss = below sediment surface
ft = feet
NGVD29 = National Geodetic Vertical Datum of 1929
WGS84 = World Geodetic System of 1984

Table 2
Summary of Vane Shear Test Results

Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Location ID	Vane Tip Depth (ft)	μ [1)]	Undisturbed $s_{u,uncorr}$ (psf)	Undisturbed $s_{u,mob}$ (psf)[1]	Remolded $s_{u,uncorr}$ (psf)	Remolded $s_{u,mob}$ (psf)[1]	S_T (ratio)
AUS-V-01	2.95	0.90 [2)]	284	256	209	188	1.36
	7.28	0.94	352	329	60.1	56	5.84
	12.28	0.68	526	357	109	74	4.81
	17.28	0.77	434	334	100	77	4.36
	22.28	0.68	568	385	97.9	66	5.80
AUS-V-02	2.28	0.82 [2)]	53	44	33.0	27	1.61
	7.28	0.82	271	223	27.2	22	9.98
	12.28	0.87	442	383	57.2	50	7.73
	17.28	0.82 [2)]	520	427	55.6	46	9.36
AUS-V-03	2.28	0.85 [2)]	83	71	48.3	41	1.72
	7.78	0.85	182	155	60.1	51	3.03
	12.28	0.91	240	218	63.0	57	3.81
	17.28	0.82	255	210	53.1	44	4.80
	22.28	0.85	390	333	72.8	62	5.36

Notes:

1) Bjerrum correction factor used to calculate $s_{u,mob}$ per Bjerrum (1972).

2) Correction factor selected using adjacent data and engineering judgment; Atterberg limit results not available for interval.

ft = feet

psf = pounds per square foot

$s_{u,uncorr}$ = uncorrected undrained shear strength

$s_{u,mob}$ = mobilized undrained shear strength (i.e. corrected for plasticity)

S_T = sediment sensitivity

μ = Bjerrum correction factor

Table 3
Summary of Index Property and Classification Test Results

Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Boring ID	Sample ID	Sample Type	Sample Depth *(ft bss)*	Fines Content *(%)*	Moisture Content *(%)*	LL	PL	PI	Wet Bulk Unit Weight *(pcf)*	Dry Bulk Unit Weight *(pcf)*	Specific Gravity	USCS Symbol	Soil Description
AUS-B-01B	AUS-B-01B-7.0-9.0	ST	8.0-8.5	74.6									Lean CLAY, little Sand
			8.5-8.8		49.8	49	23	26	106.5	71.1	2.73	CL	Lean CLAY, little Sand
	AUS-B-01B-12.0-14.0	ST	12.0-12.2	27.0							2.61		SAND, some Silt
	AUS-B-01B-17.0-19.0	ST	17.6-18.0	13.7					88.5	44.8			SAND, some Silt
			18.0-18.4		97.6	90	37	53				CL	Fat CLAY
	AUS-B-01B-22.0-24.0	ST	22.8-23.4						86.2	40.7			Elastic SILT, little Organics
			23.4-23.8	98.0	111.8	133	55	78	86.2	40.7		MH	
AUS-B-01	AUS-B-01A-27.0-29.0	ST	27.3-27.5		21.5				128.7	105.9			CLAY, trace Shells
			28.3-28.9		95.8				90.6	46.3			Sand, some Clay
	AUS-B-01A-40.0-42.0	SS	40-42	19.5	18.3								SAND, some Clay
	AUS-B-01A-70.0-72.0	SS	70-72		59.6	86	26	60					Fat CLAY
AUS-B-02	AUS-B-02-7.0-9.0	ST	7.0-7.8						100.5	62.6			CLAY, trace Sand, trace Shell Fragments
			8.1-8.8	73.8	60.5	72	31	42			2.76	CH	Fat CLAY, little Sand
	AUS-B-02-12.0-14.0	ST	13.1-13.6	93.4	78.4				96.5	54.1			Fat CLAY, little Shells
			13.6-14.0			66	31	35			2.71	CH	
	AUS-B-02-17.0-19.0	ST	17.8-18.9	24.4									SAND, some Silt, trace Gravel
	AUS-B-02-20.0-22.0	SS	20-22			20	12	7.4					SAND, some lean Clay
	AUS-B-02-30.0-32.0	SS	30-32	18.1	19.9								SAND, some Silt
	AUS-B-02-45.0-47.0	SS	45-47	16.6	19.5								SAND, some Clay
	AUS-B-02-62.0-64.0	ST	63.6-64.0	16.1	21.9	NP	NP	NP	127.6	104.6		SM	SAND, some Silt
AUS-B-03	AUS-B-03-7.0-9.0	ST	8.2-8.8	94.6	83.1	64	28	37	94.3	51.5		CH	Fat CLAY
	AUS-B-03-12.0-14.5	ST	13.3-13.9	94.1	79.1	57	28	29	96.0	53.6		CH	Fat CLAY, little Shell Fragments
			13.9-14.2		64.2				100.3	61.1			Fat CLAY, little Shell Fragments
	AUS-B-03-17.0-19.0	ST	18.2-18.8	97.8	90.8	74	32	42	90.8	47.6		CH	Fat CLAY
	AUS-B-03-21.0-23.0	ST	21.9-22.4		88.3				89.1	47.3			Fat CLAY
			22.6-22.9	94.1	85.4	65	28	37	93.4	50.4	2.72	CH	Fat CLAY
	AUS-B-03-25.5-26.5	SS	25-26.5		16.3	23	15	8.6					SAND, some lean Clay
	AUS-B-03-35.0-36.5	SS	35-36.5	63.1	20.4								CLAY, some Sand
	AUS-B-03-41.5-43.5	ST	42.7-43.3	93.1	23.2	47	19	28	126.9	103		CL	Lean CLAY
	AUS-B-03-51.5-53.5	ST	52.9-53.3	60.8	19.2	29	13	16	131	109.9		CL	Lean CLAY, some Sand

Table 3
Summary of Index Property and Classification Test Results

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Yosemite Slough Sediment Site
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Boring ID	Sample ID	Sample Type	Sample Depth *(ft bss)*	Fines Content *(%)*	Moisture Content *(%)*	LL	PL	PI	Wet Bulk Unit Weight *(pcf)*	Dry Bulk Unit Weight *(pcf)*	Specific Gravity	USCS Symbol	Soil Description
AUS-B-04	AUS-B-04-1.5-2.0	SS	1.5-2	27.1	33.0								SAND, some Silt
	AUS-B-04-25.0-27.0	SS	25-27	23.0	19.9								SAND, some Clay
	AUS-B-04-50.0-51.5	SS	50-51.5	7.8	19.2							SP-SM	Poorly Graded SAND, little Silt
	AUS-B-04-75.0-77.0	SS	75-77		55.1	82	28	54					Fat CLAY
AUS-B-06	AUS-B-06-15.0-17.0	SS	15-17		70.9	63	28	36					Fat CLAY, little Shells
	AUS-B-06-25.1-26.0	SS	25.1-26.0	45.4	20.3								SAND, some Clay
	AUS-B-06-65.0-66.5	SS	65-67	68.1	25.1	34	16	18				CL	Lean CLAY, some Sand

Notes:

bss = below sediment surface
ft = feet
in = inches
LL = liquid limit
PI = plasticity index
PL = plastic limit

NP = non-plastic
pcf = pounds per cubic foot
SS = split spoon
ST = Shelby tube
USCS = Unified Soil Classification System

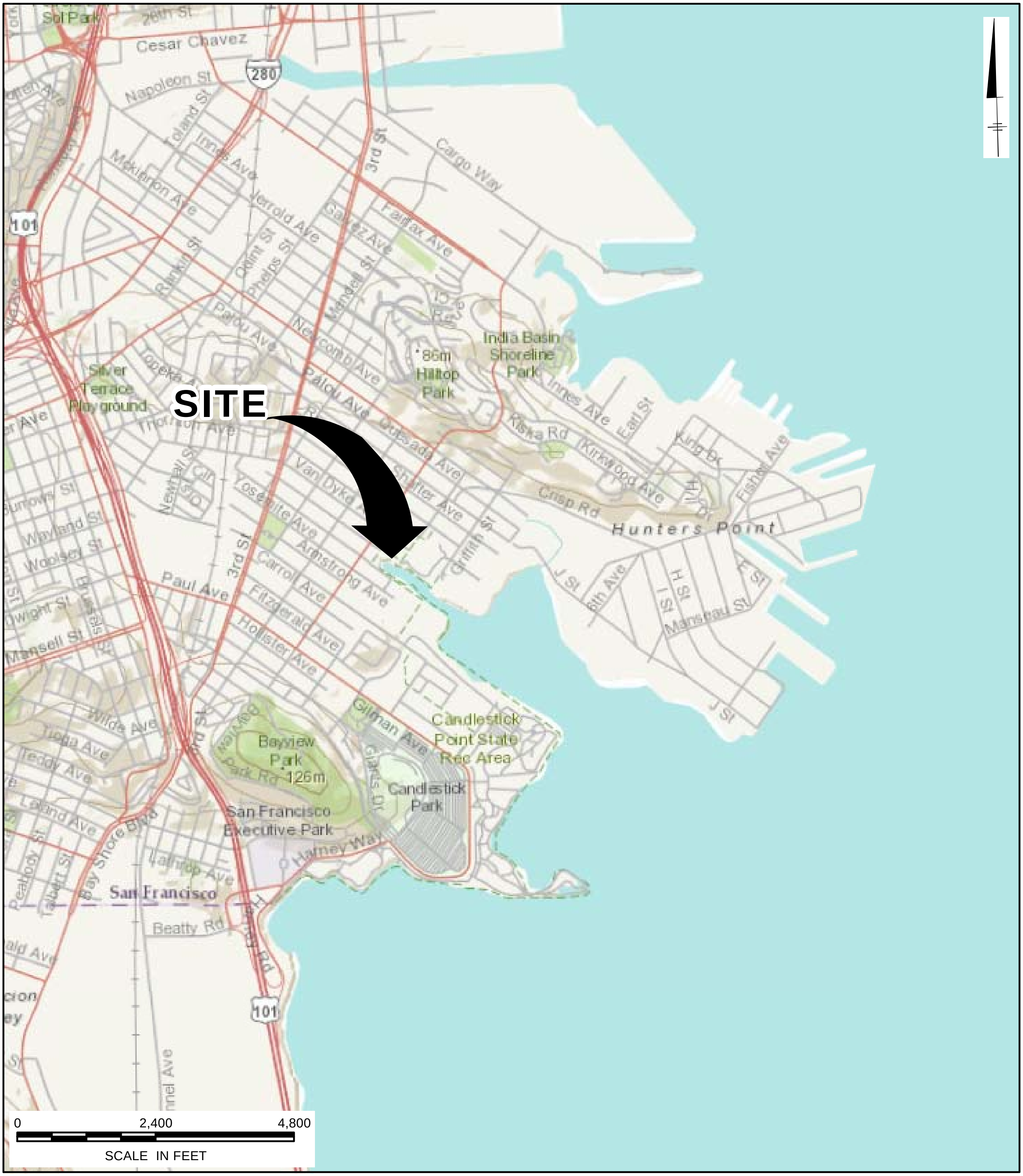
Table 4
Summary of Laboratory Undrained Strength Test Results

Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Boring ID	Sample ID	Sample Depth *(ft bss)*	$s_{u,UU}$ *(psf)*
AUS-B-01B	AUS-B-01-7.0-9.0	8.0-8.5	276
	AUS-B-01B-22.0-24.0	22.8-23.4	620
AUS-B-02	AUS-B-02-7.0-9.0	7.0-7.8	67
	AUS-B-02-12.0-14.0	13.1-13.6	241
AUS-B-03	AUS-B-03-7.0-9.0	8.2-8.8	146
	AUS-B-03-12.0-14.5	13.3-13.9	198
	AUS-B-03-17.0-19.0	18.2-18.8	239
	AUS-B-03-21.0-23.0	21.9-22.4	170
	AUS-B-03-41.5-43.5	42.7-43.3	2138
	AUS-B-03-51.5-53.5	59.2-53.3	2200

Notes:
bss = below sediment surface
ft = feet
$s_{u,UU}$ = undrained strength measured during unconsolidated, undrained triaxial compression shear strength test.
psf = pounds per square foot

Figures



Note:
Topo Basemap provided by
ArcGIS Online from ArcMap 10

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

GEOTECHNICAL DATA REPORT

SITE VICINITY MAP

ARCADIS

FIGURE
1

EXPLORATION ID	LATITUDE	LONGITUDE
AUS-B-01A	37.72271246	-122.38370525
AUS-B-01B	37.72269982	-122.38363534
AUS-B-02A	37.72140646	-122.38152052
AUS-B-02B	37.72139123	-122.38153918
AUS-B-03	37.71987129	-122.38064270
AUS-B-04	37.72207164	-122.38241855
AUS-B-05	37.72096494	-122.38244373
AUS-B-06	37.72106939	-122.38041461
AUS-V-01	37.72265003	-122.38353447
AUS-V-02	37.72134745	-122.38145746
AUS-V-03	37.71990550	-122.38067707

Legend

- Geotechnical Boring Location
- Vane Shear Test Location
- Approximate Extent of Phase 1 Restoration[1)] (Completed)
- Approximate Extent of Phase 2 Restoration[1)] (Not Completed)

Notes:
1) California State Parks Foundation's Yosemite Slough Wetlands Restoration project.
2) Site conditions may differ from those shown due to wetland restoration projects currently in-progress. Restoration areas approximated based on drawings prepared by Nobel Consultants, Inc.
3) Boring and Vane Shear Test Location coordinates are provided in World Geodetic System of 1984 (WGS).
4) Aerial Source: This image was extracted from Google Earth Pro on May 3, 2012 by R.McKinney. The date of this image is October 31, 2011. This image was georeferenced by G.McKinney using visual control points and attached to the NAD_1927_StatePlane_California_III_FIPS_0403 coordinate system

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

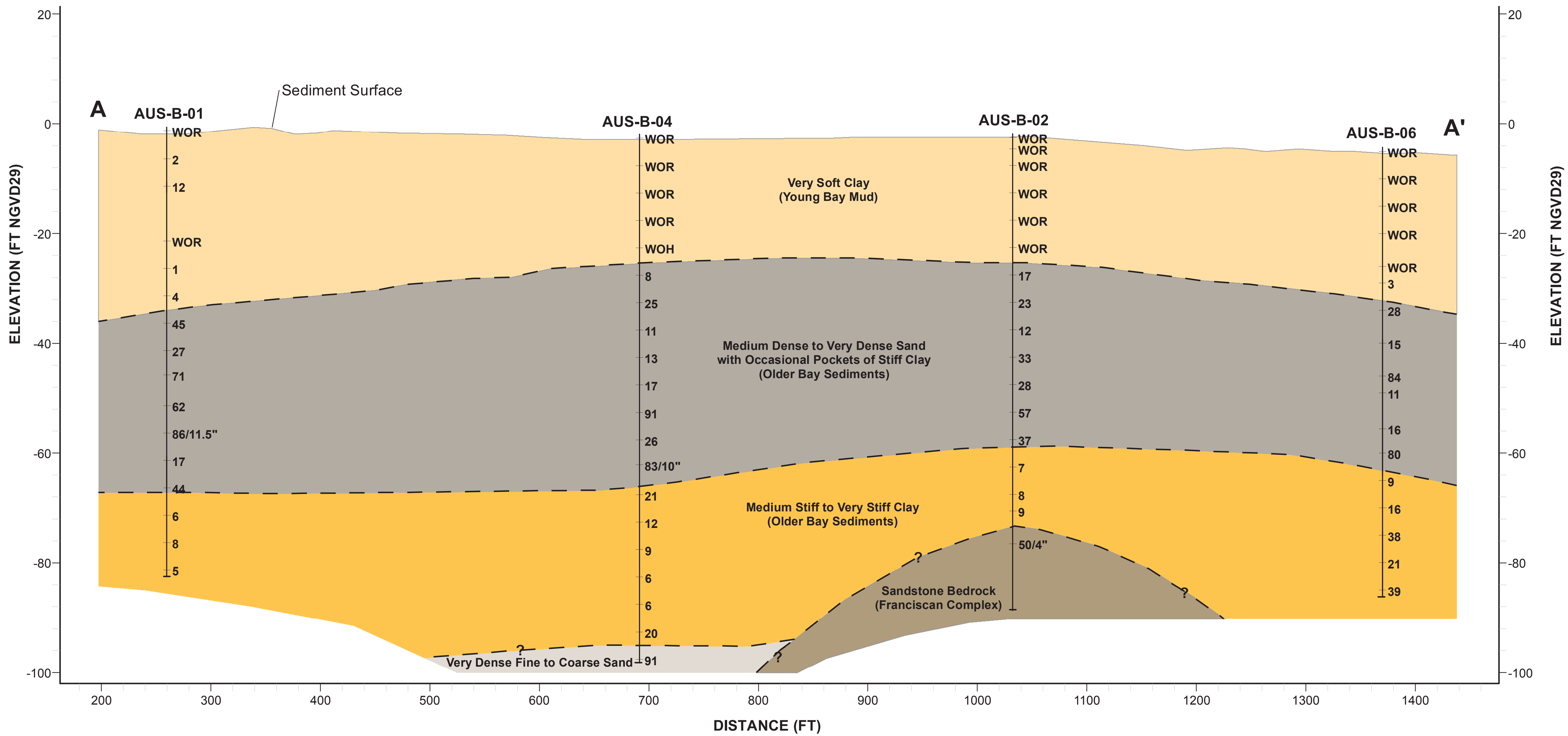
GEOTECHNICAL DATA REPORT

SITE AND EXPLORATION LOCATION PLAN

ARCADIS

FIGURE
2

CITY: San Francisco DIV/GROUP: ENV/IM DB:K Ernst LD: PIC: PM: TM:
PROJECT: B00022251.0001
Path: A:\GIS\Yosemite\MXDs\ExplorationPlan.mxd Date Saved: 5/4/2012 3:22:17 PM



AUS-B-01 Boring Designation
6 SPT Blow Count (N Value)
WOR Weight of Rods
WOH Weight of Hammer
Approximate Geologic Contact
Geologic Contact Interpreted From One Data Point
16% Rock Quality Designation (RQD)
Boring Termination

0 50 100 200 Feet
Horizontal Scale

0 10 20 40 Feet
Vertical Scale

NOTES:
1. FT- FEET
2. NGVD29 - NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. CONTACTS BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. SEDIMENT SURFACE BASED ON UNITED STATES GEOLOGICAL SURVEY NATIONAL ELEVATION DATASET 1/9 ARC-SECOND (NED 1/9). LIGHT DETECTION AND RANGING (LIDAR) DATA, A TYPE OF LASER RADAR, IS USED TO CREATE THESE ELEVATION DATASETS.

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

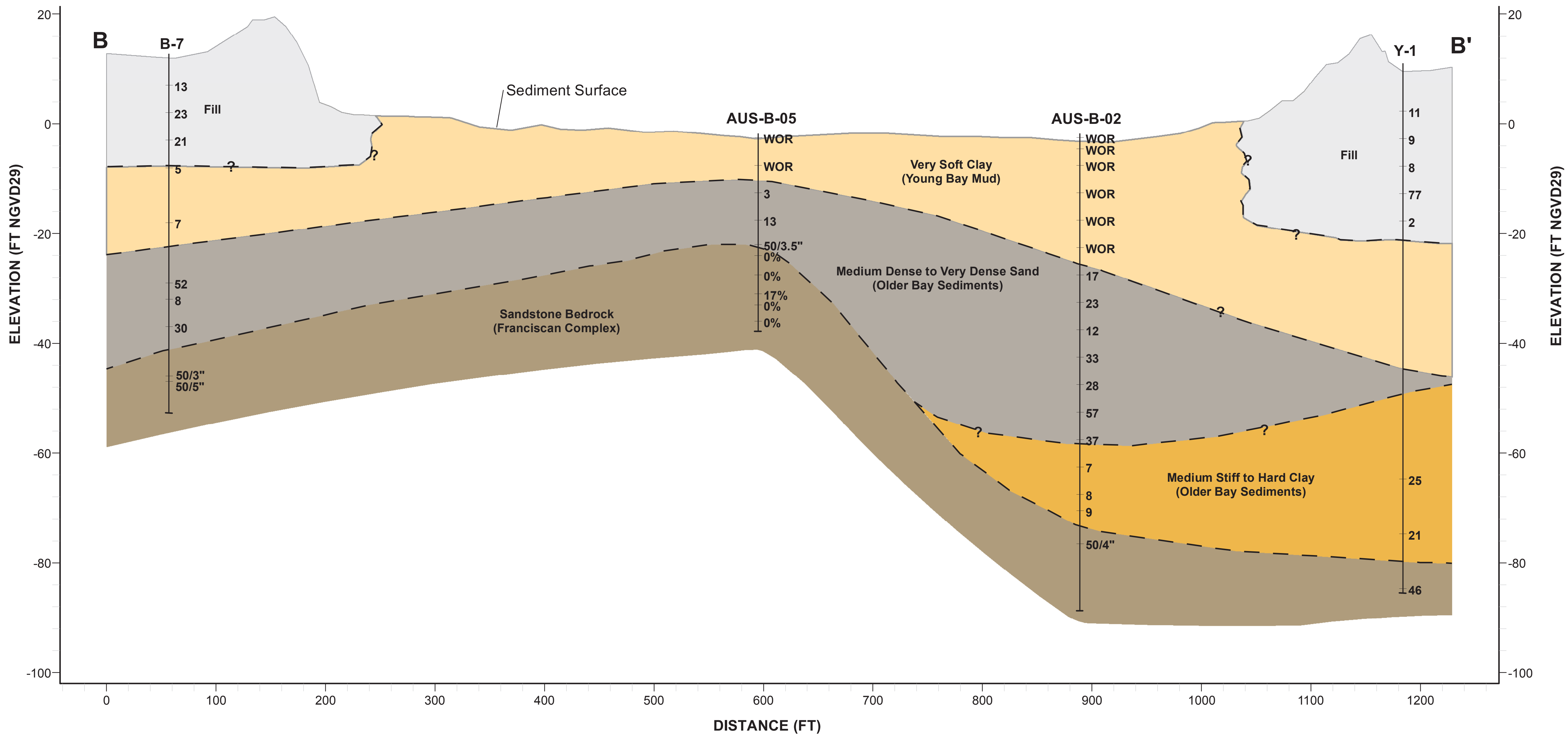
GEOTECHNICAL DATA REPORT

GENERALIZED SUBSURFACE CROSS SECTION A - A'

ARCADIS

FIGURE
3

CITY: DEN-TECH DIV/GROUP:(ENV/IM) DB: R.MCKINNEY LD: PIC: PM: TM:
PROJECT: Path: K:\GIS\Yosemite\MXDs\CrossSectionA_A_11X17_v5.mxd Date Saved: 4/27/2012 2:47:30 PM



AUS-B-05 Boring Designation

6 SPT Blow Count (N Value)

WOR Weight of Rods

WOH Weight of Hammer

— — — Approximate Geologic Contact

—?— Geologic Contact Interpreted From One Data Point

16% Rock Quality Designation (RQD)

Boring Termination

0 50 100 200 Feet

Horizontal Scale

0 10 20 40 Feet

Vertical Scale

NOTES:
1. FT- FEET
2. NGVD29 - NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. CONTACTS BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. SEDIMENT SURFACE BASED ON UNITED STATES GEOLOGICAL SURVEY NATIONAL ELEVATION DATASET 1/9 ARC-SECOND (NED 1/9). LIGHT DETECTION AND RANGING (LIDAR) DATA, A TYPE OF LASER RADAR, IS USED TO CREATE THESE ELEVATION DATASETS.
5. B-7 AND Y-1 INSTALLED AS PART OF A GEOTECHNICAL FEASIBILITY INVESTIGATION PERFORMED BY ENGEO INC. NOVEMBER/DECEMBER 2009.

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

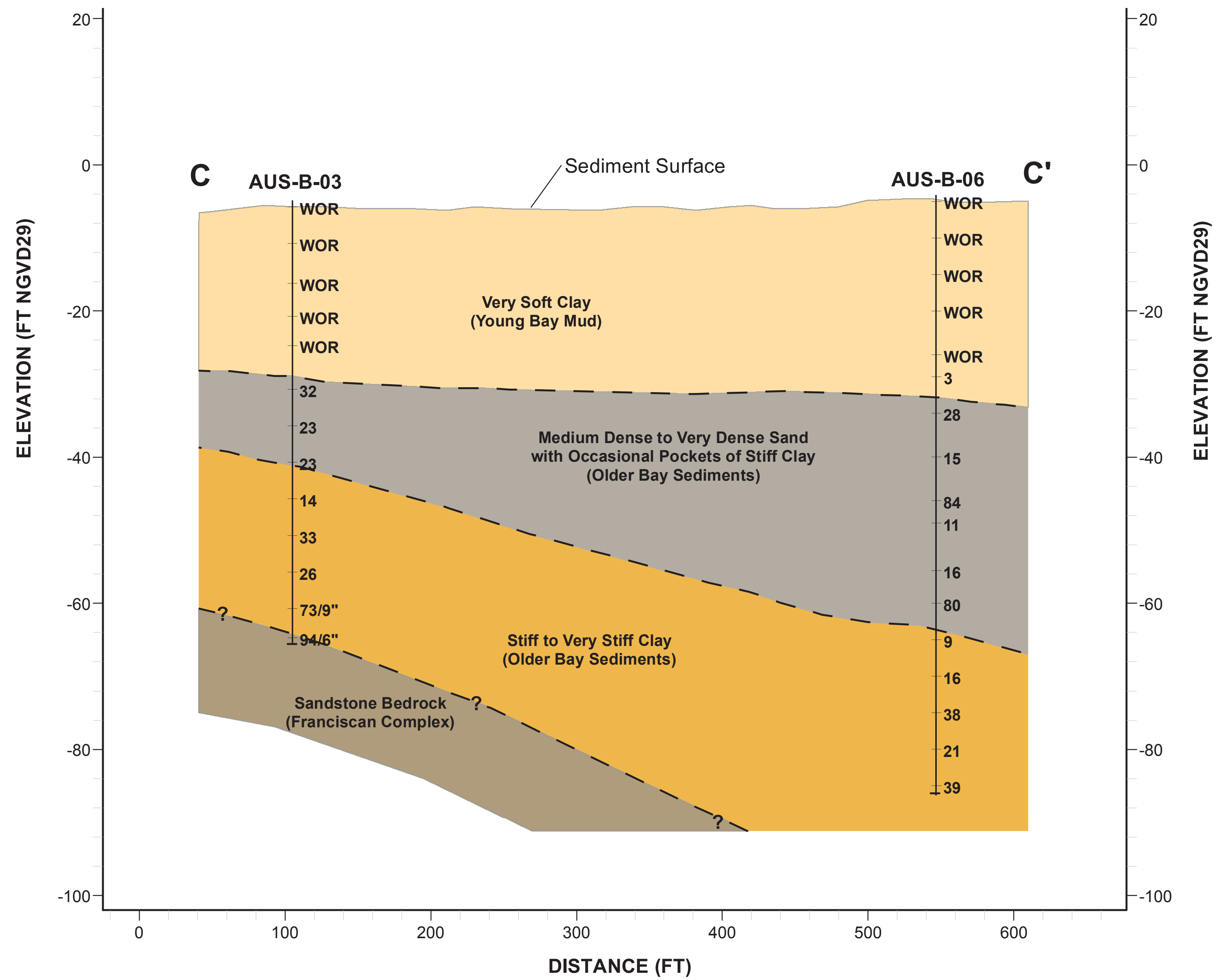
GEOTECHNICAL DATA REPORT

GENERALIZED SUBSURFACE CROSS SECTION B - B'

ARCADIS

FIGURE **4**

CITY: DEN-TECH DIV/GROUP:(ENV/IM) DB: R.MCKINNEY LD: PIC: PM: TM:
PROJECT: Path: K:\GIS\Yosemite\MXDs\CrossSectionB_B_11X17_v4.mxd Date Saved: 4/27/2012 2:49:04 PM



AUS-B-06 Boring Designation
6 SPT Blow Count (N Value)
WOR Weight of Rods
WOH Weight of Hammer
— — — Approximate Geologic Contact
—?— —?— Geologic Contact Interpreted From One Data Point
16% Rock Quality Designation (RQD)
Boring Termination

0 50 100 200 Feet
Horizontal Scale

0 10 20 40 Feet
Vertical Scale

NOTES:
1. FT- FEET
2. NGVD29 - NATIONAL GEODETIC VERTICAL DATUM OF 1929.
3. CONTACTS BETWEEN GEOLOGIC UNITS SHOWN ON CROSS SECTION ARE APPROXIMATE AND INFERRED BETWEEN BORING LOCATIONS.
4. SEDIMENT SURFACE BASED ON UNITED STATES GEOLOGICAL SURVEY NATIONAL ELEVATION DATASET 1/9 ARC-SECOND (NED 1/9). LIGHT DETECTION AND RANGING (LIDAR) DATA, A TYPE OF LASER RADAR, IS USED TO CREATE THESE ELEVATION DATASETS.

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

GEOTECHNICAL DATA REPORT

GENERALIZED SUBSURFACE CROSS SECTION C - C'

ARCADIS

FIGURE
5

ARCADIS

Appendix A

Geotechnical Field Exploration Methods and Logs

Appendix A

Geotechnical
Field Exploration
Methods and Logs

Introduction

Appendix A presents the geotechnical boring data collected by ARCADIS for the Yosemite Slough Sediment Site in San Francisco, California (site). ARCADIS engineers observed the drilling of the borings. Field boring logs were prepared for each boring. Figure A-1 presents a key to the exploration logs. The sampling equipment is depicted on Figure A-2. The boring logs are presented on Figures A-3 through A-9. Descriptions of the field methods used during the subsurface investigation are provided herein and include the following:

- Mud-rotary borings
- Standard penetration test (SPT)
- Thin-wall tube sampling
- Field vane shear testing (VST)

Exploration Locations

Eight geotechnical borings and three VST explorations were advanced at the site. The explorations were located using a handheld Trimble GeoXH global positioning system (GPS) unit with sub-meter accuracy after post-processing correction. Coordinates of the exploration locations are provided on the exploration logs.

Mud-Rotary Borings

Between March 15 and March 21, 2012, ARCADIS' drilling subcontractor, Taber Drilling, drilled eight in-water geotechnical borings within Yosemite Slough and South Basin to depths ranging from 24 feet to 96.5 feet below sediment surface (bss). The originally planned number of borings was six. However, two additional borings needed to be drilled to complete the investigation program. At boring location AUS-B-01, two borings were drilled (AUS-B-01A and AUS-B-01B) because the initial boring, AUS-B-01A, encountered a timber pile that appeared to interfere with relatively undisturbed sampling in the Young Bay Mud deposit. To collect the relatively undisturbed samples, offset boring AUS-B-01B was drilled in the Young Bay Mud deposit, to a depth of 24 feet bss. For AUS-B-01A and AUS-B-01B, two separate boring logs are presented in this appendix. At boring location AUS-B-02, the reason for drilling two separate borings was different. Drilling at this location started on March 16, 2012. At the end of the day, the boring had been advanced to 64 feet bss but no bedrock had been encountered. Because the drilling subcontractor could not leave the borehole open overnight, they backfilled the hole by grouting it with cement-bentonite grout and returned to the location the next morning to drill and offset the boring. No sampling was performed in the upper 64 feet of the offset boring. The boring was then advanced beyond 64 feet and sampling was resumed as planned. The two borings that were drilled at this location were combined into one boring log using the boring designation AUS-B-02.

Mud-rotary borings are advanced by grinding the subsurface material using a drill bit that is attached to a rapidly rotating drill string consisting of hollow steel rods. During drilling, drilling mud is forced downward through the hollow drill string. The mud exits the drill string through the drill bit, thereby washing the material cuttings to the annular space surrounding the bit and transporting them upward through the annulus surrounding the drill string. The mixture, consisting of drilling mud and cuttings, is forced upward, out of the hole, and into a settling tank and a series of screens at the ground surface that serves to remove a large portion of the cuttings before the mud is re-circulated. Drilling mud is used to prevent heave and to keep the hole from caving.

The drilling was performed using barge-mounted mud-rotary drilling equipment. Taber Drilling used barge-mounted mud-rotary drilling equipment to set casing and advance the tri-cone drill bit. To maintain separation of drilling fluid from the surrounding water column, temporary casing was lowered into the sediment. This provided a solid pipe from above the barge deck to below mudline before drilling began. Soon after drilling began, a bentonite-based drilling fluid was circulated into the borehole to maintain borehole stability and remove cuttings. Cuttings and excess drilling fluid were placed in 55-gallon drums for later testing and disposal.

Disturbed samples were recovered using SPT split-spoon samplers. Thin-wall tube samples (Shelby tubes) were used to collect relatively undisturbed samples of cohesive materials.

Standard Penetration Test

SPTs are performed in mud-rotary borings to obtain estimates of material density/consistency and to recover disturbed samples. The tests are performed in general accordance with American Society of Testing and Materials (ASTM) D 1586 using a 2-inch-outside-diameter split-spoon sampler. An illustration of the split-spoon sampler is presented on Figure A-2. The split-spoon sampler is attached to steel rods and lowered to the bottom of the hole. The sampler is driven for 18 inches by using a 140-pound hammer with a drop height of 30 inches. For each 6-inch interval of driving, the number of hammer blows is recorded. The standard penetration resistance (N-value) is taken as the number of blows required to drive the sampler the last 12 inches. The N-value can be correlated to the density of granular material and the consistency of cohesive material.

If hard driving prevents the sampler from being advanced the full 18 inches due to the presence of very dense material or obstructions, the penetration resistance is recorded as follows:

- For less than 6 inches of penetration, the N-value is recorded as the total number of blows over the distance of penetration in inches.

- For more than 6 inches of penetration, the N-value is taken as the sum of the total number of blows after the first 6 inches of penetration. This sum is expressed over the number of inches driven that exceed the first 6 inches. The blow count over the first 6 inches is not used to calculate the N-value due to drilling effects that create disturbance. For example, blow counts of 15 over the first 6 inches, 40 over the second 6 inches, and 50 over the next 3 inches would be recorded as an N-value of 90/9.

Disturbed samples are recovered from the split-spoon sampler, visually classified, and placed into 16-ounce plastic jars to preserve moisture. They are then transported to a laboratory for further testing.

Thin-WallTube Sampling

Relatively undisturbed samples of cohesive material are recovered from borings using 30-inch-long, 3-inch-diameter, thin-wall, seamless, stainless-steel sampling tubes (Shelby tubes) in general accordance with ASTM D 1587. An illustration of the thin-wall sampling tubes is presented on Figure A-2. The Shelby tubes were used in conjunction with a GUS (Gregory Undisturbed Sampler) piston sampler. A stationary piston is positioned at the bottom of the Shelby tube as it is lowered to the bottom of the borehole to prevent disturbed materials from entering the tube. To obtain a sample, the tube is pushed past the stationary piston in one continuous, relatively rapid motion. The piston remains fixed at the top of the soil to be sampled as the tube is advanced, resulting in suction that aids in retention of the sample. The tube is then carefully removed from the hole and sealed at both ends with soil seals and end caps for transport to the laboratory.

Field Vane Shear Test

Between March 21 and March 23, 2012, ARCADIS' drilling subcontractor, Taber Drilling, and its subcontractor, Fugro Consultants, advanced three in-water VST explorations within Yosemite Slough and South Basin to a depth of 22.5 feet bss. Taber Drilling's barge-mounted drilling equipment was used to advance the vane into the subsurface materials. The testing targeted the soft Young Bay Mud deposit underlying the site. Fugro Consultant's VST report is provided in Appendix B. Additional information regarding this test method is provided below.

VSTs are performed in soft, saturated, cohesive material for determination of undrained shear strength. During the test, a four-bladed vane is pushed into undisturbed material and rotated from the surface to determine the torque required to shear a cylindrical surface with the vane. This torque or moment is then converted to the unit shearing resistance of the failure surface. Friction of the vane rod and instrument are minimized during readings by use of special casings or housing, or else accounted for and subtracted from the total torque to determine the torque applied to the vane.

This test is performed on a self-boring vane. The housing is advanced to a depth that is at least five vane housing diameters above the desired depth of the vane tip.

The vane is generally advanced from the bottom of the hole or the vane housing in a single thrust to the depth at which the test is to be conducted. The vane is pushed down without use of hammer blows, vibration or rotation. No torque is applied to the rods during the thrust.

Torque is applied to the vane with a geared drive at a rate that does not exceed 0.1 degree per second.

The undrained shear strength is calculated in the following manner. For a rectangular vane of H/D=2;

$$(S_U)_{fv} = 6\, T_{max} / 7\pi D^3$$

Where:

$(S_U)_{fv}$ = undrained shear strength from the vane

T_{max} = maximum value of measured torque corrected for apparatus and rod friction

D = vane diameter

H = height of vane

SOIL DESCRIPTION

Soil descriptions on the exploration logs are based on visual observations and laboratory testing on selected samples. The samples were visually classified in general accordance with ASTM D 2488.

Soil descriptions generally consist of the following:
Color, MAJOR CONSTITUENT, minor constituents, moisture, density/consistency, additional observations

MINOR CONSTITUENTS

Description	Estimated Percentage
Trace	Less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%

MOISTURE

Dry	Little perceptible moisture
Damp	Below optimum moisture for compaction
Moist	Likely near optimum moisture content
Wet	Likely wet of optimum moisture content
Saturated	Probably below water table or in perched groundwater

DENSITY/CONSISTENCY

Soil density/consistency descriptions on boring logs are primarily based on Standard Penetration Resistance. Density/consistency descriptions on exploration logs are provided in parentheses if they are based on visual observations rather than correlations with Standard Penetration Resistance (N-values) and other test results.

Granular Soils Density	Standard Penetration Resistance (N) in Blows/Foot	Cohesive Soils Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Undrained Strength in TSF
Very loose	0 to 4	Very soft	0 to 2	<0.125
Loose	4 to 10	Soft	2 to 4	0.125 to 0.25
Medium dense	10 to 30	Medium stiff	4 to 8	0.25 to 0.5
Dense	30 to 50	Stiff	8 to 15	0.5 to 1.0
Very dense	>50	Very stiff	15 to 30	1.0 to 2.0
		Hard	>30	>2.0

ROCK DESCRIPTION

Rock descriptions on the exploration logs are based on visual observations and generally consist of the following:
Color, ROCK TYPE, field strength, structure, decomposition, disintegration, fracture density, fracture type, fracture infilling, fracture uneveness, moisture condition, additional observations.

TEST SYMBOLS

MC	Moisture Content	UC	Unconfined Compression
GS	Grain Size	TX	Triaxial Compressive Strength
AL	Atterberg Limits	DS	Direct Shear
SG	Specific Gravity	PL	Point Load Index
DT	Density Test	K	Permeability
OG	Organic Content	PP	Pocket Penetrometer in $tons/ft^2$
CN	Consolidation	TV	Torvane in $tons/ft^2$
UU	Unconsolidated Undrained Triaxial	PID	Photoionization Detector Reading
CU	Consolidated Undrained Triaxial	CA	Chemical Analysis

SAMPLE TYPE SYMBOLS

⊠	Split Spoon
⧄	Shelby Tube
▥	Cuttings
◧	Core Run
P	Tube pushed, not driven

YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

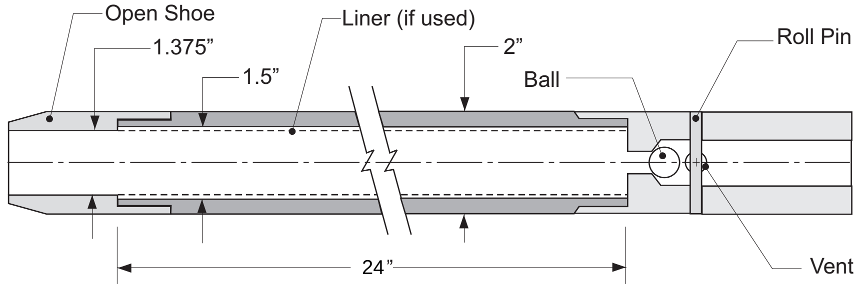
GEOTECHNICAL DATA REPORT

KEY TO EXPLORATION LOGS

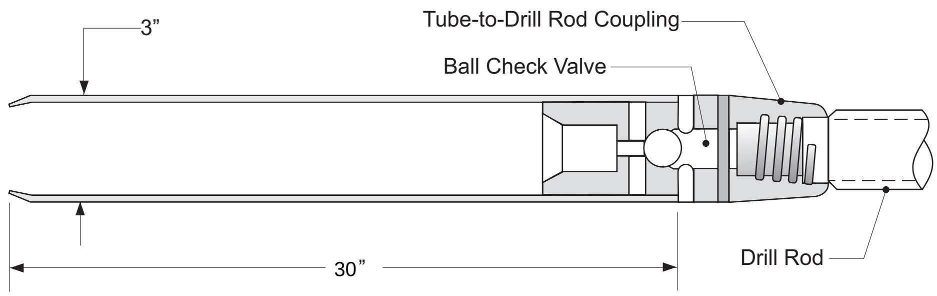
ARCADIS

FIGURE
A-1

Split Spoon Sampler
(ASTM D 1586)



Thin-Walled Tube Sampler/Shelby Tube
(ASTM D 1587)



YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

GEOTECHNICAL DATA REPORT

SAMPLE RECOVERY EQUIPMENT

ARCADIS

FIGURE
A-2

08/18/09 SYRACUSE-NY-141ENV-DJH, K.SARTORI
B0009961/0001/00063/CDR/09661G01.CDR

Boring Log *AUS-B-01A*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.722709º N 122.383714º W WGS84

Approximate Mudline Elevation: -0.7 feet (NGVD29) Water Depth: 3.4 to 0 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-01-0.0-2.0		WOR	14	MC					Dark gray CLAY, trace fine sand, very soft, wet. (Young Bay Mud)
5	--		2	0						Wood debris indicating presence of timber pile.
										Gray fine to coarse SAND, little fine to medium gravel, subround to subangular, trace clay, medium dense, wet. (Young Bay Mud)
10	AUS-B-01-10.0-12.0		12	7	MC					
15										Gray CLAY, trace shell fragments, trace organics (decomposed wood), occasional sand lenses and lenses of organic material, very soft, wet. (Young Bay Mud)
	AUS-B-01-18.0-20.0			24						
20	AUS-B-01-20.0-22.0		WOR	16						Wood observed in samplers. An offset boring, AUS-B-01B, was drilled to collect relatively undisturbed samples away from wood debris.
	AUS-B-01-22.0-24.0			24						
25	AUS-B-01-25.0-26.2		1	24	MC					
	AUS-B-01-26.4-27.0				MC					
	AUS-B-01-27.0-29.0			24	MC, DT					
30	AUS-B-01-30.0-31.8		4	19	MC					
										Light brown to olive gray fine SAND, trace to little clay, trace silt, trace gravel, subround, dense to very dense, wet. (Older Bay Sediments)
35	AUS-B-01-35.0-37.0		45	20						
40	AUS-B-01-40.0-42.0		27	16	GS, MC					
45	AUS-B-01-45.0-46.0		72	12						
50										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

ARCADIS

Boring Log *AUS-B-01A*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.722709º N 122.383714º W WGS84

Approximate Mudline Elevation: -0.7 feet (NGVD29) Water Depth: 3.4 to 0 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
50	AUS-B-01-50.0-52.0	☒	62	22	MC					Light brown to olive gray fine SAND, trace to little clay, trace silt, trace gravel, subround, dense to very dense, wet. (Older Bay Sediments)
										Blue-gray CLAY, high plasticity, and fine SAND, hard, moist. (Older Bay Sediments)
55	AUS-B-01-55.0-55.9 AUS-B-01-55.9-56.5	☒	86/11.5"	14	MC MC					Dark gray fine SAND, trace clay, very dense, moist. (Older Bay Sediments)
										Dark brown to dark gray SILT, non plastic, and fine SAND, very stiff, moist. (Older Bay Sediments)
60	AUS-B-01-60.0-61.8	☒	17	22	MC					
										Dark brown to dark gray fine SAND, medium dense, wet. (Older Bay Sediments)
65	AUS-B-01-65.0-66.7	☒	44	17	MC					
										Blue-gray CLAY, high plasticity, trace organics (decomposed wood fibers), medium stiff, moist. (Older Bay Sediments)
70	AUS-B-01-70.0-72.0	☒	6	20	MC, AL					
75	AUS-B-01-75-75.7 AUS-B-01-75.7-77.0	☒	8	24	MC MC					
80	AUS-B-01-80.0-82.0	☒	5	22	MC					
										Boring Terminated at 82' bss. Completed 03/20/2012

Use ldfx: H:\Yosemite Slough\Boring Logs\Source Files\YS_040512.ldfx

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

ARCADIS

Boring Log *AUS-B-01B*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.722692º N 122.383642º W WGS84

Approximate Mudline Elevation: -0.5 feet (NGVD29) Water Depth: 3.1 to 3.5 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0										Gray CLAY, little sand, trace shell fragments, very soft, wet. (Young Bay Mud)
5										
	AUS-B-01B-7.0-9.0			24	GS, MC, AL, DT, SG, CN, UU					
10										Gray SAND, little silt/clay, wet. (Young Bay Mud)
	AUS-B-01B-12.0-14.0			14	GS, AL, SG					
15										
	AUS-B-01B-17.0-19.0			18	GS, MC, AL, DT					Gray CLAY, highly plastic, wet. (Young Bay Mud)
20										Gray SILT, highly plastic, little organics, wet. (Young Bay Mud)
	AUS-B-01B-22.0-24.0			24	GS, MC, AL, DT, CN, UU					
										Boring Terminated at 24' bss. Completed 03/21/2012
25										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-02*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.721424º N 122.381528º W WGS84

Approximate Mudline Elevation: -1.7 feet (NGVD29) Water Depth: 0.0 to 1.2 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-02-0.0-2.0		WOR	12	MC					Gray SILT, trace fine sand, very soft, wet. (Young Bay Mud)
	AUS-B-02-2.0-4.0		WOR	18	MC					Gray CLAY, trace silt, occassional Sand lenses, shell fragments, very soft, wet. (Young Bay Mud)
5	AUS-B-02-5.0-7.0		WOR	18	MC					
	AUS-B-02-7.0-9.0			24	GS, MC, AL, DT, SG, CN, UU					
10	AUS-B-02-10.0-12.0		WOR	16						
	AUS-B-02-12.0-14.0			24	GS, MC, AL, DT, SG, UU					Note: Slight increase in stiffness noted with depth.
15	AUS-B-02-15.0-17.0		WOR	24						
	AUS-B-02-17.0-19.0			24	GS					
20	AUS-B-02-20.0-20.5 AUS-B-02-21.0-22.0		WOR	20	AL					
25	AUS-B-02-25.0-27.0		17	18	MC					Brown fine SAND, trace to little clay, medium dense, wet. (Older Bay Sediments) Rust color staining to 25.6' bss.
30	AUS-B-02-30.0-32.0		23	24	GS, MC					
35	AUS-B-02-35.0-37.0		12	24	MC					
										Brown CLAY, high plasticity, and SAND, moist. (Older Bay Sediments)
40	AUS-B-02-40.0-42.0		33	24	MC					Brown to gray fine SAND, trace clay, trace silt, dense to very dense, wet. (Older Bay Sediments)
45	AUS-B-02-45.0-47.0		28	22	GS, MC					
50										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-02*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.721424º N 122.381528º W WGS84

Approximate Mudline Elevation: -1.7 feet (NGVD29) Water Depth: 0.0 to 1.2 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
50	AUS-B-02-50.0-52.0		57	16	MC					Brown to gray fine SAND, trace clay, trace silt, dense to very dense, wet. (Older Bay Sediments)
55	AUS-B-02-55.0-56.7		37	20	MC					
	AUS-B-02-56.7-57.0				MC					Gray CLAY, high plasticity, trace organics (twig particles), medium stiff to hard, moist. (Older Bay Sediments)
60	AUS-B-02-60.0-62.0		7	14	MC					
	AUS-B-02-62.0-64.0			24	GS, MC, AL, DT					SAND lense between approximately 62 and 64 ft bss.
65			8	0						Stopped drilling on 3/16/2012; grouted hole. Started drilling at offset location on 3/17/2012. (37.721403° N, 122.381546° W)
	AUS-B-02-68.0-69.4		9	24	MC					
70	AUS-B-02-69.4-70.0				MC					Gray fine SAND, trace clay, trace organics (decomposed wood particles), loose, wet. (Older Bay Sediments)
	AUS-B-02-71.0-71.5			6	MC					Gray CLAY, high plasticity, medium stiff, wet. (Older Bay Sediments)
75			50/4"	0						SANDSTONE BEDROCK (Franciscan Formation)
										Used mud rotary bit to try to find competent rock.
80										
										Drilling becomes more difficult.
85										
87										Boring terminated at 87' bss. Completed 03/17/2012.

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-03*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.719882º N 122.380647º W WGS84

Approximate Mudline Elevation: -5.3 feet (NGVD29) Water Depth: 3.9 - 1.9 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-03-0.0-2.0		WOR	18	MC					Dark gray CLAY, trace fine sand, trace shell fragments (up to 1" x 0.25"), very soft, wet. (Young Bay Mud)
5	AUS-B-03-5.0-7.0		WOR	16	MC					
	AUS-B-03-7.0-9.0			24	GS, MC, AL, DT, UU					
10	AUS-B-03-10.5-12.5		WOR	20						
	AUS-B-03-12.5-14.5			24	GS, MC, AL, DT, CN, UU					
15	AUS-B-03-15.0-17.0		WOR	24						
	AUS-B-03-17.0-19.0			24	GS, MC, AL, DT, UU					
20	AUS-B-03-19.0-21.0		WOR	24						
	AUS-B-03-21.0-23.0			21	GS, MC, AL, DT, SG, CN, UU					
										SAND lense at 25 ft bss.
25	AUS-B-03-25.0-26.5		32	18	MC, AL					Gray CLAY, little fine sand, very stiff, moist. (Older Bay Sediments)
										Light brown to light gray fine to medium SAND, trace silt, medium dense, wet. (Older Bay Sediments) Rust colored staining.
30	AUS-B-03-30.0-30.5 AUS-B-03-30.5-31.5		23	17	MC					
										Brown to gray fine SAND, little silt, becoming SILT, low to medium plasticity, trace fine sand. (Older Bay Sediments)
35	AUS-B-03-35.0-36.5		23	12	GS, MC					
	AUS-B-03-36.5-38.5			24						Light gray CLAY, high plasticity, trace fine sand, stiff to very stiff, moist. (Older Bay Sediments)
40	AUS-B-03-40.0-41.5		14	9						
	AUS-B-03-41.5-43.5			24	GS, MC, AL, DT, UU					
45	AUS-B-03-45.0-46.2		33	14						
										Olive gray fine SAND, trace silt, moist. (Older Bay Sediments)
50										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-03*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.719882º N 122.380647º W WGS84

Approximate Mudline Elevation: -5.3 feet (NGVD29) Water Depth: 3.9 - 1.9 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
50	AUS-B-03-50.0-50.6				MC					Brown to gray CLAY, high plasticity, trace fine sand, very stiff, moist. (Older Bay Sediments)
	AUS-B-03-50.6-51.5		26	13	MC					
	AUS-B-03-51.5-53.5			24	GS, MC, AL, DT, UU					
55	AUS-B-03-55.1-55.8		73/9"	9	MC					CLAY, medium to high plasticity, some fine to medium Gravel, subangular to angular, hard, moist. (highly weathered bedrock) (Older Bay Sediments)
60	AUS-B-03-60.0-60.5		94/6"	6	MC					Fine to coarse GRAVEL, angular, very dense, moist. (Older Bay Sediments)
										Boring terminated at 60.5' bss. Completed 03/15/2012.

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1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-04*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.722061º N 122.382434º W WGS84

Approximate Mudline Elevation: -2.0 feet (NGVD29) Water Depth: 3.6 to 0.0 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-04-0.0-1.5 AUS-B-04-1.5-2.0	☒	WOR	12	MC GS, MC				Clay	Gray CLAY, trace to little fine sand, trace silt, trace shell fragments, very soft, wet. (Young Bay Mud)
5	AUS-B-04-5.0-6.3 AUS-B-04-6.3-7.0	☒	WOR	18	MC MC					
10	AUS-B-04-10.0-12.0	☒	WOR	24	MC					
15	AUS-B-04-15.0-17.0	☒	WOR	24	MC					
20	AUS-B-04-20.0-20.5 AUS-B-04-20.5-22.0	☒	WOH	24	MC MC					
~23.5									Sand	Gray to brown fine SAND, trace to little silt, loose to medium dense, wet. (Older Bay Sediments)
25	AUS-B-04-25.0-27.0	☒	8	22	GS, MC					
30	AUS-B-04-30.0-32.0	☒	25	22	MC					
35	AUS-B-04-35.0-37.0	☒	11	21	MC					
~38.5									Clay	Brown CLAY, medium plasticity, and fine SAND, stiff, moist. (Older Bay Sediments) Rust colored staining at 40.8 ft bss.
40	AUS-B-04-40.0-42.0	☒	13	18	MC					
~43.5									Sand	Light gray to light brown fine SAND, trace silt, medium dense, wet. (Older Bay Sediments)
45	AUS-B-04-45.0-47.0	☒	17	18	MC					
50										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

ARCADIS

Boring Log *AUS-B-04*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.722061º N 122.382434º W WGS84

Approximate Mudline Elevation: -2.0 feet (NGVD29) Water Depth: 3.6 to 0.0 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
50	AUS-B-04-50.0-51.5		91	15	GS, MC					Brown to gray fine SAND, trace silt, very dense, wet. (Older Bay Sediments)
										Light brown CLAY, high plasticity, some fine Sand, very stiff, moist. (Older Bay Sediments)
55	AUS-B-04-55.0-56.6		26	18	MC					
	AUS-B-04-56.6-57.0				MC					Light brown becoming dark gray fine SAND, trace clay, medium dense to very dense, moist to wet. (Older Bay Sediments)
60	AUS-B-04-60.0-60.8		83/10"	10	MC					
										Gray CLAY, medium to high plasticity, trace to little fine sand, medium stiff to very stiff, moist. (Older Bay Sediments)
65	AUS-B-04-65.0-66.8		21	14	MC					
	AUS-B-04-66.8-67.0									
70	AUS-B-04-70.0-72.0		12	20	MC					
75	AUS-B-04-75.0-77.0		9	20	MC, AL					
80	AUS-B-04-80.0-82.0		6	18	MC					
85	AUS-B-04-85.0-87.0		6	24	MC					
90	AUS-B-04-90.0-92.0		20	18	MC					
										Light brown fine to coarse SAND, subround to subangular, trace silt, very dense, wet. (Older Bay Sediments)
95	AUS-B-04-95.0-96.5		91	18	MC					
										Boring terminated at 96.5' bss. Completed 03/19/2012.

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-05*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.720975º N 122.382444º W WGS84

Approximate Mudline Elevation: -1.7 feet (NGVD29) Water Depth: 4.2 to 0.0 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-05-0.0-2.0		WOR	16	MC					Gray to dark gray CLAY, trace to little silt, trace shell fragments, very soft, wet. (Young Bay Mud)
5	AUS-B-05-5.0-7.0		WOR	14	MC					
10	AUS-B-05-10.0-12.0		3	24	MC					Gray to light brown fine to coarse SAND, angular, some Silt, little fine gravel, very loose to medium dense, wet. (Older Bay Sediments)
15	AUS-B-05-15.0-17.0		13	18	MC					
20	AUS-B-05-20.0-20.6		50/3.5"	10	MC					Light brown fine SAND, trace silt, very dense, dry to moist, cementation (weathered bedrock). (Older Bay Sediments)
				46		100	87	0		Dark gray fine-grained SANDSTONE BEDROCK, moderately decomposed, intensly fractured, dry with staining to moist. (Franciscan Formation) Core rate of 48 feet per hour.
25				42		100	7	0		
30				32		89	31	17		
				30		100	10	0		
35				26		87	17	0		
										Boring terminated at 36' bss. Completed 03/19/2012.

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-06*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.721070º N 122.380404º W WGS84

Approximate Mudline Elevation: -3.9 feet (NGVD29) Water Depth: 7.0 to 2.9 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
0	AUS-B-06-0.0-2.0	X	WOR	12	MC					Gray to dark gray CLAY, trace shell fragments up to 1" x 1/2", very soft, wet. (Young Bay Mud)
5	AUS-B-06-5.0-7.0	X	WOR	16	MC					
10	AUS-B-06-10.0-12.0	X	WOR	12	MC					Note: Slight increase in stiffness noted with depth.
15	AUS-B-06-15.0-17.0	X	WOR	20	MC, AL					
20	AUS-B-06-21.0-22.0 AUS-B-06-22.0-23.0	X	WOR	24	MC MC					
25	AUS-B-06-24.0-25.1 AUS-B-06-25.1-26.0	X	3	24	MC GS, MC					Olive gray fine SAND, little clay, loose, wet. (Young Bay Mud)
										Olive gray CLAY, some fine sand, trace organics (wood fragments), soft, high plasticity, moist, gray motling. (Young Bay Mud)
30	AUS-B-06-29.0-31.0	X	28	22	MC					Light brown fine SAND, trace silt, medium dense, moist, brown motling. (Older Bay Sediments)
35	AUS-B-06-35.0-37.0	X	15	16	MC					Gray brown CLAY, little fine sand, very stiff, high plasticity, moist, brown motling. (Older Bay Sediments)
40	AUS-B-06-41.0-42.5	X	84	18	MC					Gray brown fine SAND, trace silt, very dense, wet. (Older Bay Sediments)
45	AUS-B-06-44.0-46.0	X	11	15	MC					Gray brown CLAY, high plasticity, some fine sand, stiff, wet. (Older Bay Sediments) Staining at 45.5-46 ft.
50										

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Boring Log *AUS-B-06*

Yosemite Slough Geotechnical Data Report, San Francisco, California

37.721070º N 122.380404º W WGS84

Approximate Mudline Elevation: -3.9 feet (NGVD29) Water Depth: 7.0 to 2.9 ft (during drilling)

Depth (ft.)	Sample ID	Sample Type	SPT Results N-value	Approx. Recovery (in.)	Lab Tests	TCR (%)	SCR (%)	RQD (%)	Lithology	Description
50	AUS-B-06-50.5-52.5	☒	16	24	MC					Light gray fine SAND, trace silt, medium dense to very dense, wet. (Older Bay Sediments) Rust colored staining.
55	AUS-B-06-55.0-57.0	☒	80	15	MC					
60	AUS-B-06-60.0-62.0	☒	9	16	MC					Gray to olive gray CLAY, little to some sand, high plasticity, trace organics (decomposed grass fibers), stiff, moist, brown motling. (Older Bay Sediments)
65	AUS-B-06-65.0-66.5 AUS-B-06-66.5-67.0	☒	16	18	GS, MC, AL MC					
70	AUS-B-06-70.0-71.2 AUS-B-06-71.2-72.0	☒	38	24	MC MC					Brown fine SAND, trace silt, shell fragments up to 1/4"x1/4", dense, wet. (Older Bay Sediments) Light gray to light brown CLAY, high plasticity, stiff to hard, moist. (Older Bay Sediments) Layer of fine sand at 71.8-71.9 ft.
75	AUS-B-06-75.0-77.0	☒	21	10	MC					
80	AUS-B-06-80.0-82.0	☒	39	10	MC					
										Boring terminated at 82' bss. Completed 03/18/2012.

1. Refer to Figure A-1, Key to Exploration Logs, for explanation of symbols and definitions.
2. The stratum lines represent the approximate boundaries between soil units. Actual changes may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the subsurface conditions.
4. bss = below sediment surface; RQD = rock quality designation; SCR = solid core recovery; TCR = total core recovery; WOR = weight of rod; WOH = weight of hammer.
5. SPT N-Values have not been corrected.

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Appendix B

Vane Shear Test Data Report

Project No.: 04 09120013
April 19, 2012

Carsten Becker, P.E
ARCADIS U.S., Inc.
2300 Eastlake Avenue East, Suite 200
Seattle, WA 98102

VANE SHEAR TESTING SERVICES
YOSEMITE SLOUGH
SAN FRANCISCO, CALIFORNIA

FUGRO Consultants is pleased to submit this final report of Field Vane Shear Testing (VST) conducted at Yosemite Slough, San Francisco, California. Our services were performed under the direction of ARCADIS U.S. The subject testing was performed on March 21st, 22nd & 23rd, 2012. This report includes VST test results and references describing the analysis methods used.

SCOPE

The work consisted of performing 29 vane shear tests (15 peak shear strength tests & 14 remolded shear strength tests) at 3 near-shore locations. The vane equipment was deployed by a drill barge which is owned and operated by Taber Drilling. A summary of the scope of work performed is presented in Table 1 of this report. Graphical logs of the results and tabular summaries of the test data and references are presented in this report.

VST

The VSTs were conducted in general accordance with ASTM Test Method D2573-08, by advancing a GeoTech vane borer with a 65 x 135 mm vane installed to each test depth using a barge mounted drill rig operated by Taber Drilling. The vane borer is a self-boring vane that is used for in situ measurements of the undrained shear strength (Su) of clay and silt.

The main part of the vane borer is the vane. The vane consists of a 4-bladed vane welded to a steel rod. Two vane sizes are available for use with the vane borer (55 x 110mm & 65 x 130mm).

To avoid friction between the vane rod and the clay when the vane is rotated during tests, a vane protection tube protects the vane rod. When the vane borer is pushed into the soil, the vane is withdrawn into a vane protection shoe and locked into position. The vane borer is pushed into the soil to one half meter above the test depth. The vane is then pushed one half meter out of the protection shoe where the test is executed.

TEST RESULTS

ASTM Test Method D2573-08 states that this test method covers the field vane test in saturated clay and silt soils for determination of undrained shear strength. Knowledge of the nature of the soil in which each vane test is to be made is necessary for assessment of the applicability and interpretation of the test. The test is not applicable for sandy soils which may allow drainage during the test. Plots of torque vs. torque head rotation aid the determination of test quality.

The test results presented in this report include plots of torque vs. vane torque head rotation, shear strength and remolded strength vs. depth and sensitivity vs. depth. The peak shear strength was estimated from these plots was then reported as undrained shear strength. The results are summarized in Table 1 of this report.

LIMITATIONS

Findings and interpretations presented in this data report are based on the data obtained from the field program and analysis of resulting data. The interpretations were performed using generally accepted methods and in a manner consistent with the level of care and skill ordinarily exercised by professionals performing similar services. No warranty or guarantee, expressed or implied is made or intended. The interpretations presented are estimated values, assuming generalized site conditions, and are only intended to provide guidance. The user should carefully review the data and should be fully aware of the techniques and limitations of the methods used in interpretations. FUGRO Consultants is not responsible for any claims, damages, or liability associated with use of the data and estimated properties presented in this report. The data does not necessarily reflect strata variations that may exist at the site.

CLOSING

We appreciate the opportunity to assist you with the requested services. If we may be of further assistance, please call us at your convenience.

Sincerely,
FUGRO Consultants

Virgil A. Baker
Technical Manager

Fugro Consultants

Vane Shear Test Summary

-Table 1-

VST Location ID	Date	VST Depth (Feet bgs)	Comments
AUS-V-01	3/21/2012	3.17	
AUS-V-01	3/21/2012	7.50	
AUS-V-01	3/21/2012	12.50	
AUS-V-01	3/21/2012	17.50	
AUS-V-01	3/21/2012	22.50	
AUS-V-02	3/22/2012	2.50	
AUS-V-02	3/22/2012	7.50	
AUS-V-02	3/22/2012	12.50	
AUS-V-02	3/22/2012	17.50	
AUS-V-02	3/22/2012	22.50	Too Stiff for Remolded Strength Test
AUS-V-03	3/23/2012	2.50	
AUS-V-03	3/23/2012	8.00	
AUS-V-03	3/23/2012	12.50	
AUS-V-03	3/23/2012	17.50	
AUS-V-03	3/23/2012	22.50	

469 Roland Way Oakland, CA
Ph. (415) 265-1614 Fax (510) 430-8850

Field Vane Shear Test Report, Ref: ASTM D 2573-01(2007)

Project: 04.09120013 Location: Yosemite Slough Coord:

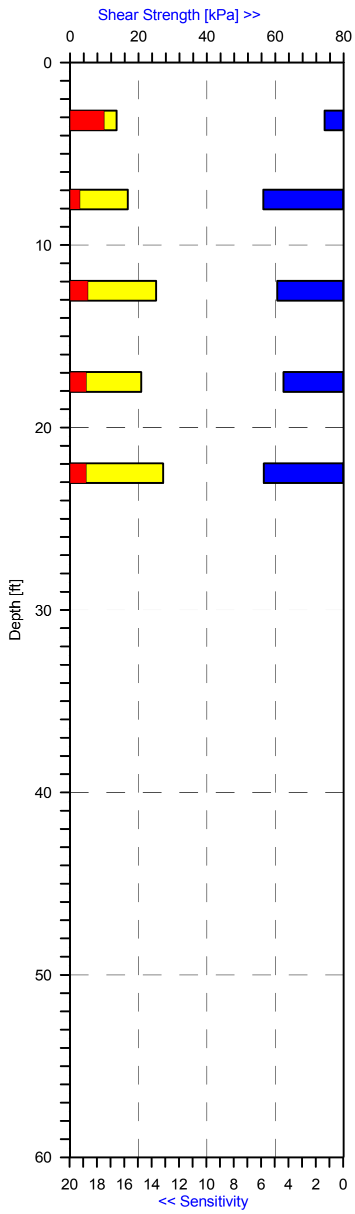
Sounding ID: **AUS-V-01** Vane Shape/Size: Rectangular, 130 x 65 mm Date: 3/21/2012

Test #	Undist/ Remold	Depth Vane Tip (m)	Depth Vane Tip (ft)	Housing Tip (ft)	Time End Push/ Rotations	Pause Prior to Start Test (min)	Time to Failure (min)	Avg. Rotation Speed Deg/sec	Max Torque (Nm)	Rod Friction (Nm)	Su (kPa)	Su (psf)	α*	Su Mob (psf)*	Remold Su Mob (psf)	S_T (ratio)	Remold Rotations
1	U		3.17	1.9	NR	1		0.10	16.01	2.30	13.61	284	0.80	227		NA	NA
2	R		3.17	1.9	NR	1		0.10	12.08	2.02	9.99	209	0.80		167	1.36	10
3	U		7.50	6.3	NR	1		0.10	18.44	1.49	16.83	352	0.80	281		NA	NA
4	R		7.50	6.3	NR	1		0.10	5.99	3.09	2.88	60	0.80		48	5.84	10
5	U		12.50	11.3	NR	1		0.10	27.80	2.44	25.18	526	0.80	421		NA	NA
6	R		12.50	11.3	NR	1		0.10	9.29	4.02	5.23	109	0.80		87	4.81	10
7	U		17.50	16.3	NR	1		0.10	23.21	2.29	20.77	434	0.80	347		NA	NA
8	R		17.50	16.3	NR	1		0.10	7.67	2.87	4.77	100	0.80		80	4.36	10
9	U		22.50	21.3	NR	1		0.10	29.55	2.18	27.18	568	0.80	454		NA	NA
10	R		22.50	21.3	NR	1		0.10	6.71	1.99	4.69	98	0.80		78	5.80	10

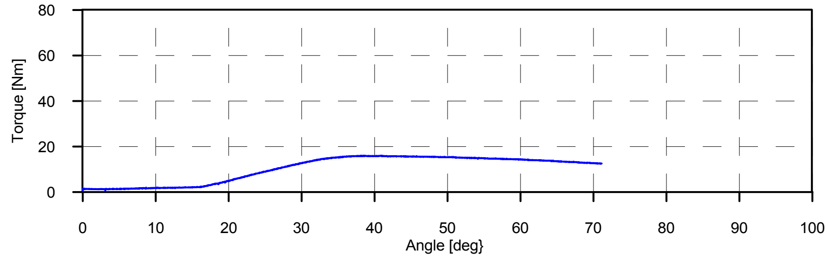
* As per Bjerrum, 1972. α = 0.8 is a default mid-range value based on PI = 50. Whenever possible, α should be based on site-specific PI data.
α will typically range between 0.6 and 1.0 based on PI. Accurate PI data from the discrete VST interval should improve the accuracy of the su mob result.
For this report, specific PI data were used in corrections when available if the inference of PI to the discrete VST interval was reasonable.
Note: time to failure does not include rod friction measurement time.

Calculate Alpha

PI =	50
α =	0.80

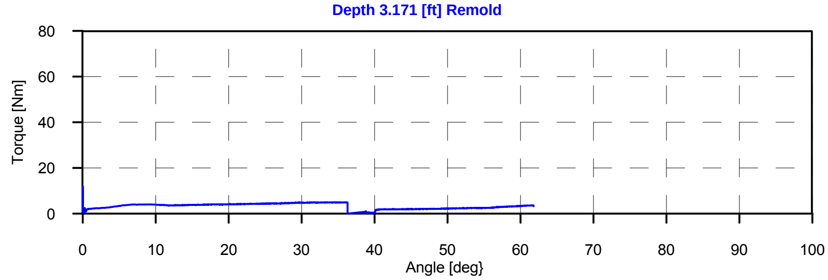


Depth 3.170 [ft]



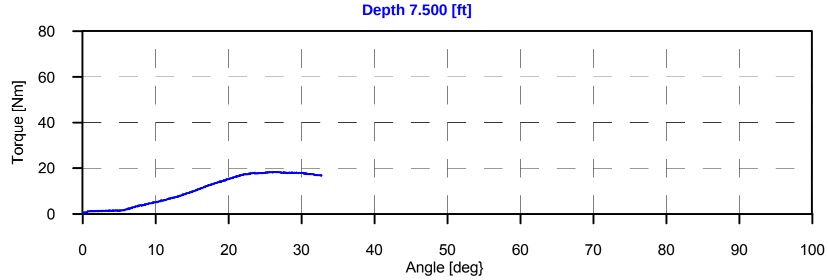
Shear strength = 13.61 [kPa], Max torque = 16.01 {Nm], Rod friction = 2.30 [Nm]

Depth 3.171 [ft] Remold



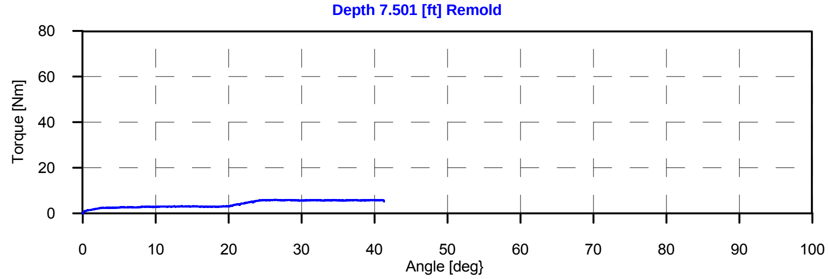
Shear strength = 9.99 [kPa], Max torque = 12.08 {Nm], Rod friction = 2.02 [Nm]

Depth 7.500 [ft]



Shear strength = 16.83 [kPa], Max torque = 18.44 {Nm], Rod friction = 1.49 [Nm]

Depth 7.501 [ft] Remold

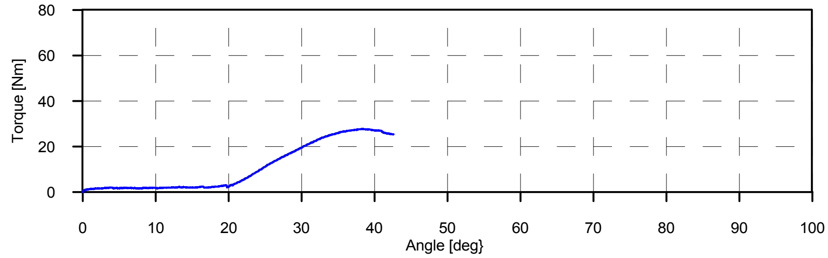


Shear strength = 2.88 [kPa], Max torque = 5.99 {Nm], Rod friction = 3.09 [Nm]

FUGRO

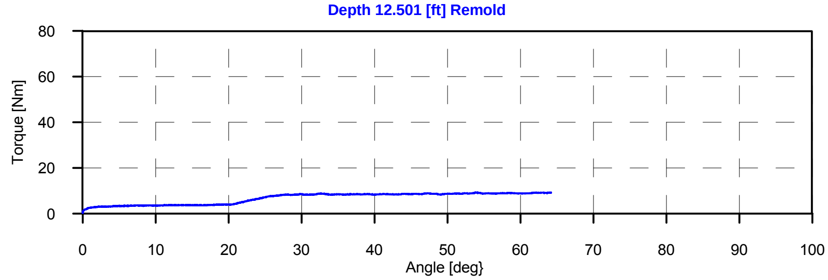
Location: Yosemite Slough	Position	Ground Level	Test ID: AUS-V-01
Project ID: 04.09120013	Client: Fugro Consultants, Inc.	Date: 3/21/2012	Scale
Project		Page: 1/3	Fig.
Vane type & size: Rectangular end, 13.0 x 6.5 cm		File: AUS-V-01.vct	

Depth 12.500 [ft]



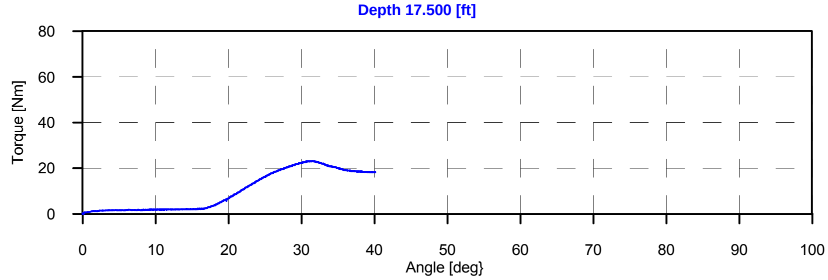
Shear strength = 25.18 [kPa], Max torque = 27.80 {Nm], Rod friction = 2.44 [Nm]

Depth 12.501 [ft] Remold



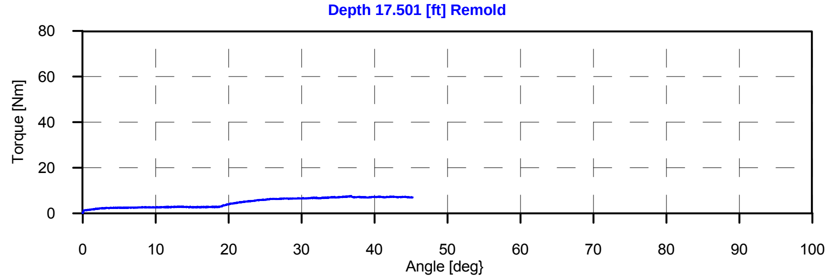
Shear strength = 5.23 [kPa], Max torque = 9.29 {Nm], Rod friction = 4.02 [Nm]

Depth 17.500 [ft]



Shear strength = 20.77 [kPa], Max torque = 23.21 {Nm], Rod friction = 2.29 [Nm]

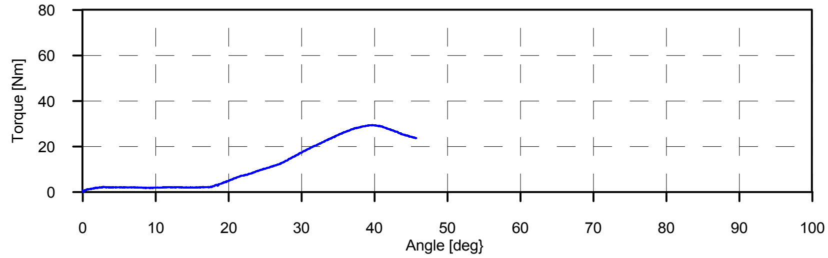
Depth 17.501 [ft] Remold



Shear strength = 4.77 [kPa], Max torque = 7.67 {Nm], Rod friction = 2.87 [Nm]

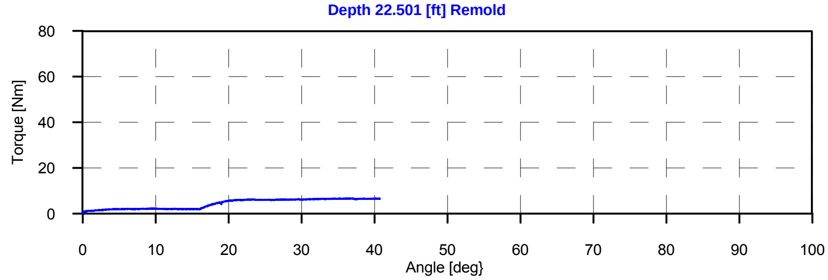
Location Yosemite Slough	Position	Ground Level	Test ID AUS-V-01
Project ID 04.09120013	Client Fugro Consultants, Inc.	Date 3/21/2012	Scale
Project		Page 2/3	Fig.
Vane type & size Rectangular end, 13.0 x 6.5 cm		File AUS-V-01.vct	

Depth 22.500 [ft]



Shear strength = 27.18 [kPa], Max torque = 29.55 {Nm], Rod friction = 2.18 [Nm]

Depth 22.501 [ft] Remold



Shear strength = 4.69 [kPa], Max torque = 6.71 {Nm], Rod friction = 1.99 [Nm]

Location Yosemite Slough		Position	Ground Level	Test ID AUS-V-01
Project ID 04.09120013		Client Fugro Consultants, Inc.	Date 3/21/2012	Scale
Project			Page 3/3	Fig.
Vane type & size Rectangular end, 13.0 x 6.5 cm			File AUS-V-01.vct	

Field Vane Shear Test Report, Ref: ASTM D 2573-01(2007)

Project: 04.09120013   Location: Yosemite Slough   Coord:

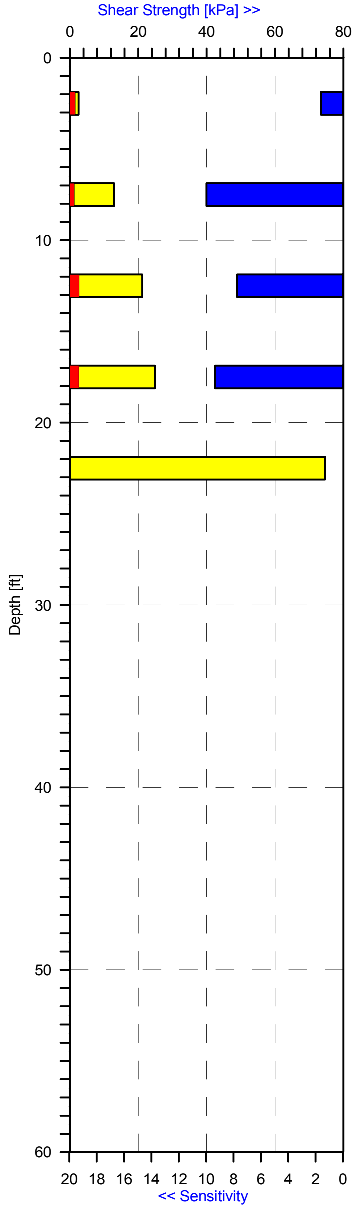
Sounding ID: **AUS-V-02**   Vane Shape/Size: Rectangular, 130 x 65 mm   Date: 3/22/2012

Test #	Undist/ Remold	Depth Vane Tip (m)	Depth Vane Tip (ft)	Housing Tip (ft)	Time End Push/ Rotations	Pause Prior to Start Test (min)	Time to Failure (min)	Avg. Rotation Speed Deg/sec	Max Torque (Nm)	Rod Friction (Nm)	Su (kPa)	Su (psf)	α*	Su Mob (psf)*	Remold Su Mob (psf)	S_T (ratio)	Remold Rotations
1	U		2.50	1.3	NR	1		0.10	4.92	2.36	2.54	53	0.80	42		NA	NA
2	R		2.50	1.3	NR	1		0.10	3.66	2.07	1.58	33	0.80		26	1.61	10
3	U		7.50	6.3	NR	1		0.10	14.76	1.69	12.98	271	0.80	217		NA	NA
4	R		7.50	6.3	NR	1		0.10	3.69	2.38	1.30	27	0.80		22	9.98	10
5	U		12.50	11.3	NR	1		0.10	23.28	1.95	21.18	442	0.80	354		NA	NA
6	R		12.50	11.3	NR	1		0.10	4.99	2.23	2.74	57	0.80		46	7.73	10
7	U		17.50	16.3	NR	1		0.10	27.53	2.45	24.90	520	0.80	416		NA	NA
8	R		17.50	16.3	NR	1		0.10	6.14	3.46	2.66	56	0.80		44	9.36	10
9	U		22.50	21.3	NR	1		0.10	78.04	2.91	74.60	1558	0.80	1247		NA	NA

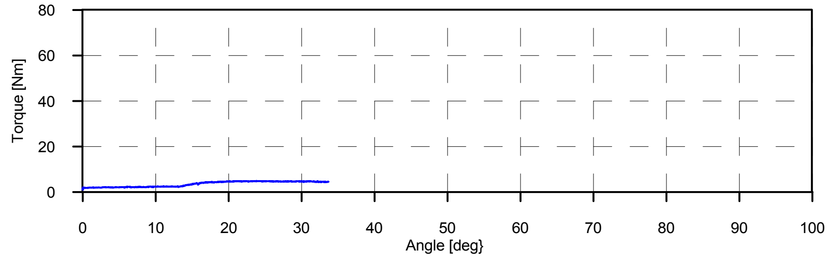
* As per Bjerrum, 1972. α = 0.8 is a default mid-range value based on PI = 50. Whenever possible, α should be based on site-specific PI data.
α will typically range between 0.6 and 1.0 based on PI. Accurate PI data from the discrete VST interval should improve the accuracy of the su mob result.
For this report, specific PI data were used in corrections when available if the inference of PI to the discrete VST interval was reasonable.
Note: time to failure does not include rod friction measurement time.

Calculate Alpha

PI =	50
α =	0.80

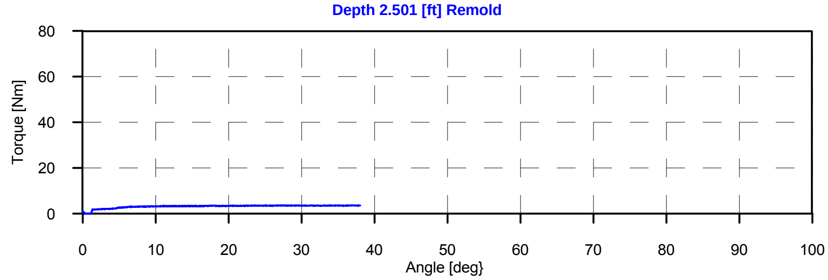


Depth 2.500 [ft]



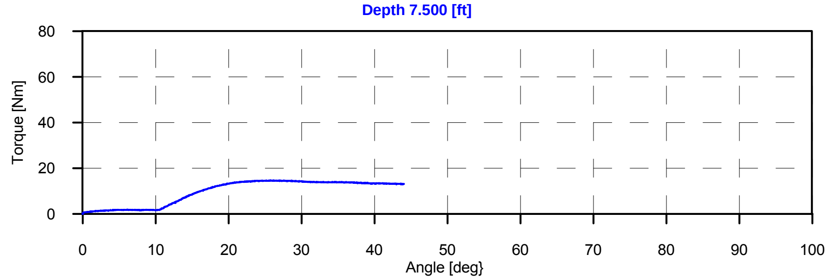
Shear strength = 2.54 [kPa], Max torque = 4.92 {Nm], Rod friction = 2.36 [Nm]

Depth 2.501 [ft] Remold



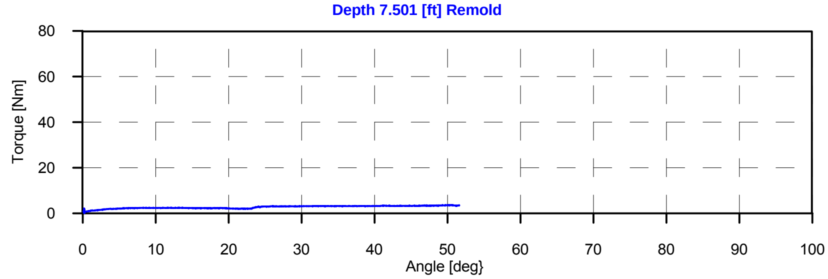
Shear strength = 1.58 [kPa], Max torque = 3.66 {Nm], Rod friction = 2.07 [Nm]

Depth 7.500 [ft]



Shear strength = 12.98 [kPa], Max torque = 14.76 {Nm], Rod friction = 1.69 [Nm]

Depth 7.501 [ft] Remold

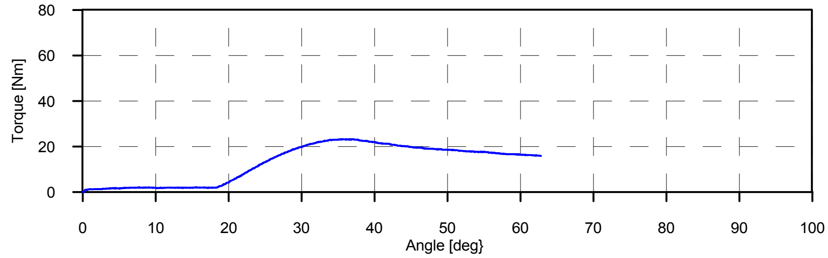


Shear strength = 1.30 [kPa], Max torque = 3.69 {Nm], Rod friction = 2.38 [Nm]

FUGRO

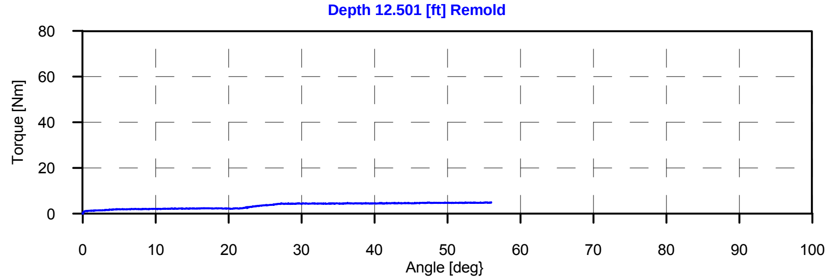
Location: Yosemite Slough	Position		Ground Level	Test ID: AUS-V-02
Project ID: 04.09120013	Client: Fugro Consultants, Inc.		Date: 3/22/2012	Scale
Project			Page: 1/3	Fig.
Vane type & size: Rectangular end, 13.0 x 6.5 cm			File: AUS-V-02.vct	

Depth 12.500 [ft]



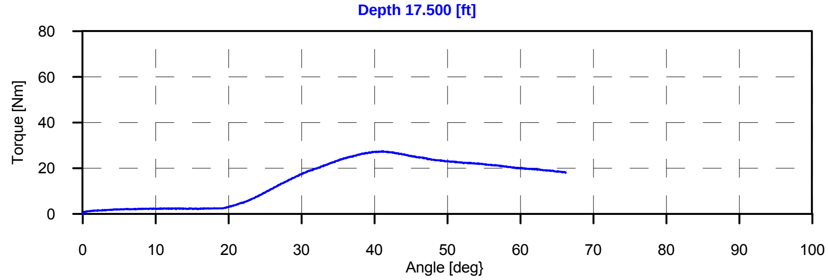
Shear strength = 21.18 [kPa], Max torque = 23.28 {Nm], Rod friction = 1.95 [Nm]

Depth 12.501 [ft] Remold



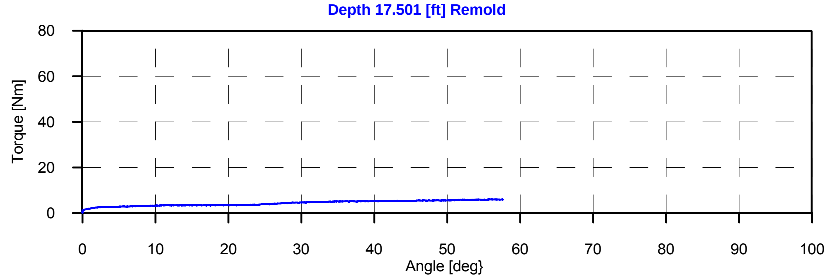
Shear strength = 2.74 [kPa], Max torque = 4.99 {Nm], Rod friction = 2.23 [Nm]

Depth 17.500 [ft]



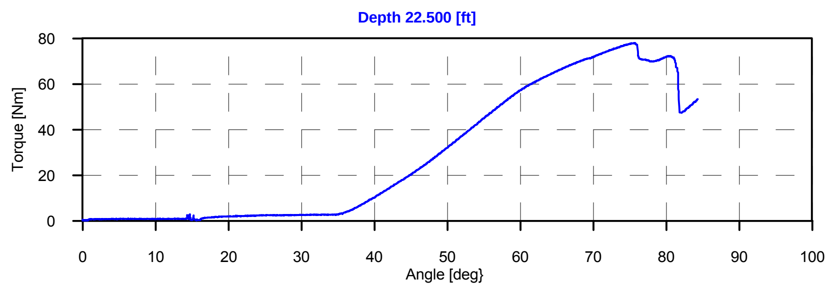
Shear strength = 24.90 [kPa], Max torque = 27.53 {Nm], Rod friction = 2.45 [Nm]

Depth 17.501 [ft] Remold



Shear strength = 2.66 [kPa], Max torque = 6.14 {Nm], Rod friction = 3.46 [Nm]

Location: Yosemite Slough	Position	Ground Level	Test ID: AUS-V-02
Project ID: 04.09120013	Client: Fugro Consultants, Inc.	Date: 3/22/2012	Scale
Project		Page: 2/3	Fig.
Vane type & size: Rectangular end, 13.0 x 6.5 cm		File: AUS-V-02.vct	



Shear strength = 74.60 [kPa], Max torque = 78.04 {Nm], Rod friction = 2.91 [Nm]

Location Yosemite Slough	Position		Ground Level	Test ID AUS-V-02
Project ID 04.09120013	Client Fugro Consultants, Inc.		Date 3/22/2012	Scale
Project			Page 3/3	Fig.
Vane type & size Rectangular end, 13.0 x 6.5 cm			File AUS-V-02.vct	

Field Vane Shear Test Report, Ref: ASTM D 2573-01(2007)

Project: 04.09120013 Location: Yosemite Slough Coord:

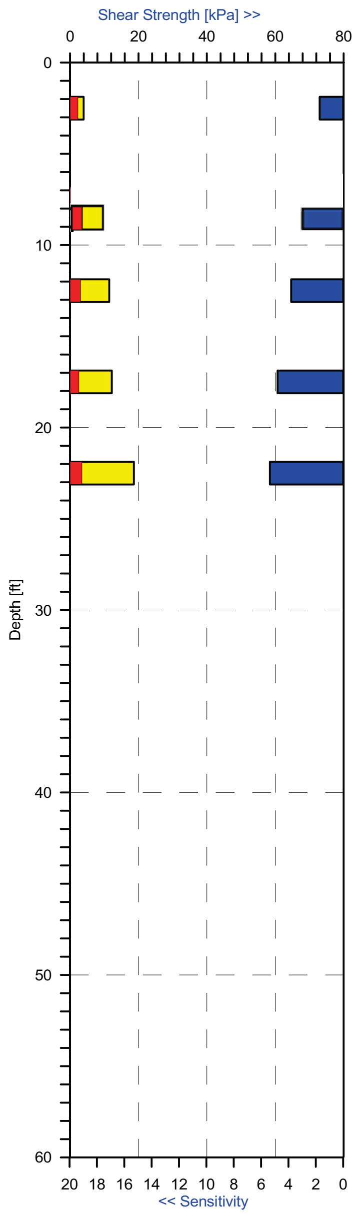
Sounding ID: **AUS-V-03** Vane Shape/Size: Rectangular, 130 x 65 mm Date: 3/23/2012

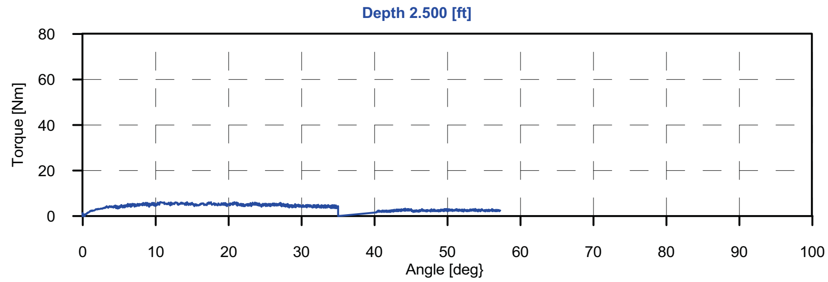
Test #	Undist/ Remold	Depth Vane Tip (m)	Depth Vane Tip (ft)	Housing Tip (ft)	Time End Push/ Rotations	Pause Prior to Start Test (min)	Time to Failure (min)	Avg. Rotation Speed Deg/sec	Max Torque (Nm)	Rod Friction (Nm)	Su (kPa)	Su (psf)	α*	Su Mob (psf)*	Remold Su Mob (psf)	S_T (ratio)	Remold Rotations
1	U		2.50	1.3	NR	1		0.10	6.21	2.21	3.97	83	0.80	66		NA	NA
2	R		2.50	1.3	NR	1		0.10	3.65	2.15	1.49	31	0.80		25	2.67	10
3	U		8.00	6.8	NR	1		0.10	12.37	3.59	8.72	182	0.80	146		NA	NA
4	R		8.00	6.8	NR	1		0.10	6.02	3.12	2.88	60	0.80		48	3.03	10
5	U		12.50	11.3	NR	1		0.10	14.80	3.23	11.49	240	0.80	192		NA	NA
6	R		12.50	11.3	NR	1		0.10	5.90	2.86	3.02	63	0.80		50	3.81	10
7	U		17.50	16.3	NR	1		0.10	15.19	2.89	12.21	255	0.80	204		NA	NA
8	R		17.50	16.3	NR	1		0.10	5.66	3.10	2.54	53	0.80		42	4.80	10
9	U		22.50	21.3	NR	1		0.10	21.17	2.35	18.69	390	0.80	312		NA	NA
10	R		22.50	21.3	NR	1		0.10	8.36	4.85	3.49	73	0.80		58	5.36	10

* As per Bjerrum, 1972. α = 0.8 is a default mid-range value based on PI = 50. Whenever possible, α should be based on site-specific PI data.
α will typically range between 0.6 and 1.0 based on PI. Accurate PI data from the discrete VST interval should improve the accuracy of the su mob result.
For this report, specific PI data were used in corrections when available if the inference of PI to the discrete VST interval was reasonable.
Note: time to failure does not include rod friction measurement time.

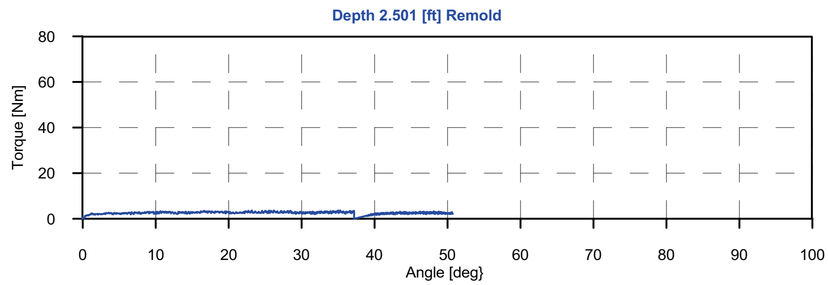
Calculate Alpha

PI =	50
α =	0.80

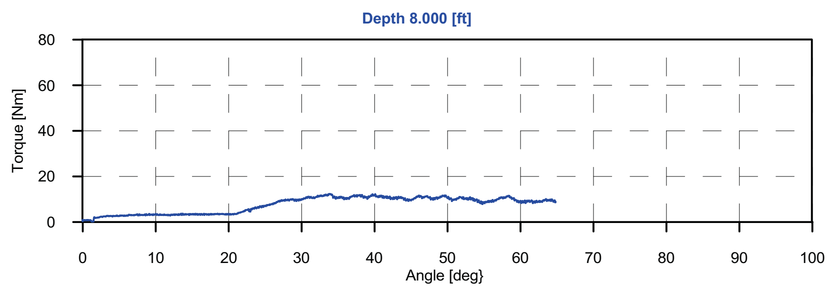




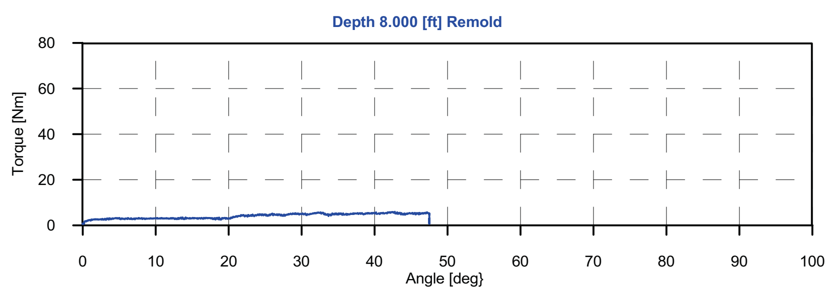
Shear strength = 3.97 [kPa], Max torque = 6.21 {Nm], Rod friction = 2.21 [Nm]



Shear strength = 2.31 [kPa], Max torque = 3.65 {Nm], Rod friction = 1.32 [Nm]



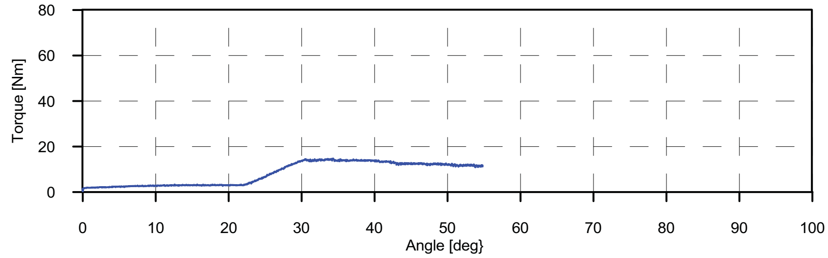
Shear strength = 8.72 [kPa], Max torque = 12.37 {Nm], Rod friction = 3.59 [Nm]



Shear strength = 2.88 [kPa], Max torque = 6.02 {Nm], Rod friction = 3.12 [Nm]

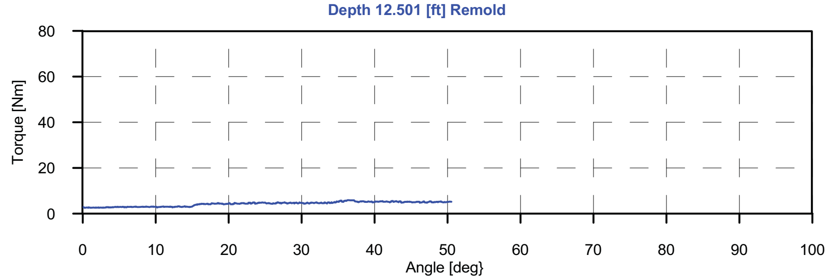
Location: Yosemite Slough	Position	Ground Level	Test ID: AUS-V-03
Project ID: 04.09120013	Client: Fugro Consultants, Inc.	Date: 3/23/2012	Scale
Project		Page: 1/3	Fig.
Vane type & size: Rectangular end, 13.0 x 6.5 cm		File: AUS-V-03.vct	

Depth 12.500 [ft]



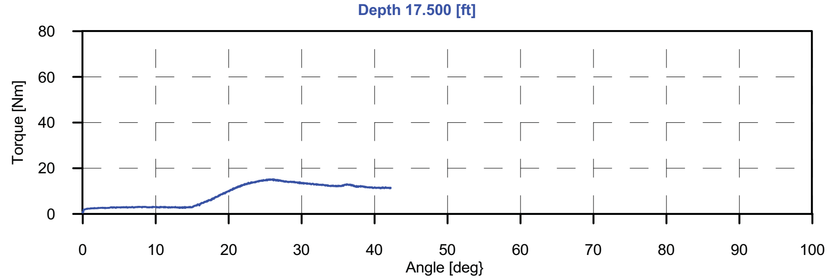
Shear strength = 11.49 [kPa], Max torque = 14.80 {Nm], Rod friction = 3.23 [Nm]

Depth 12.501 [ft] Remold



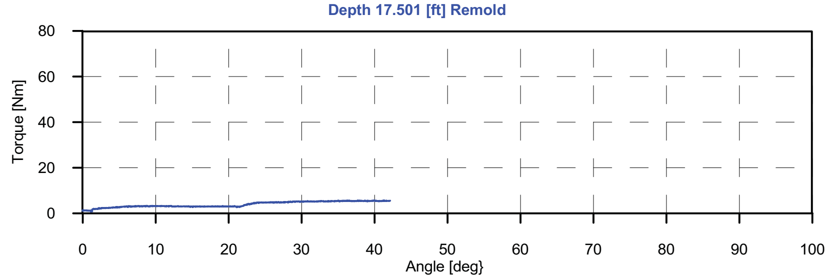
Shear strength = 3.02 [kPa], Max torque = 5.90 {Nm], Rod friction = 2.86 [Nm]

Depth 17.500 [ft]



Shear strength = 12.21 [kPa], Max torque = 15.19 {Nm], Rod friction = 2.89 [Nm]

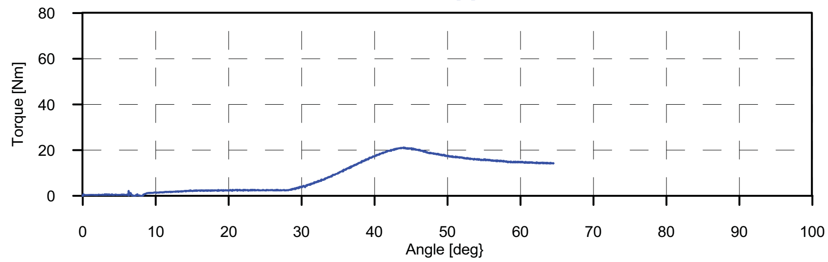
Depth 17.501 [ft] Remold



Shear strength = 2.54 [kPa], Max torque = 5.66 {Nm], Rod friction = 3.10 [Nm]

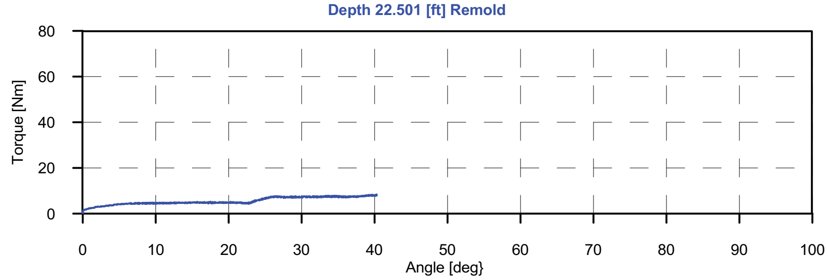
Location Yosemite Slough	Position		Ground Level	Test ID AUS-V-03
Project ID 04.09120013	Client Fugro Consultants, Inc.		Date 3/23/2012	Scale
Project			Page 2/3	Fig.
Vane type & size Rectangular end, 13.0 x 6.5 cm			File AUS-V-03.vct	

Depth 22.500 [ft]



Shear strength = 18.69 [kPa], Max torque = 21.17 {Nm], Rod friction = 2.35 [Nm]

Depth 22.501 [ft] Remold



Shear strength = 3.49 [kPa], Max torque = 8.36 {Nm], Rod friction = 4.85 [Nm]

Location	Position	Ground Level	Test ID
Yosemite Slough			AUS-V-03
Project ID	Client	Date	Scale
04.09120013	Fugro Consultants, Inc.	3/23/2012	
Project		Page	Fig.
		3/3	
Vane type & size		File	
Rectangular end, 13.0 x 6.5 cm		AUS-V-03.vct	

Appendix C

Geotechnical Laboratory Test Methods and Results

Introduction

Geotechnical laboratory testing was performed on selected samples collected in borings drilled at the Yosemite Slough Sediment Site in San Francisco, California (site). Cooper Testing Laboratory conducted the laboratory testing as a subcontractor to ARCADIS. The testing was performed under guidance of a qualified ARCADIS engineer on both disturbed and relatively undisturbed samples. This appendix presents the methods used to determine material classification and physical properties of the samples and the laboratory test reports provided by the geotechnical testing laboratory.

Classification

Samples obtained from the explorations were visually classified in the field by properly trained ARCADIS staff in general accordance with American Society of Testing and Materials (ASTM) D 2488. The samples were then couriered to the laboratory, where testing was performed on selected samples to verify field classifications. Grain size analyses and Atterberg limit tests were used to classify the samples in general accordance with the Unified Soil Classification System (UCSC) (ASTM D 2487). A summary of the USCS is provided on Figure C-1.

Sample Extrusion (Thin-WallTube Samples)

Thin-wall tube samples obtained during drilling of geotechnical borings were shipped to the laboratory for sample extrusion, visual description of the recovered material, and collection of subsamples for geotechnical testing. The subsample intervals for triaxial strength testing and consolidation testing were carefully removed from the thin-wall tubes. A tube cutter was used to slowly cut an interval from the base of the tube. The cutter was rotated around the tube and tightened slowly so as not to burr or bevel the edge. Once the testing interval was cut from the main tube, it was placed into a vertical hydraulic piston with a head-platen matching the inner diameter of the tube. The piston was slowly extended and pressed the sample out of the tube section in the same direction the sample was collected (i.e., the sample was pushed up from the bottom). The section of tube was held in place using a plate with a circular opening of equal diameter as the inner diameter of the tube and a recessed lip matching the outer diameter of the tube.

Moisture Content Determination (MC)

Moisture contents were determined for selected samples in general accordance with ASTM D 2216. Moisture contents were also routinely determined in conjunction with other tests such as the Atterberg limit, consolidation, and triaxial tests. Moisture content analyses are generally not performed on samples with limited recovery or with high percentages of gravel. The moisture content results are summarized in Table C-1.

Atterberg Limits (AL)

Atterberg limits of selected fine-grained samples were determined in general accordance with ASTM D 4318. The Atterberg limits consist of liquid limit (LL) and plastic limit (PL). These parameters provide an indication of the engineering behavior of fine-grained material. Plasticity characteristics are used for classification of inorganic and organic cohesive material. Atterberg limits are also frequently used to estimate physical properties, such as consolidation and compressibility characteristics, and consistency and shear strength parameters.

Grain Size Analysis (GS)

Grain size analyses were conducted in general accordance with ASTM D 422 to determine the particle size distribution of selected samples. The grain size distribution of material retained on the No. 200 sieve (sand, gravel, and larger material) was determined using a mechanical sieve analysis. The results of the mechanical analysis were plotted on a graph as percent finer (by weight) versus grain size.

Density Test (DT)

Subsamples were cut from material collected using Shelby tubes for density determination. The volume of each sample was simply determined based on measurements of the diameter and height of the sample. The total unit weight was based on the volume and wet weight of the material. Following determination of the total unit weight of the sample, its moisture content was determined in accordance with ASTM D 2216 so that its dry unit weight could be calculated.

Specific Gravity (SG)

Specific gravity was determined for selected samples in general accordance with ASTM D 854. Specific gravity is a measure of density of the solids expressed as a multiple of the density of water at 20 degrees Celsius.

Consolidation Test (CN)

One-dimensional consolidation tests were performed on representative fine-grained samples to estimate the compressibility, maximum past stress (preconsolidation stress), and time-rate of consolidation of the material. The tests were performed on relatively undisturbed samples in general accordance with ASTM D 2435, Method B. A cylindrical sample (typically 2 inches in diameter and 1 inch in height) is carefully placed in a rigid ring (i.e., standard odometer ring), where it is inundated with water. The ring provides lateral confinement during loading. Drainage is provided through porous disks at the top and bottom of the sample. The sample is loaded in increments, and change in sample height is measured at certain time intervals for each load increment. The applied load is incrementally increased until the preconsolidation stress is exceeded. When a rebound/reload cycle is requested, the load is then decreased by one increment, allowing the sample to rebound before it is re-loaded to confirm the preconsolidation stress. Loading is completed when the data from three consecutive loads are observed to plot on the virgin compression curve (i.e., the loads are above the preconsolidation stress). Rebound is measured during unloading. Each load is applied until primary consolidation is completed before the next load increment is applied. The test results are plotted in terms of strain as a function of effective stress (or applied pressure). The compressibility of the material is estimated based on the stress-strain consolidation curve. The coefficient of consolidation is a measure of time-rate of consolidation and is determined based on the test results for selected load increments.

Unconsolidated Undrained Triaxial Compression Test (UU)

Unconsolidated, undrained triaxial compression tests were performed on selected samples in general accordance with ASTM D 2850. This test method is used to estimate the undrained shear strength of cohesive material.

A relatively undisturbed, cylindrical sample is encased in a flexible wall, impermeable membrane and placed in a triaxial cell. The triaxial cell is filled with water, which is subsequently pressurized to predetermined magnitudes, thereby subjecting the sample to a confining pressure representing the in-situ stress state. No consolidation of the sample is permitted prior to loading. The sample is then loaded axially at a constant rate of strain to failure in compression. No drainage is allowed during shearing. Stresses and deformations are recorded continuously during the test.

The test results are plotted as stress-strain curves (principal stress difference as a function of axial strain) and in the shear stress-principal stress space as Mohr circles. Failure is taken as the stresses within the sample corresponding to the maximum principal stress difference attained, or the maximum principal stress ratio attained, or the principal stress difference at 15 percent strain, whichever occurs first during the test. The undrained shear strength is defined as the shear stress at failure (principal stress difference at failure divided by two).

Consolidated Undrained Triaxial Compression Test (CU)

One consolidated, undrained triaxial compression test was performed on a selected Young Bay Mud sample. The test was performed in general accordance with ASTM D 4767. This test method is used to determine undrained shear strength of material consolidated to a preselected confining stress. The measurement of pore pressure during the shearing further allows the estimation of effective stress parameters (i.e., drained shear strength parameters) for cohesive material. For this particular test, a high confining stress of 95 pounds per square inch was selected in an attempt to create normally consolidated conditions and to determine the normalized undrained shear strength of the Young Bay Mud. To closely replicate in-situ conditions, K_0 consolidation was performed by applying stresses during the consolidation phase such that no radial deformation of the sample took place. Additional details regarding the test method are provided below.

A relatively undisturbed, cylindrical sample is encased in a flexible wall, impermeable membrane and placed in the triaxial cell, which is then filled with water. To achieve a saturated state for the sample, a backpressure is applied to the water in the triaxial cell and the porewater in the sample, forcing air within the system into solution. After the saturation phase is complete, the cell pressure is raised, subjecting the sample to a confining pressure. Drainage is permitted during this phase of the test to allow the sample to consolidate to the confining pressure. Following completion of consolidation, the drainage valves are closed and the sample is loaded axially at a constant rate of strain, subjecting the sample to undrained shearing conditions. The test is carried out until the sample fails in compression. Axial stress, pore pressure, and deformations are measured and recorded continuously during the test.

The test results are plotted as stress-strain curves (principal stress difference and principal stress ratio as a function of axial strain) and as pore pressure versus strain. The test results are also plotted as stress paths in terms of effective stress. Failure is determined as the stresses within the sample corresponding to the maximum principal stress difference attained, or the maximum principal stress ratio attained, or the principal stress difference at 15 percent strain, whichever occurs first during the test.

References

American Society for Testing and Materials (ASTM). 2012. Annual Book of ASTM Standards, Vol. 04.08, Soil and Rock (I).

Table C-1
Summary Geotechnical Moisture Content Test Results

Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Boring ID	Sample ID	Sample Depth *(ft bss)*	Moisture Content *(%)*
AUS-B-01	AUS-B-01A-0.0-2.0	0-2	95.3
	AUS-B-01A-10.0-12.0	10-12	13.7
	AUS-B-01A-25.0-26.2	25.0-26.2	95.1
	AUS-B-01A-26.4-27.0	26.4-27.0	27.5
	AUS-B-01A-27.0-29.0	27.3-27.5	21.5
	AUS-B-01A-27.0-29.0	28.3-28.9	95.8
	AUS-B-01A-30.0-31.8	30.0-31.8	25.3
	AUS-B-01A-40.0-42.0	40-42	18.3
	AUS-B-01A-50.0-52.0	50-52	19.5
	AUS-B-01A-55.0-55.9	55-55.9	17.9
	AUS-B-01A-55.9-56.5	55.9-56.5	15.2
	AUS-B-01A-60.0-61.8	60-61.8	20.2
	AUS-B-01A-65.0-66.7	65.0-66.7	20.7
	AUS-B-01A-70.0-72.0	70-72	59.6
	AUS-B-01A-75.0-75.7	75-75.7	67.0
	AUS-B-01A-75.7-77.0	75.7-77	59.5
	AUS-B-01A-80.0-82.0	80-82	64.8
	AUS-B-01B-7.0-9.0	7-9	49.8
	AUS-B-01B-17.0-19.0	17-19	97.6
	AUS-B-01B-22.0-24.0	22-24	111.8
AUS-B-02	AUS-B-02-0.0-2.0	0-2	79.3
	AUS-B-02-2.0-4.0	2-4	87.2
	AUS-B-02-5.0-7.0	5-7	87.4
	AUS-B-02-7.0-9.0	7-9	60.5
	AUS-B-02-12.0-14.0	12-14	78.4
	AUS-B-02-25.0-27.0	25-27	19.3
	AUS-B-02-30.0-32.0	30-32	19.9
	AUS-B-02-35.0-37.0	35-37	20.8
	AUS-B-02-40.0-42.0	40-42	18.4
	AUS-B-02-45.0-47.0	45-47	19.5
	AUS-B-02-50.0-52.0	50-52	18.8
	AUS-B-02-55.0-56.7	55-57	20.5
	AUS-B-02-56.7-57.0	55-57	26.8
	AUS-B-02-60.0-62.0	60-62	53.2
	AUS-B-02-62.0-64.0	62-64	21.9
	AUS-B-02-68.0-69.4	68-69.4	42.1
	AUS-B-02-69.4-70.0	69.4-70	18.2
	AUS-B-02-71.0-71.5	75-77	45.5
AUS-B-03	AUS-B-03-0.0-2.0	0-2	99.4
	AUS-B-03-5.0-7.0	5-7	85.3
	AUS-B-03-7.0-9.0	7-9	83.1
	AUS-B-03-12.5-14.5	12.5-14.5	79.1
	AUS-B-03-17.0-19.0	17-19	90.8
	AUS-B-03-21.0-23.0	21-23	88.3
	AUS-B-03-25.5-26.5	25-26.5	16.3
	AUS-B-03-30.5-31.5	30.5-31.5	18.5
	AUS-B-03-35.0-36.5	35-36.5	20.4
	AUS-B-03-41.5-43.5	41.5-43.5	23.2
	AUS-B-03-50.0-50.6	50-51.5	24.3
	AUS-B-03-50.6-51.5	50-51.5	15.7
	AUS-B-03-51.5-53.5	51.5-53.5	19.2
	AUS-B-03-55.1-55.8	55.1-55.8	17.1
	AUS-B-03-60.0-60.5	60.-60.5	10.6

Table C-1
Summary Geotechnical Moisture Content Test Results

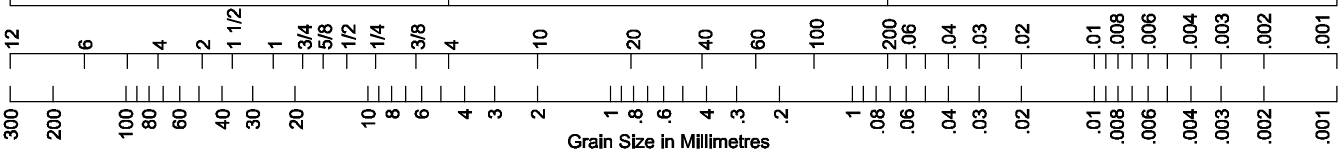
Geotechnical Data Report
Yosemite Slough Sediment Site
San Francisco, California

Boring ID	Sample ID	Sample Depth (ft bss)	Moisture Content (%)
AUS-B-04	AUS-B-04-0.0-1.5	0-2	73.0
	AUS-B-04-1.5-2.0	0-2	33.0
	AUS-B-04-5.0-6.3	5-7	54.2
	AUS-B-04-6.3-7.0	5-7	62.3
	AUS-B-04-10.0-12.0	10-12	53.2
	AUS-B-04-15.0-17.0	15-17	80.6
	AUS-B-04-20.0-20.5	20-22	56.2
	AUS-B-04-20.5-22.0	20-22	17.2
	AUS-B-04-25.0-27.0	25-27	19.9
	AUS-B-04-30.0-32.0	30-32	21.8
	AUS-B-04-35.0-37.0	35-37	21.9
	AUS-B-04-40.0-42.0	40-42	19.2
	AUS-B-04-45.0-47.0	45-47	20.1
	AUS-B-04-50.0-51.5	50-51.5	19.2
	AUS-B-04-55.0-56.6	55-57	19.5
	AUS-B-04-56.6-57.0	55-57	16.9
	AUS-B-04-60.0-60.8	60-62	17.5
	AUS-B-04-65.0-66.8	65-67	24.6
	AUS-B-04-70.0-72.0	70-72	52.6
	AUS-B-04-75.0-77.0	75-77	55.1
	AUS-B-04-80.0-82.0	80-82	61.6
	AUS-B-04-85.0-87.0	85-87	59.3
	AUS-B-04-90.0-92.0	90-92	20.1
	AUS-B-04-95.0-96.2	95-96.5	14.7
AUS-B-05	AUS-B-05-0.0-2.0	0-2	92.4
	AUS-B-05-5.0-7.0	5-7	59.8
	AUS-B-05-10.0-12.0	10-12	32.4
	AUS-B-05-15.0-17.0	15-17	18.0
	AUS-B-05-20.0-20.6	20-20.6	8.4
AUS-B-06	AUS-B-06-0.0-2.0	0-2	113.3
	AUS-B-06-5.0-7.0	5-7	87.1
	AUS-B-06-10.0-12.0	10-12	74.1
	AUS-B-06-15.0-17.0	15-17	70.9
	AUS-B-06-21.0-22.0	21-23	76.0
	AUS-B-06-22.0-23.0	21-23	35.5
	AUS-B-06-24.0-25.1	24-26	15.4
	AUS-B-06-25.1-26.0	24-26	20.3
	AUS-B-06-29.0-31.0	29-31	15.2
	AUS-B-06-35.0-37.0	35-37	19.2
	AUS-B-06-41.0-42.5	41-42.5	15.4
	AUS-B-06-44.0-46.0	44-46	23.7
	AUS-B-06-50.5-52.5	50.5-52.5	18.4
	AUS-B-06-55.0-57.0	55-57	18.5
	AUS-B-06-60.0-62.0	60-62	53.7
	AUS-B-06-65.0-66.5	65-67	25.1
	AUS-B-06-66.5-67.0	65-67	16.9
	AUS-B-06-70.0-71.2	70-72	17.1
	AUS-B-06-71.2-72.0	70-72	18.6
	AUS-B-06-75.0-77.0	75-77	21.9
	AUS-B-06-80.0-82.0	80-82	13.6

Notes:
bgs = below ground surface
ft = feet

Grain Size

Size of Opening in Inches	U.S. Standard Sieve Size	Grain Size in Millimetres



COBBLES	GRAVEL	SAND	SILT and CLAY
Coarse-Grained Soils			Fine-Grained Soils

Coarse-Grained Soils

G W	G P	G M	G C	S W	S P	S M	S C
GRAVEL with <5% fines		* GRAVEL with >12% fines		GRAVEL with <5% fines		* GRAVEL with >12% fines	
More than 50% (by weight) of coarse fraction larger than No. 4				More than 50% (by weight) of coarse fraction smaller than No. 4			
More than 50% (by weight) larger than No. 200 sieve							

G W and S W: $\left(\frac{D_{60}}{D_{10}}\right)$ >4 for G W, >6 for S W & $1 \leq \left(\frac{(D_{30})^2}{D_{10} \times D_{60}}\right) \leq 3$

G P and S P: GRAVEL or SAND not meeting requirements for G W and S W

G M and S M: Atterberg limits below A line or PI <4

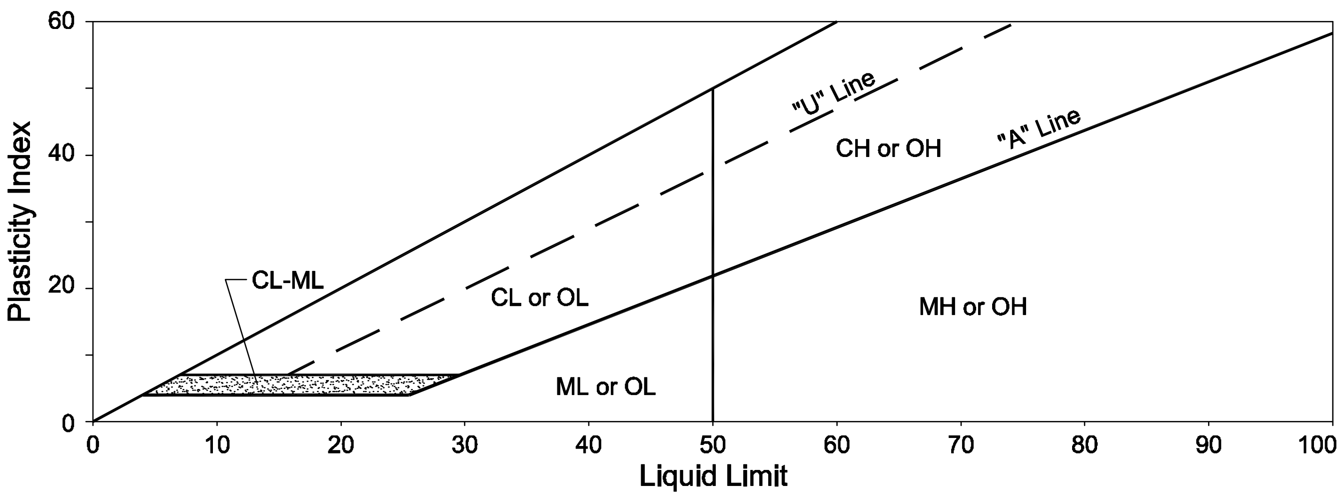
G C and S C: Atterberg limits above A line and PI >7

* Coarse-grained soils with fines contents between 5 and 12% require dual classification using two group symbols.

D_{10}, D_{30}, and D_{60} are the particle-size diameters corresponding to 10, 30, and 60% passing on the cumulative particle-size distribution curve.

Fine-Grained Soils

M L	C L	O L	M H	C H	O H	Pt
SILT	CLAY	Organic	SILT	CLAY	Organic	Peat
Liquid Limit <50%			Liquid Limit >50%			
More than 50% (by weight) smaller than No. 200 sieve						



YOSEMITE SLOUGH SEDIMENT SITE
SAN FRANCISCO, CA

GEOTECHNICAL DATA REPORT

UNIFIED SOIL CLASSIFICATION SYSTEM

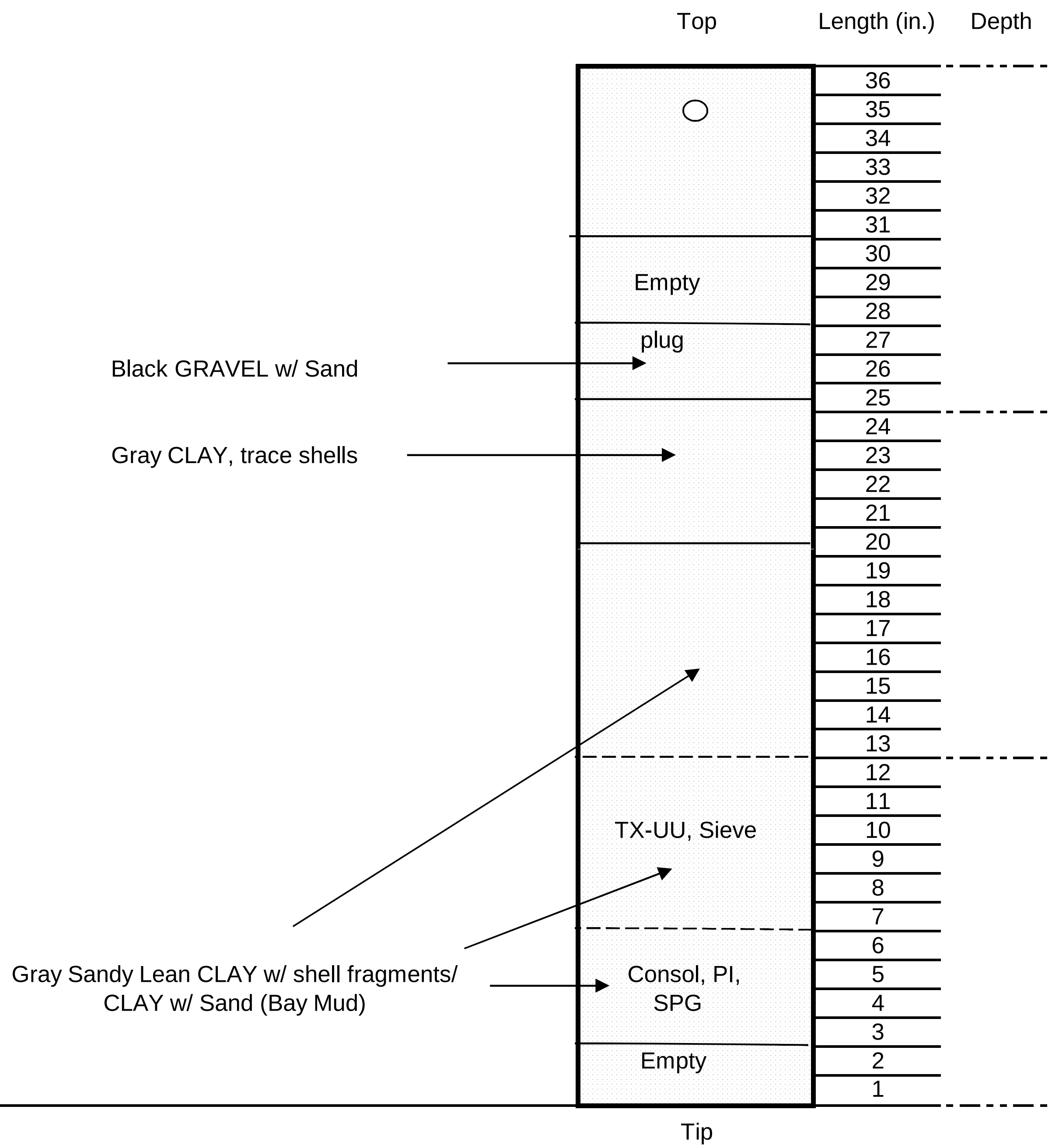
ARCADIS

FIGURE
C-1

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-01** Sample: **ST-01** Depth (ft.): **7-9**

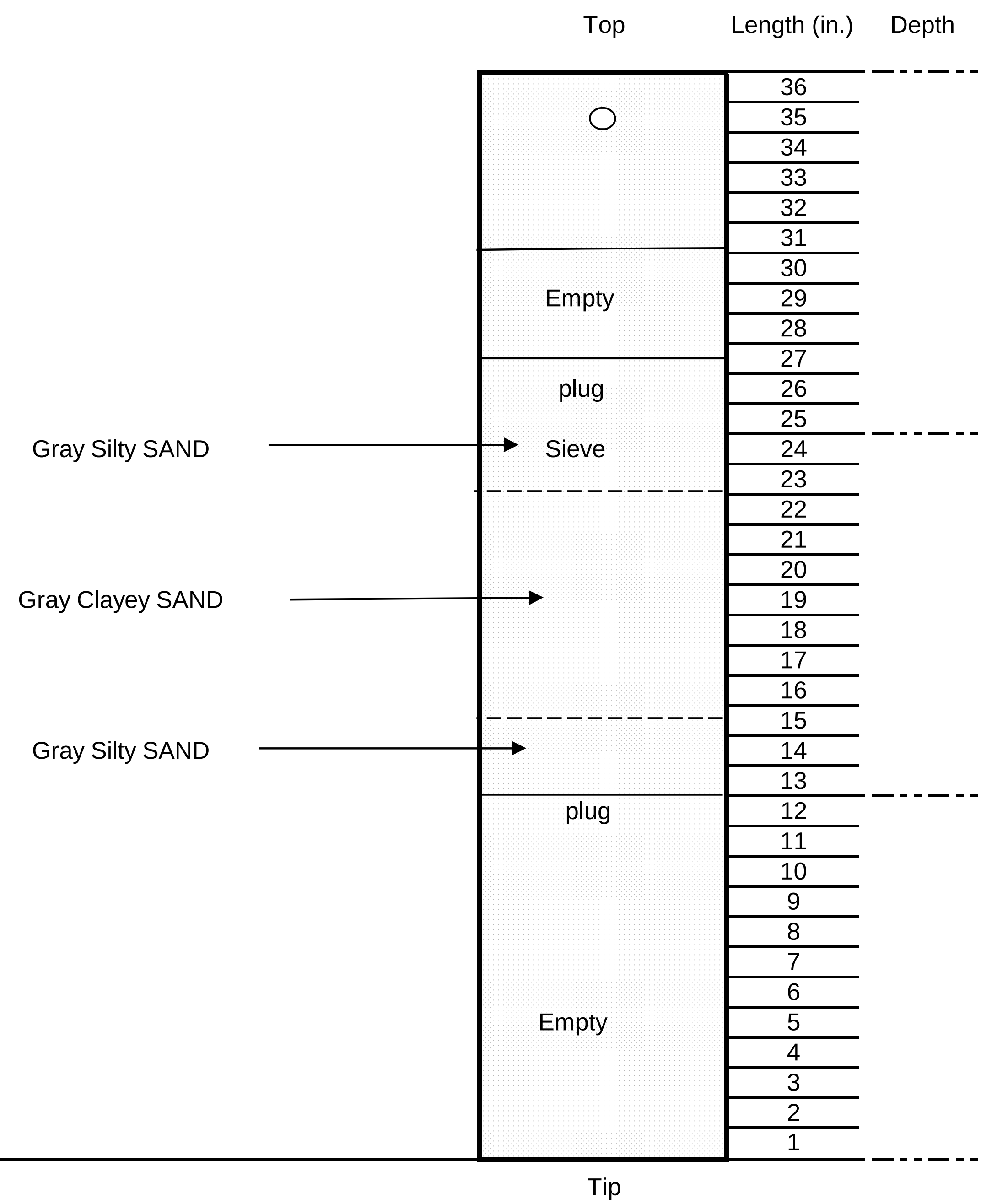


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-01** Sample: **ST-02** Depth (ft.): **12-14**

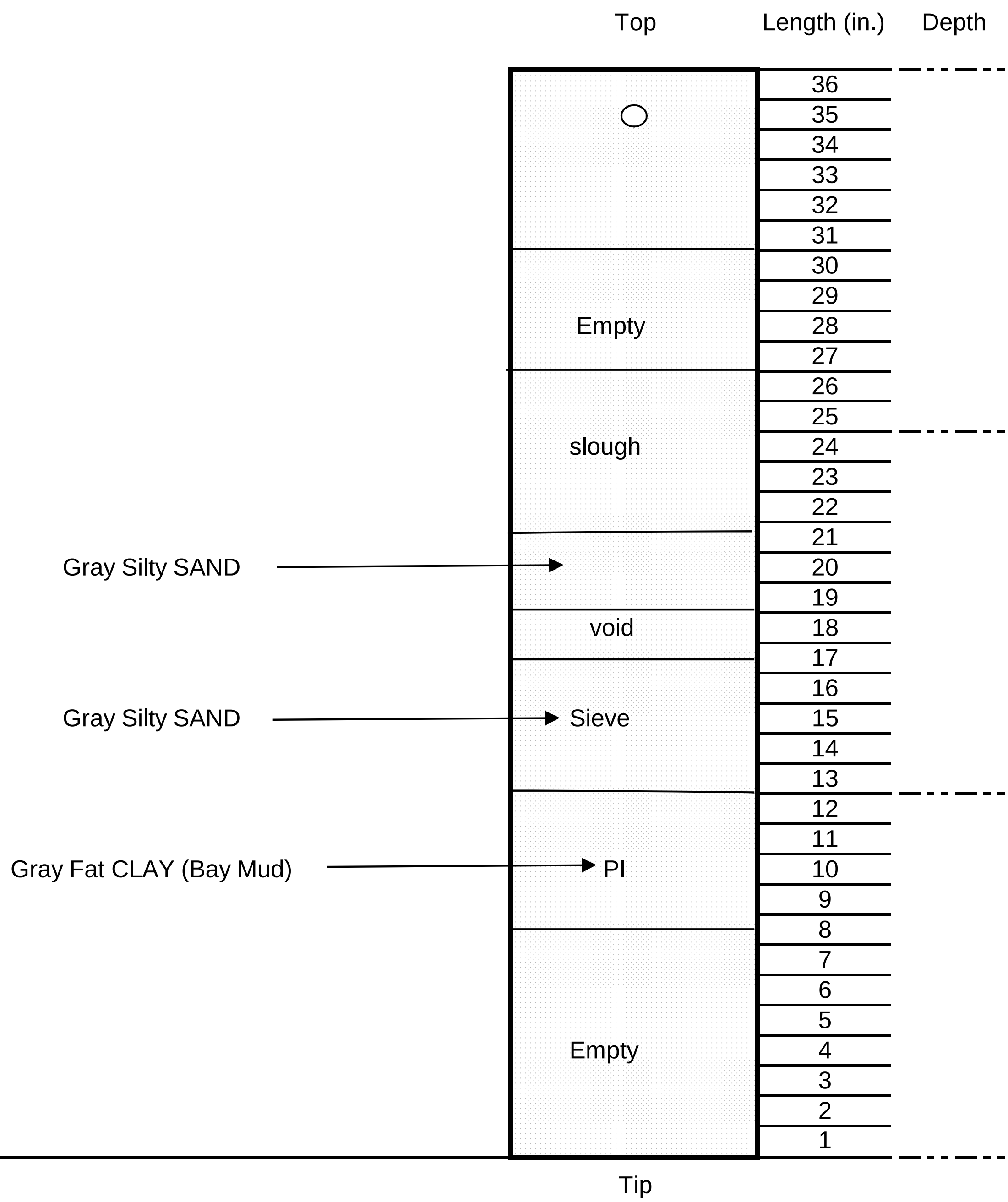


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-01** Sample: **ST-03** Depth (ft.): **17-19**

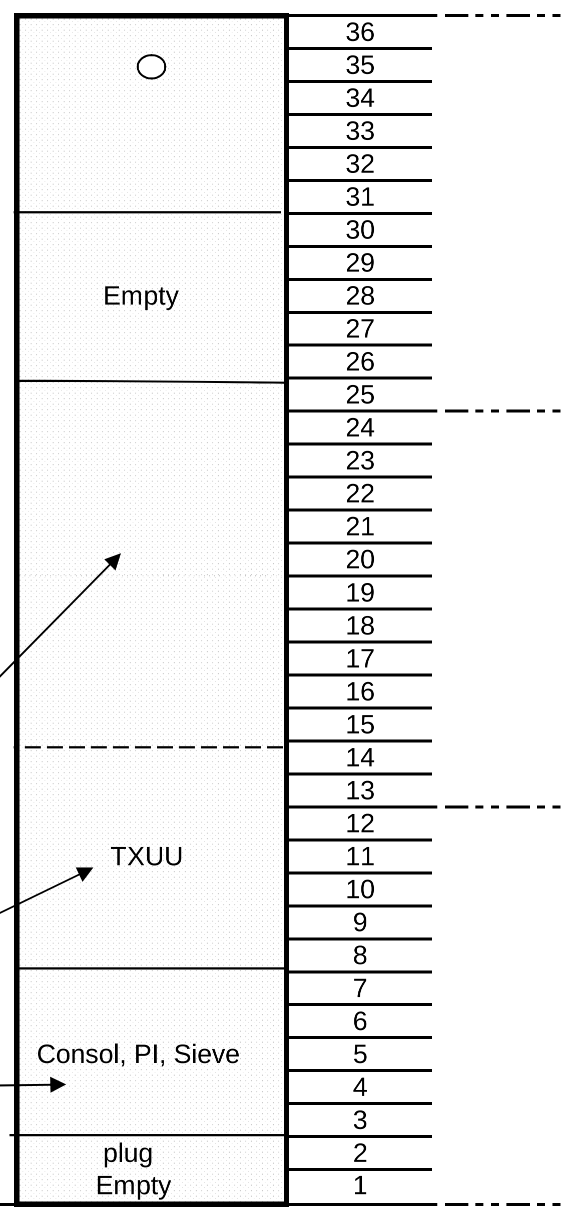


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.: 477-013
Date: 5/3/2012
Company Name: Arcadis
Run By: MD
Project Name: Yosemite Slough
Reduced By: RU
Project No.: B0002251.0001.00006
Boring: **AUS-B-01** Sample: **ST-04** Depth (ft.): **22-24**

Top | Length (in.) | Depth



Greenish Gray Elastic SILT w/ organics
(Bay Mud)

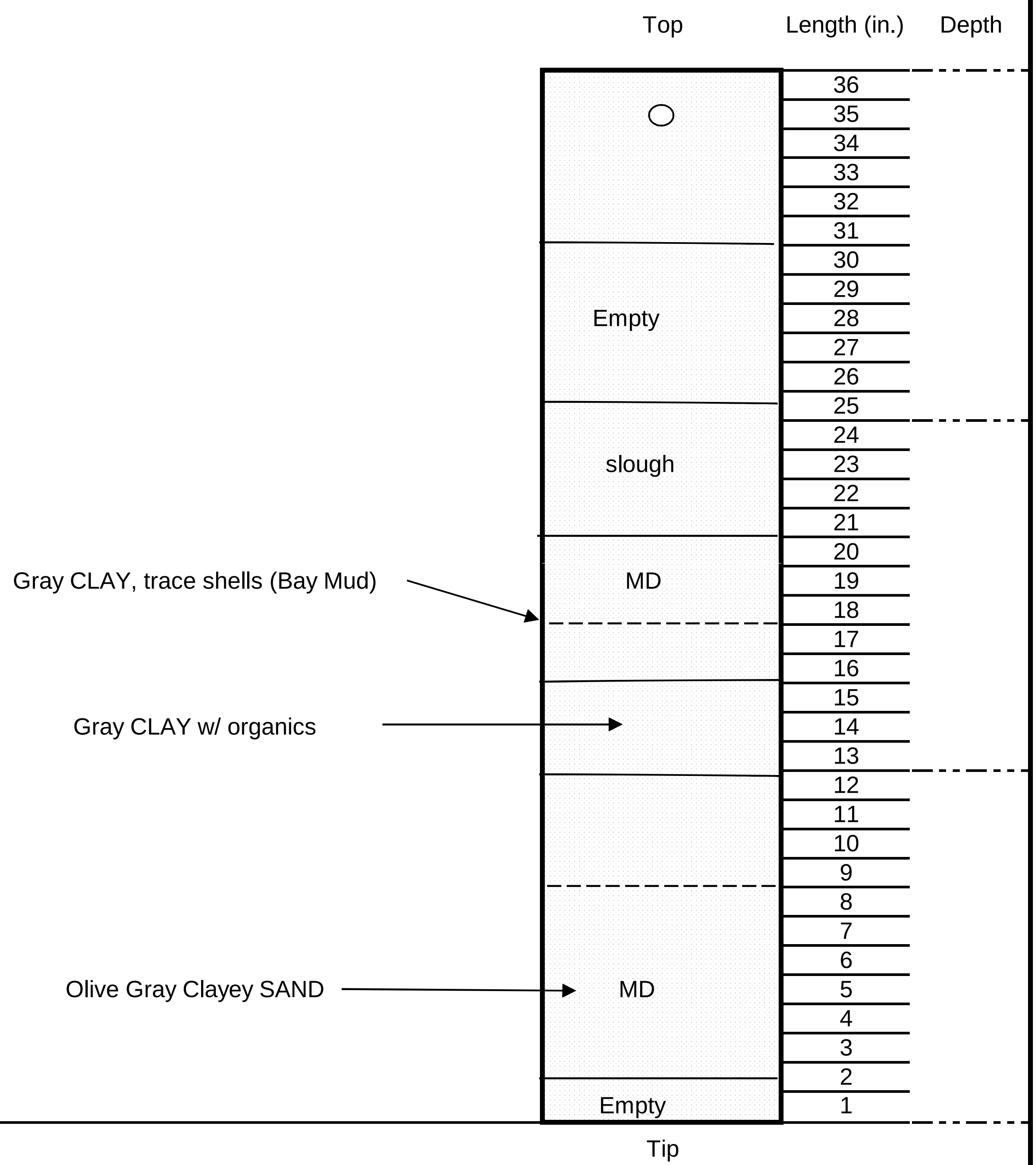
Tip

NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-01** Sample: **ST-03** Depth (ft.): **27-29**

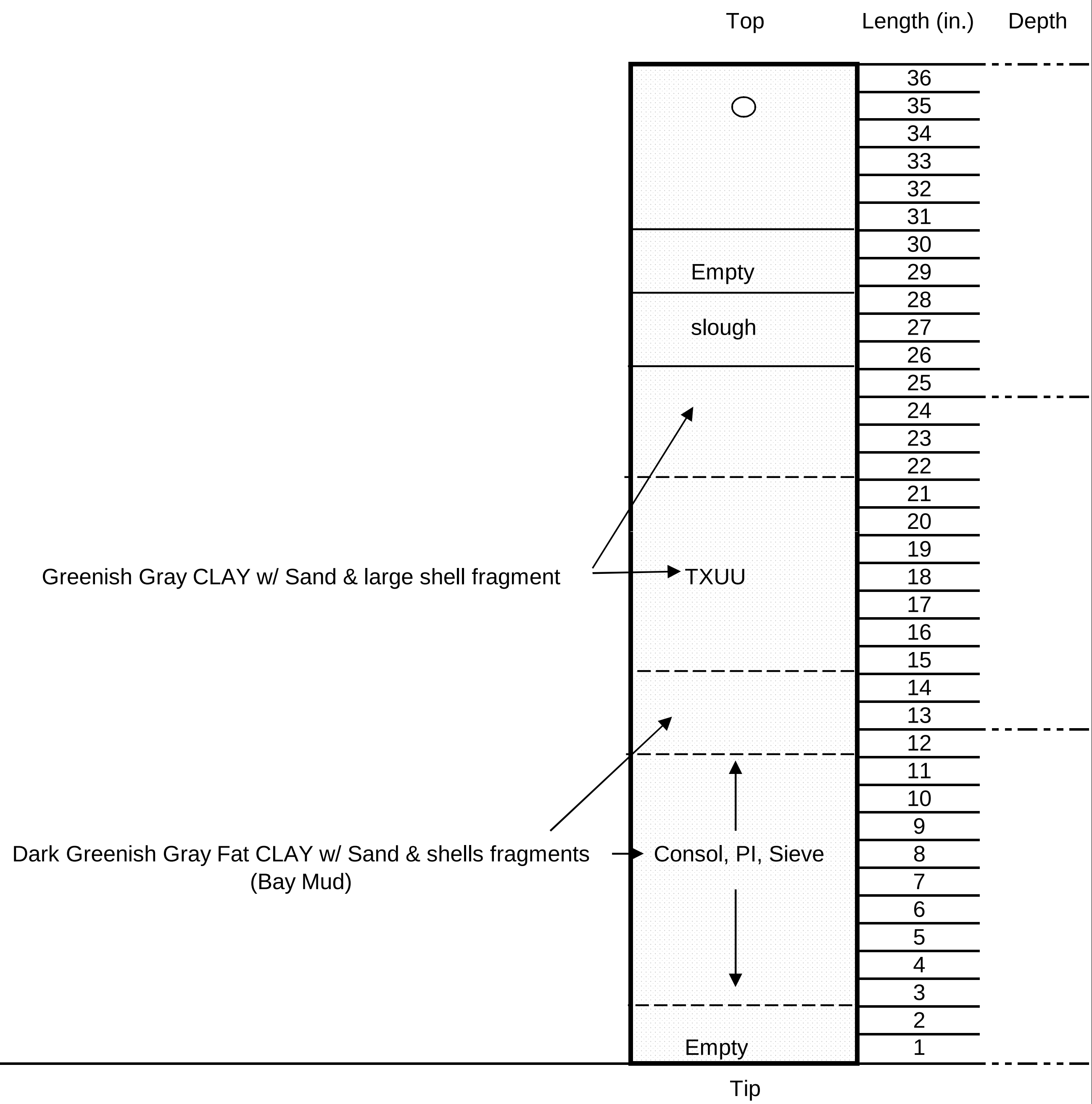


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-02** Sample: **ST-01** Depth (ft.): **7-9**

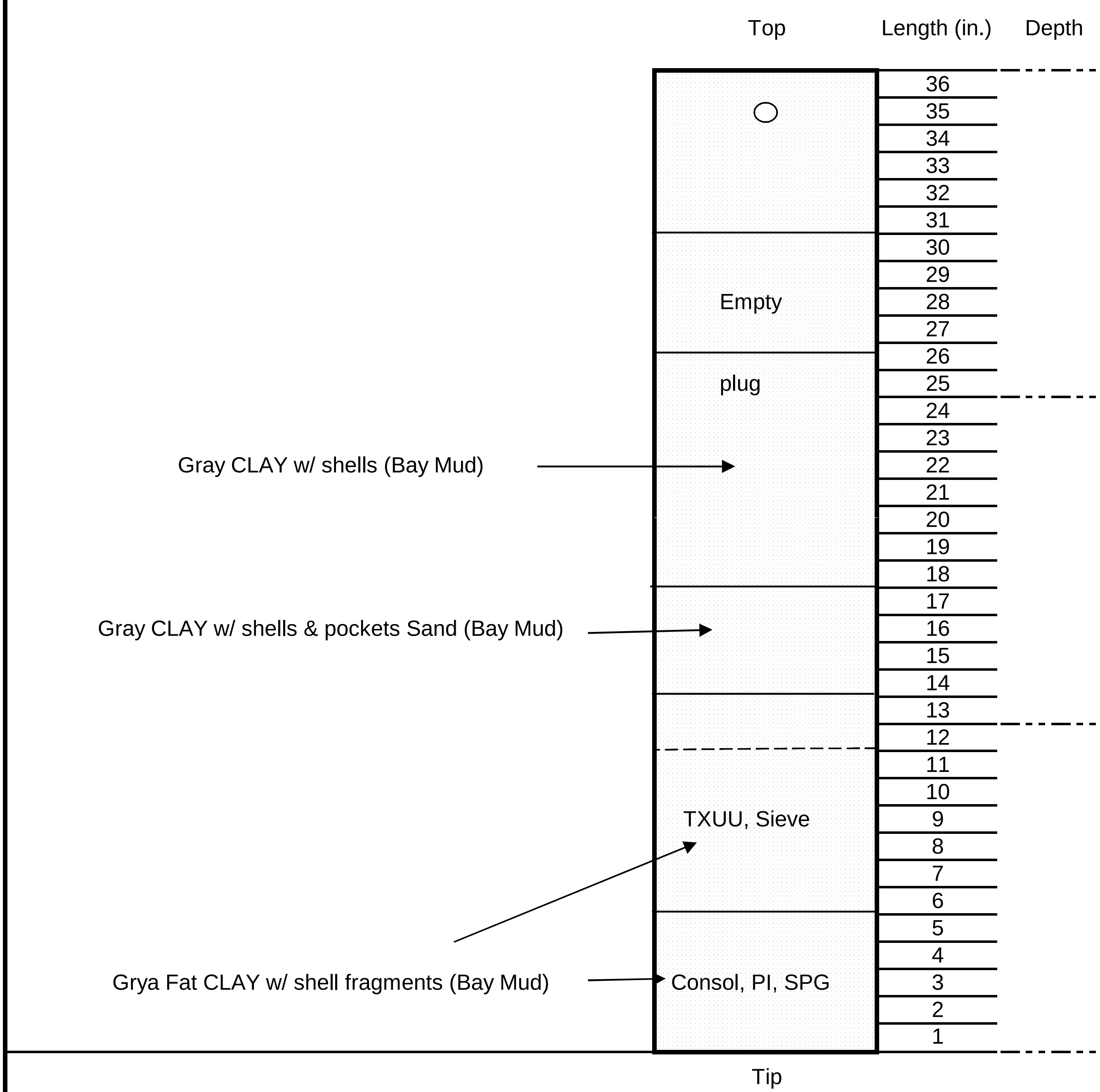


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube. Dashed lines indicate zones where listed tests were performed.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-02** Sample: **ST-02** Depth (ft.): **12-14**

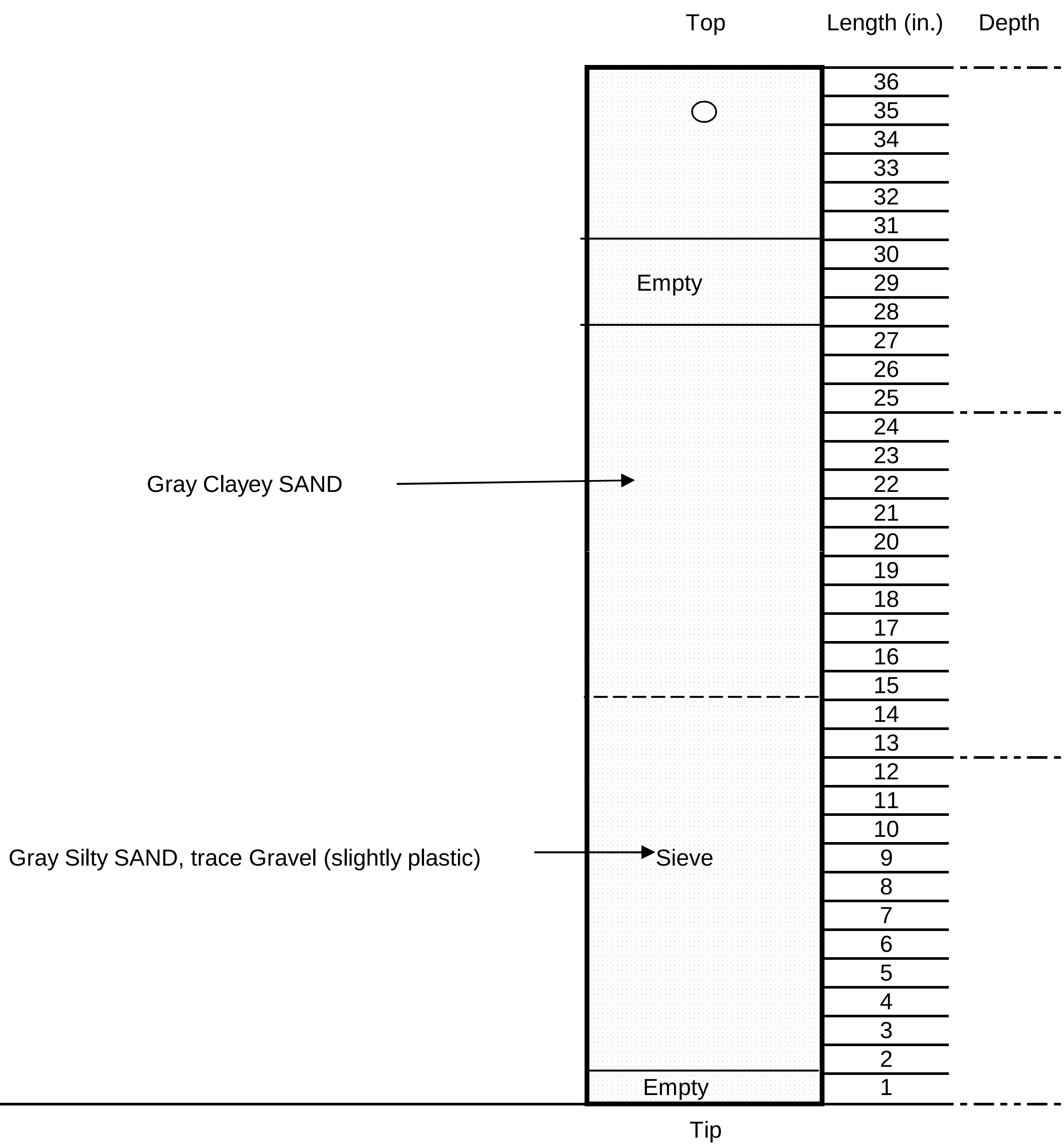


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-02** Sample: **ST-03** Depth (ft.): **17-19**



NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013		Date:	5/3/2012
Company Name:	Arcadis		Run By:	MD
Project Name:	Yosemite Slough		Reduced By:	RU
Project No.:	B0002251.0001.00006			
Boring:	**AUS-B-02**	Sample: **ST-04**	Depth (ft.):	**62-64**

Top	Length (in.)	Depth
○	36	
	35	
	34	
	33	
	32	
	31	
Empty	30	
	29	
	28	
	27	
	26	
	25	
	24	
	23	
	22	
	21	
	20	
	19	
	18	
slough	17	
	16	
	15	
	14	
	13	
	12	
	11	
	10	
	9	
	8	
MD, Sieve, PI	7	
	6	
	5	
	4	
	3	
	2	
	1	
Tip		

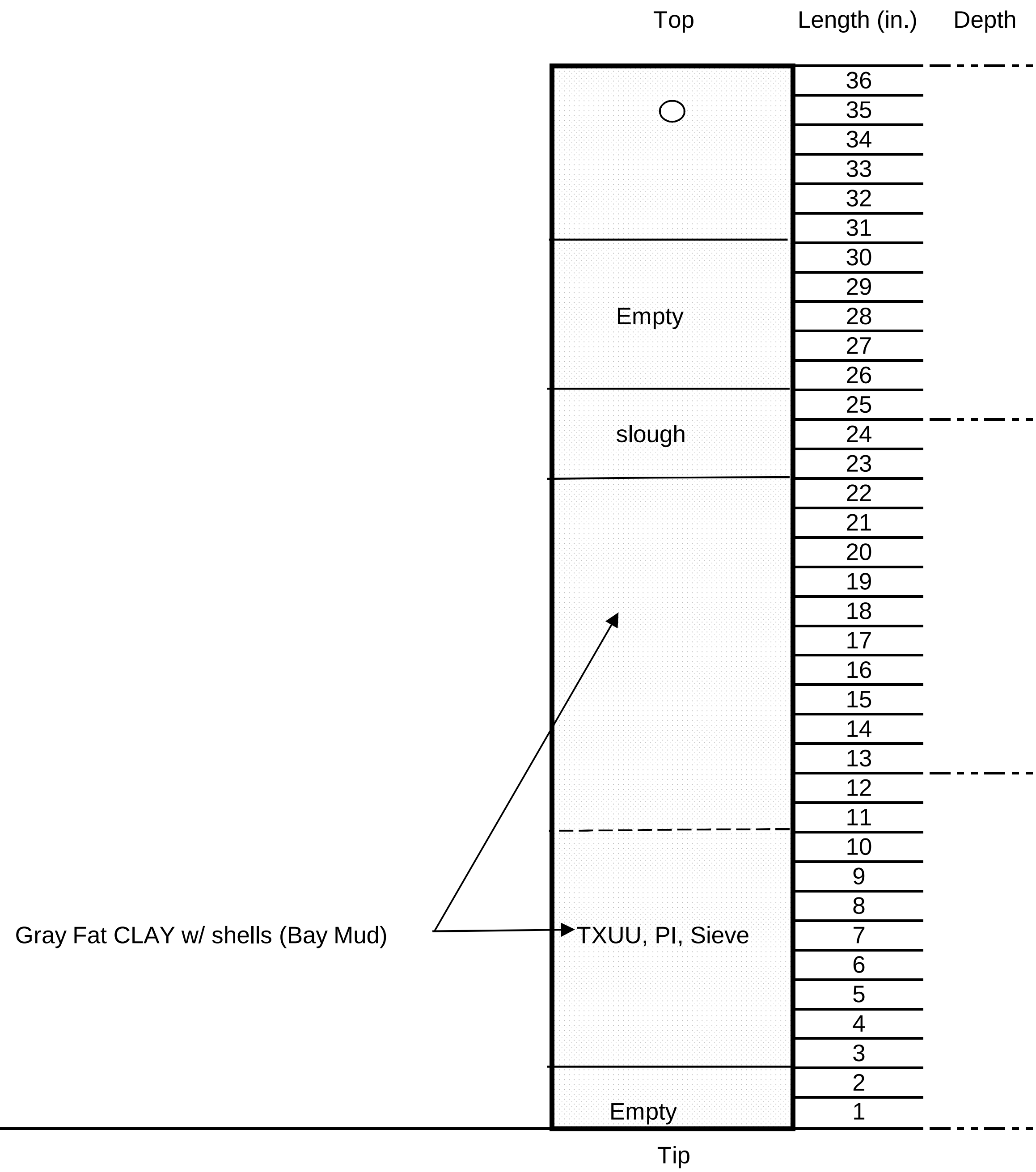
Gray Silty SAND → MD, Sieve, PI

NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-03** Sample: **ST-01** Depth (ft.): **7-9**

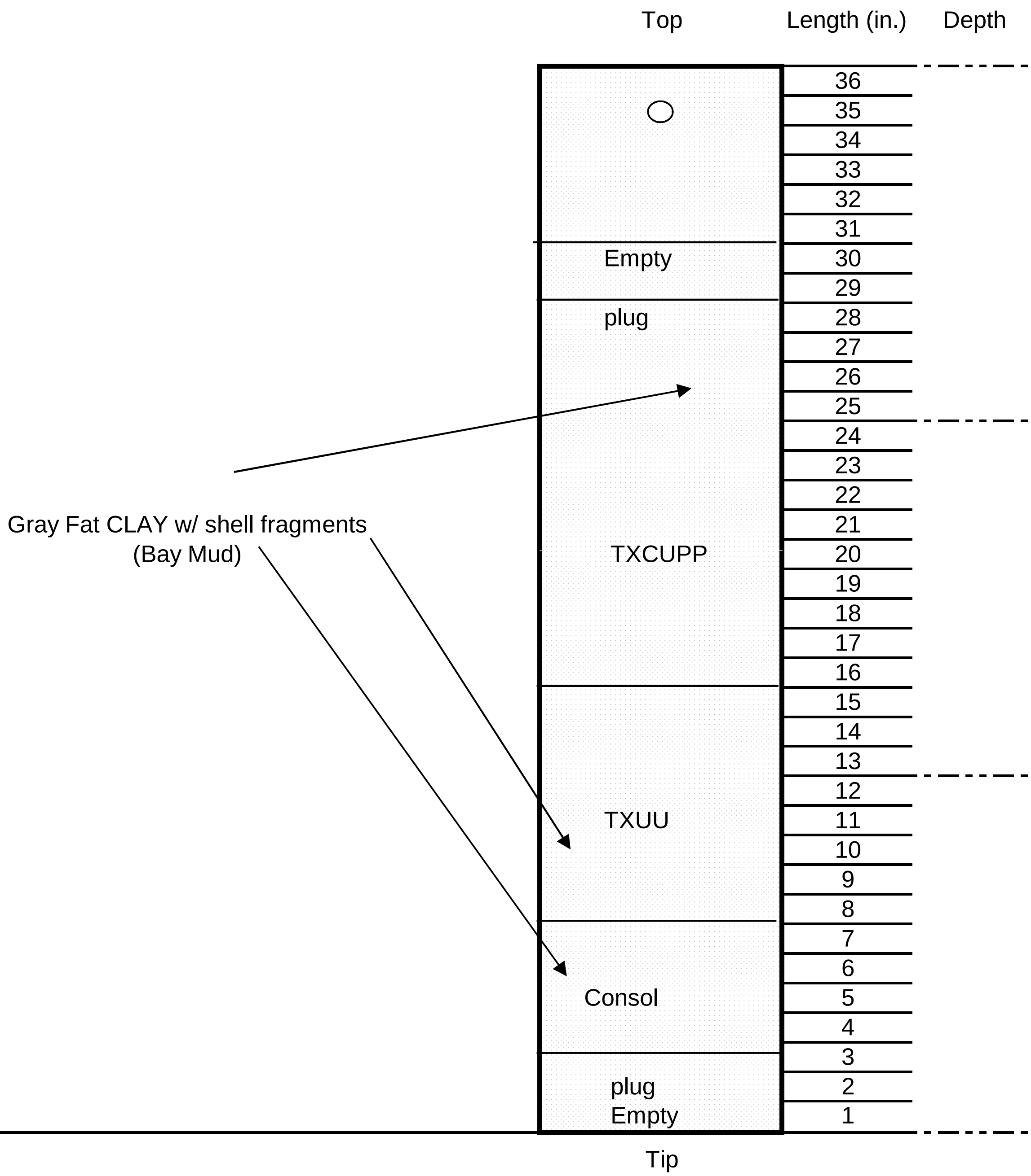


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/3/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

Boring: **AUS-B-03** Sample: **ST-02** Depth (ft.): **12-14.5**

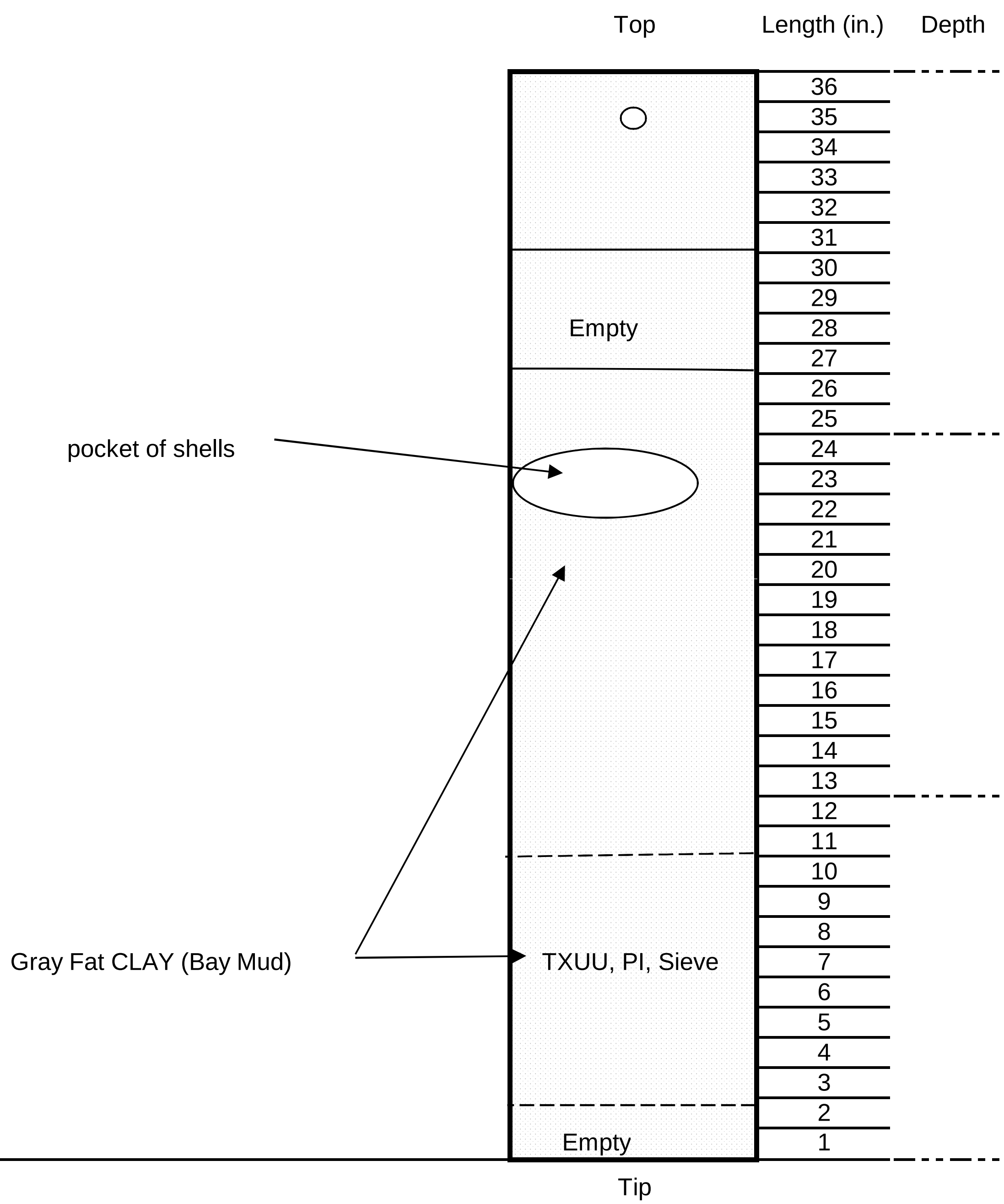


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.: 477-013
Company Name: Arcadis
Project Name: Yosemite Slough
Project No.: B0002251.0001.00006
Boring: **AUS-B-03** Sample: **ST-03** Depth (ft.): **17-19**

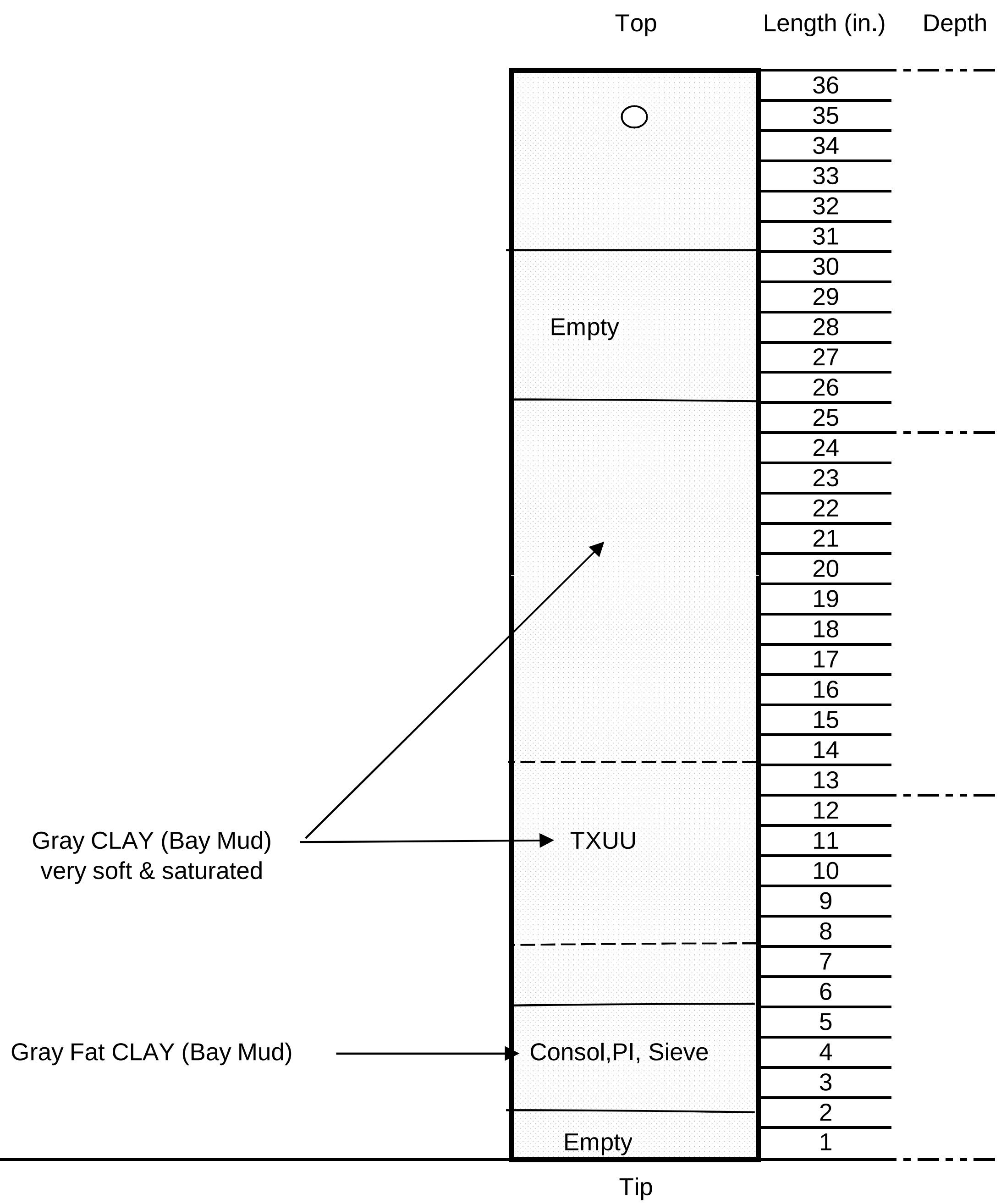
Date: 5/3/2012
Run By: MD
Reduced By: RU



NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube. Dashed lines indicate zones where listed tests were performed.

Log of Shelby Tube

CTL No.:	477-013		Date:	5/3/2012	
Company Name:	Arcadis		Run By:	MD	
Project Name:	Yosemite Slough		Reduced By:	RU	
Project No.:	B0002251.0001.00006				
Boring:	**AUS-B-03**	Sample:	**ST-04**	Depth (ft.):	**21-23**

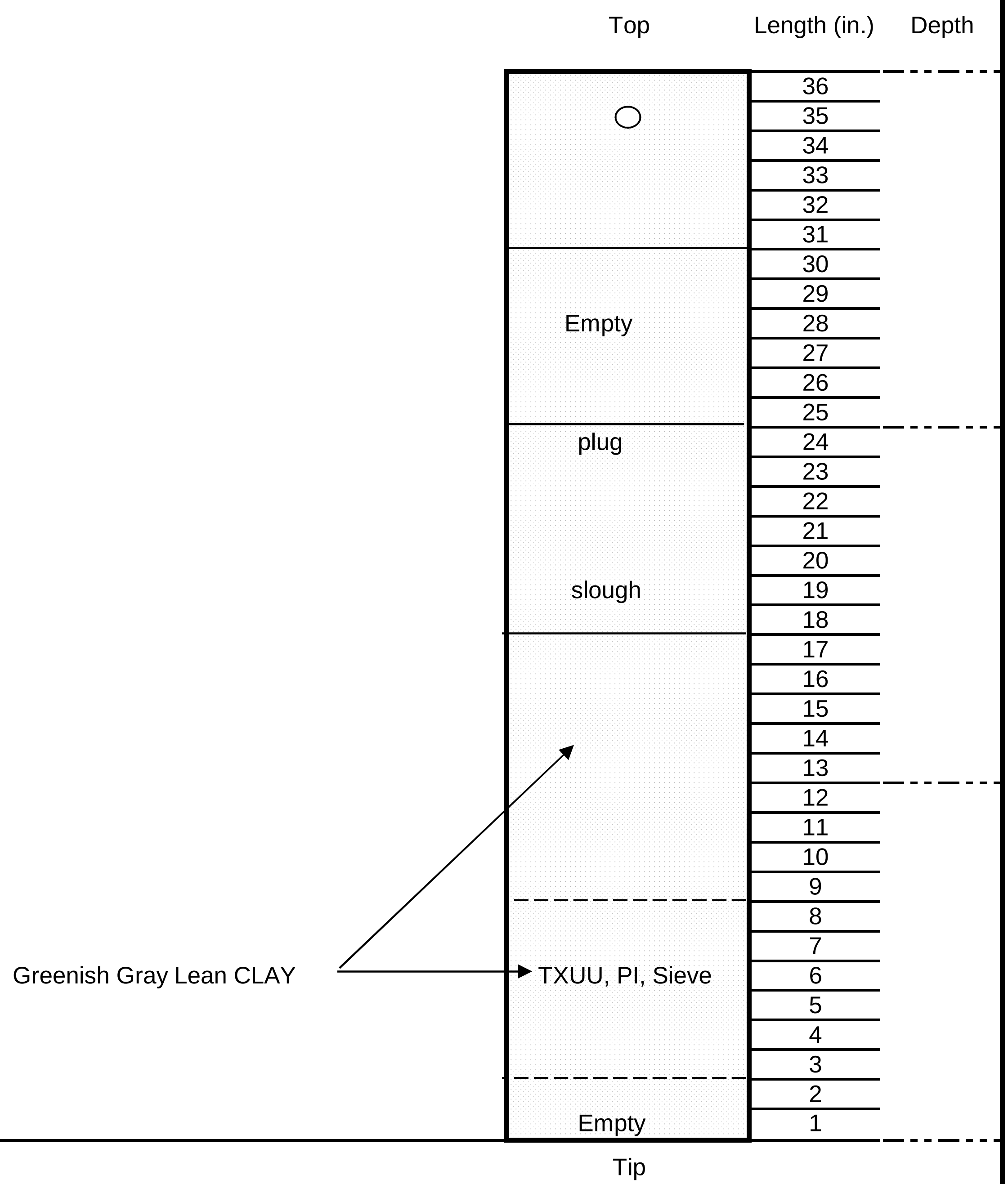


NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Log of Shelby Tube

CTL No.:	477-013	Date:	5/4/2012
Company Name:	Arcadis	Run By:	MD
Project Name:	Yosemite Slough	Reduced By:	RU
Project No.:	B0002251.0001.00006		

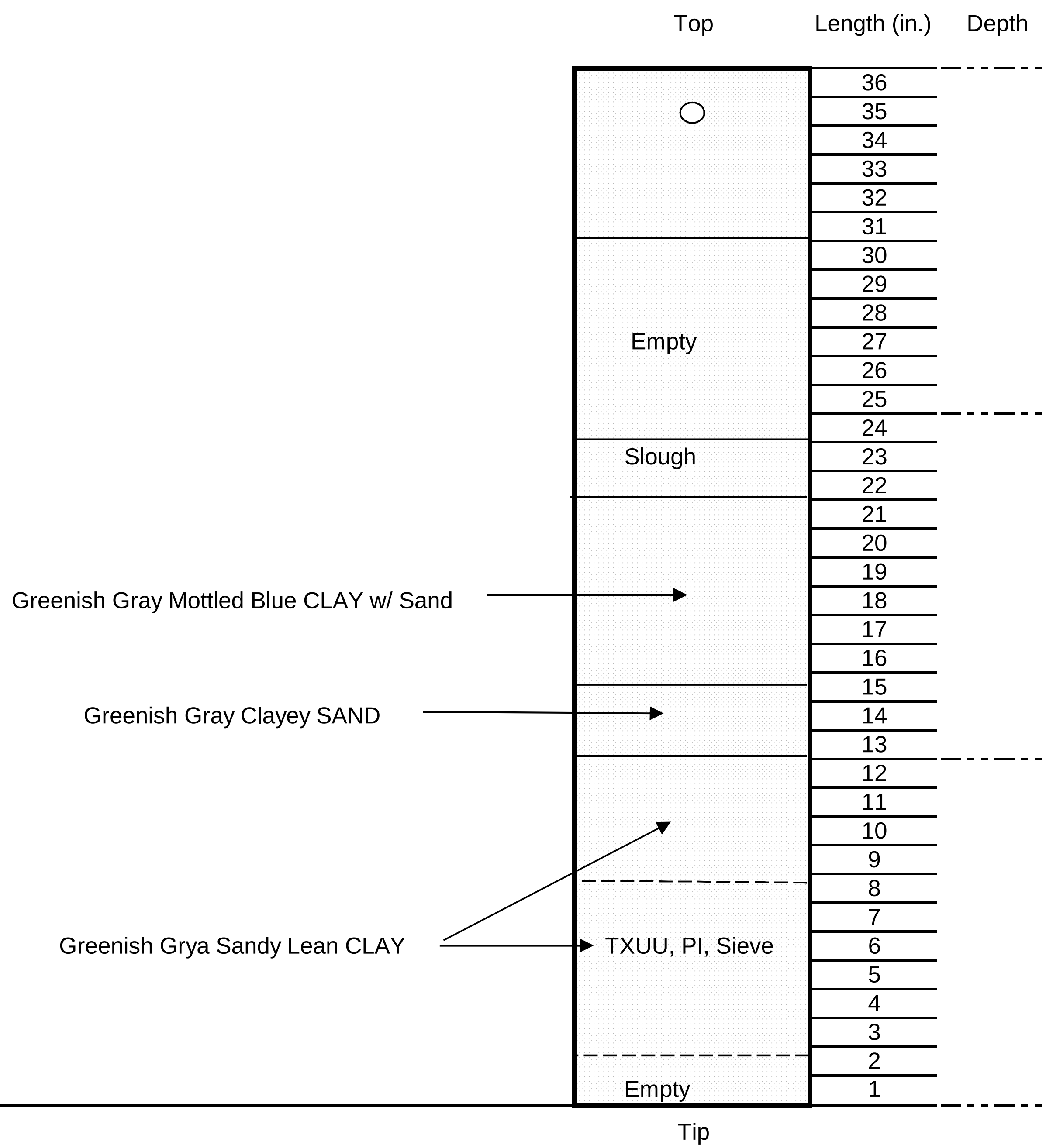
Boring: **AUS-B-03** Sample: **ST-06** Depth (ft.): **41-43.5**



NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

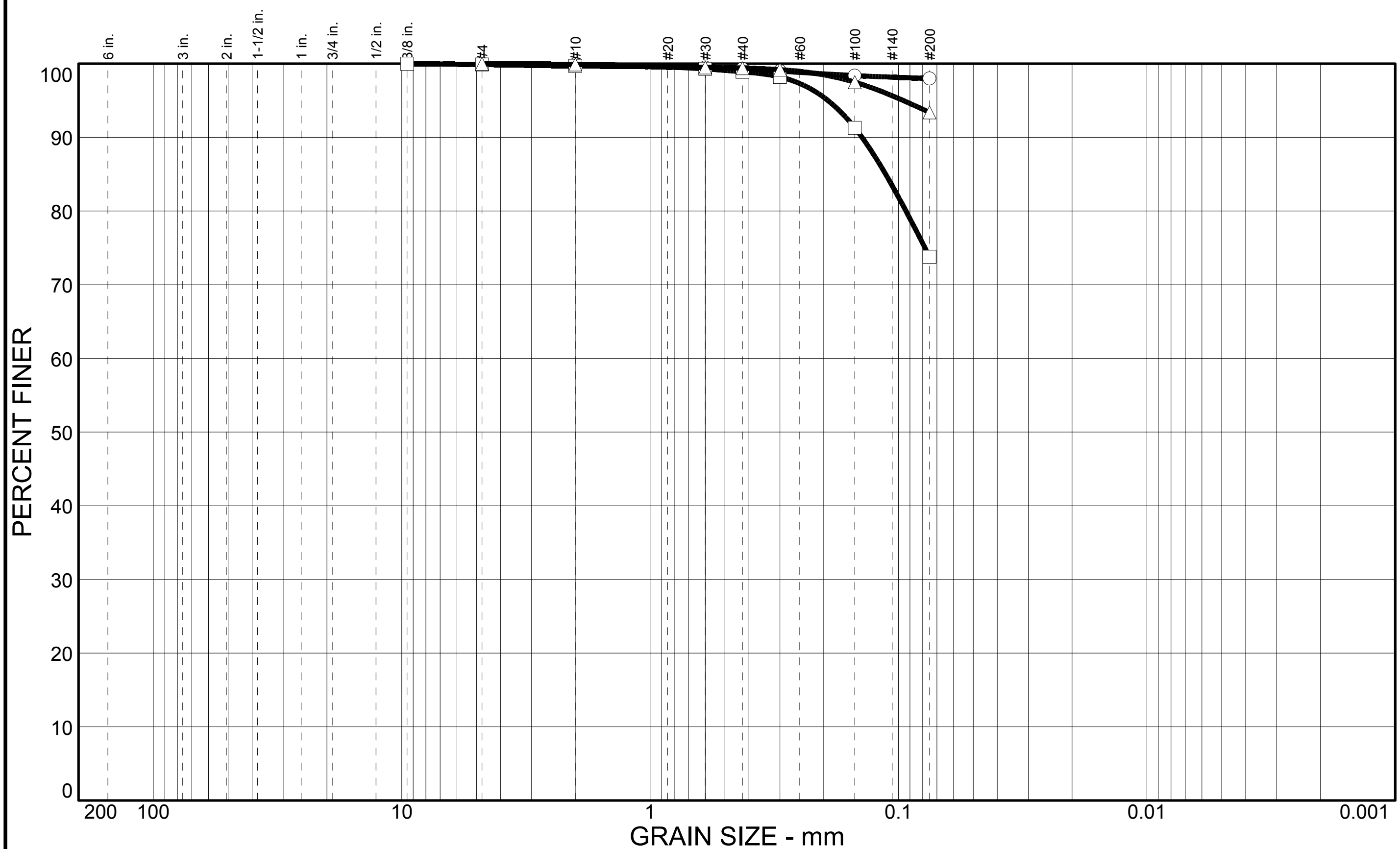
Log of Shelby Tube

CTL No.: 477-013
Date: 5/3/2012
Company Name: Arcadis
Run By: MD
Project Name: Yosemite Slough
Reduced By: RU
Project No.: B0002251.0001.00006
Boring: **AUS-B-03** Sample: **ST-07** Depth (ft.): **51.5-53**



NOTE: All descriptions are visual descriptions unless classification tests were performed on that portion of the tube.

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			2.0	98.0		MH		54.5	132.5
□		0.1	26.1	73.8		CH		30.6	72.2
△			6.6	93.4		CH		30.7	65.6

SIEVE inches size	PERCENT FINER ○	□	△
3/8"		100.0	

	GRAIN SIZE ○	□	△
D_{60}			
D_{30}			
D_{10}			

	COEFFICIENTS ○	□	△
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.9	100.0
#10	99.9	99.7	99.9
#30	99.5	99.3	99.5
#40	99.3	98.9	99.4
#50	99.0	98.2	99.2
#100	98.4	91.3	97.5
#200	98.0	73.8	93.4

SOIL DESCRIPTION

○ Greenish Gray Elastic SILT w/ organics (Bay Mud)

□ Dark Greenish Gray Fat CLAY w/ Sand & shell fragments (Bay Mud)

△ Gray Fat CLAY w/ shell fragments (Bay Mud)

REMARKS:

○

□

△

○ Source: AUS-B-01-22.0-24.0 Sample No.: ST-04 Elev./Depth: 22-24'

□ Source: AUS-B-02-7.0-9.0 Sample No.: ST-01 Elev./Depth: 7-9(Tip-11)

△ Source: AUS-B-02-12.0-14.0 Sample No.: ST-02 Elev./Depth: 12-14(Tip-5)

COOPER TESTING LABORATORY

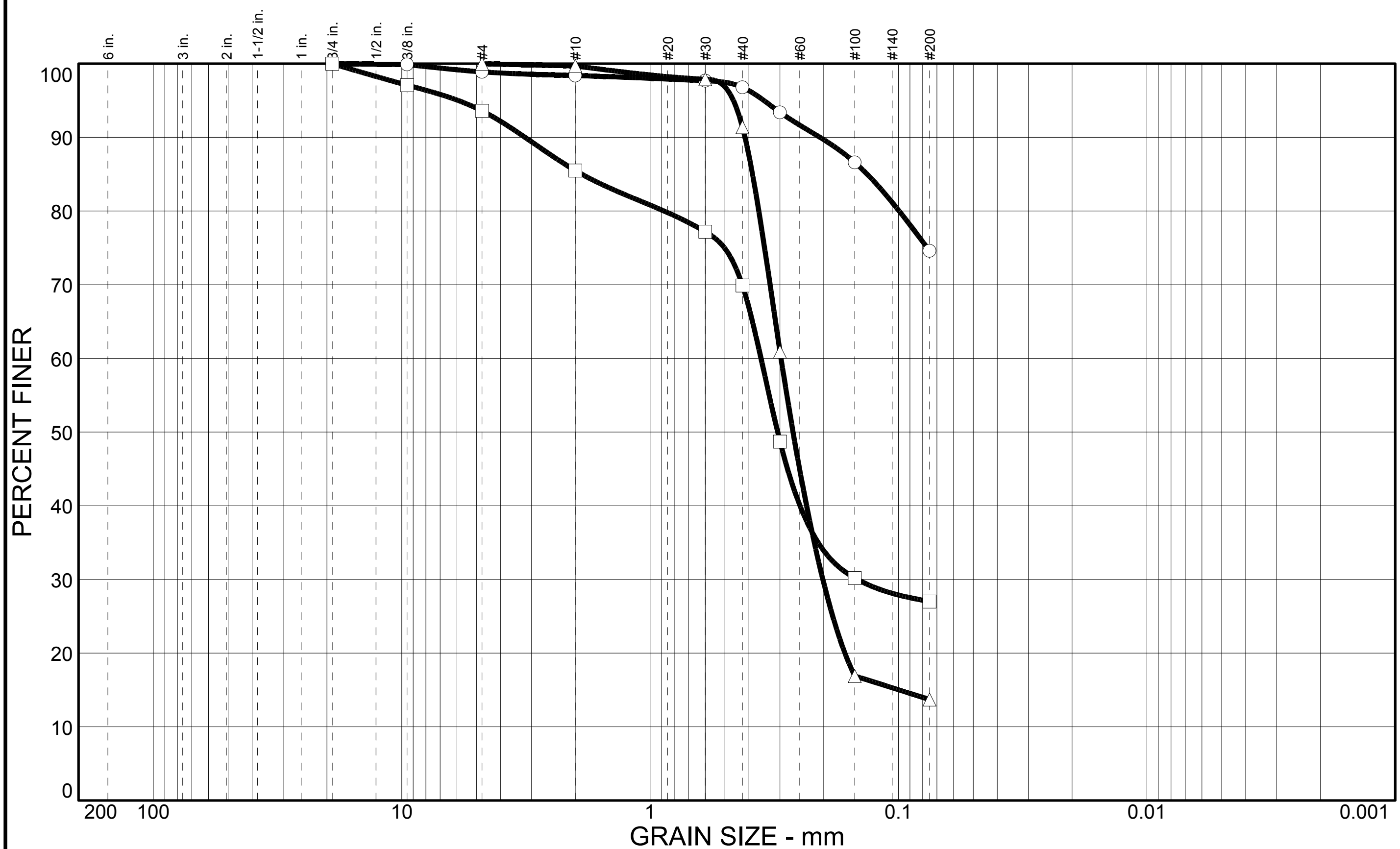
Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		1.1	24.3	74.6		CL		22.5	48.7
□		6.4	66.6	27.0					
△			86.3	13.7					

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	
3/8"	99.9	97.1	
GRAIN SIZE			
D_{60}		0.358	0.297
D_{30}		0.146	0.202
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	98.9	93.6	100.0
#10	98.4	85.5	99.7
#30	97.7	77.2	97.9
#40	96.8	69.9	91.4
#50	93.4	48.7	60.9
#100	86.6	30.2	16.9
#200	74.6	27.0	13.7

SOIL DESCRIPTION

○ Gray Lean CLAY w/ Sand (Bay Mud)

□ Gray Silty SAND

△ Gray Silty SAND

REMARKS:

○

□

△

○ Source: AUS-B-01-7.0-9.0 Sample No.: ST-01 Elev./Depth: 7-9(Tip-6)

□ Source: AUS-B-01-12.0-14.0 Sample No.: ST-02 Elev./Depth: 12-14(Tip-22)

△ Source: AUS-B-01-17.0-19.0 Sample No.: ST-03 Elev./Depth: 17-19(Tip-13)

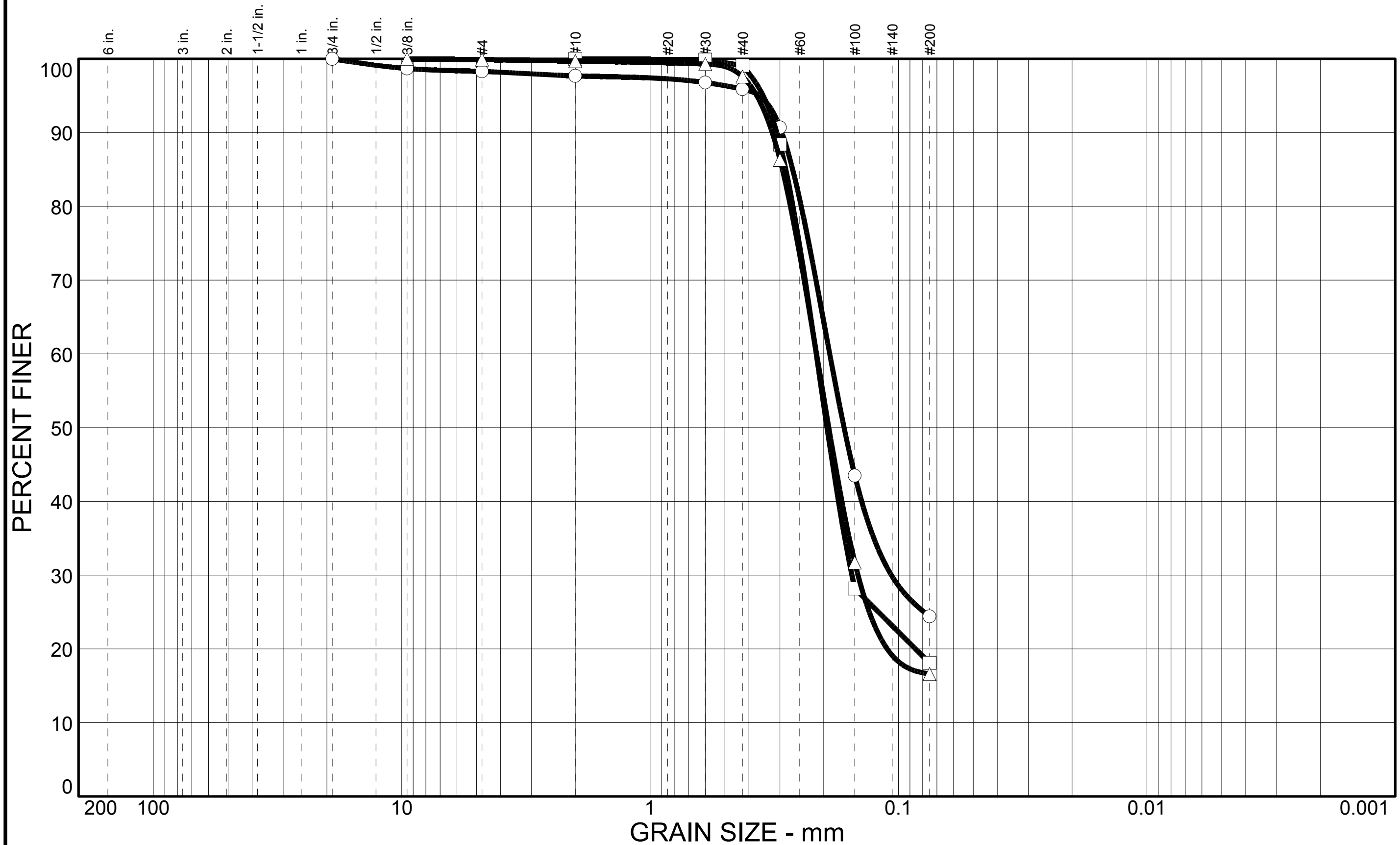
COOPER TESTING LABORATORY

Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013 Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		1.7	73.9	24.4					
□			81.9	18.1					
△		0.1	83.3	16.6					

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0		
3/8"	98.7		100.0
GRAIN SIZE			
D_{60}	0.189	0.215	0.214
D_{30}	0.107	0.154	0.146
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	98.3		99.9
#10	97.7	100.0	99.7
#30	96.8	99.9	99.3
#40	95.9	99.1	97.6
#50	90.7	88.4	86.3
#100	43.5	28.2	31.7
#200	24.4	18.1	16.6

SOIL DESCRIPTION

○ Gray Silty SAND

□ Brown Silty SAND

△ Grayish Brown Clayey SAND

REMARKS:

○

□

△

○ Source: AUS-B-02-17.0-19.0 Sample No.: ST-03 Elev./Depth: 17-19(Tip-14)

□ Source: AUS-B-02-30.0-32.0 Sample No.: SS-08 Elev./Depth: 30-32'

△ Source: AUS-B-02-45.0-47.0 Sample No.: SS-11 Elev./Depth: 45-47'

COOPER TESTING LABORATORY

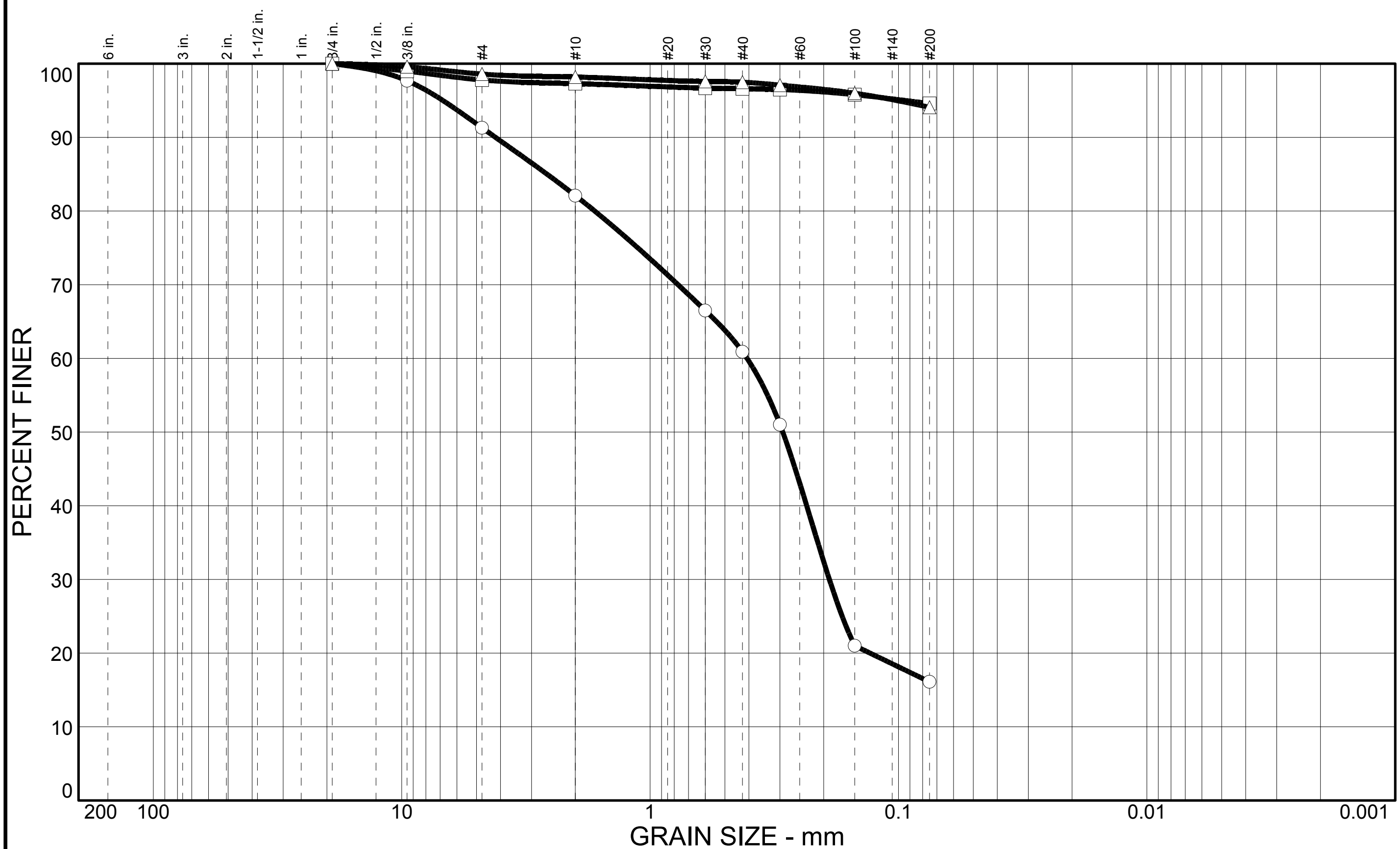
Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		8.7	75.2	16.1		SM		NP	
□		2.2	3.2	94.6		CH		27.7	64.2
△		1.4	4.5	94.1		CH		28.1	57.4

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100.0	100.0	100.0
3/8"	97.7	99.0	99.6

	GRAIN SIZE ○	□	△
D_{60}	0.407		
D_{30}	0.190		
D_{10}			

	COEFFICIENTS ○	□	△
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	91.3	97.8	98.6
#10	82.1	97.3	98.2
#30	66.5	96.7	97.6
#40	60.9	96.6	97.5
#50	51.0	96.5	97.1
#100	21.0	95.8	96.0
#200	16.1	94.6	94.1

SOIL DESCRIPTION

○ Gray Silty SAND

□ Gray Fat CLAY (Bay Mud)

△ Gray Fat CLAY w/ shell fragments (Bay Mud)

REMARKS:

○

□

△

○ Source: AUS-B-02-62.0-64.0 Sample No.: ST-04 Elev./Depth: 62-64'

□ Source: AUS-B-03-7.0-9.0 Sample No.: ST-01 Elev./Depth: 7-9'

△ Source: AUS-B-03-12.5-14.5 Sample No.: ST-02 Elev./Depth: 12.5-14.5(Tip-7)

COOPER TESTING LABORATORY

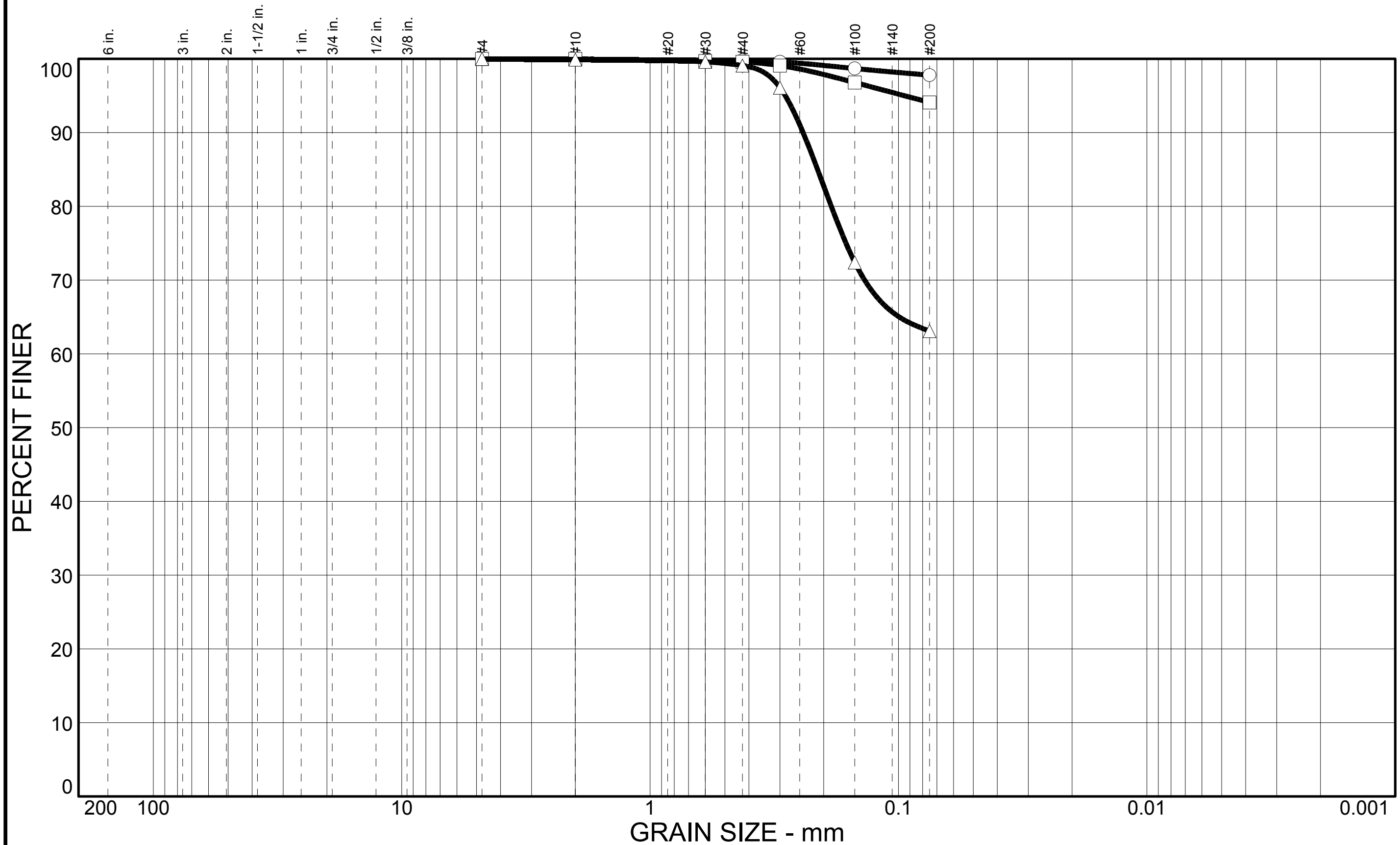
Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			2.2	97.8		CH		31.9	74.1
□			5.9	94.1		CH		27.7	65.1
△			36.9	63.1					

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}			
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	100.0	100.0
#10	99.9	100.0	99.9
#30	99.8	99.7	99.6
#40	99.8	99.6	99.1
#50	99.6	99.1	96.1
#100	98.7	96.8	72.4
#200	97.8	94.1	63.1

SOIL DESCRIPTION

○ Gray Fat CLAY (Bay Mud)

□ Gray Fat CLAY (Bay Mud)

△ Grayish Brown Sandy CLAY

REMARKS:

○

□

△

○ Source: AUS-B-03-17.0-19.0 Sample No.: ST-03 Elev./Depth: 17-19'

□ Source: AUS-B-03-21.0-23.0 Sample No.: ST-04 Elev./Depth: 21-23'

△ Source: AUS-B-03-35.0-36.5 Sample No.: SS-09 Elev./Depth: 35-36.5'

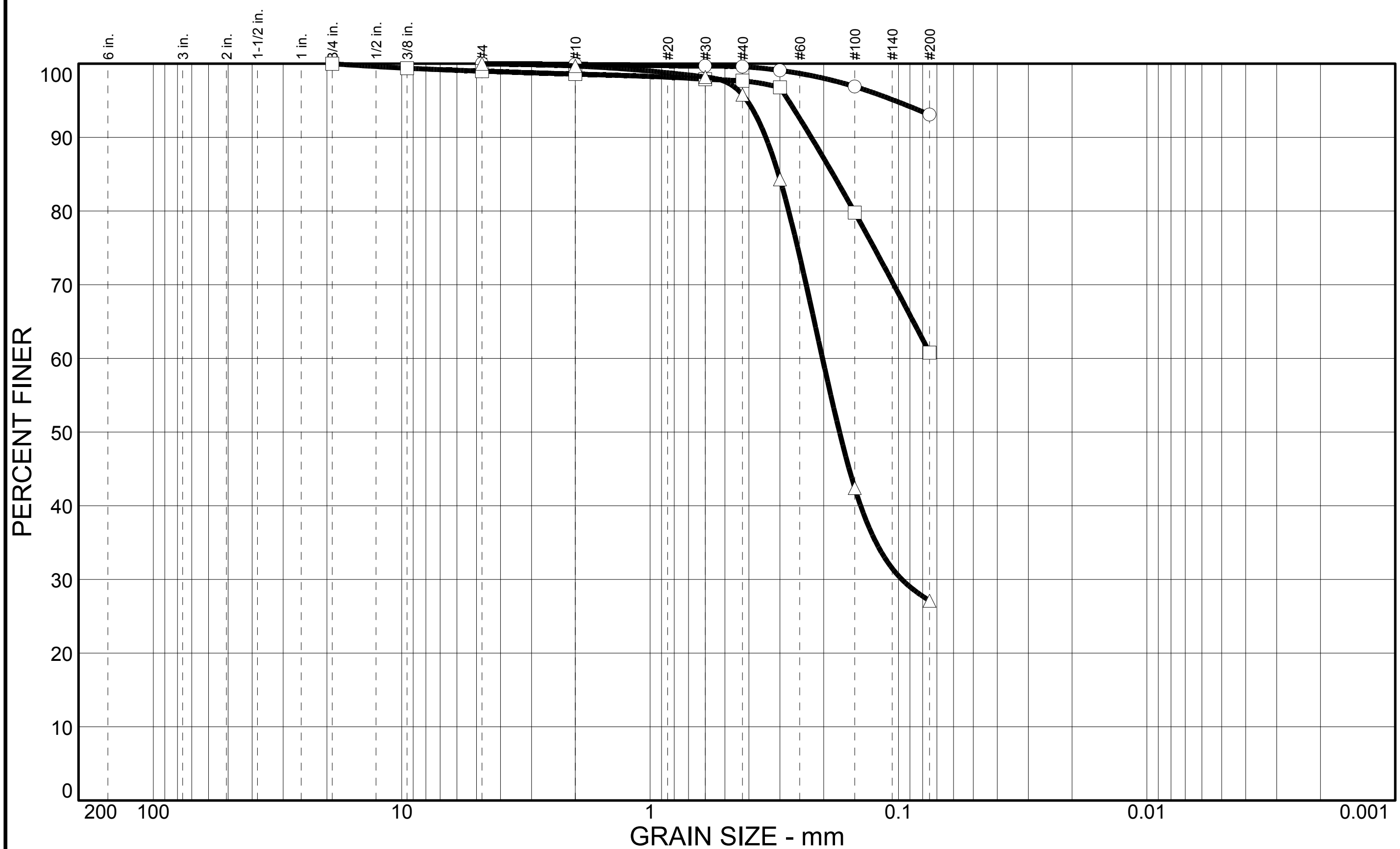
COOPER TESTING LABORATORY

Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013 Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			6.9	93.1		CL		19.4	46.9
□		1.0	38.2	60.8		CL		13.2	29.2
△			72.9	27.1					

SIEVE inches size	PERCENT FINER ○	□	△
3/4"		100.0	
3/8"		99.4	

	GRAIN SIZE		
D_{60}			0.202
D_{30}			0.0970
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	99.0	100.0
#10	99.9	98.6	99.7
#30	99.7	97.9	98.2
#40	99.6	97.7	95.8
#50	99.1	96.8	84.3
#100	96.9	79.8	42.4
#200	93.1	60.8	27.1

SOIL DESCRIPTION

○ Greenish Gray Lean CLAY

□ Greenish Gray Sandy Lean CLAY

△ Gray Silty SAND (slightly plastic)

REMARKS:

○

□

△

○ Source: AUS-B-03-41.5-43.5 Sample No.: ST-06 Elev./Depth: 41.5-43.5'

□ Source: AUS-B-03-51.5-53.5 Sample No.: ST-07 Elev./Depth: 51.5-53.5'

△ Source: AUS-B-04-1.5-2.0 Sample No.: SS-01 Elev./Depth: 0-2'

COOPER TESTING LABORATORY

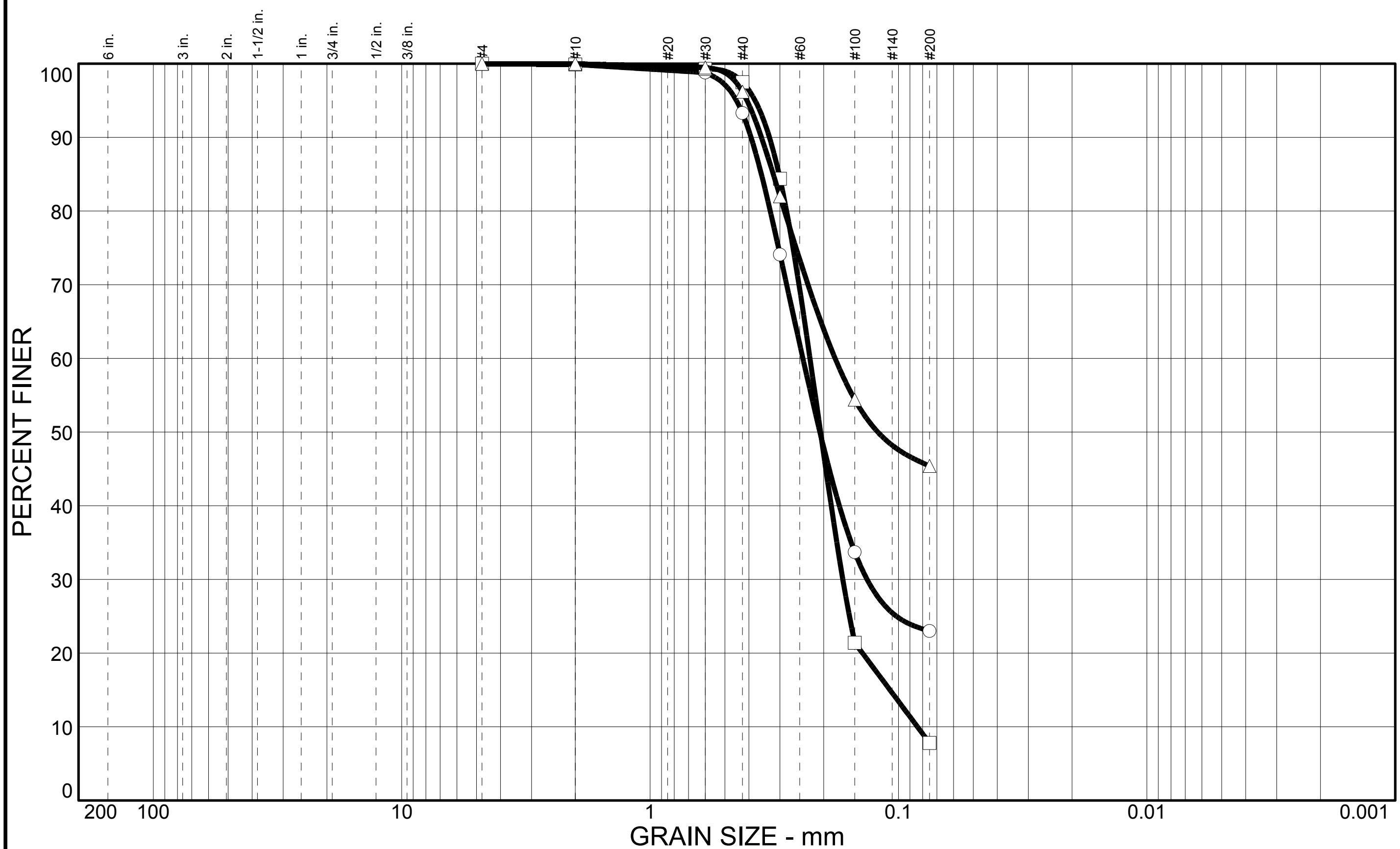
Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○			77.0	23.0					
□			92.2	7.8		SP-SM			
△			54.6	45.4					

SIEVE inches size	PERCENT FINER ○	□	△
GRAIN SIZE			
D_{60}	0.243	0.227	0.180
D_{30}	0.134	0.168	
D_{10}		0.0839	
COEFFICIENTS			
C_c		1.47	
C_u		2.71	

SIEVE number size	PERCENT FINER ○	□	△
#4	100.0	100.0	100.0
#10	99.9	99.9	100.0
#30	98.8	99.3	99.5
#40	93.3	97.5	96.2
#50	74.1	84.4	82.0
#100	33.7	21.4	54.4
#200	23.0	7.8	45.4

SOIL DESCRIPTION

○ Dark Olive Gray Clayey SAND

□ Grayish Brown Poorly Graded SAND w/ Silt

△ Olive Gray Clayey SAND

REMARKS:

○

□

△

○ Source: AUS-B-04-25.0-27.0 Sample No.: SS-06 Elev./Depth: 25-27'

□ Source: AUS-B-04-50.0-51.5 Sample No.: SS-11 Elev./Depth: 50-51.5'

△ Source: AUS-B-06-25.1-26.0 Sample No.: SS-06 Elev./Depth: 25.1-26'

COOPER TESTING LABORATORY

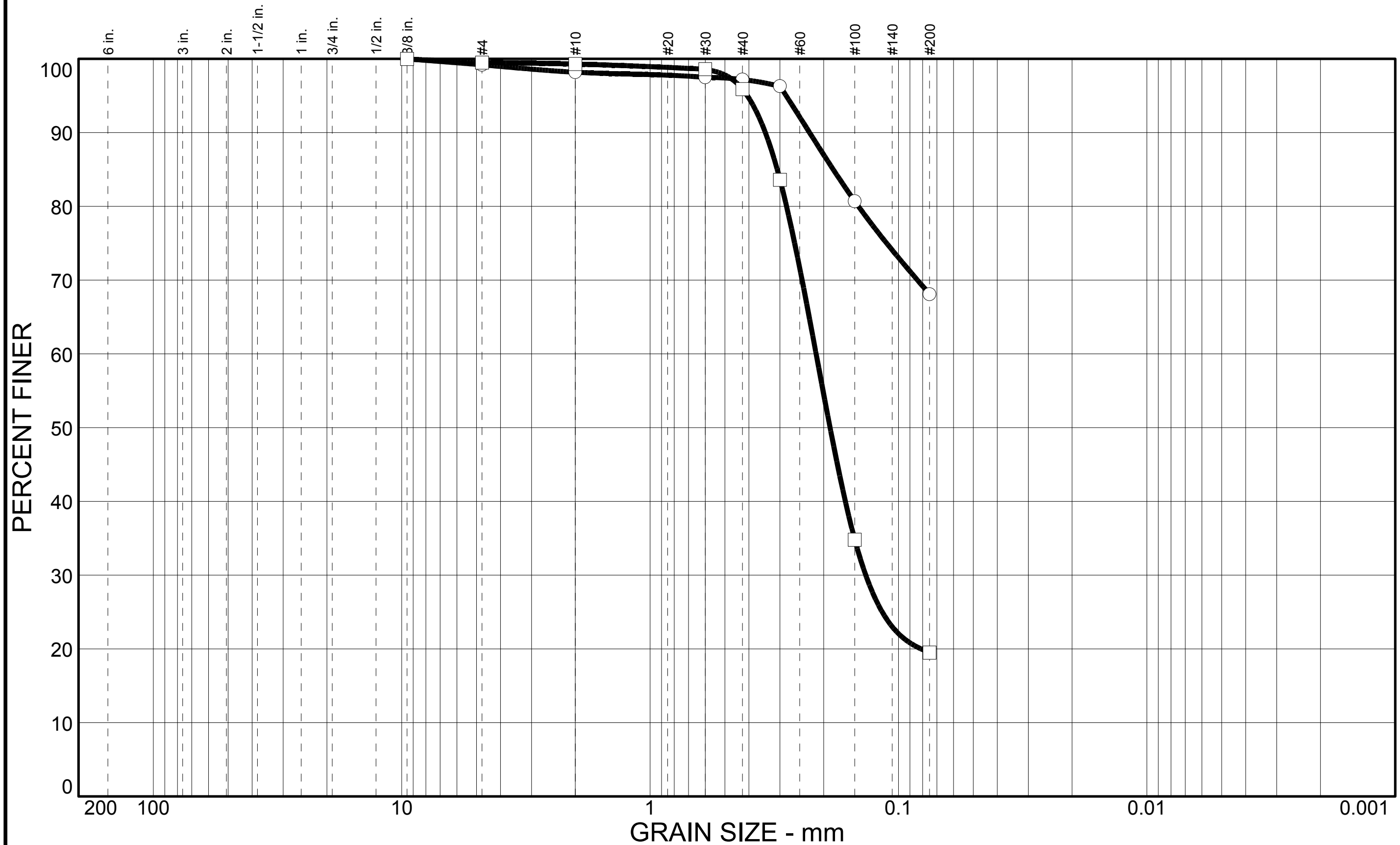
Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013

Figure

Particle Size Distribution Report



	% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.8	31.1	68.1		CL		15.6	33.6
□		0.5	80.0	19.5					

SIEVE inches size	PERCENT FINER ○	□	
3/8"	100.0	100.0	
	GRAIN SIZE		
D_{60}		0.215	
D_{30}		0.136	
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	
#4	99.2	99.5	
#10	98.2	99.3	
#30	97.5	98.6	
#40	97.2	95.9	
#50	96.3	83.6	
#100	80.7	34.8	
#200	68.1	19.5	

SOIL DESCRIPTION

○ Very Dark Greenish Gray Sandy Lean CLAY

□ Mottled Grayish Brown Clayey SAND

REMARKS:

○

□

○ Source: AUS-B-06-65.0-66.5 Sample No.: SS-14 Elev./Depth: 65-67'

□ Source: AUS-B-01-40.0-42.0 Sample No.: SS-08 Elev./Depth: 40-42'

COOPER TESTING LABORATORY

Client: Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

Project No.: 477-013 Figure

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No:	477-013	**Project No.**	B0002251.0001.00006	**By:**	RU
Client:	Arcadis	**Date:**	05/02/12		
Project Name:	Yosemite Slough Sediment Site	**Remarks:**	AUS-B-01-ST-03 @ 17-19' - sample disturbed m/c only.		

Boring:	AUS-B-01-ST-03	AUS-B-01-ST-03	AUS-B-01B-ST-03	AUS-B-02-ST-04				
Sample:								
Depth, ft:	27-29(Tip-2")	27-29(Tip17")	17-19	62-64				
Visual Description:	Olive Gray Clayey SAND	Gray CLAY, trace shells (Bay Mud)	Gray Fat Clayey SAND (Bay Mud)	Gray Silty SAND				
Actual G_s								
Assumed G_s	2.70	2.70	2.70	2.70				
Moisture, %	21.5	95.8	97.6	21.9				
Wet Unit wt, pcf	128.7	90.6	88.5	127.6				
Dry Unit wt, pcf	105.9	46.3	44.8	104.6				
Dry Bulk Dens.pb, (g/cc)	1.70	0.74	0.72	1.68				
Saturation, %	98.0	97.8	95.3	96.7				
Total Porosity, %	37.2	72.6	73.5	38.0				
Volumetric Water Cont, θ_w	36.5	71.0	70.0	36.8				
Volumetric Air Cont., θ_a	0.7	1.6	3.5	1.2				
Void Ratio	0.59	2.65	2.77	0.61				
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered approximate.

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013a **Project No.** B0002251.0001.00006 **By:** RU

Client: Arcadis **Date:** 04/23/12

Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-01/AUSV-01							
Sample ID:	AUS-B-01-0.0-2.0	AUS-B-01-10.0-12.0	AUS-B-01-25.0-26.2	AUS-B-01-26.4-27.0	AUS-B-01-30.0-31.8	AUS-B-01-40.0-42.0	AUS-B-01-50.0-52.0	AUS-B-01-55.0-55.9
Sample No.:	SS-01	SS-03	SS-05	SS-05	SS-06	SS-08	SS-10	SS-11
Depth, ft:	0-2	10-12	25-27	25-27	30-32	40-42	50-52	55-56.5
Visual Description:	Dark Gray CLAY w/ Sand	Gray SAND w/ shells	Gray CLAY	Black Clayey SAND	Brown Clayey SAND	Mottled Grayish Brown Clayey SAND	Gray Silty SAND	Greenish Gray Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	95.3	13.7	95.1	27.5	25.3	18.3	19.5	17.9
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013b **Project No.** B0002251.0001.00006 **By:** RU

Client: Arcadis **Date:** 04/23/12

Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-01/AUSV-01							
Sample ID:	AUS-B-01-55.9-56.5	AUS-B-01-60.0-61.8	AUS-B-01-65.0-66.7	AUS-B-01-70.0-72.0	AUS-B-01-75.0-75.7	AUS-B-01-75.7-70.0	AUS-B-01-80.0-82.0	
Sample No.:	SS-11	SS-12	SS-13	SS-14	SS-15	SS-15	SS-16	
Depth, ft:	55-56.5	60-62	65-67	70-72	75-77	75-77	80-82	
Visual Description:	Gray Silty SAND	Dark Gray Clayey SAND	Gray Silty SAND	Greenish Gray Fat CLAY	Greenish Gray CLAY	Greenish Gray CLAY	Greenish Gray CLAY	
Actual G_s								
Assumed G_s								
Moisture, %	15.2	20.2	20.7	59.6	67.0	59.5	64.8	
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont, Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013c **Project No.** B0002251.0001.00006 **By:** RU

Client: Arcadis **Date:** 04/23/12

Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-02							
Sample ID:	AUS-B-02-0.0-2.0	AUS-B-02-2.0-4.0	AUS-B-02-5.0-7.0	AUS-B-02-25.0-27.0	AUS-B-02-30.0-32.0	AUS-B-02-35.0-37.0	AUS-B-02-40.0-42.0	AUS-B-02-45.0-47.0
Sample No.:	SS-01	SS-02	SS-03	SS-07	SS-08	SS-09	SS-10	SS-11
Depth, ft:	0-2	2-4	5-7	25-27	30-32	35-37	40-42	45-47
Visual Description:	Dark Gray CLAY w/ Sand	Gray CLAY w/ shells	Gray CLAY	Mottled Brown Clayey SAND	Brown Silty SAND	Mottled Brown Clayey SAND	Grayish Brown Clayey SAND	Grayish Brown Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	79.3	87.2	87.4	19.3	19.9	20.8	18.4	19.5
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont, Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered approximate.

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No:	477-013d	**Project No.**	B0002251.0001.00006	**By:**	RU
Client:	Arcadis	**Date:**	04/23/12		
Project Name:	Yosemite Slough Sediment Site	**Remarks:**			

Boring:	AUS-B-02							
Sample ID:	AUS-B-02-50.0-52.0	AUS-B-02-55.0-56.7	AUS-B-02-56.7-57.0	AUS-B-02-60.0-62.0	AUS-B-02-68.0-69.4	AUS-B-02-694.-70.0	AUS-B-02-71.0-71.5	
Sample No.:	SS-12	SS-13	SS-13	SS-14	SS-15	SS-16	SS-17	
Depth, ft:	50-52	55-57	55-57	60-62	68-69.4	69.4-70	71.0-71.5	
Visual Description:	Grayish Brown Silty SAND	Brown Silty SAND	Mottled Grayish Brown CLAY	Greenish Gray CLAY w/ Sand	Dark Gray CLAY w/ Sand	Gray Clayey SAND	Dark Gray CLAY w/ Sand	
Actual G_s								
Assumed G_s								
Moisture, %	18.8	20.5	26.8	53.2	42.1	18.2	45.5	
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013e **Project No.** B0002251.0001.00006 **By:** RU
Client: Arcadis **Date:** 04/23/12
Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-03							
Sample ID:	AUS-B-03-0.0-2.0	AUS-B-03-5.0-7.0	AUS-B-03-25.5-26.5	AUS-B-03-30.5-31.5	AUS-B-03-35.0-36.5	AUS-B-03-50.0-50.6	AUS-B-03-50.6-51.5	AUS-B-03-55.1-55.8
Sample No.:	SS-01	SS-02	SS-06	SS-08	SS-09	SS-12	SS-13	
Depth, ft:	0-2	5-7	25-26.5	30.5-31.5	35-36.5	50-51.5	50-51.5	55.1-55.8
Visual Description:	Dark Gray CLAY	Gray CLAY w/ shells	Greenish Gray Lean Clayey SAND	Mottled Brown Clayey SAND	Grayish Brown Sandy CLAY	Gray Sandy CLAY	Gray Sandy CLAY	Mottled Grayish Brown Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	99.4	85.3	16.3	18.5	20.4	24.3	15.7	17.1
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013f **Project No.** B0002251.0001.00006 **By:** RU

Client: Arcadis **Date:** 04/23/12

Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-03							
Sample ID:	AUS-B-03-60.0-60.5							
Sample No.:	SS-14							
Depth, ft:	60.0-60.5							
Visual Description:	Brown SAND w/ Clay & Gravel							
Actual G_s								
Assumed G_s								
Moisture, %	10.6							
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013g **Project No.** B0002251.0001.00006 **By:** RU
Client: Arcadis **Date:** 04/23/12
Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-04							
Sample ID:	AUS-B-04-0.0-1.5	AUS-B-04-1.5-2.0	AUS-B-04-5.0-6.3	AUS-B-04-6.3-7.0	AUS-B-04-10.0-12.0	AUS-B-04-15.0-17.0	AUS-B-04-20.0-20.5	AUS-B-04-20.5-22.0
Sample No.:	SS-01	SS-01	SS-02	SS-02	SS-03	SS-04	SS-05	SS-05
Depth, ft:	0-2	0-2	5-7	5-7	10-12	15-17	20-22	20-22
Visual Description:	Dark Gray Sandy CLAY	Gray Silty SAND (slightly plastic)	Dark Gray Clayey SAND	Gray CLAY w/ shells	Gray CLAY, trace Sand	Gray CLAY w/ shells	Gray CLAY, trace Sand	Dark Brown Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	73.0	33.0	54.2	62.3	53.2	80.6	56.2	17.2
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No:	477-013h	**Project No.**	B0002251.0001.00006	**By:**	RU
Client:	Arcadis	**Date:**	04/23/12		
Project Name:	Yosemite Slough Sediment Site	**Remarks:**			

Boring:	AUS-B-04							
Sample ID:	AUS-B-04-25.0-27.0	AUS-B-04-30.0-32.0	AUS-B-04-35.0-37.0	AUS-B-04-40.0-42.0	AUS-B-04-45.0-47.0	AUS-B-04-50.0-51.5	AUS-B-04-55.0-56.6	AUS-B-04-55.6-57.0
Sample No.:	SS-06	SS-07	SS-08	SS-09	SS-10	SS-11	SS-12	SS-12
Depth, ft:	25-27	30-32	35-37	40-42	45-47	50-51.5	55-57	55-57
Visual Description:	Dark Olive Gray Clayey SAND	Mottled Grayish Brown SAND w/ Clay	Mottled Grayish Brown SAND w/ Clay	Mottled Grayish Brown Clayey SAND	Mottled Grayish Brown Clayey SAND	Grayish Brown Poorly Graded SAND w/ Silt	Mottled Grayish Brown Clayey SAND	Mottled Grayish Brown Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	19.9	21.8	21.9	19.2	20.1	19.2	19.5	16.9
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont, Θ_w								
Volumetric Air Cont., Θ_a								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No:	477-013i	**Project No.**	B0002251.0001.00006
By:	RU		
Client:	Arcadis	**Date:**	04/23/12
Project Name:	Yosemite Slough Sediment Site	**Remarks:**	

Boring:	AUS-B-04							
Sample ID:	AUS-B-04-60.0-60.8	AUS-B-04-65.0-66.8	AUS-B-04-70.0-72.0	AUS-B-04-75.0-77.0	AUS-B-04-80.0-82.0	AUS-B-04-85.0-87.0	AUS-B-04-90.0-92.0	AUS-B-04-95.0-96.2
Sample No.:	SS-13	SS-14	SS-15	SS-16	SS-17	SS-18	SS-19	SS-20
Depth, ft:	60-62	65-67	70-72	75-77	80-82	85-87	90-92	95-96.5
Visual Description:	Greenish Gray SAND w/ Silt	Dark Greenish Gray CLAY w/ Sand	Mottled Greenish Gray CLAY	Greenish Gray Fat CLAY	Greenish Gray CLAY	Greenish Gray CLAY	Greenish Gray Clayey SAND	Light Yellowish Brown SAND w/ Silt
Actual G_s								
Assumed G_s								
Moisture, %	17.5	24.6	52.6	55.1	61.6	59.3	20.1	14.7
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013j **Project No.** B0002251.0001.00006 **By:** RU
Client: Arcadis **Date:** 04/23/12
Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-05							
Sample ID:	AUS-B-05-0.0-2.0	AUS-B-05-5.0-7.0	AUS-B-05-10.0-12.0	AUS-B-05-15.0-17.0	AUS-B-05-20.0-20.6			
Sample No.:	SS-01	SS-02	SS-03	SS-04	SS-05			
Depth, ft:	0-2	5-7	10-12	15-17	20-20.6			
Visual Description:	Dark Gray CLAY	Gray CLAY w/ Sand and shells	Gray SAND w/ Clay & shells	Strong Brown Clayey SAND	Brown Silty SAND			
Actual G_s								
Assumed G_s								
Moisture, %	92.4	59.8	32.4	18.0	8.4			
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013k **Project No.** B0002251.0001.00006 **By:** RU
Client: Arcadis **Date:** 04/30/12
Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-06							
Sample ID:	AUS-B-06-0.0-2.0	AUS-B-06-5.0-7.0	AUS-B-06-10.0-12.0	AUS-B-06-15.0-17.0	AUS-B-06-21.0-22.0	AUS-B-06-22.0-23.0	AUS-B-06-24.0-25.1	AUS-B-06-25.1-26.0
Sample No.:	SS-01	SS-02	SS-03	SS-04	SS-05	SS-05	SS-06	SS-06
Depth, ft:	0-2	5-7	10-12	15-17	21-23	21-23	24-26	24-26
Visual Description:	Gray CLAY	Gray CLAY w/ shells	Dark Greenish Gray CLAY	Dark Gray Fat CLAY w/ shells	Greenish Gray CLAY	Very Dark Greenish Gray Sandy CLAY	Dark Olive Gray Sandy CLAY	Olive Gray Clayey SAND
Actual G_s								
Assumed G_s								
Moisture, %	113.3	87.1	74.1	70.9	76.0	35.5	15.4	20.3
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Ѳw								
Volumetric Air Cont., Ѳa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

CTL Job No: 477-013I **Project No.** B0002251.0001.00006 **By:** RU
Client: Arcadis **Date:** 04/30/12
Project Name: Yosemite Slough Sediment Site **Remarks:**

Boring:	AUS-B-06							
Sample ID:	AUS-B-06-29.0-31.0	AUS-B-06-35.0-37.0	AUS-B-06-41.0-42.5	AUS-B-06-44.0-46.0	AUS-B-06-50.5-52.5	AUS-B-06-55.0-57.0	AUS-B-06-60.0-62.0	AUS-B-06-65.0-66.5
Sample No.:	SS-07	SS-08	SS-09	SS-10	SS-11	SS-12	SS-13	SS-14
Depth, ft:	29-31	35-37	41-42.5	44-46	50.5-52.5	55-57	60-62	65-67
Visual Description:	Olive Clayey SAND	Olive Brown Sandy CLAY	Olive SAND w/ Clay	Light Olive Brown Sandy CLAY	Olive SAND	Olive SAND	Olive CLAY	Very Dark Greenish Gray Sandy Lean CLAY
Actual G_s								
Assumed G_s								
Moisture, %	15.2	19.2	15.4	23.7	18.4	18.5	53.7	25.1
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

Moisture-Density-Porosity Report
Cooper Testing Labs, Inc. (ASTM D 2937)

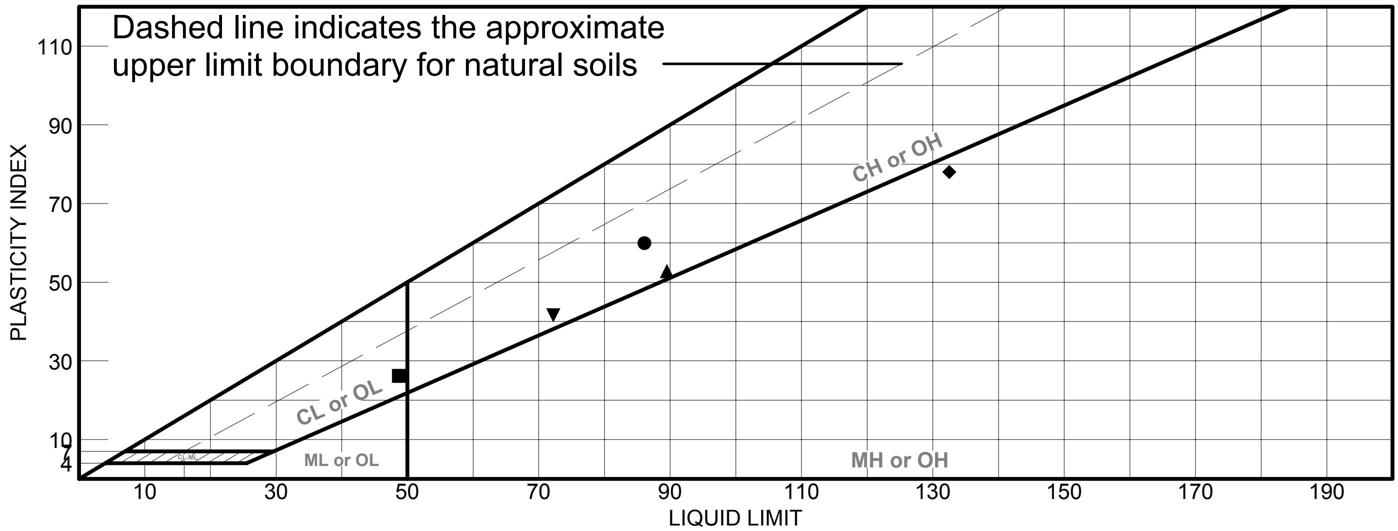
CTL Job No:	477-013m	**Project No.**	B0002251.0001.00006	**By:**	RU
Client:	Arcadis	**Date:**	04/30/12		
Project Name:	Yosemite Slough Sediment Site	**Remarks:**			

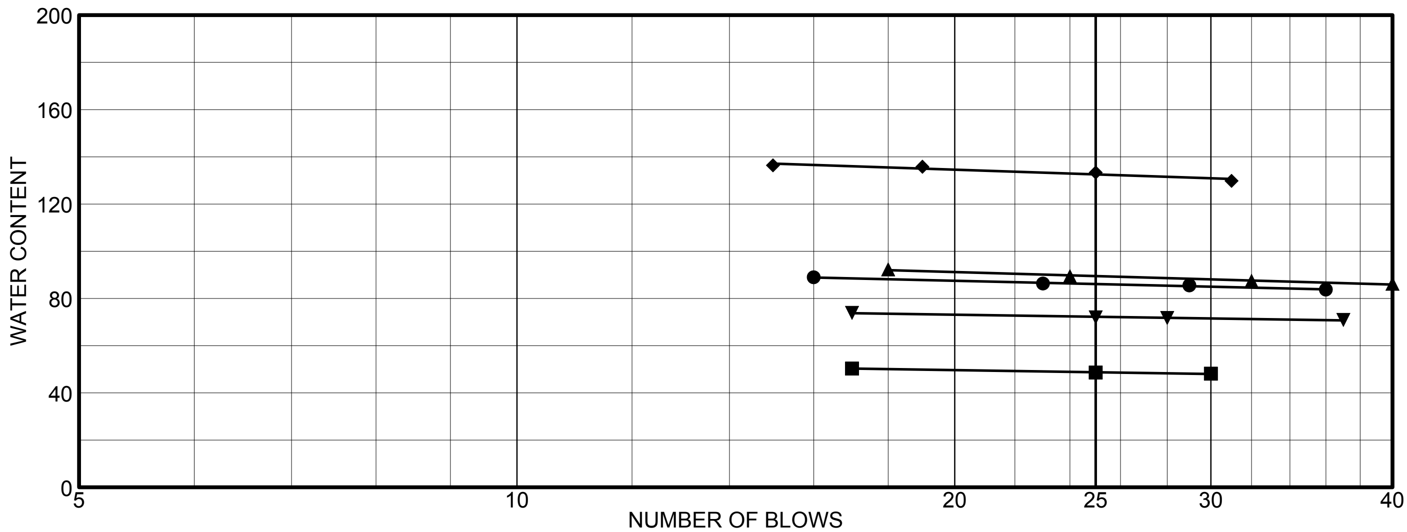
Boring:	AUS-B-06							
Sample ID:	AUS-B-06-66.5-67.0	AUS-B-06-70.0-71.2	AUS-B-06-71.3-72.0	AUS-B-06-75.0-77.0	AUS-B-06-80.0-82.0			
Sample No.:	SS-14	SS-15	SS-15	SS-16	SS-17			
Depth, ft:	65-67	70-72	70-72	75-77	80-82			
Visual Description:	Gray Olive Sandy CLAY	Olive SAND	Grayish Green CLAY w/ Sand & shells	Olive Brown Sandy CLAY	Light Olive Brown Sandy CLAY/ Clayey SAND			
Actual G_s								
Assumed G_s								
Moisture, %	16.9	17.1	18.6	21.9	13.6			
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.ρb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw								
Volumetric Air Cont., Θa								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation,

The Zero Air-Voids curves represent the dry density at 100% saturation for each value of specific gravity

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish Gray Fat CLAY	86.1	26.2	59.9			
■	Gray Lean CLAY w/ Sand (Bay Mud)	48.7	22.5	26.2	96.8	74.6	CL
▲	Gray Fat CLAY (Bay Mud)	89.5	36.7	52.8			SC
◆	Greenish Gray Elastic SILT w/ organics (Bay Mud)	132.5	54.5	78.0	99.3	98.0	MH
▼	Dark Greenish Gray Fat CLAY w/ Sand & shell fragments (Bay Mud)	72.2	30.6	41.6	98.9	73.8	CH

Project No. 477-013 **Client:** Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

● **Source:** AUS-B-01-70.0-72.0 **Sample No.:** SS-14 **Elev./Depth:** 70-72'
■ **Source:** AUS-B-01-7.0-9.0 **Sample No.:** ST-01 **Elev./Depth:** 7-9(Tip-6)
▲ **Source:** AUS-B-01-17.0-19.0 **Sample No.:** ST-03 **Elev./Depth:** 17-19'
◆ **Source:** AUS-B-01-22.0-24.0 **Sample No.:** ST-04 **Elev./Depth:** 22-24'
▼ **Source:** AUS-B-02-7.0-9.0 **Sample No.:** ST-01 **Elev./Depth:** 7-9(Tip-11)

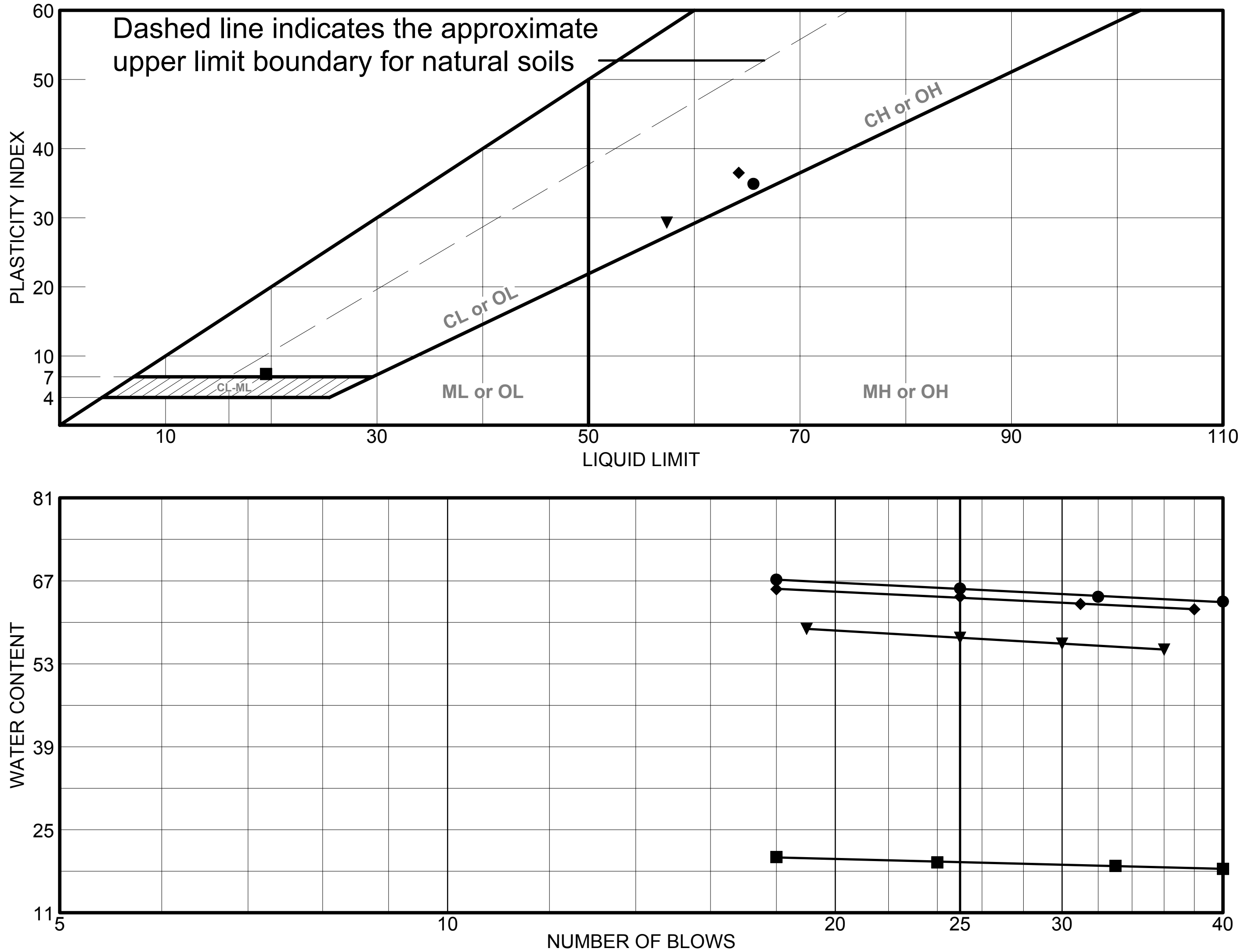
Remarks:
- ● Sample was prepared using the wet prep method.
- ■ Sample was prepared using the wet prep method.
- ▲ Sample was prepared using the wet prep method
- ◆ Sample was prepared using the wet prep method.
- ▼ Sample was prepared using the wet prep method.

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Fat CLAY w/ shell fragments (Bay Mud)	65.6	30.7	34.9	99.4	93.4	CH
■	Grayish Brown Lean Clayey SAND	19.5	12.1	7.4			
▲	Gray Silty SAND		NP	NP	60.9	16.1	SM
◆	Gray Fat CLAY (Bay Mud)	64.2	27.7	36.5	96.6	94.6	CH
▼	Gray Fat CLAY w/ shell fragments (Bay Mud)	57.4	28.1	29.3	97.5	94.1	CH

Project No. 477-013 **Client:** Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

● **Source:** AUS-B-02-12.0-14.0 **Sample No.:** ST-02 **Elev./Depth:** 12-14(Tip-5)
■ **Source:** AUS-B-02-20.0-22.0 **Sample No.:** SS-06 **Elev./Depth:** 20-22'
▲ **Source:** AUS-B-02-62.0-64.0 **Sample No.:** ST-04 **Elev./Depth:** 62-64'
◆ **Source:** AUS-B-03-7.0-9.0 **Sample No.:** ST-01 **Elev./Depth:** 7-9'
▼ **Source:** AUS-B-03-12.5-14.5 **Sample No.:** ST-02 **Elev./Depth:** 12.5-14.5(Tip-7)

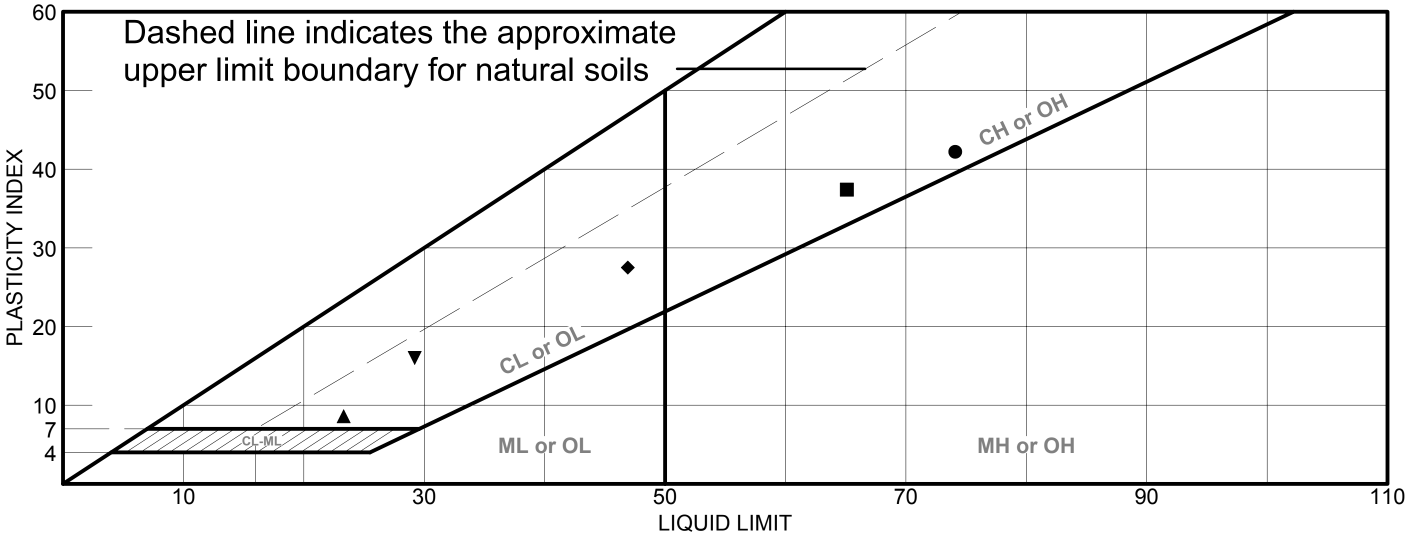
Remarks:
● Sample was prepared using the wet prep method.
■ Sample was prepared using the wet prep method.
▲ Sample was prepared using the wet prep method. Could not roll out. Sample slides in bowl.
◆ Sample was prepared using the wet prep method.
▼ Sample was prepared using the wet

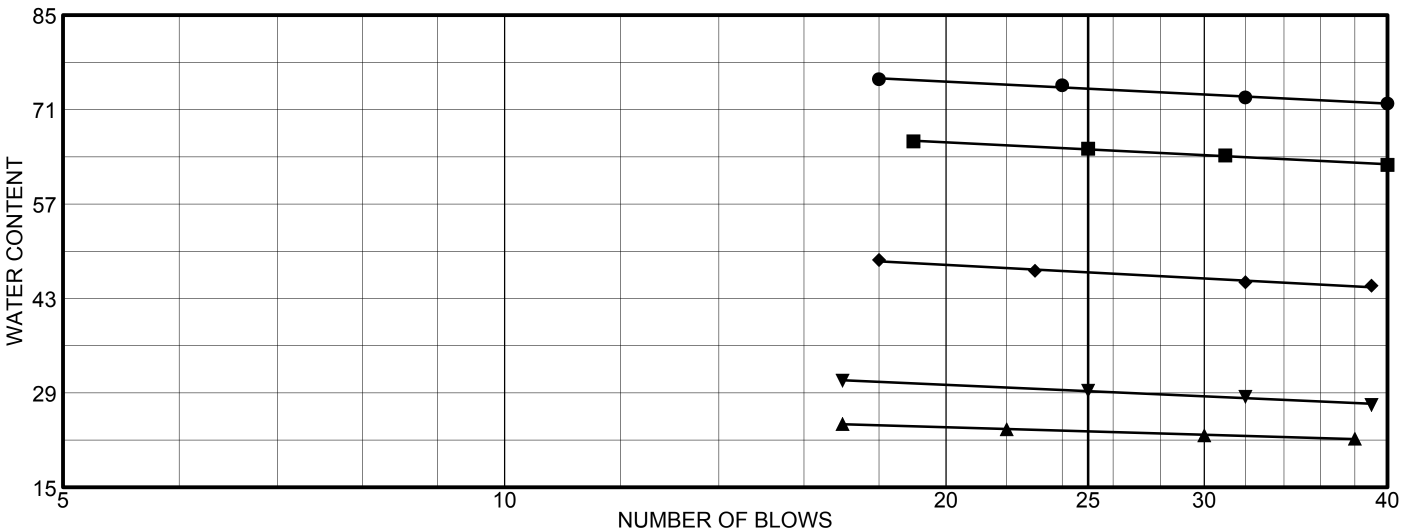
LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Fat CLAY (Bay Mud)	74.1	31.9	42.2	99.8	97.8	CH
■	Gray Fat CLAY (Bay Mud)	65.1	27.7	37.4	99.6	94.1	CH
▲	Greenish Gray Lean Clayey SAND	23.3	14.7	8.6			
◆	Greenish Gray Lean CLAY	46.9	19.4	27.5	99.6	93.1	CL
▼	Greenish Gray Sandy Lean CLAY	29.2	13.2	16.0	97.7	60.8	CL

Project No. 477-013 **Client:** Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

● **Source:** AUS-B-03-17.0-19.0 **Sample No.:** ST-03 **Elev./Depth:** 17-19'
■ **Source:** AUS-B-03-21.0-23.0 **Sample No.:** ST-04 **Elev./Depth:** 21-23'
▲ **Source:** AUS-B-03-25.5-26.5 **Sample No.:** SS-06 **Elev./Depth:** 25-26.5'
◆ **Source:** AUS-B-03-41.5-43.5 **Sample No.:** ST-06 **Elev./Depth:** 41.5-43.5'
▼ **Source:** AUS-B-03-51.5-53.5 **Sample No.:** ST-07 **Elev./Depth:** 51.5-53.5'

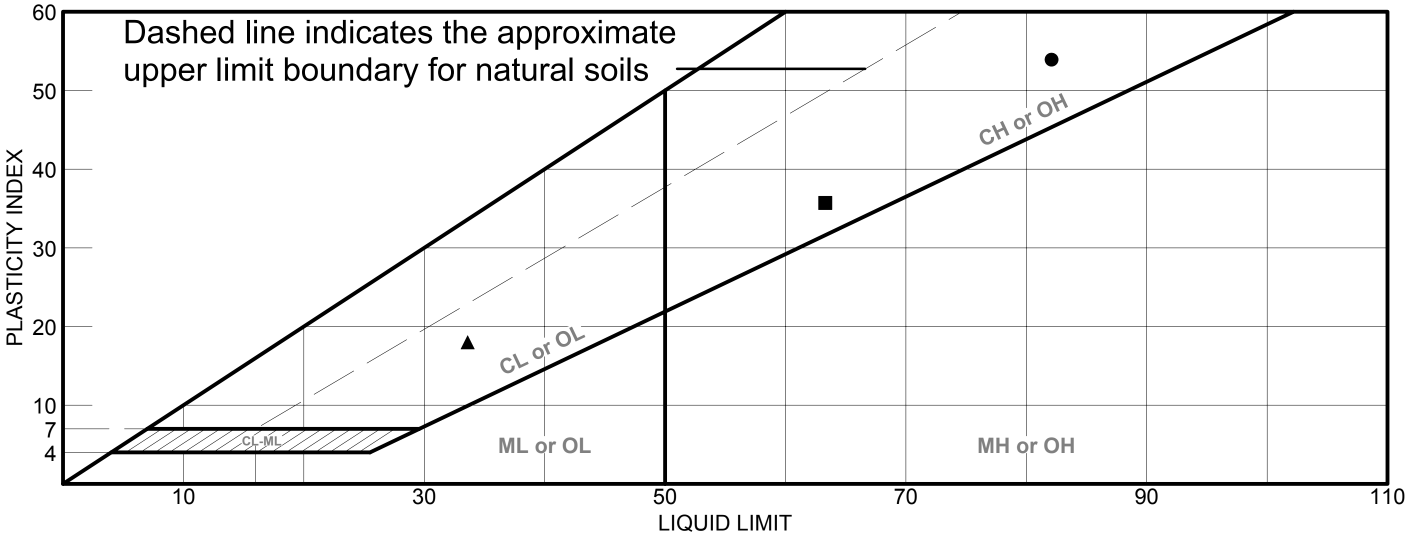
Remarks:
- ● Sample was prepared using the wet prep method.
- ■ Sample was prepared using the wet prep method.
- ▲ Sample was prepared using the wet prep method.
- ◆ Sample was prepared using the wet prep method.
- ▼ Sample was prepared using the wet prep method.

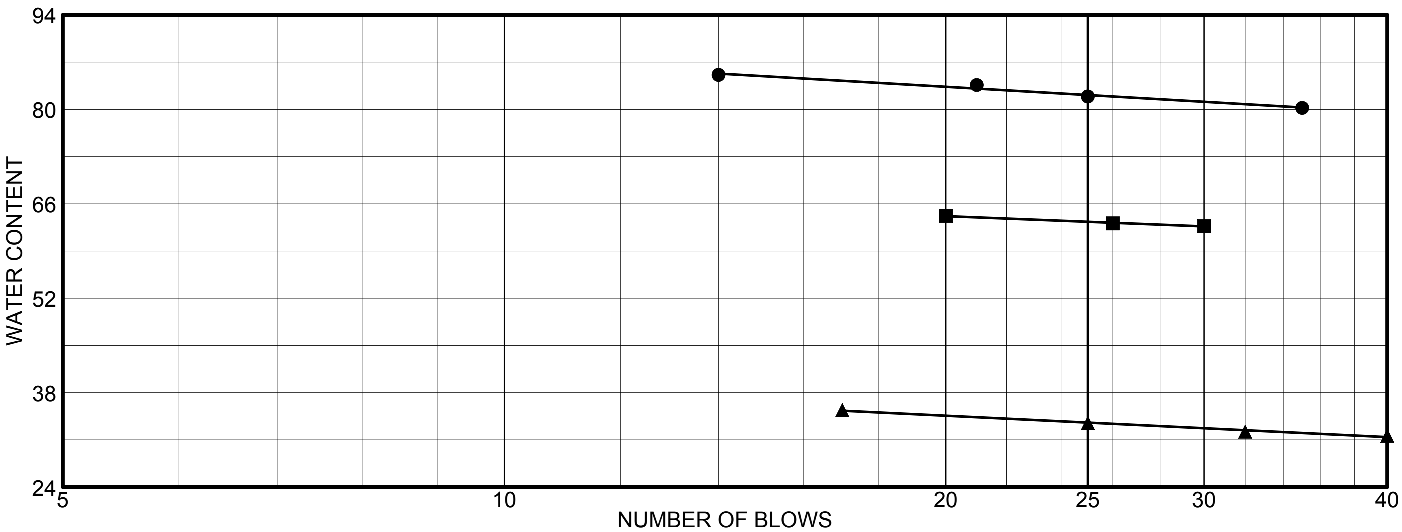
LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish Gray Fat CLAY	82.1	28.2	53.9			
■	Dark Gray Fat CLAY w/ shells	63.3	27.6	35.7			
▲	Very Dark Greenish Gray Sandy Lean CLAY	33.6	15.6	18.0	97.2	68.1	CL

Project No. 477-013 **Client:** Arcadis

Project: Yosemite Slough Sediment Site - B0002251.0001.00006

● **Source:** AUS-B-04-75.0-77.0 **Sample No.:** SS-16 **Elev./Depth:** 75-77'

■ **Source:** AUS-B-06-15.0-17.0 **Sample No.:** SS-04 **Elev./Depth:** 15-17'

▲ **Source:** AUS-B-06-65.0-66.5 **Sample No.:** SS-14 **Elev./Depth:** 65-67'

Remarks:

● Sample was prepared using the wet prep method.

■ Sample was prepared using the wet prep method.

▲ Sample was prepared using the wet prep method.

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

Specific Gravity by Pycnometer

ASTM D 854m

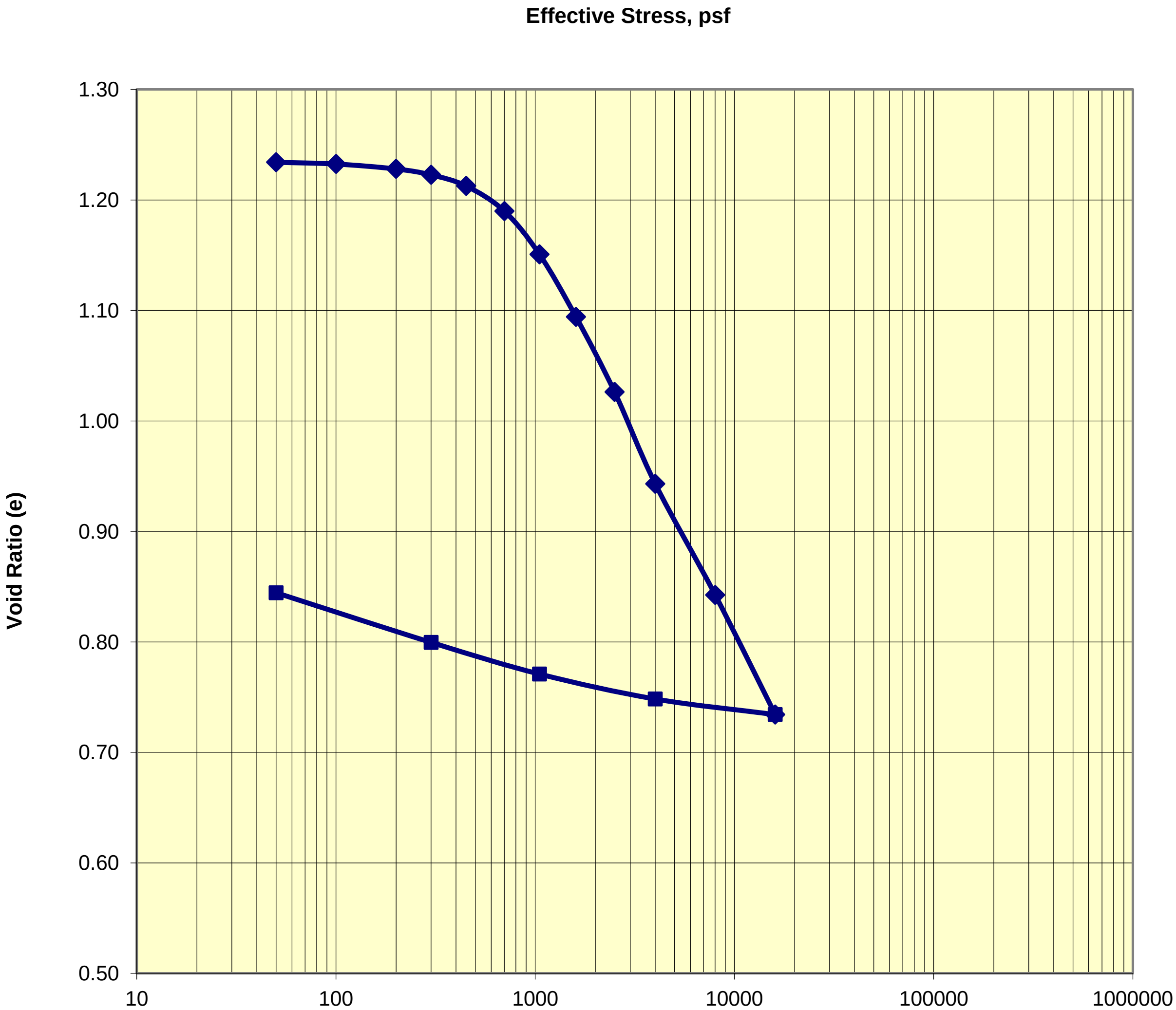
COOPER TESTING LABORATORY

CTL Job#:	477-013	**Project Name:**	Yosemite Slough	**Date:**	05/03/12
Client:	Arcadis	**Project No.:**	B0002251.0001.00006	**Run By:**	MD
				Checked	DC

Boring:	AUS-B-01	AUS-B-02	AU-B-03	AUS-B-01	AUS-B-02			
Sample:	ST-02	ST-01	ST-04	ST-01	ST-02			
Depth, ft.:	12-14	7-9	21-23	7-9	12-14			
Pan No.:								
Soil Description (visual)	Gray Silty SAND	Dark Greenish Gray Fat CLAY w/ Sand (Bay Mud)	Gray Fat CLAY (Bay Mud)	Gray Sandy Lean CLAY w/ shell fragments (Bay Mud)	Gray Fat CLAY w/ shell fragments (Bay Mud)			
Dish No.								
Air-Dry Weight, gm	57.32	69.47	54.59	85.15	61.83			
Oven-Dry Weight., gm	55.41	68.03	53.28	83.93	60.34			
Dish Weight, gm	0.00	0.00	0.00	0.00	0.00			
Hydroscopic MC, %	3.4	2.1	2.5	1.5	2.5			
Pycnometer No.:								
Wt Pycn., Soil & H2O (Wb), g	696.8	715.3	704.9	728.6	709.9			
Test Temp. (T), ^oC	23.1	23.4	23.3	23.3	23.3			
Wt Pycn. & H2O @ T (Wa), g	662.6	671.9	671.2	675.4	671.9			
Wt of Air-Dried Soil (Wm), g	57.32	69.47	54.59	85.15	61.83			
Wt of Oven-Dried Soil (Wo), g	55.41	68.03	53.28	83.93	60.34			
Temp. Corr. Factor (K)	0.99931	0.99924	0.99926	0.99926	0.99926			
Specific Gravity (20^oC) $Gs = \frac{K\ Wo}{Wo+Wa-Wb}$	**2.61**	**2.76**	**2.72**	**2.73**	**2.71**			

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-01	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-01	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	7-9(Tip-6)	**Checked:**	PJ/DC
Soil Type:	Gray Lean CLAY w/ Sand (Bay Mud)		(8.5 ft)	**Date:**	5/3/2012

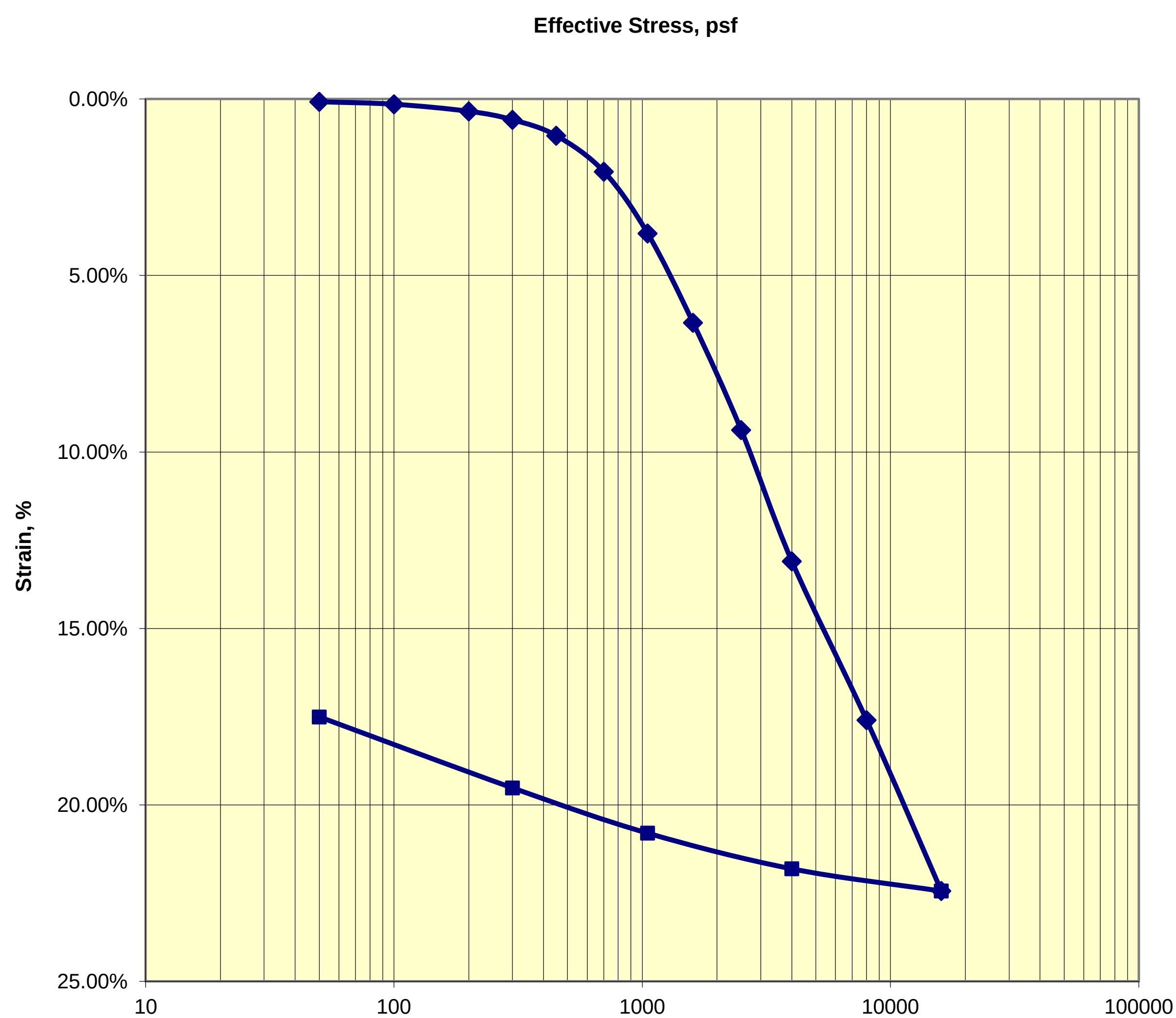


Ass. Gs = 2.73	**Initial**	**Final**
Moisture %:	43.8	30.9
Dry Density, pcf:	76.3	92.5
Void Ratio:	1.234	0.843
% Saturation:	96.8	100

Remarks:

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-01	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-01	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	7-9(Tip-6)	**Checked:**	PJ/DC
Soil Type:	Gray Lean CLAY w/ Sand (Bay Mud)		(8.5 ft)	**Date:**	5/3/2012

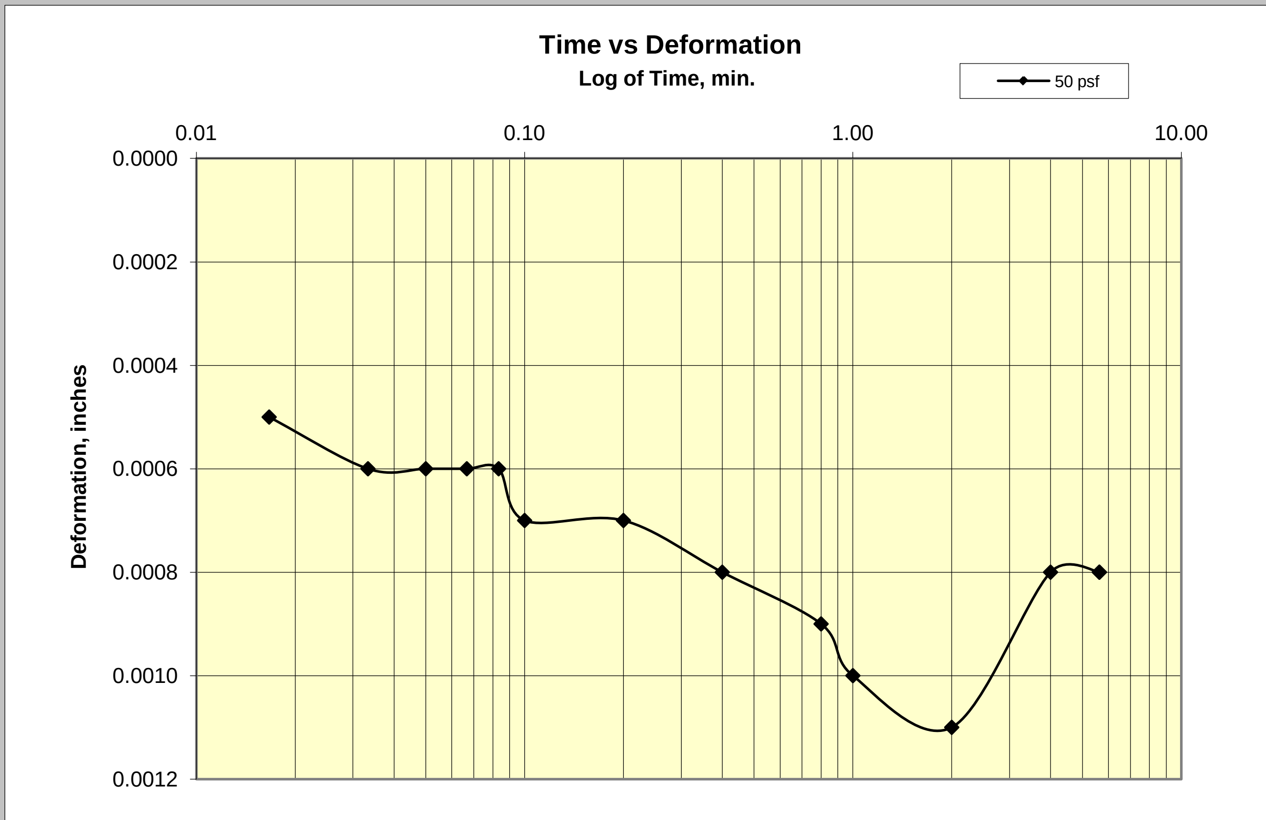


Ass. Gs = 2.73	**Initial**	**Final**
Moisture %:	43.8	30.9
Dry Density, pcf:	76.3	92.5
Void Ratio:	1.234	0.843
% Saturation:	96.8	100

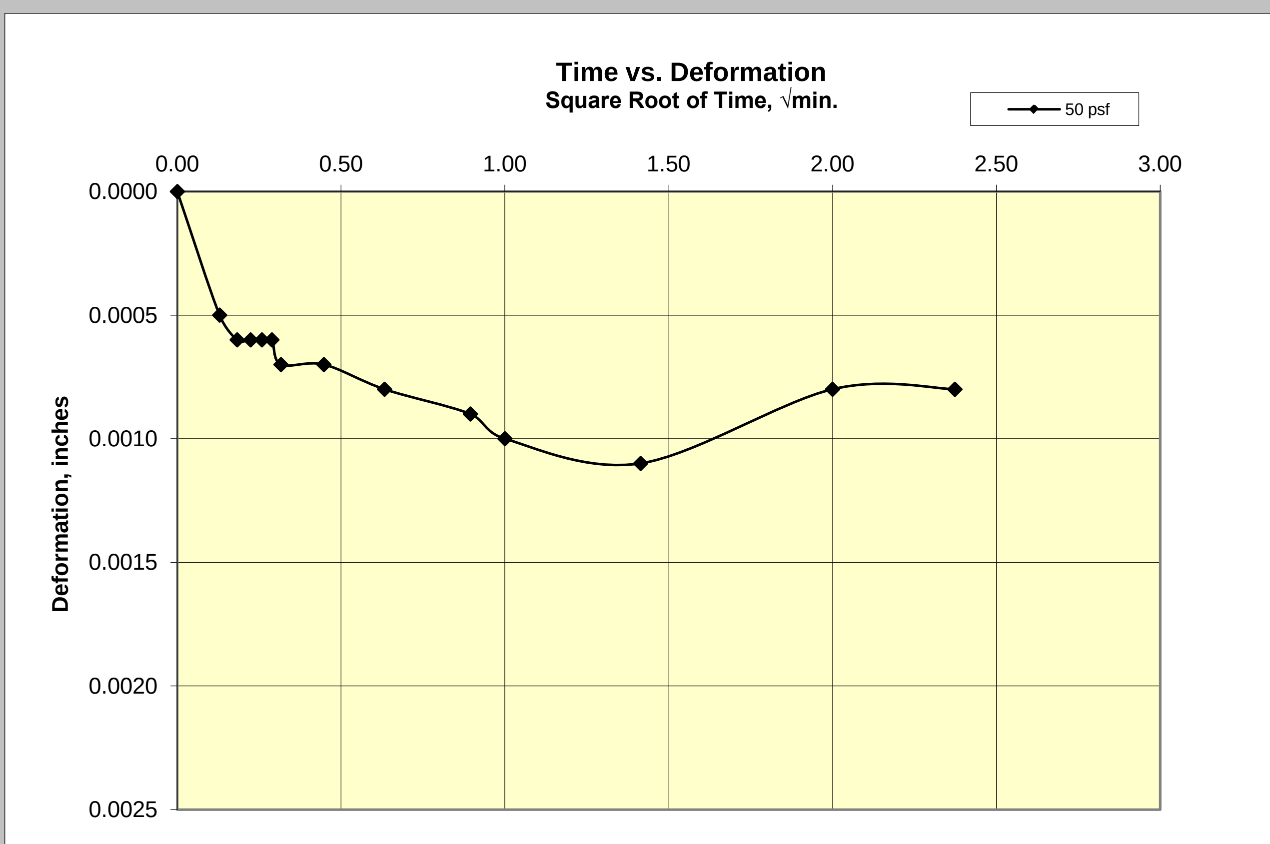
Remarks:

Cooper Testing Labs, Inc.

Load 1 | 50 PSF | AUS-B-01-7.0-9.0 | (8.5 ft)

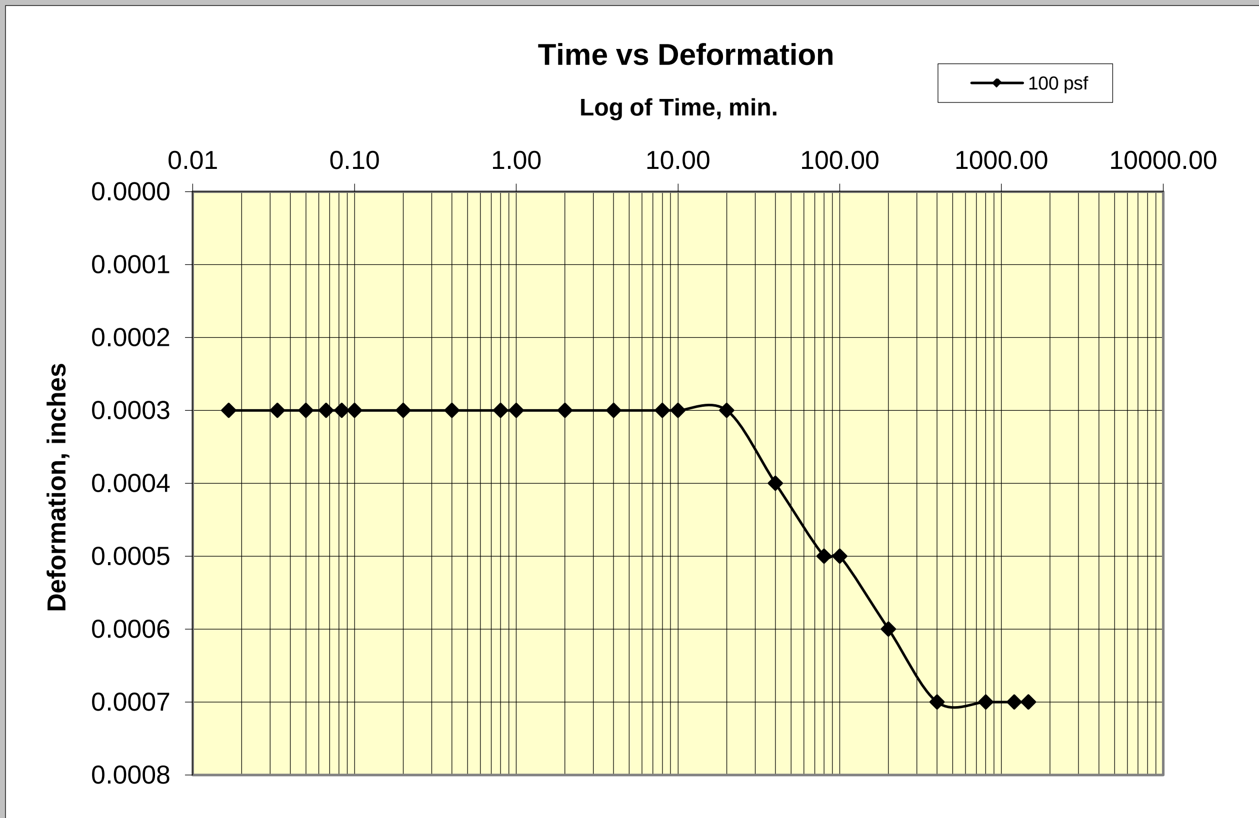


50 PSF

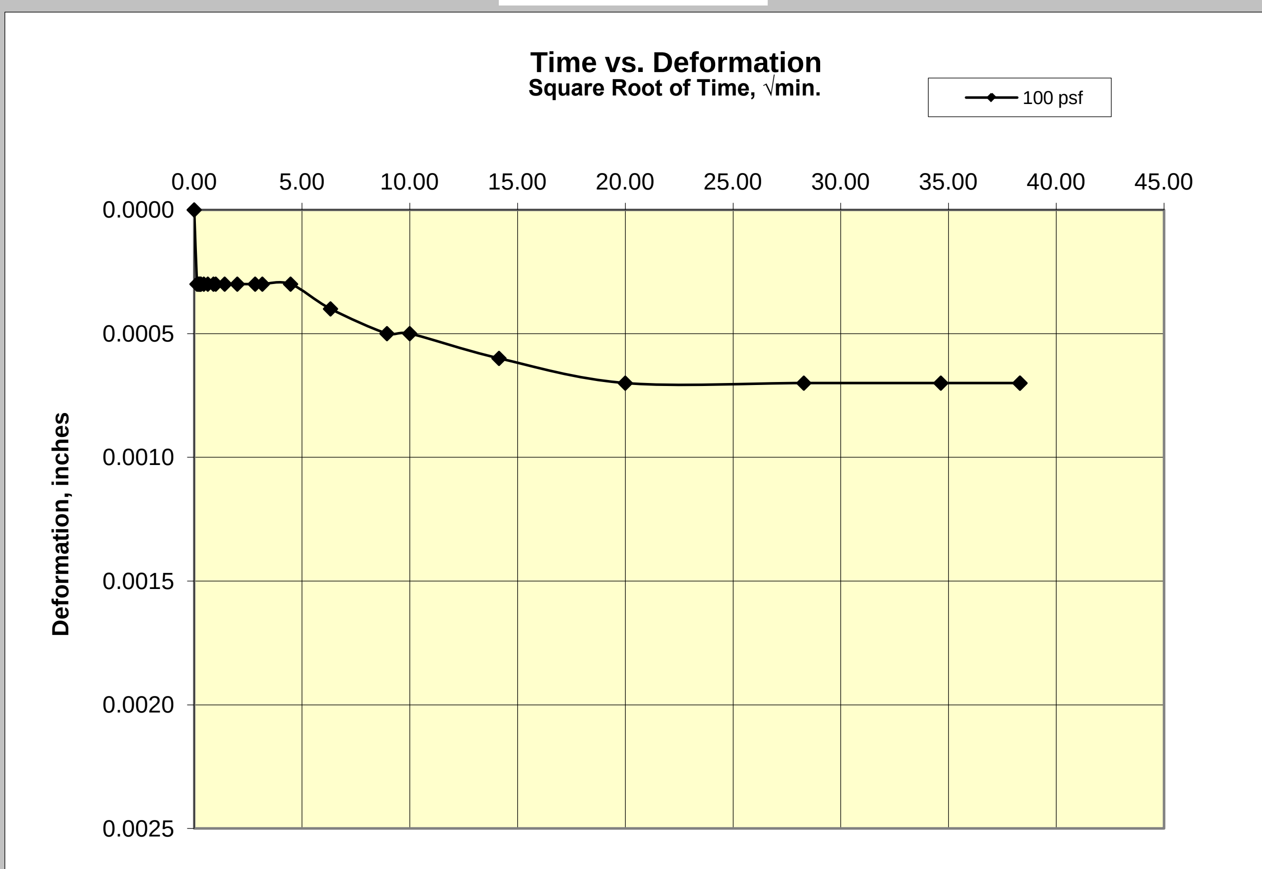


Cooper Testing Labs, Inc.

Load 2	100 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

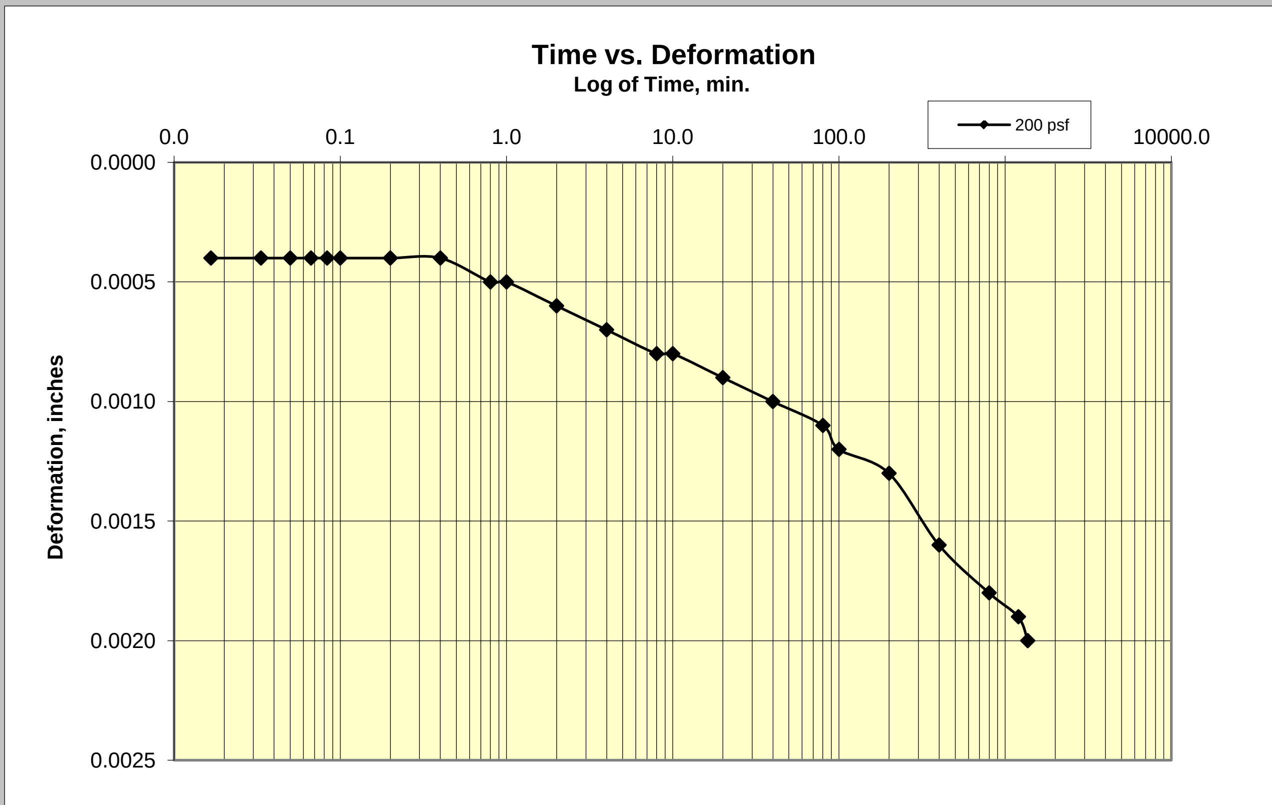


100 PSF

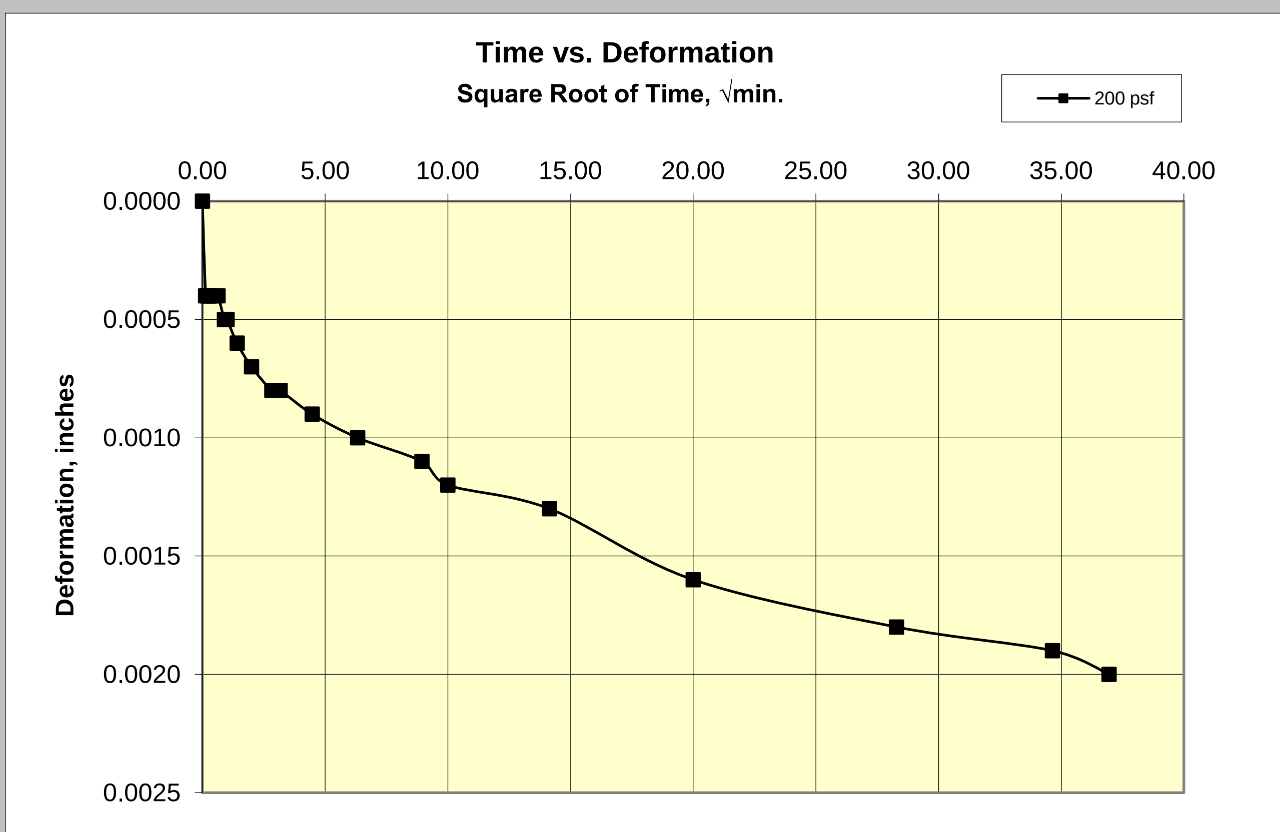


Cooper Testing Labs, Inc.

Load 3	200 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

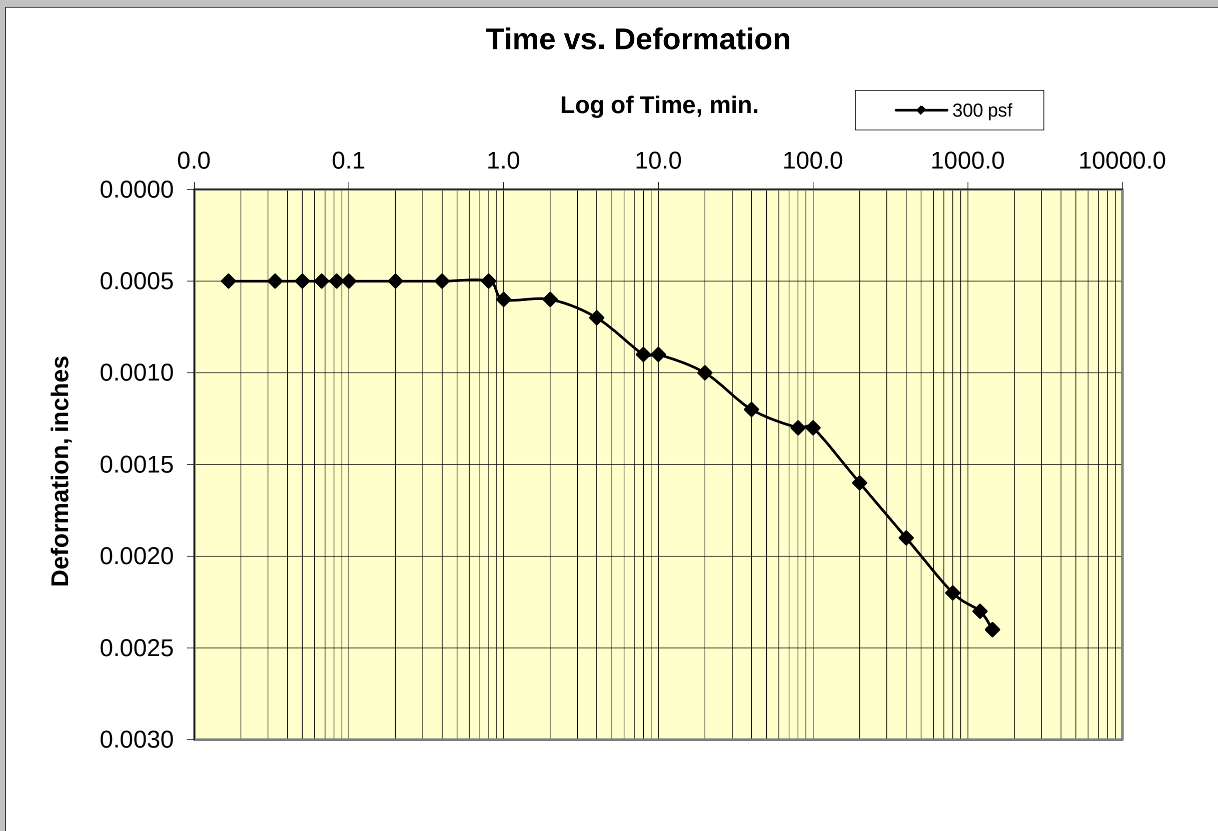


200 PSF

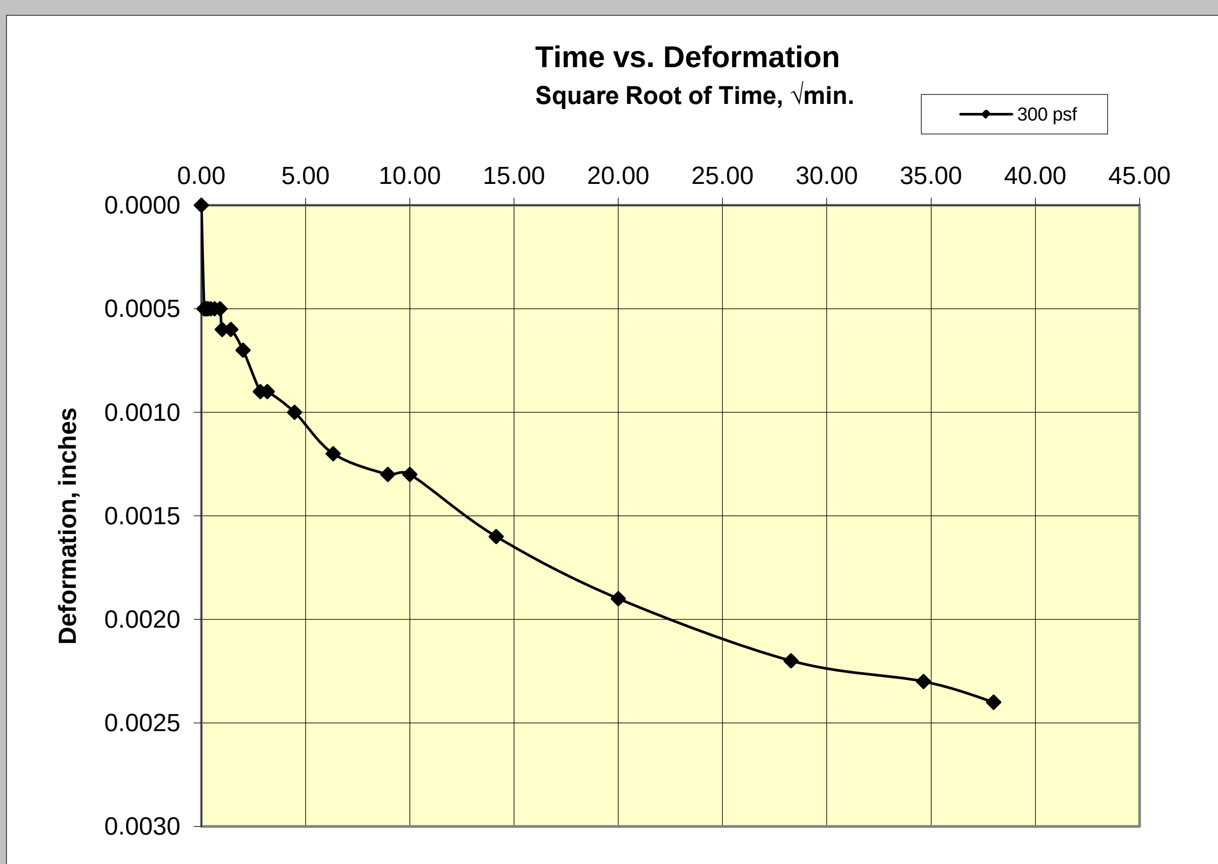


Cooper Testing Labs, Inc.

Load 4	300 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

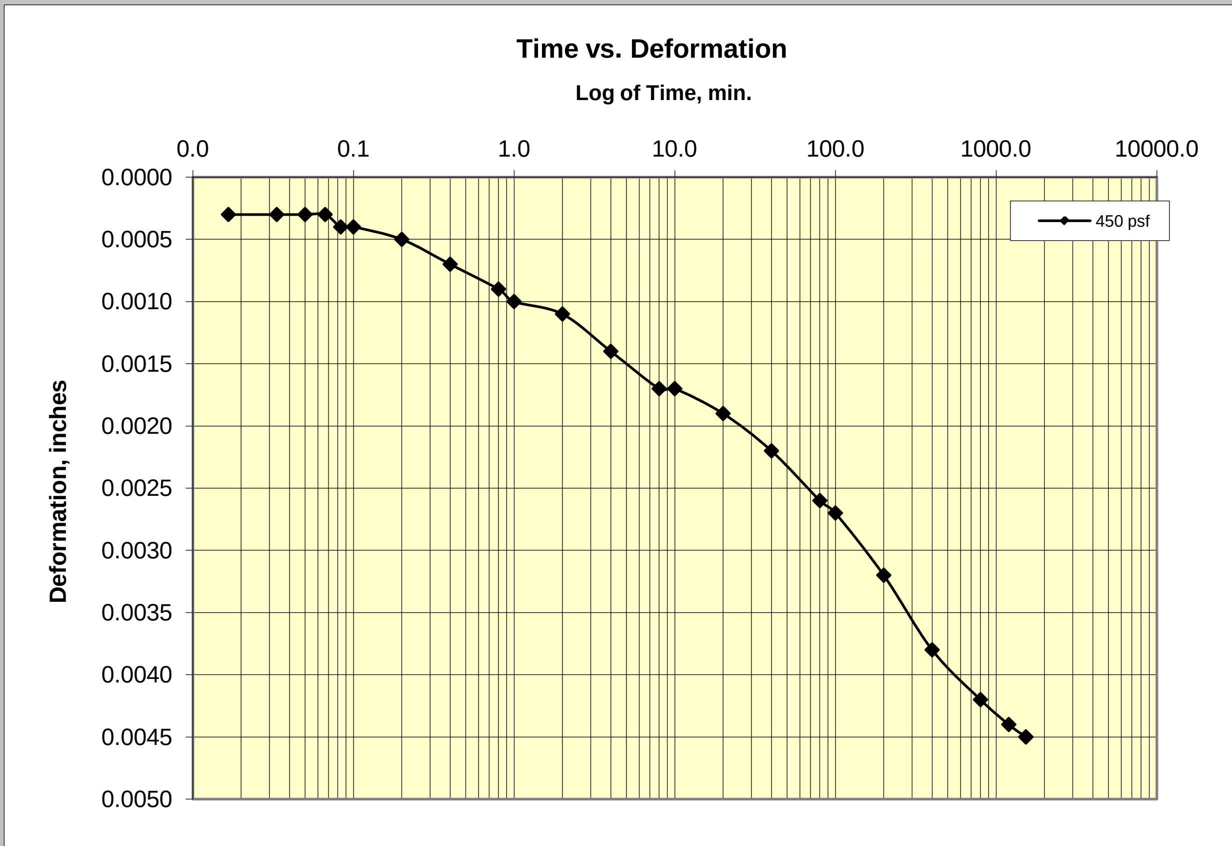


300 PSF

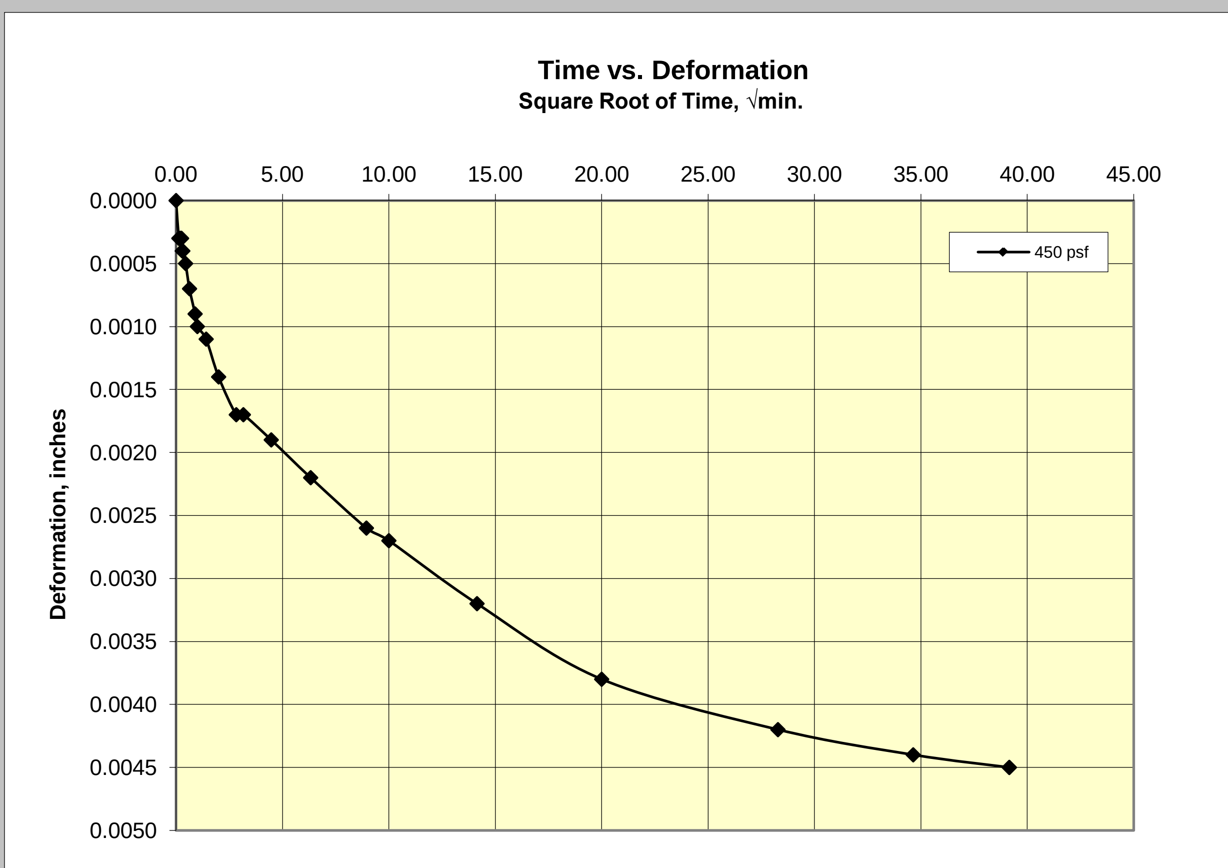


Cooper Testing Labs, Inc.

Load 5	450 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

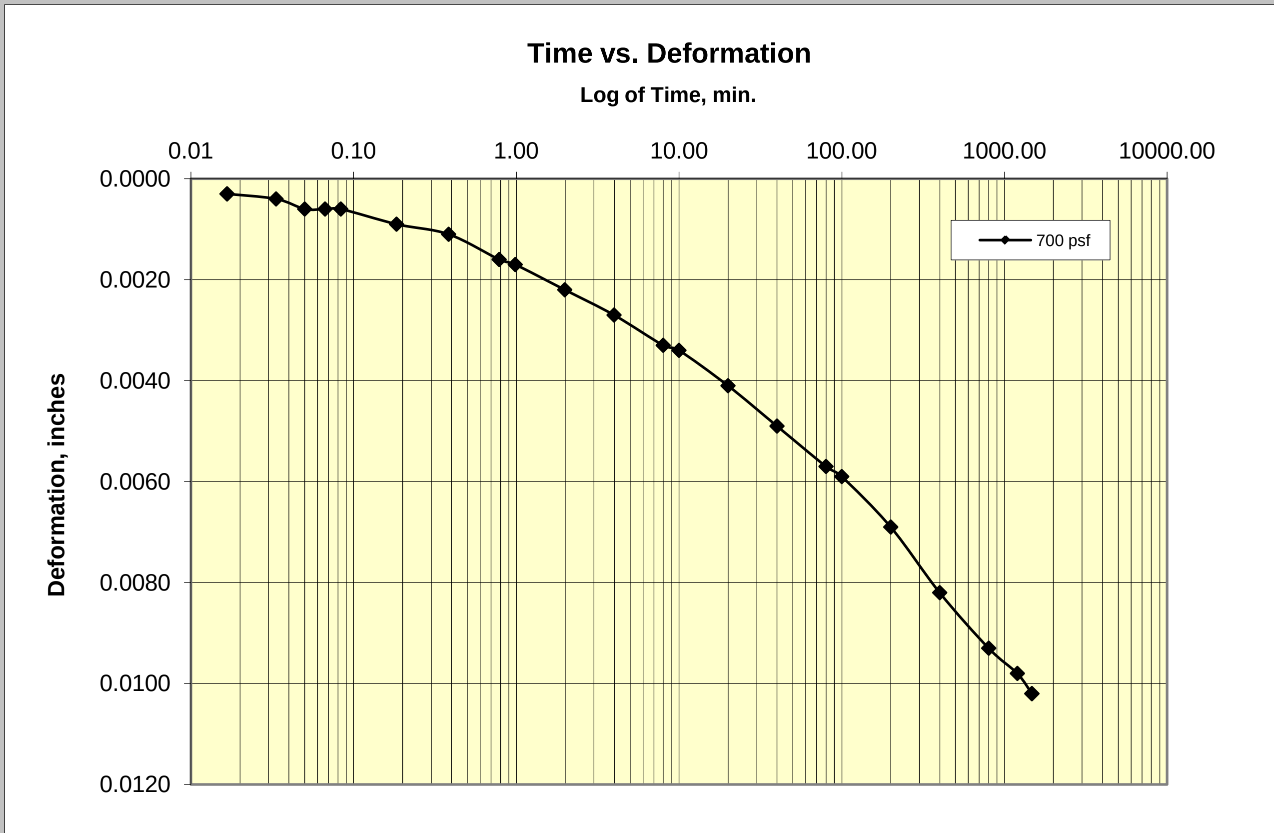


450 PSF

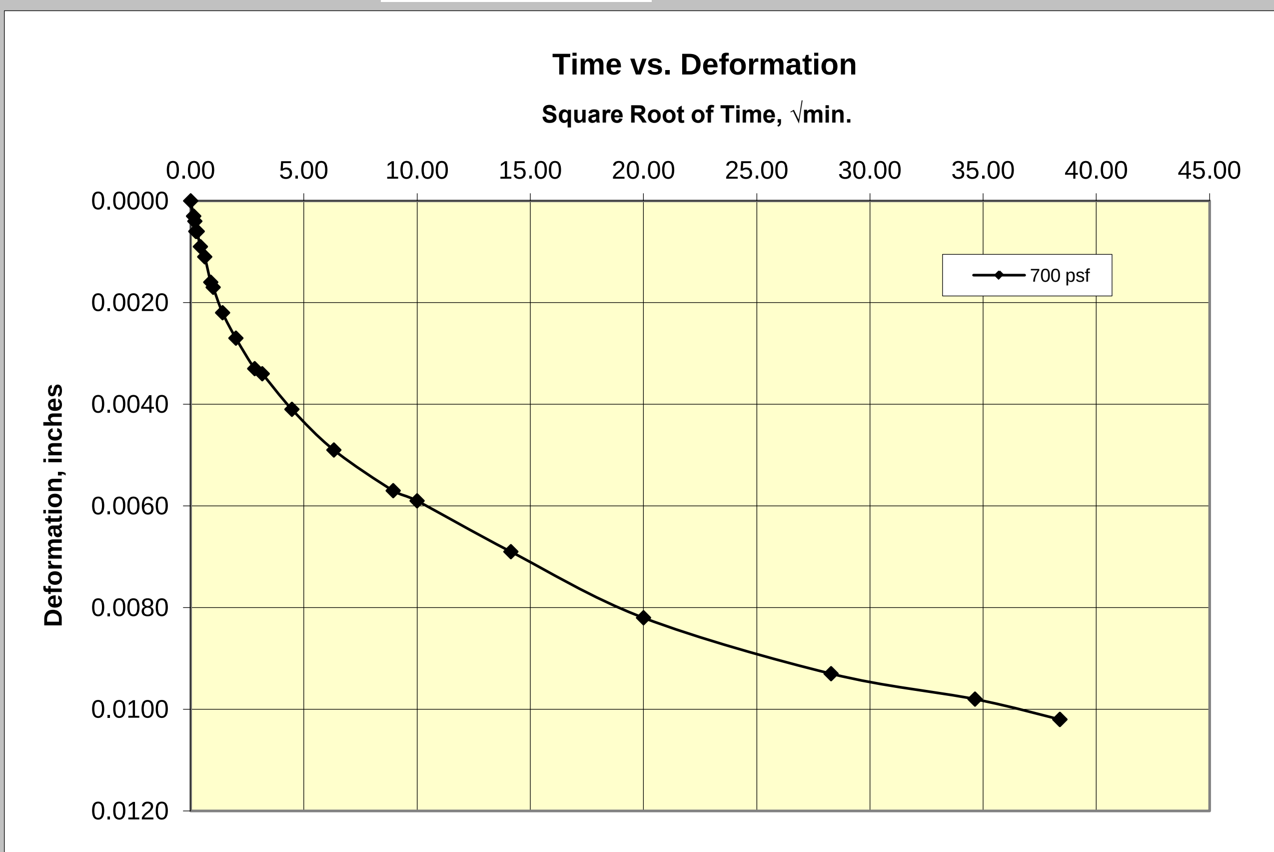


Cooper Testing Labs, Inc.

Load 6	700 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

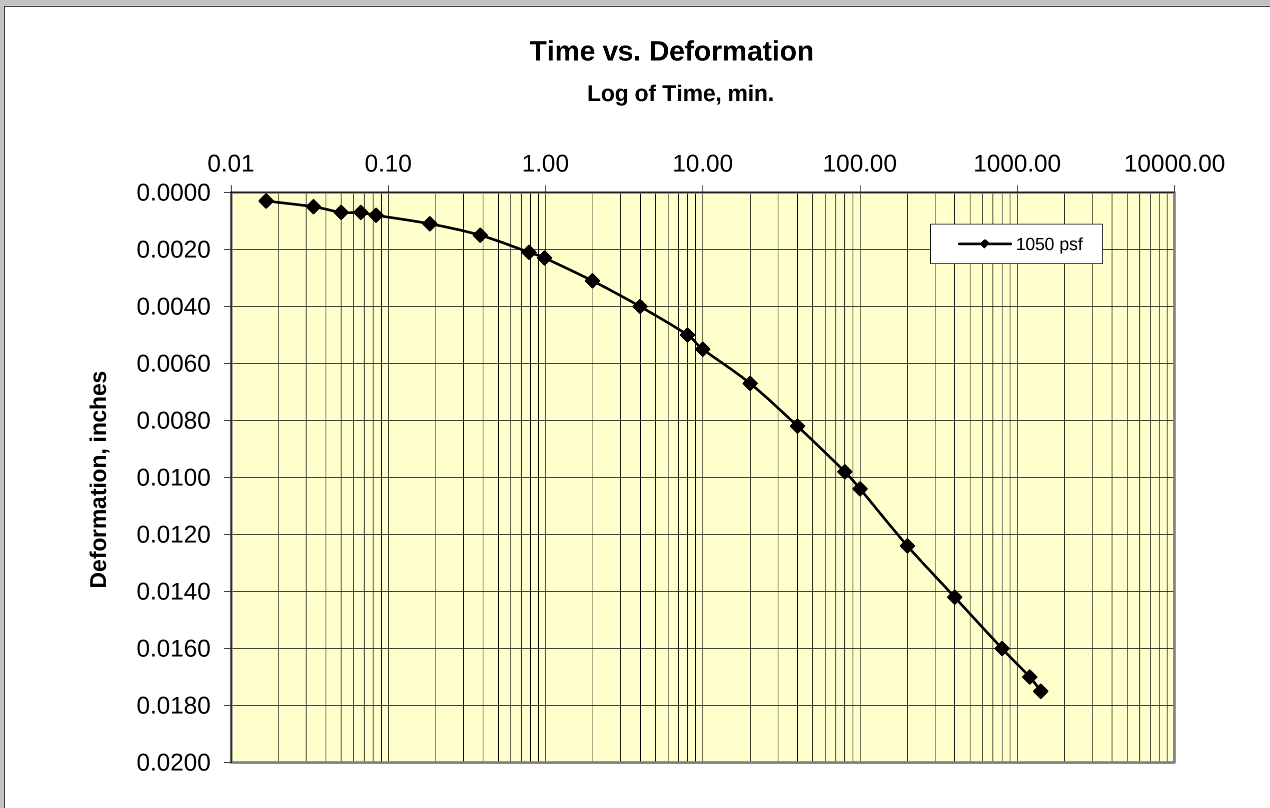


700 PSF

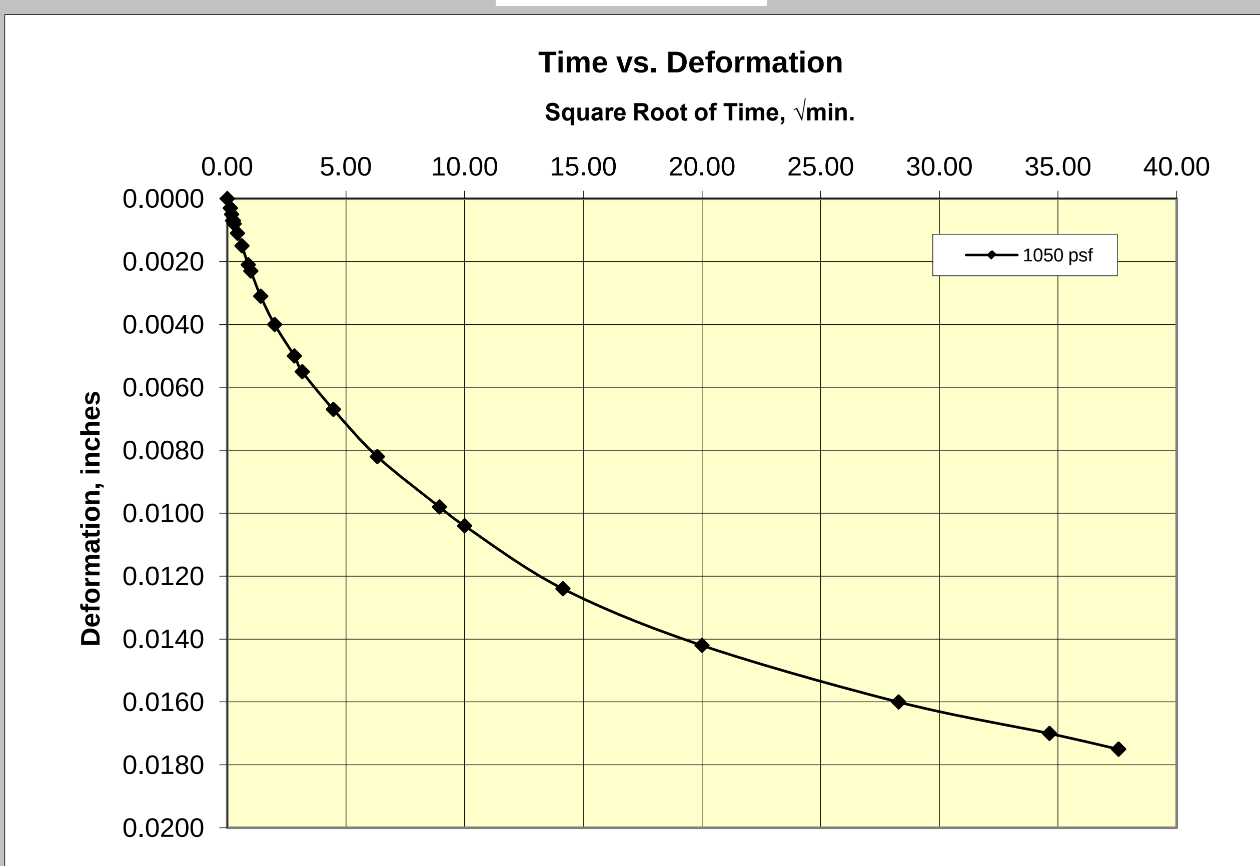


Cooper Testing Labs, Inc.

Load 7	1050 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

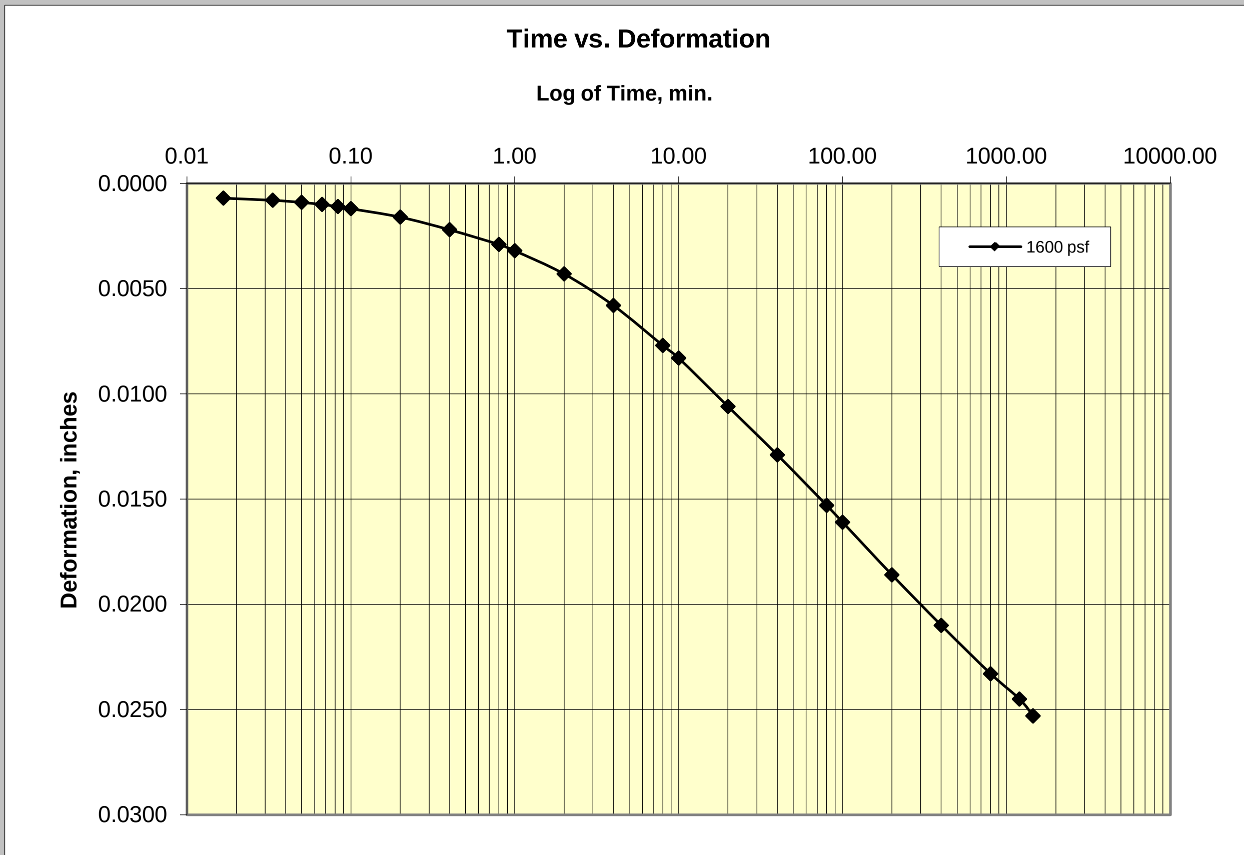


1050 PSF

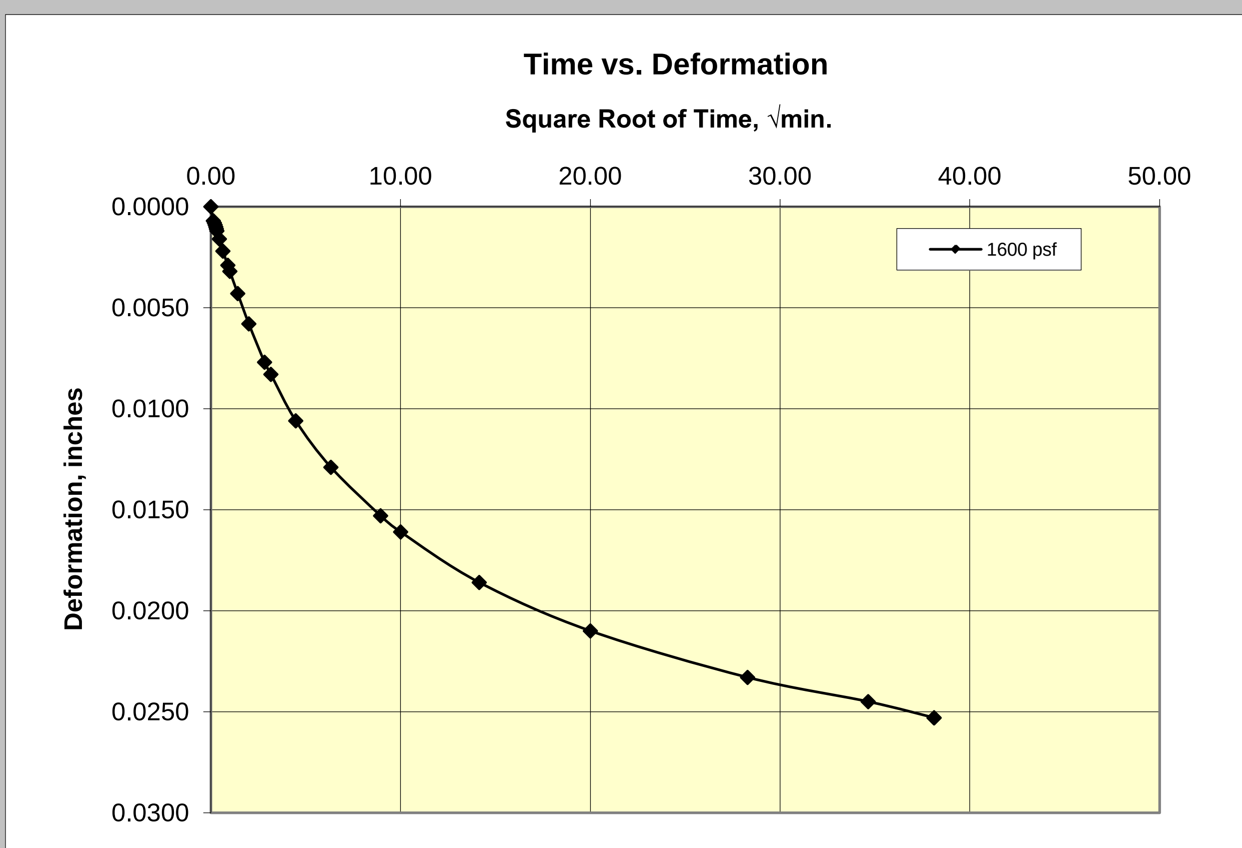


Cooper Testing Labs, Inc.

Load 8	1600 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

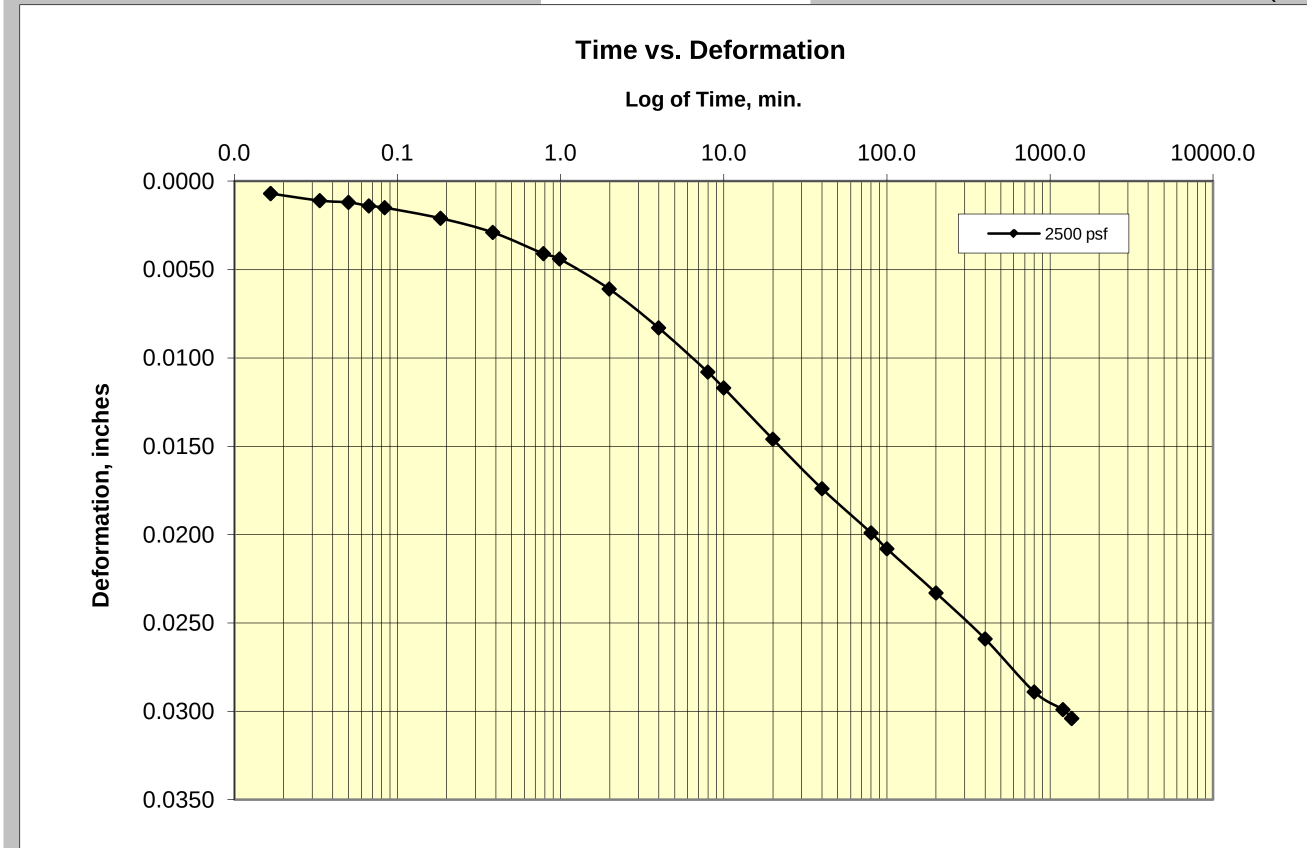


1600 PSF

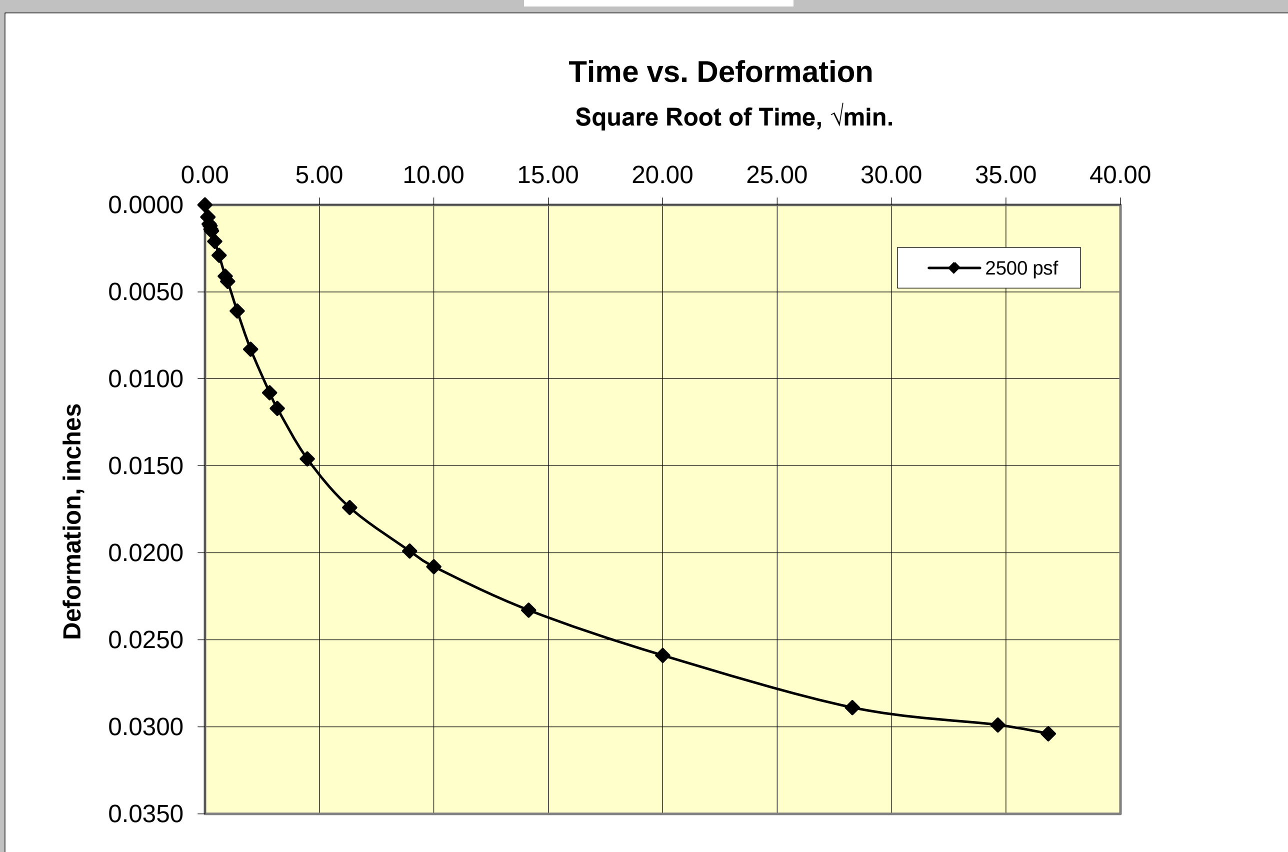


Cooper Testing Labs, Inc.

Load 9	2500 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

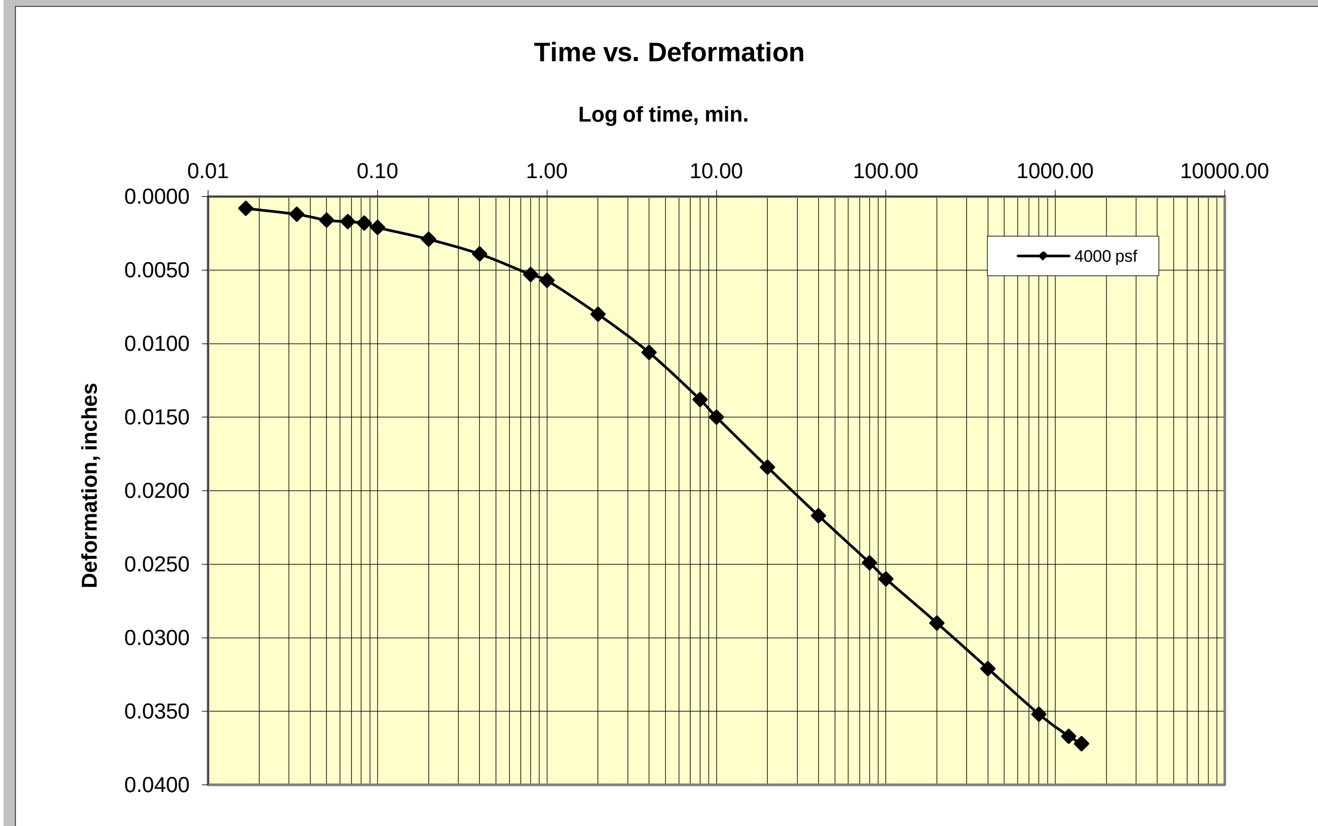


2500 PSF

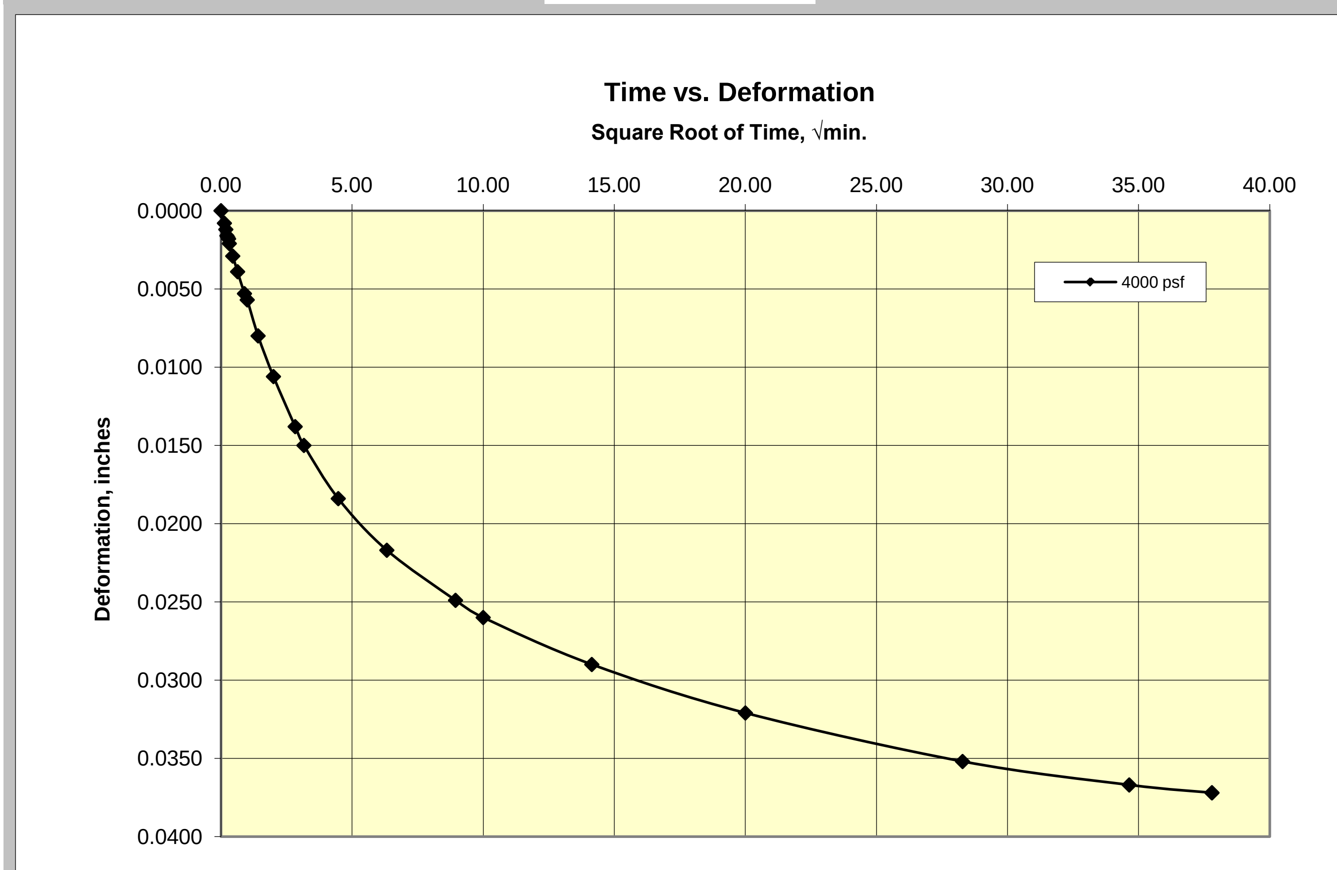


Cooper Testing Labs, Inc.

Load 10	4000 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

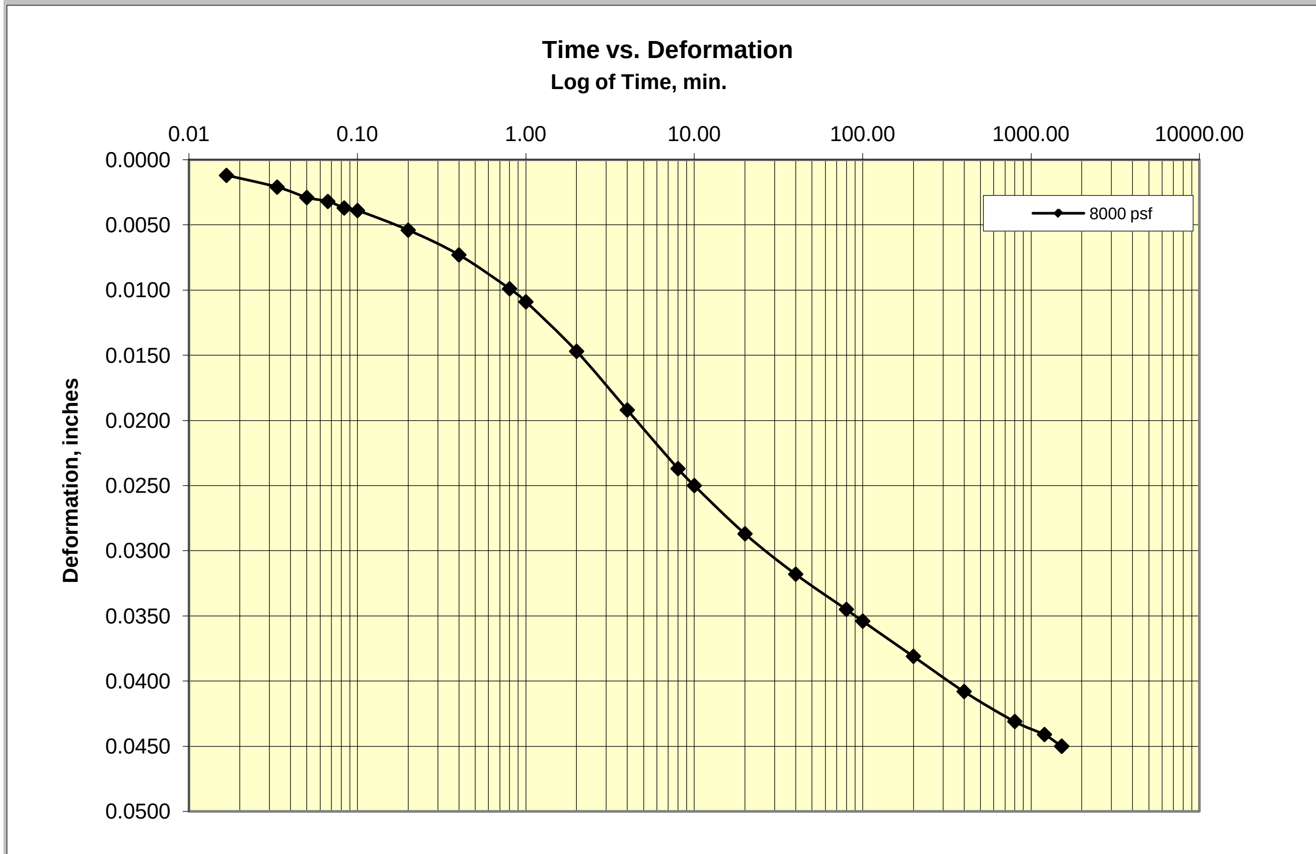


4000 PSF

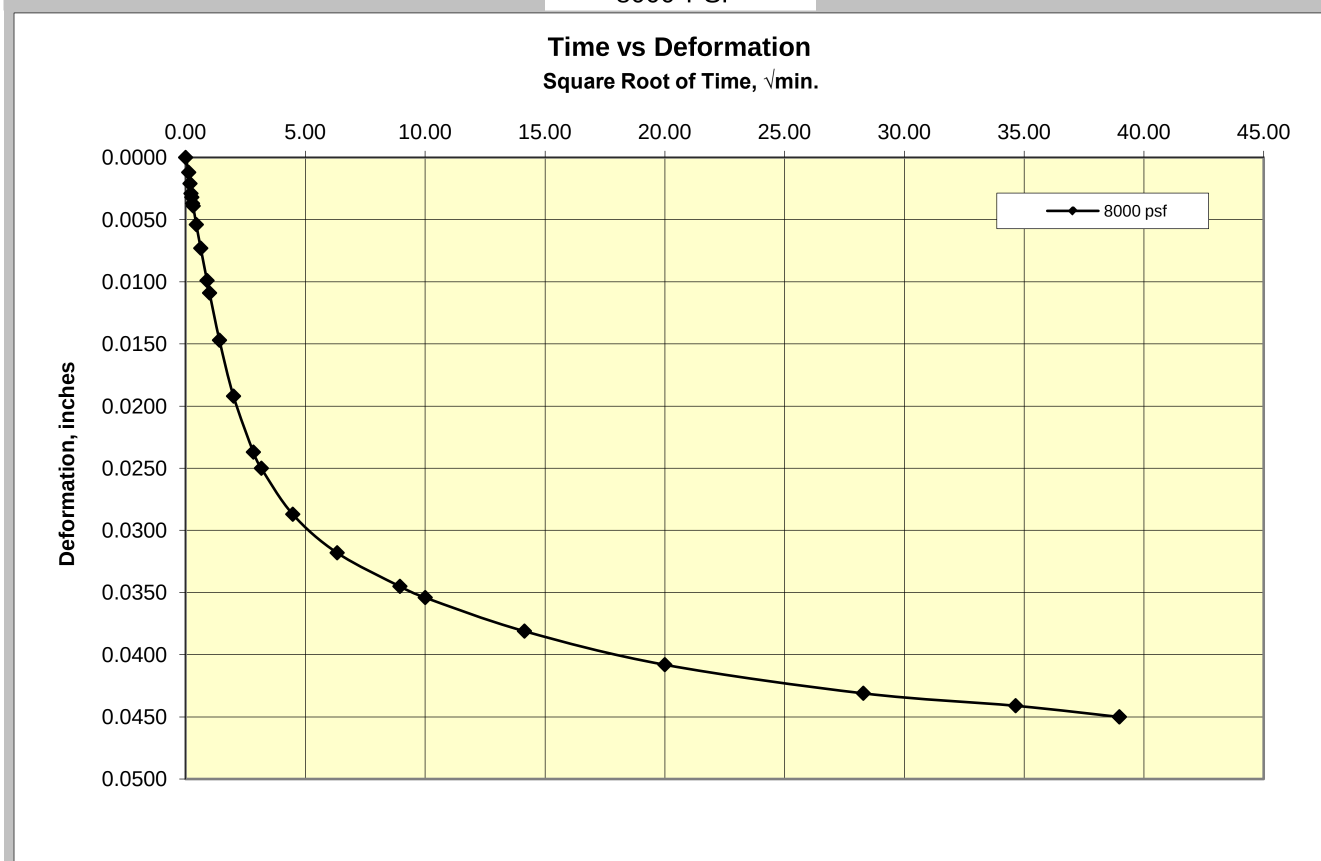


Cooper Testing Labs, Inc.

Load 11	8000 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

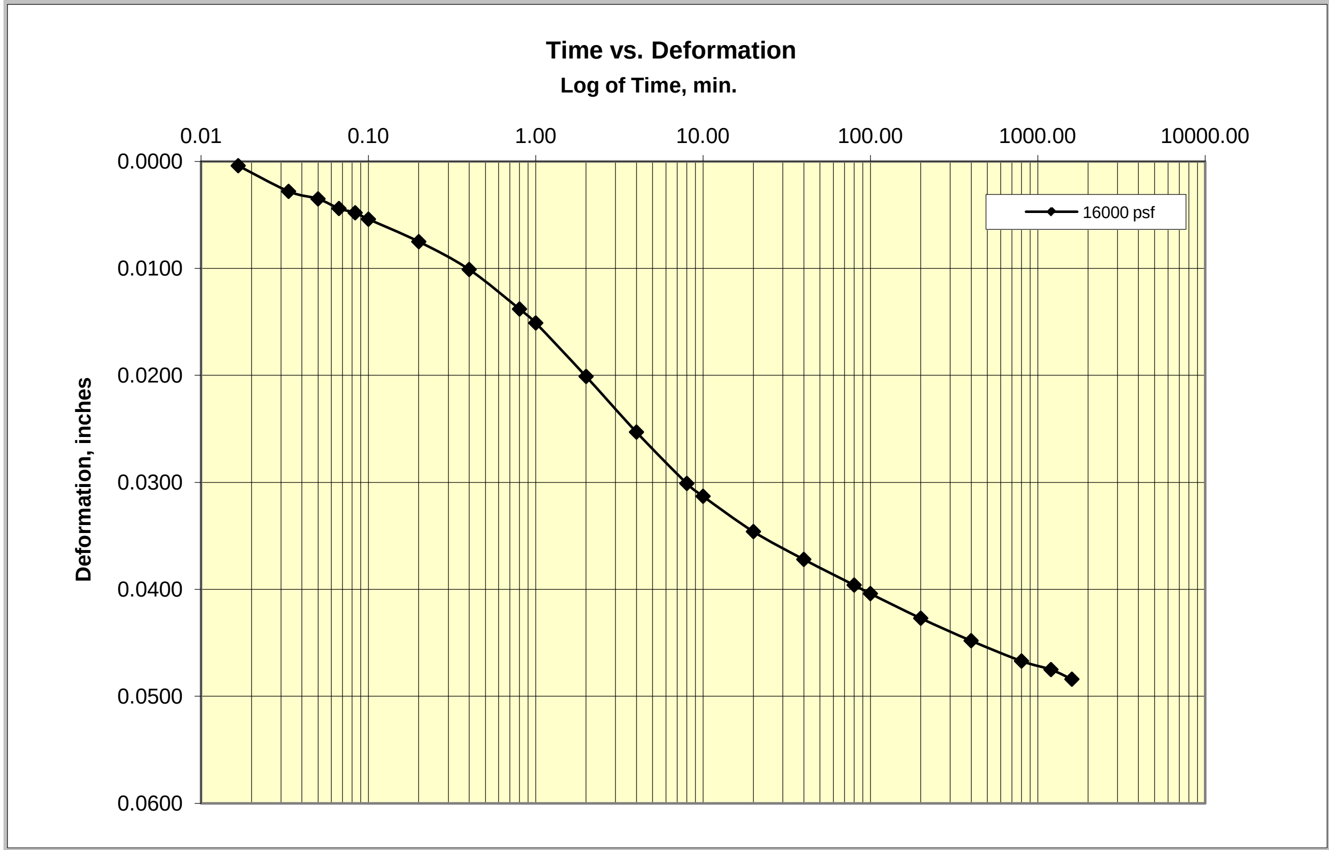


8000 PSF

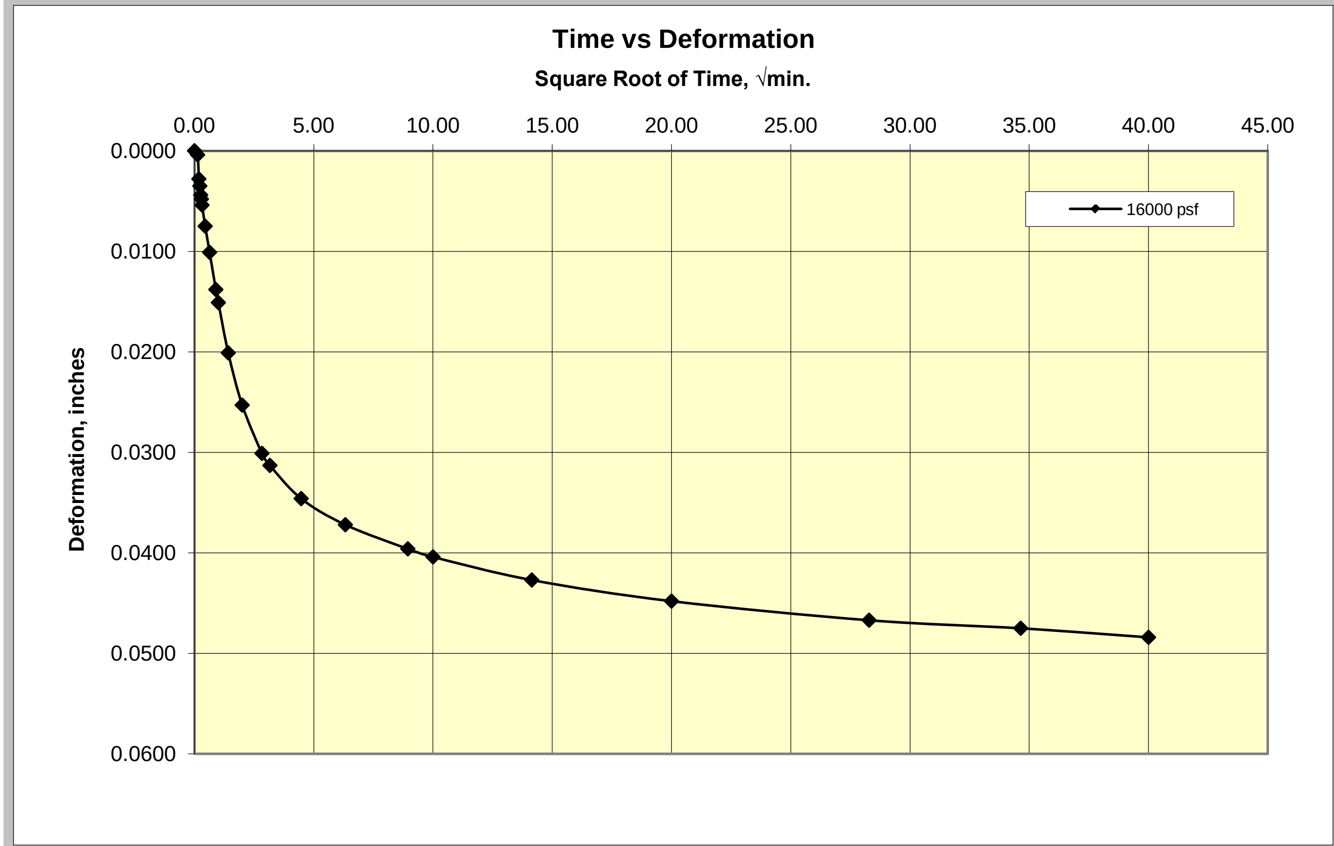


Cooper Testing Labs, Inc.

Load 12	16000 PSF	AUS-B-01-7.0-9.0	(8.5 ft)

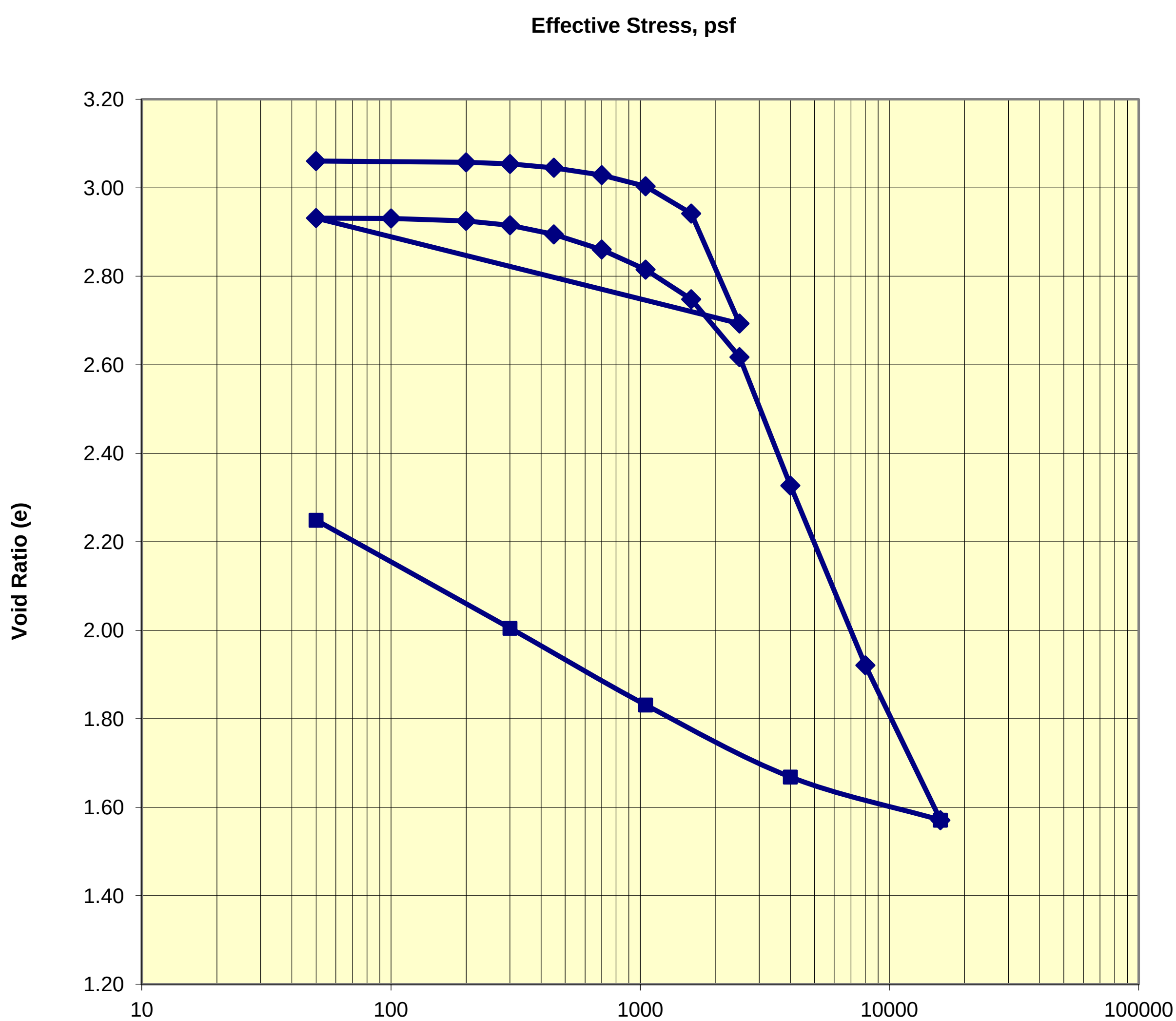


16000 PSF



Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-01	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-04	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	22-24(Tip-7)	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Elastic SILT w/ organics (Bay Mud)		(23.4 ft)	**Date:**	5/9/2012

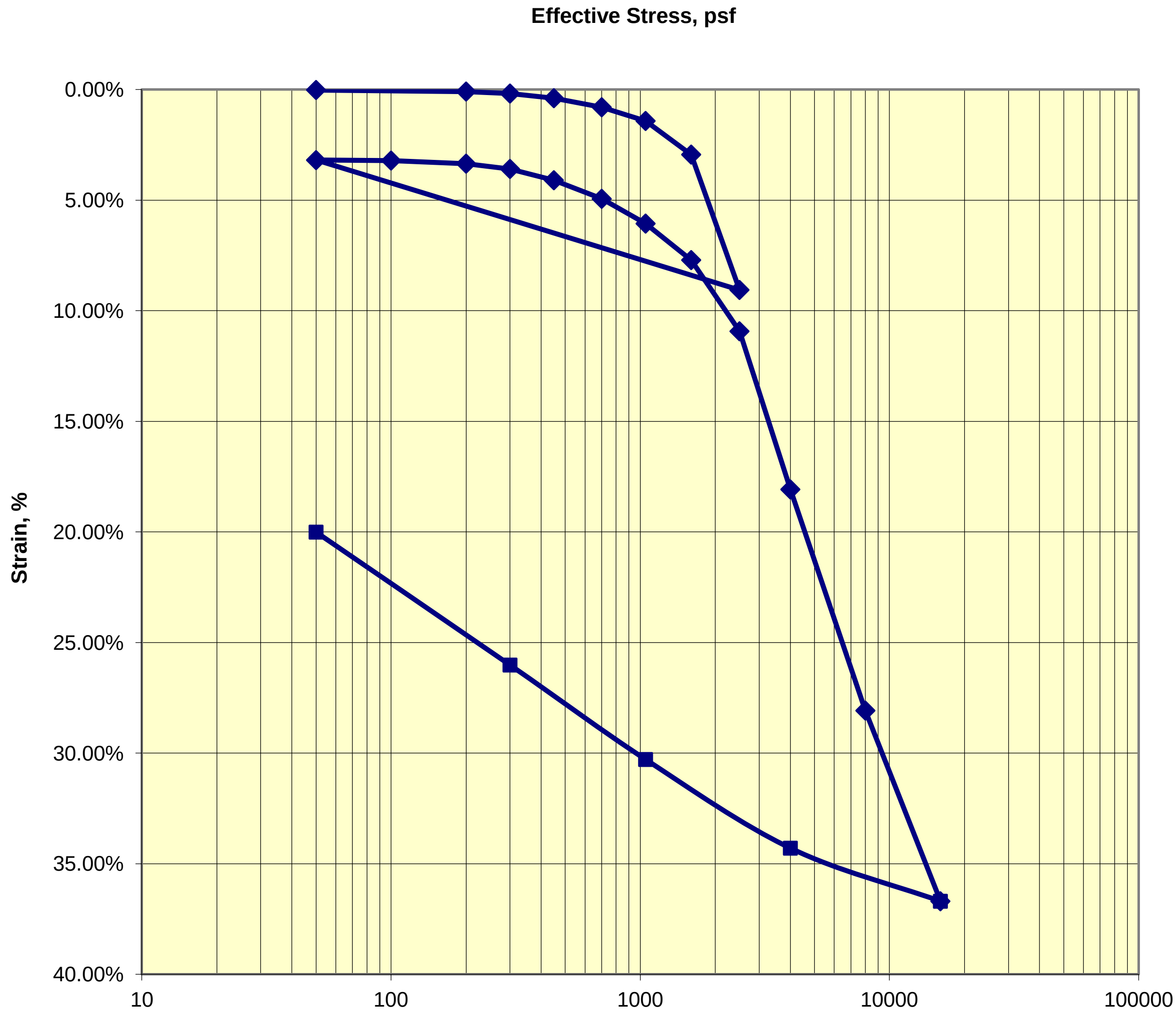


Ass. Gs = 2.7	**Initial**	**Final**
Moisture %:	110.2	81.9
Dry Density, pcf:	41.5	52.5
Void Ratio:	3.058	2.208
% Saturation:	97.3	100

Remarks:

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-01	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-04	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	22-24(Tip-7)	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Elastic SILT w/ organics (Bay Mud)		(23.4 ft)	**Date:**	5/9/2012

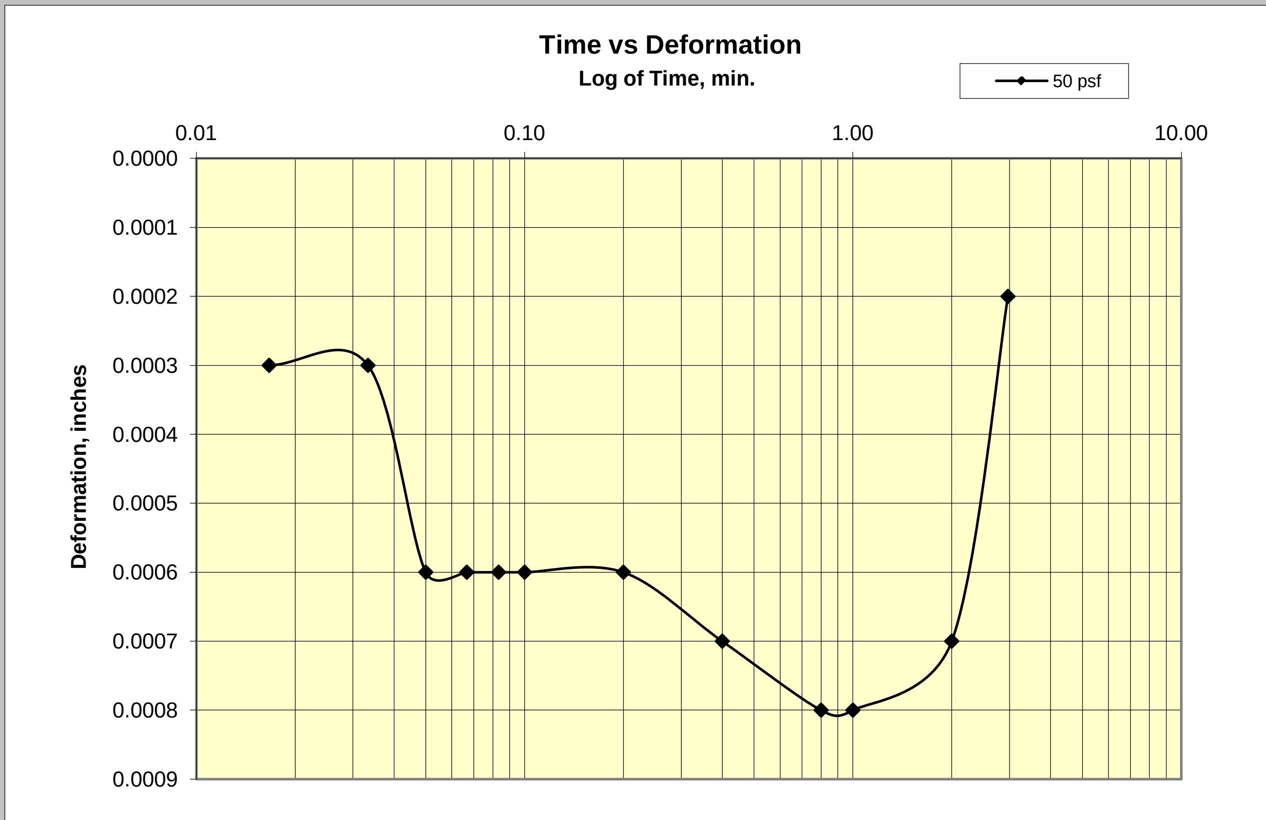


Ass. Gs = 2.7	Initial	Final
Moisture %:	110.2	81.9
Dry Density, pcf:	41.5	52.5
Void Ratio:	3.058	2.208
% Saturation:	97.3	100

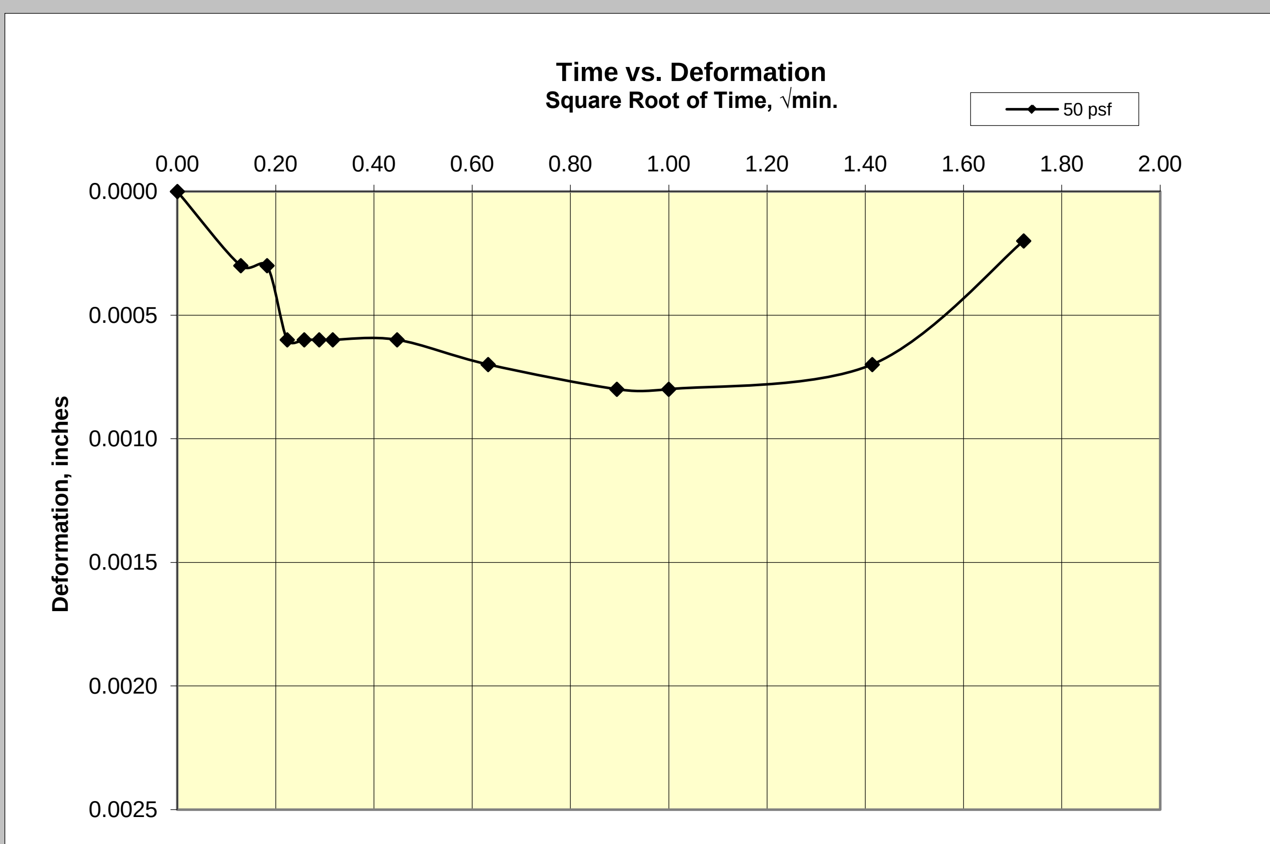
Remarks:

Cooper Testing Labs, Inc.

Load 1 | 50 PSF | AUS-B-01-22.0-24.0 | (23.4 ft)

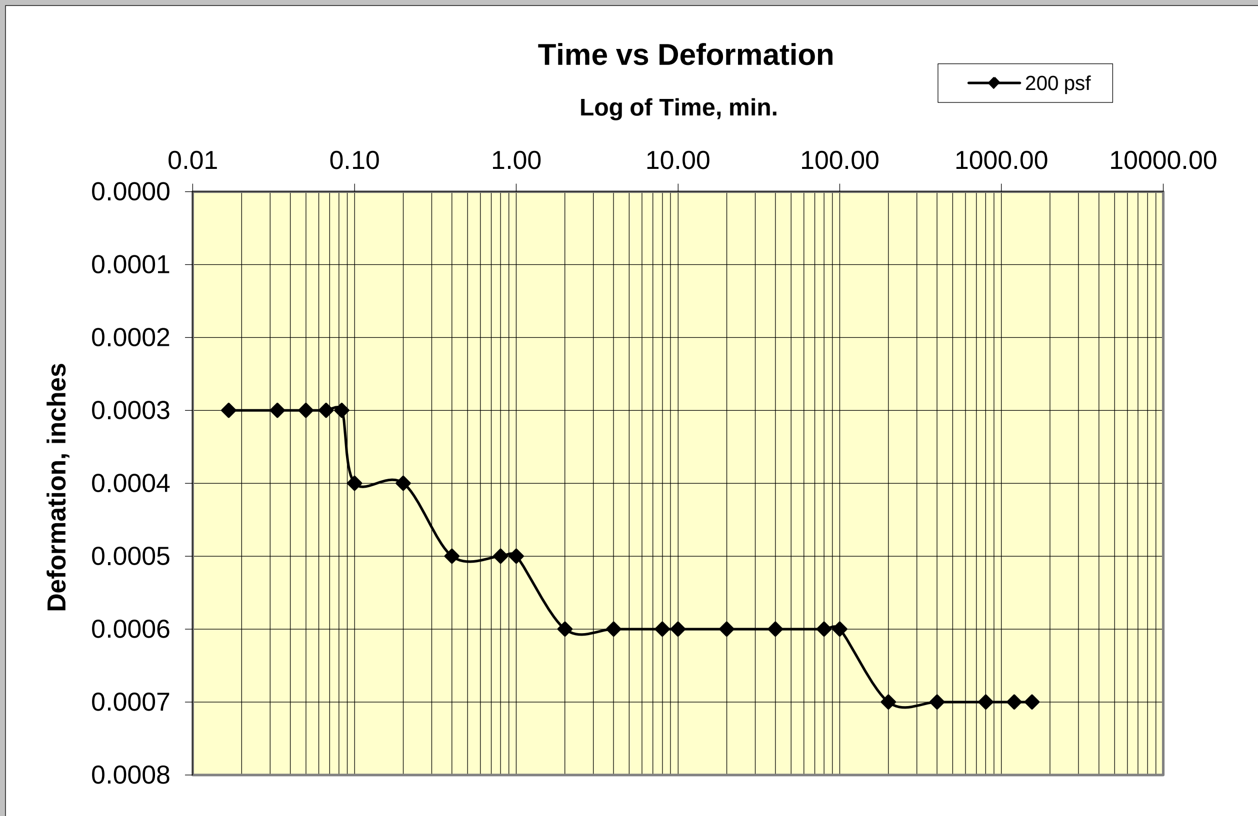


50 PSF

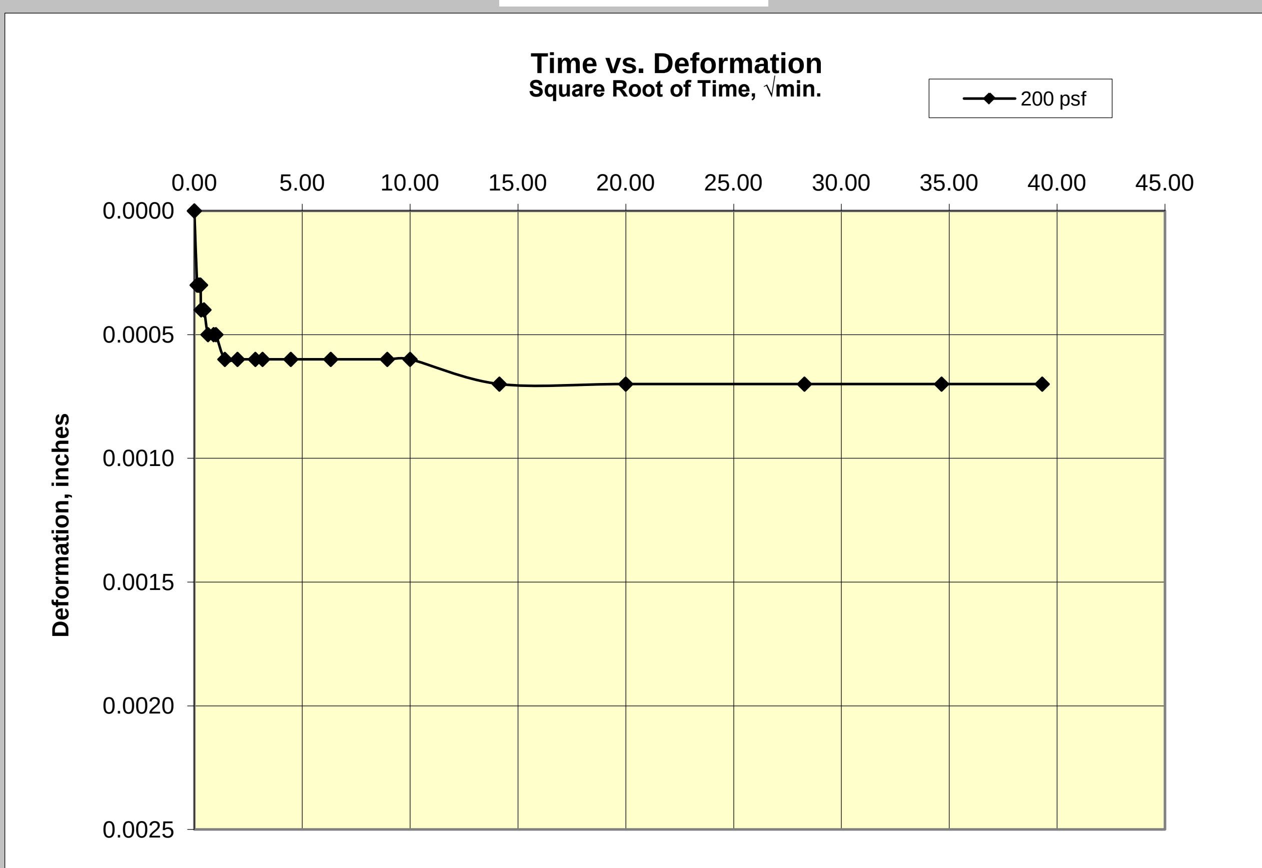


Cooper Testing Labs, Inc.

Load 2	200 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

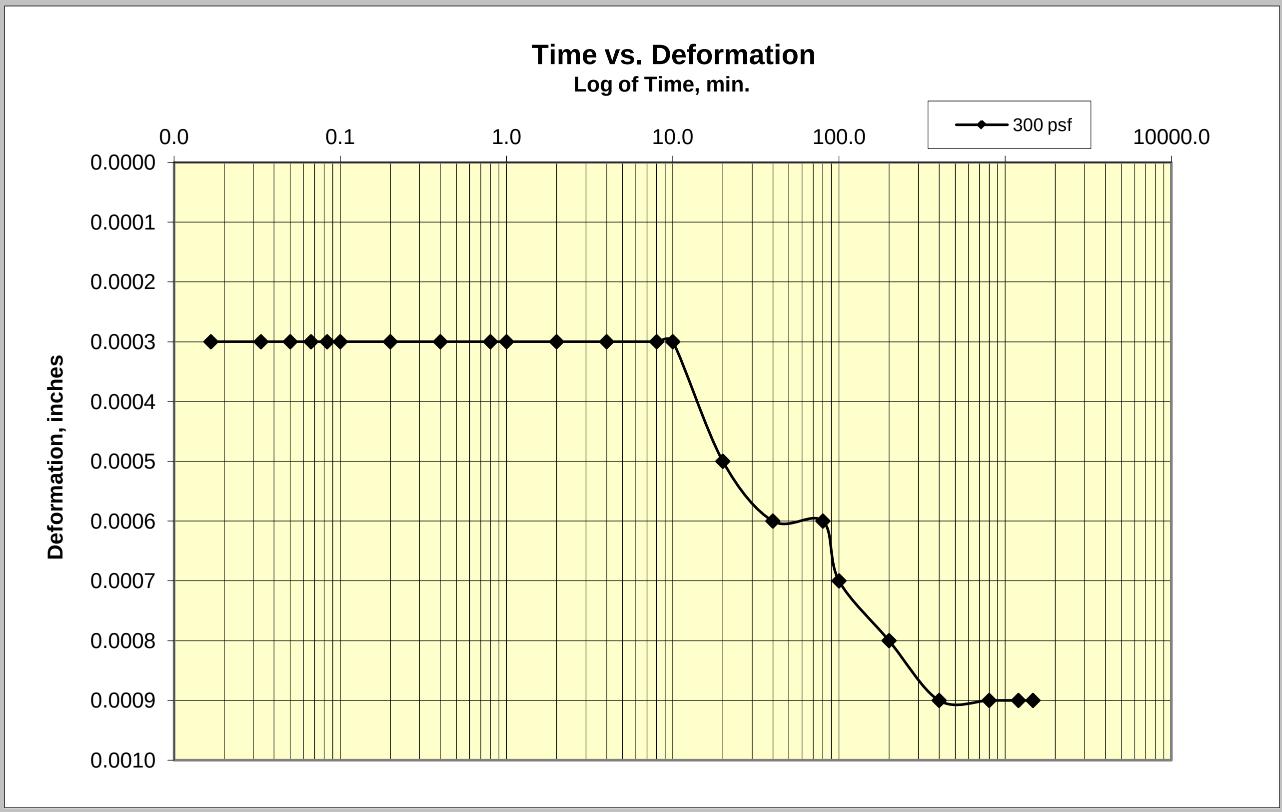


200 PSF

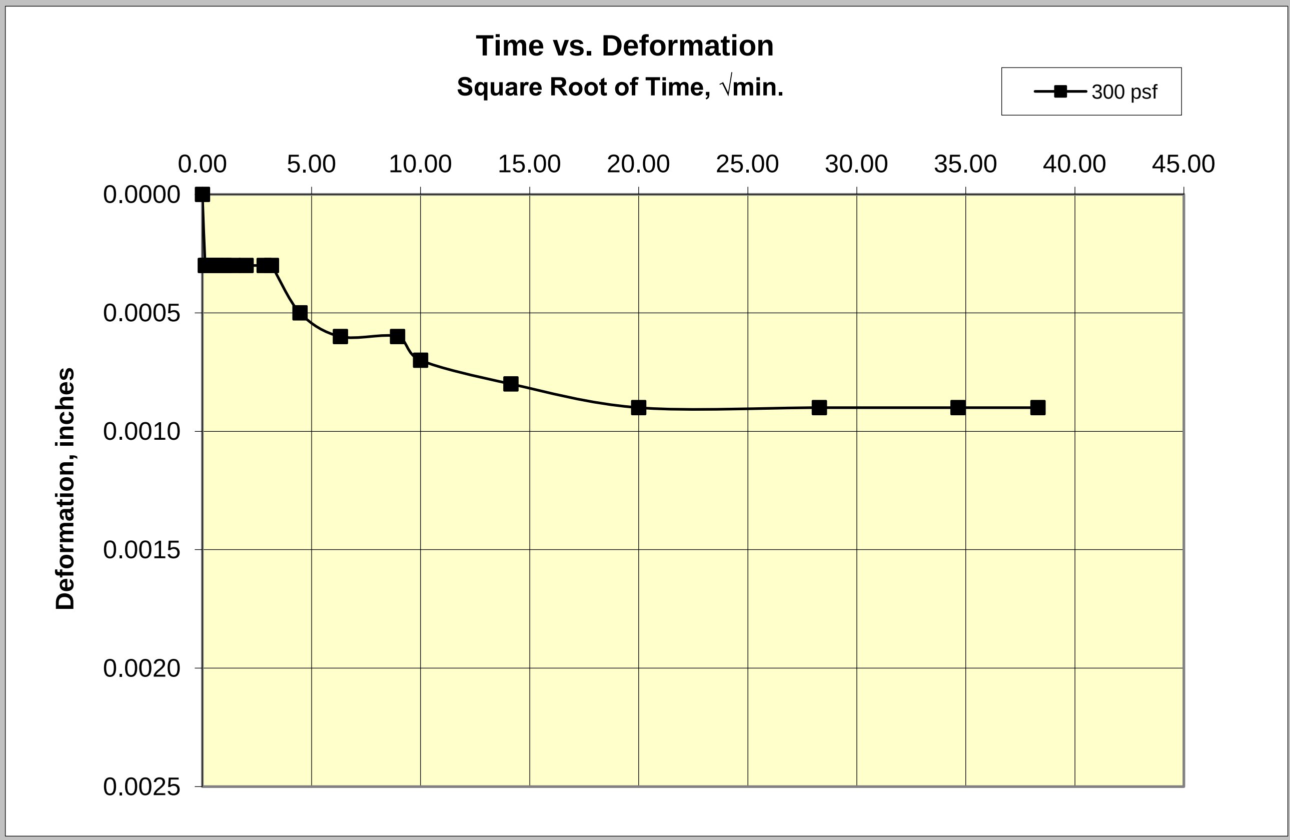


Cooper Testing Labs, Inc.

Load 3	300 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

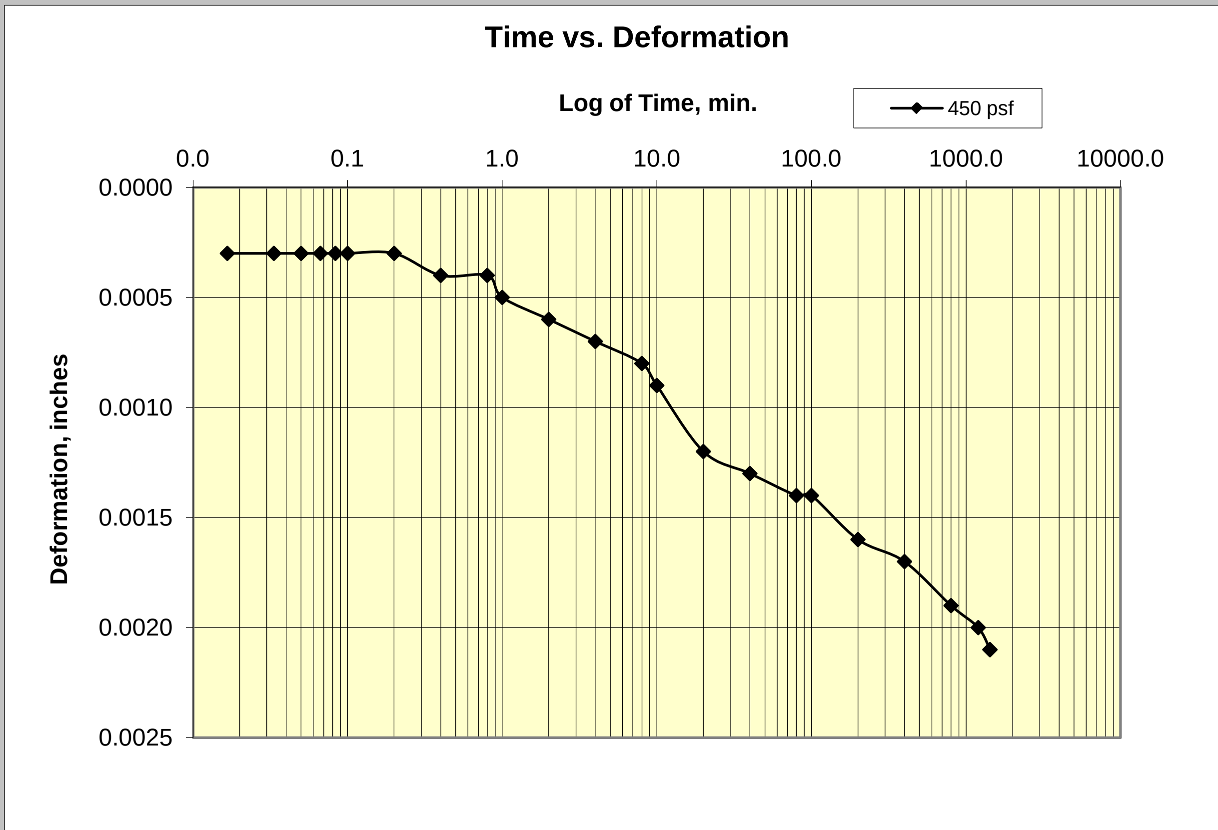


300 PSF

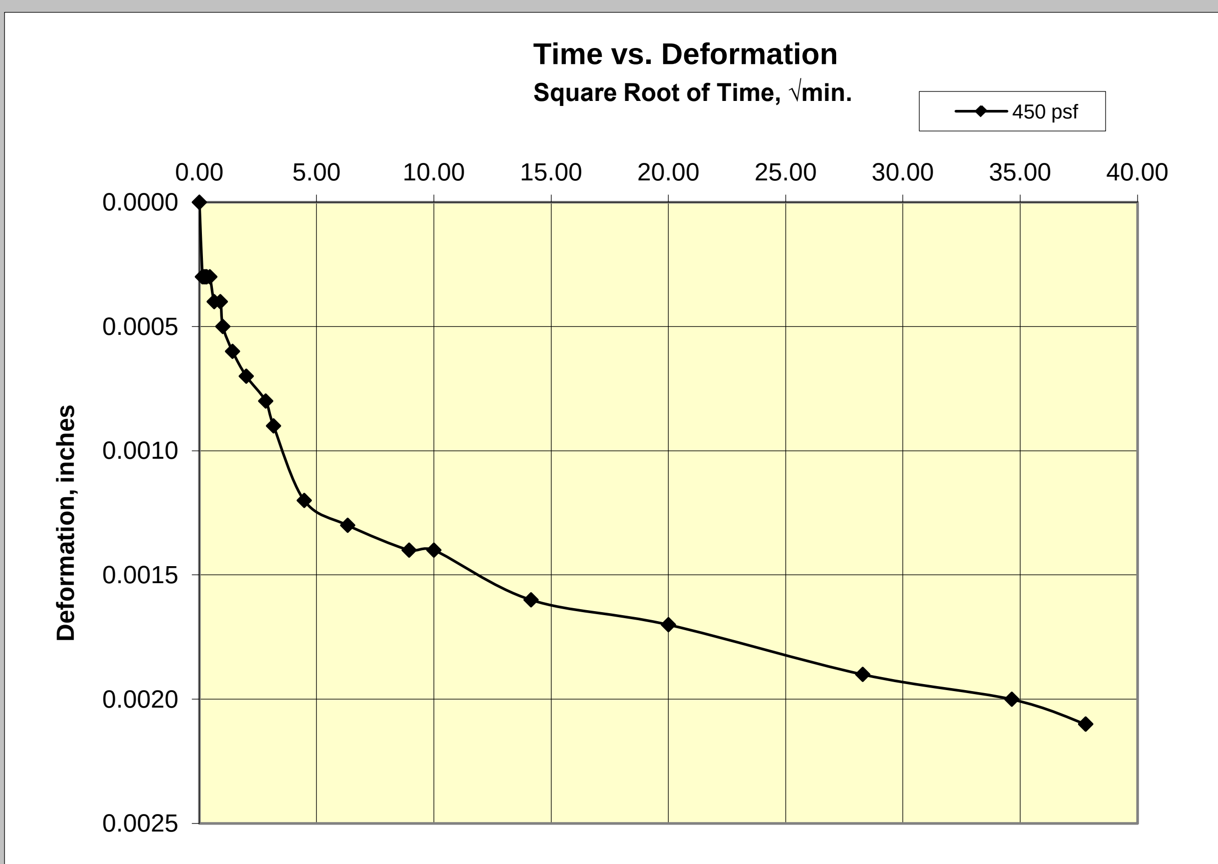


Cooper Testing Labs, Inc.

Load 4	450 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

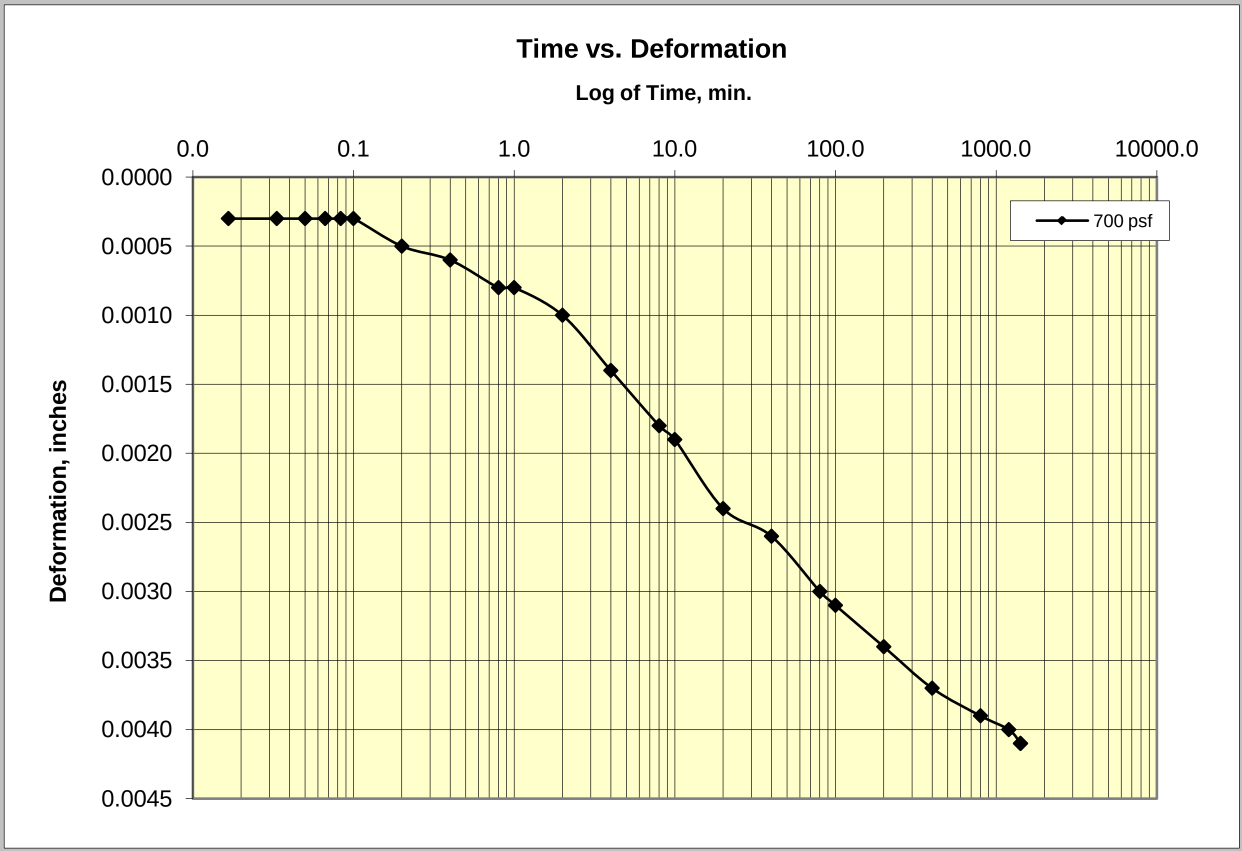


450 PSF

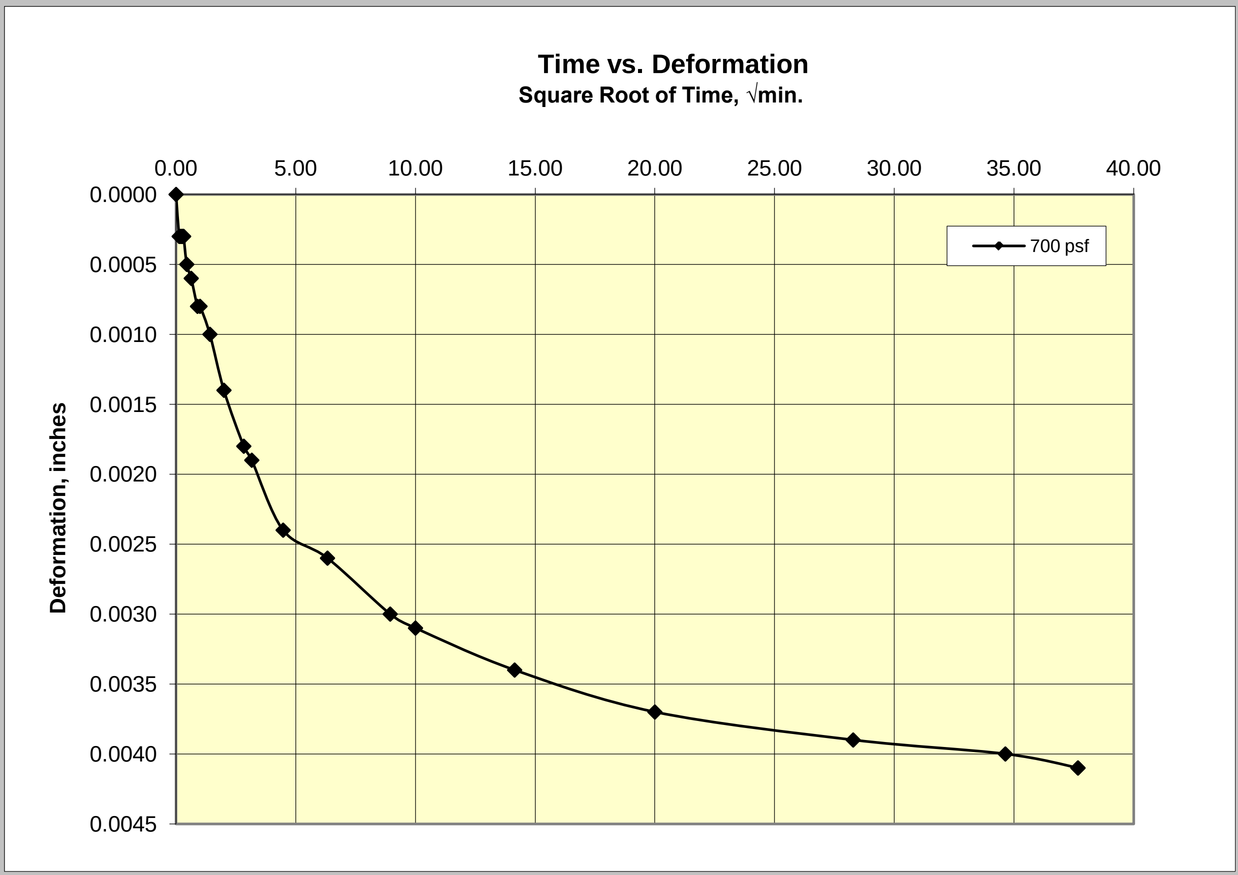


Cooper Testing Labs, Inc.

Load 5	700 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

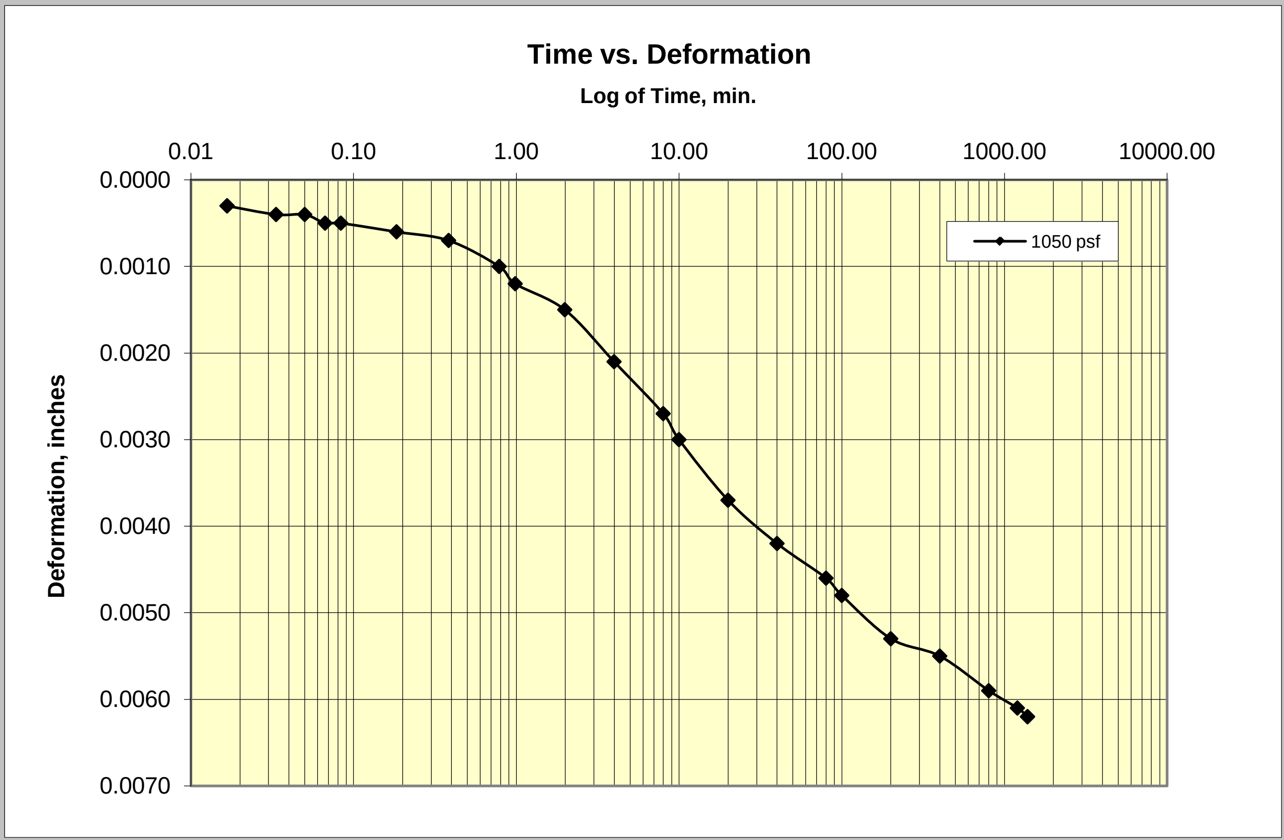


700 PSF

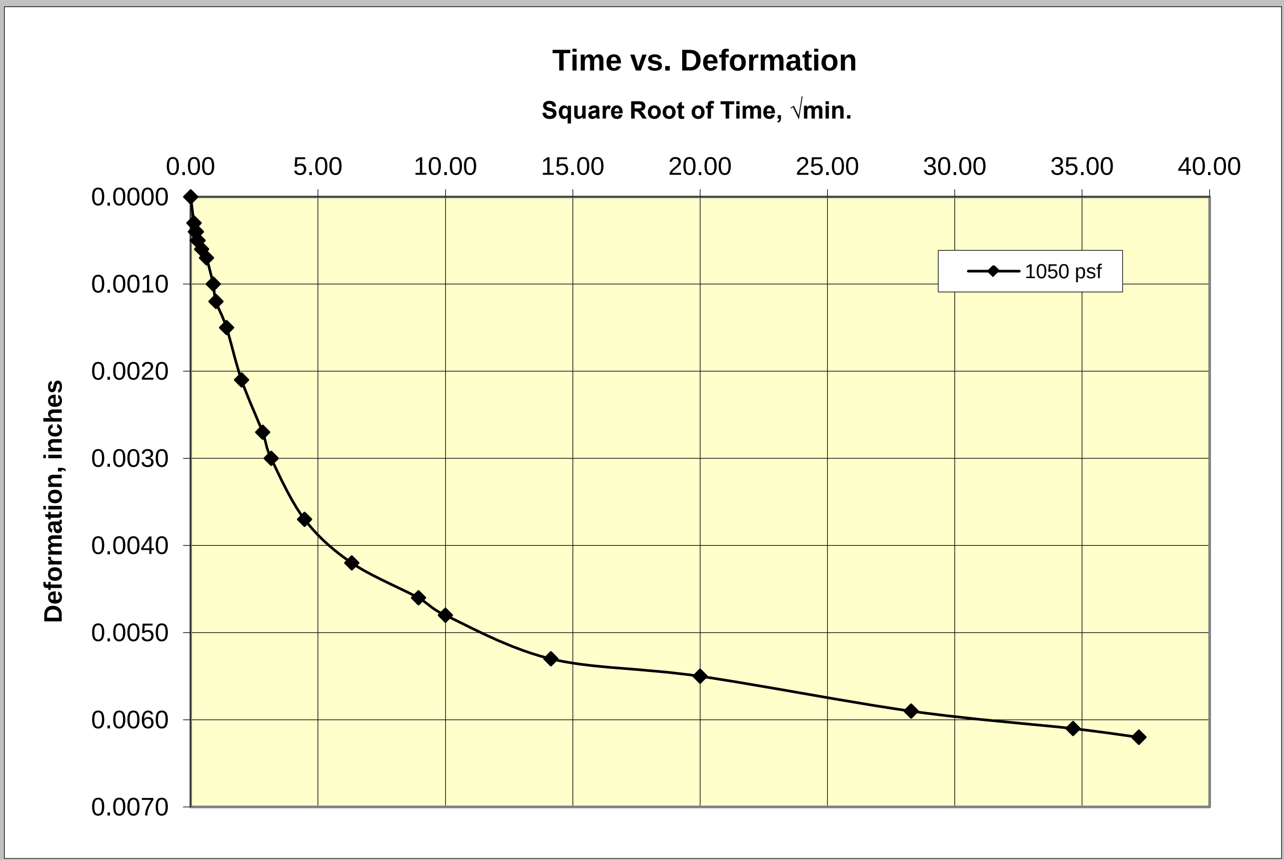


Cooper Testing Labs, Inc.

Load 6	1050 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

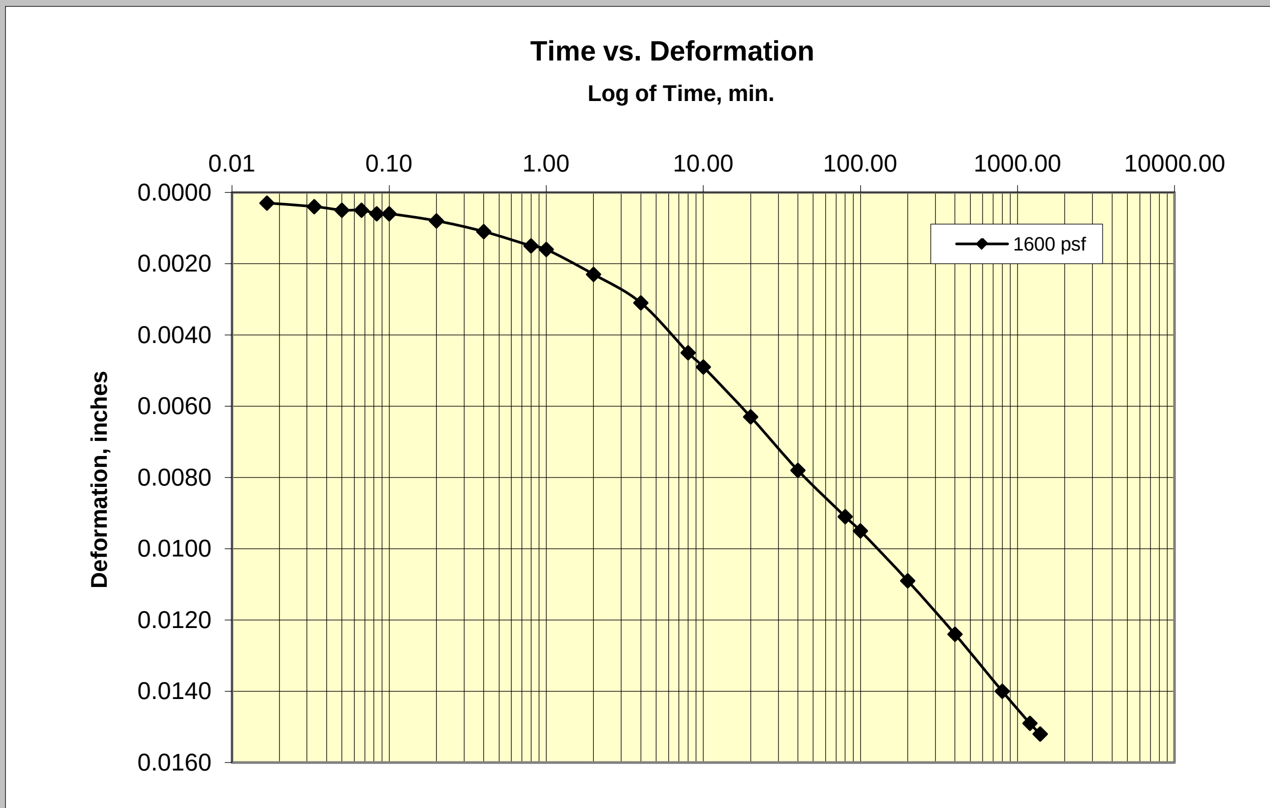


1050 PSF

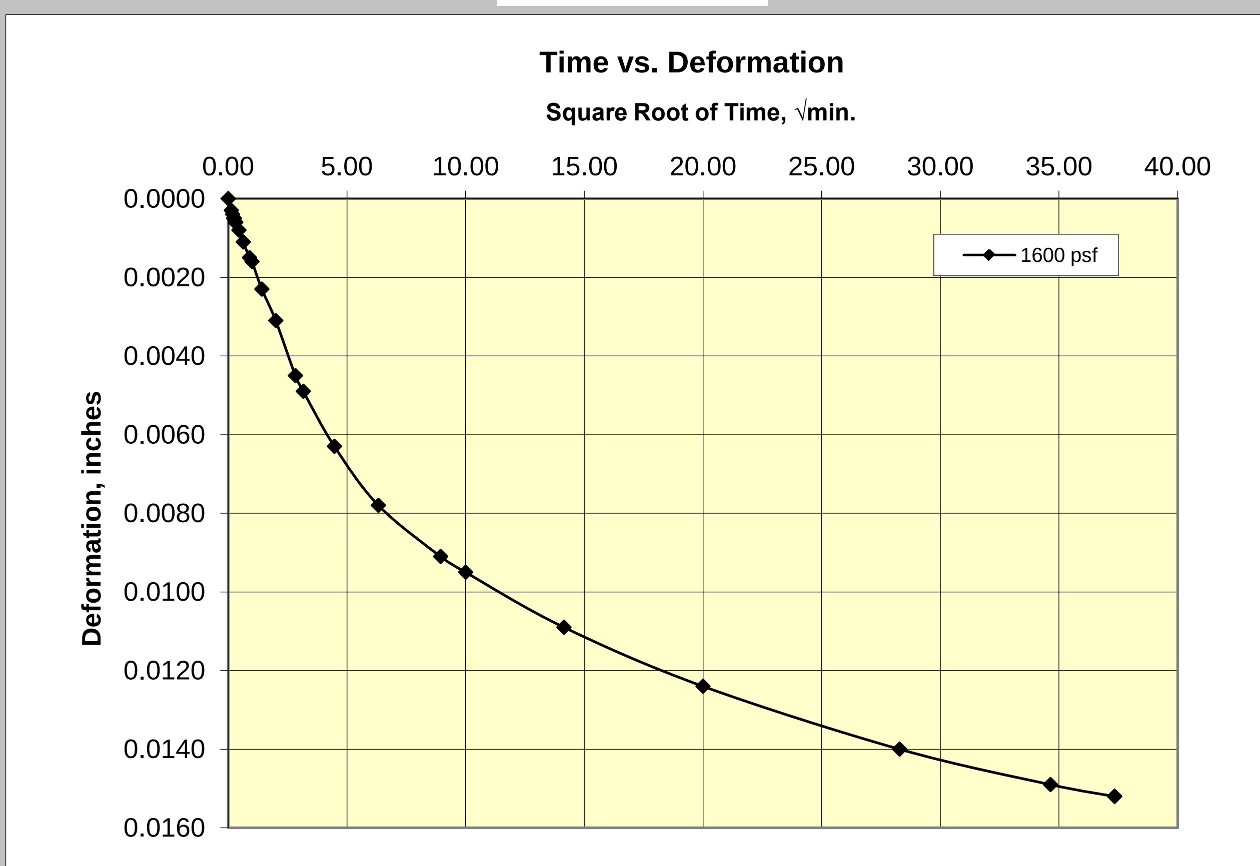


Cooper Testing Labs, Inc.

Load 7	1600 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

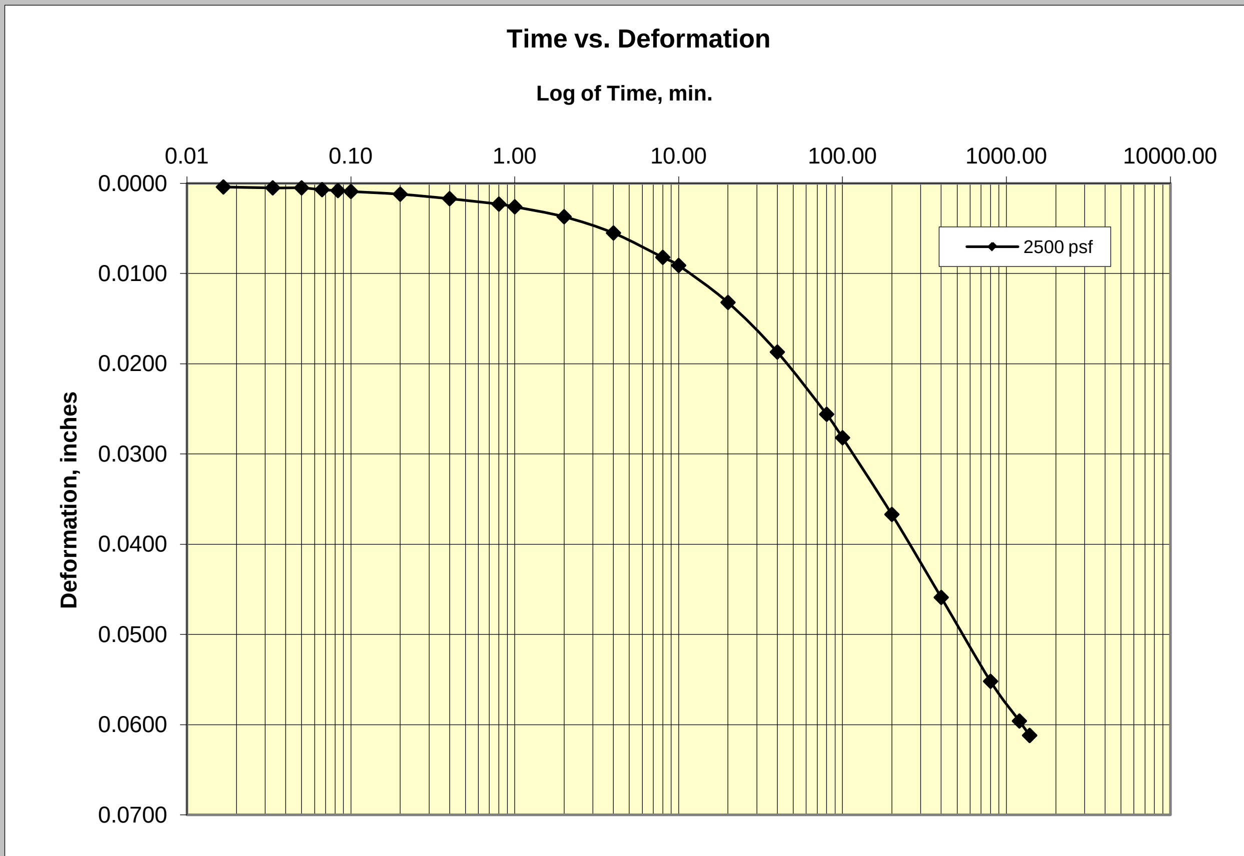


1600 PSF

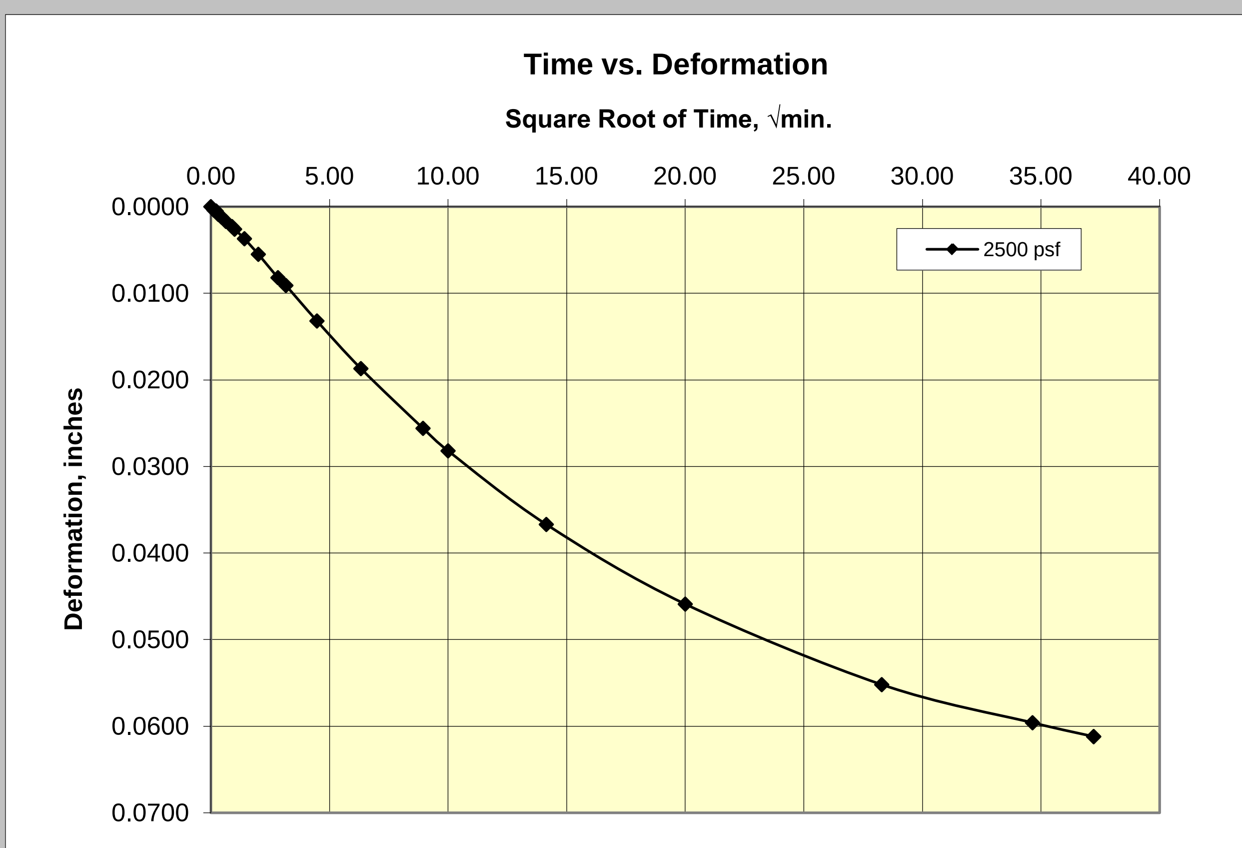


Cooper Testing Labs, Inc.

Load 8 | 2500 PSF | AUS-B-01-22.0-24.0 | (23.4 ft)

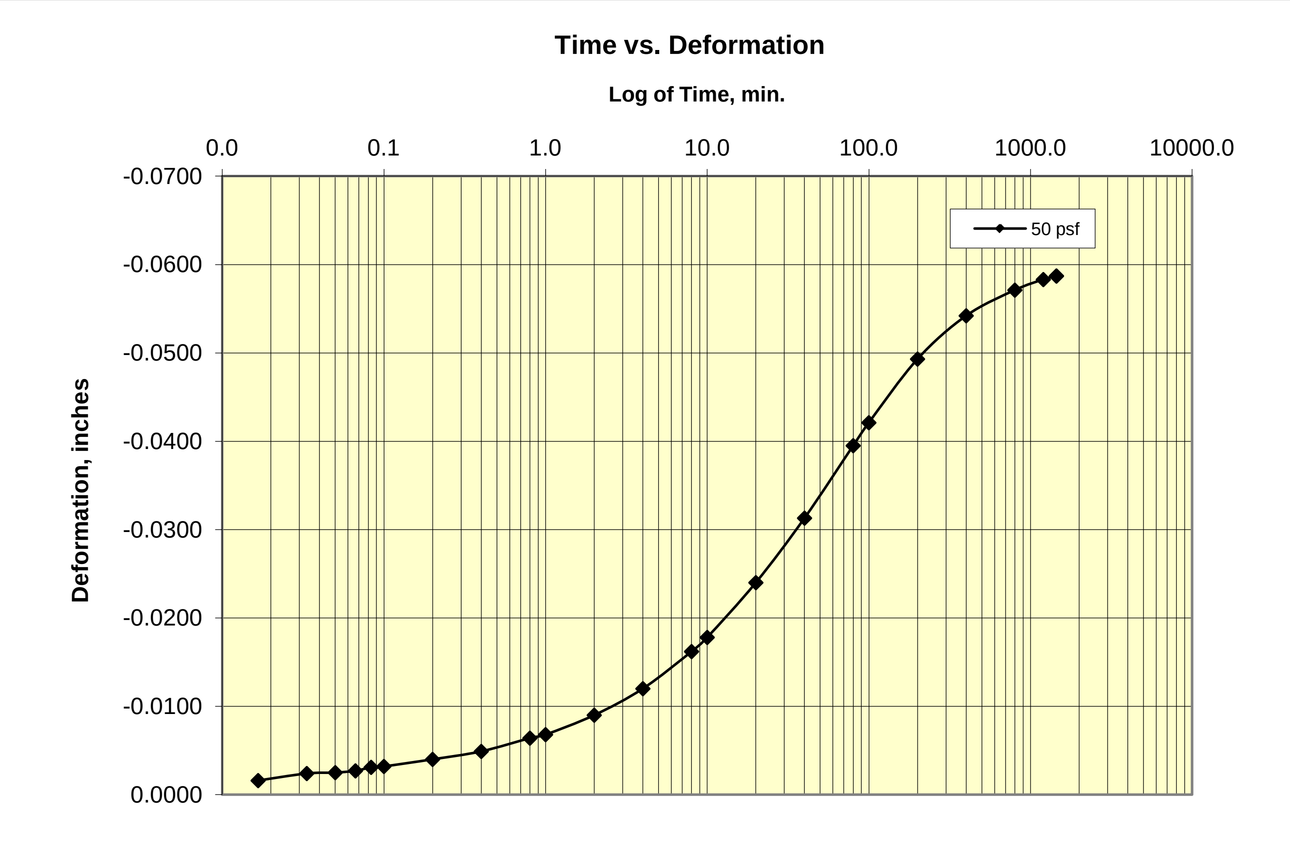


2500 PSF

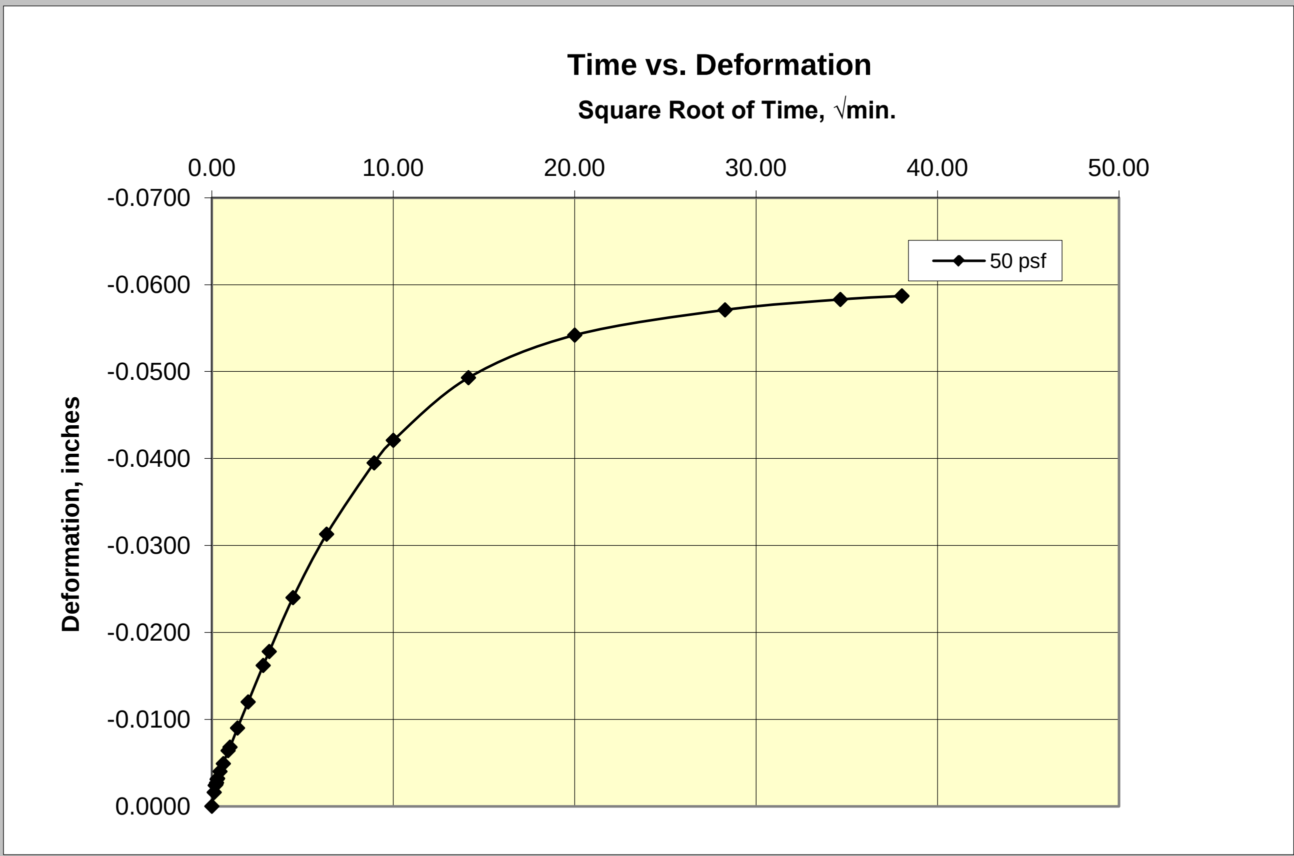


Cooper Testing Labs, Inc.

Load 9 | 50 PSF | AUS-B-01-22.0-24.0 | (23.4 ft)

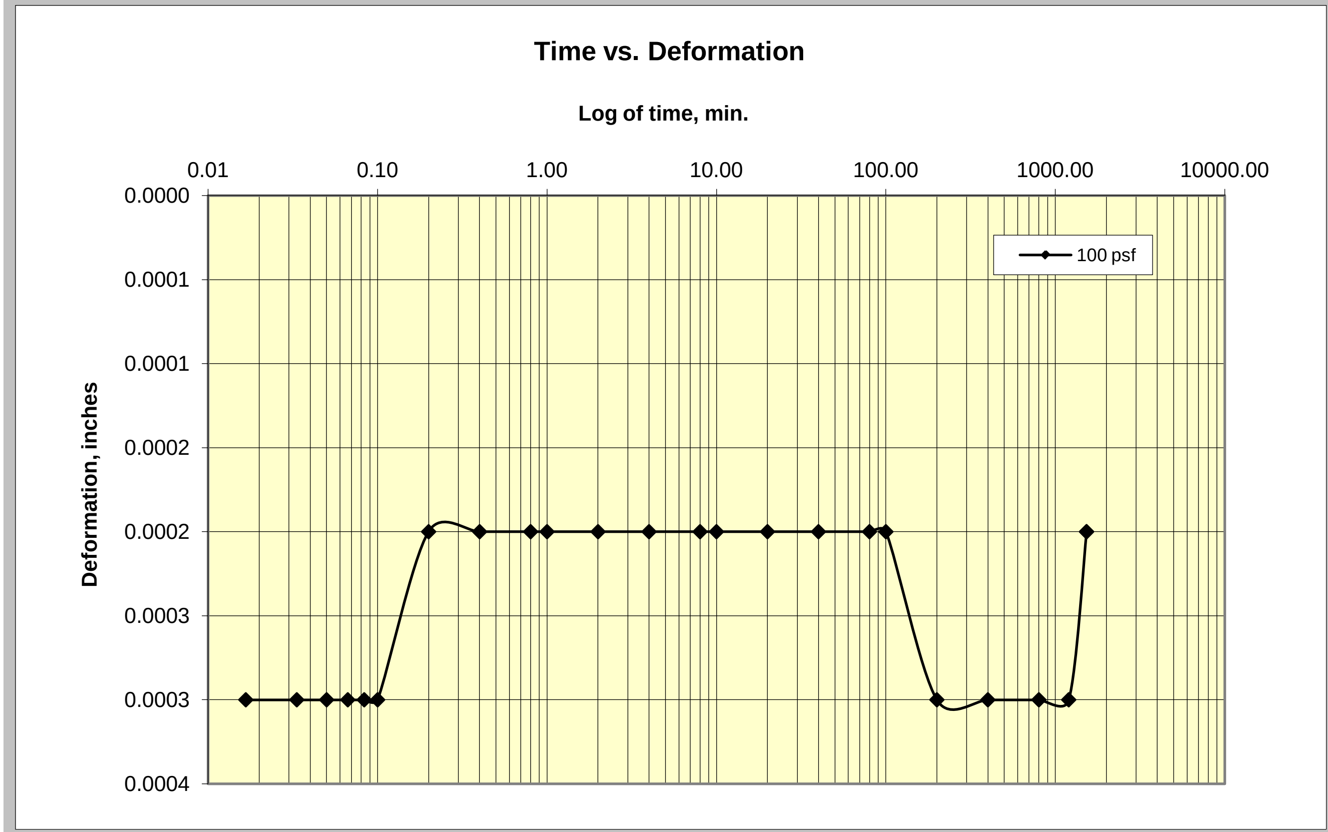


50 PSF

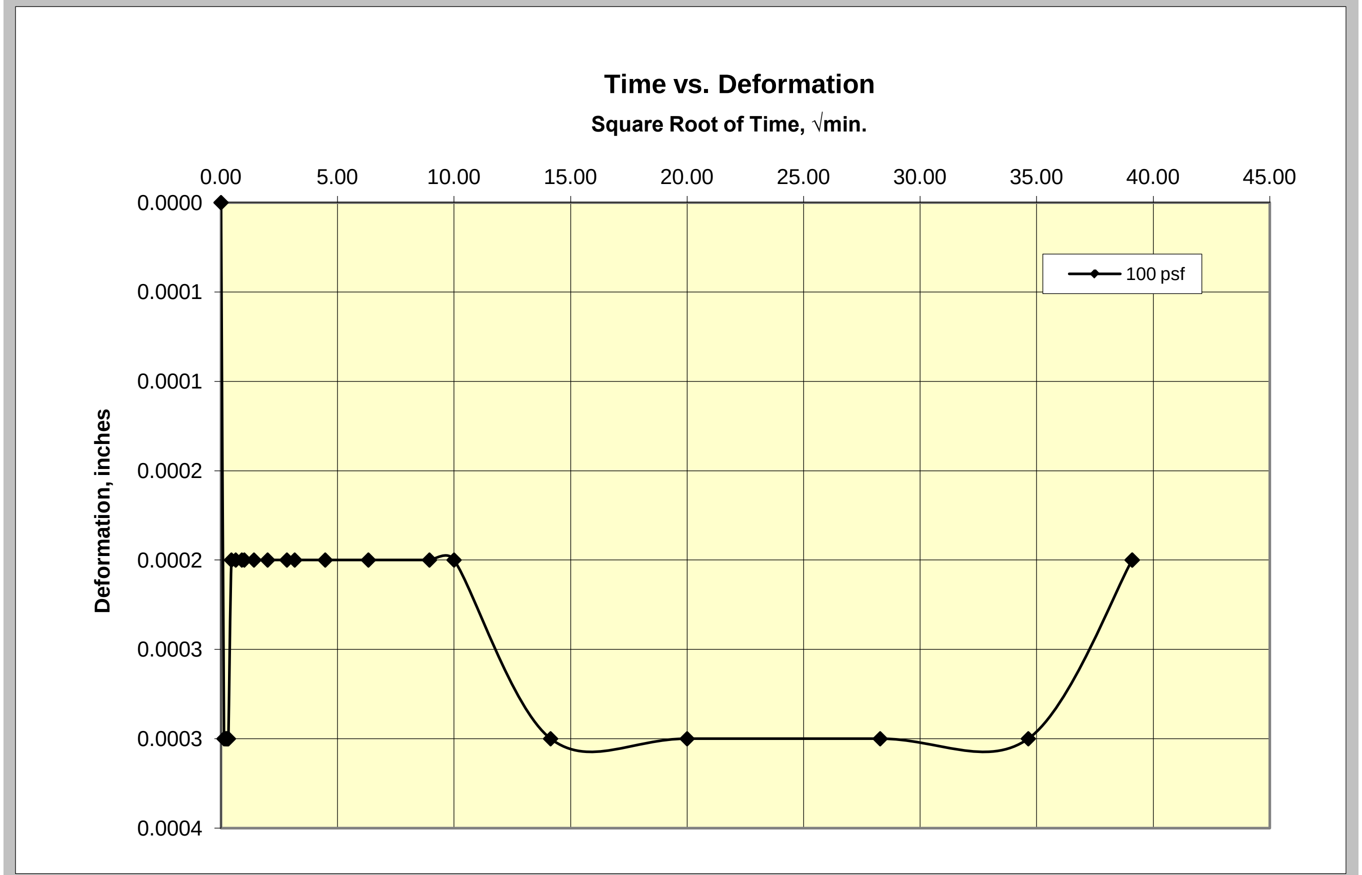


Cooper Testing Labs, Inc.

Load 10	100 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

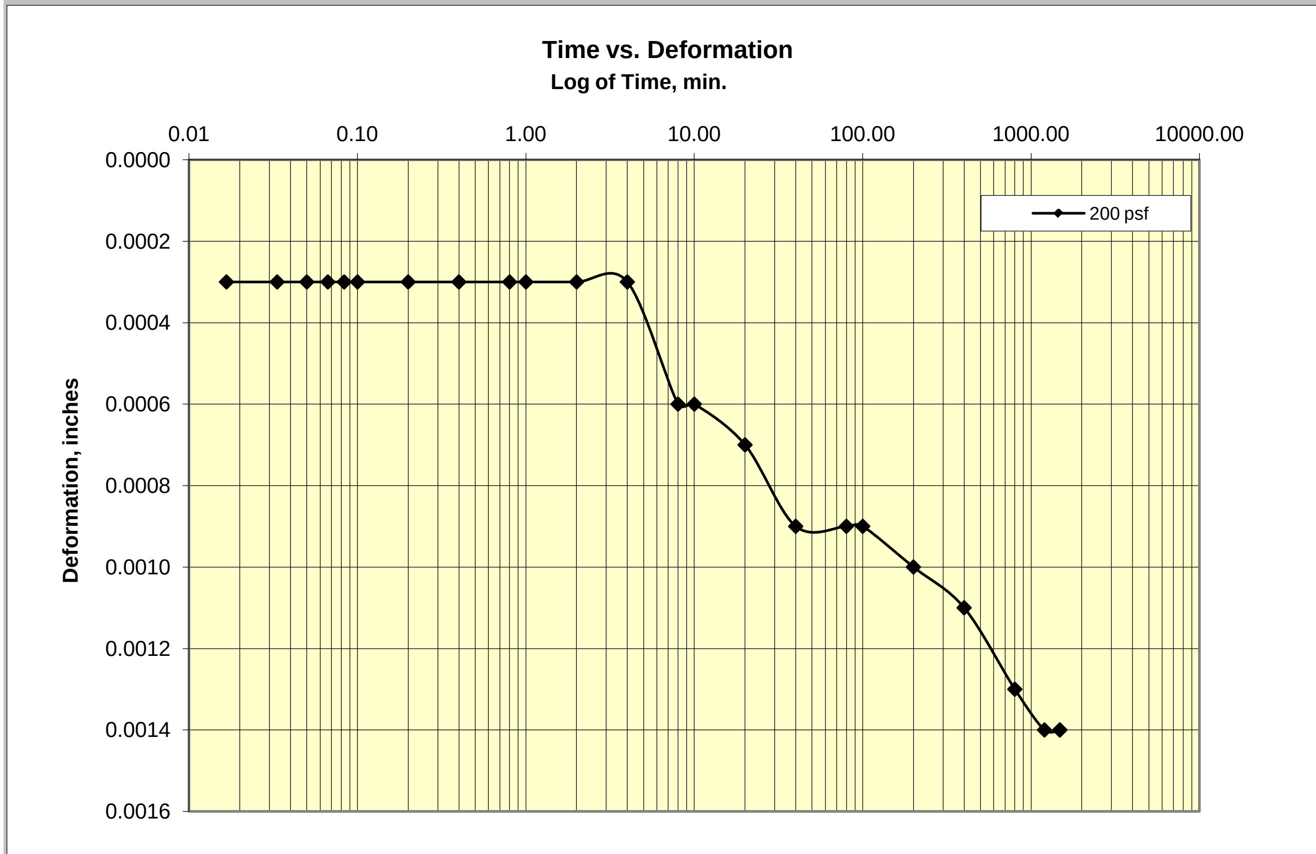


100 PSF

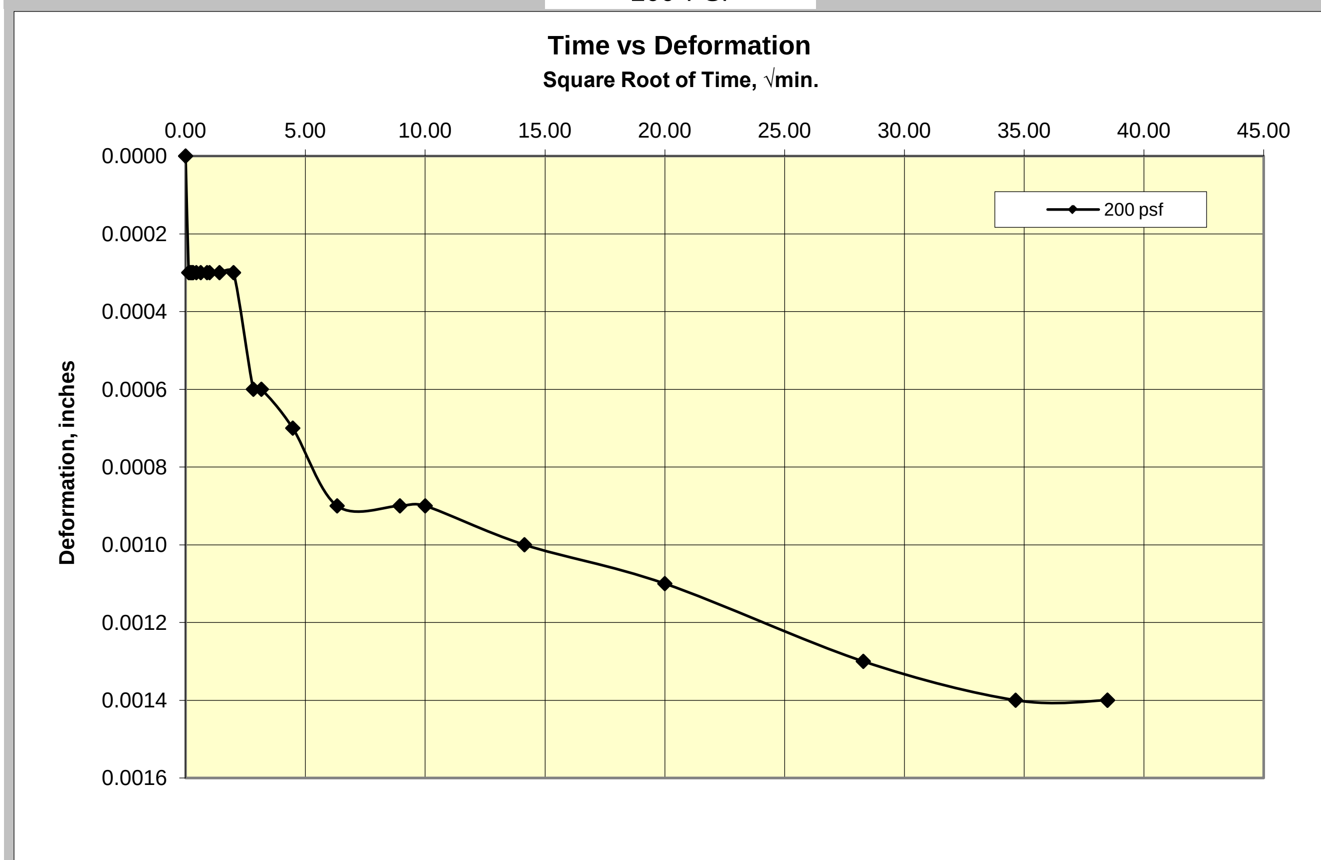


Cooper Testing Labs, Inc.

Load 11	200 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

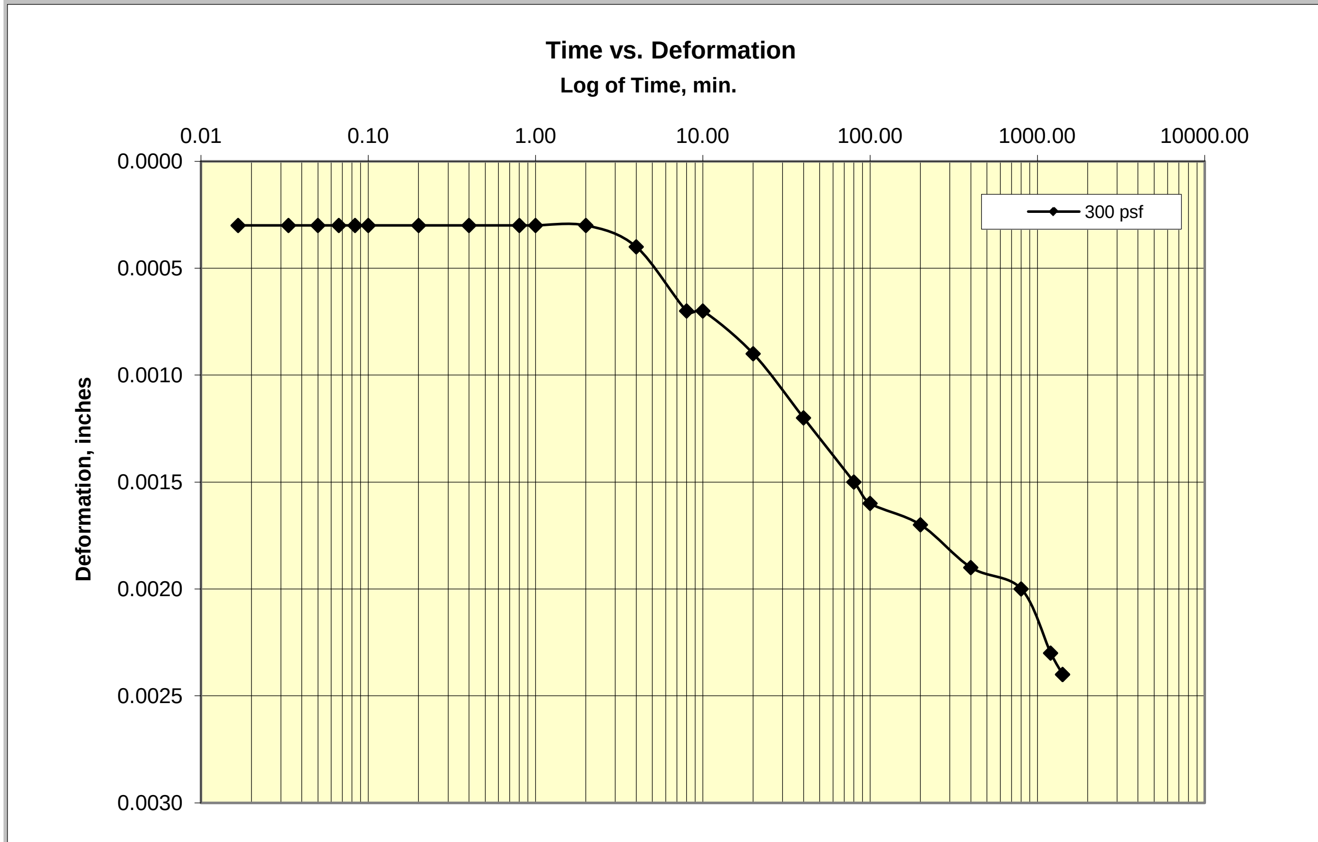


200 PSF

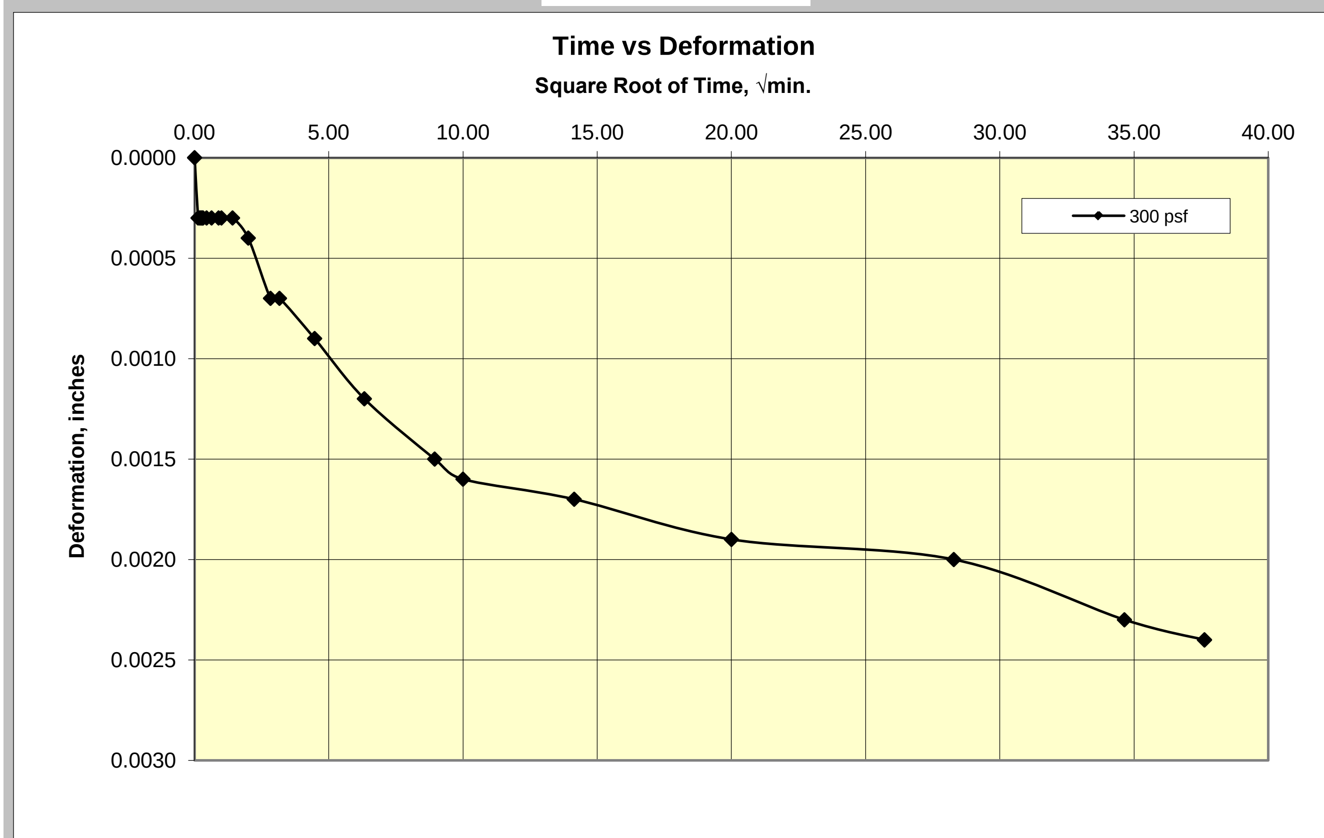


Cooper Testing Labs, Inc.

Load 12	300 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

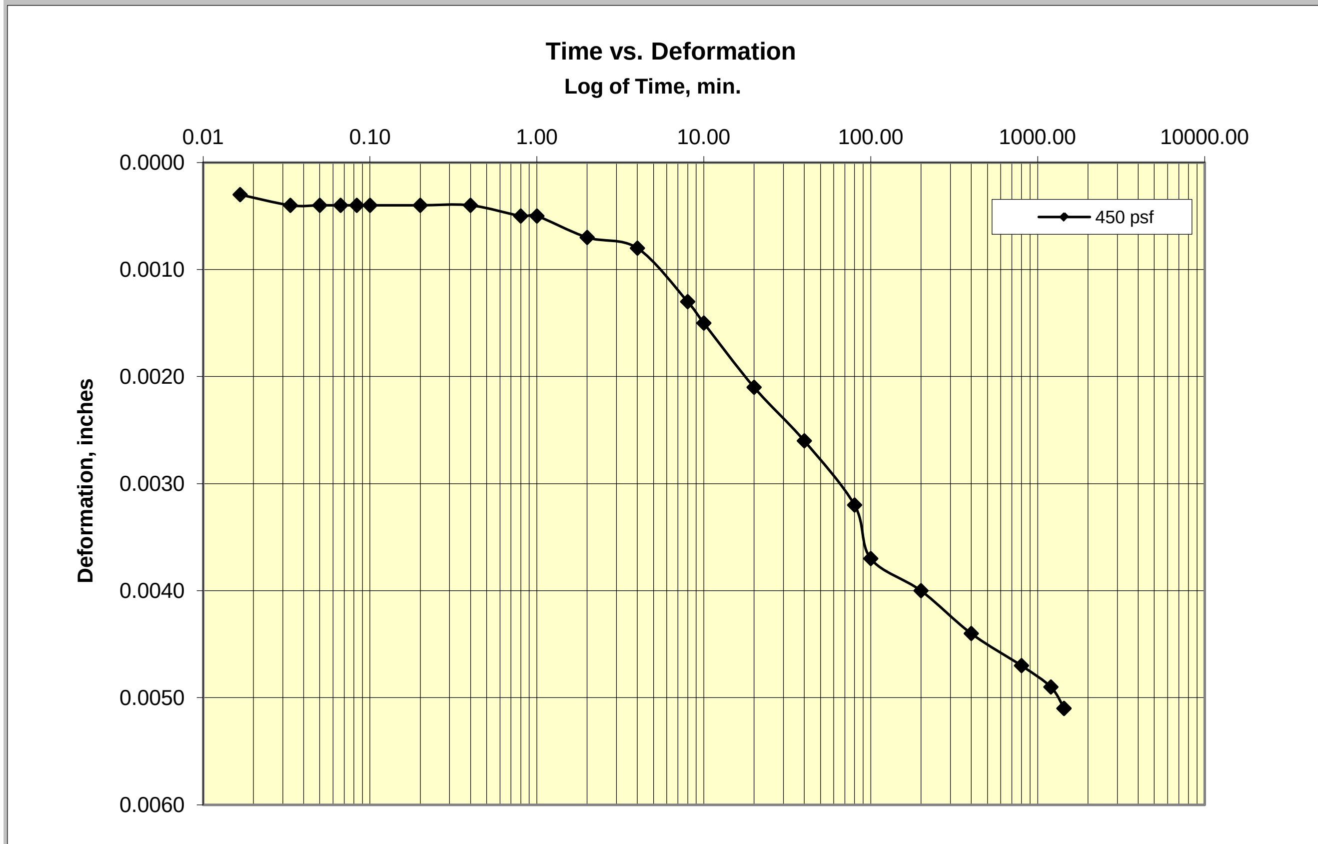


300 PSF

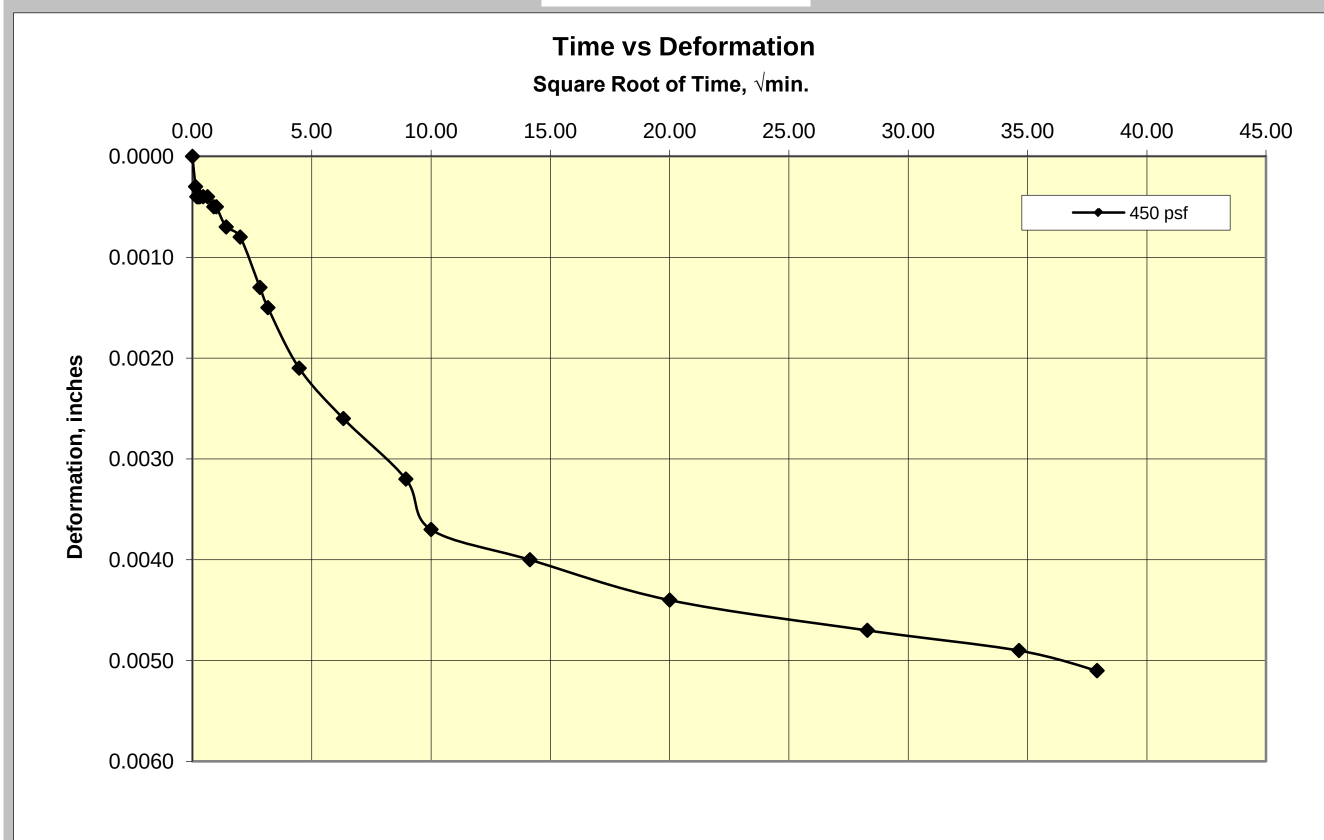


Cooper Testing Labs, Inc.

Load 13	450 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

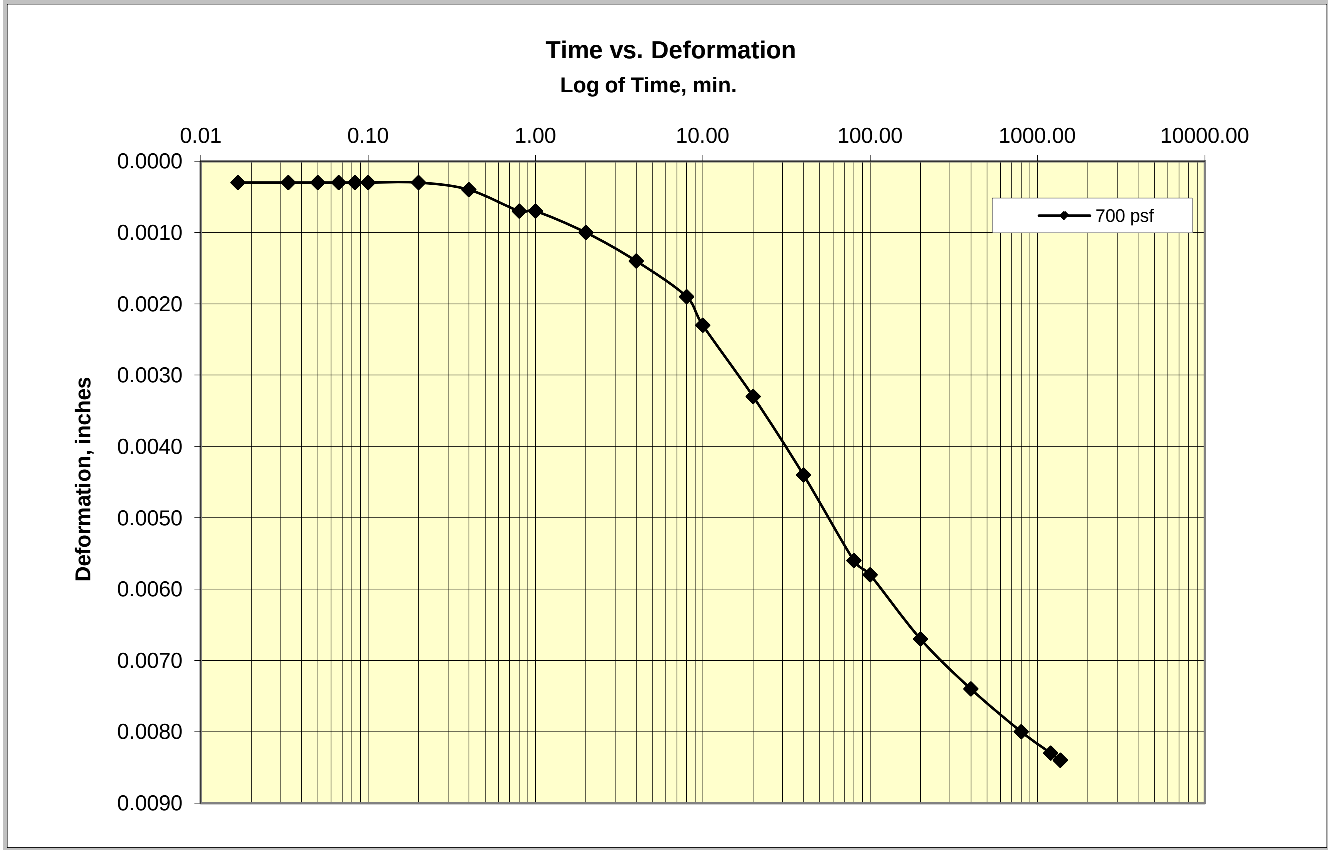


450 PSF

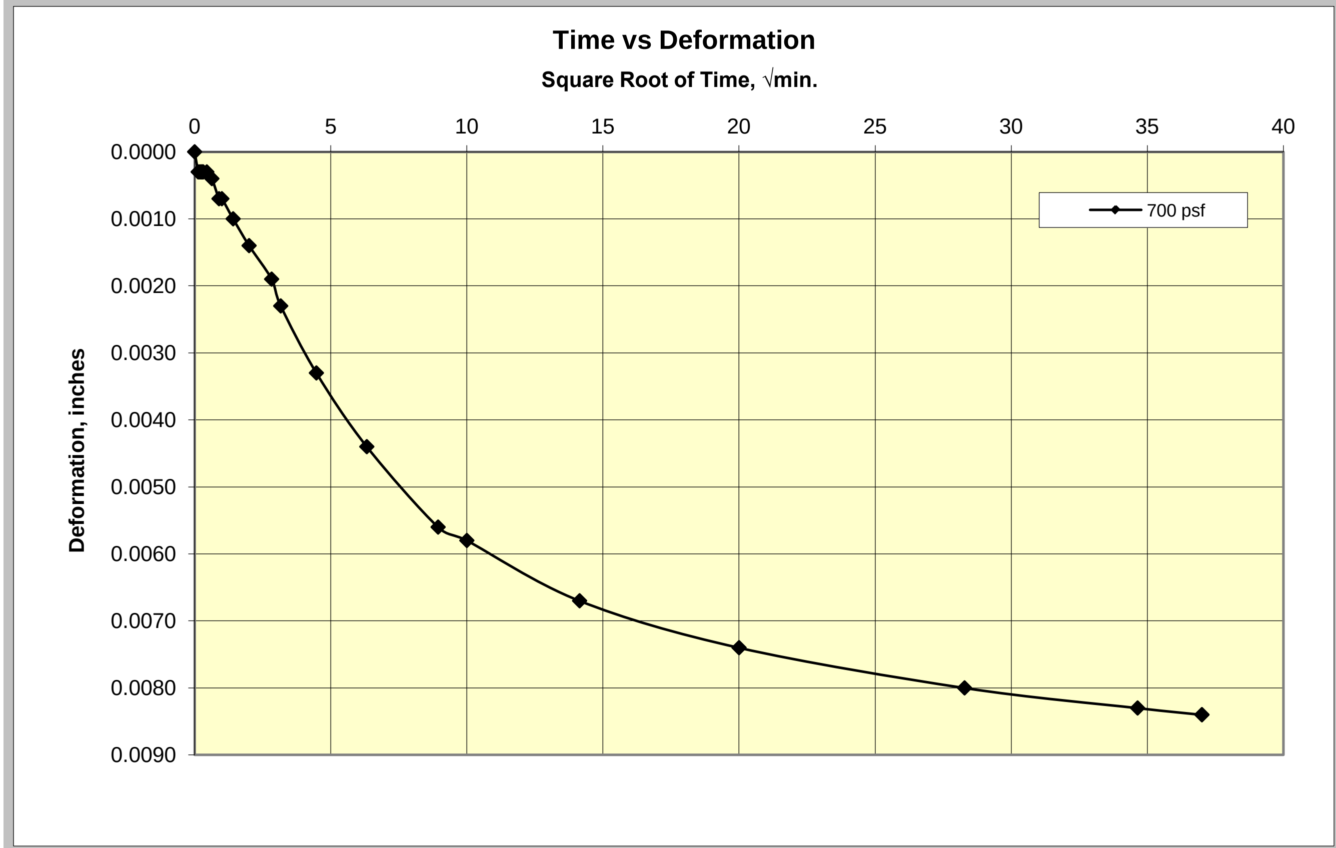


Cooper Testing Labs, Inc.

Load 14	700 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

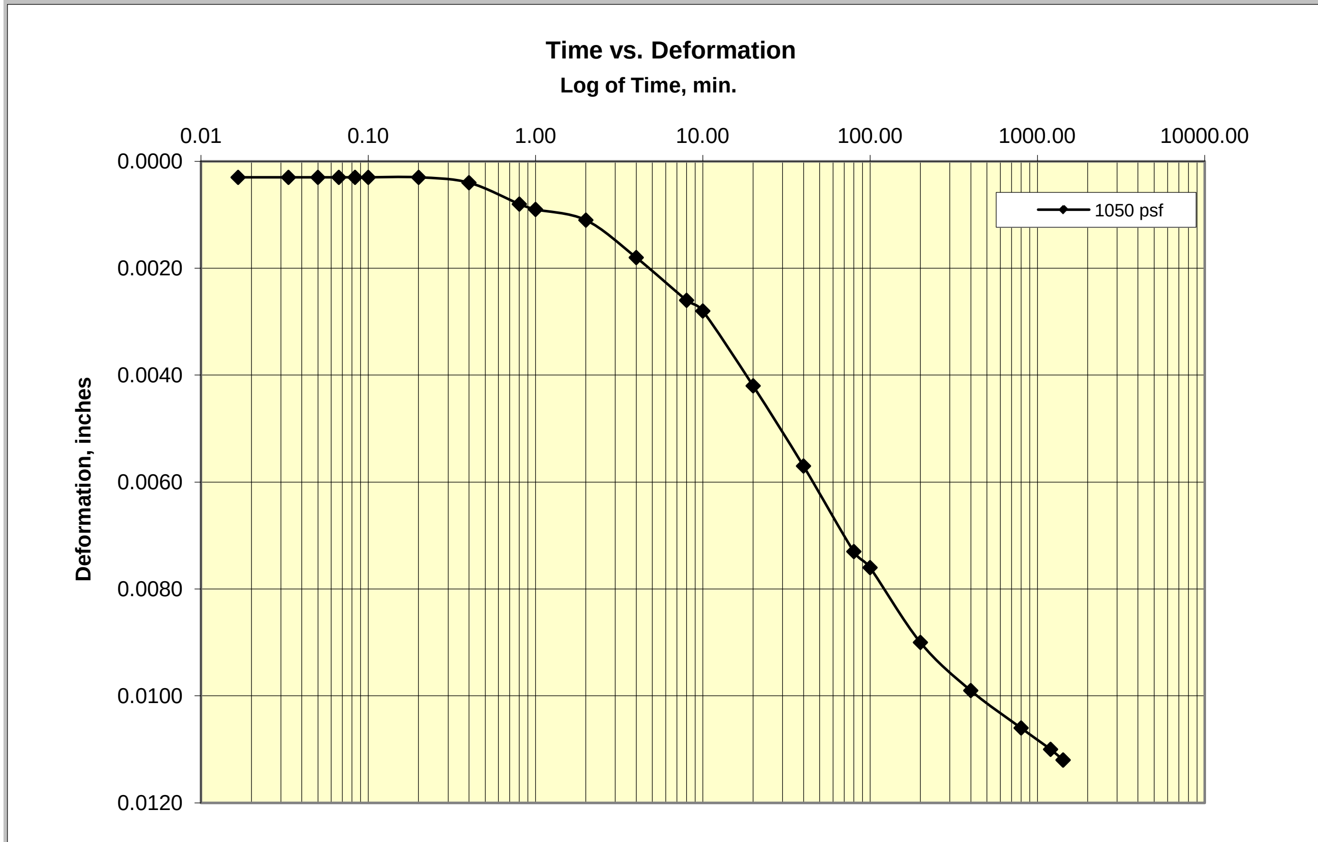


700 PSF

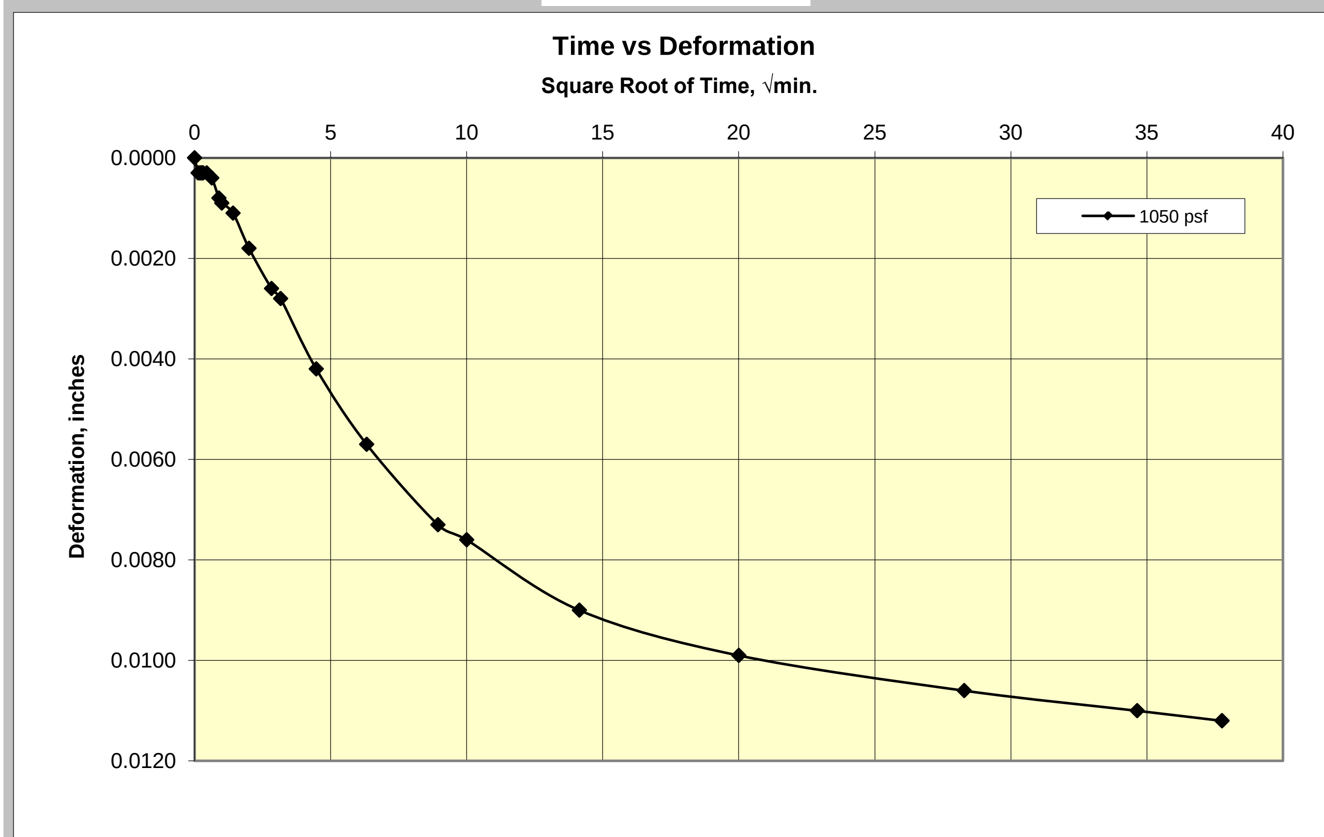


Cooper Testing Labs, Inc.

Load 15	1050 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

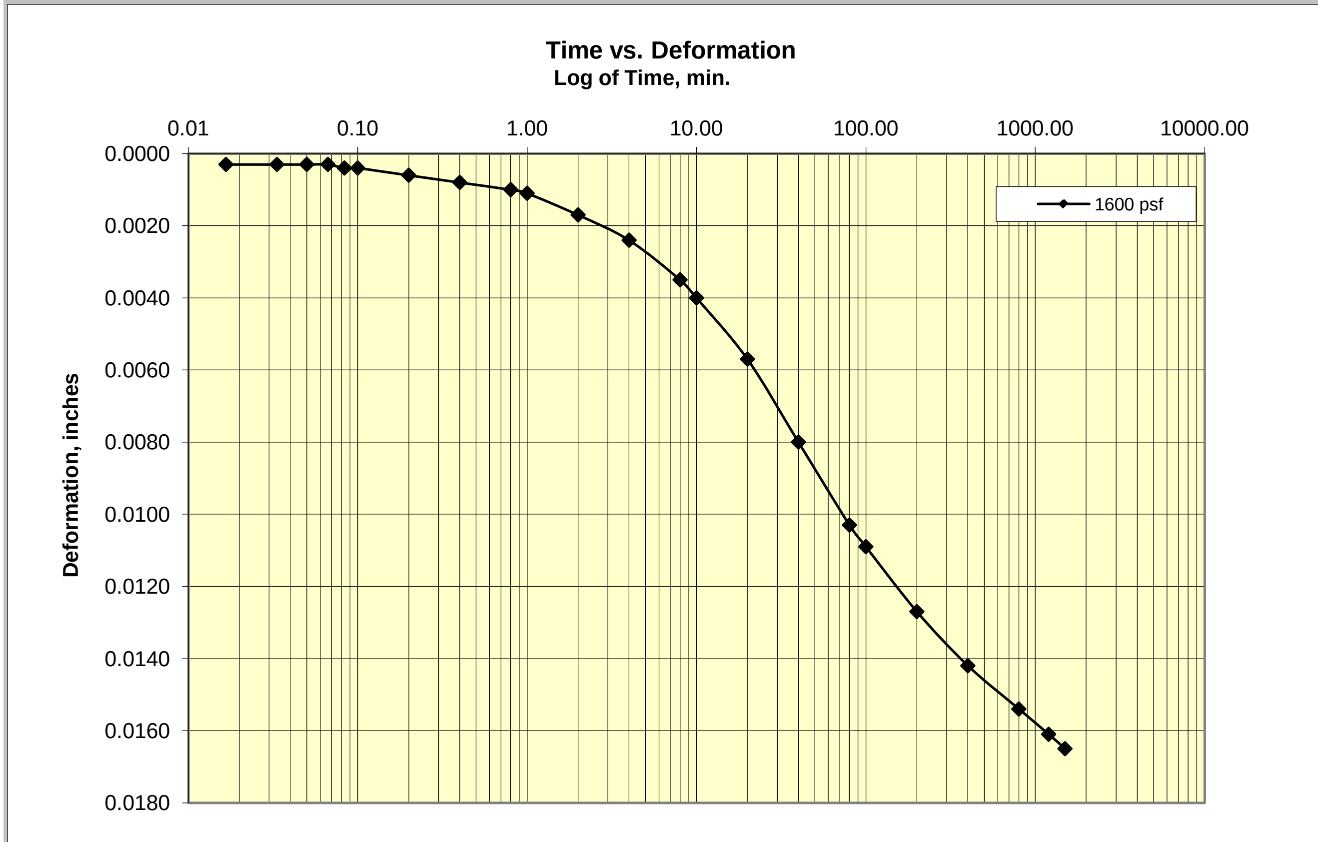


1050 PSF

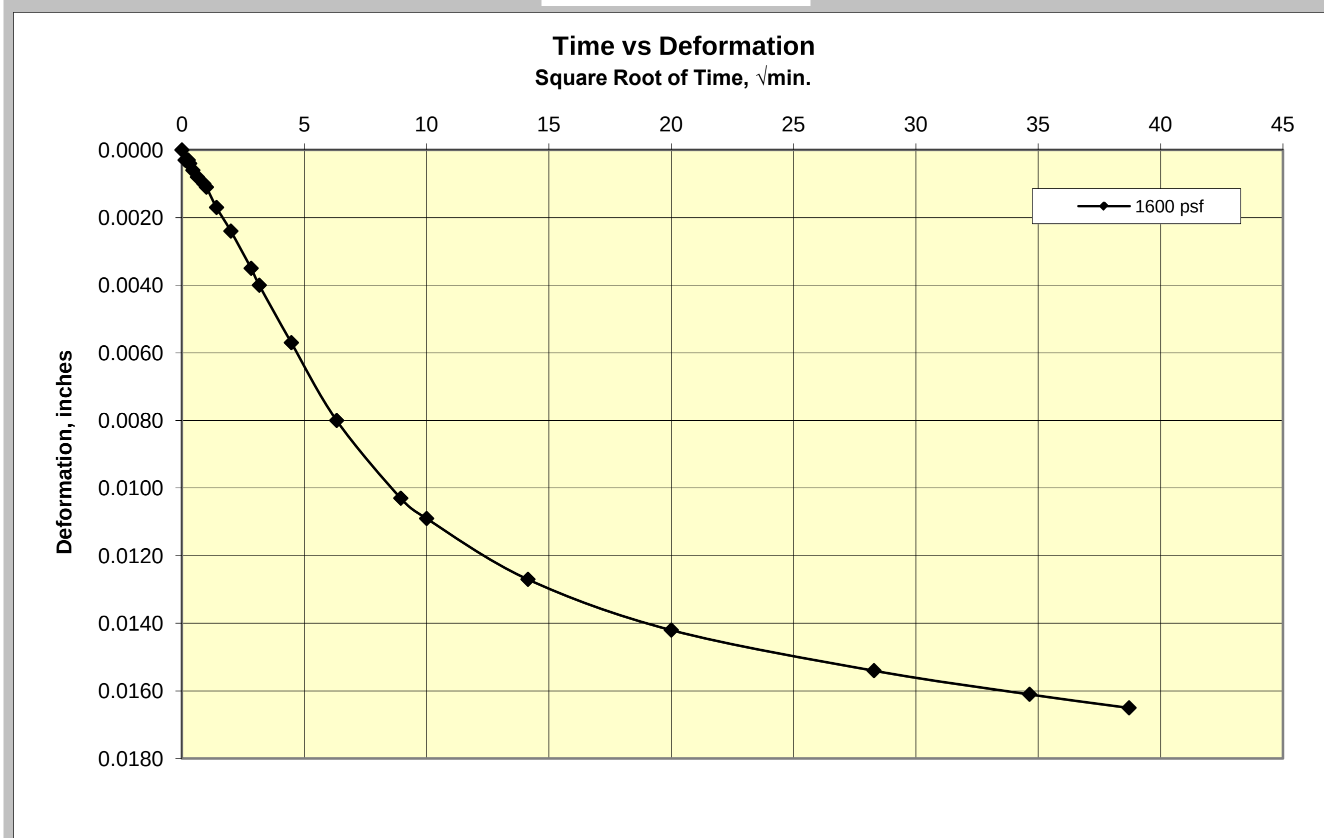


Cooper Testing Labs, Inc.

Load 16 | 1600 PSF | AUS-B-01-22.0-24.0 | (23.4 ft)

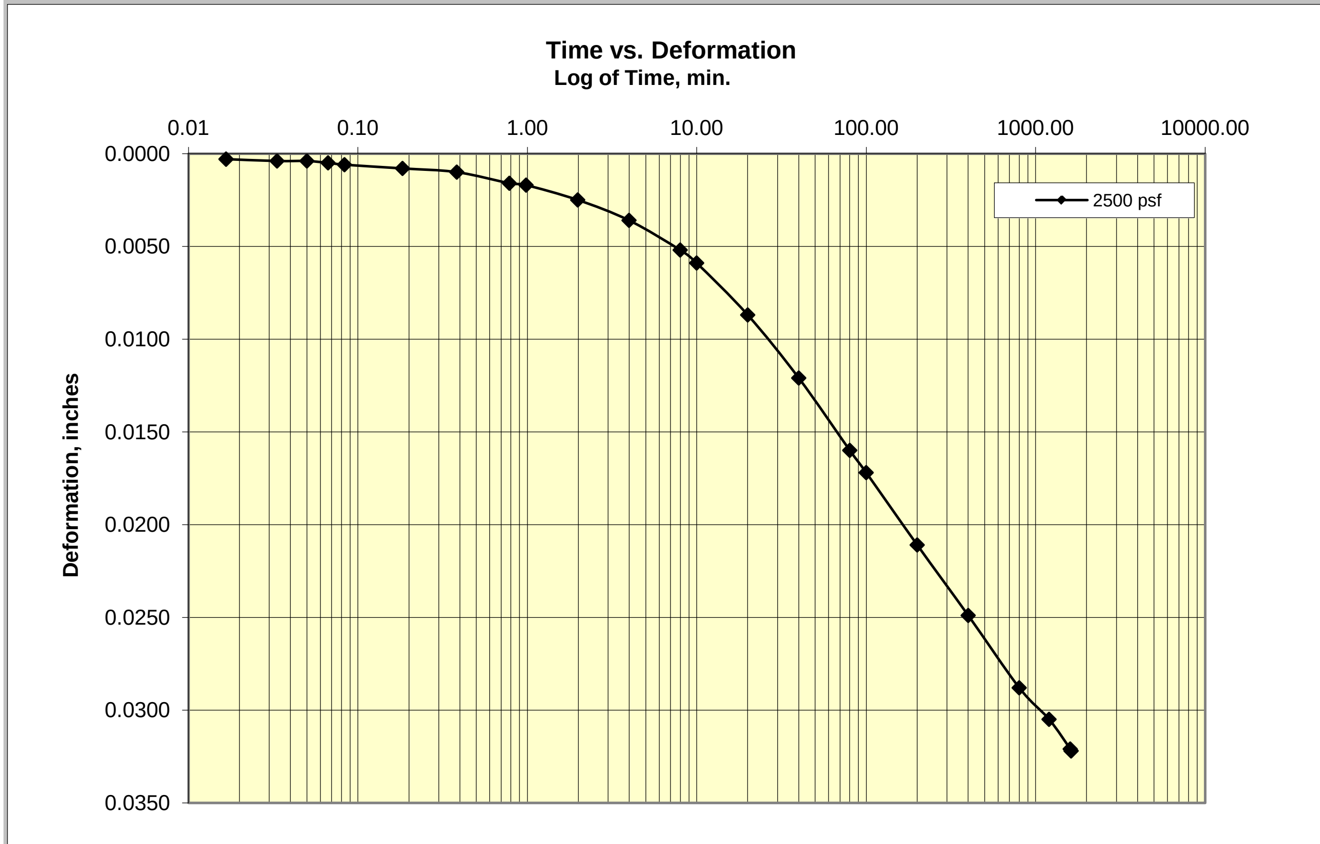


1600 PSF

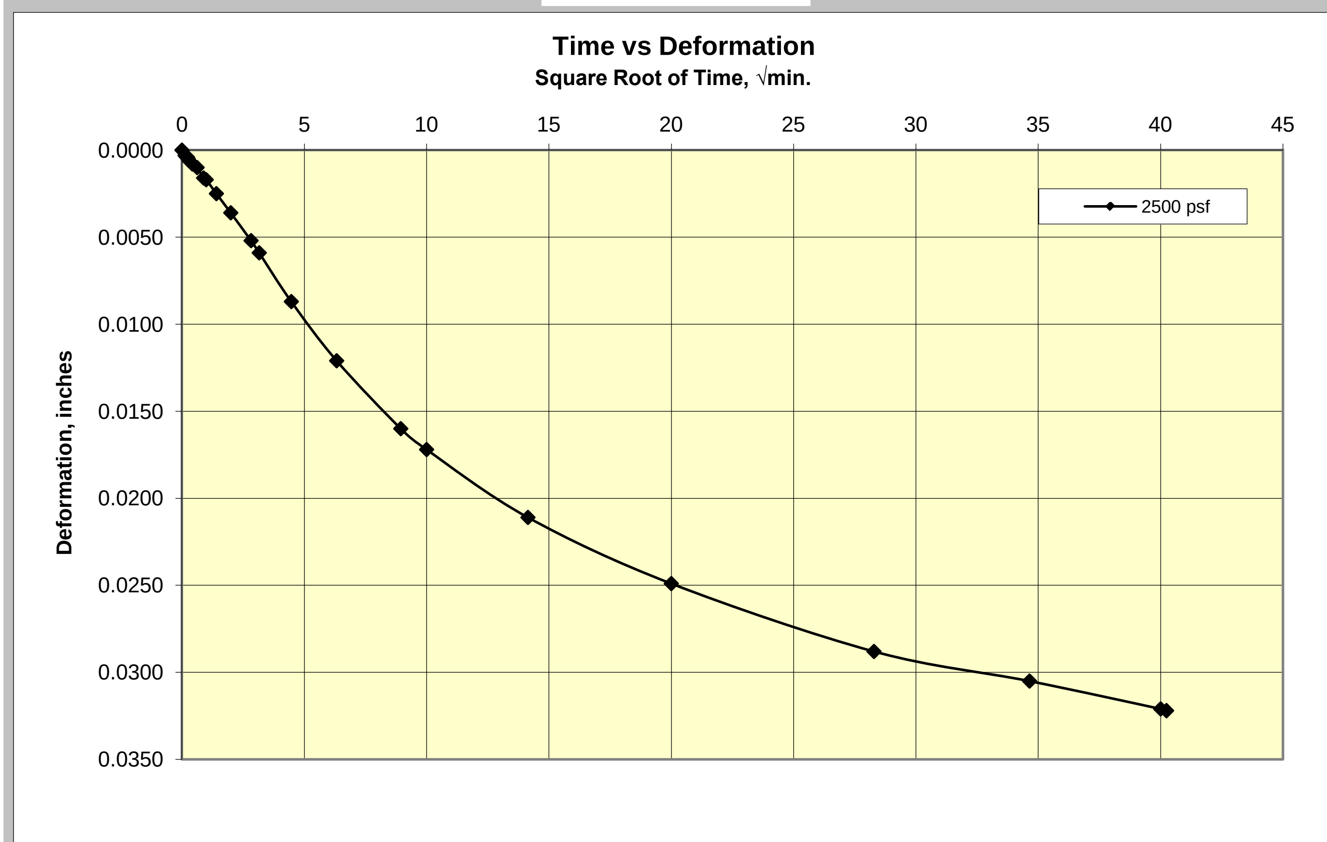


Cooper Testing Labs, Inc.

Load 17	2500 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

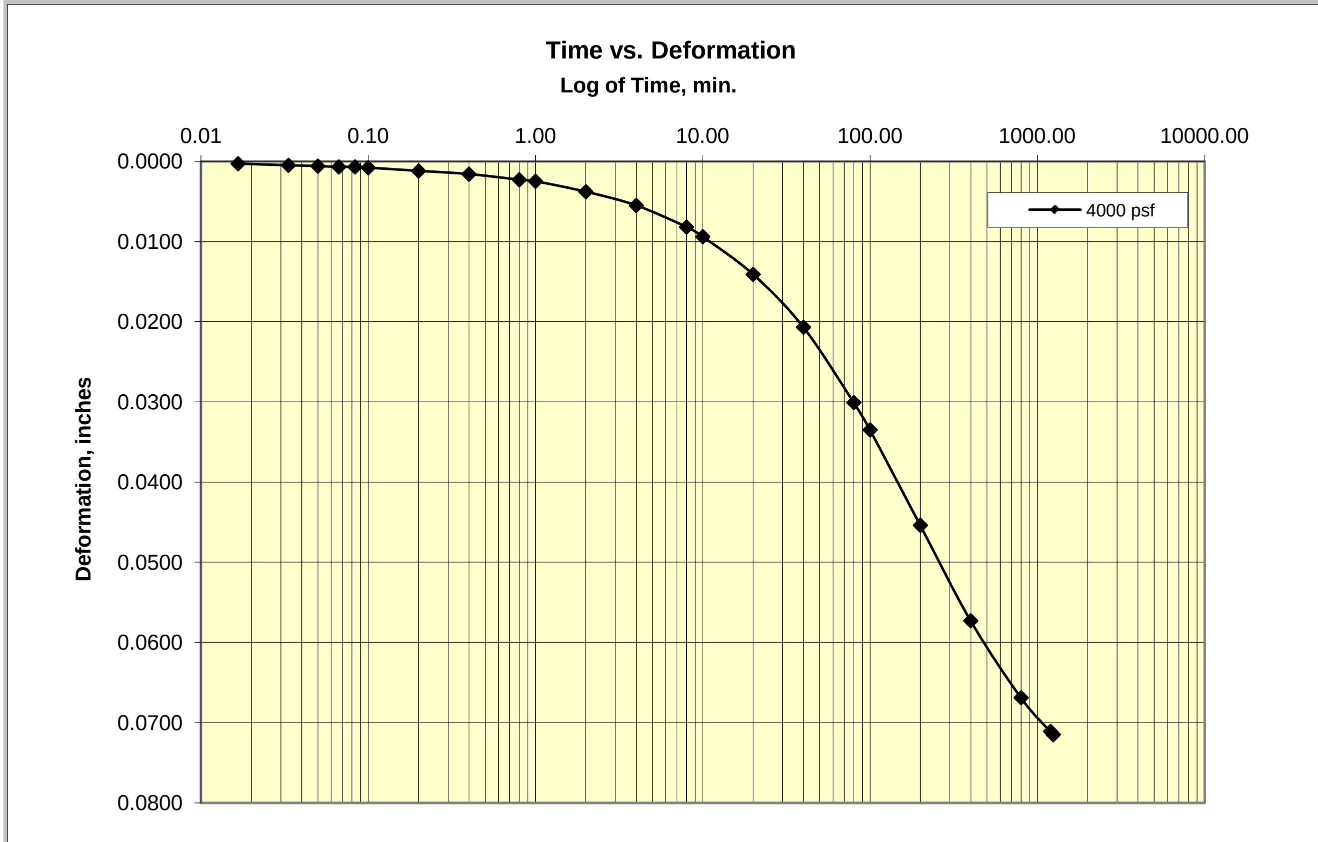


2500 PSF

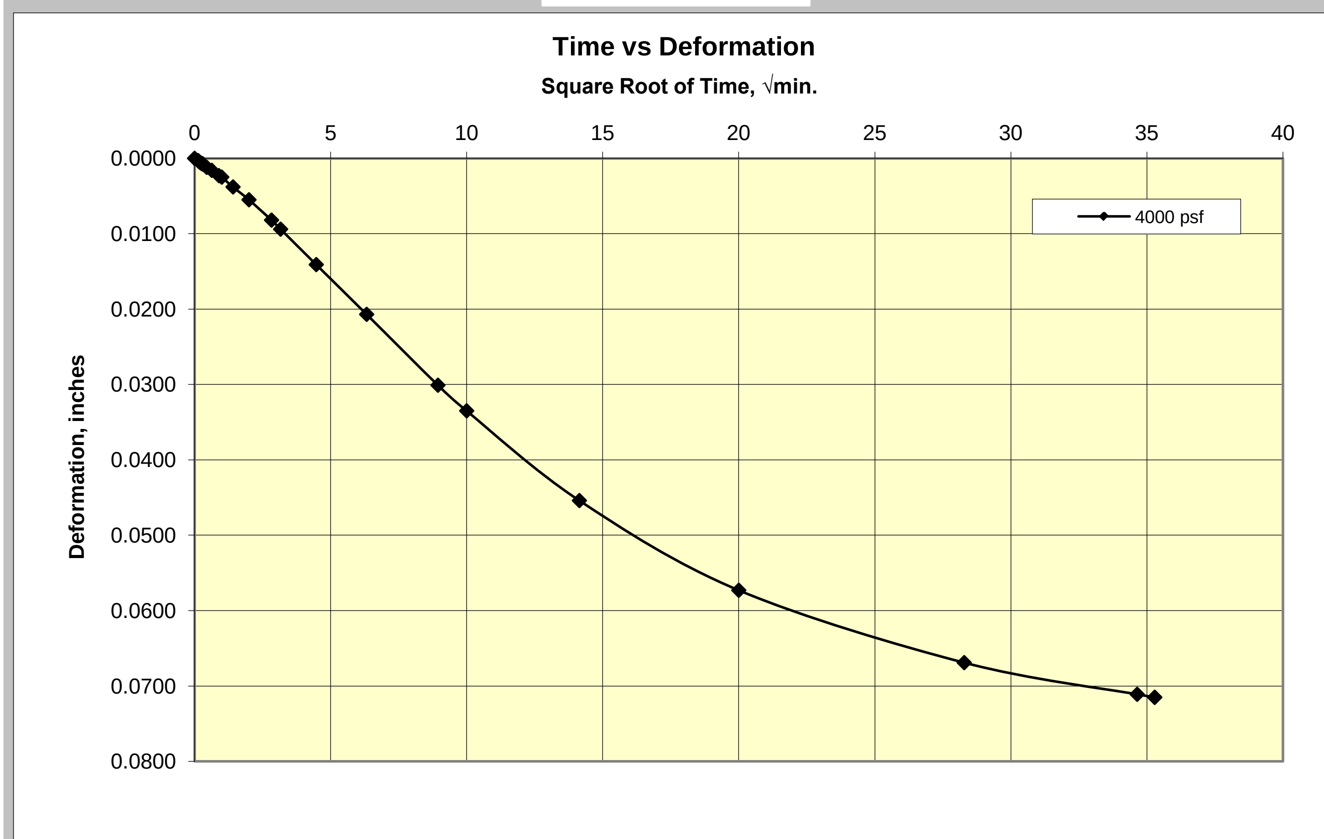


Cooper Testing Labs, Inc.

Load 18 | 4000 PSF | AUS-B-01-22.0-24.0 | (23.4 ft)

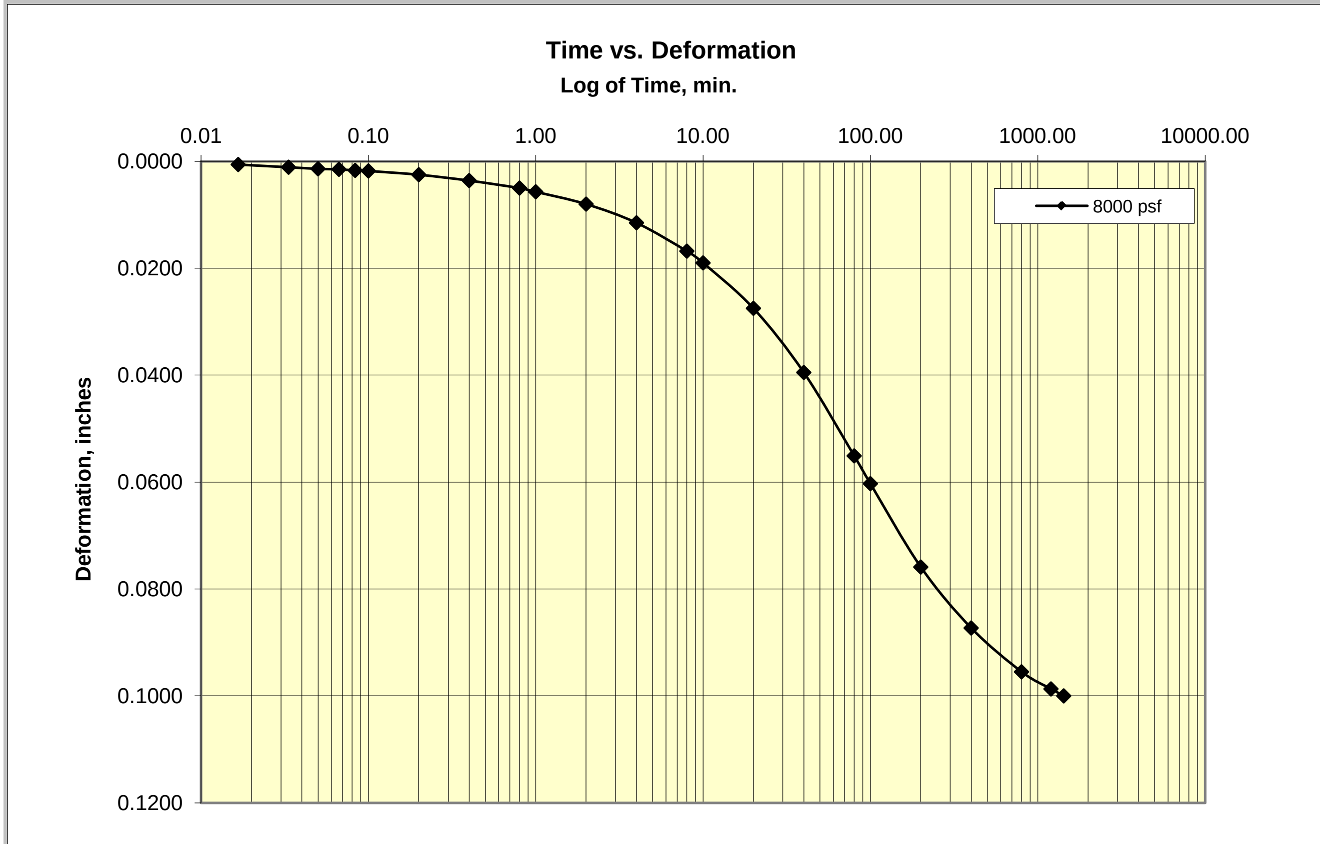


4000 PSF

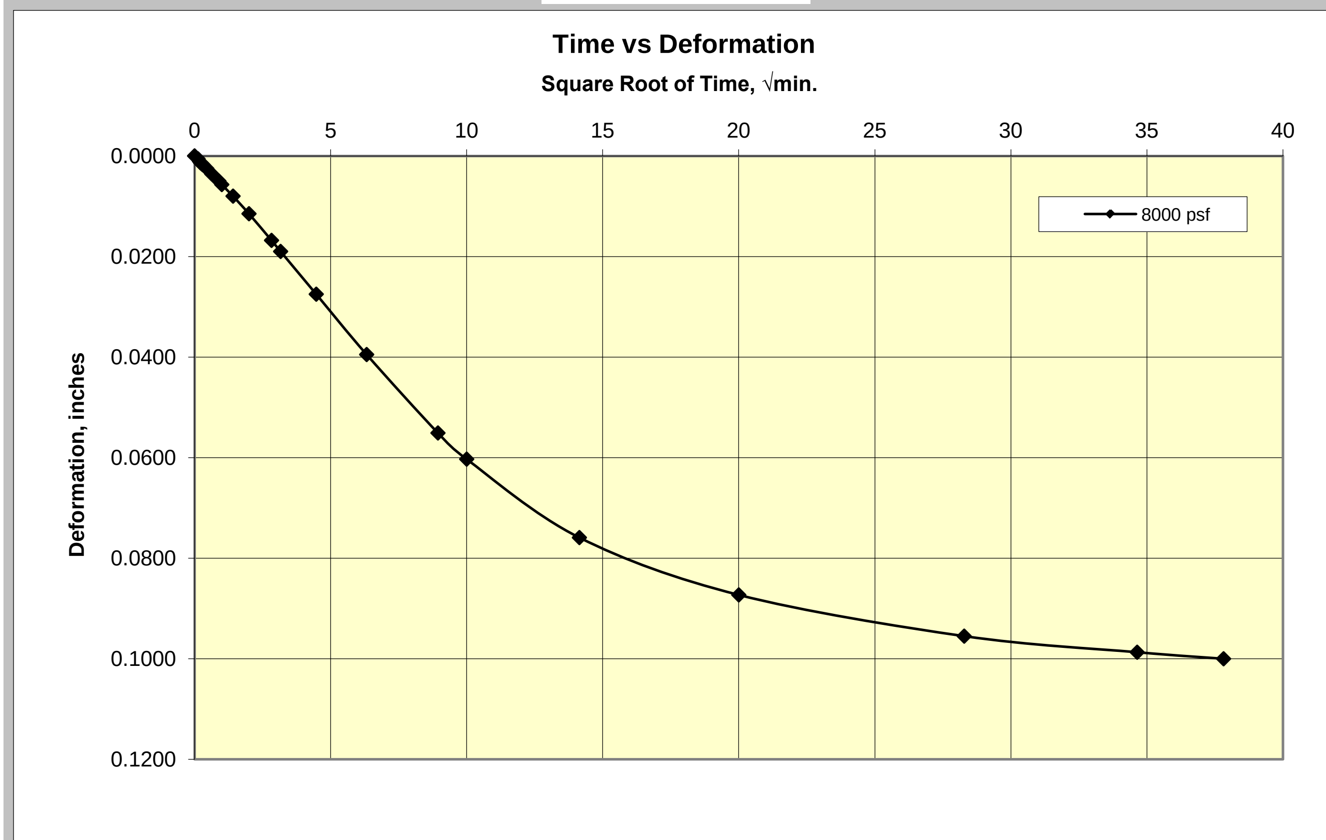


Cooper Testing Labs, Inc.

Load 19	8000 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

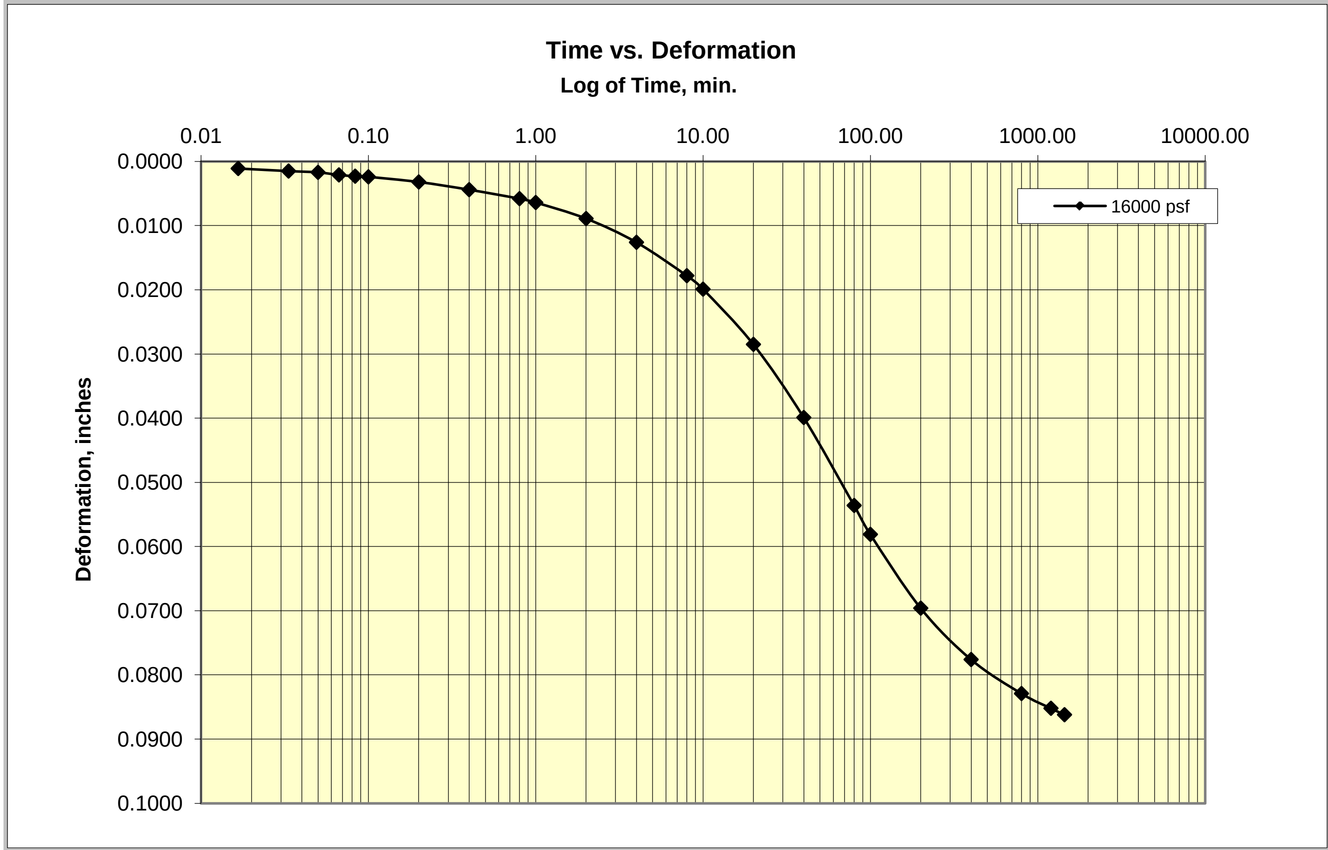


8000 PSF

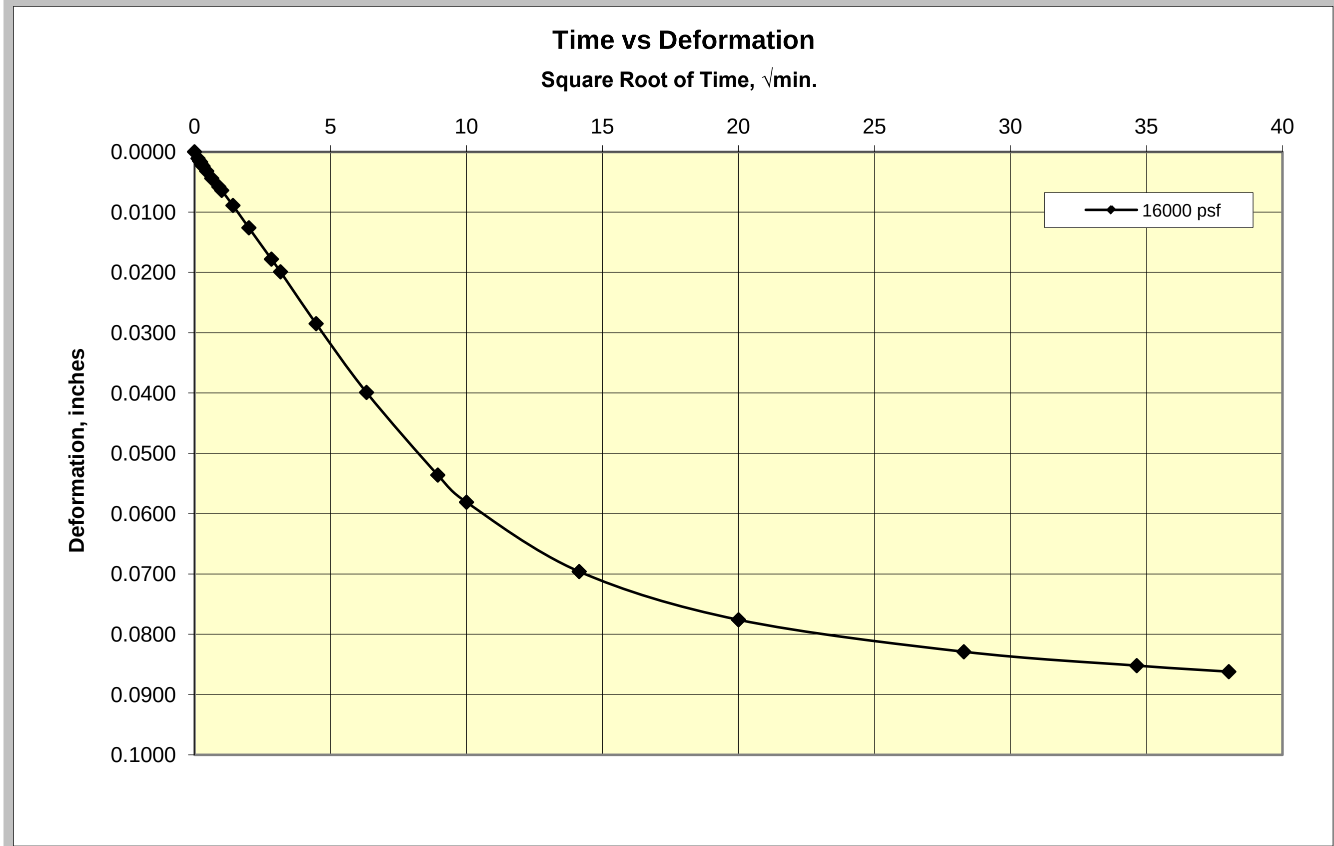


Cooper Testing Labs, Inc.

Load 20	16000 PSF	AUS-B-01-22.0-24.0	(23.4 ft)

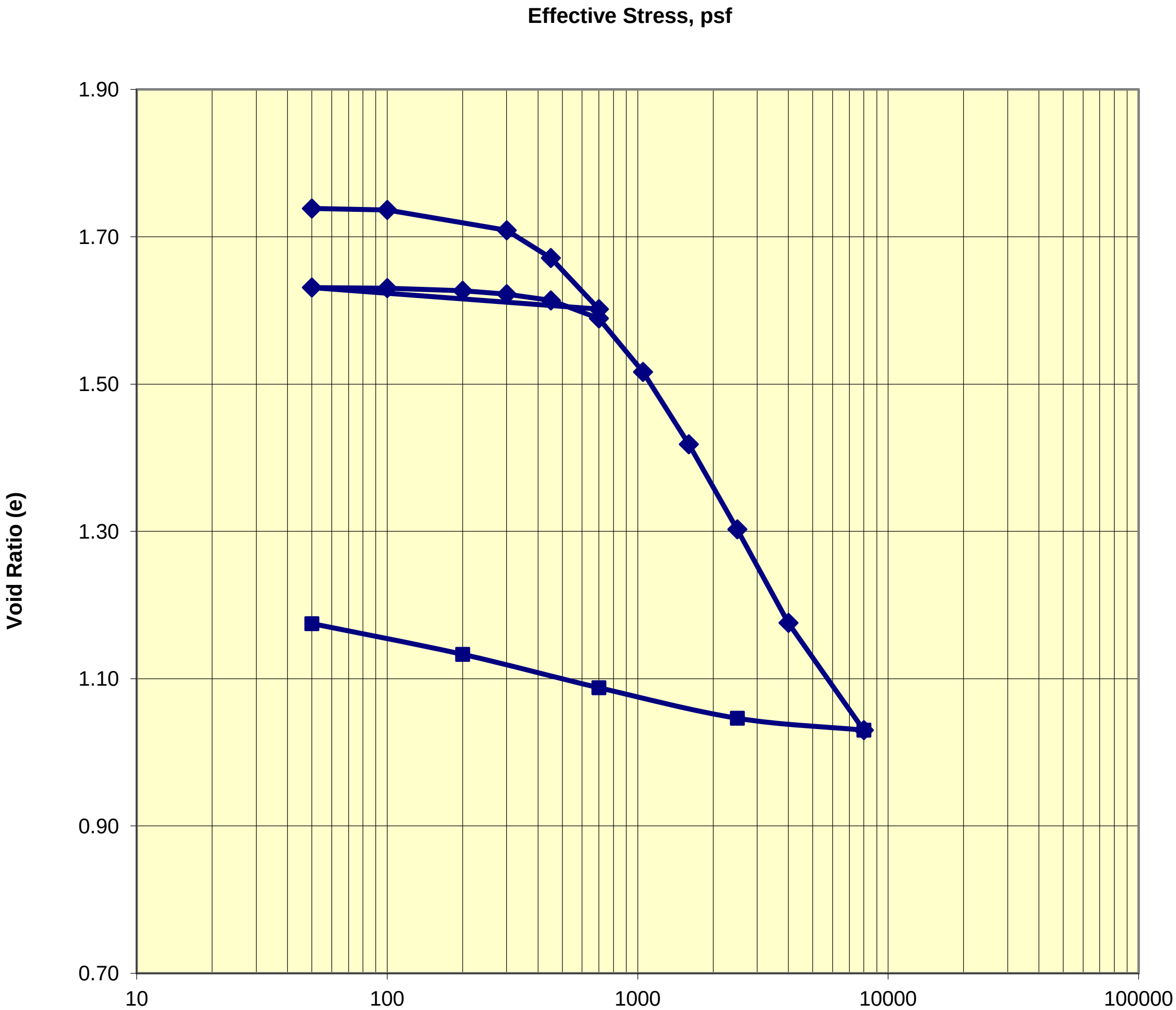


16000 PSF



Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-02	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-01	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	7-9(Tip-11)	**Checked:**	PJ/DC
Soil Type:	Dark Greenish Gray Fat CLAY w/ Sand(Bay Mud)		(8.1 ft)	**Date:**	5/3/2012

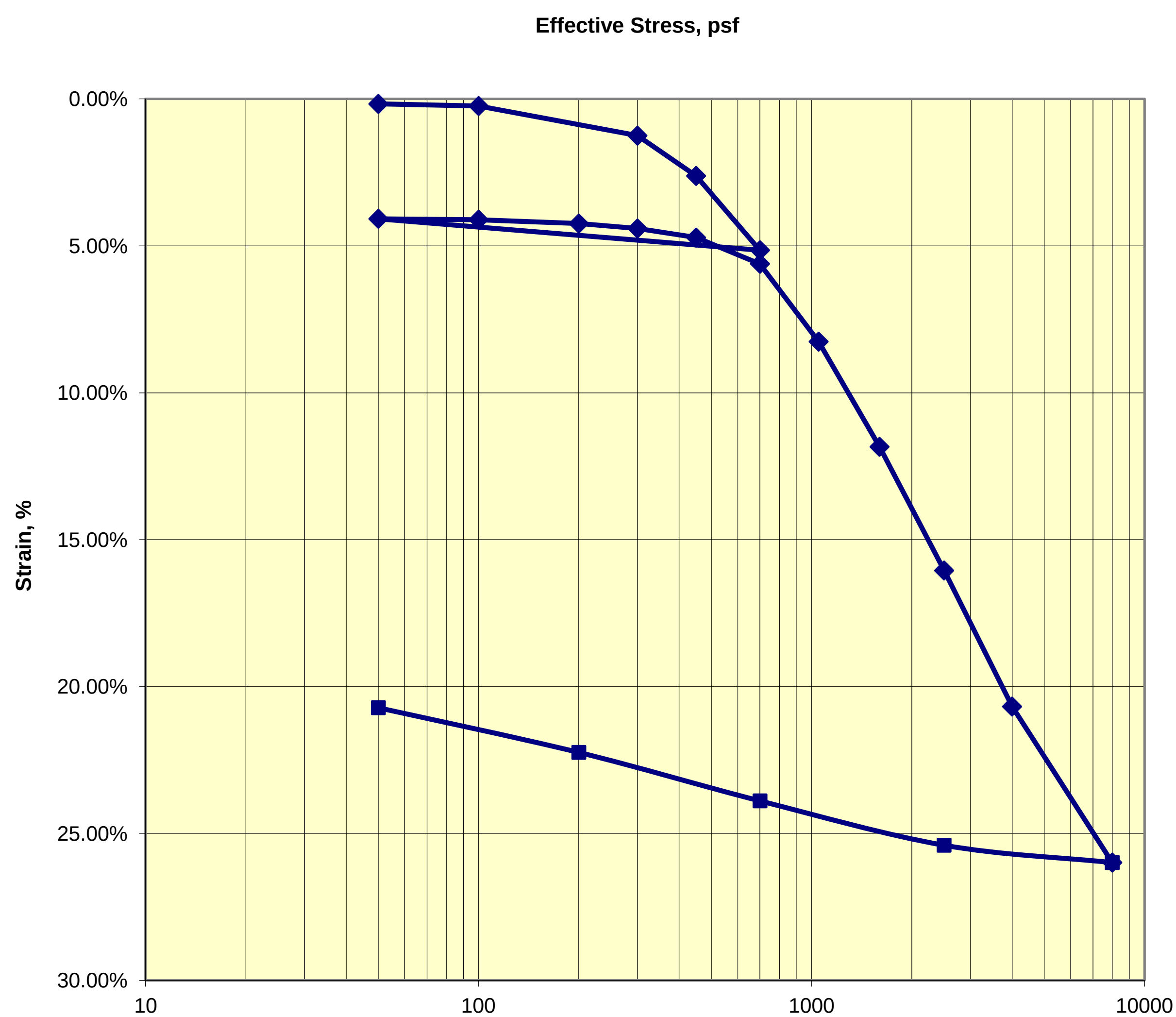


Ass. Gs = 2.76	**Initial**	**Final**
Moisture %:	61.9	42.3
Dry Density, pcf:	62.9	79.6
Void Ratio:	1.741	1.166
% Saturation:	98.2	100

Remarks:

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-02	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-01	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	7-9(Tip-11)	**Checked:**	PJ/DC
Soil Type:	Dark Greenish Gray Fat CLAY w/ Sand(Bay Mud)		(8.1 ft)	**Date:**	5/3/2012

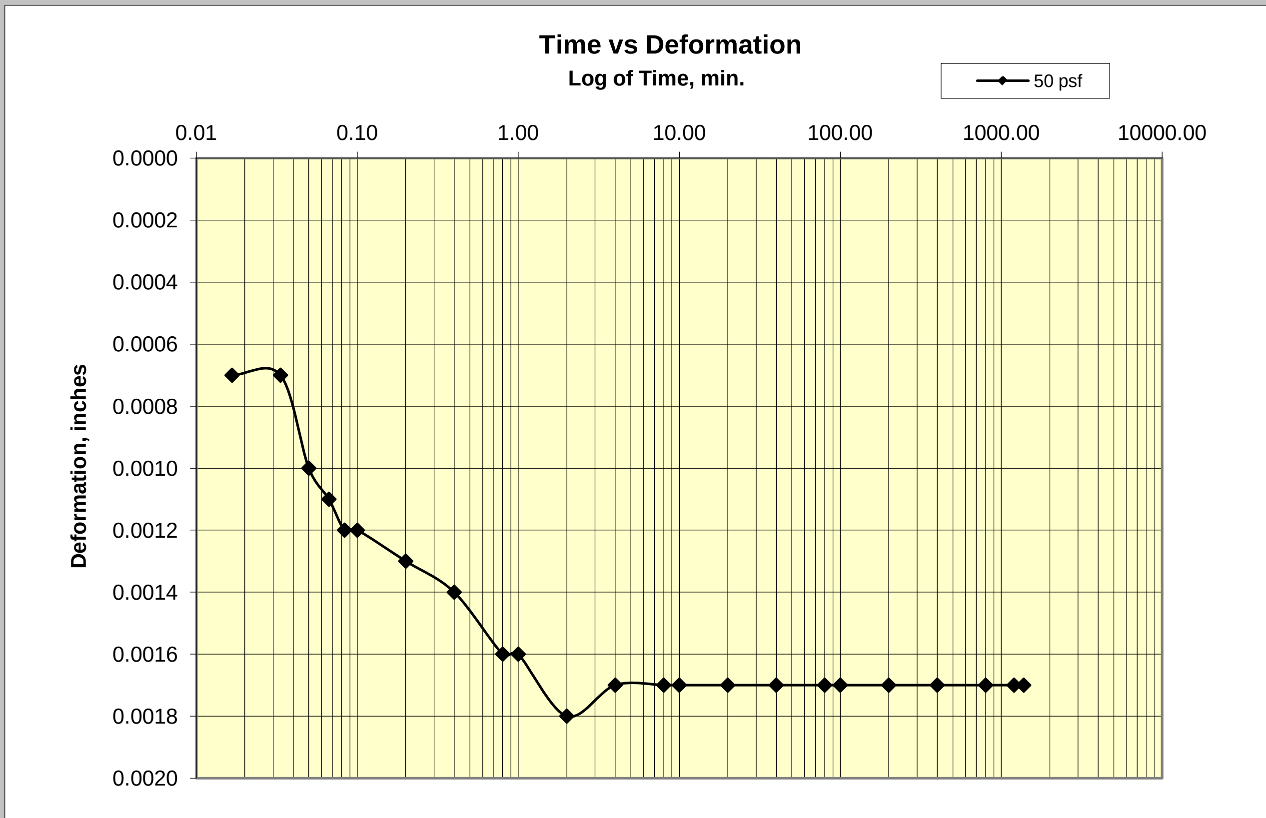


Ass. Gs = 2.76	**Initial**	**Final**
Moisture %:	61.9	42.3
Dry Density, pcf:	62.9	79.6
Void Ratio:	1.741	1.166
% Saturation:	98.2	100

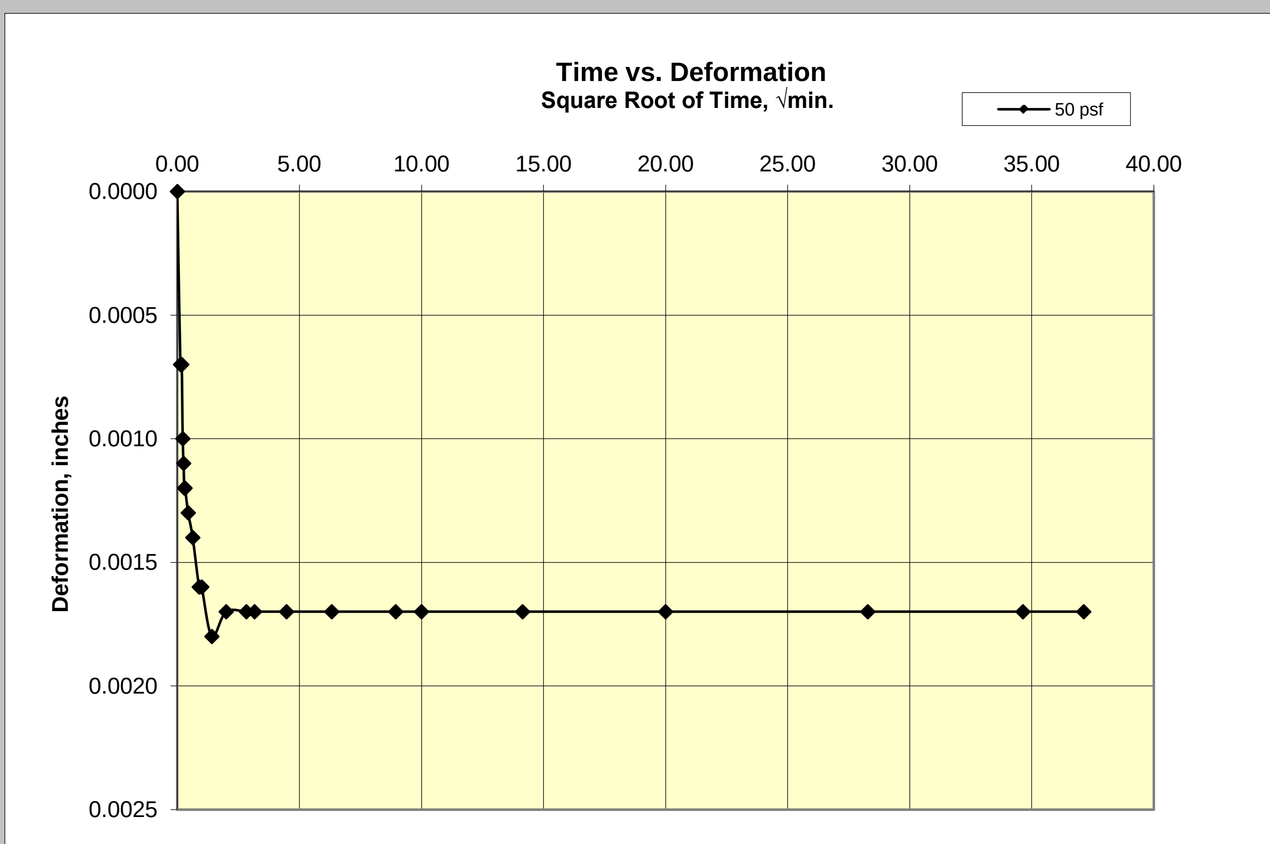
Remarks:

Cooper Testing Labs, Inc.

Load 1	50 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

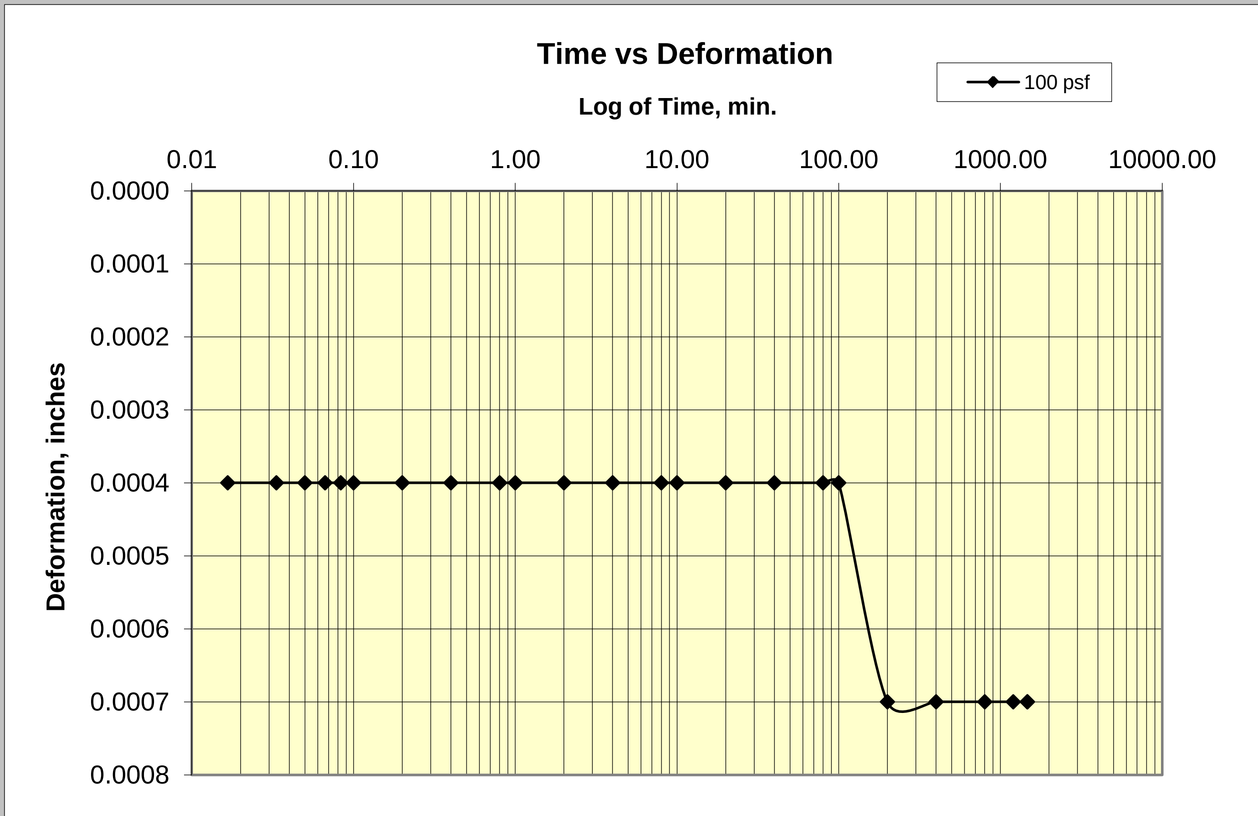


50 PSF

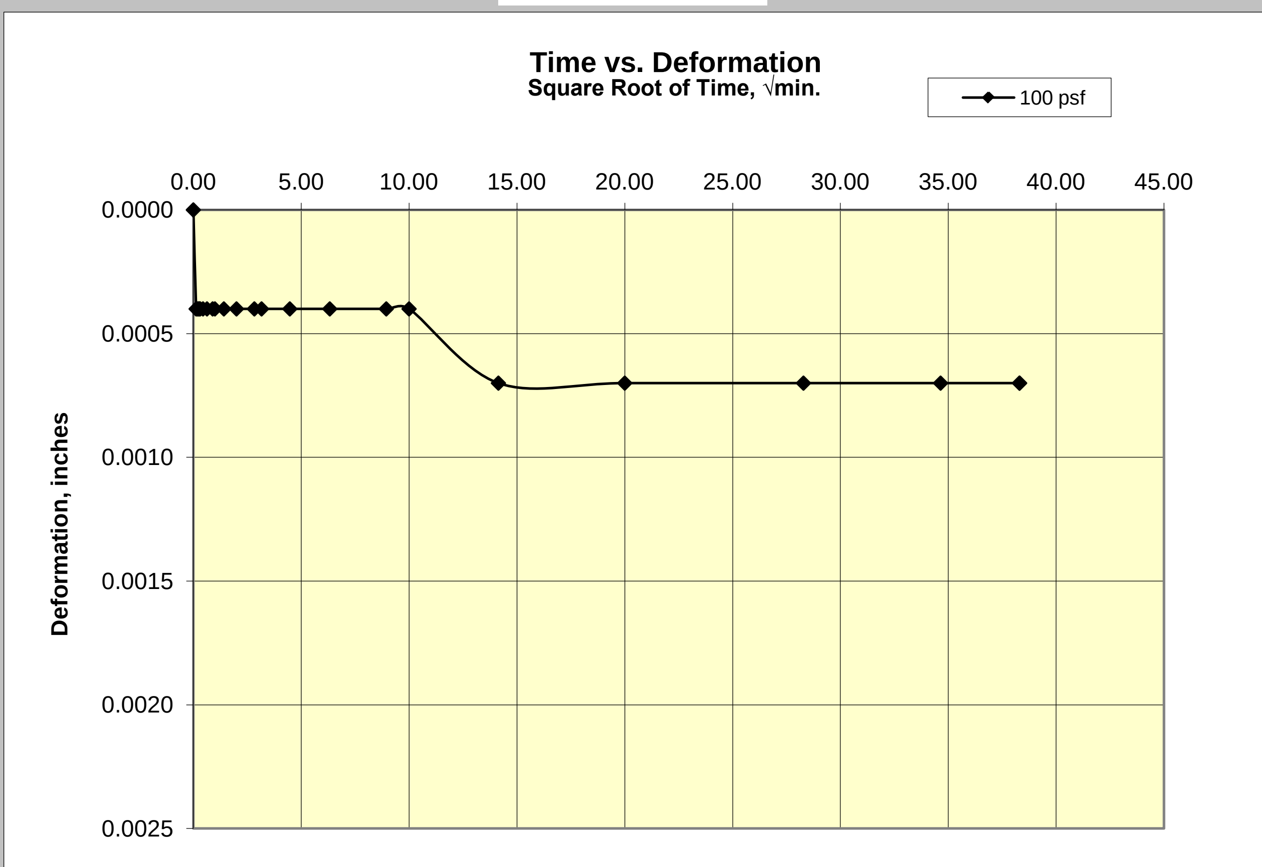


Cooper Testing Labs, Inc.

Load 2	100 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

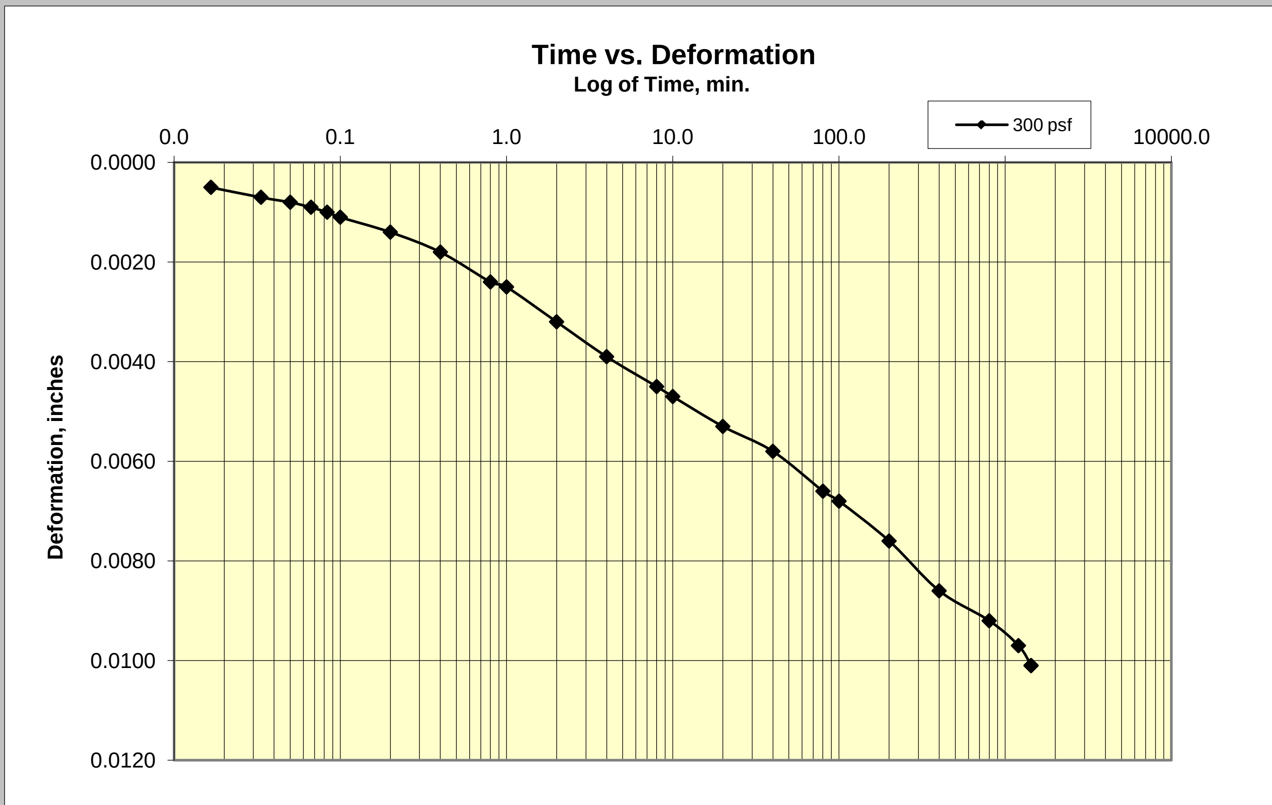


100 PSF

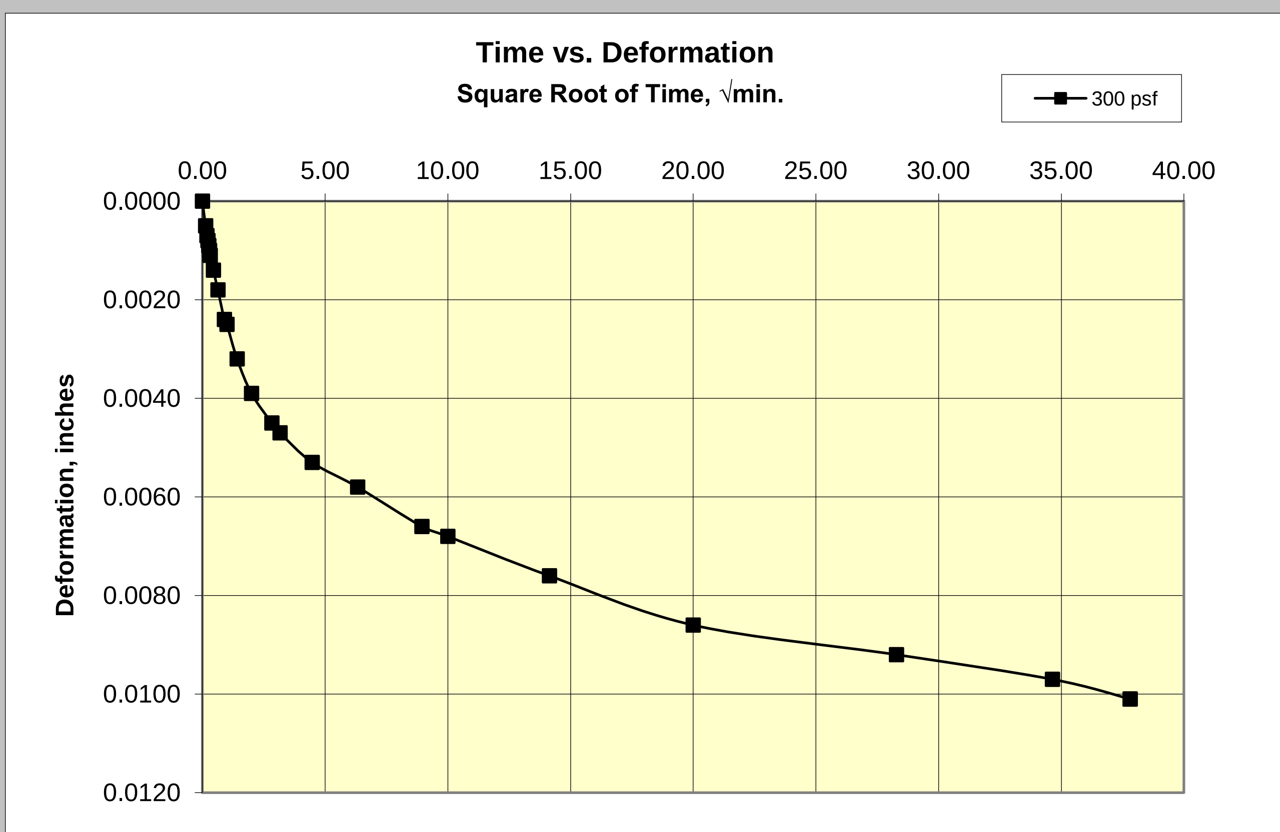


Cooper Testing Labs, Inc.

Load 3	300 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

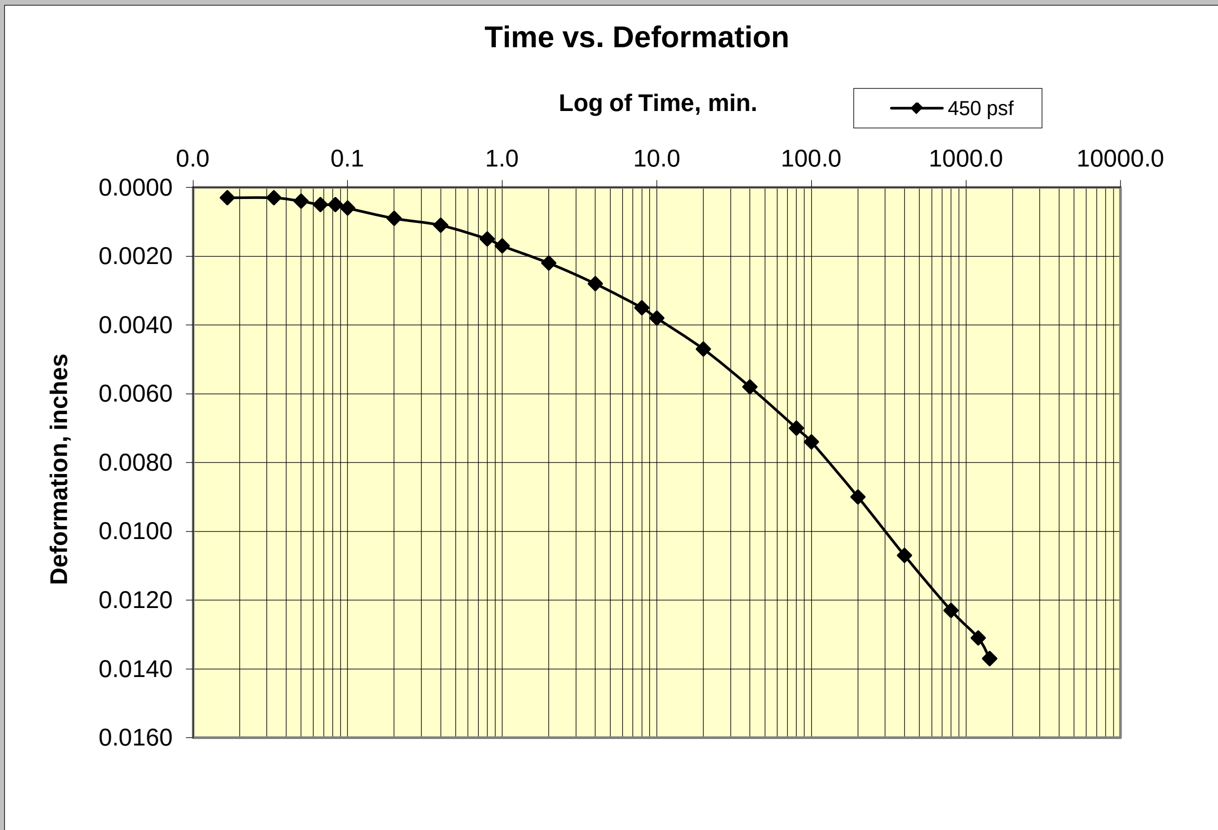


300 PSF

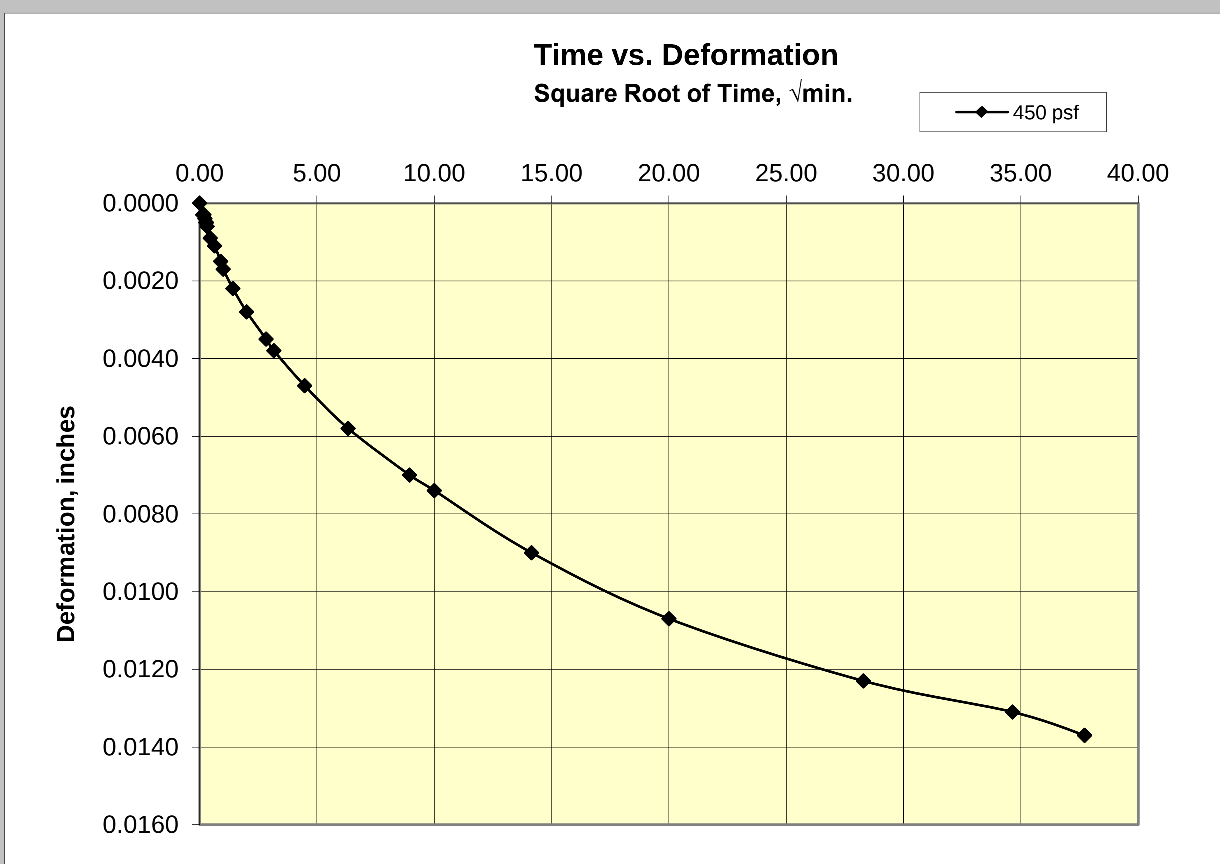


Cooper Testing Labs, Inc.

Load 4	450 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

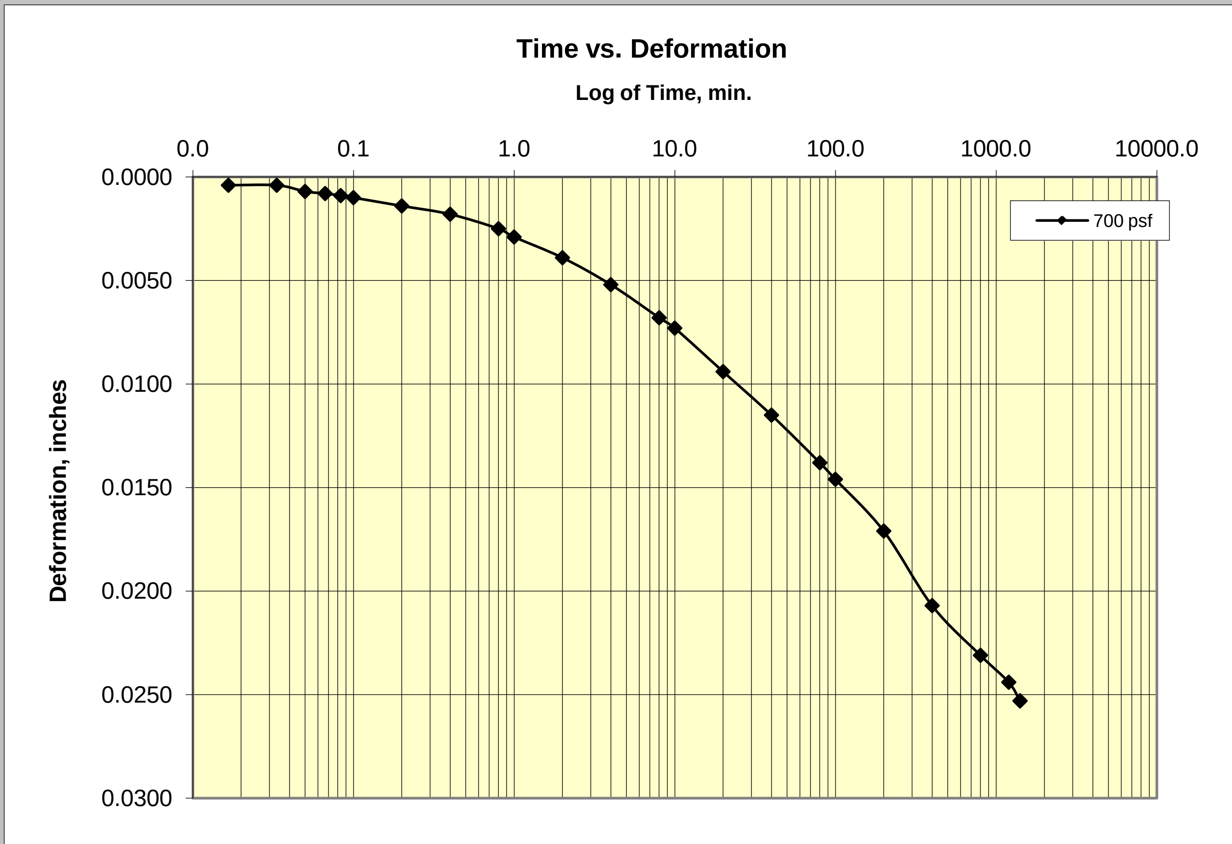


450 PSF

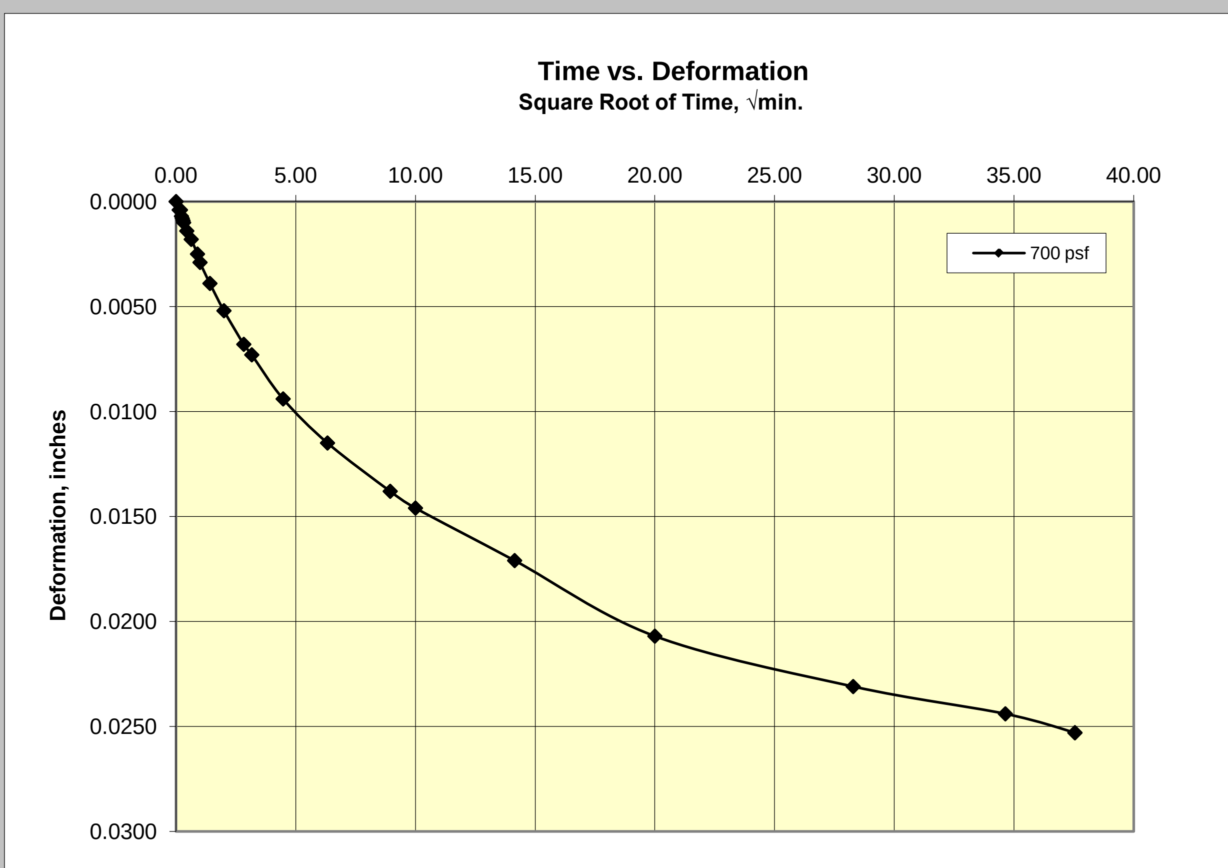


Cooper Testing Labs, Inc.

Load 5 | 700 PSF | AUS-B-02-7.0-9.0 | (8.1 ft)

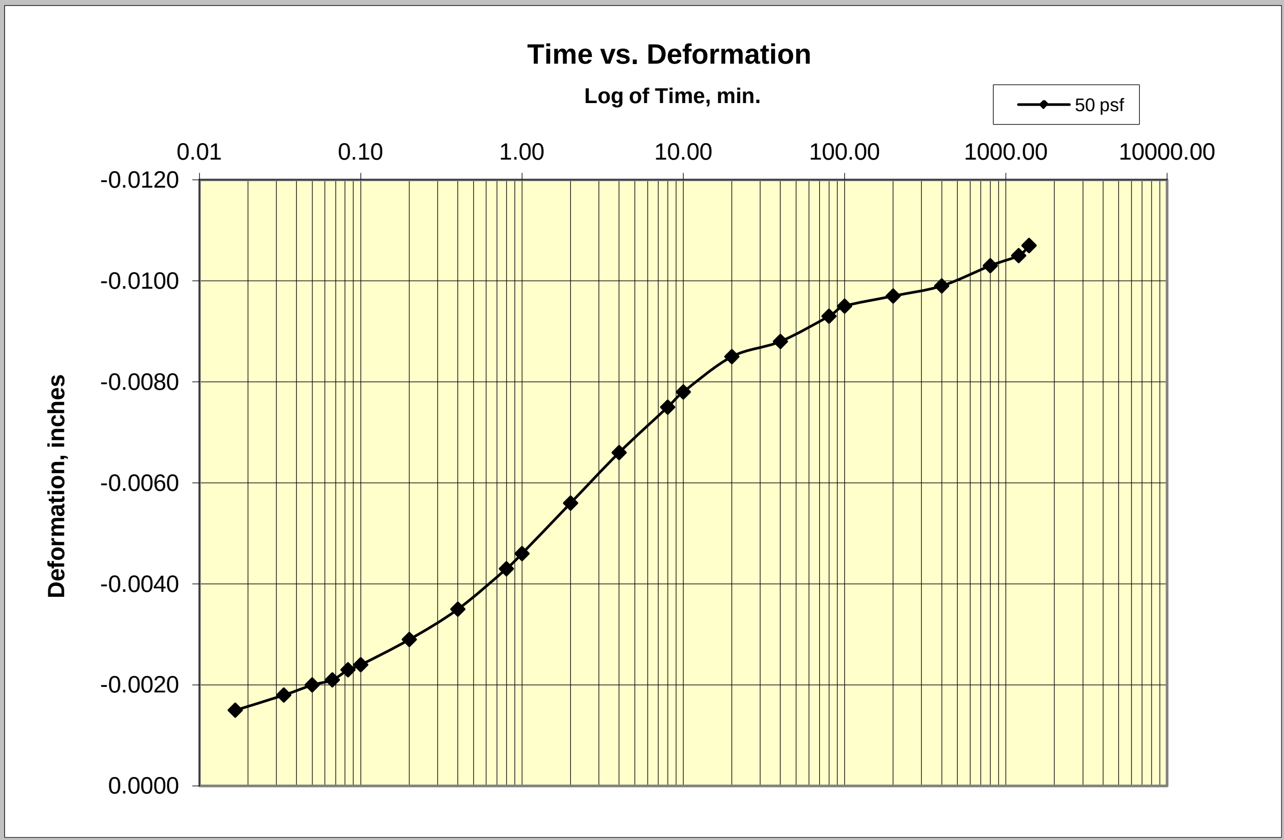


700 PSF

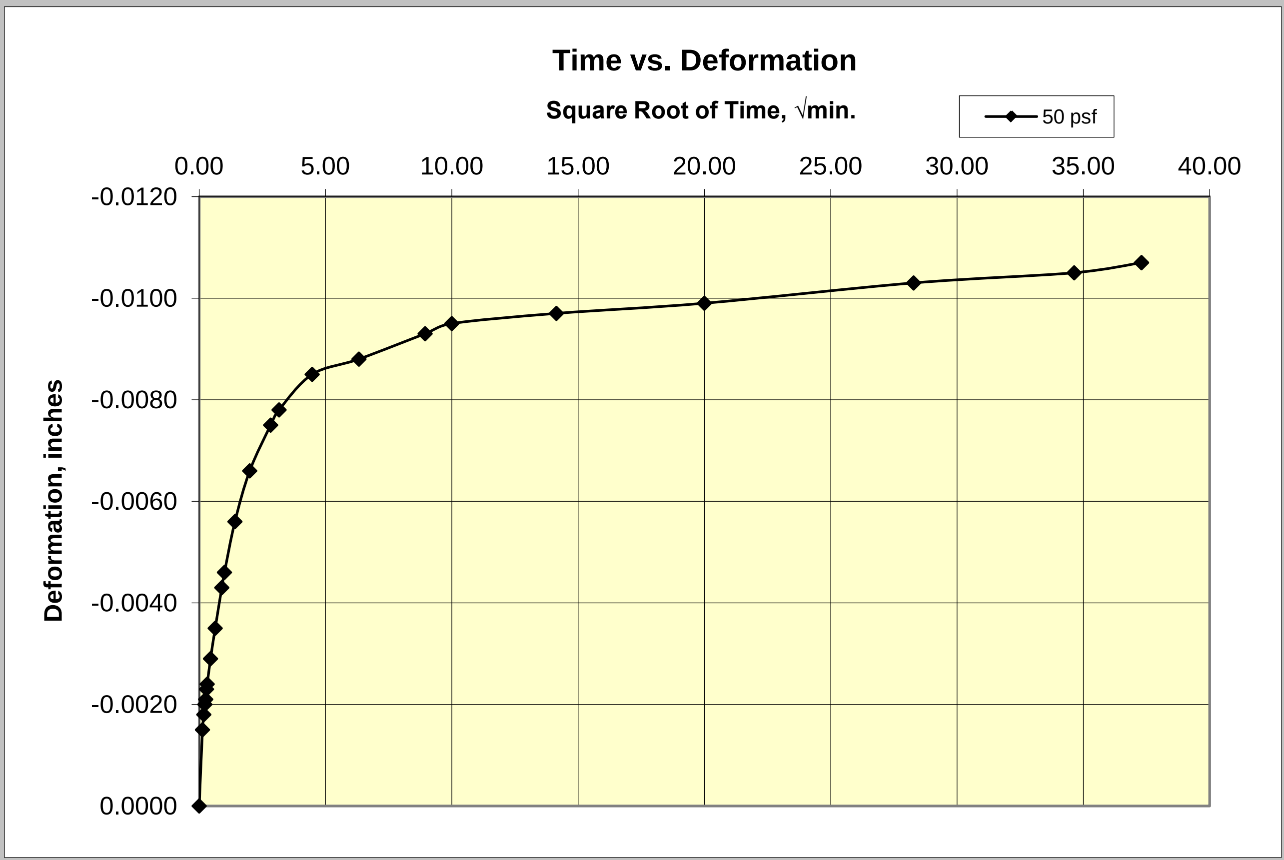


Cooper Testing Labs, Inc.

Load 6 | 50 PSF | AUS-B-02-7.0-9.0 | (8.1 ft)

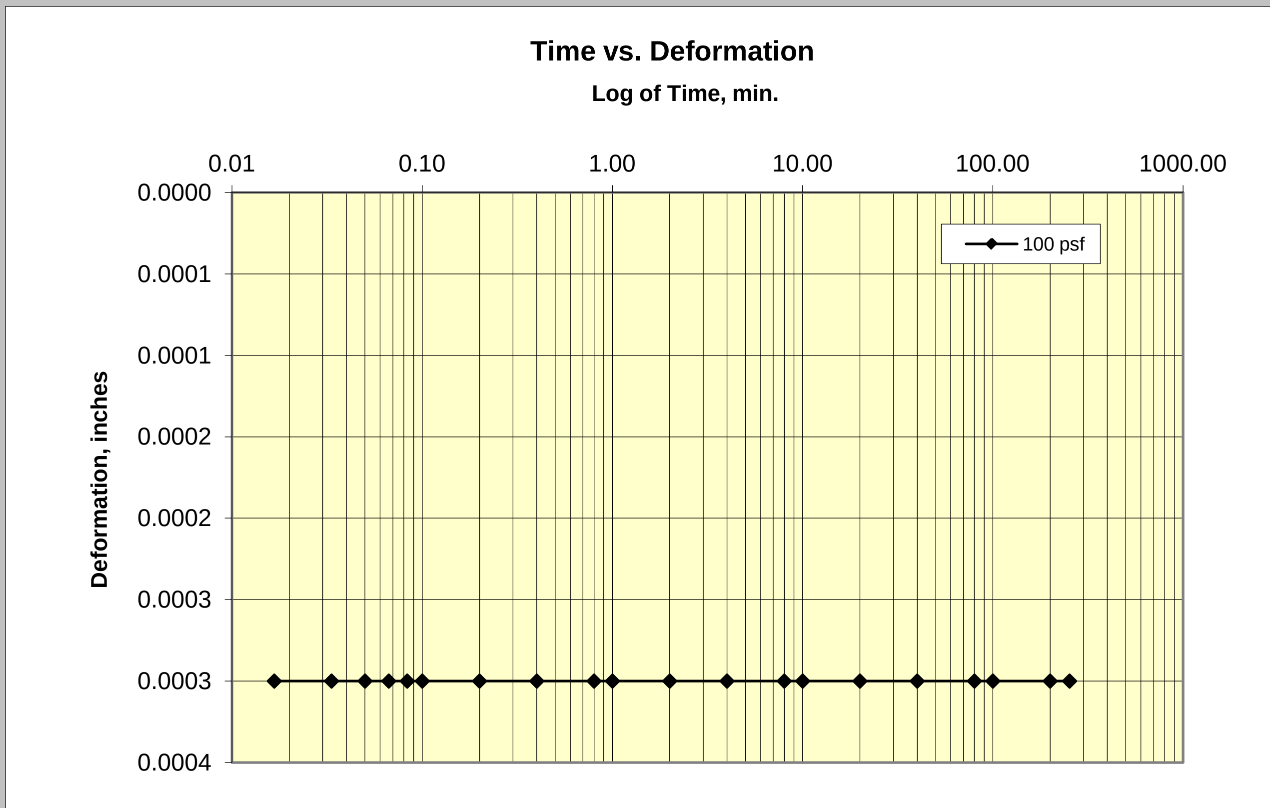


50 PSF

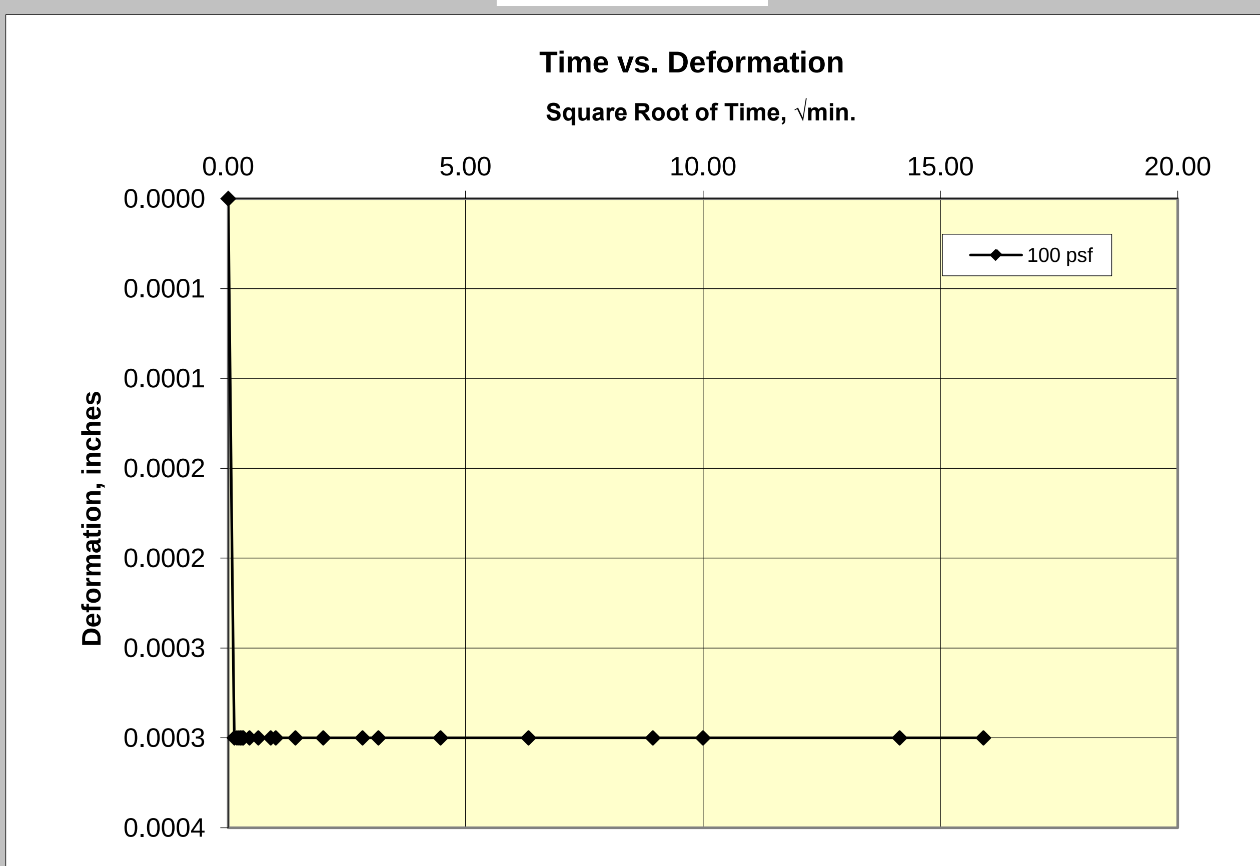


Cooper Testing Labs, Inc.

Load 7	100 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

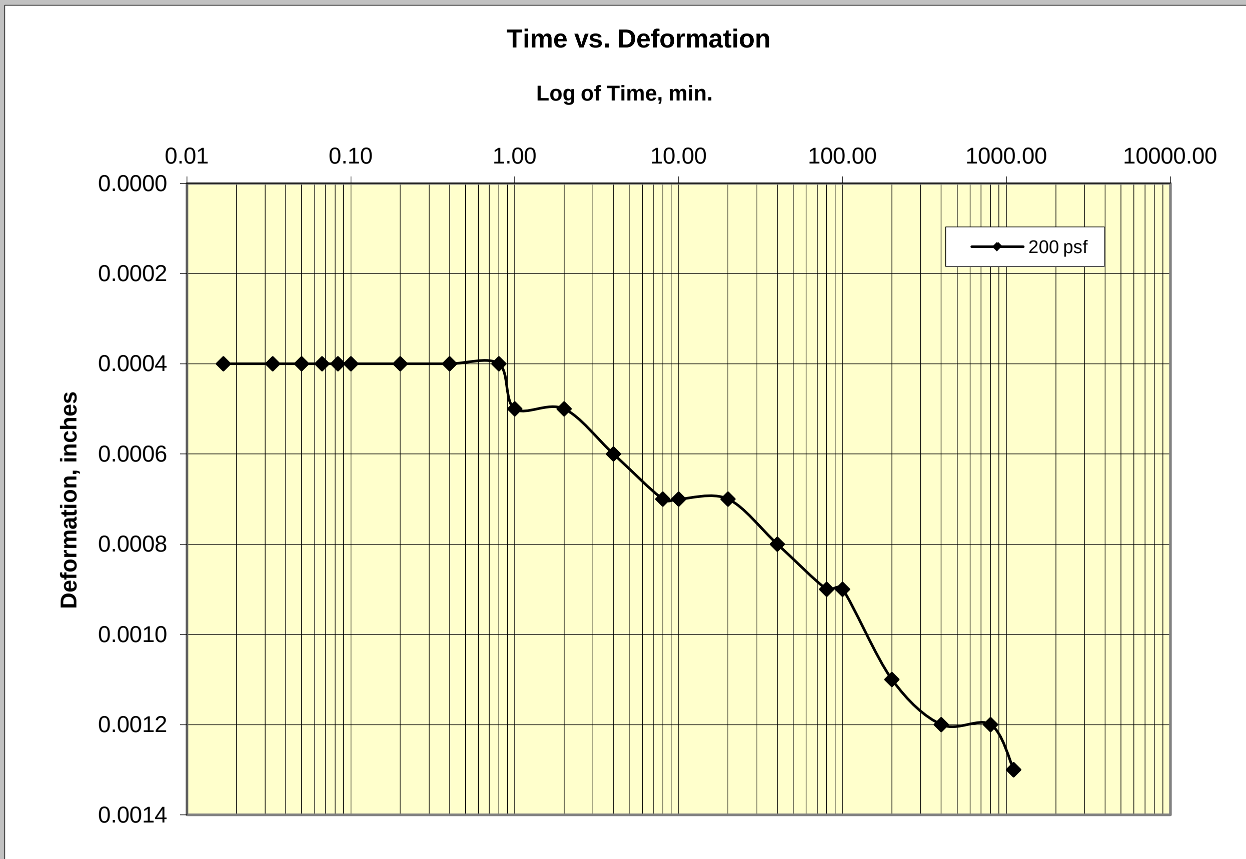


100 PSF

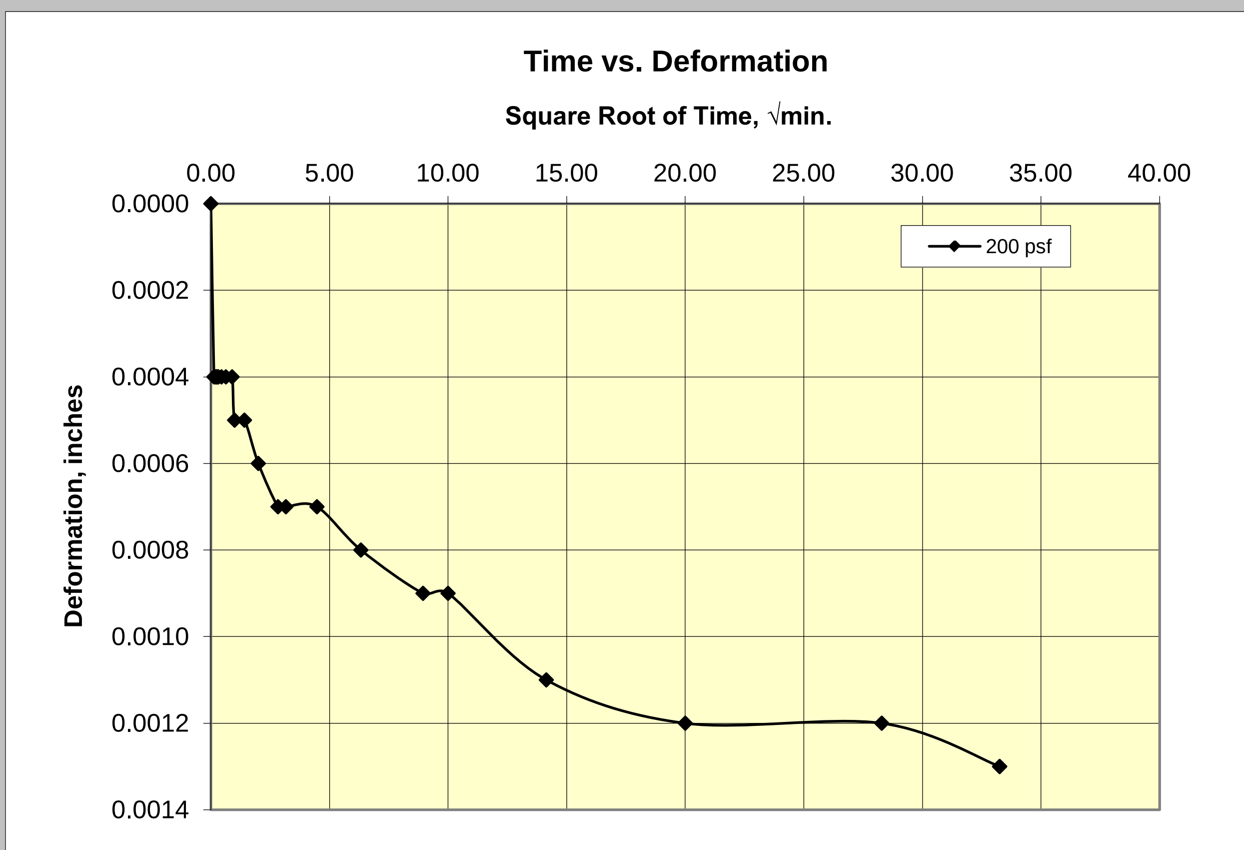


Cooper Testing Labs, Inc.

Load 8 | 200 PSF | AUS-B-02-7.0-9.0 | (8.1 ft)

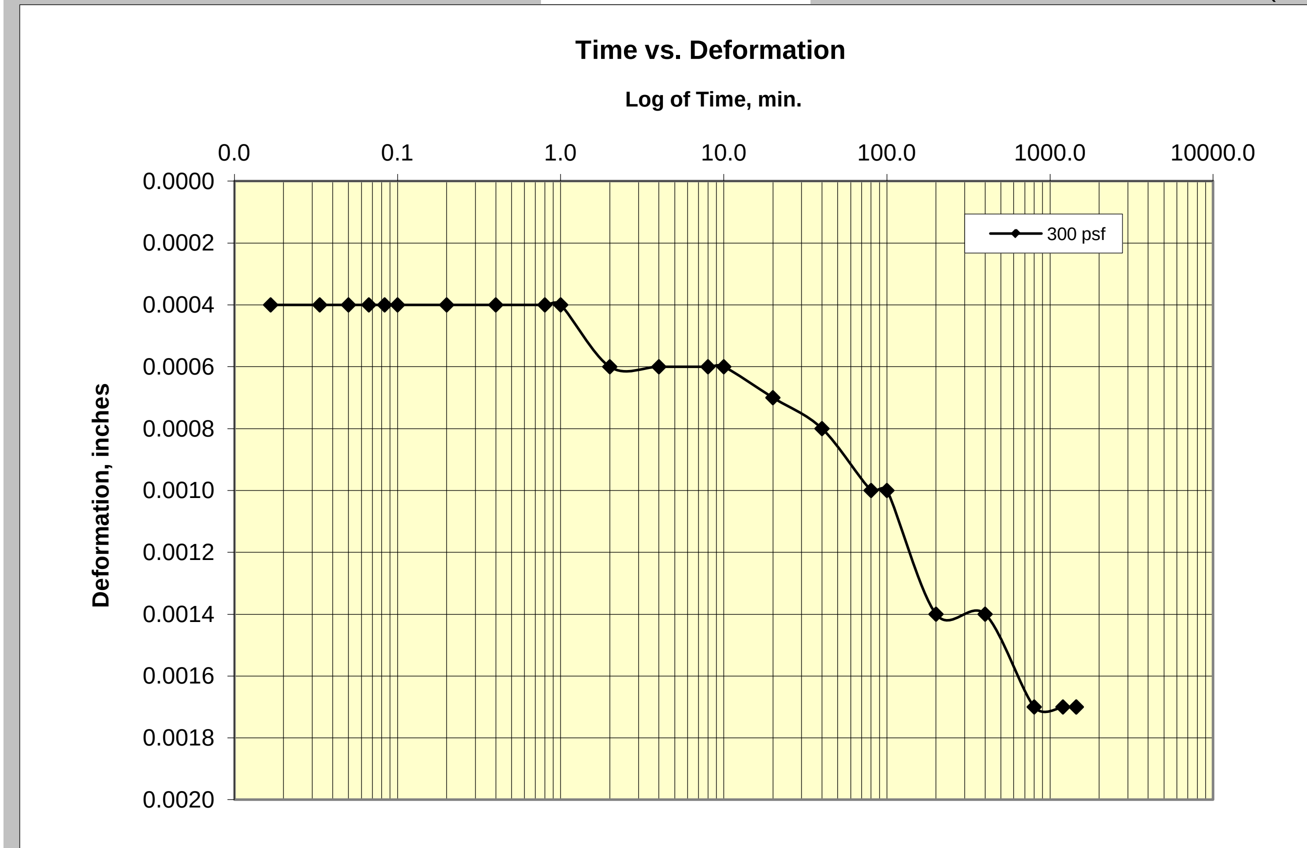


200 PSF

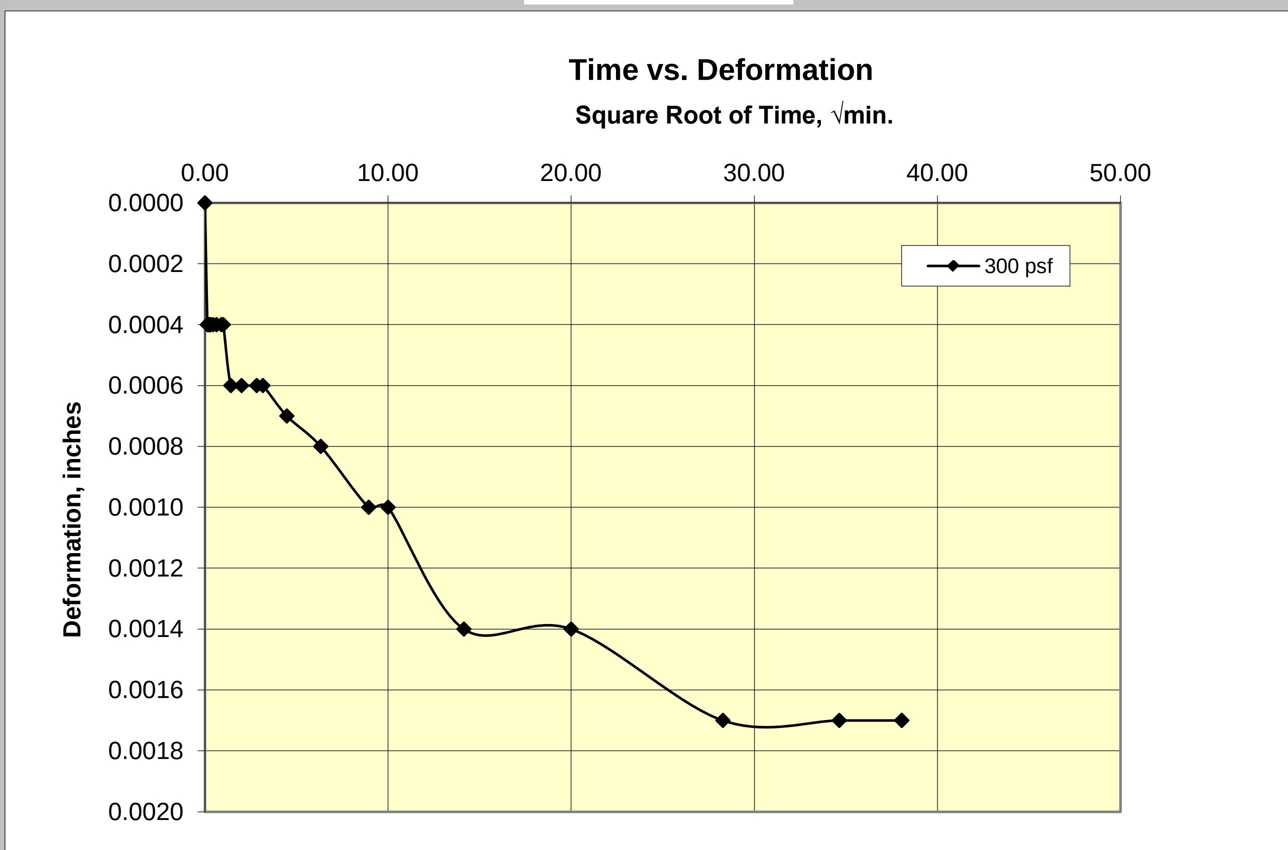


Cooper Testing Labs, Inc.

Load 9	300 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

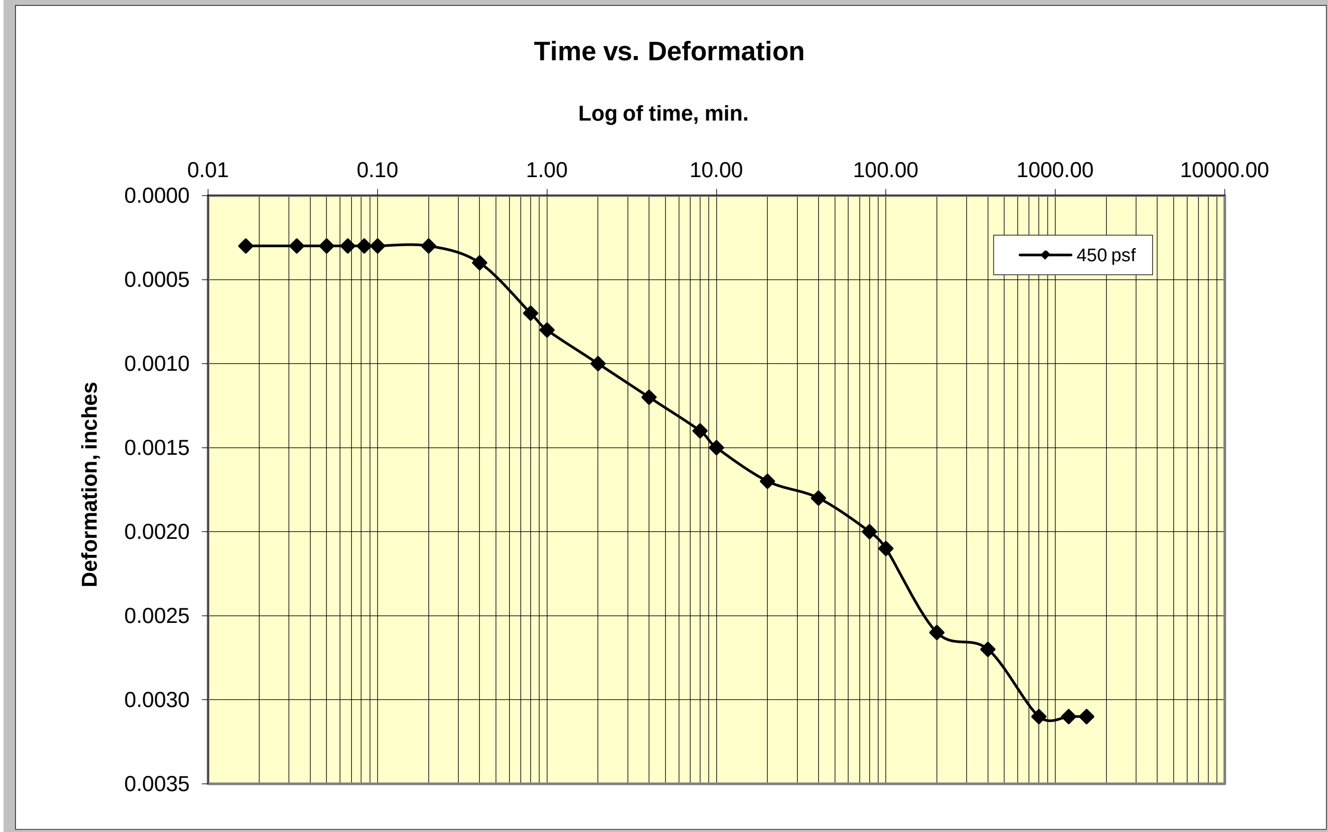


300 PSF

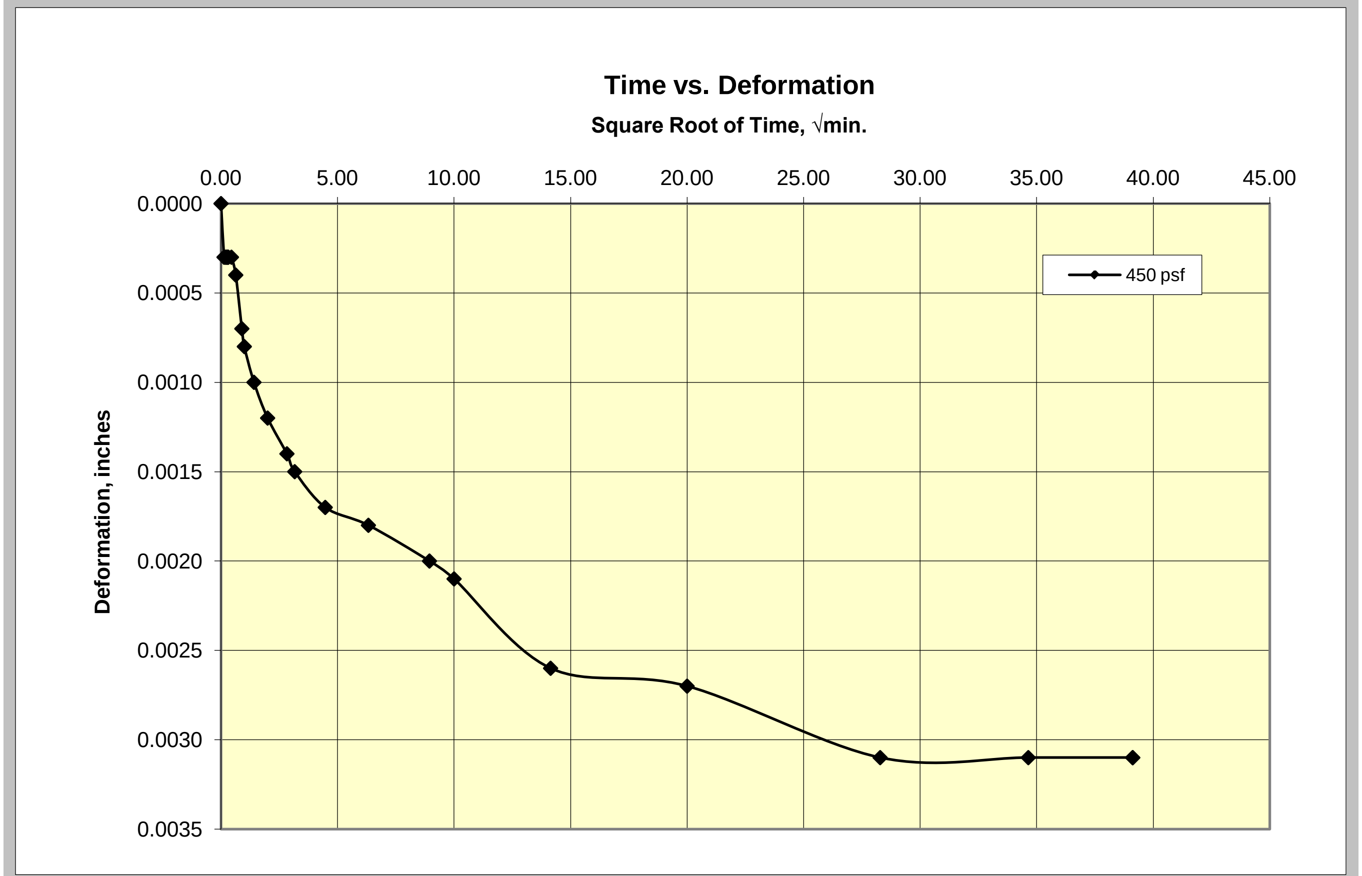


Cooper Testing Labs, Inc.

Load 10	450 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

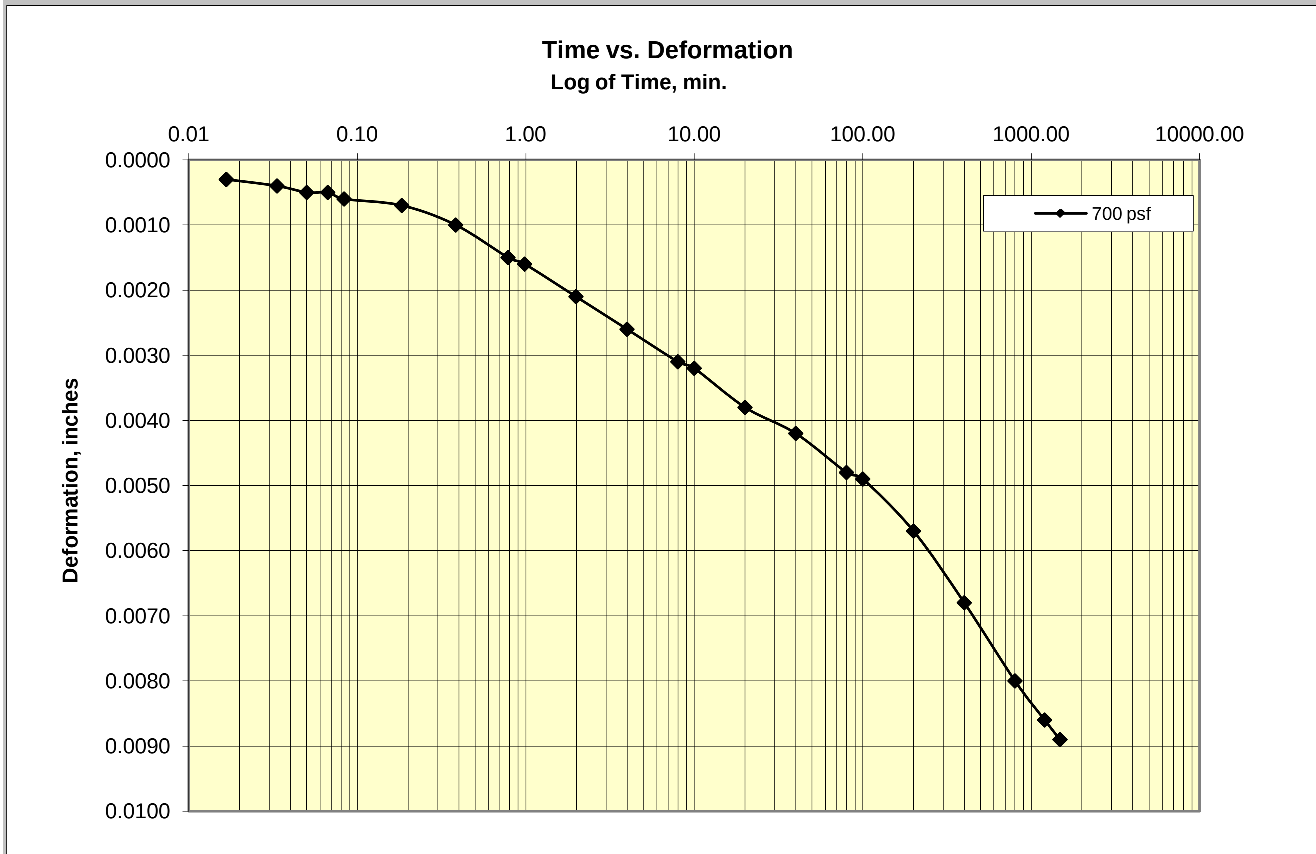


450 PSF

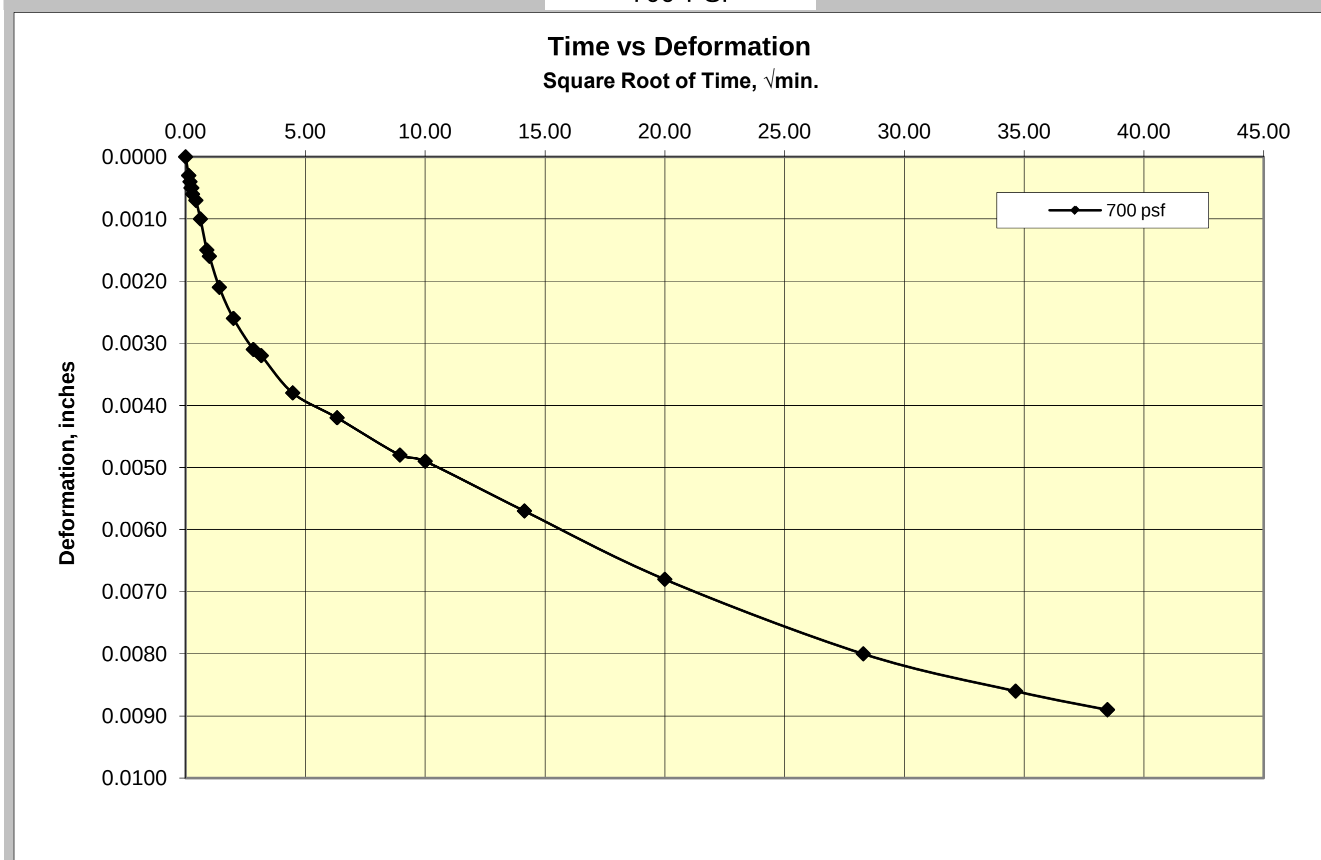


Cooper Testing Labs, Inc.

Load 11	700 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

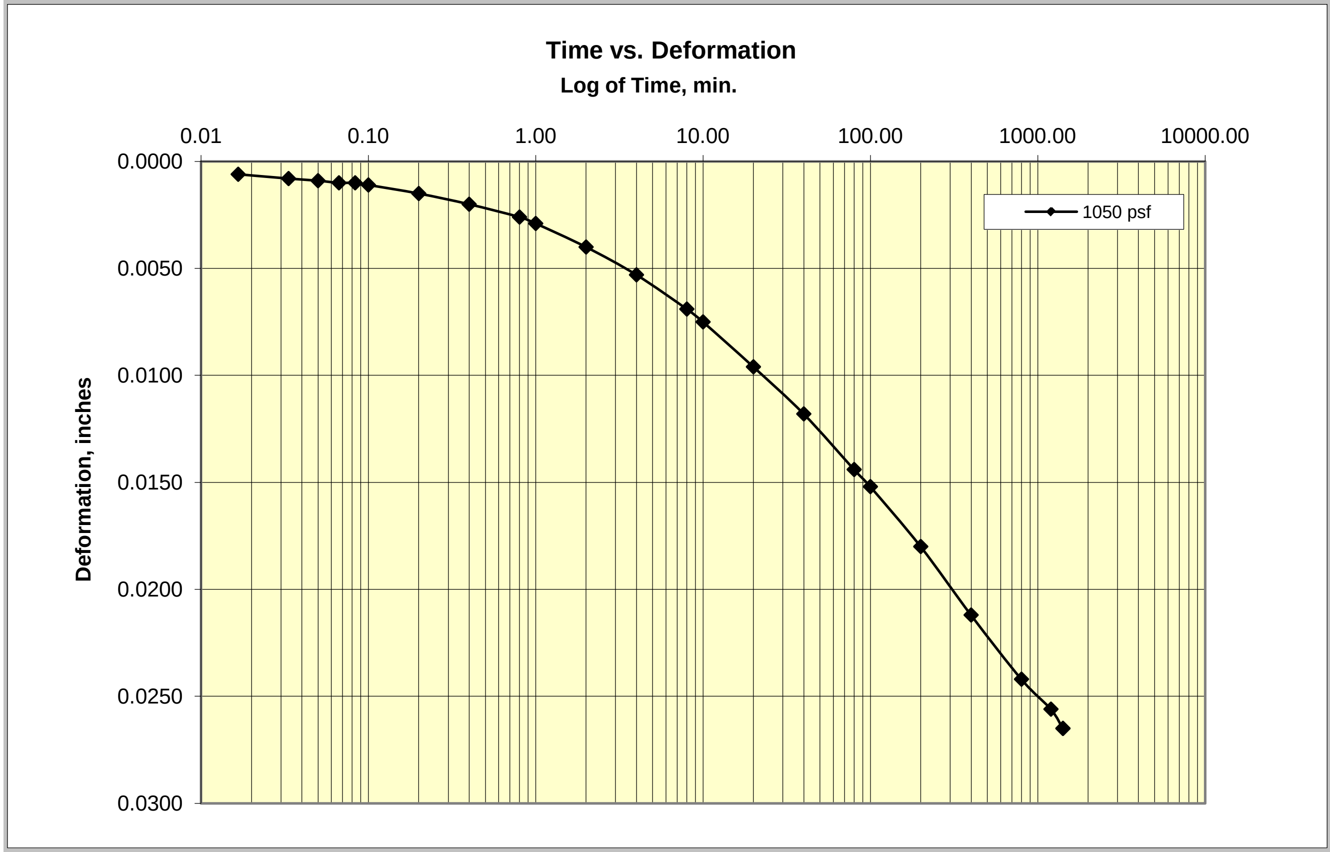


700 PSF

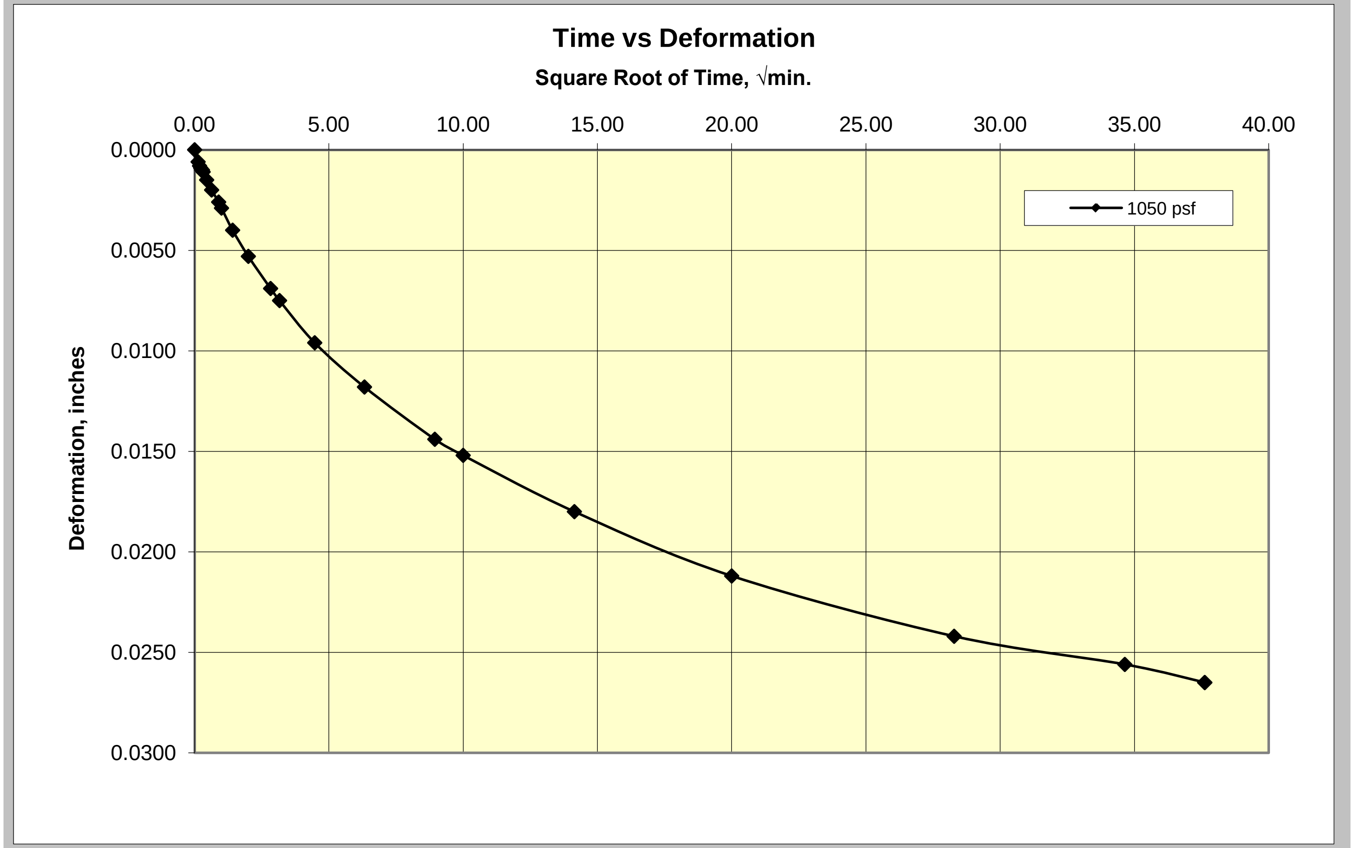


Cooper Testing Labs, Inc.

Load 12	1050 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

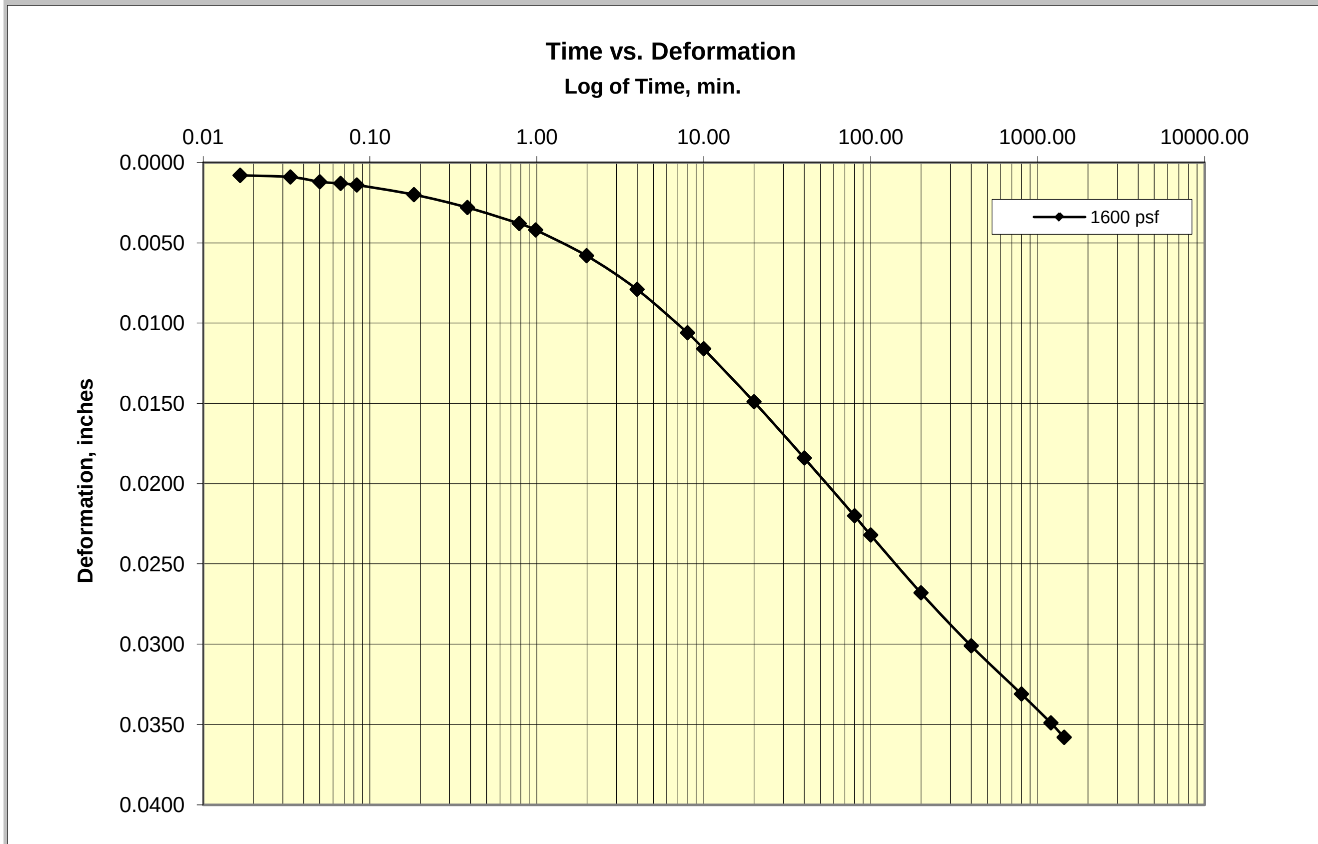


1050 PSF

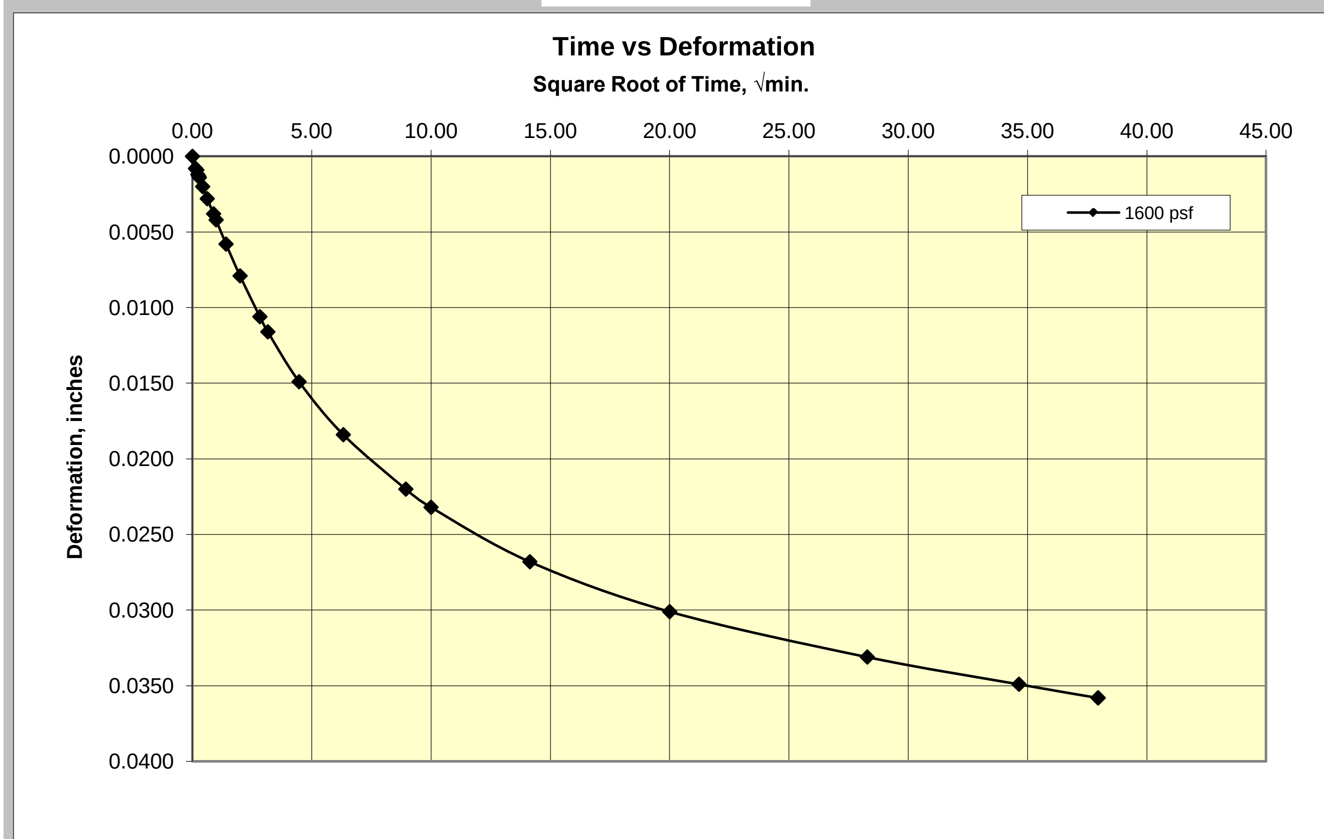


Cooper Testing Labs, Inc.

Load 13 | 1600 PSF | AUS-B-02-7.0-9.0 | (8.1 ft)

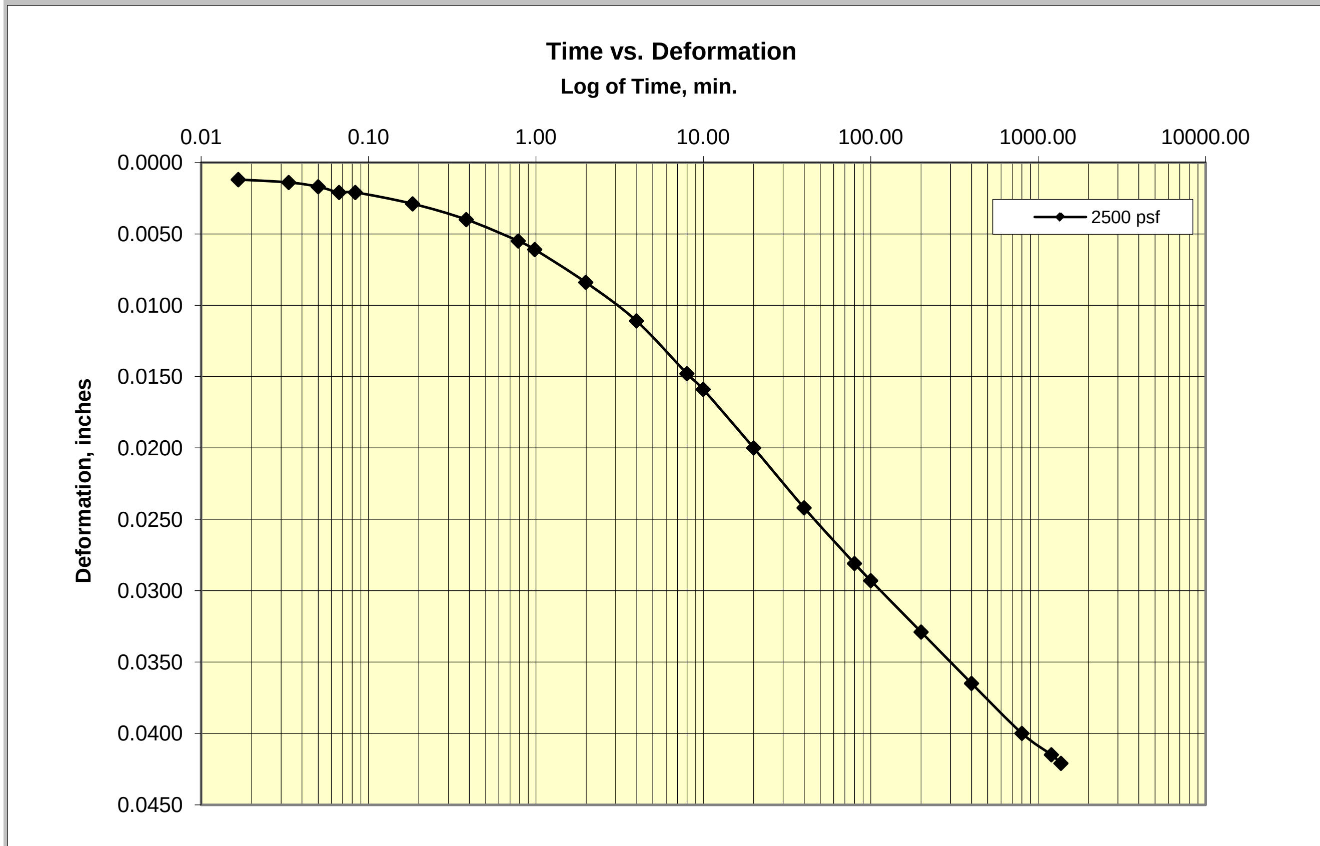


1600 PSF

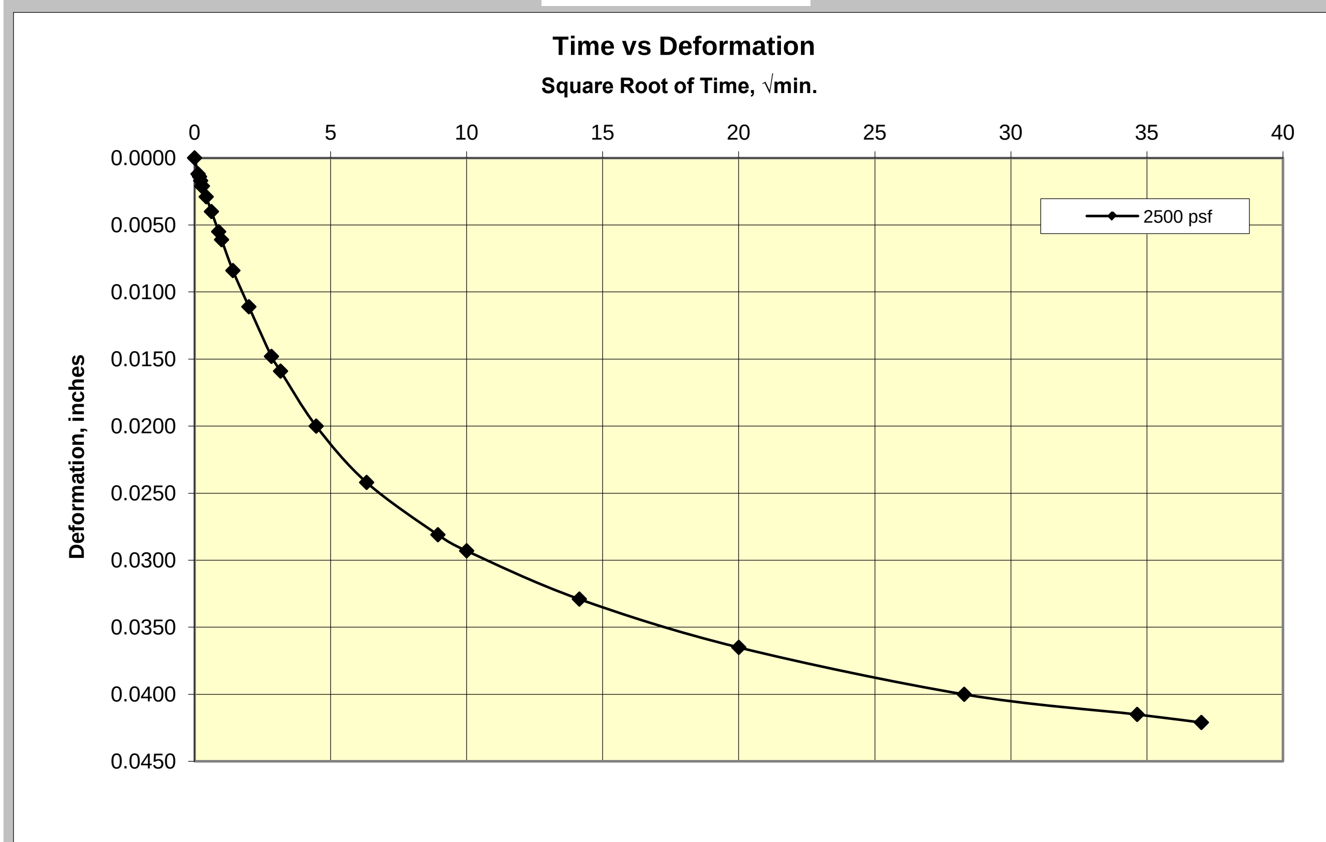


Cooper Testing Labs, Inc.

Load 14	2500 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

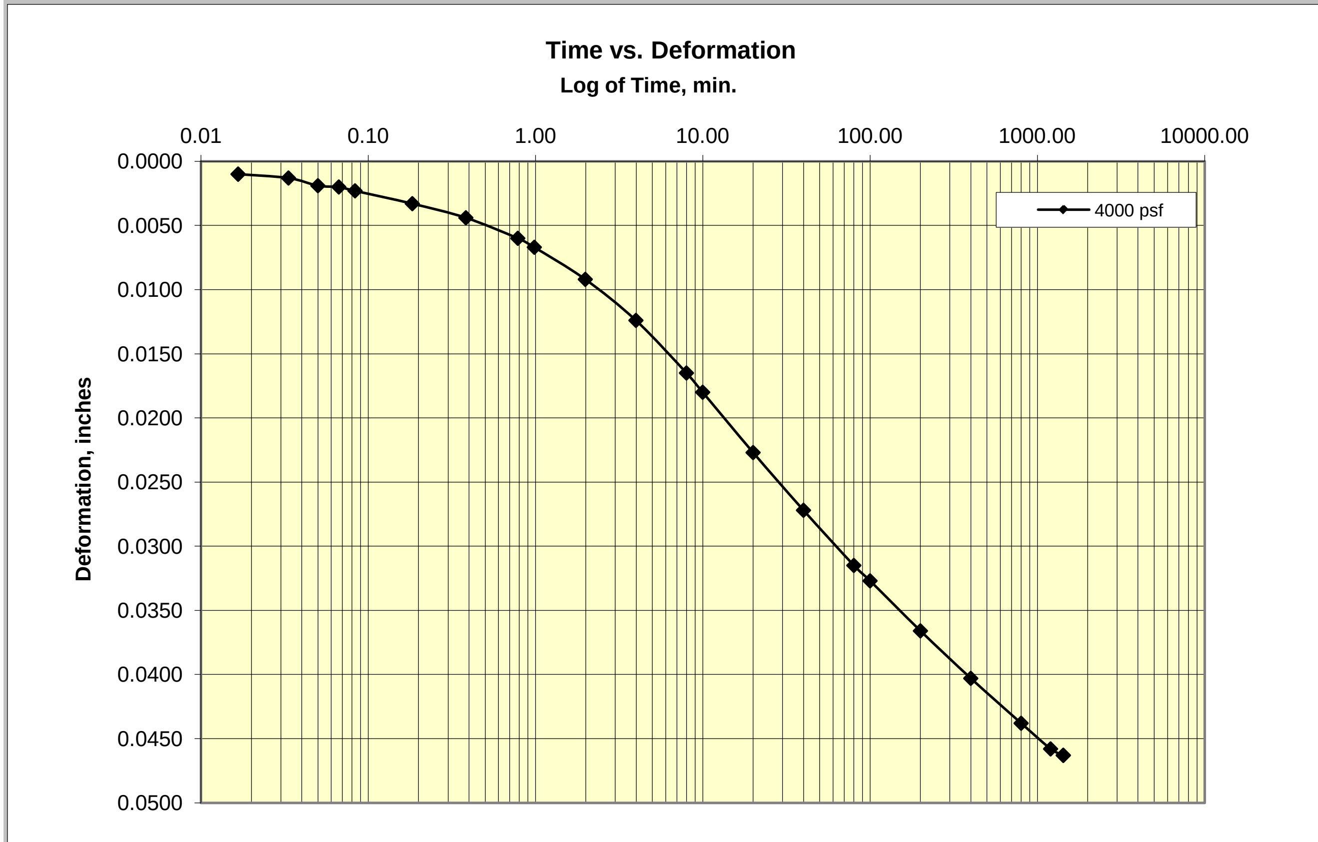


2500 PSF

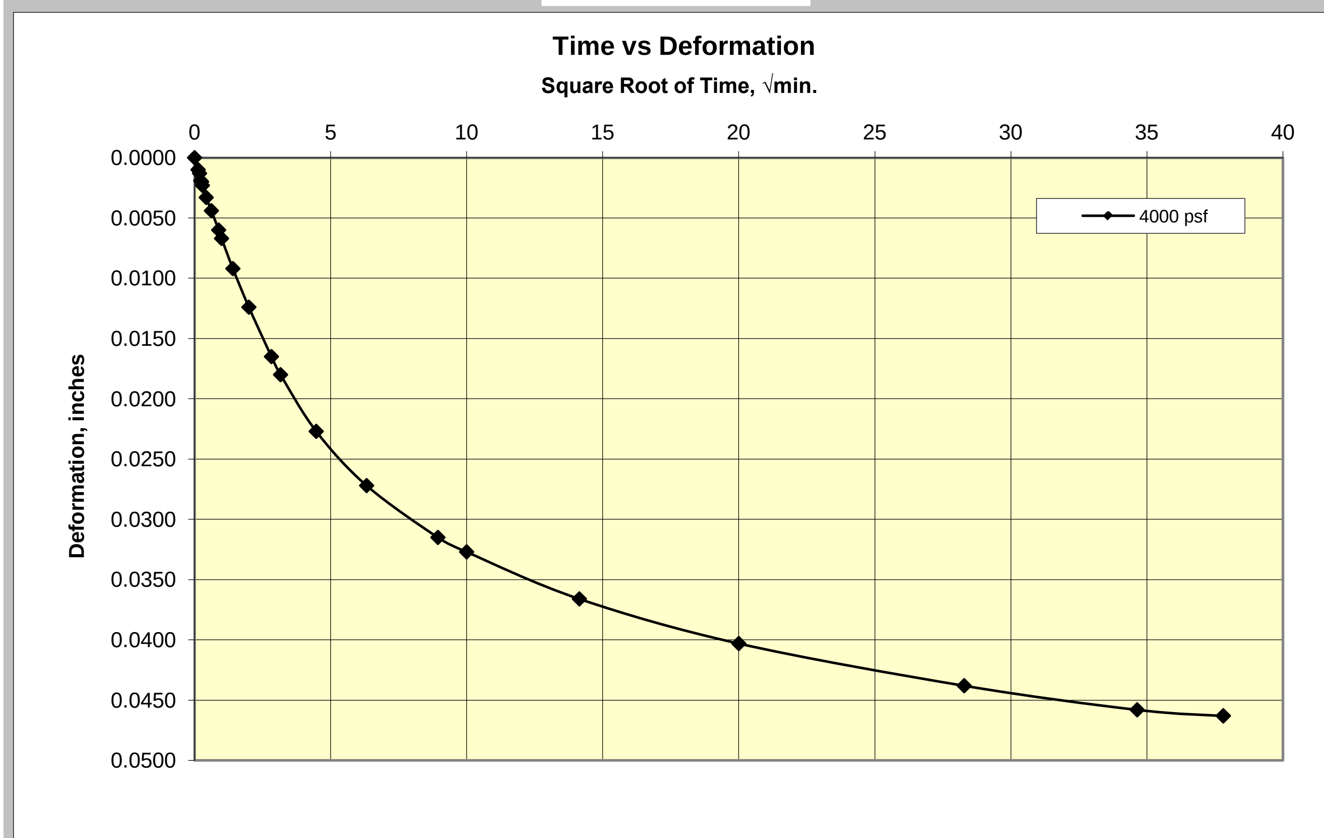


Cooper Testing Labs, Inc.

Load 15	4000 PSF	AUS-B-02-7.0-9.0	(8.1 ft)

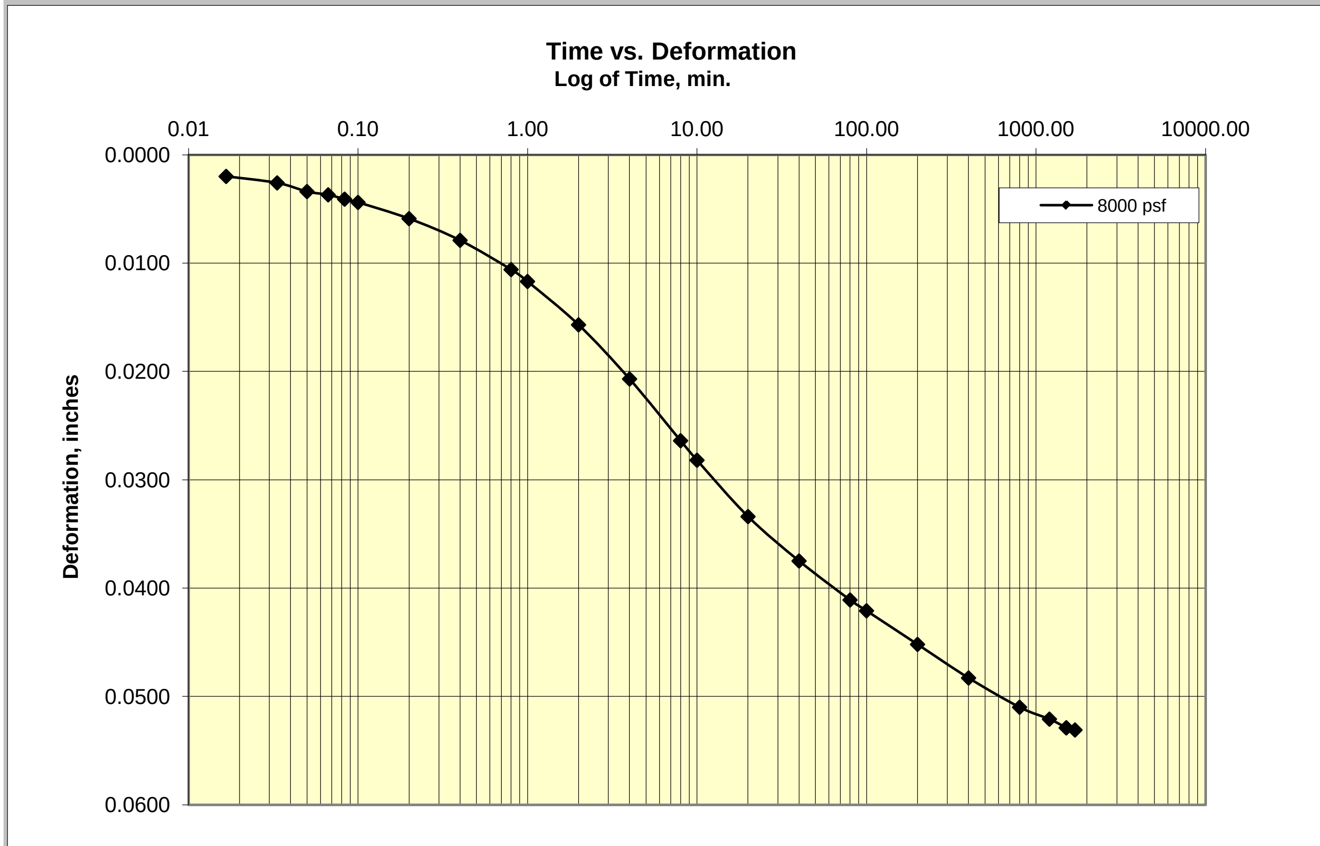


4000 PSF

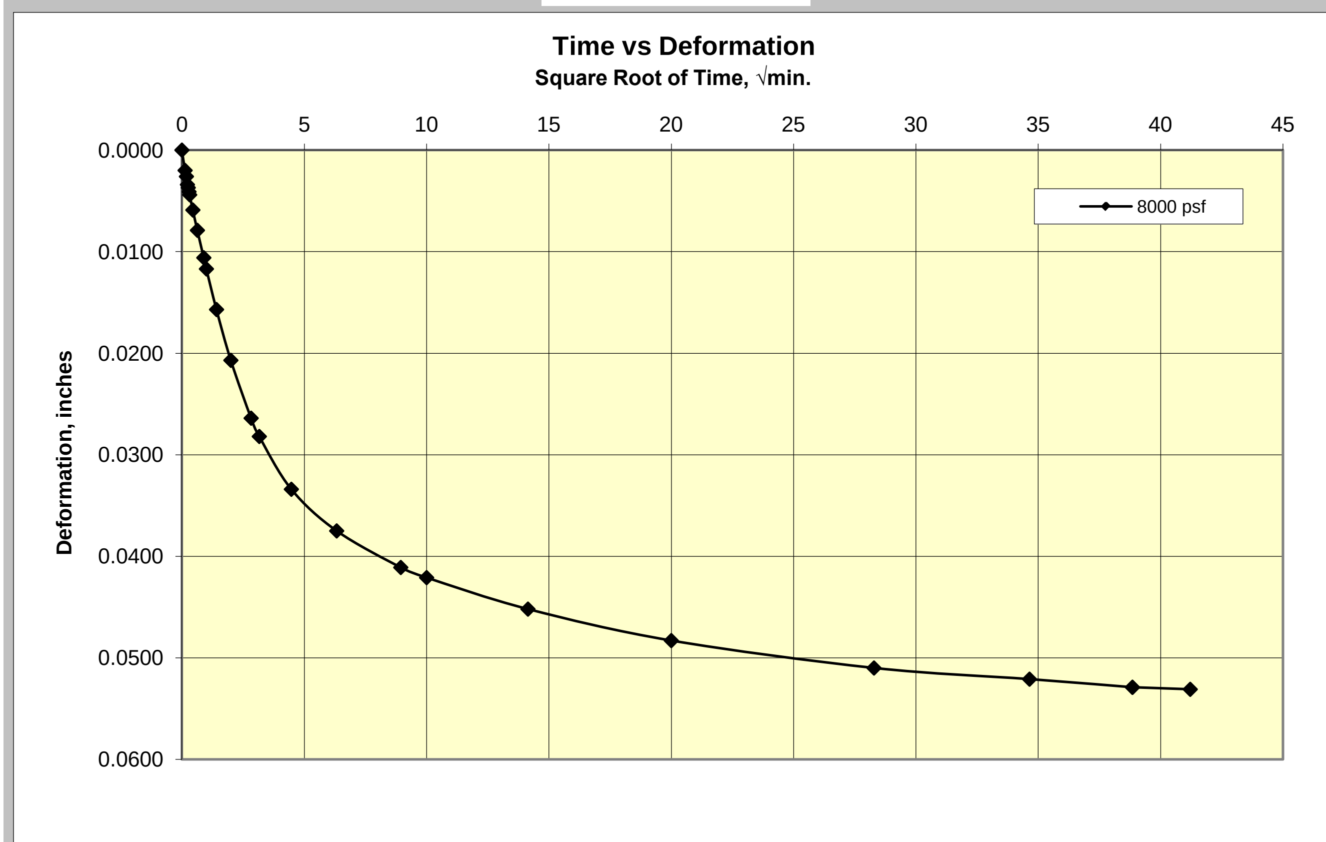


Cooper Testing Labs, Inc.

Load 16	8000 PSF	AUS-B-02-7.0-9.0	(8.1 ft)



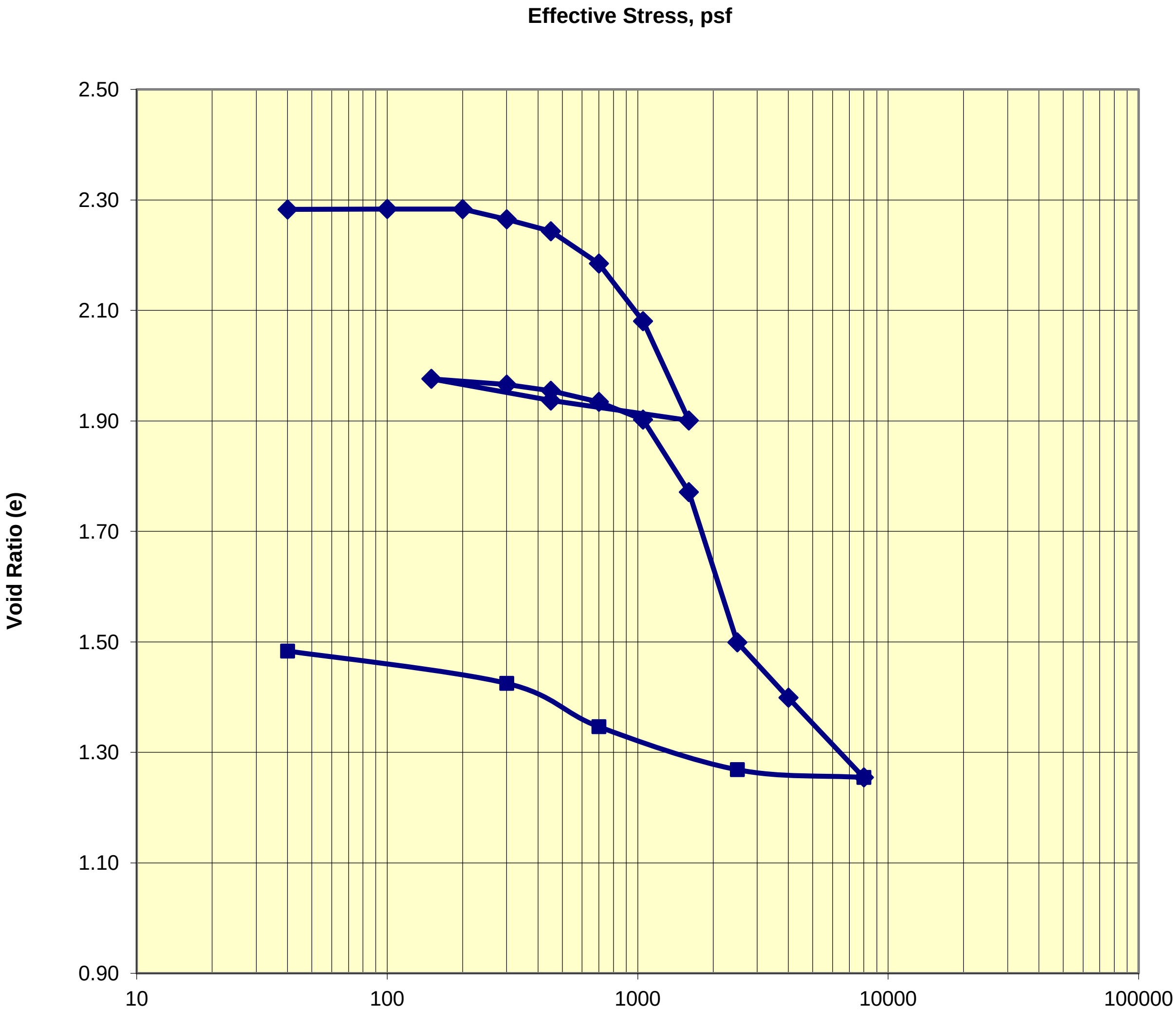
8000 PSF



Consolidation Test
ASTM D2435

COOPER TESTING LABORATORY

Job No.:	477-013	**Boring:**	AUS-B-02	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-02	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	12-14(Tip-5)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY w/ shell fragments (Bay Mud)		(13.6 ft)	**Date:**	5/9/2012



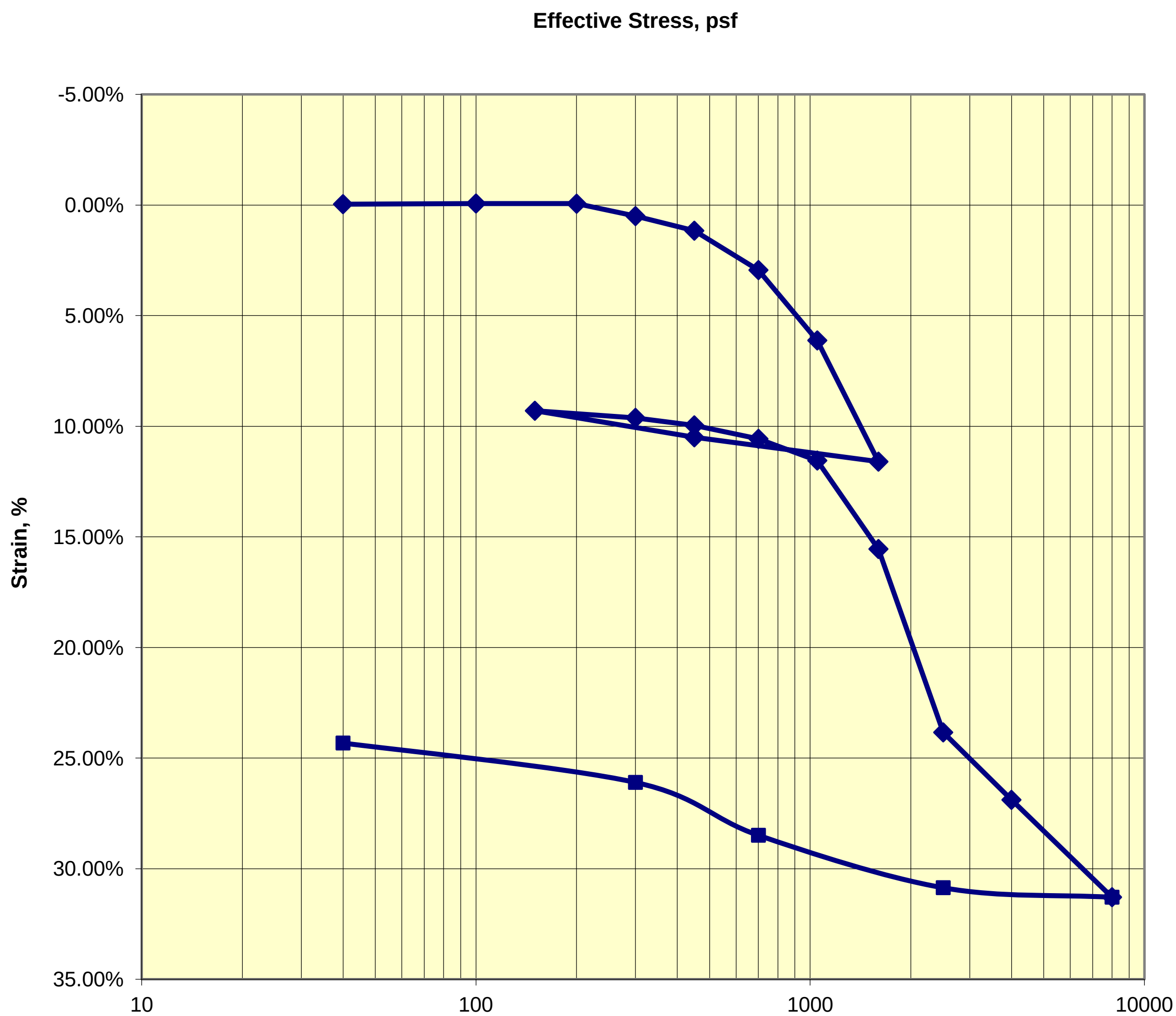
Ass. Gs = 2.61	**Initial**	**Final**
Moisture %:	87.2	56.7
Dry Density, pcf:	49.7	65.8
Void Ratio:	2.279	1.477
% Saturation:	99.8	100

Remarks: The sample appeared to go into secondary compression very abruptly. When the test was ended nothing unusual was noted during tear-down or when splitting the sample. Shell fragments were up to about 3/8" in size.

Consolidation Test
ASTM D2435

COOPER TESTING LABORATORY

Job No.:	477-013	**Boring:**	AUS-B-02	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-02	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	12-14(Tip-5)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY w/ shell fragments (Bay Mud)		(13.6 ft)	**Date:**	5/9/2012

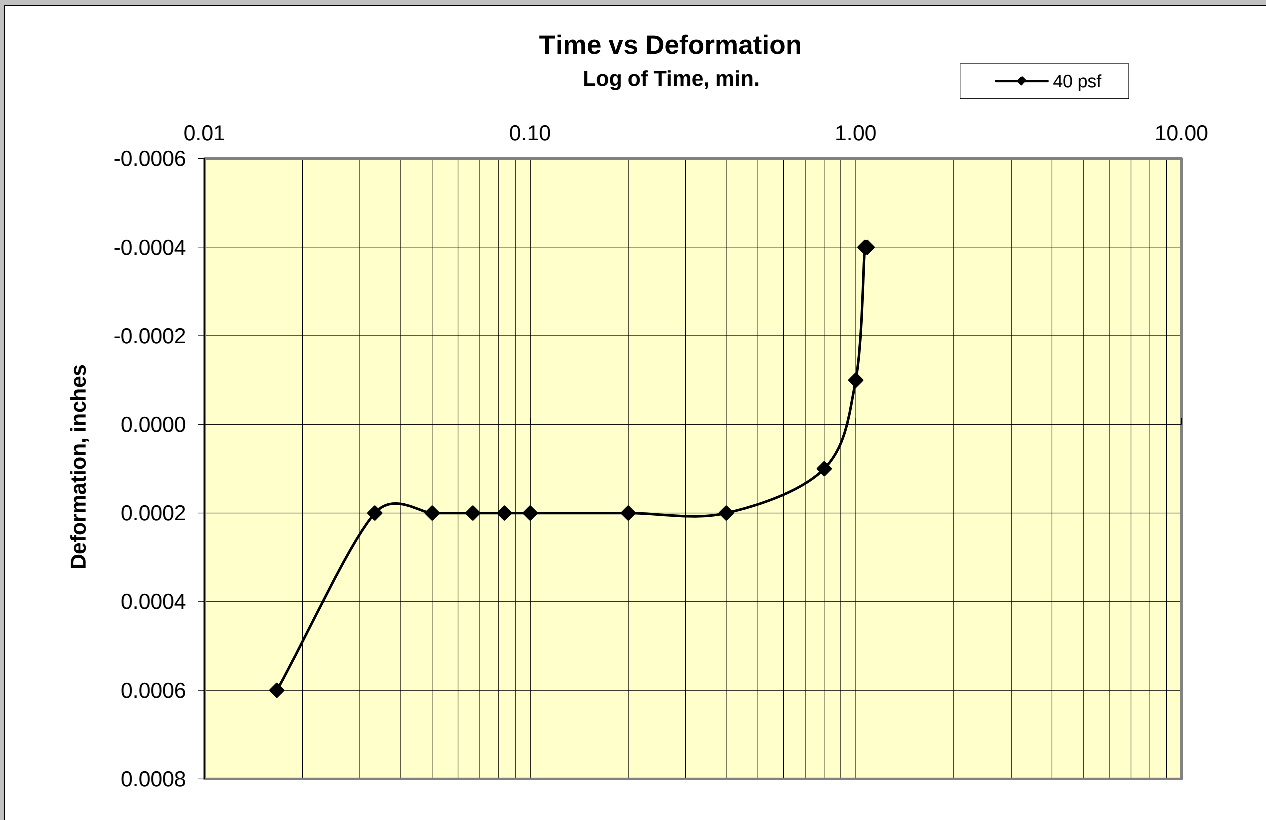


Ass. Gs = 2.61	**Initial**	**Final**
Moisture %:	87.2	56.7
Dry Density, pcf:	49.7	65.8
Void Ratio:	2.279	1.477
% Saturation:	99.8	100

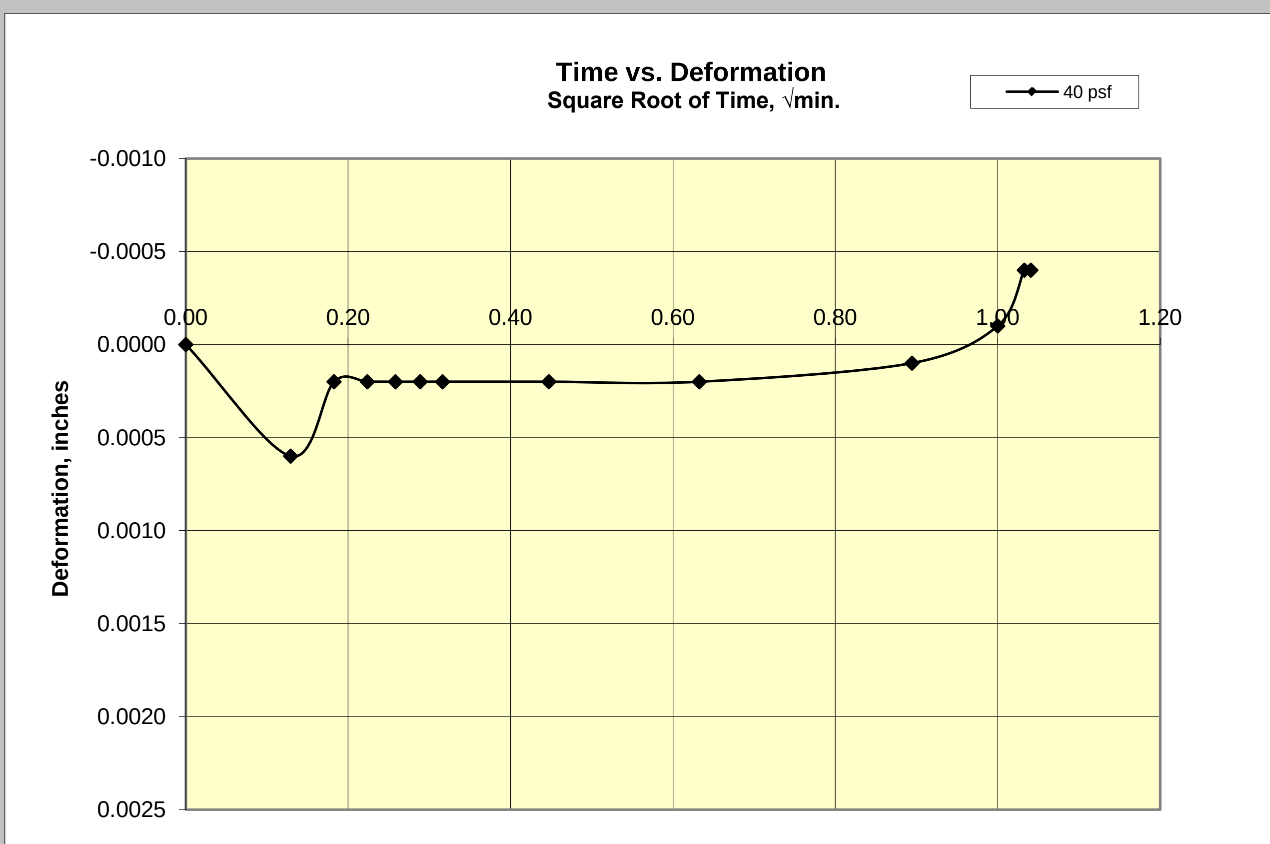
Remarks: The sample appeared to go into secondary compression very abruptly. When the test was ended nothing unusual was noted during tear-down or when splitting the sample. Shell fragments were up to about 3/8" in size.

Cooper Testing Labs, Inc.

Load 1	40 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

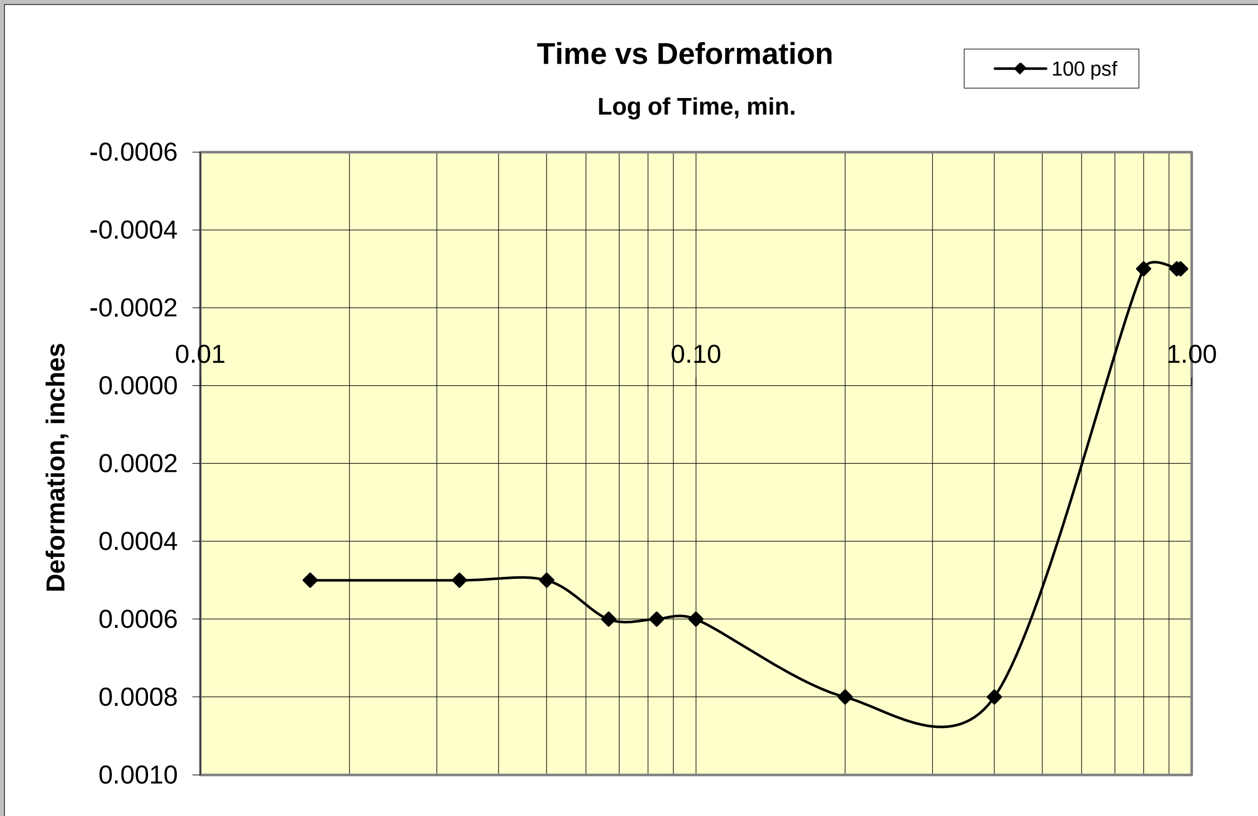


40 PSF

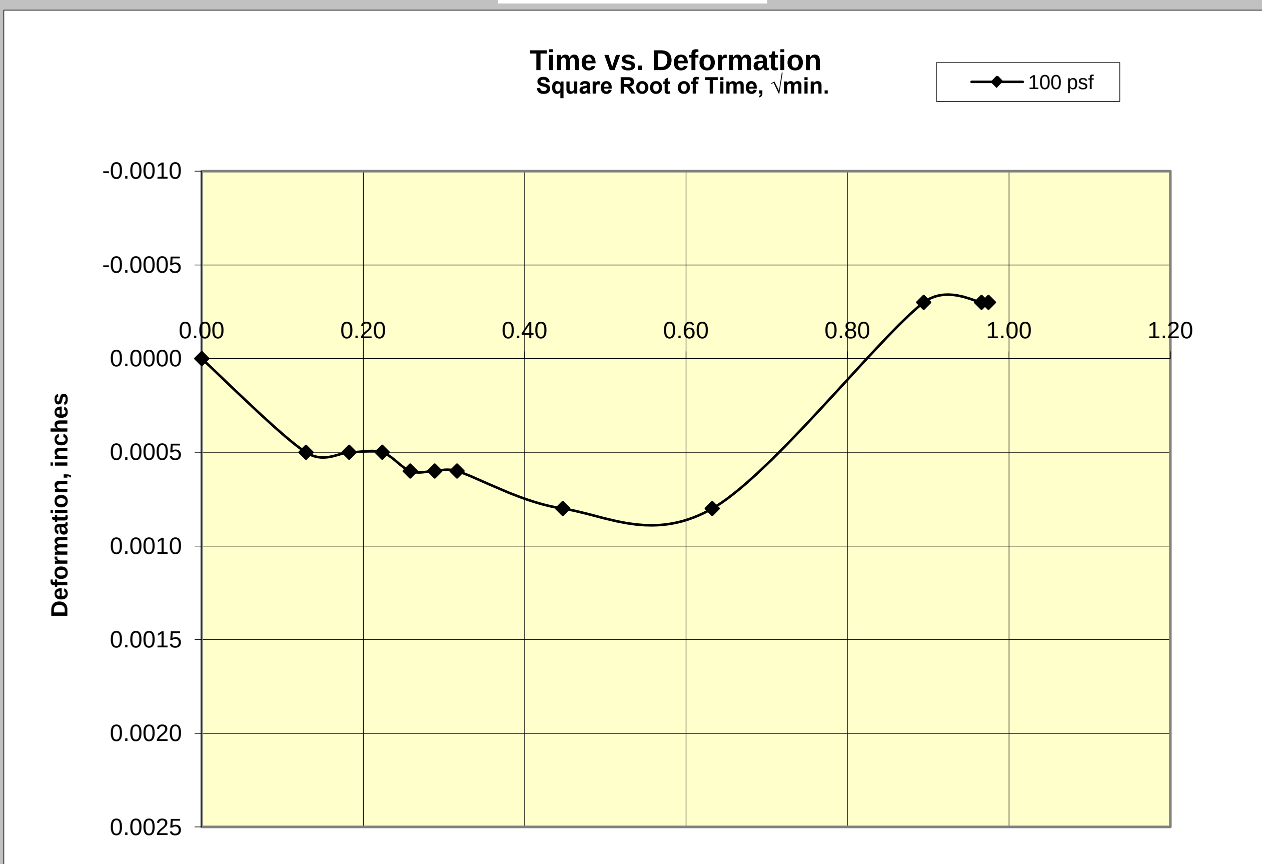


Cooper Testing Labs, Inc.

Load 2	100 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

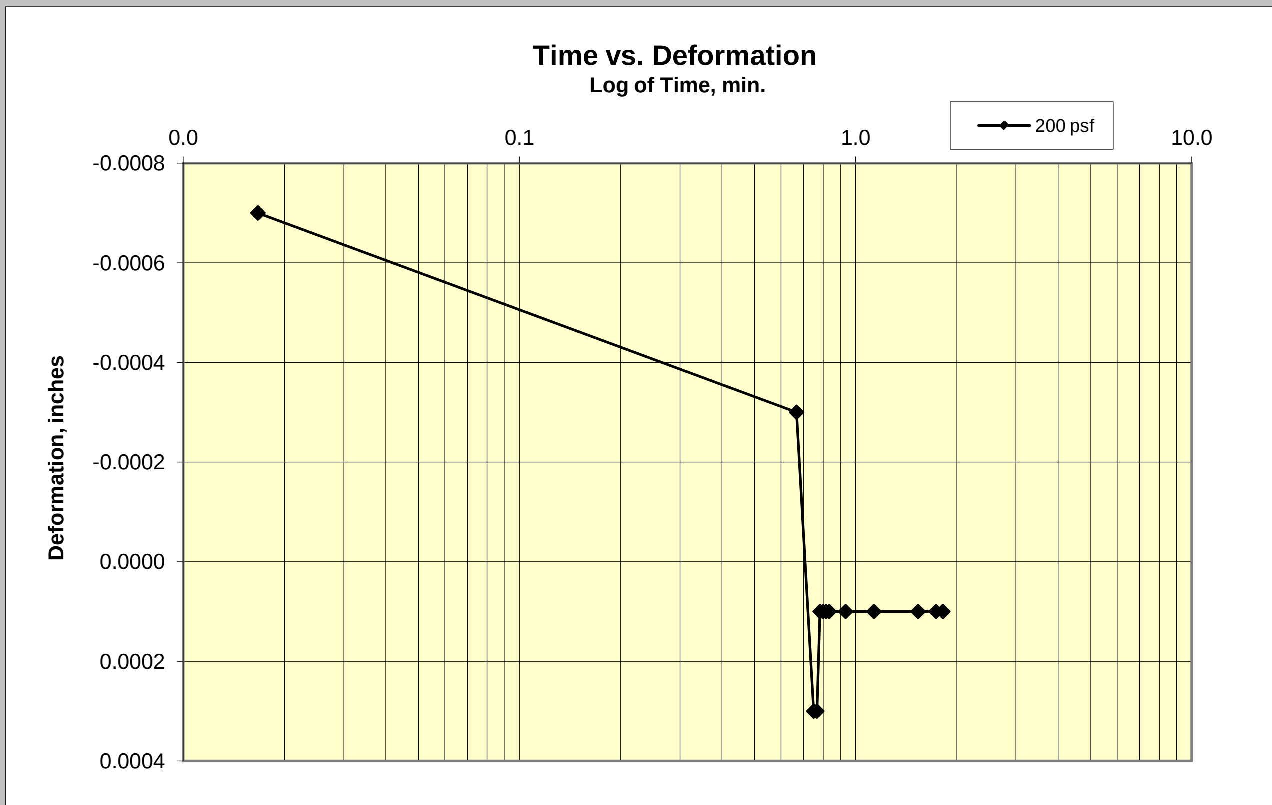


100 PSF

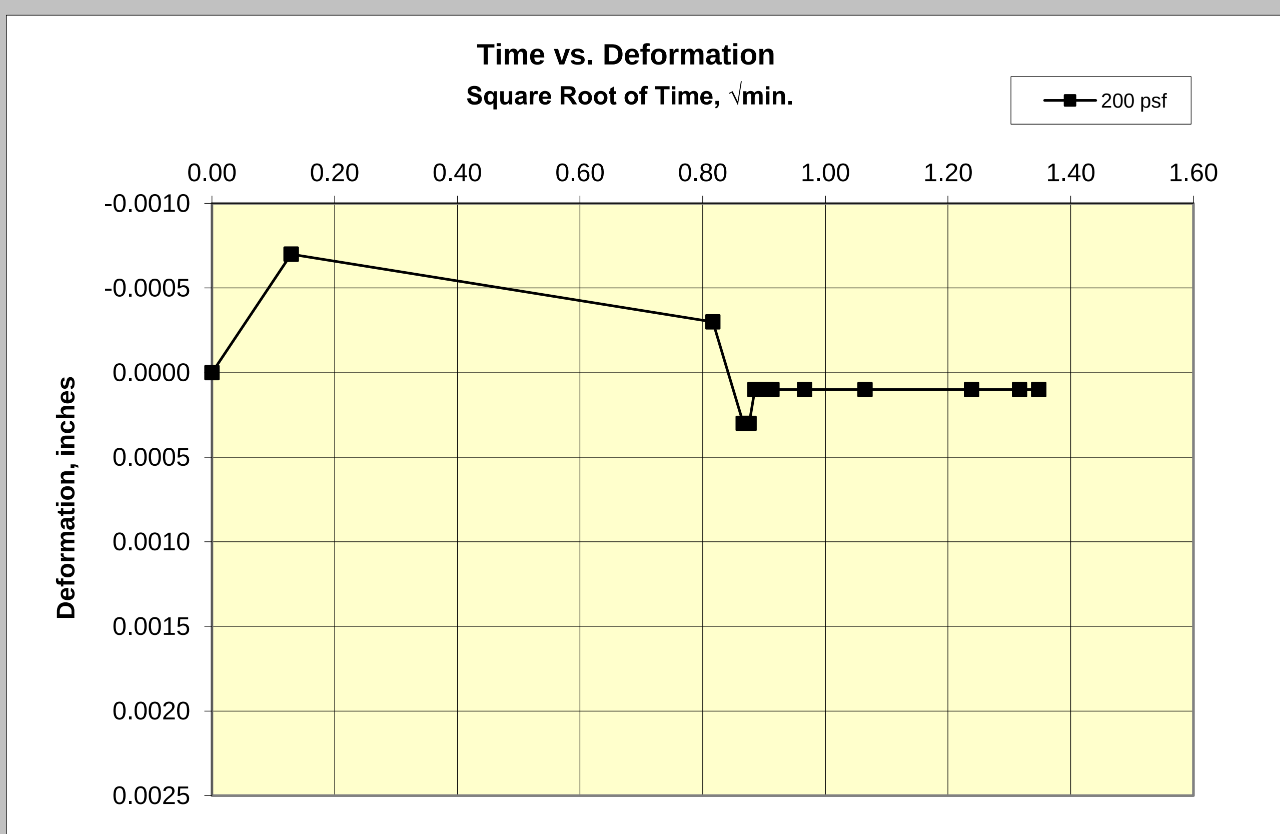


Cooper Testing Labs, Inc.

Load 3	200 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

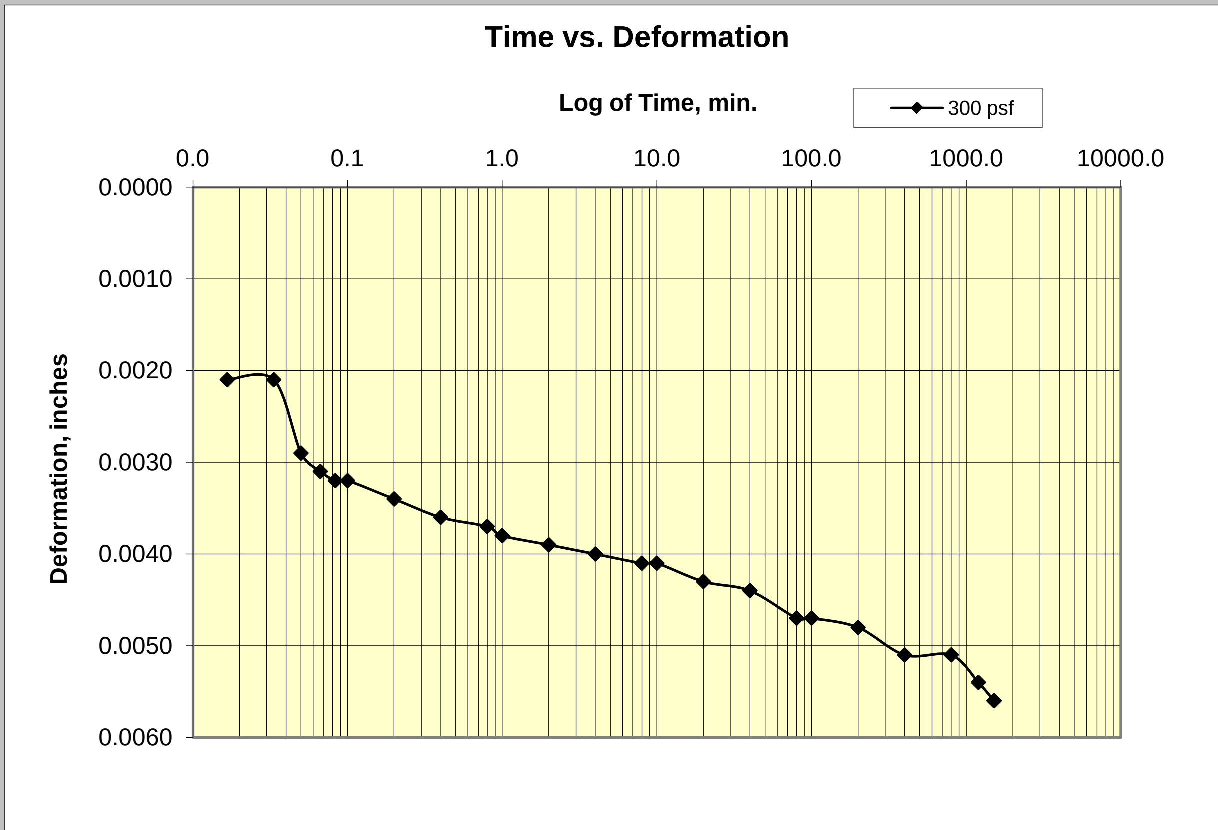


200 PSF

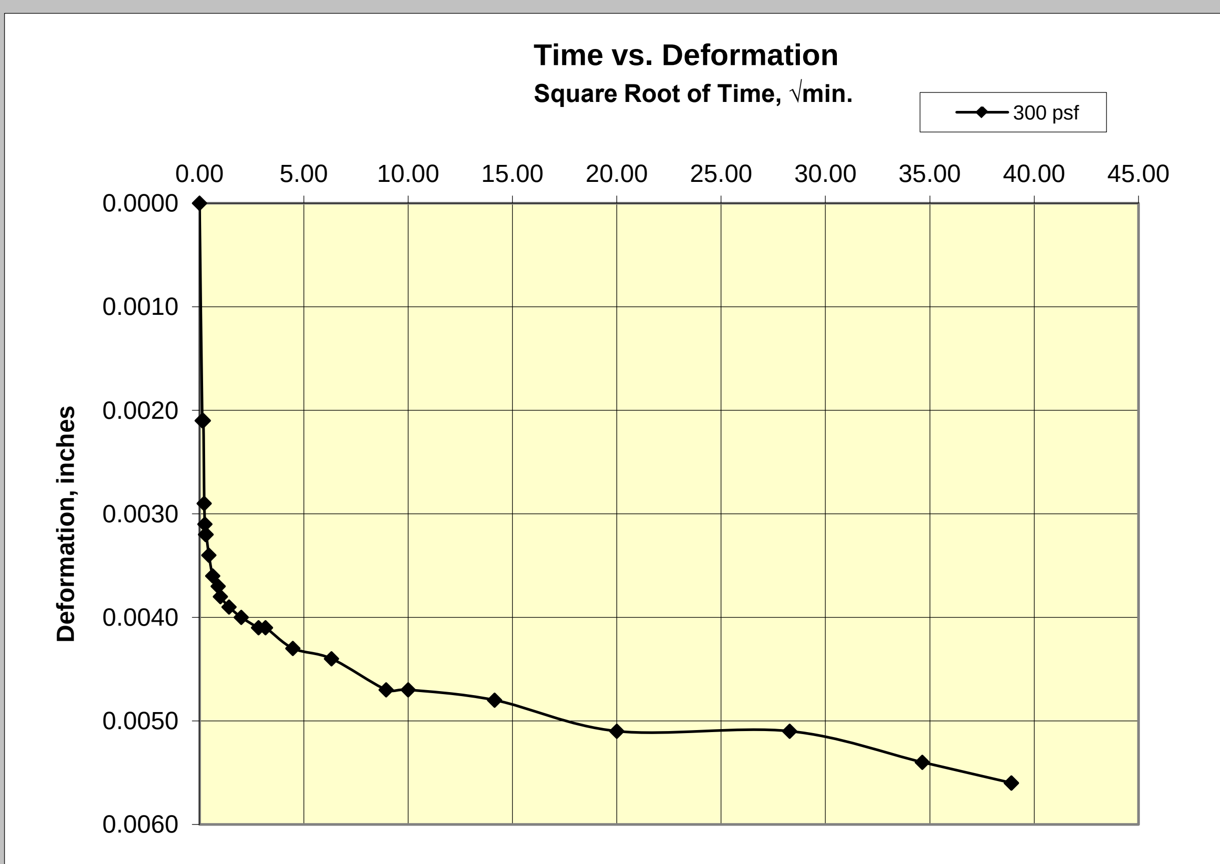


Cooper Testing Labs, Inc.

Load 4	300 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

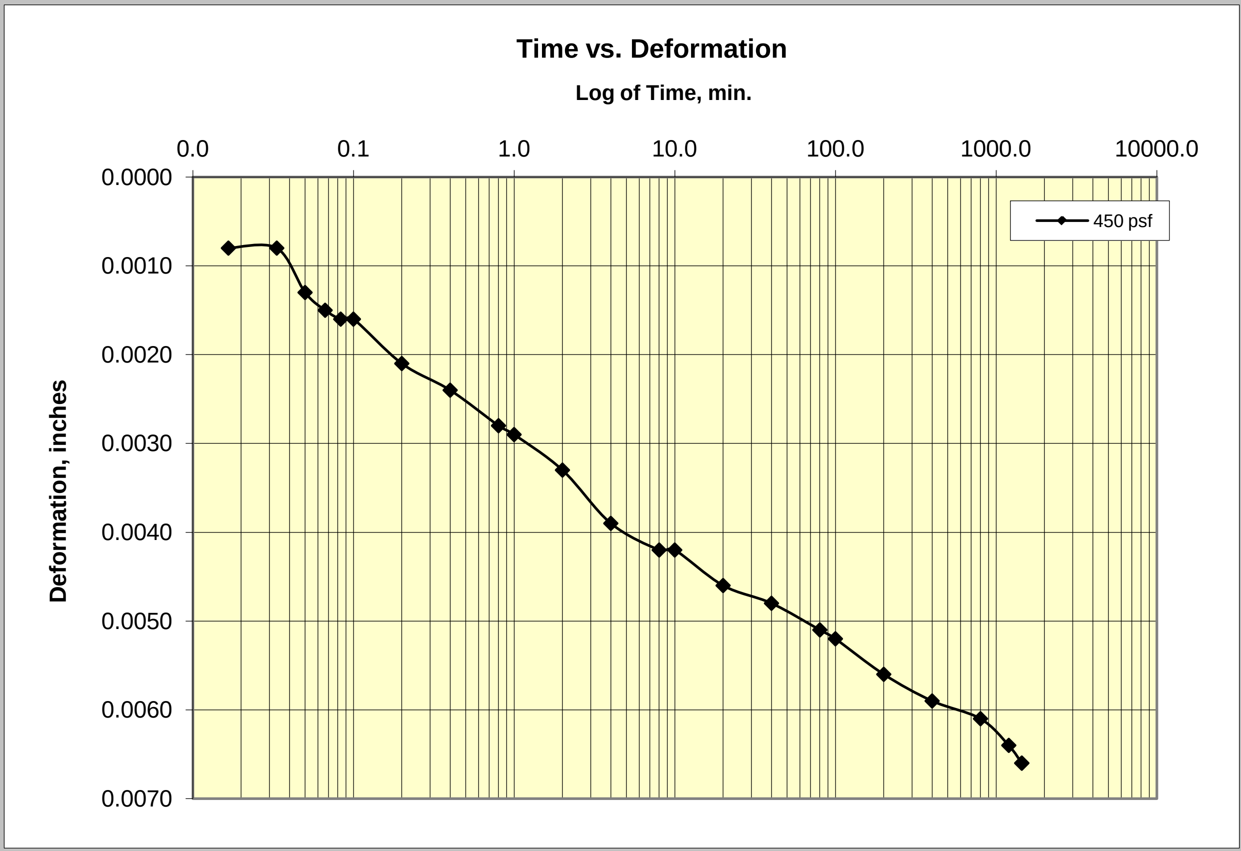


300 PSF

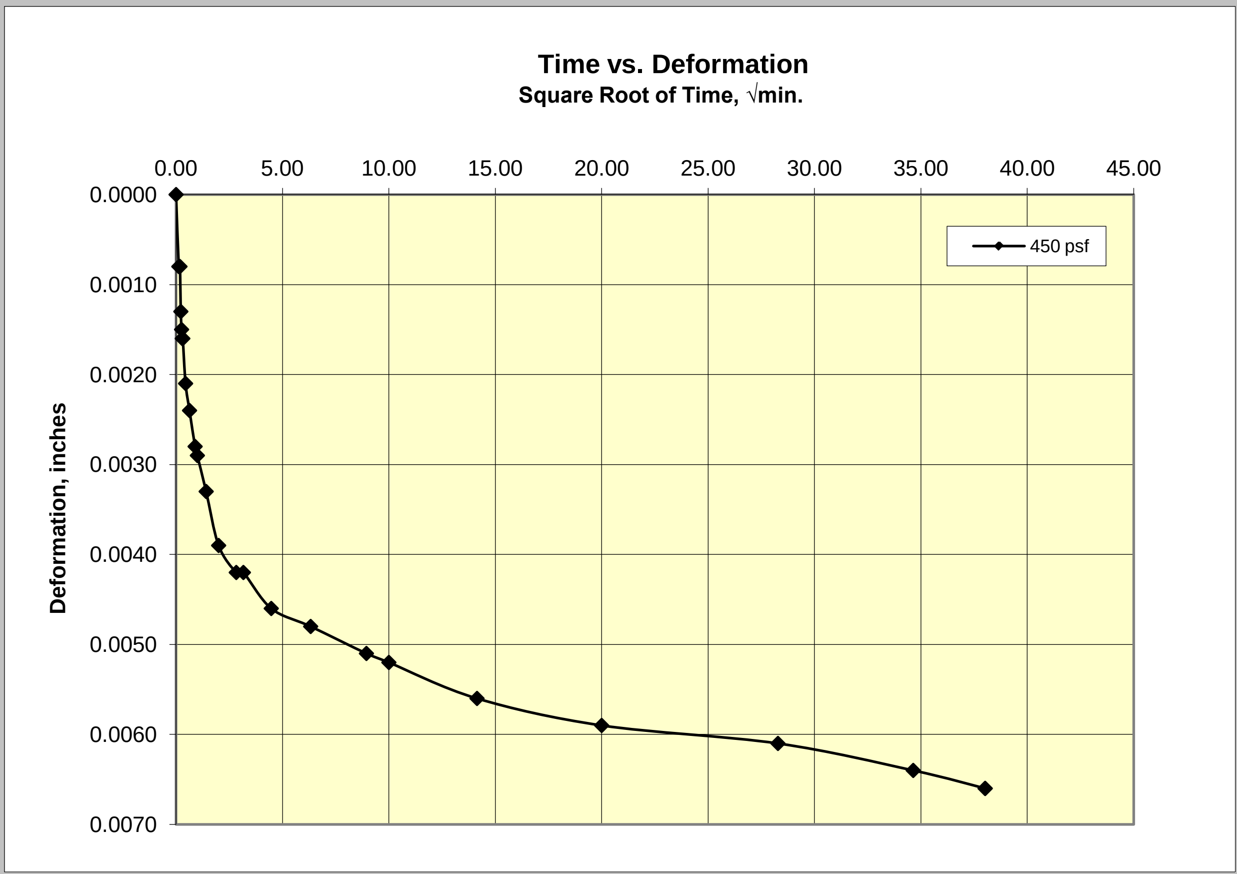


Cooper Testing Labs, Inc.

Load 5	450 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

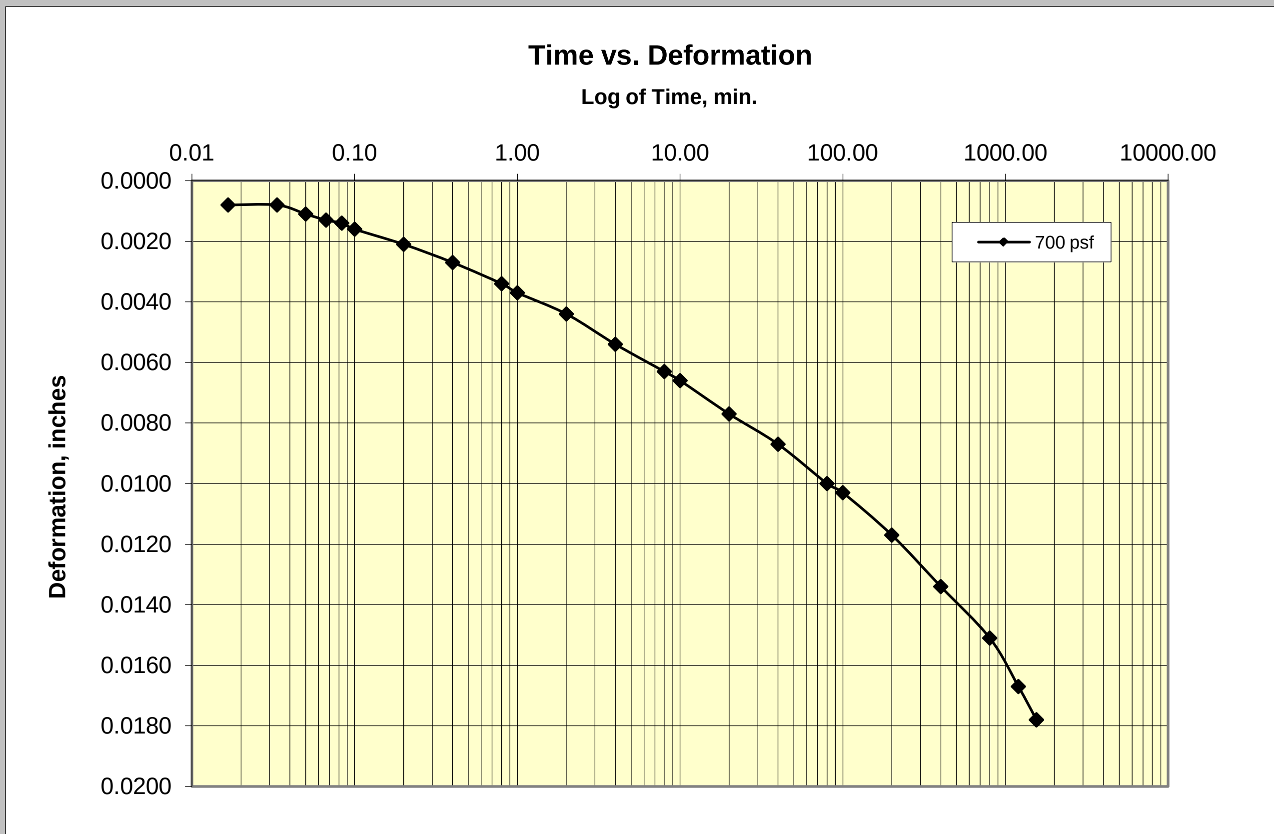


450 PSF

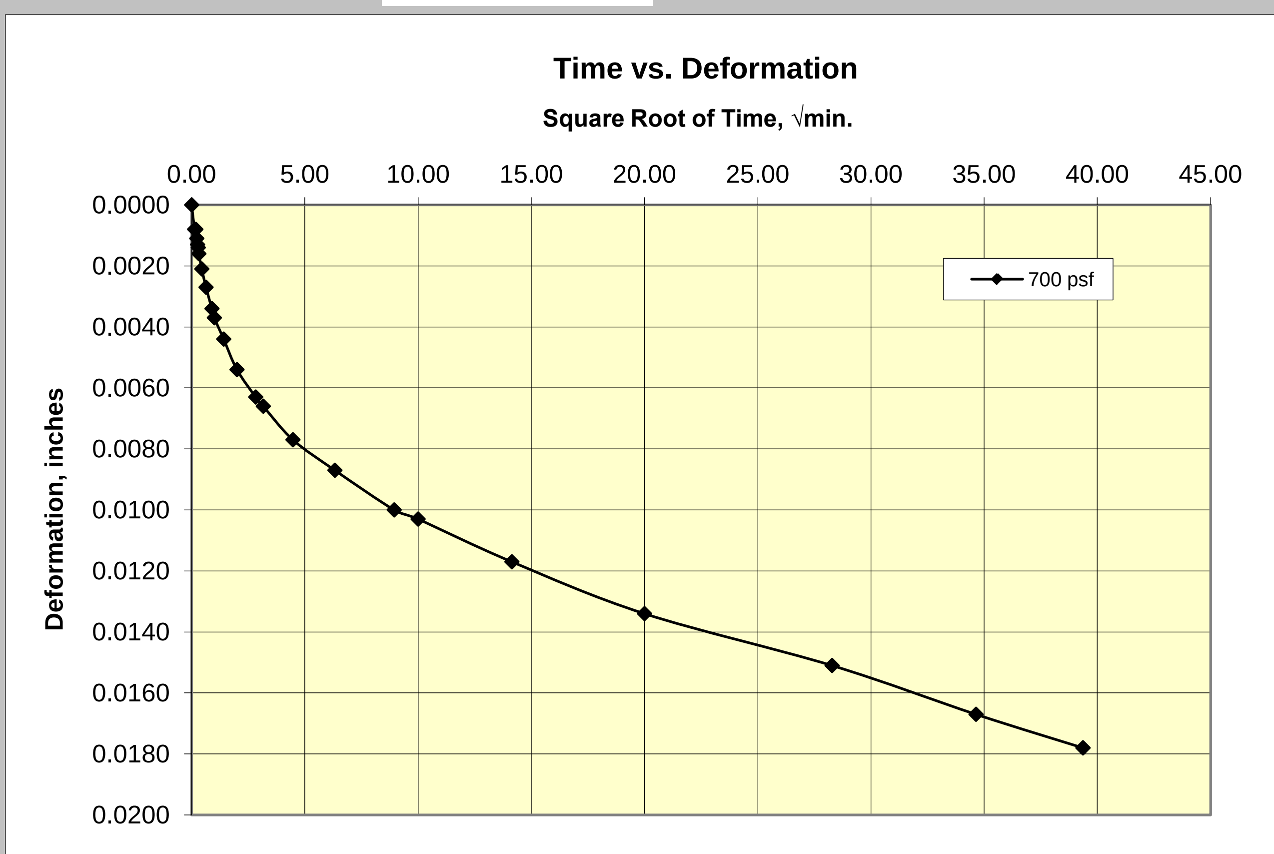


Cooper Testing Labs, Inc.

Load 6	700 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

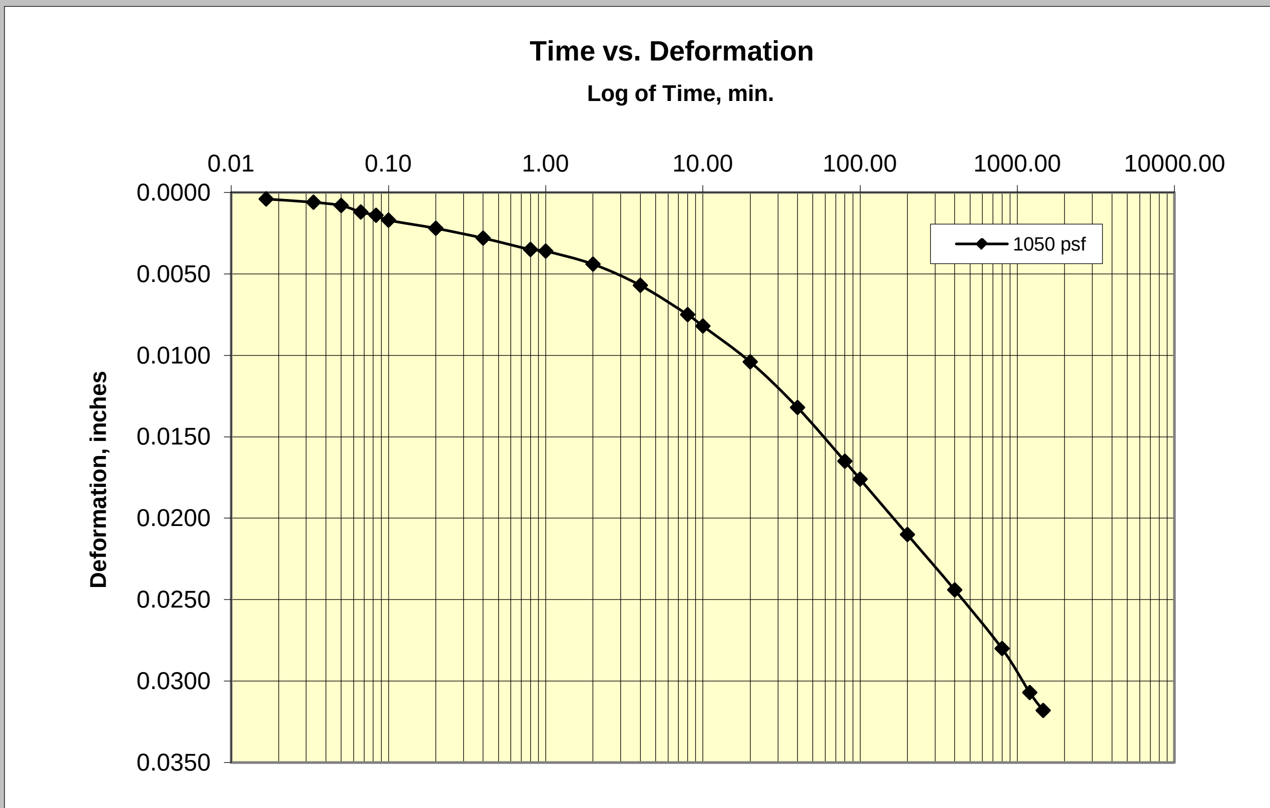


700 PSF

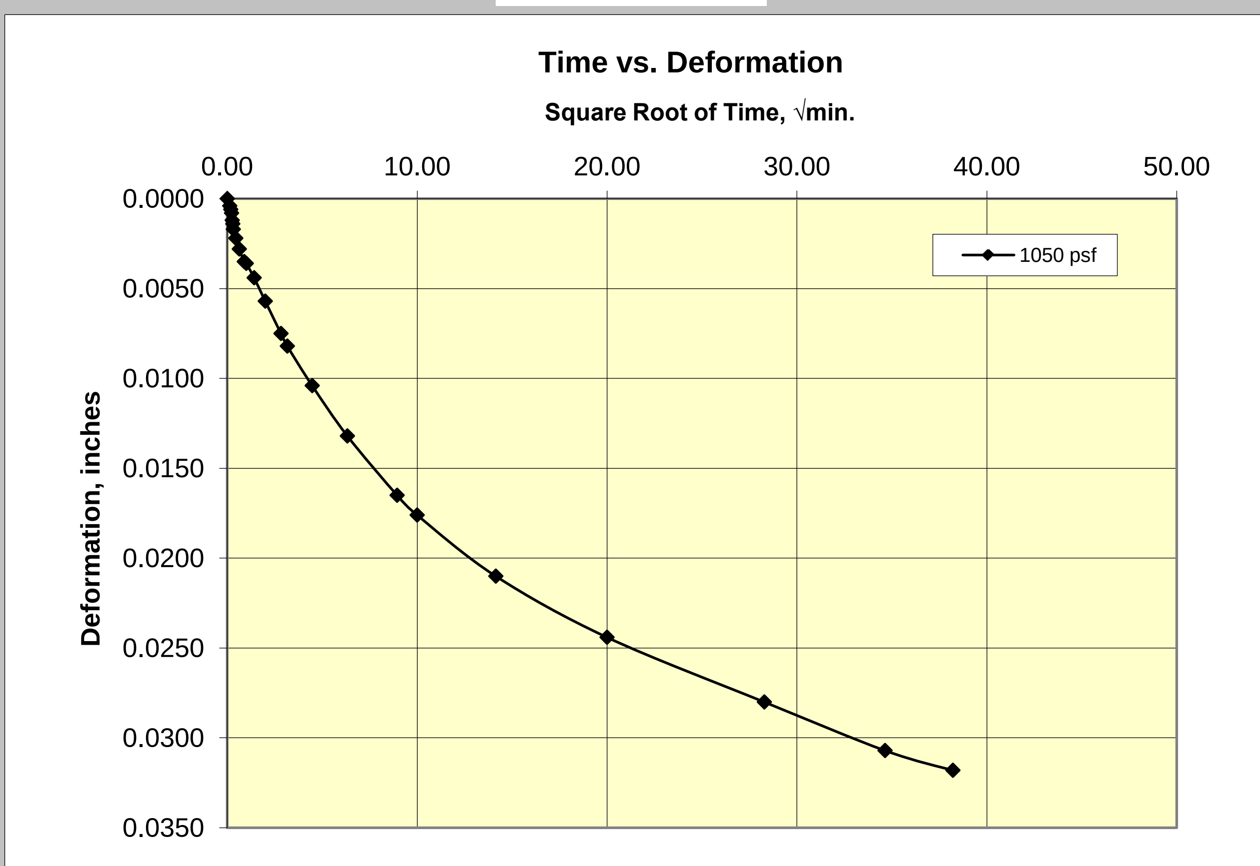


Cooper Testing Labs, Inc.

Load 7 | 1050 PSF | AUS-B-02-12.0-14.0 | (13.1 ft)

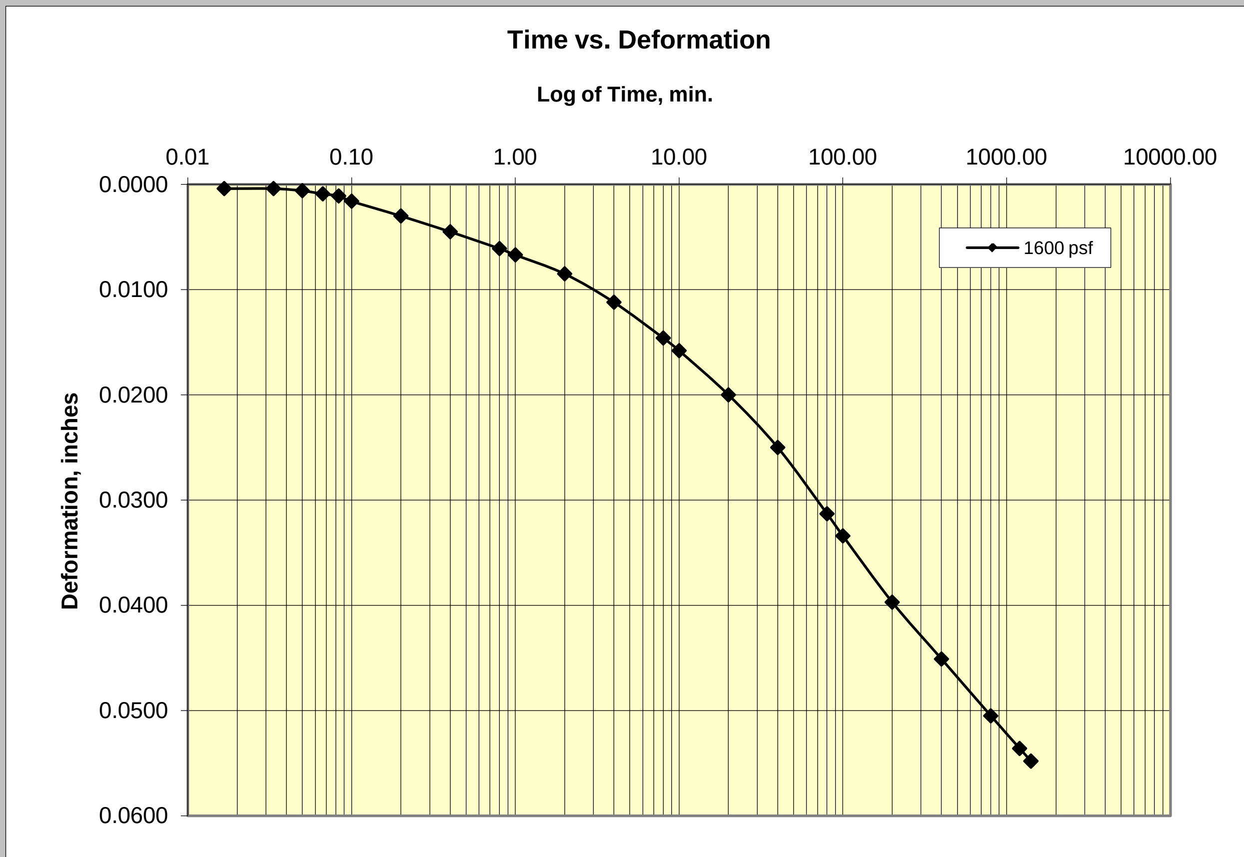


1050 PSF

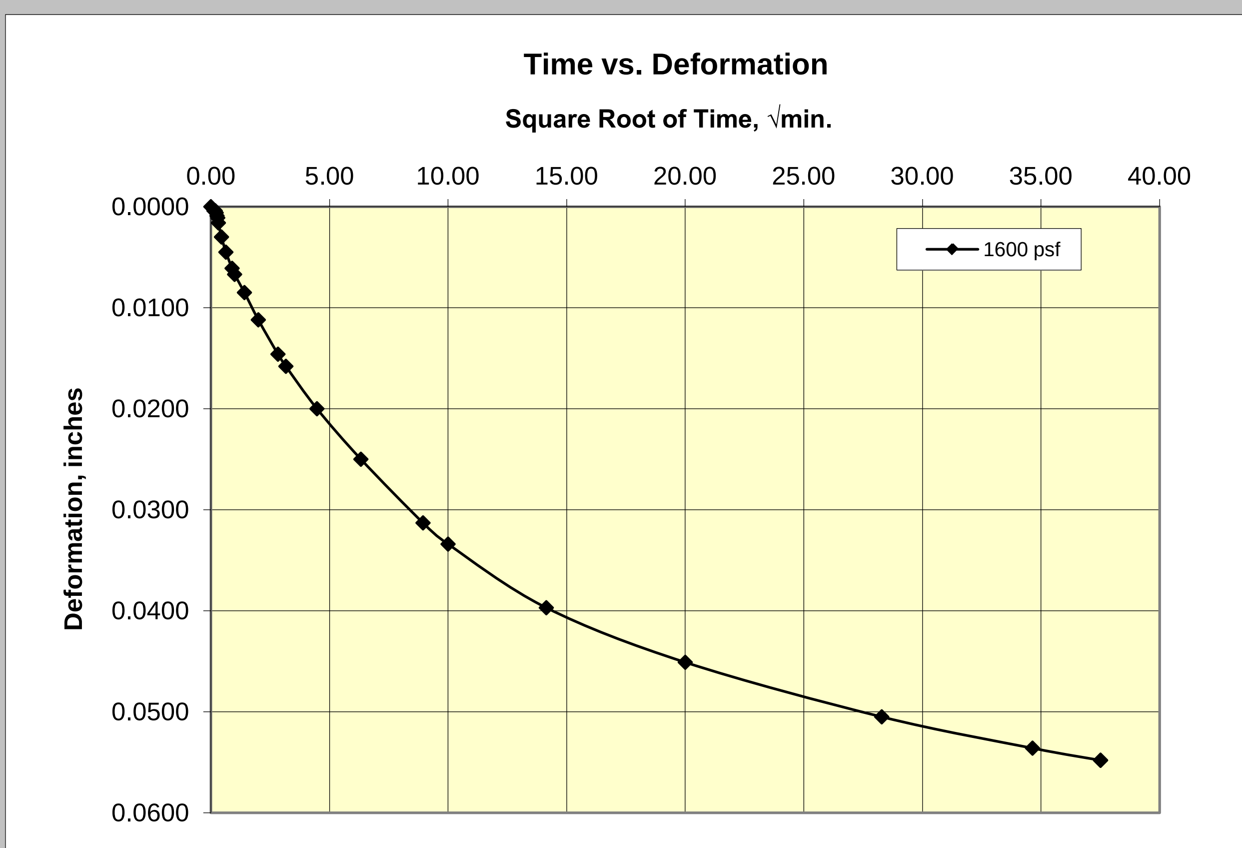


Cooper Testing Labs, Inc.

Load 8 | 1600 PSF | AUS-B-02-12.0-14.0 | (13.1 ft)

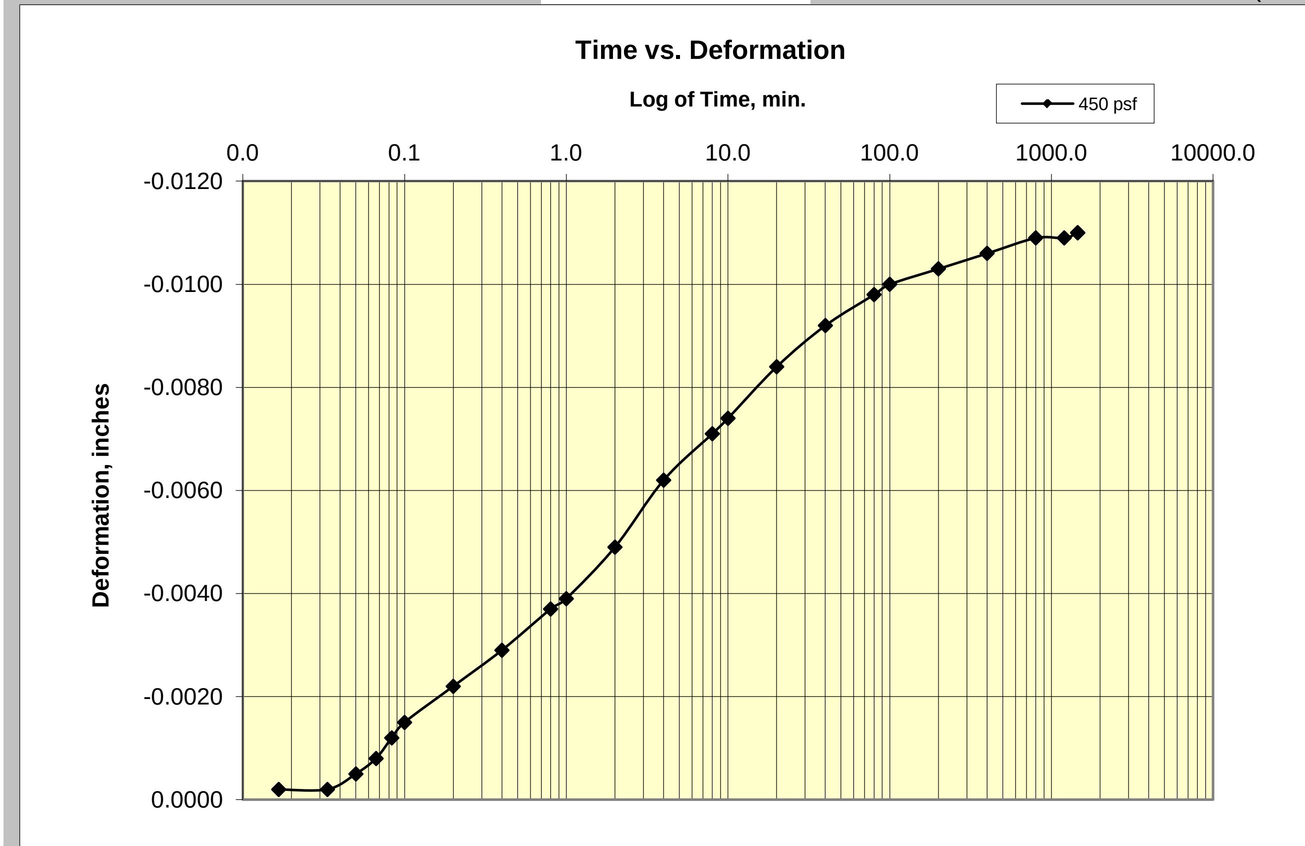


1600 PSF

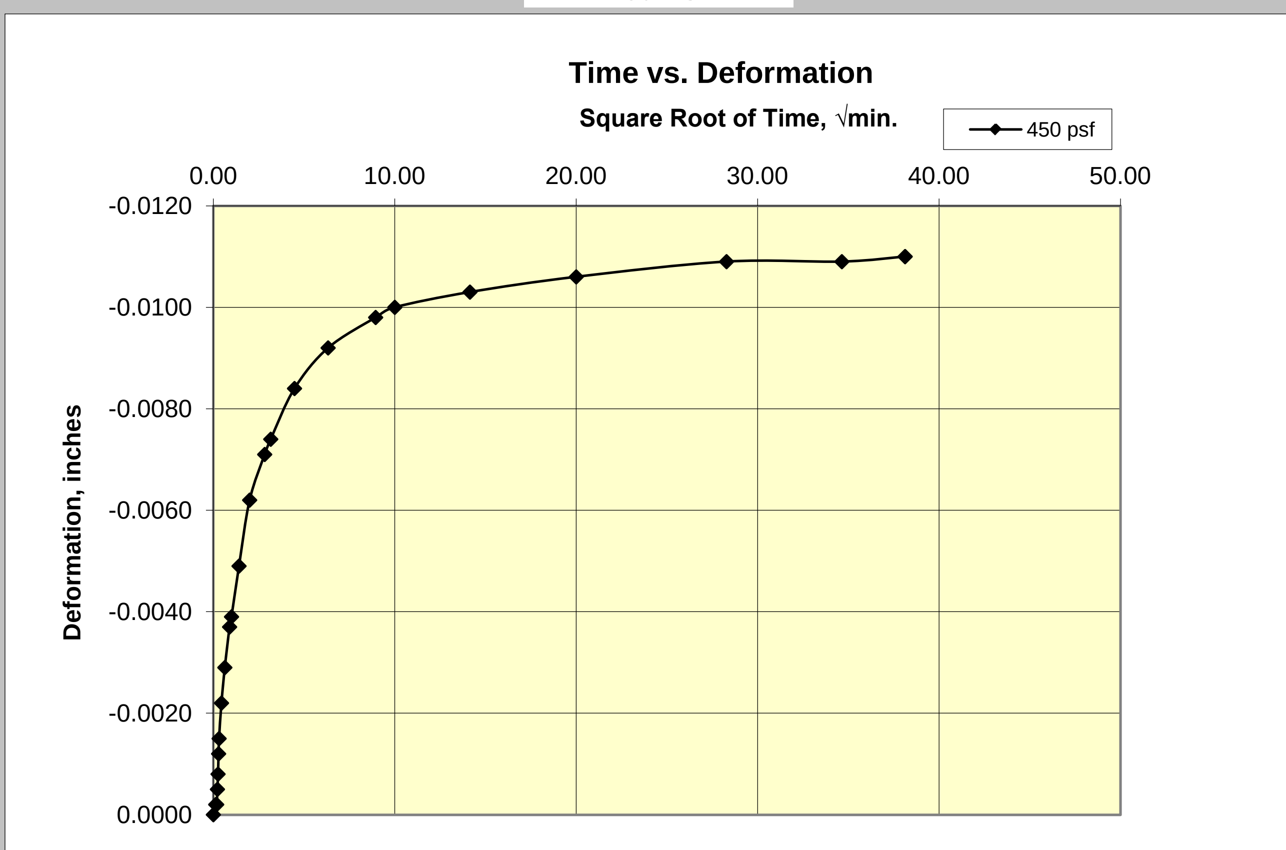


Cooper Testing Labs, Inc.

Load 9	450 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

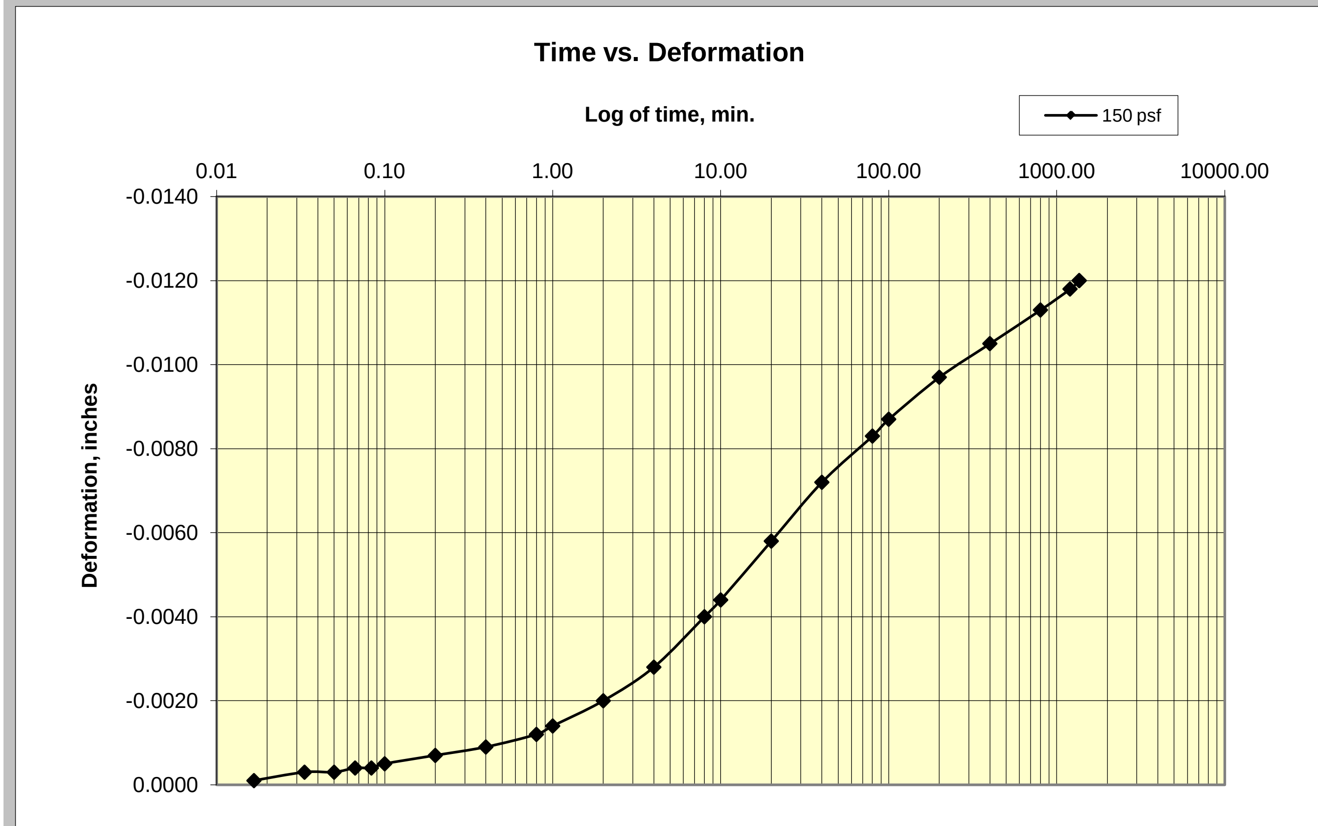


450 PSF

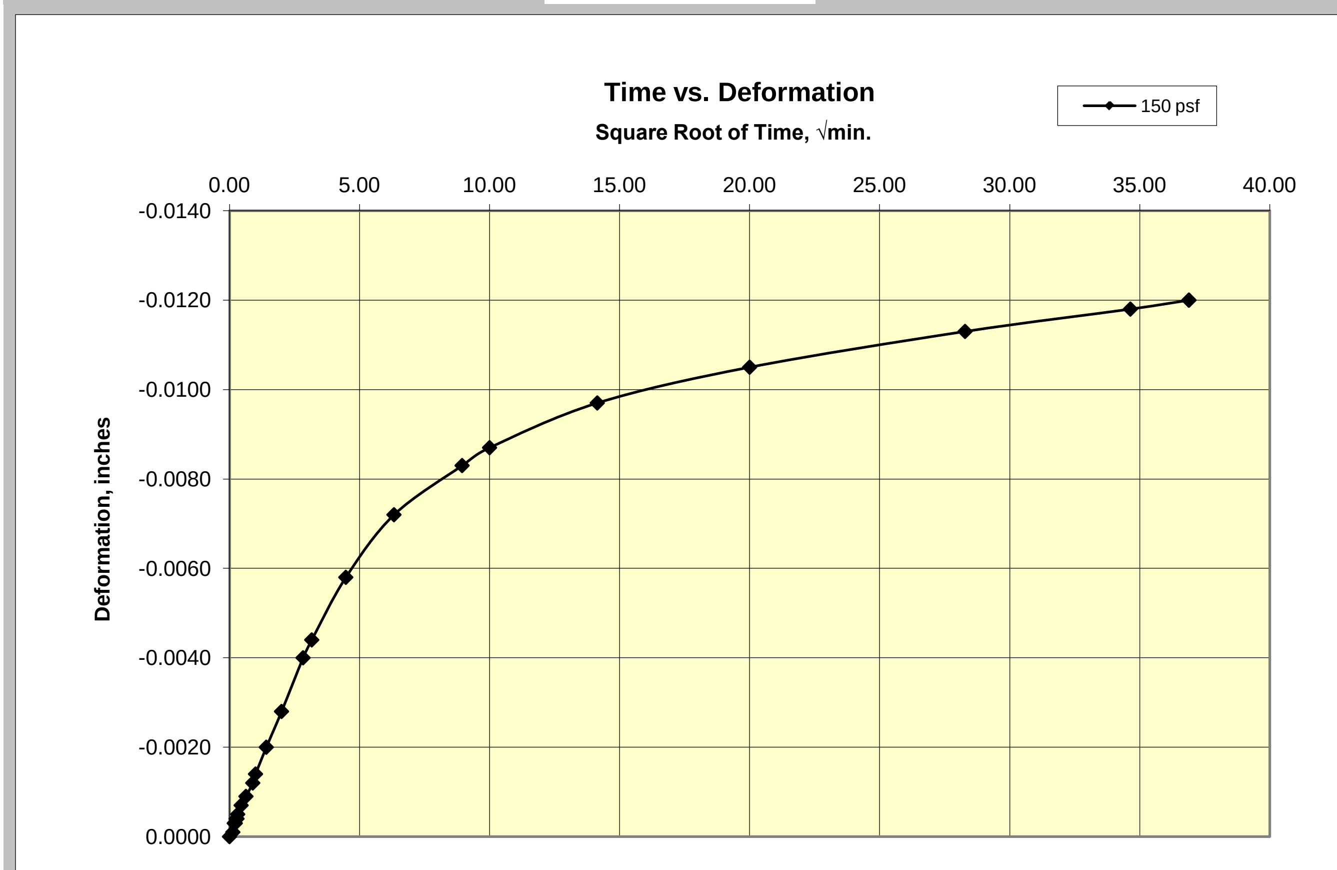


Cooper Testing Labs, Inc.

Load 10	150 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

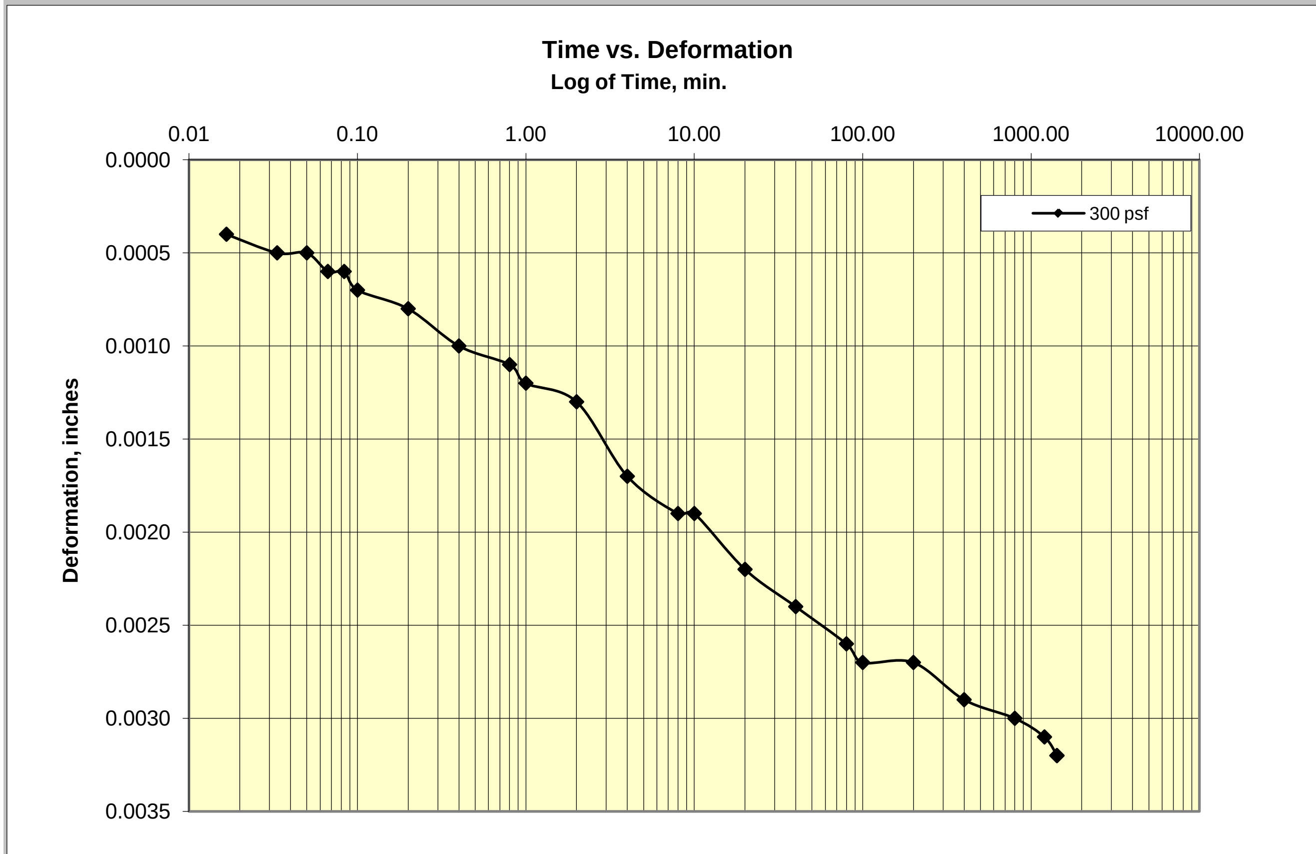


150 PSF

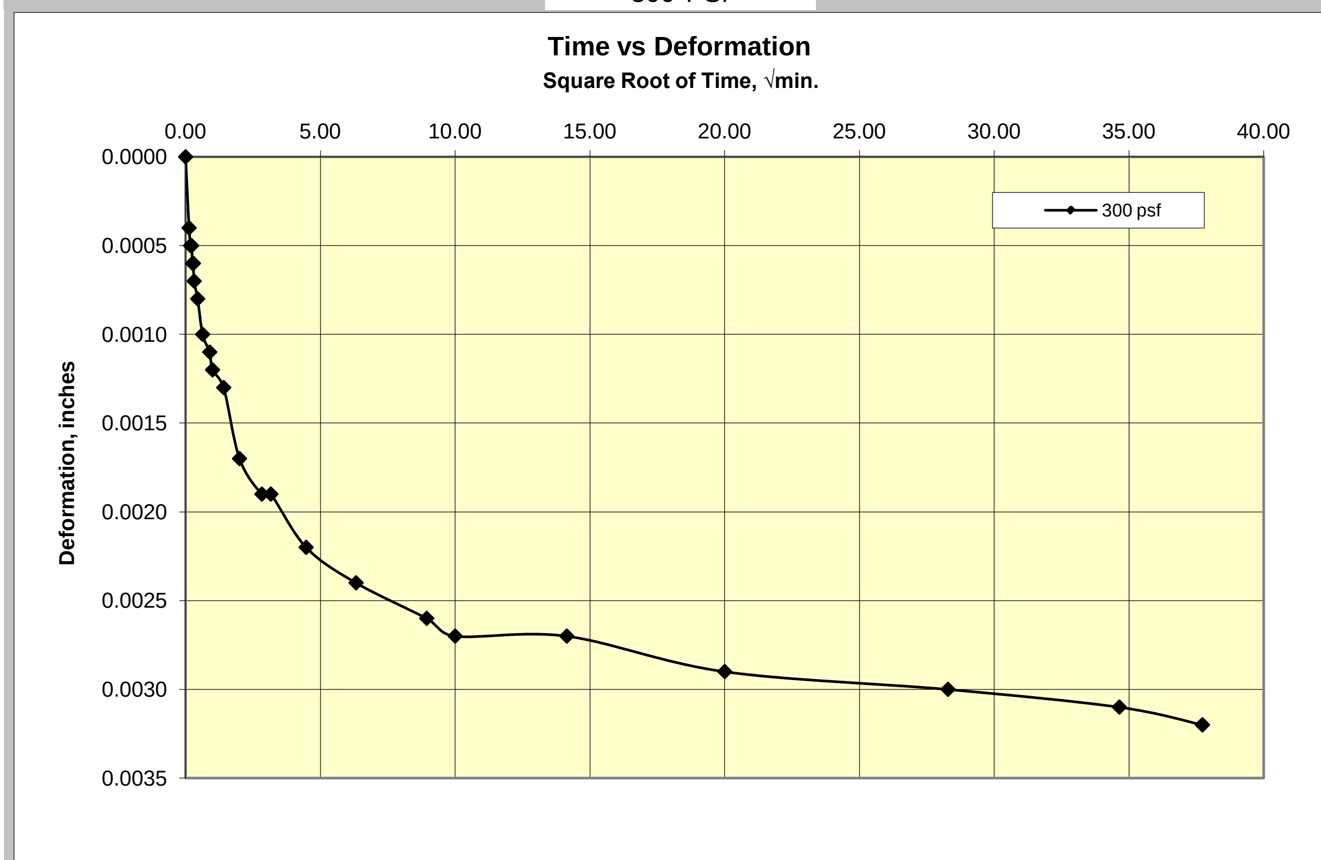


Cooper Testing Labs, Inc.

Load 11	300 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

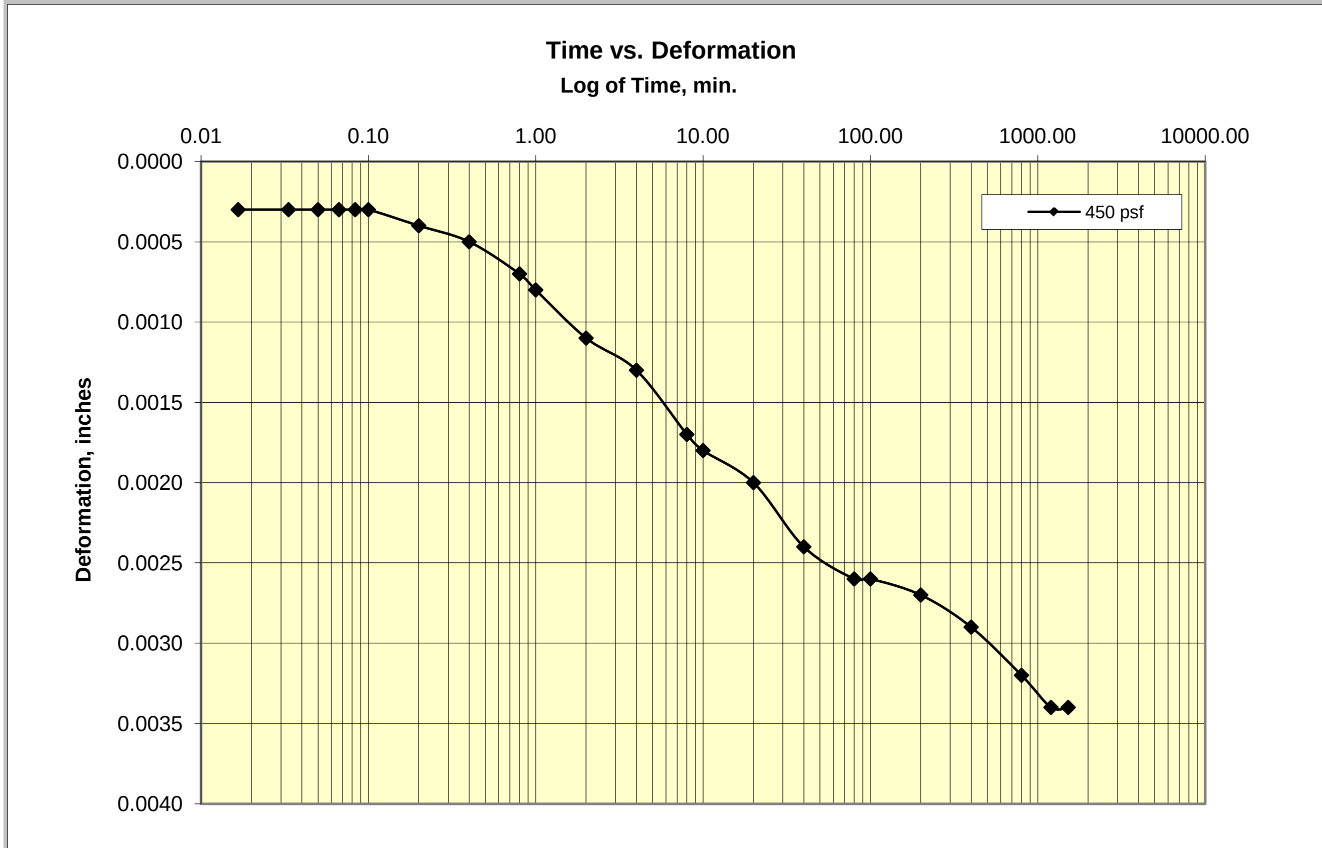


300 PSF

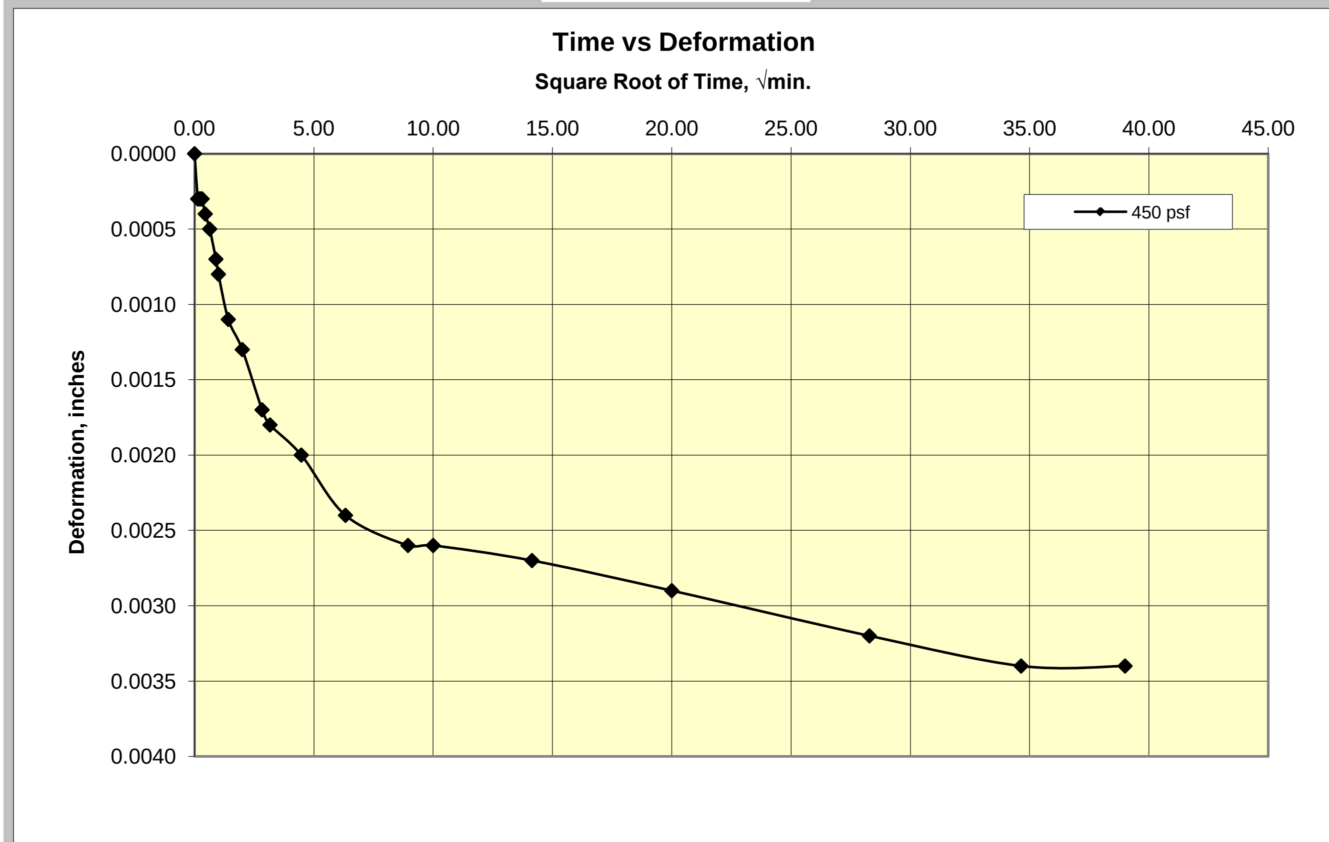


Cooper Testing Labs, Inc.

Load 12 | 450 PSF | AUS-B-02-12.0-14.0 | (13.1 ft)

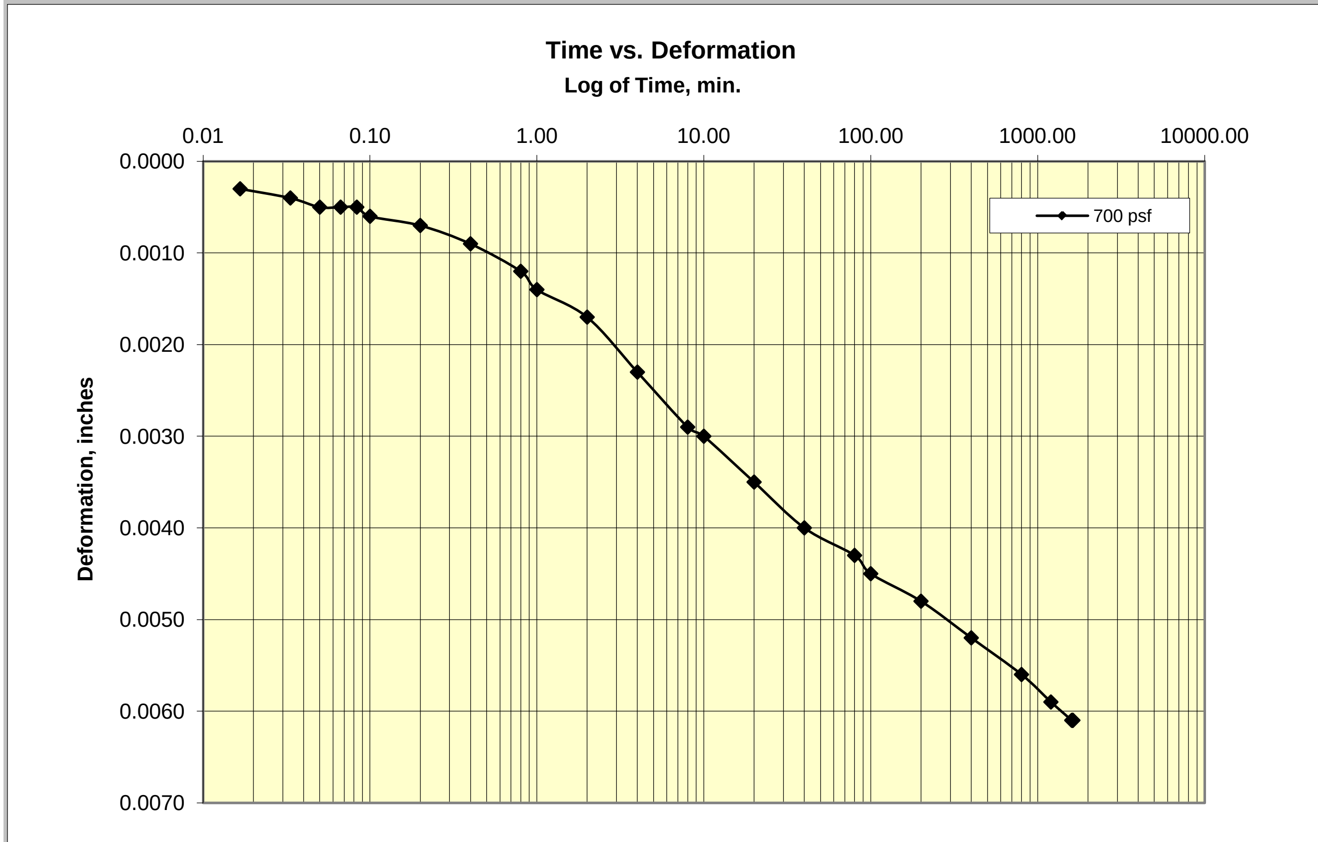


450 PSF

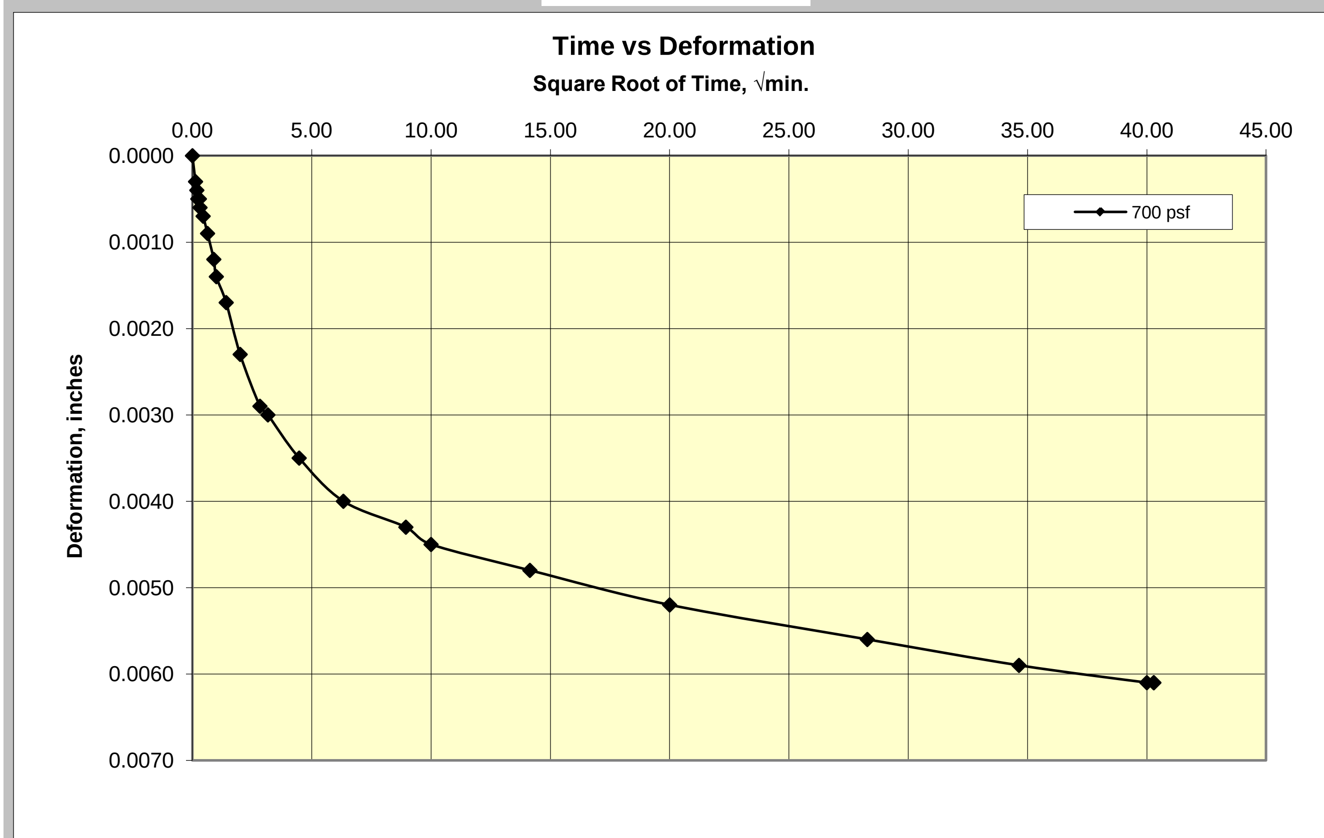


Cooper Testing Labs, Inc.

Load 13 | 700 PSF | AUS-B-02-12.0-14.0 | (13.1 ft)

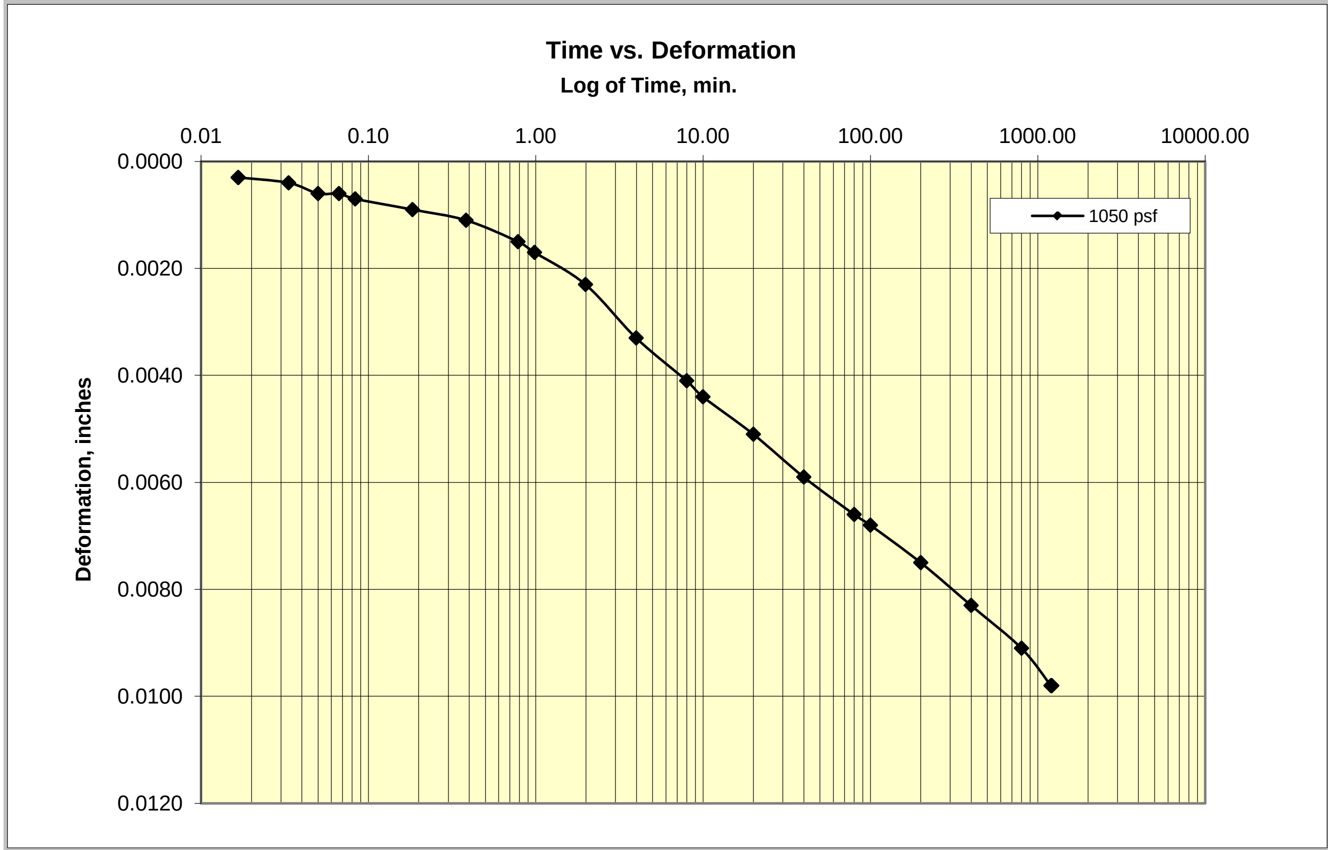


700 PSF

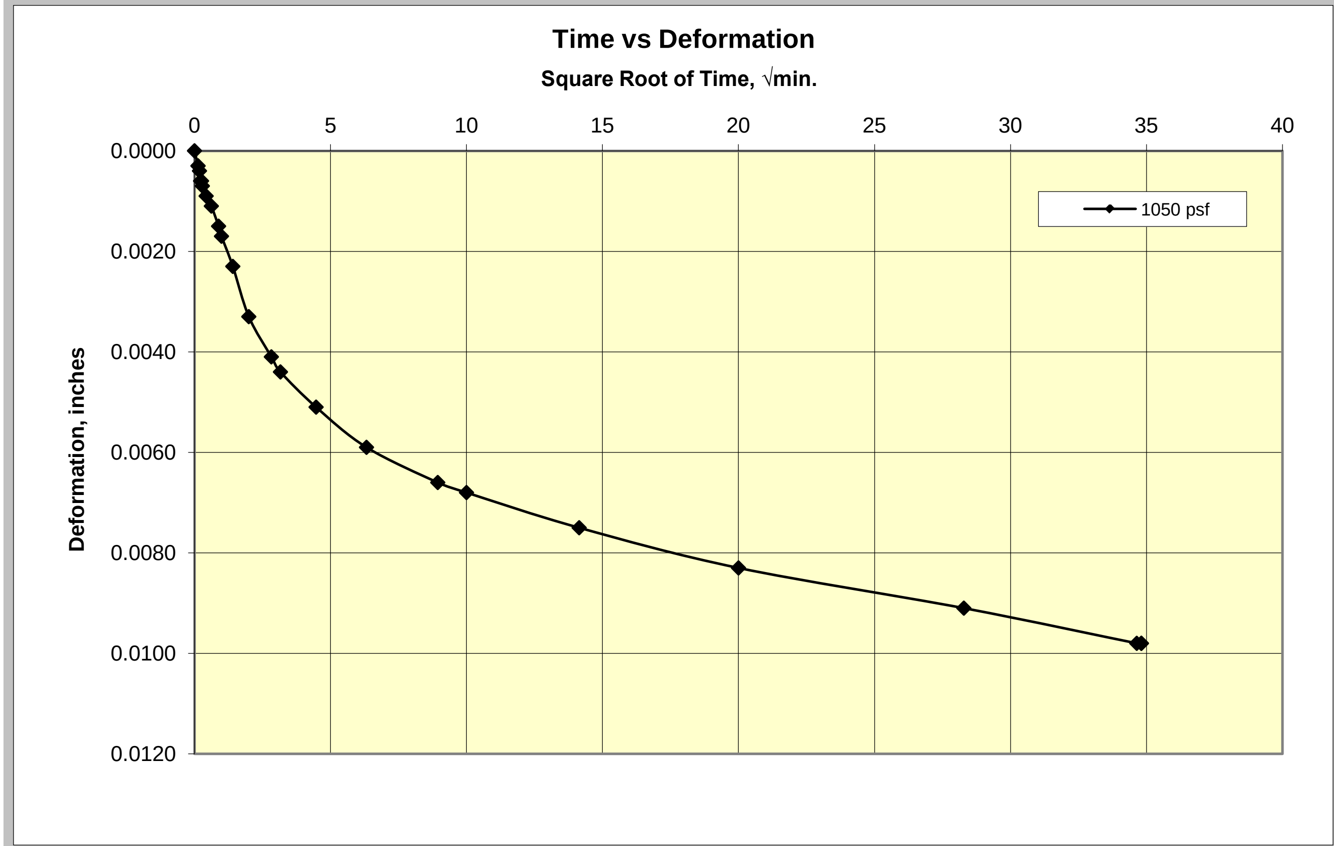


Cooper Testing Labs, Inc.

Load 14	1050 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

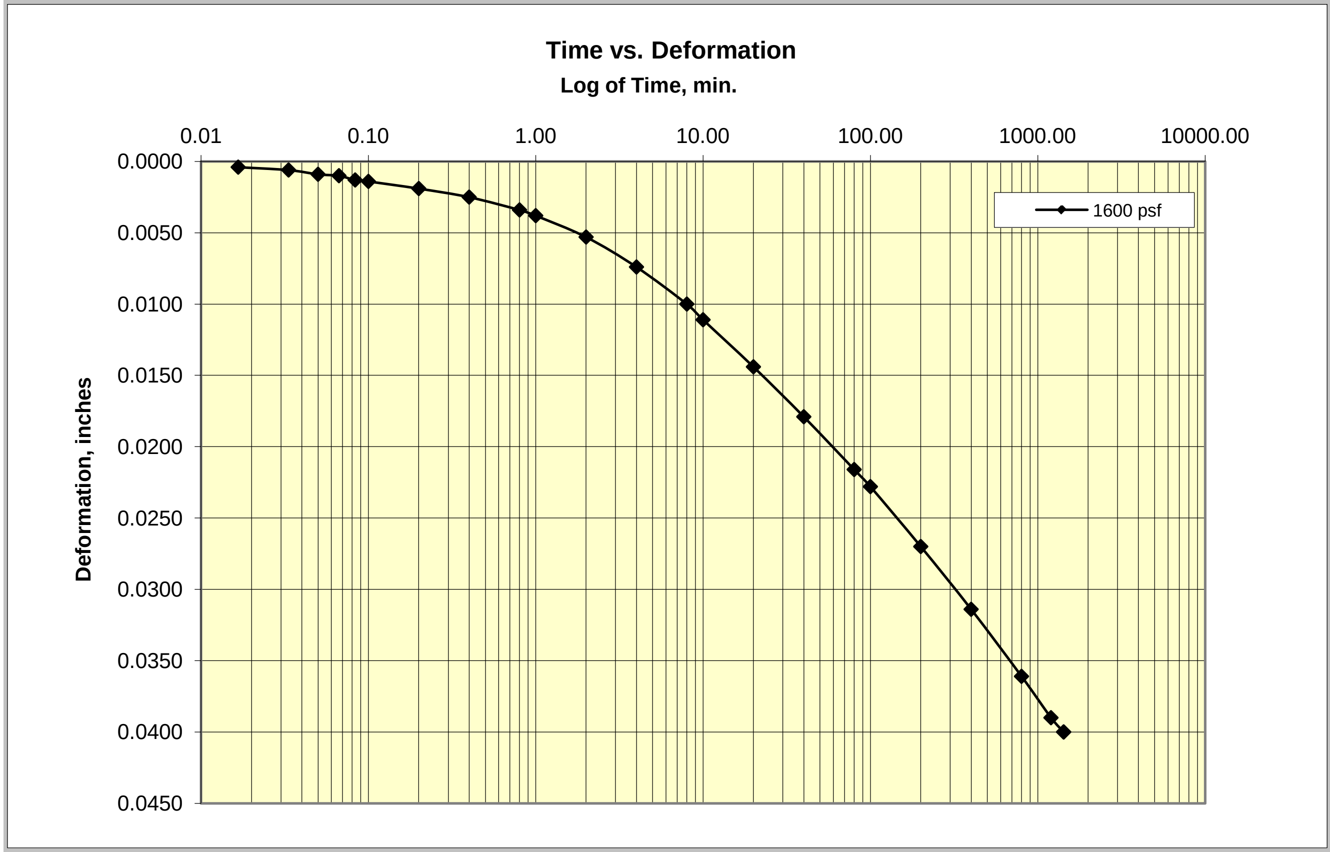


1050 PSF

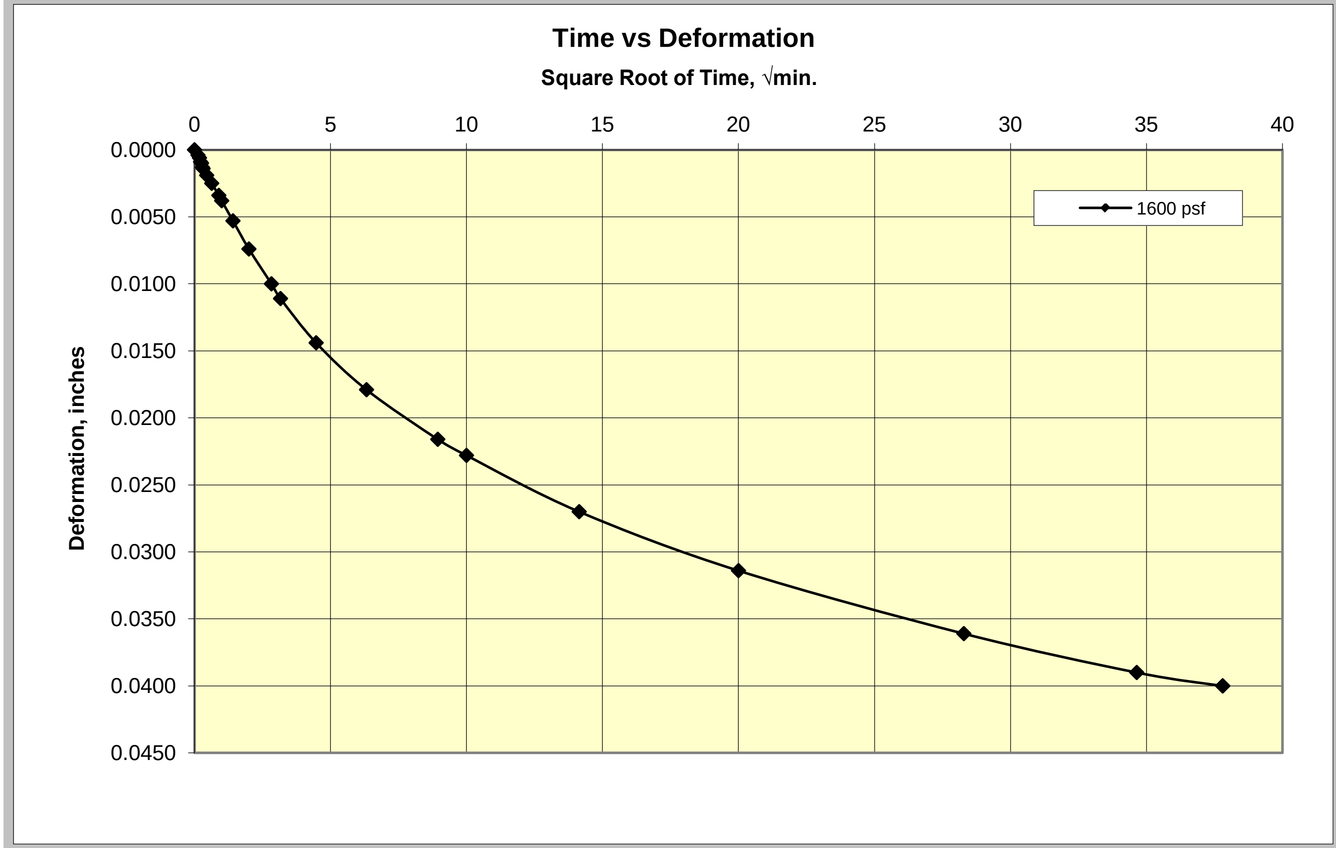


Cooper Testing Labs, Inc.

Load 15	1600 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

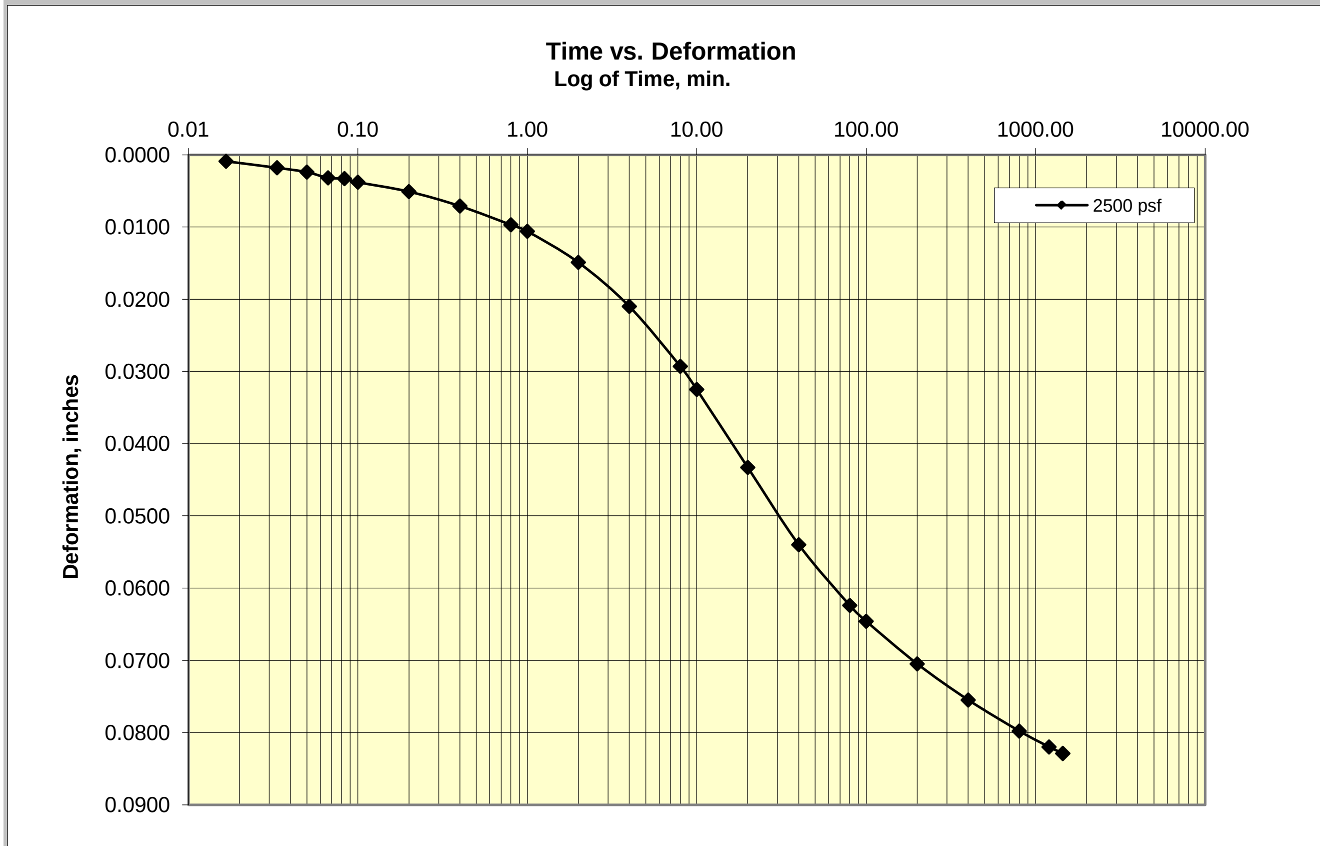


1600 PSF

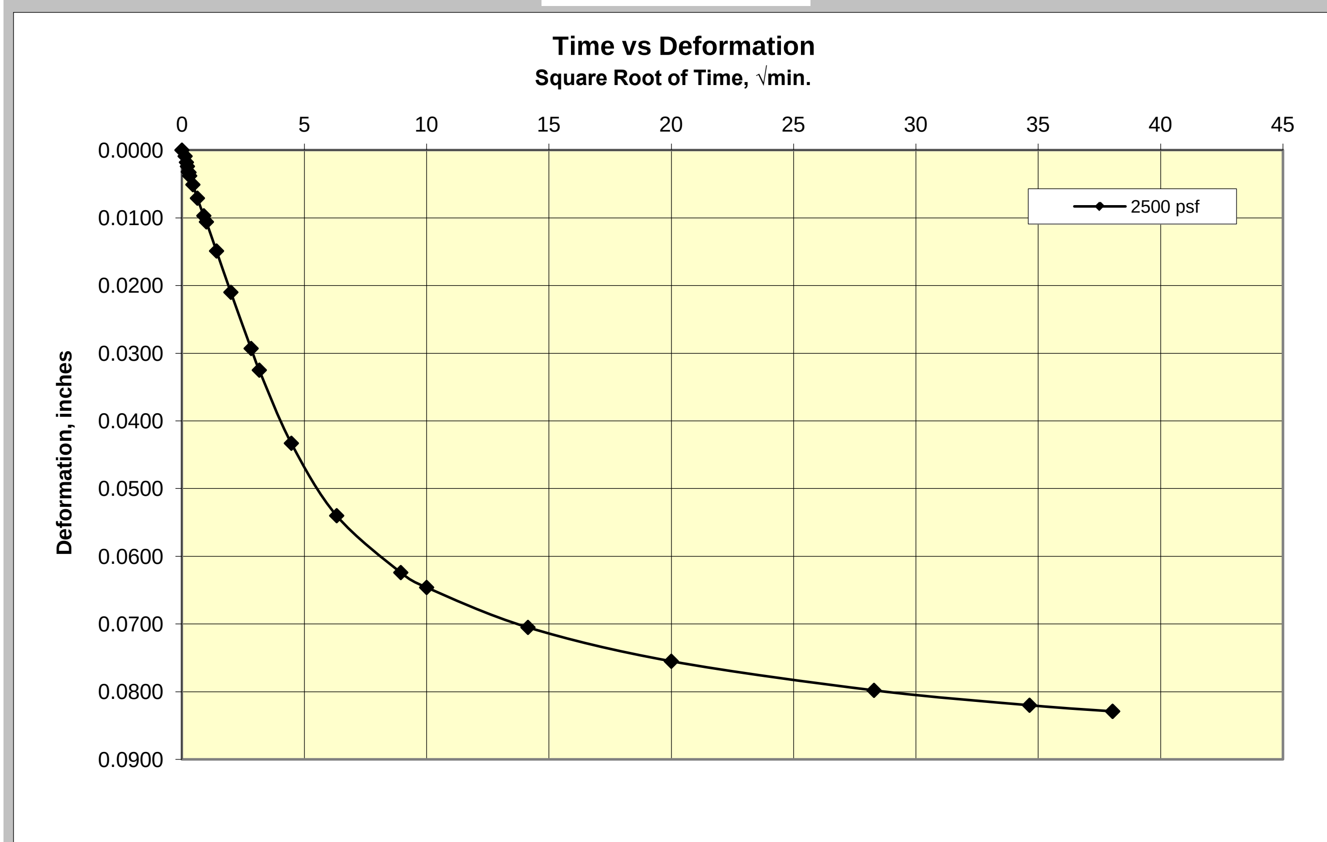


Cooper Testing Labs, Inc.

Load 16	2500 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

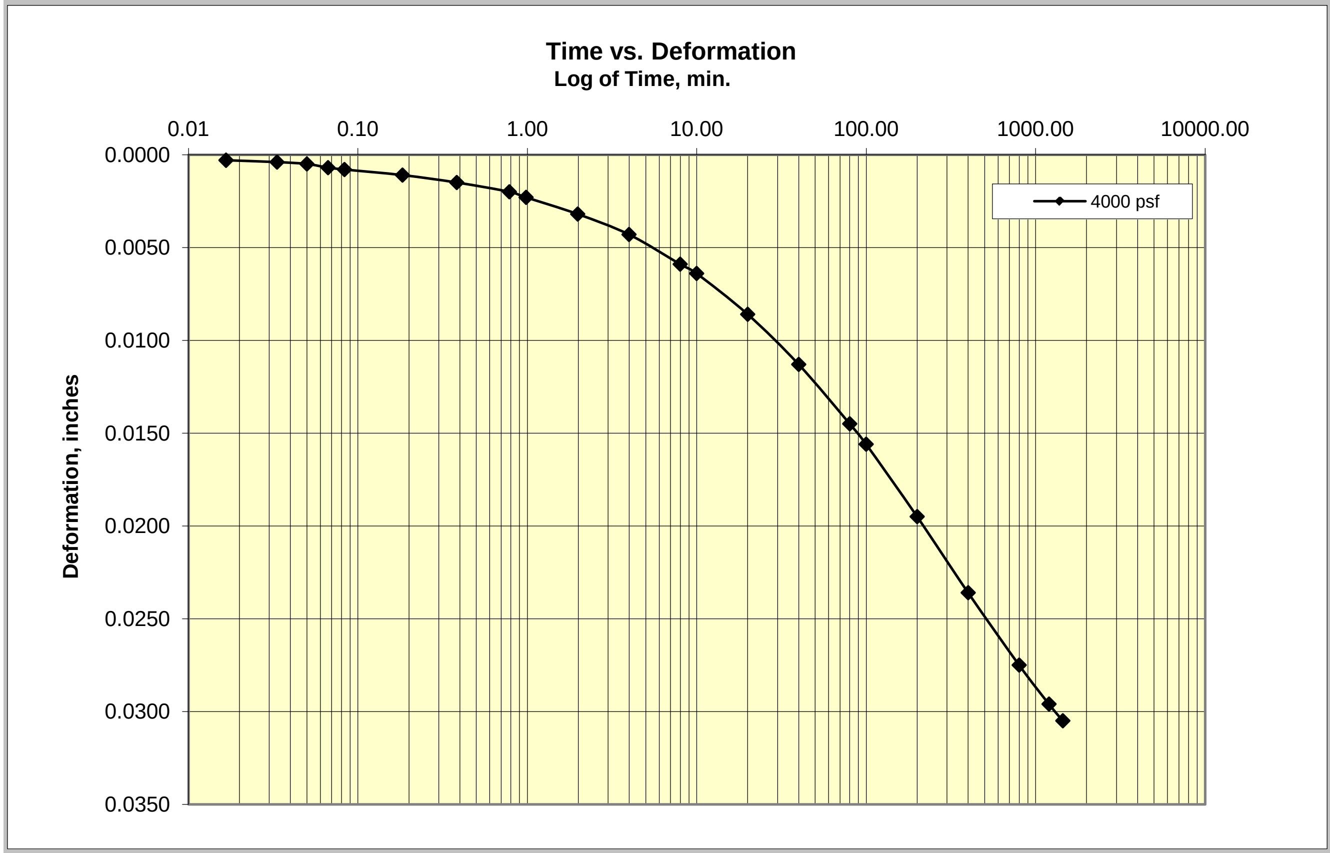


2500 PSF

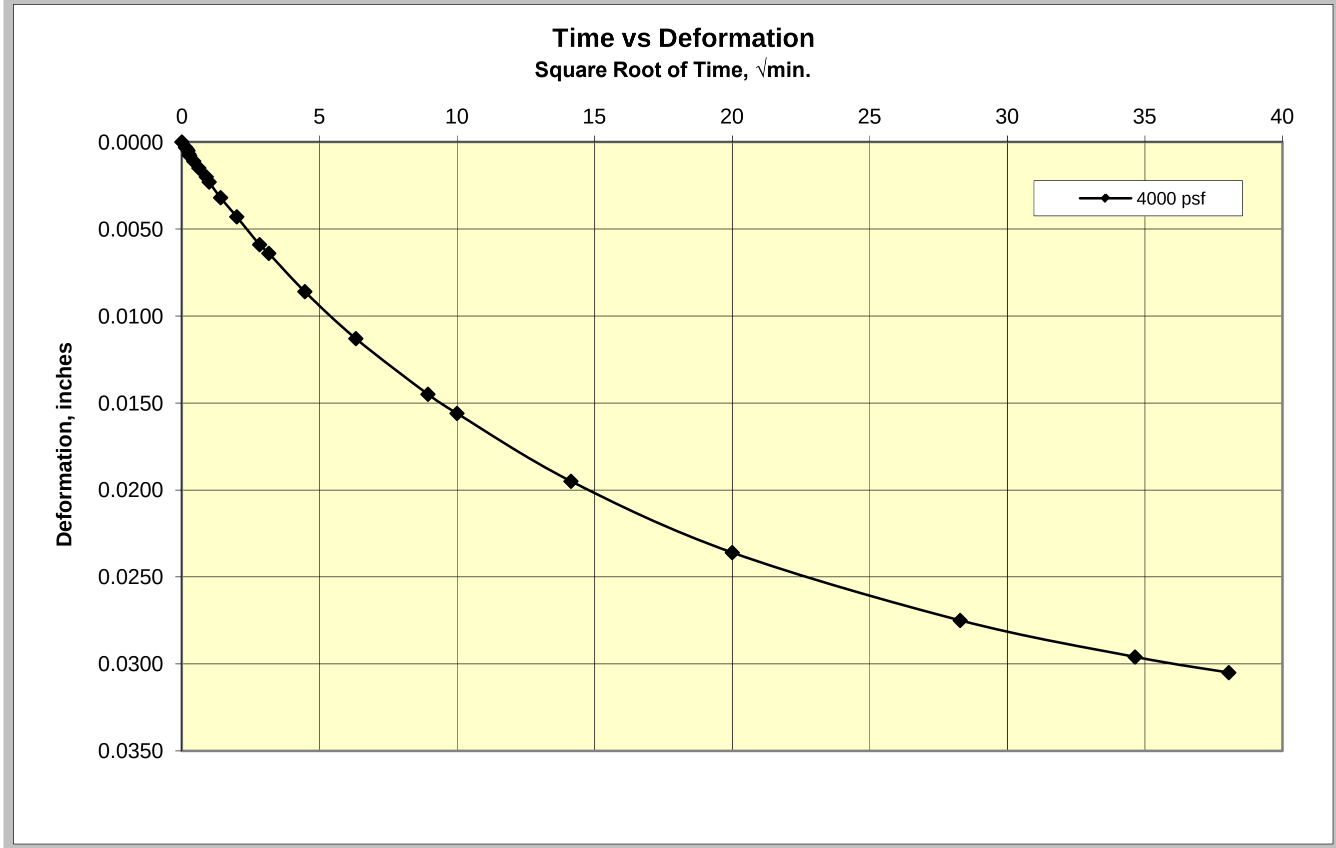


Cooper Testing Labs, Inc.

Load 17	4000 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

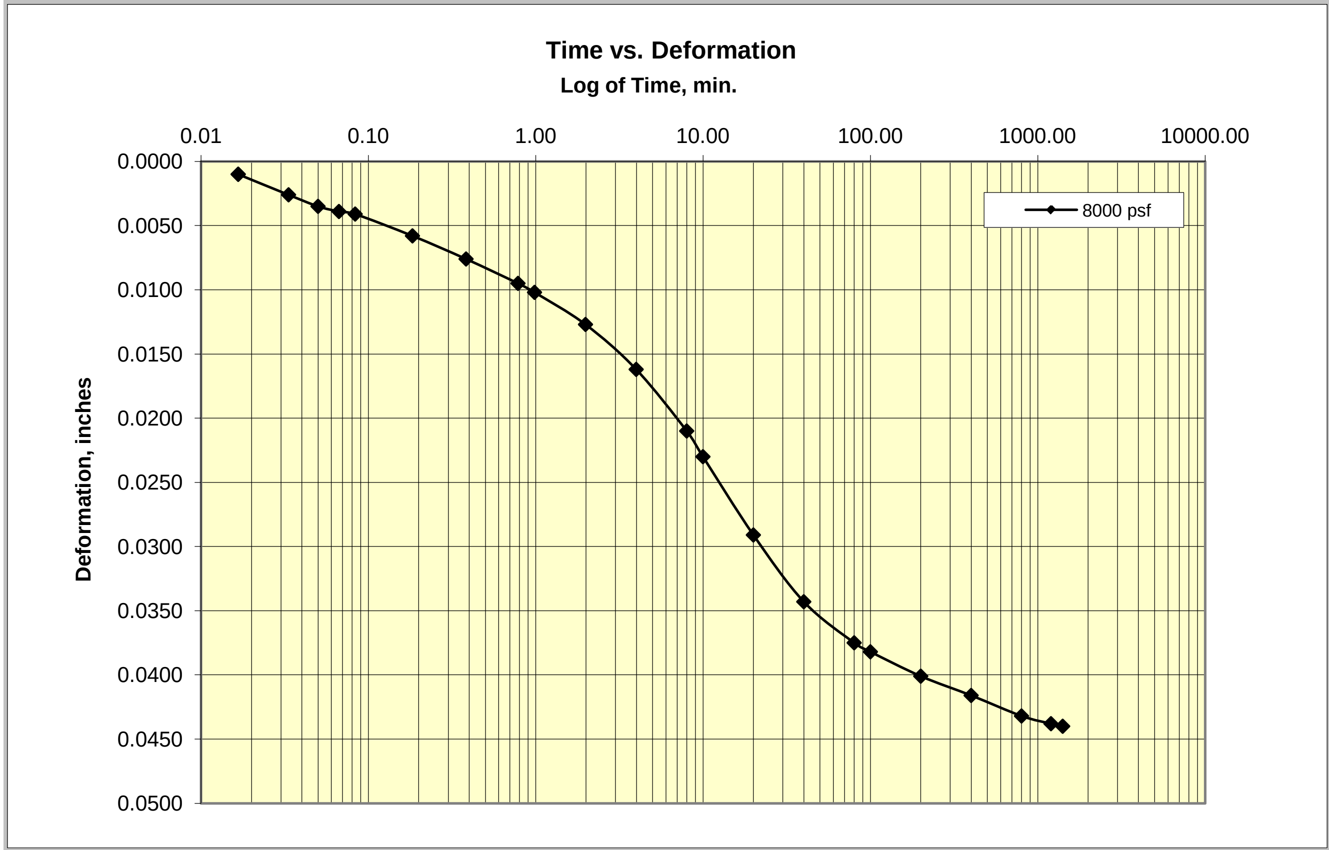


4000 PSF

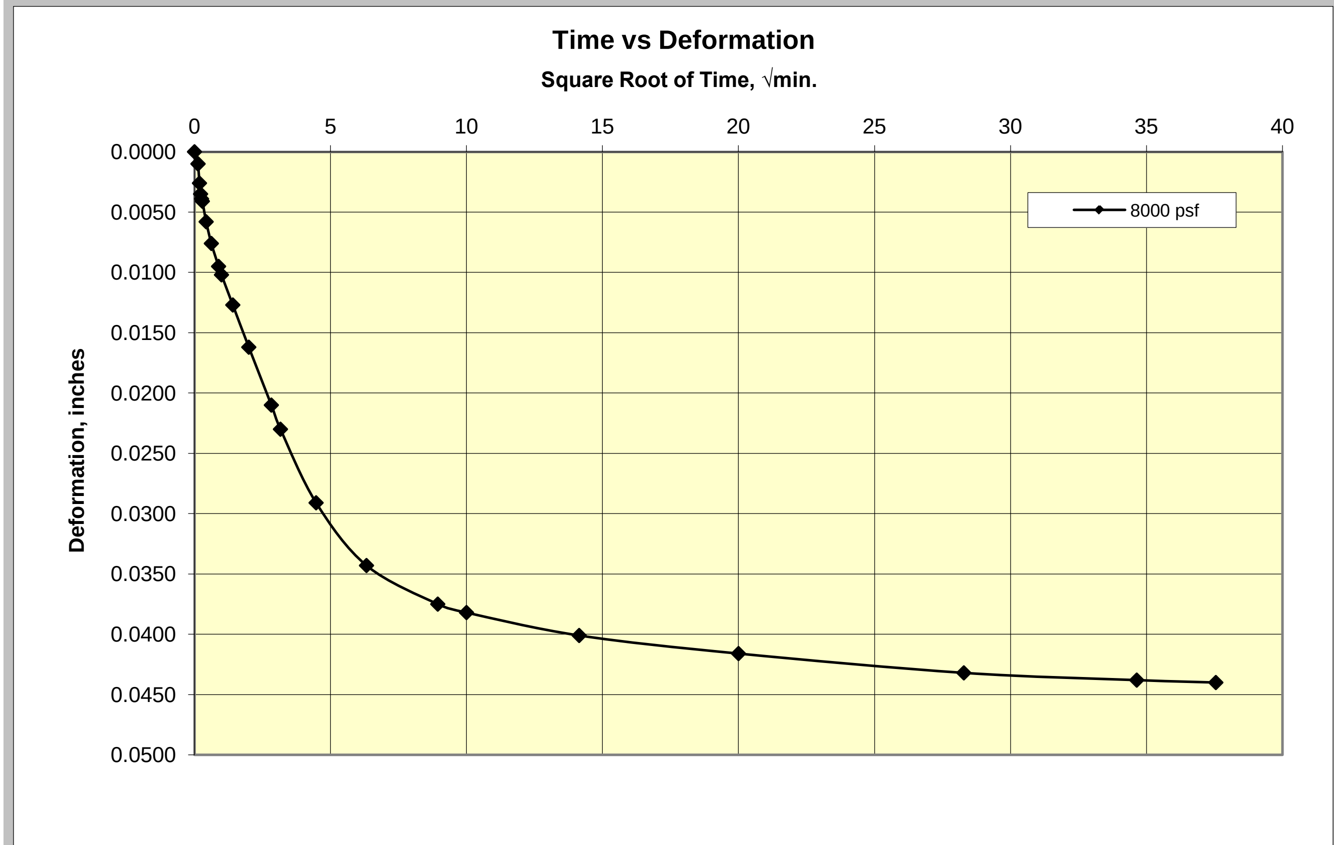


Cooper Testing Labs, Inc.

Load 18	8000 PSF	AUS-B-02-12.0-14.0	(13.1 ft)

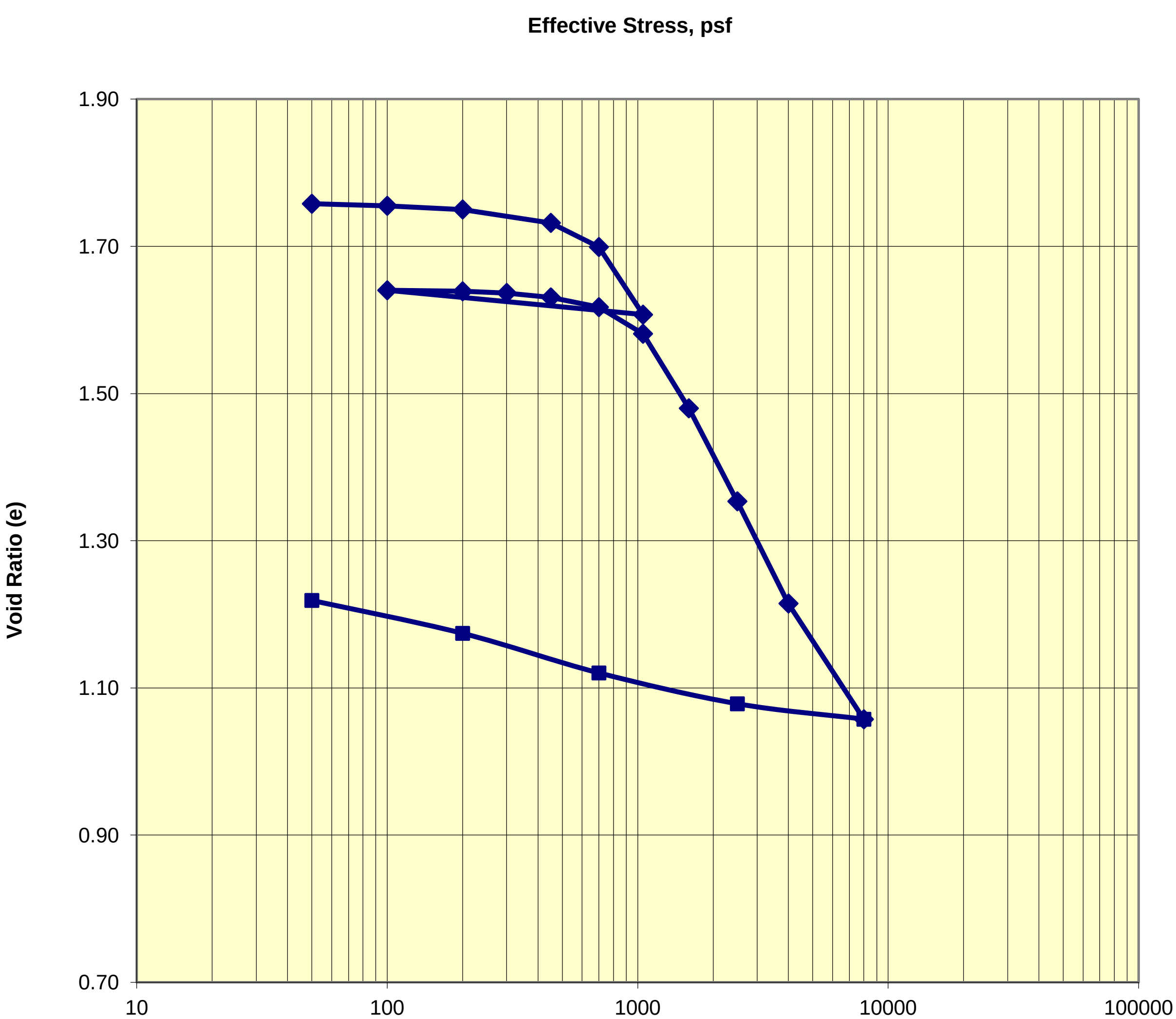


8000 PSF



Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-03	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-02	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	12-14.5(Tip-7)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY w/ shell fragments (Bay Mud)		(13.9 ft)	**Date:**	5/7/2012

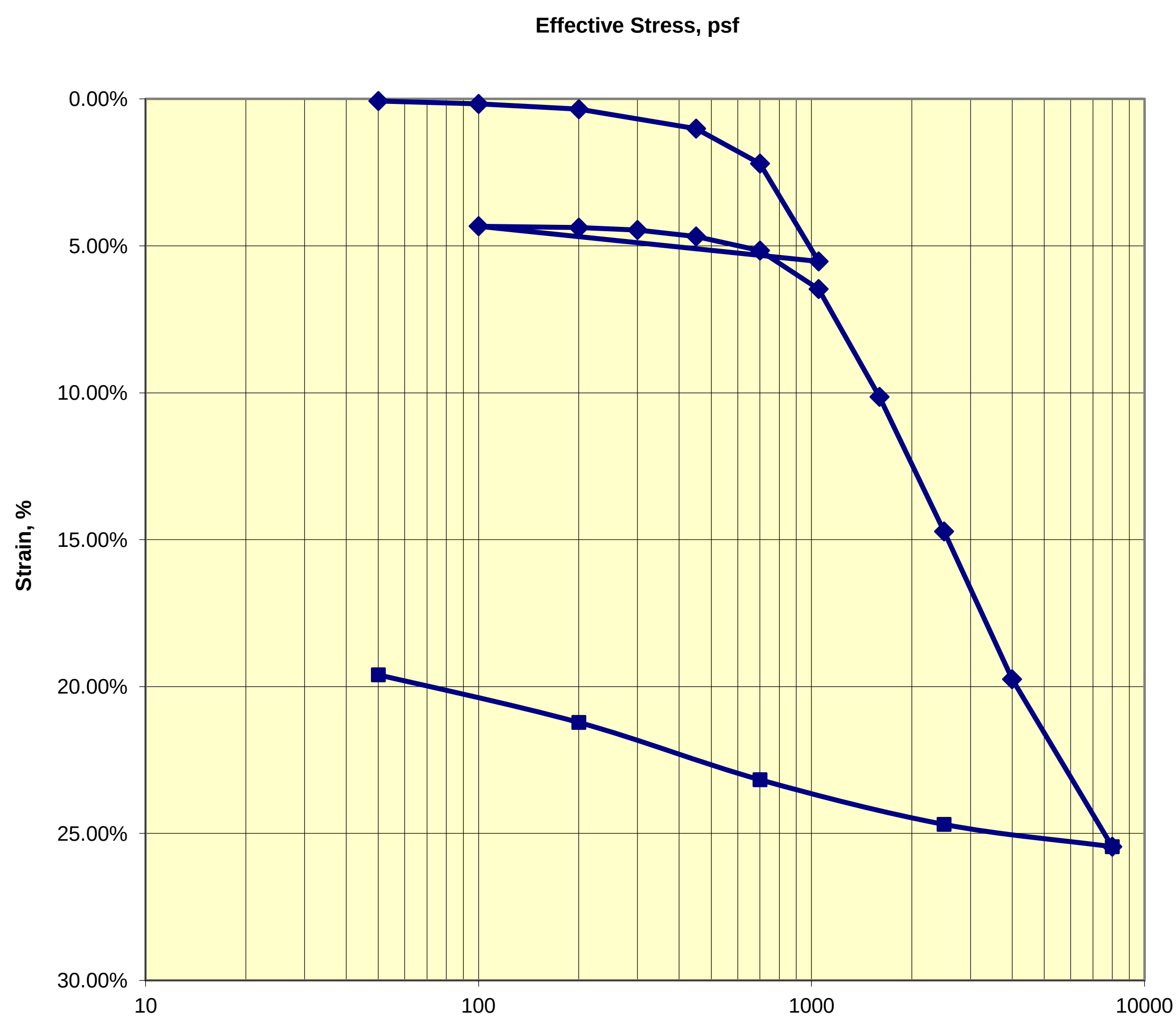


Ass. Gs = 2.7	**Initial**	**Final**
Moisture %:	64.2	45.1
Dry Density, pcf:	61.1	76.0
Void Ratio:	1.758	1.217
% Saturation:	98.7	100

Remarks:

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-03	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-02	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	12-14.5(Tip-7)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY w/ shell fragments (Bay Mud)		(13.9 ft)	**Date:**	5/7/2012

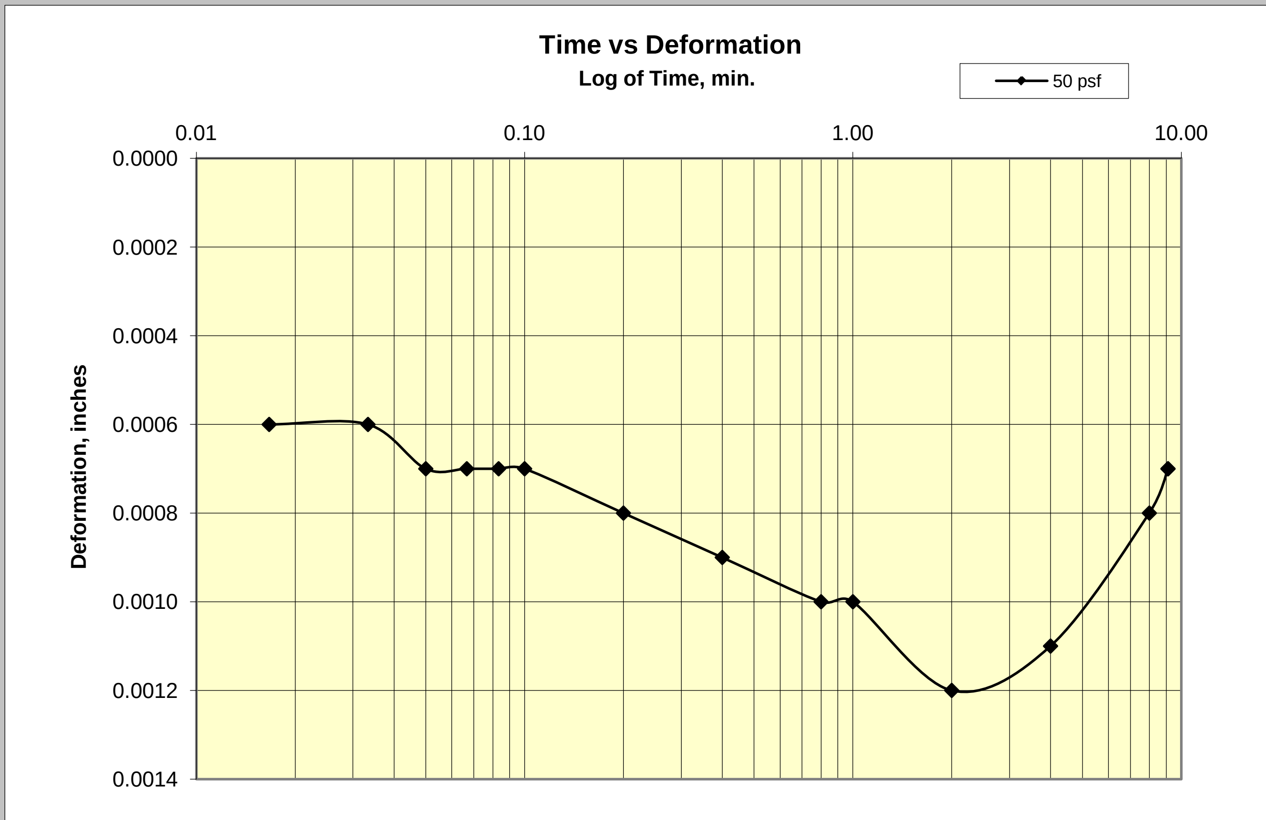


Ass. Gs = 2.7	**Initial**	**Final**
Moisture %:	64.2	45.1
Dry Density, pcf:	61.1	76.0
Void Ratio:	1.758	1.217
% Saturation:	98.7	100

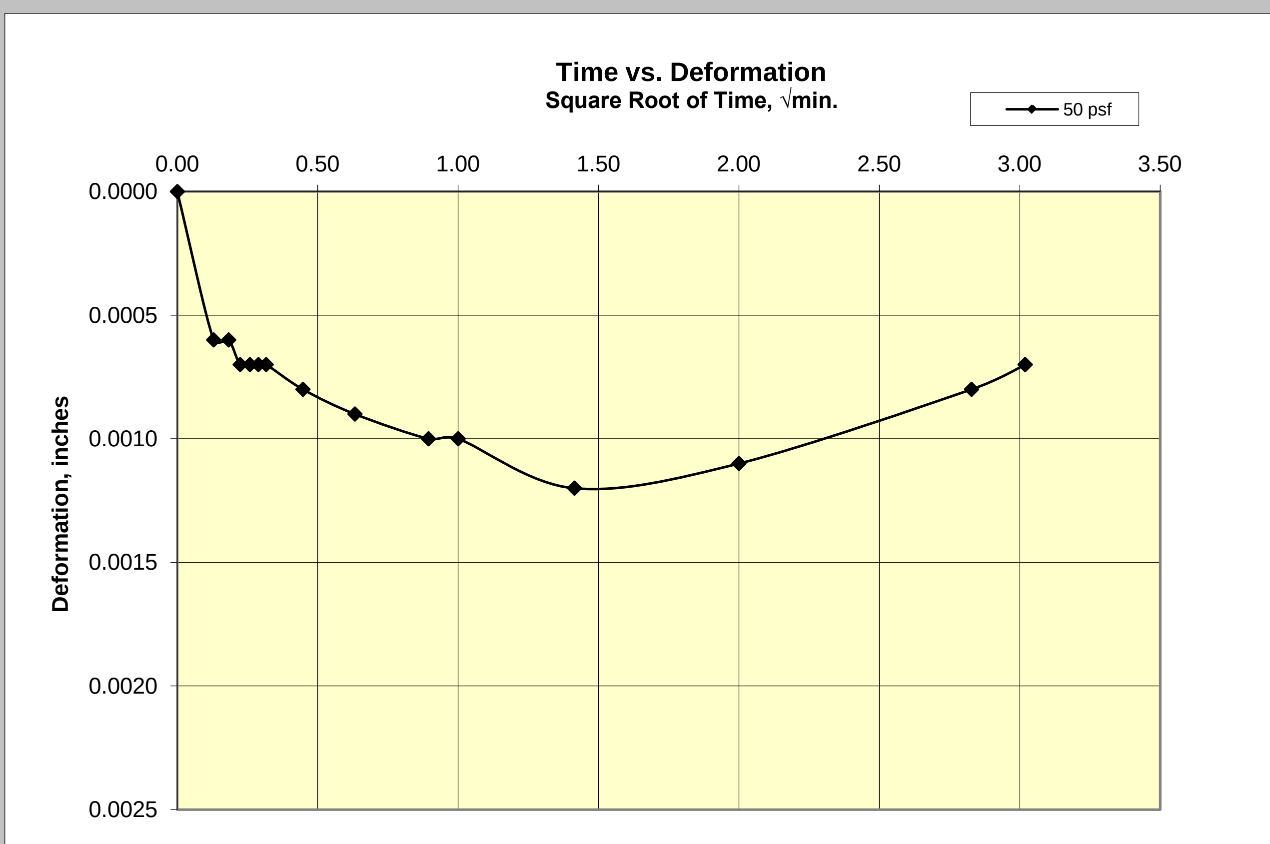
Remarks:

Cooper Testing Labs, Inc.

Load 1 | 50 PSF | AUS-B-03-12.5-14.5 | (13.9 ft)

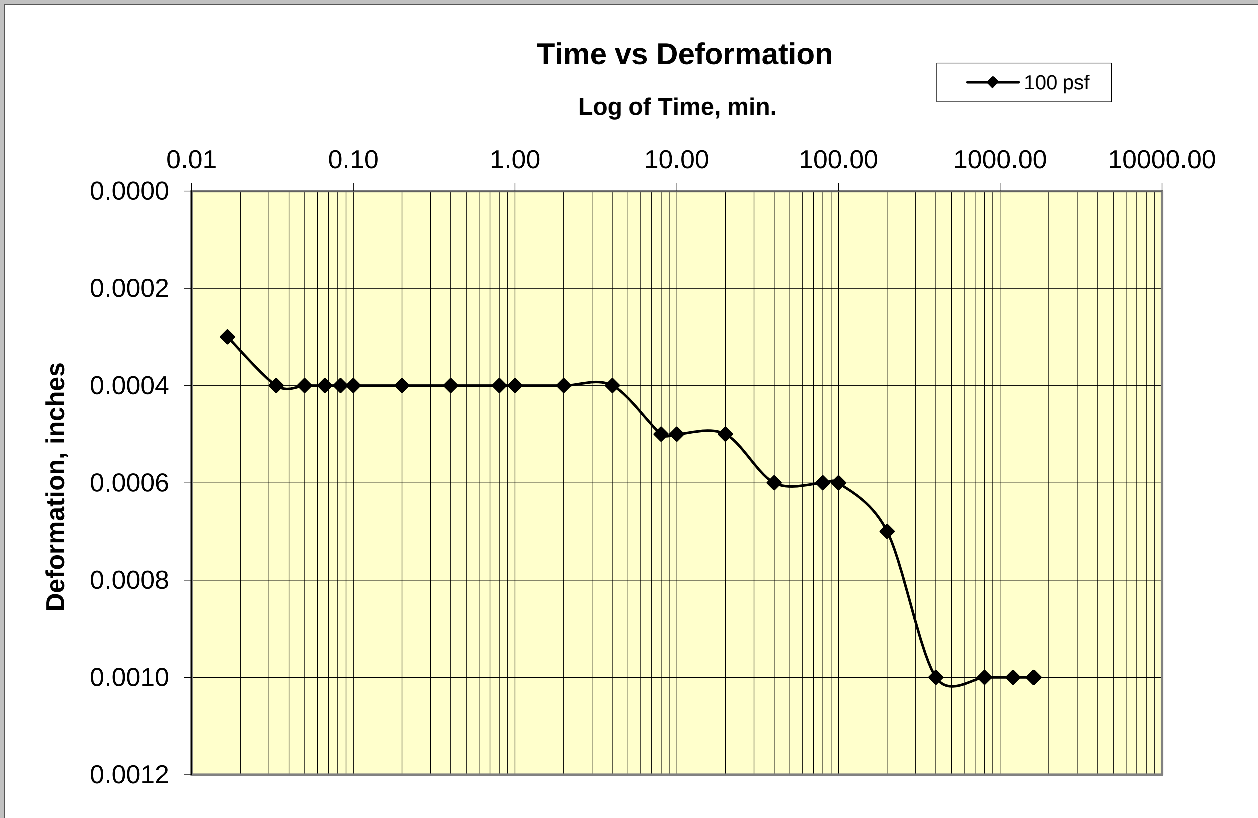


50 PSF

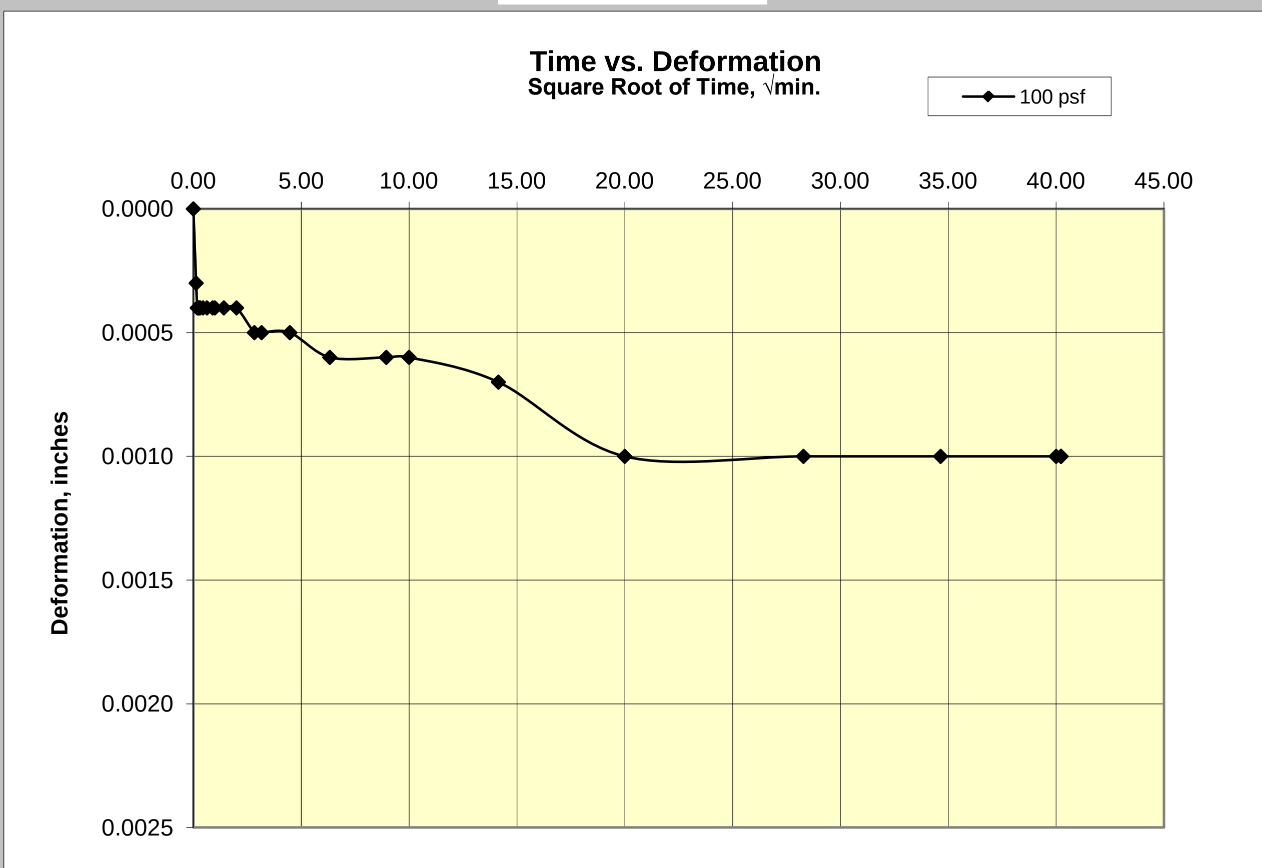


Cooper Testing Labs, Inc.

Load 2 | 100 PSF | AUS-B-03-12.5-14.5 | (13.9 ft)

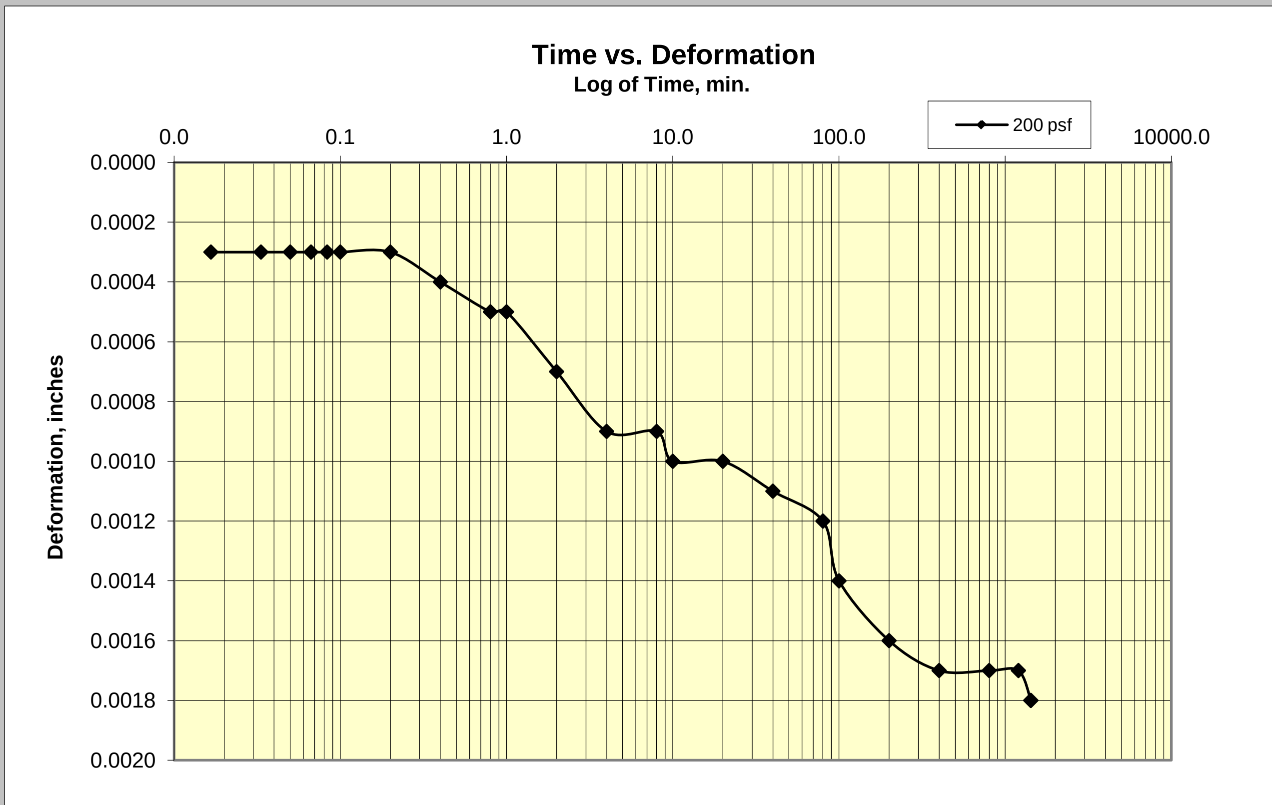


100 PSF

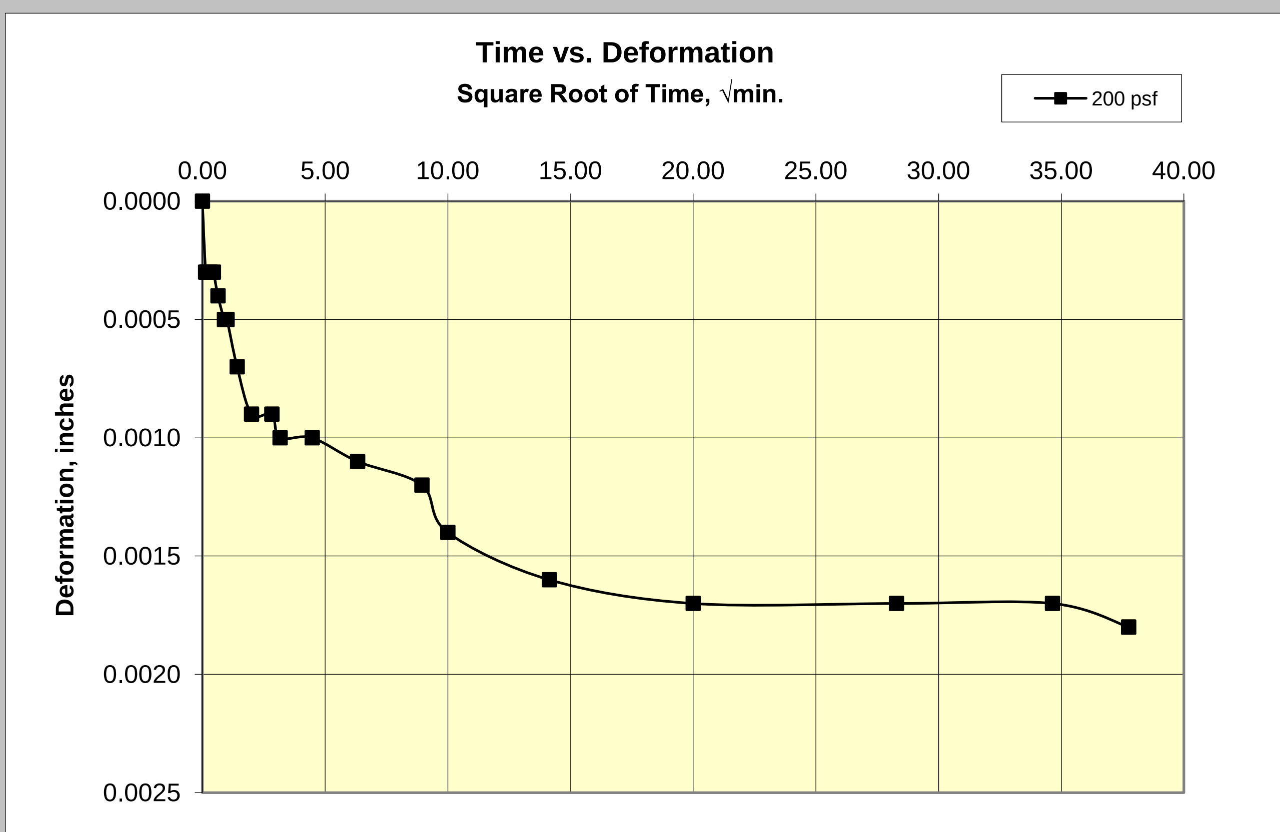


Cooper Testing Labs, Inc.

Load 3	200 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

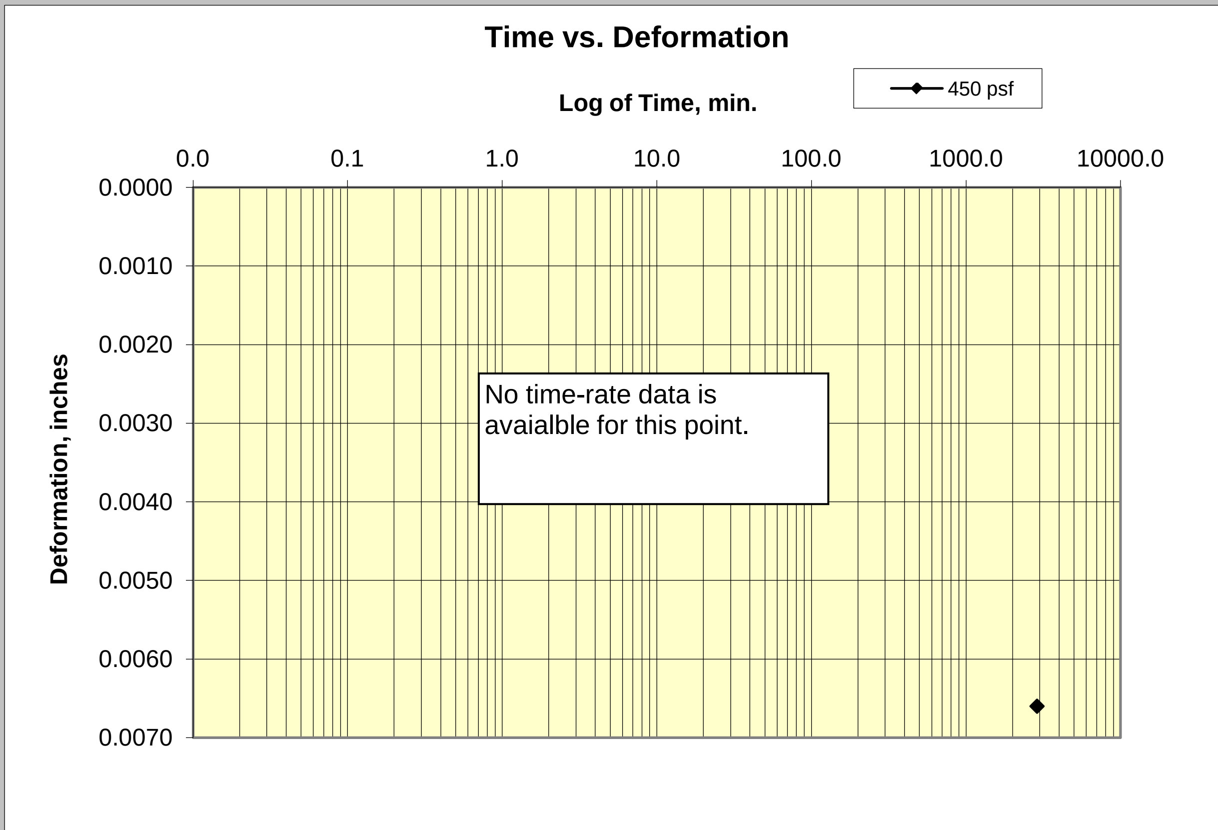


200 PSF

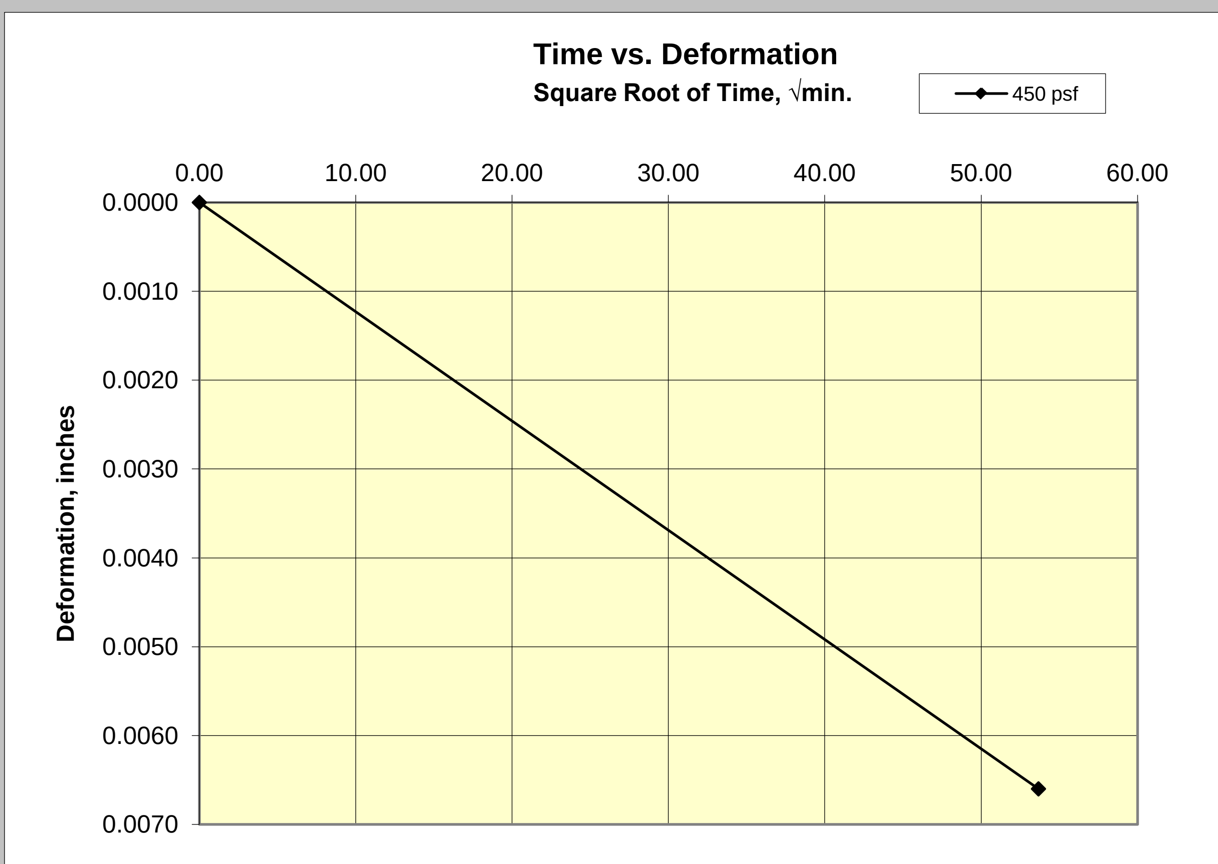


Cooper Testing Labs, Inc.

Load 4	450 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

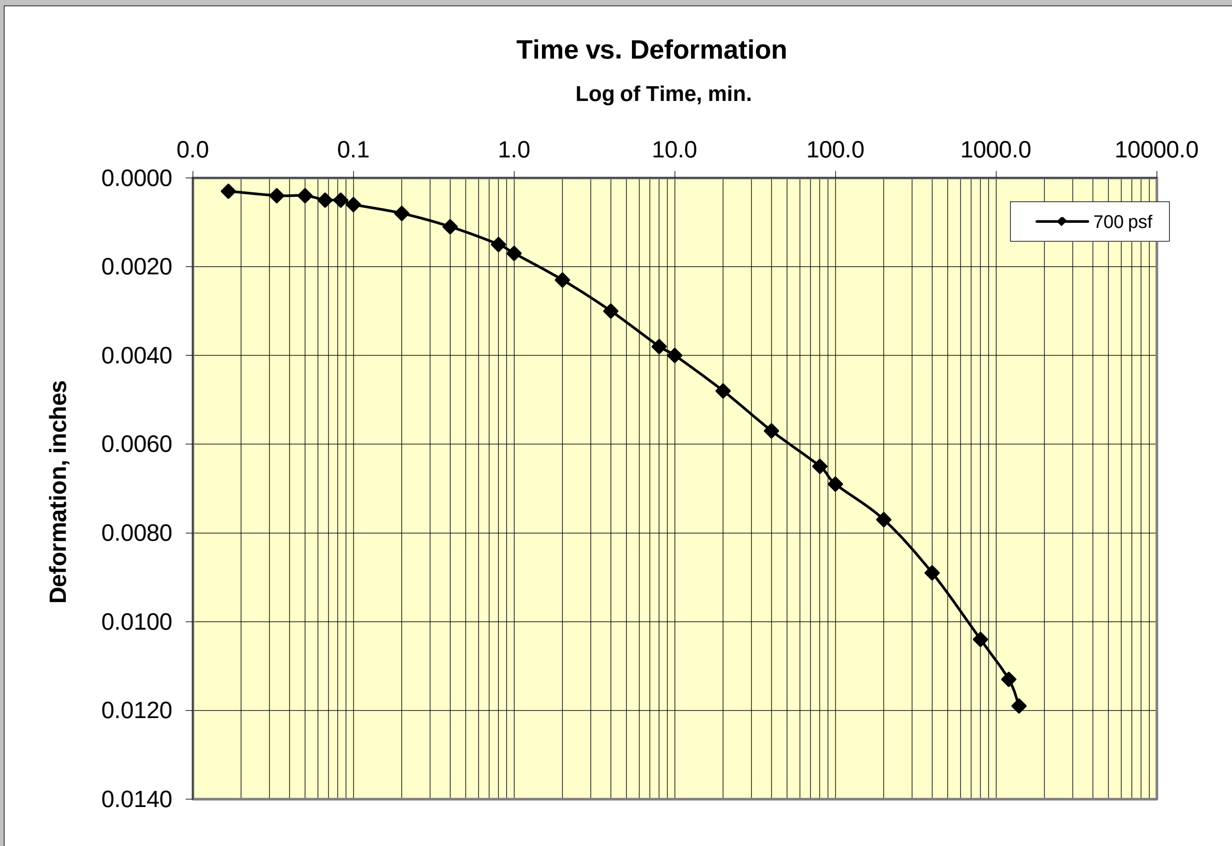


450 PSF

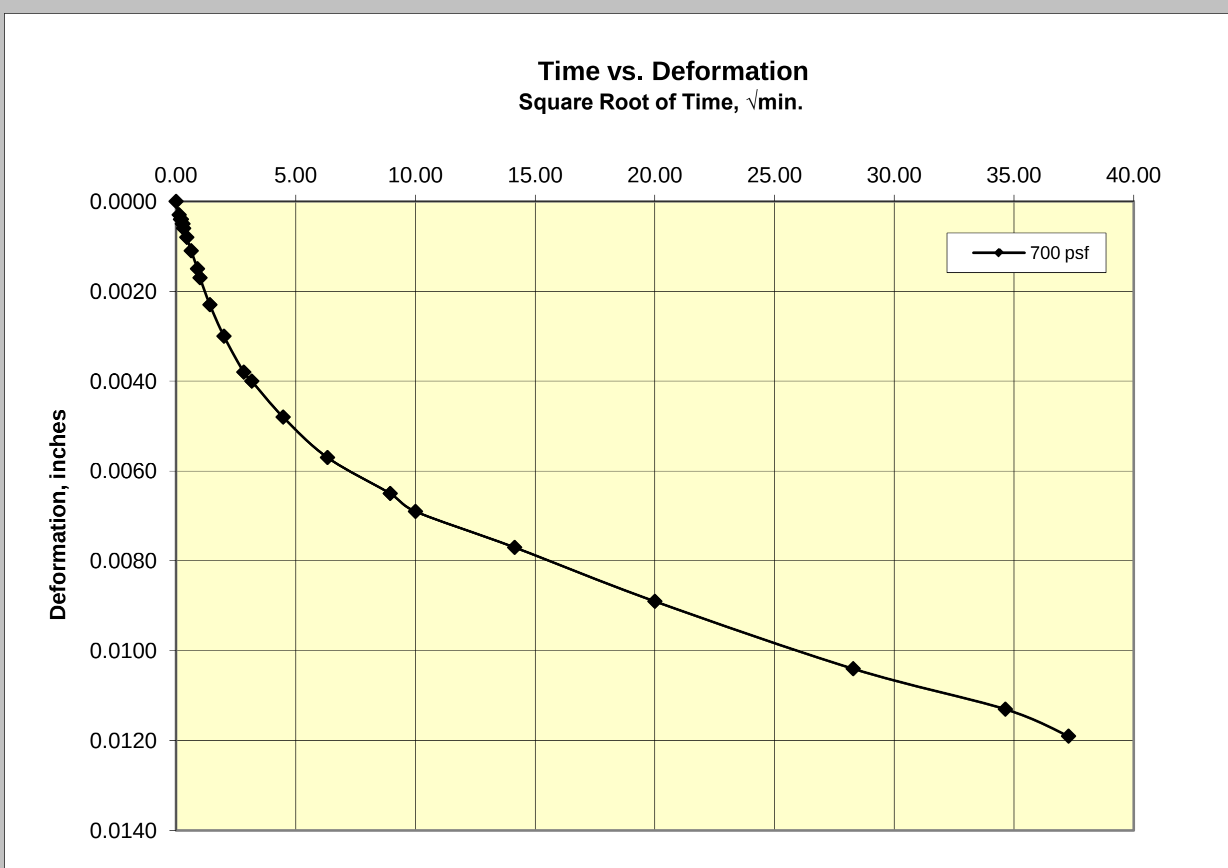


Cooper Testing Labs, Inc.

Load 5	700 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

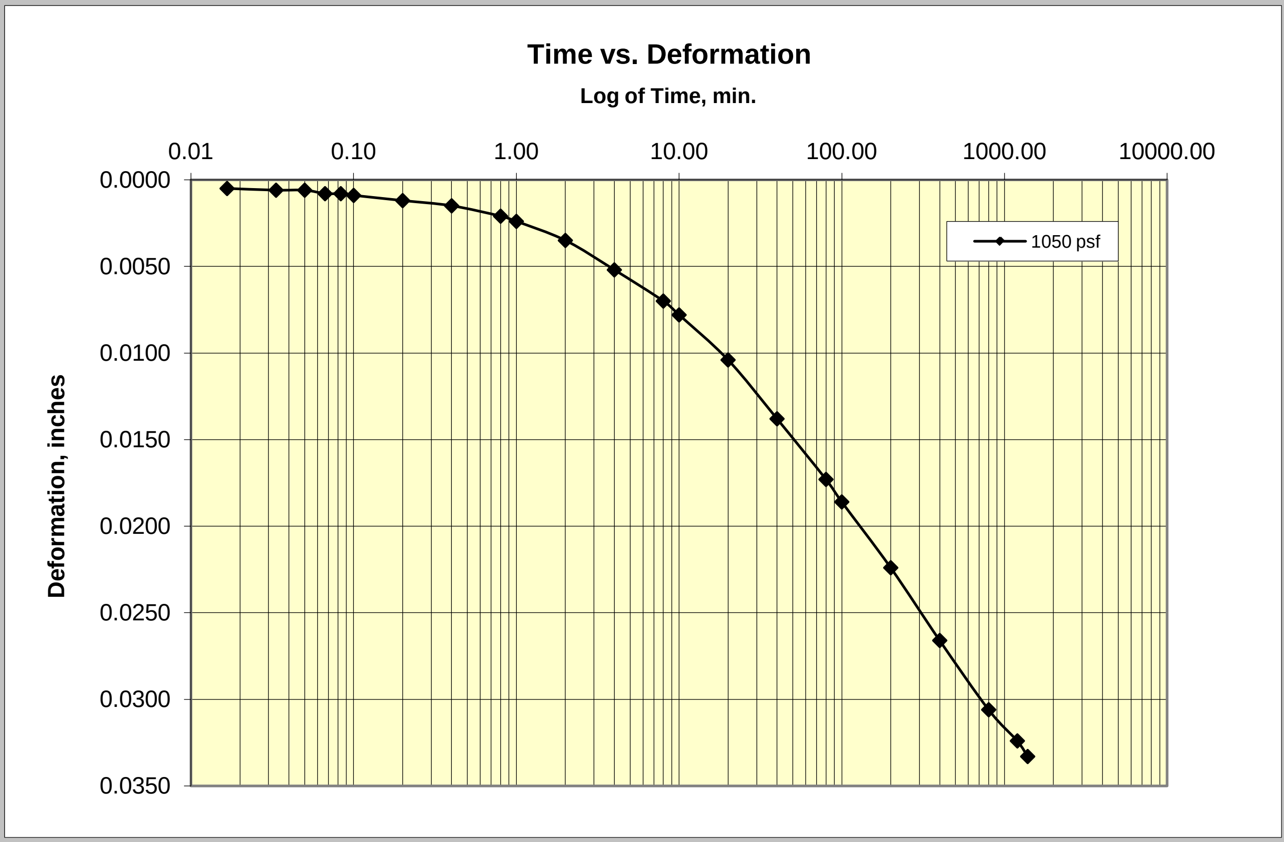


700 PSF

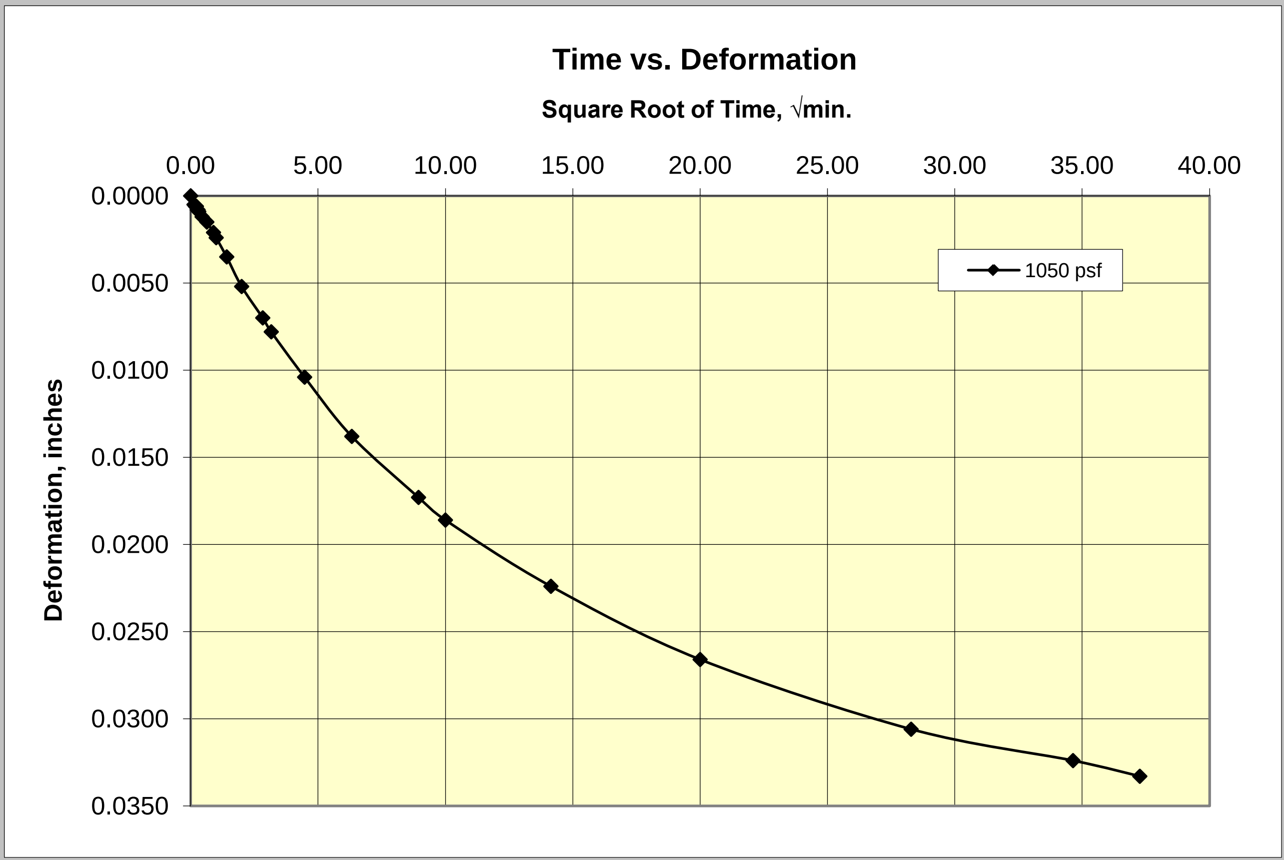


Cooper Testing Labs, Inc.

Load 6	1050 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

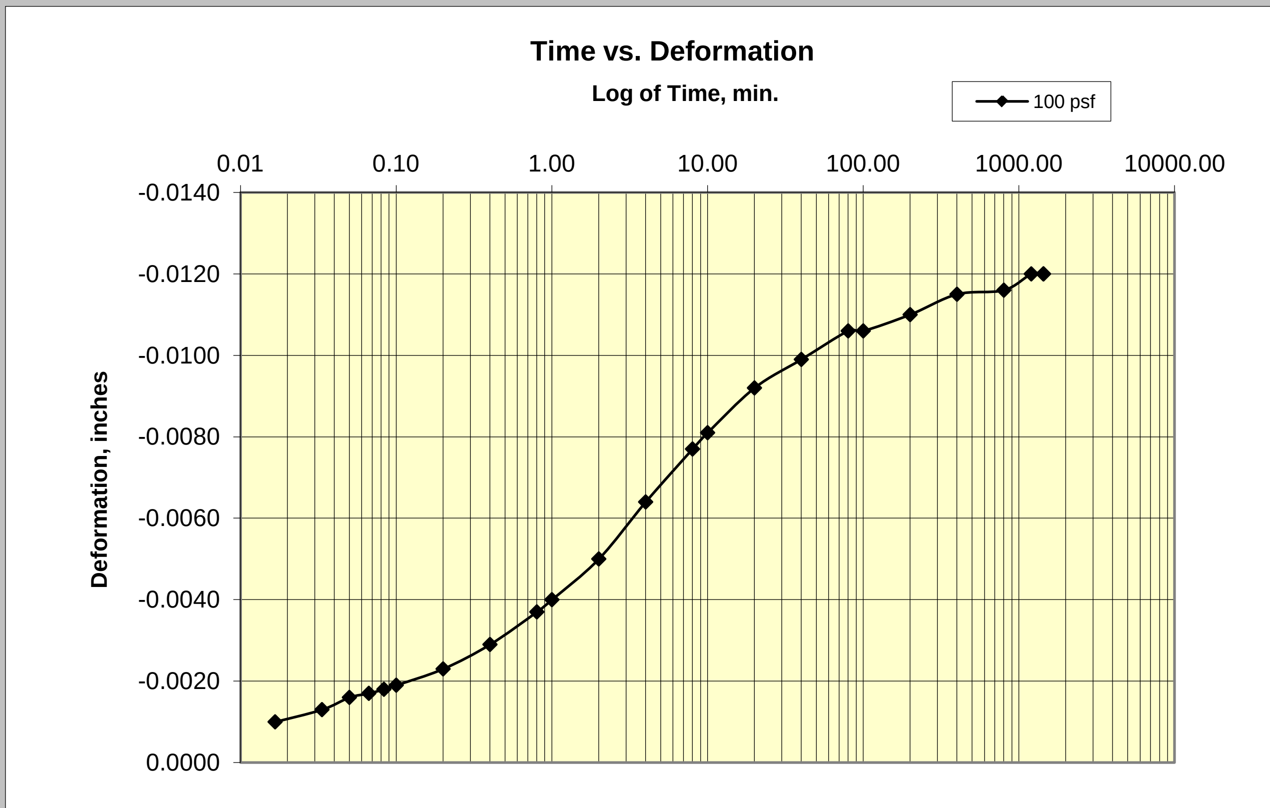


1050 PSF

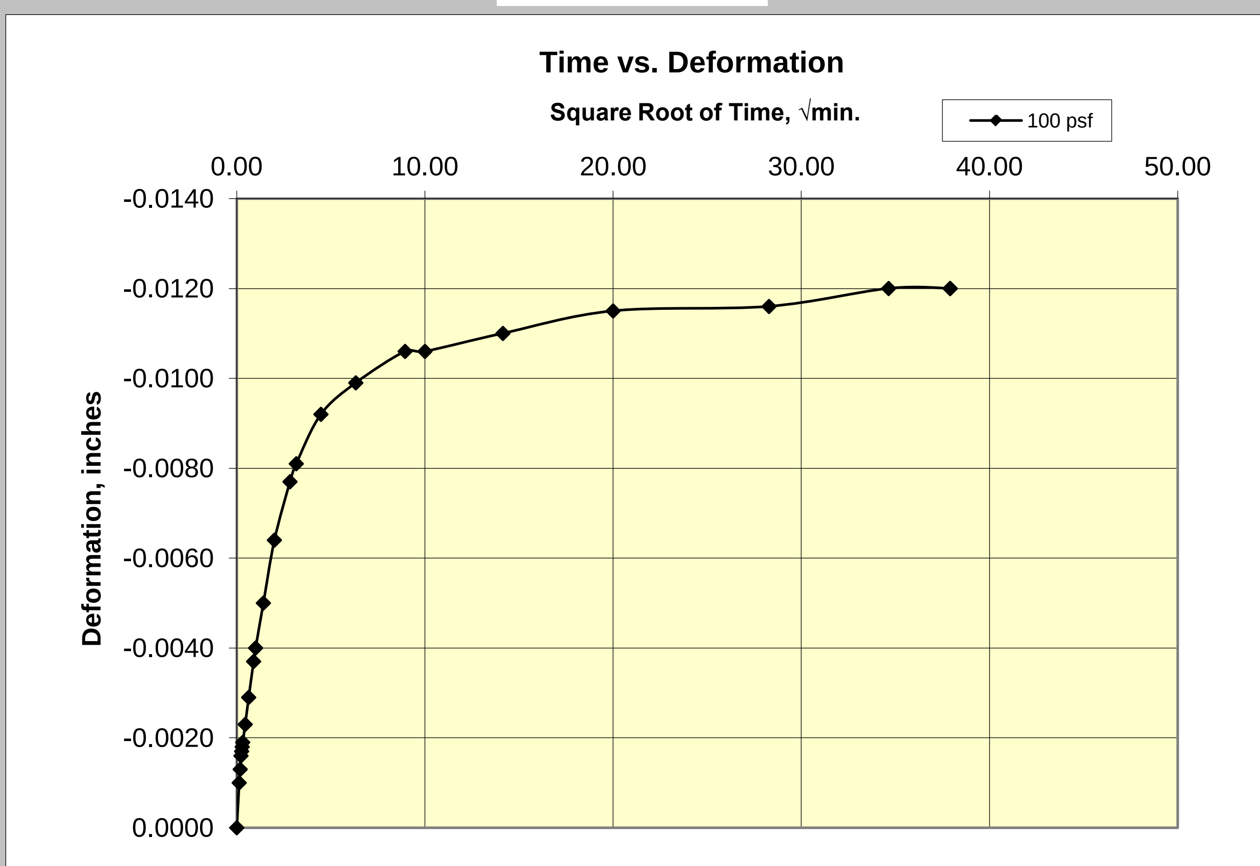


Cooper Testing Labs, Inc.

Load 7	100 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

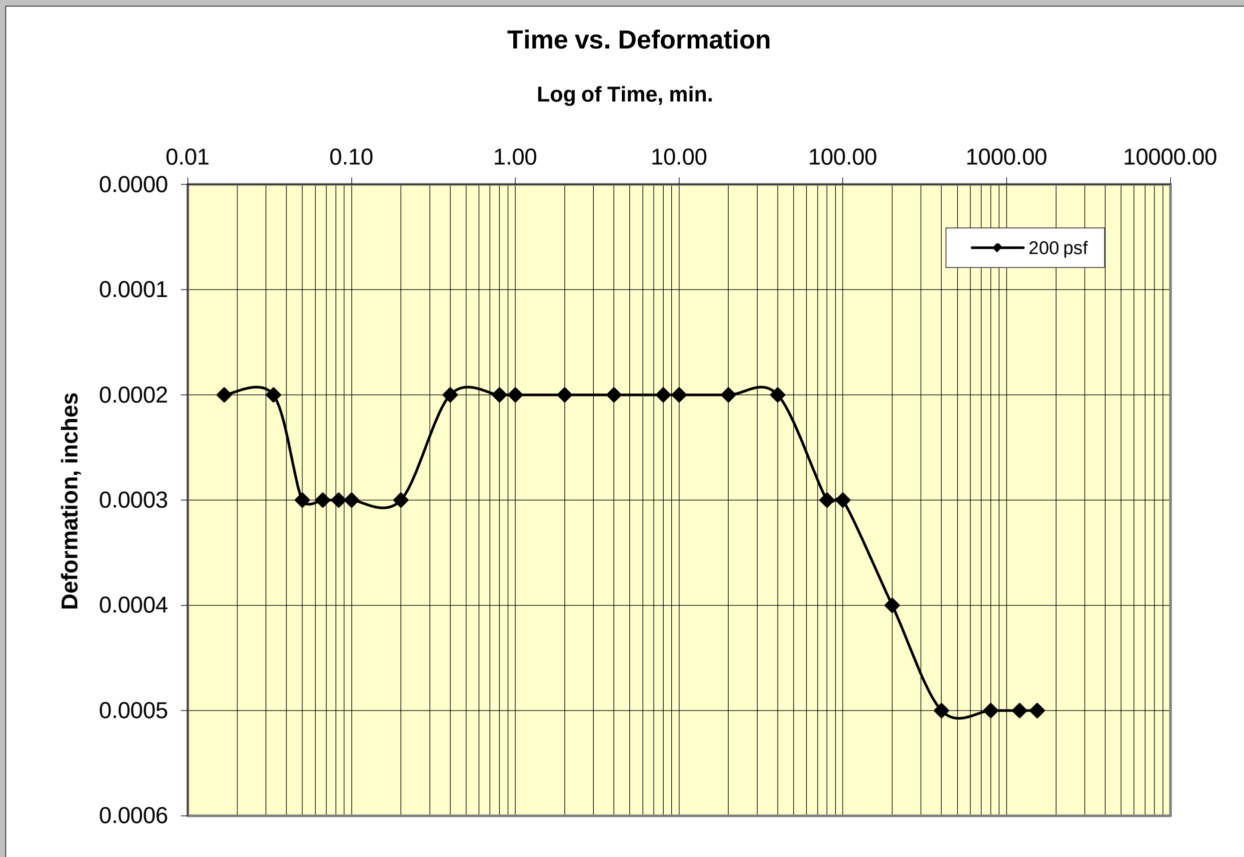


100 PSF

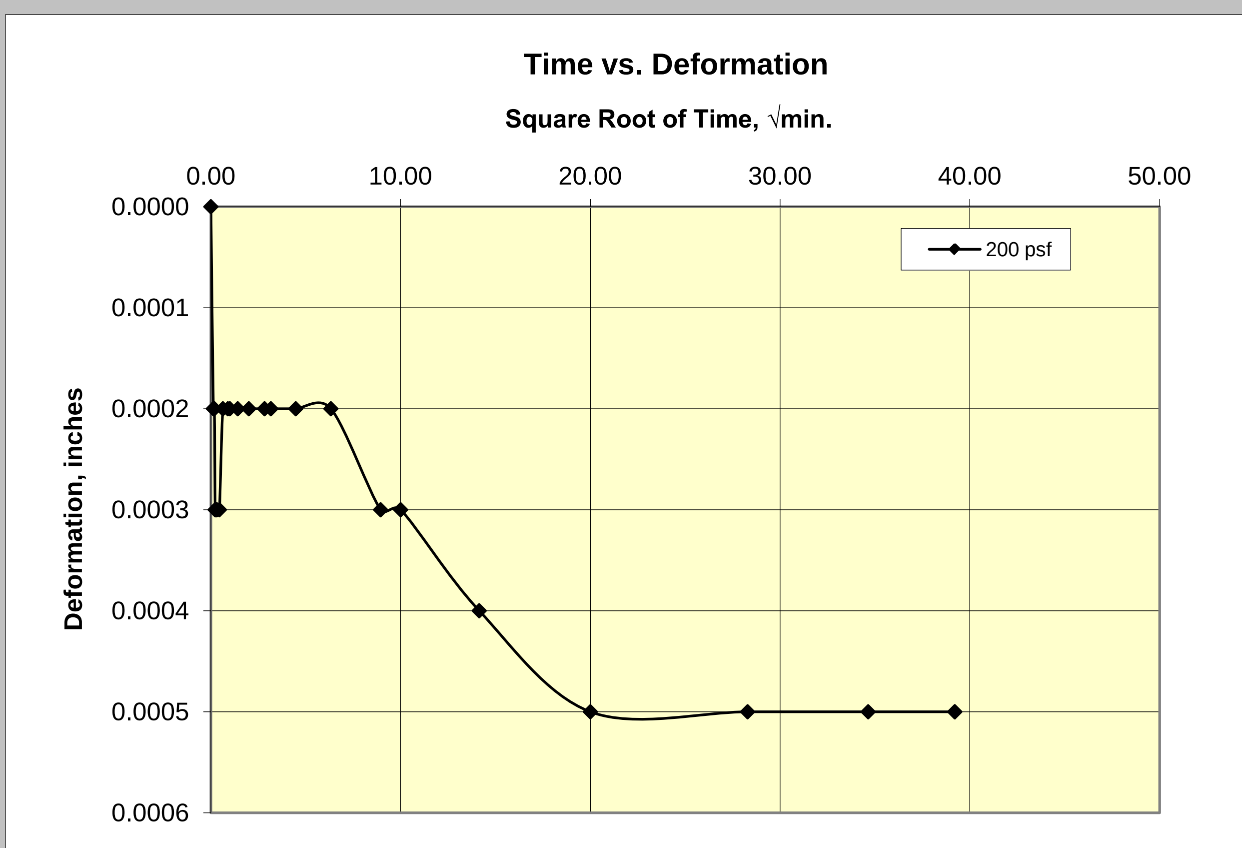


Cooper Testing Labs, Inc.

Load 8	200 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

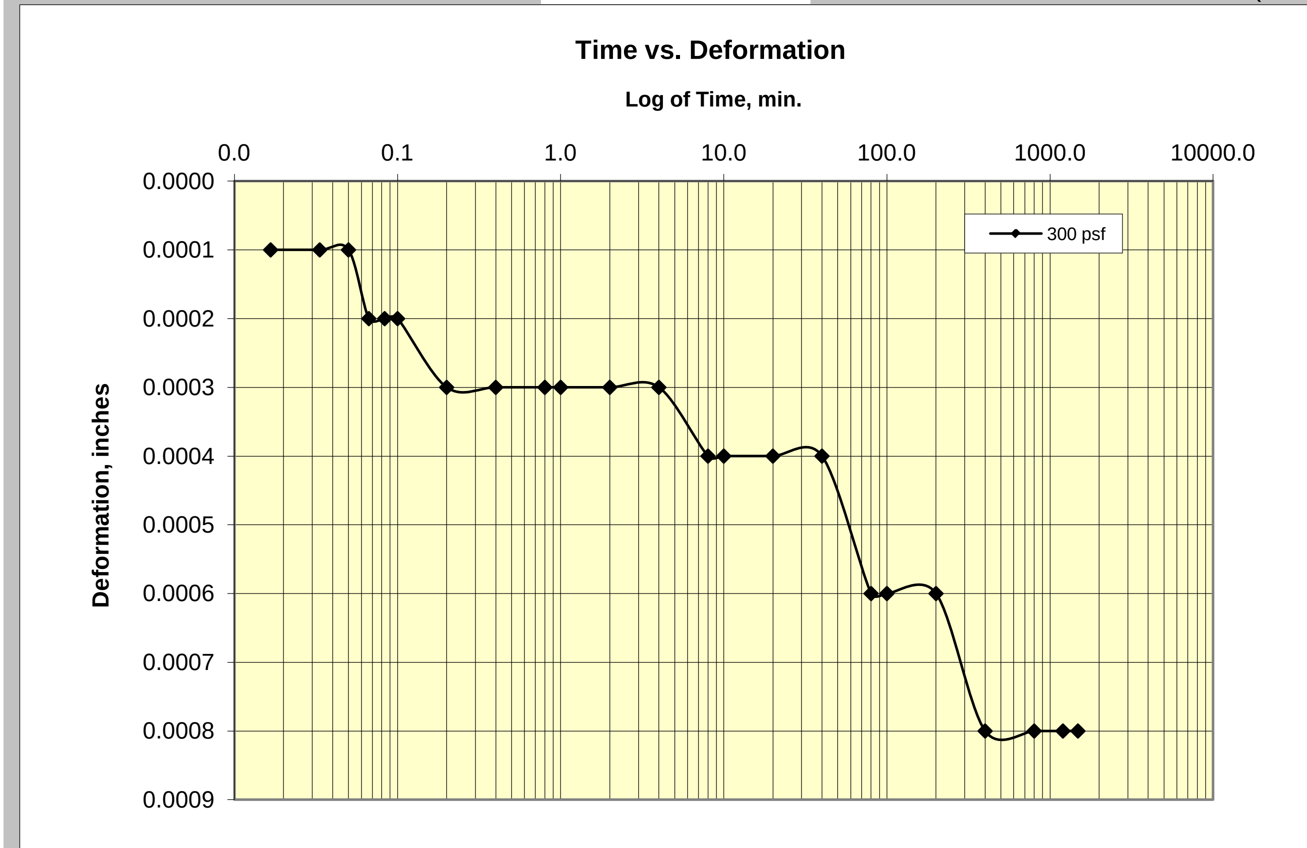


200 PSF

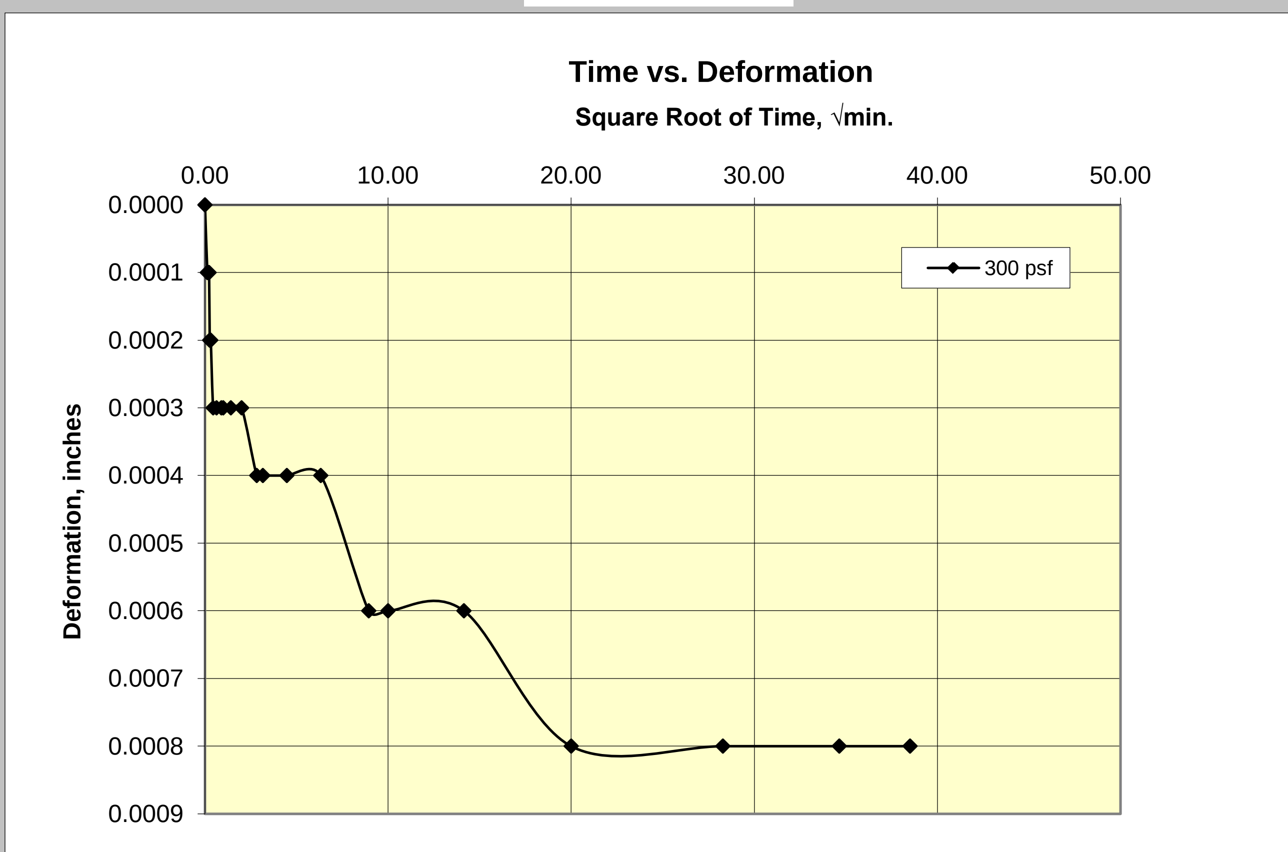


Cooper Testing Labs, Inc.

Load 9	300 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

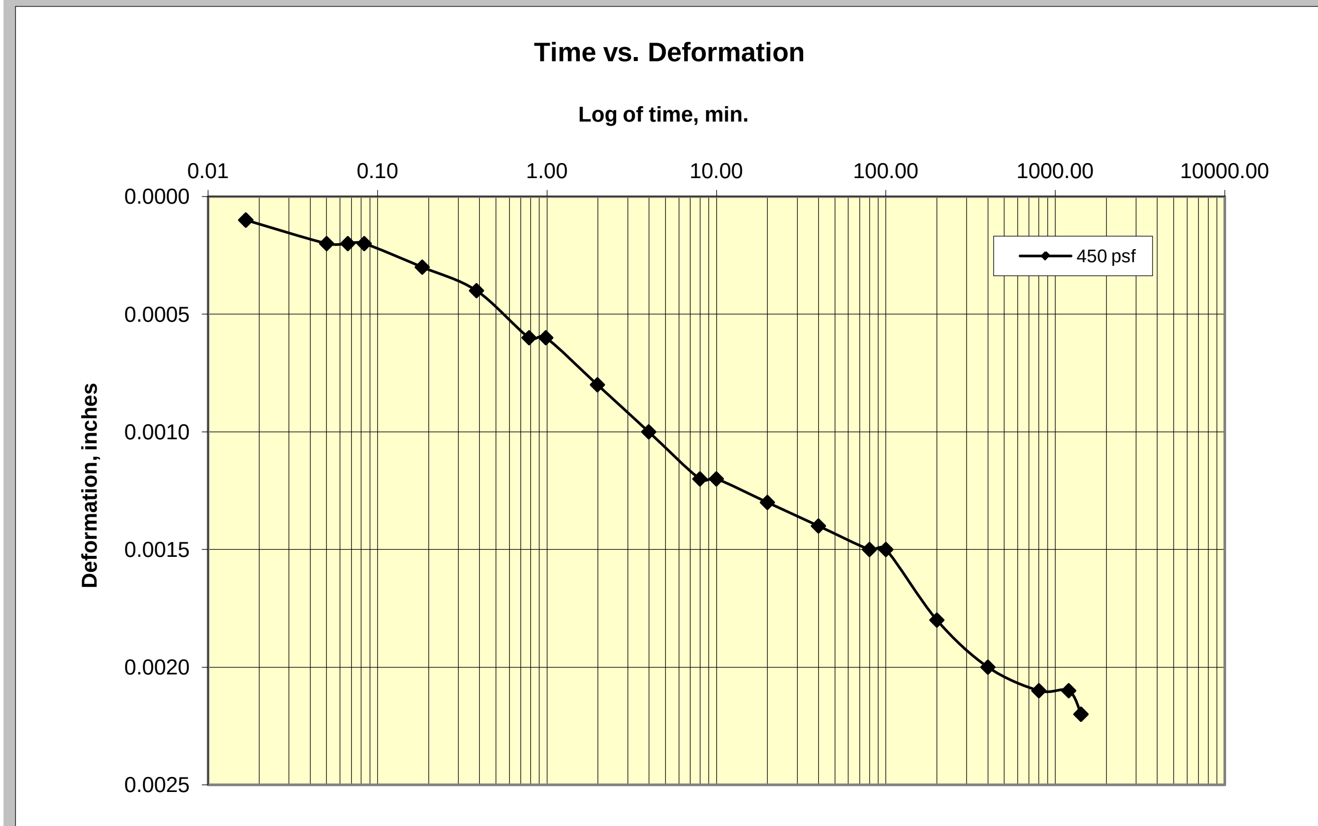


300 PSF

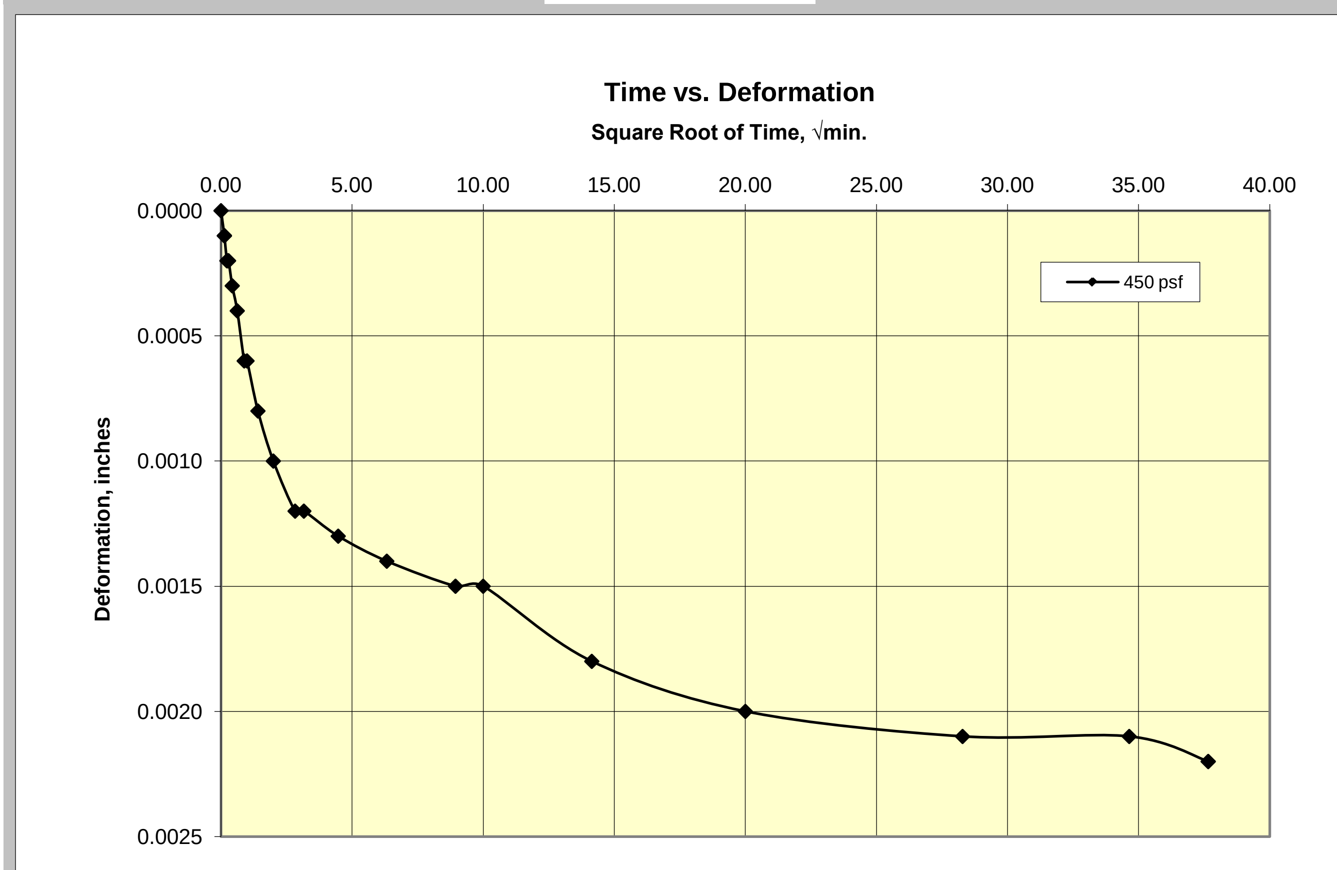


Cooper Testing Labs, Inc.

Load 10	450 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

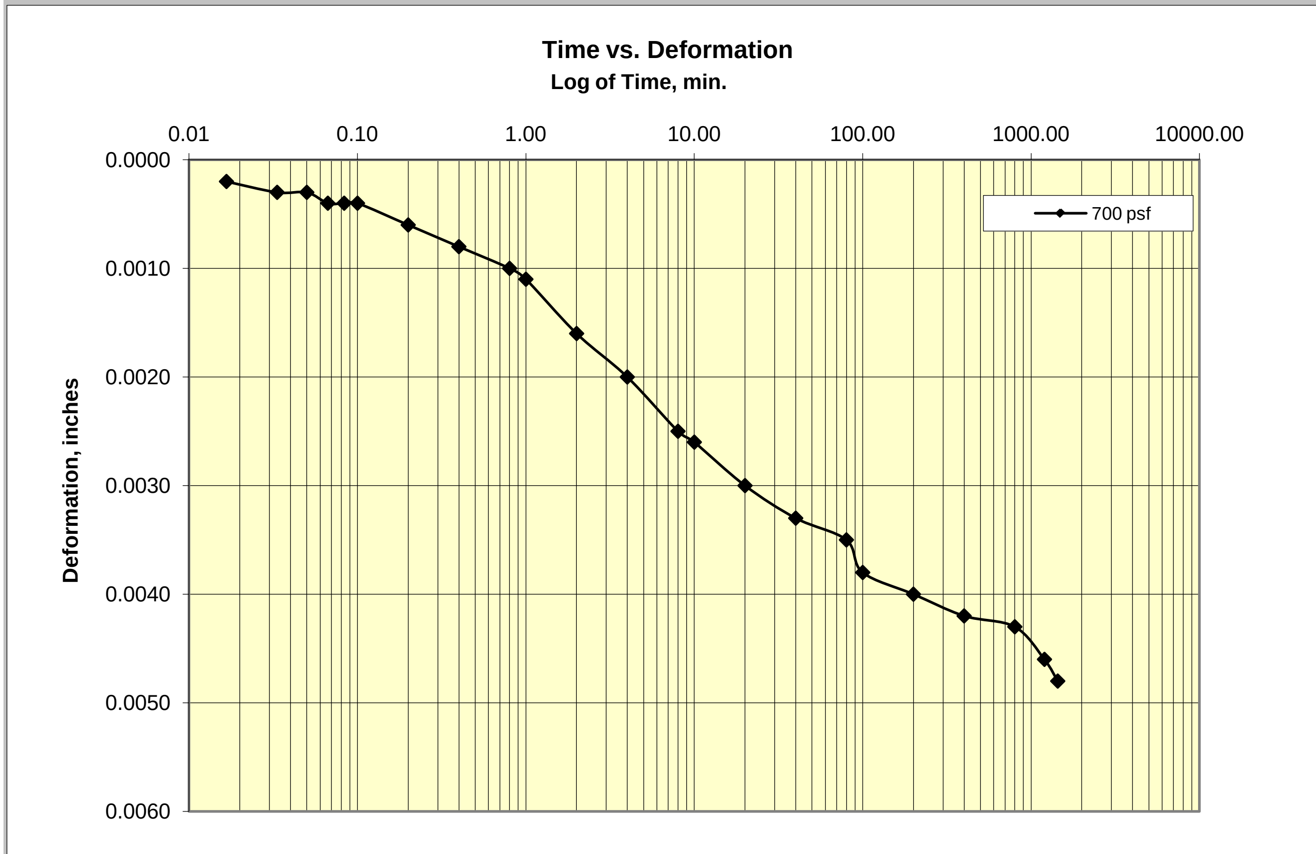


450 PSF

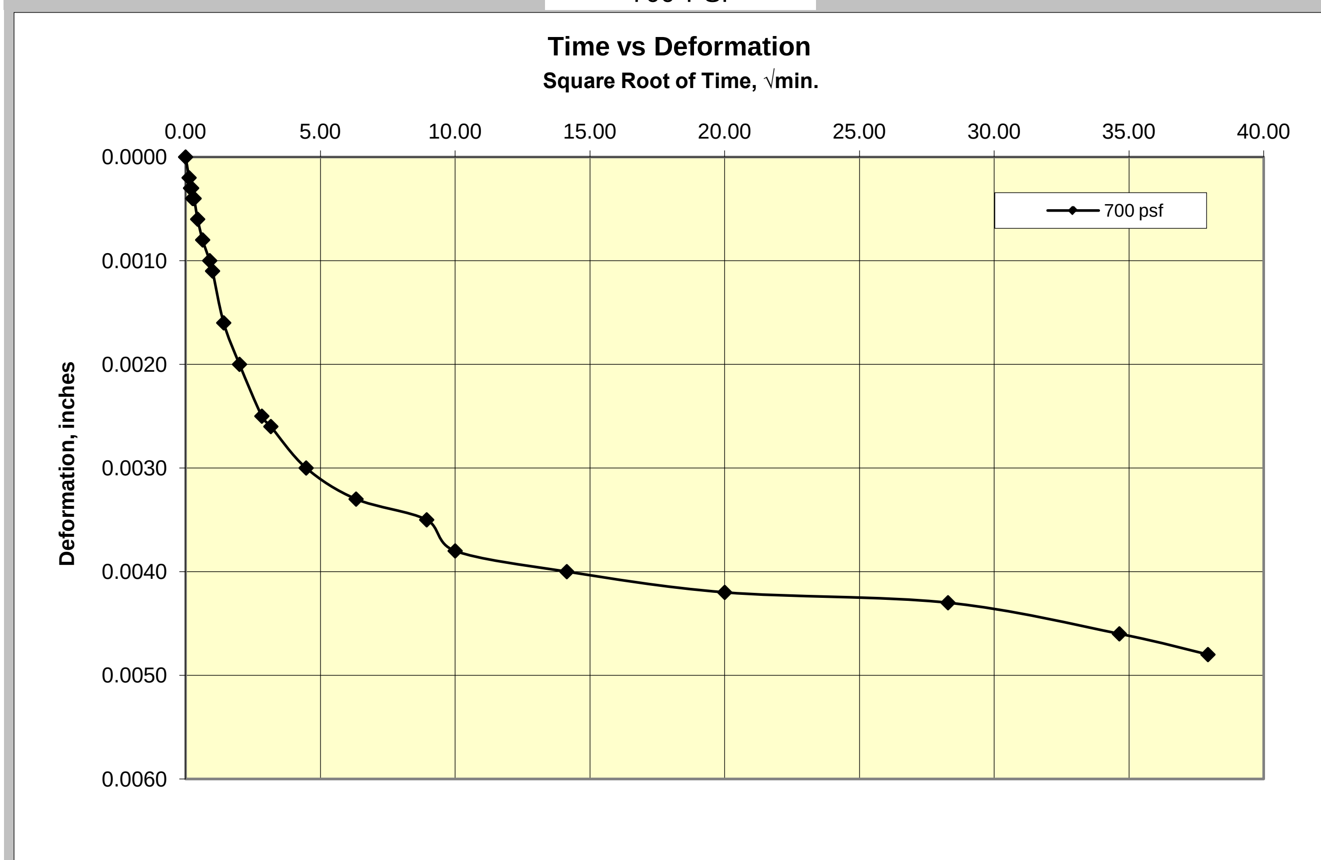


Cooper Testing Labs, Inc.

Load 11 | 700 PSF | AUS-B-03-12.5-14.5 | (13.9 ft)

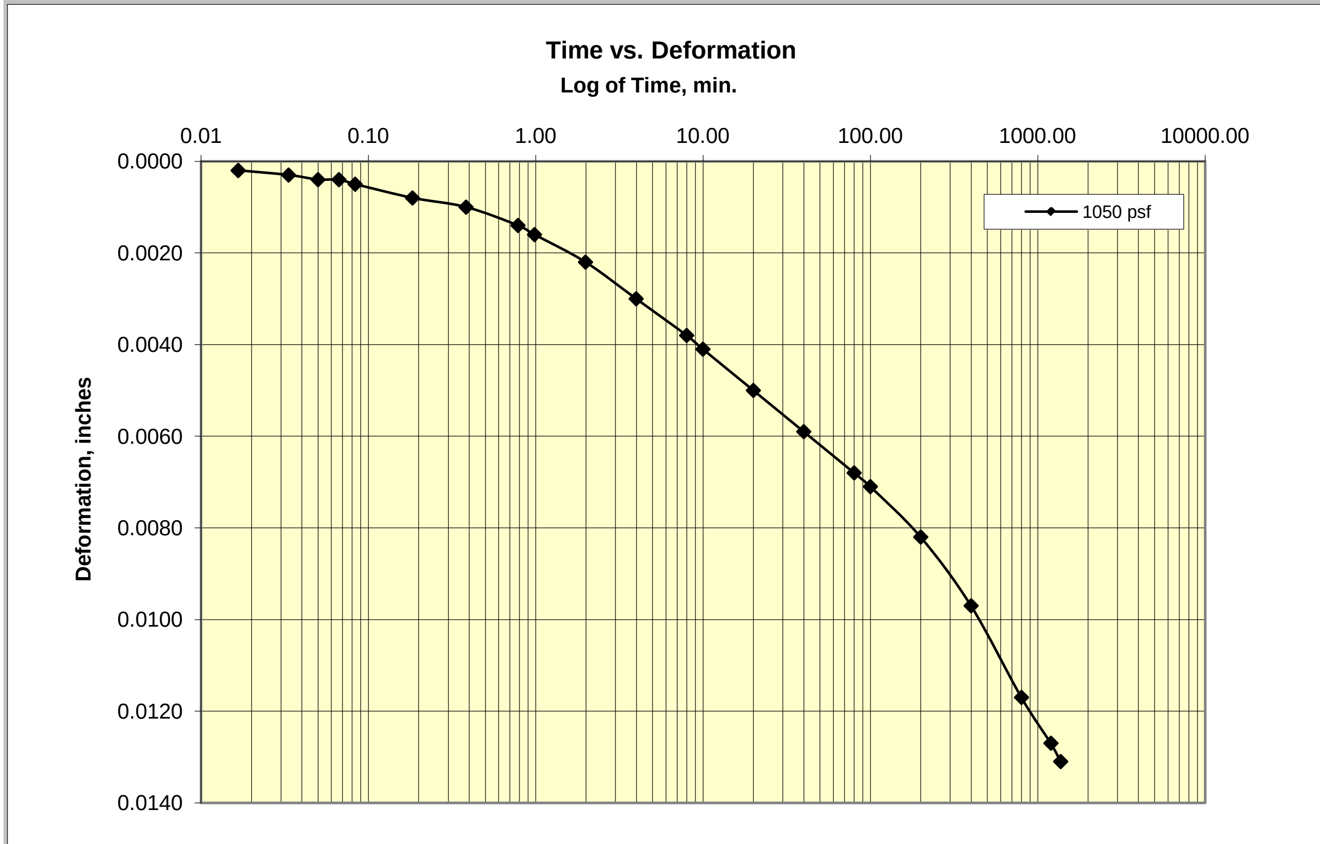


700 PSF

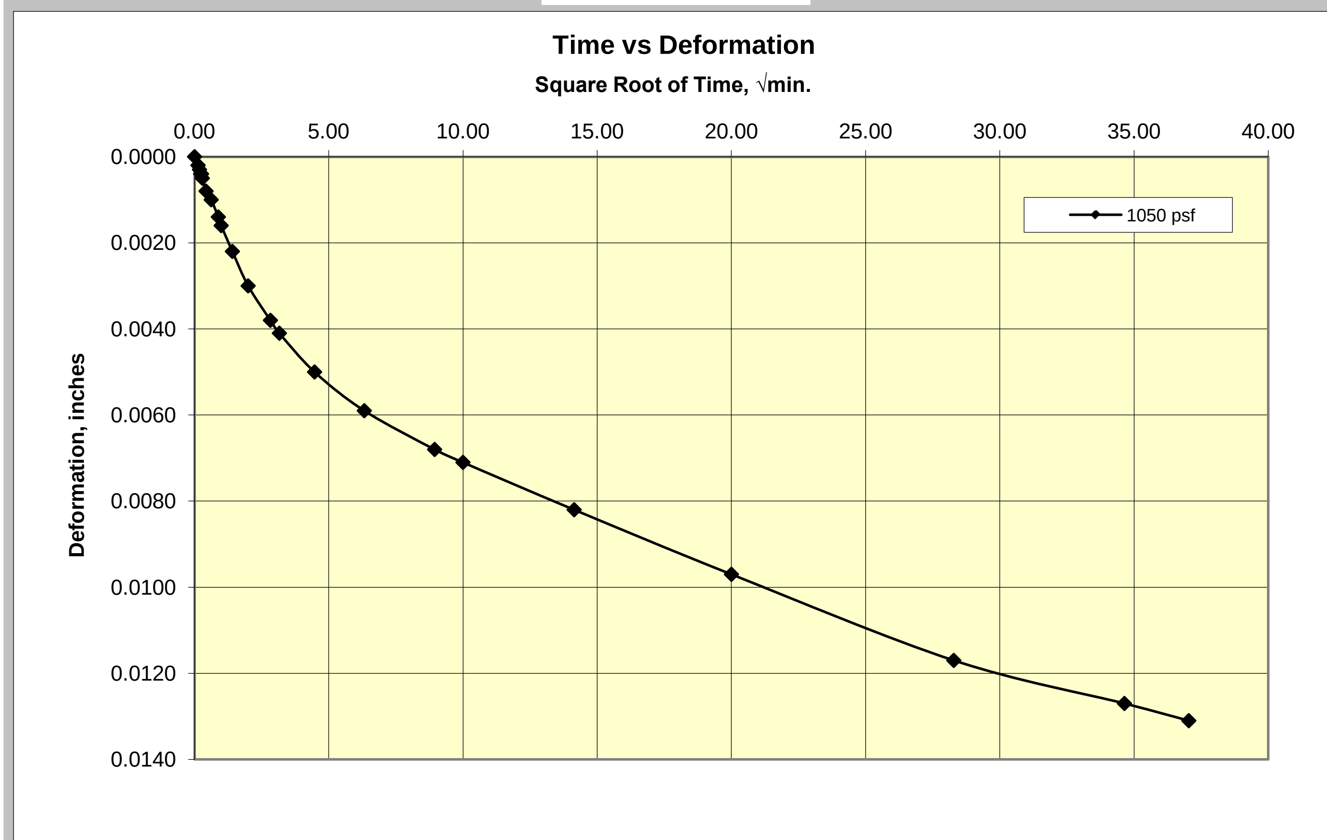


Cooper Testing Labs, Inc.

Load 12	1050 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

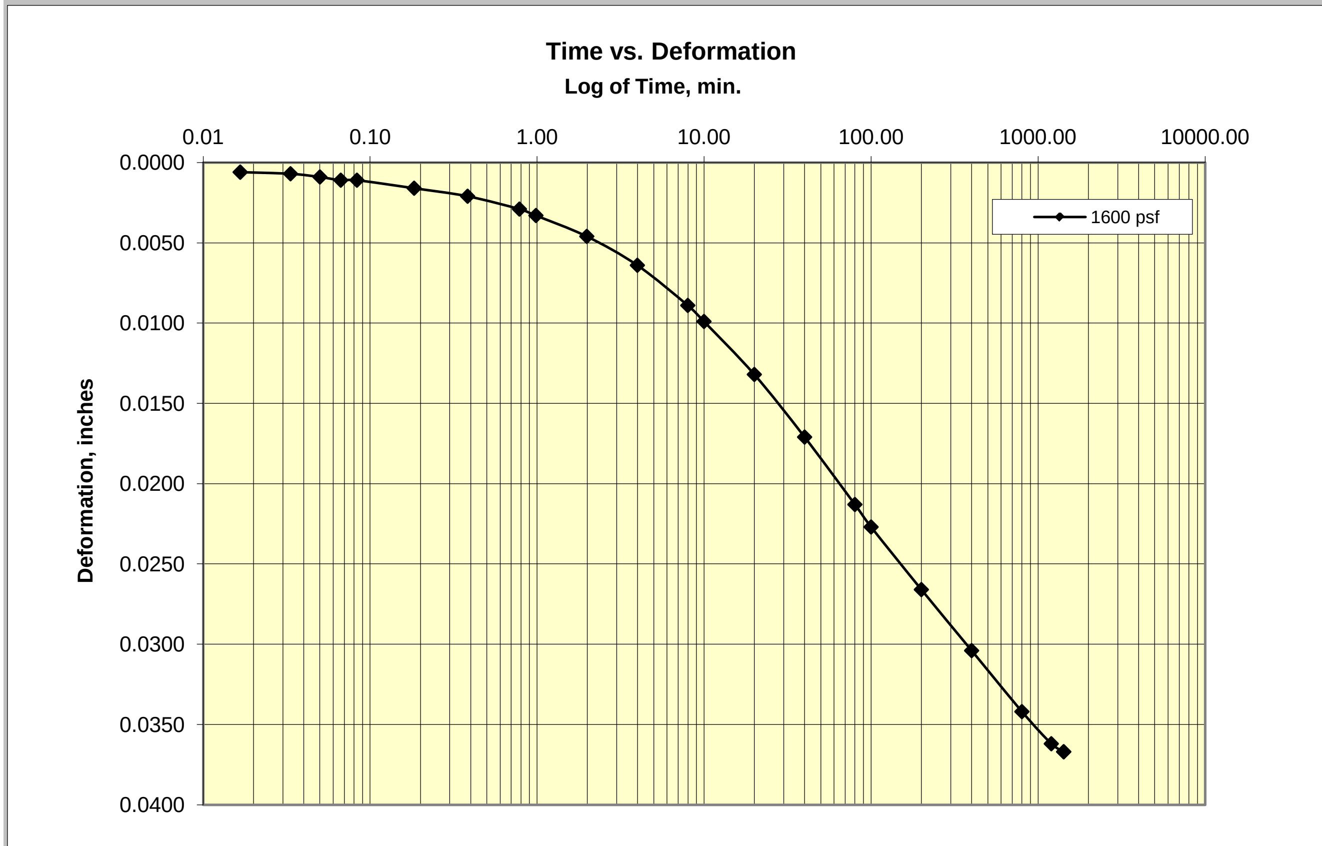


1050 PSF

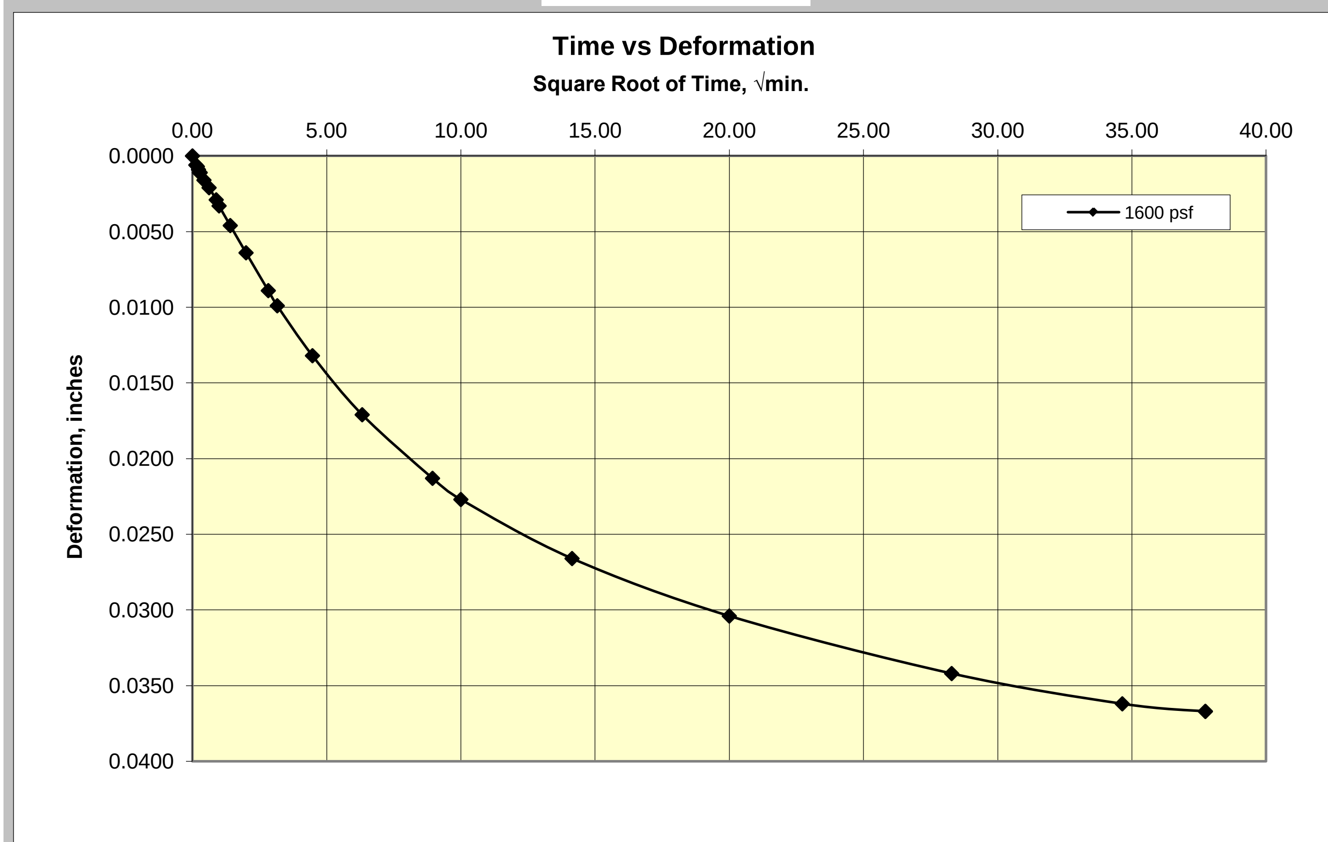


Cooper Testing Labs, Inc.

Load 13	1600 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

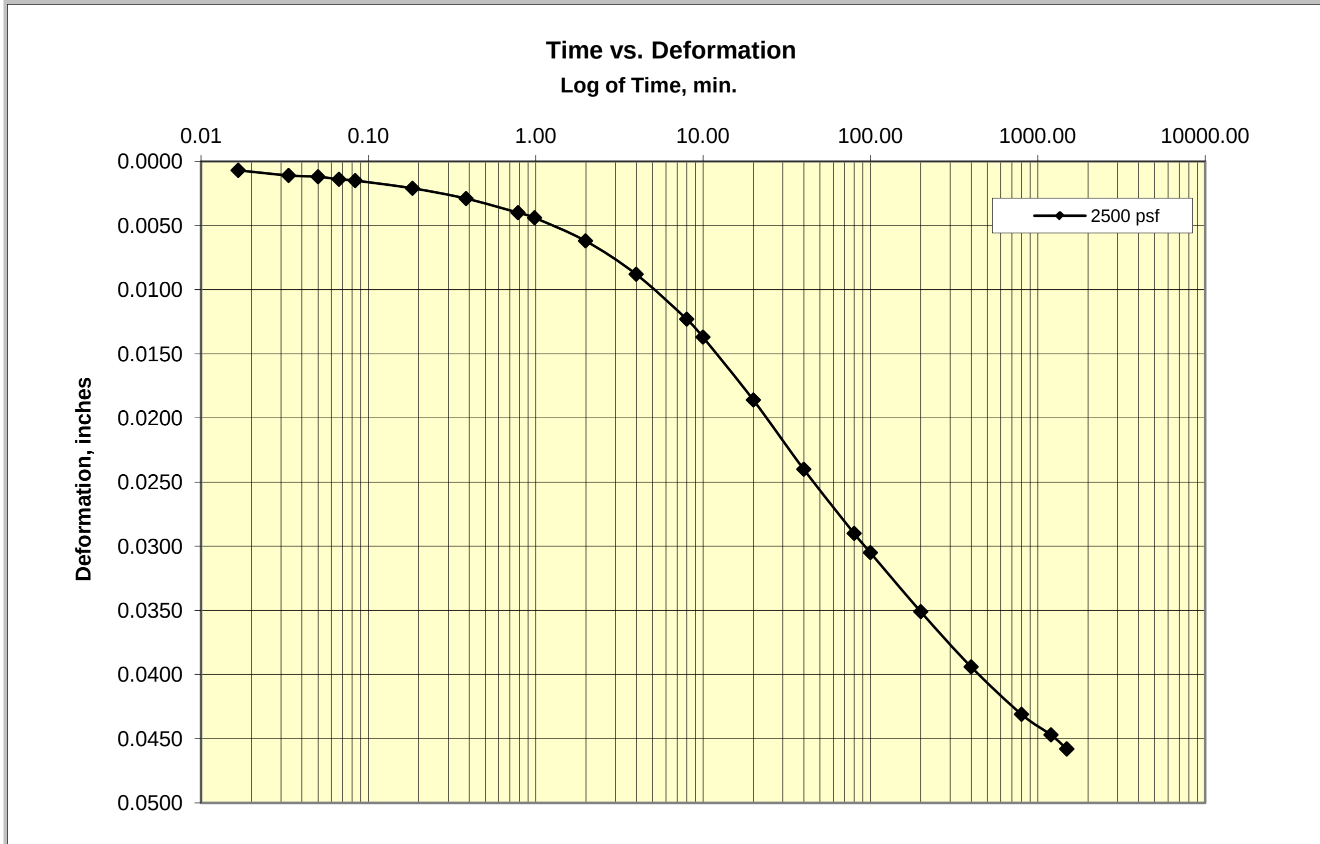


1600 PSF

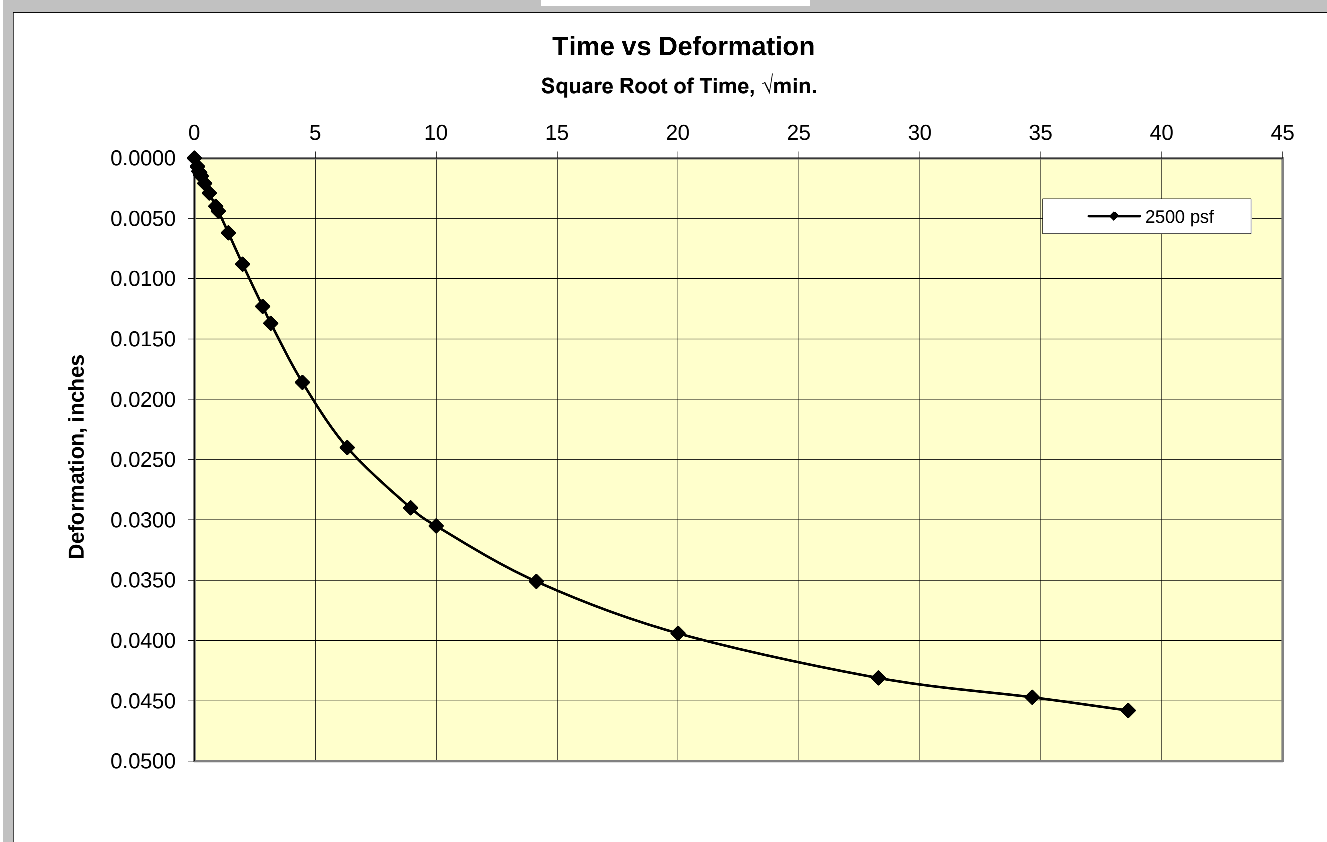


Cooper Testing Labs, Inc.

Load 14	2500 PSF	AUS-B-03-12.5-14.5	(13.9 ft)

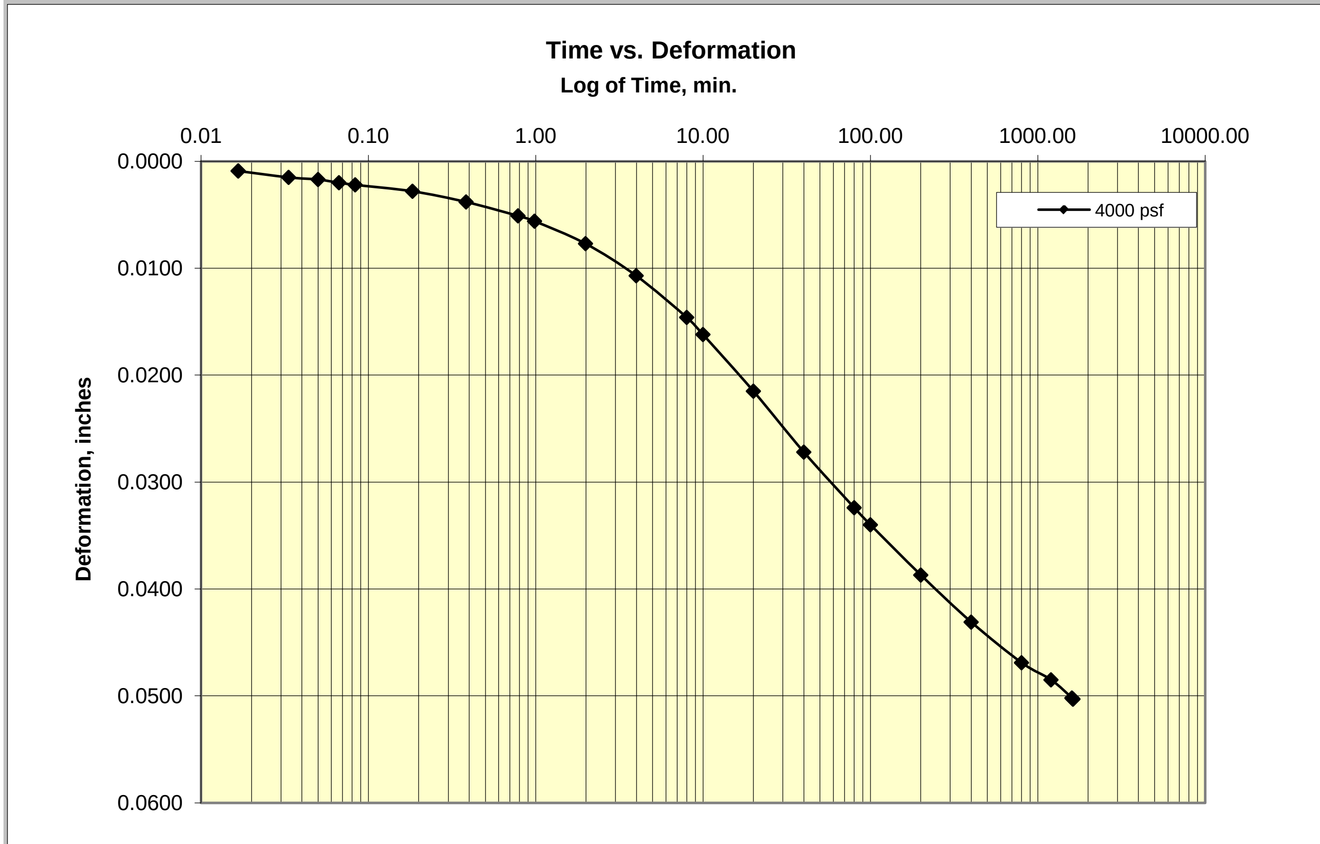


2500 PSF

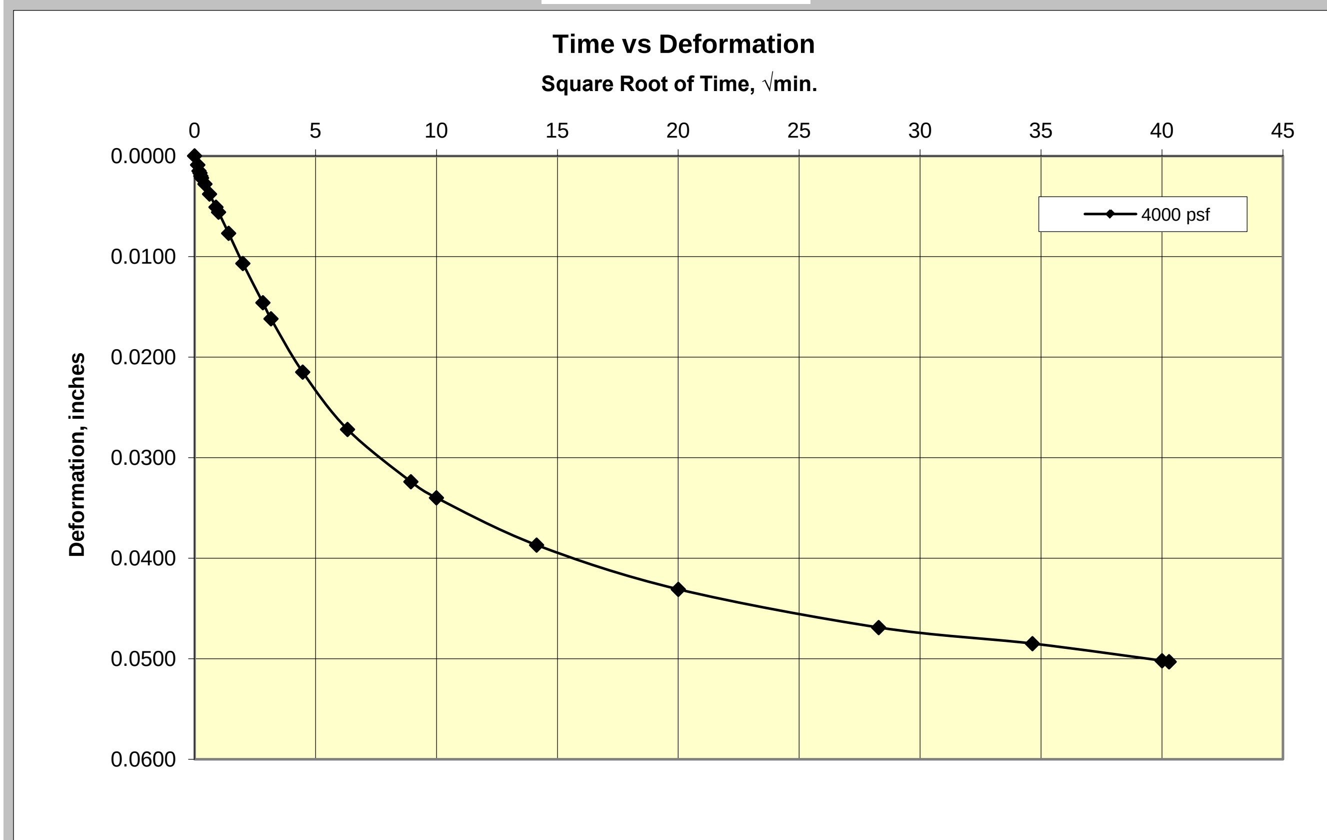


Cooper Testing Labs, Inc.

Load 15 | 4000 PSF | AUS-B-03-12.5-14.5 | (13.9 ft)

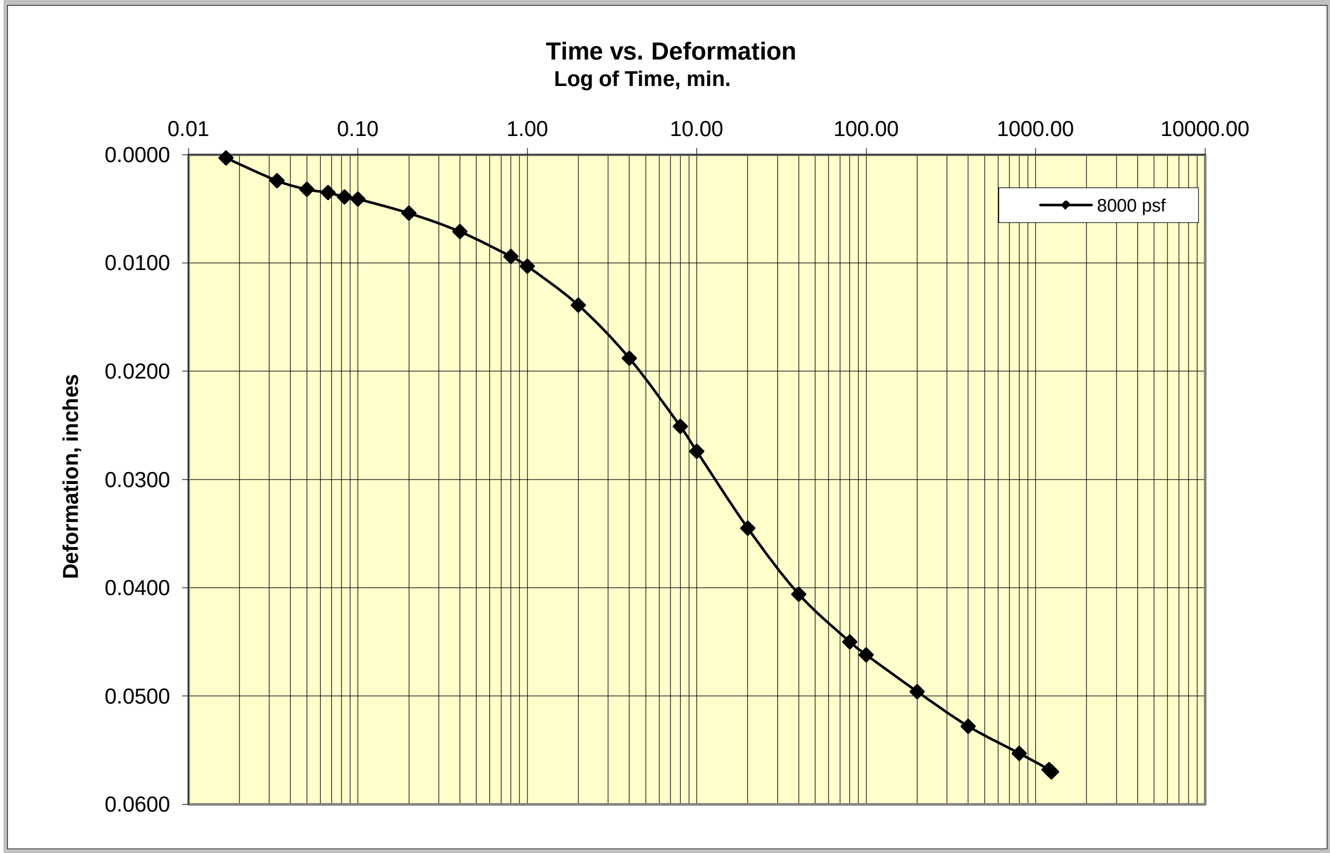


4000 PSF

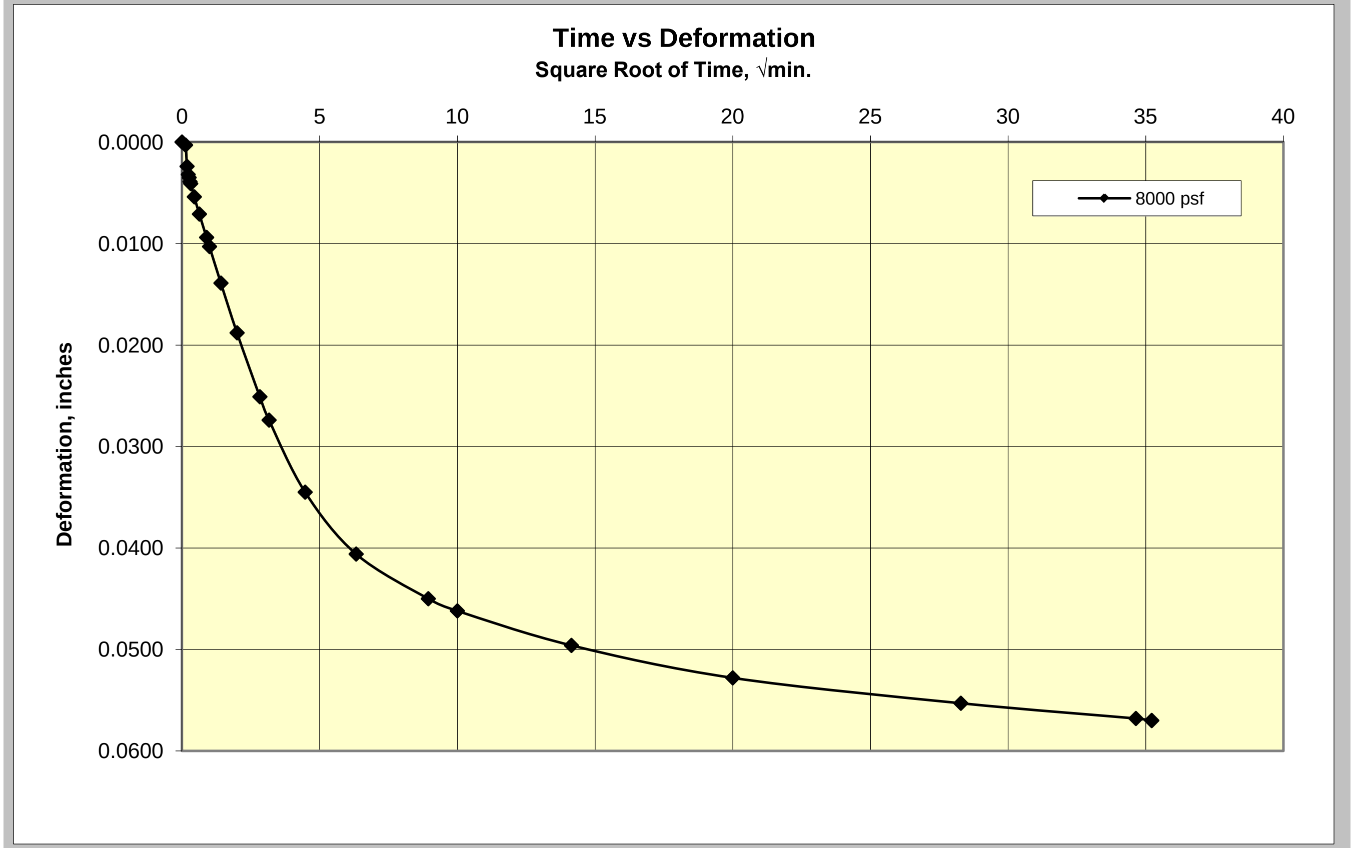


Cooper Testing Labs, Inc.

Load 16	8000 PSF	AUS-B-03-12.5-14.5	(13.9 ft)



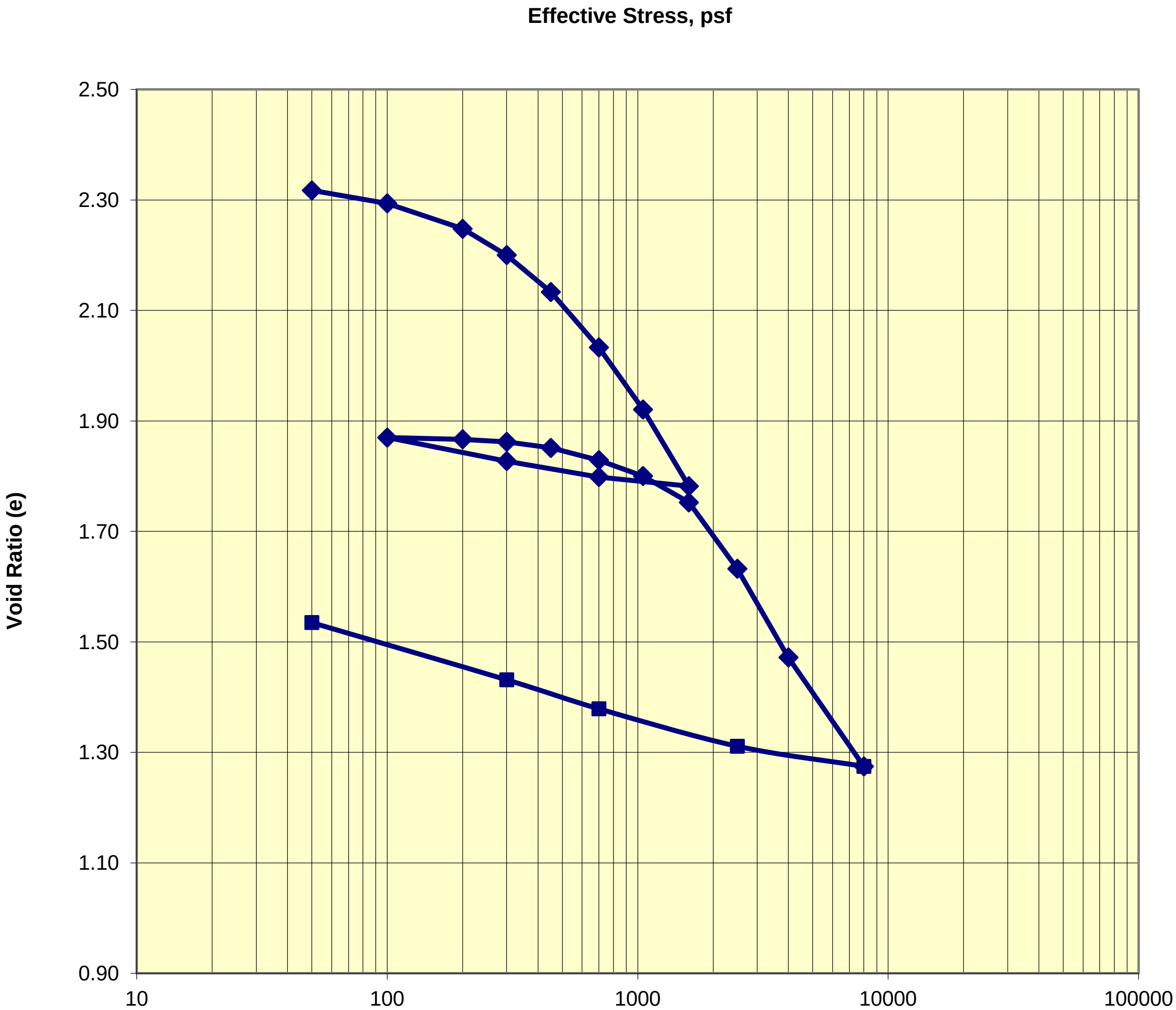
8000 PSF



Consolidation Test

ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-03	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-04	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	21-23(Tip-5)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY (Bay Mud)		(22.6 ft)	**Date:**	5/9/2012

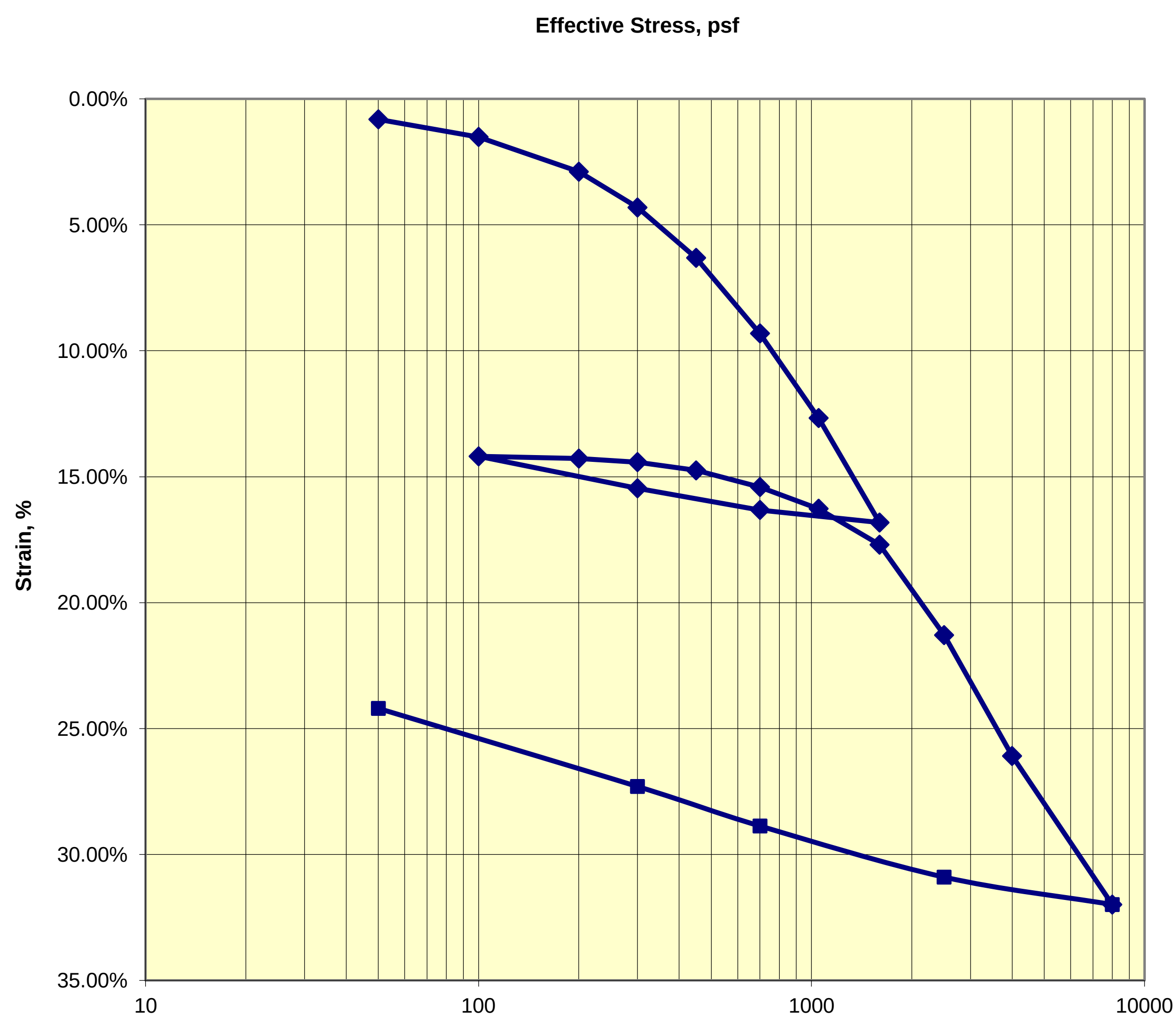


Ass. Gs = 2.7	**Initial**	**Final**
Moisture %:	85.4	56.8
Dry Density, pcf:	50.4	66.6
Void Ratio:	2.342	1.532
% Saturation:	98.5	100

Remarks:

Consolidation Test
ASTM D2435

Job No.:	477-013	**Boring:**	AUS-B-03	**Run By:**	MD
Client:	Arcadis	**Sample:**	ST-04	**Reduced:**	PJ
Project:	Yosemite Slough	**Depth, ft.:**	21-23(Tip-5)	**Checked:**	PJ/DC
Soil Type:	Gray Fat CLAY (Bay Mud)		(22.6 ft)	**Date:**	5/9/2012

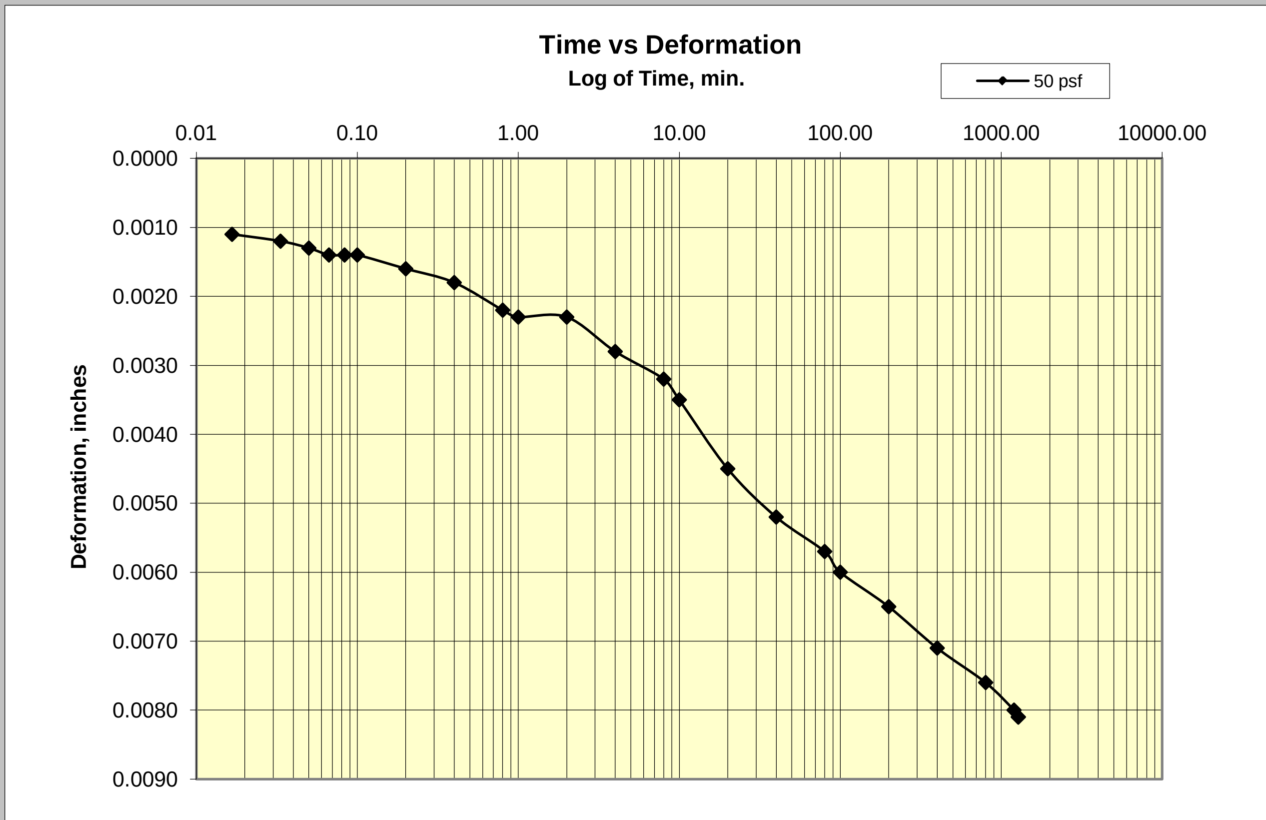


Ass. Gs = 2.7	**Initial**	**Final**
Moisture %:	85.4	56.8
Dry Density, pcf:	50.4	66.6
Void Ratio:	2.342	1.532
% Saturation:	98.5	100

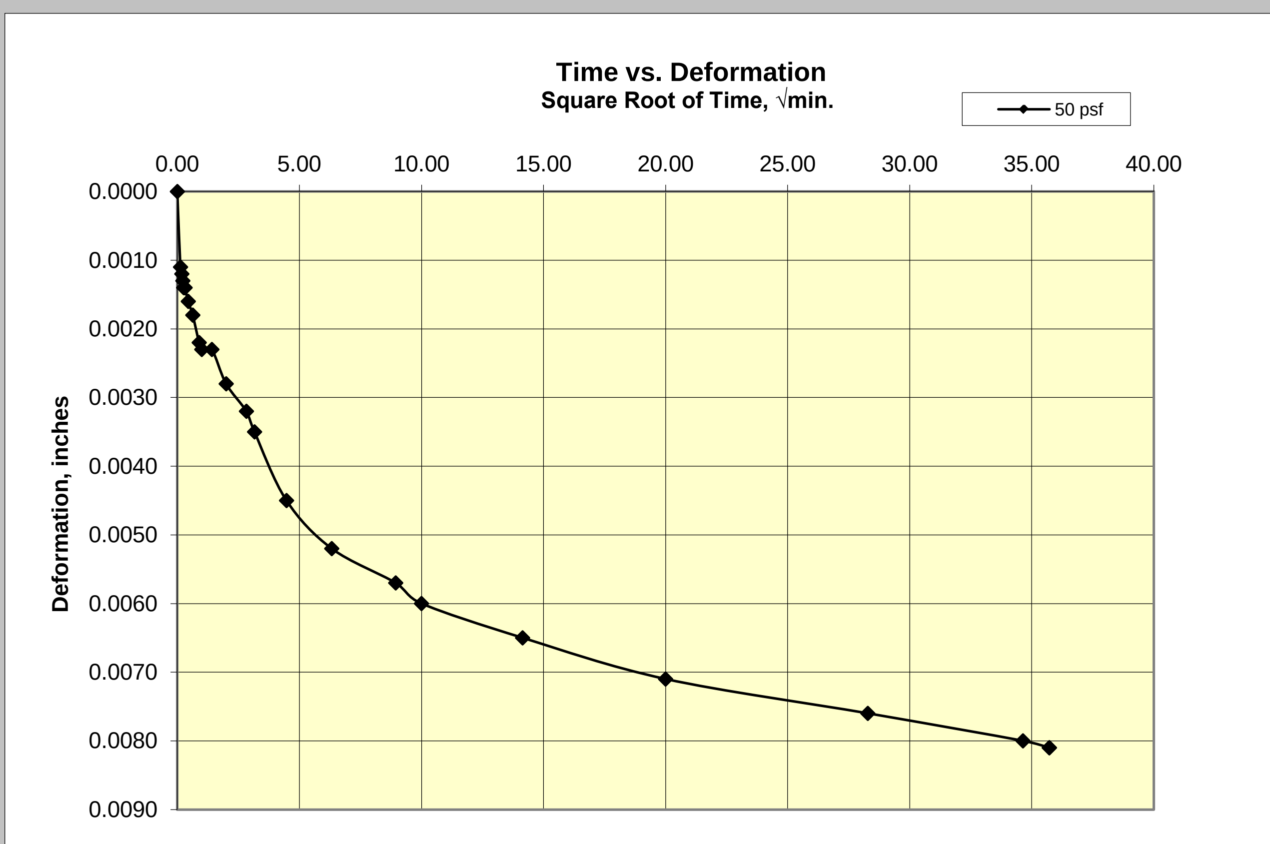
Remarks:

Cooper Testing Labs, Inc.

Load 1 | 50 PSF | AUS-B-03-21.0-23.0 | (22.6 ft)

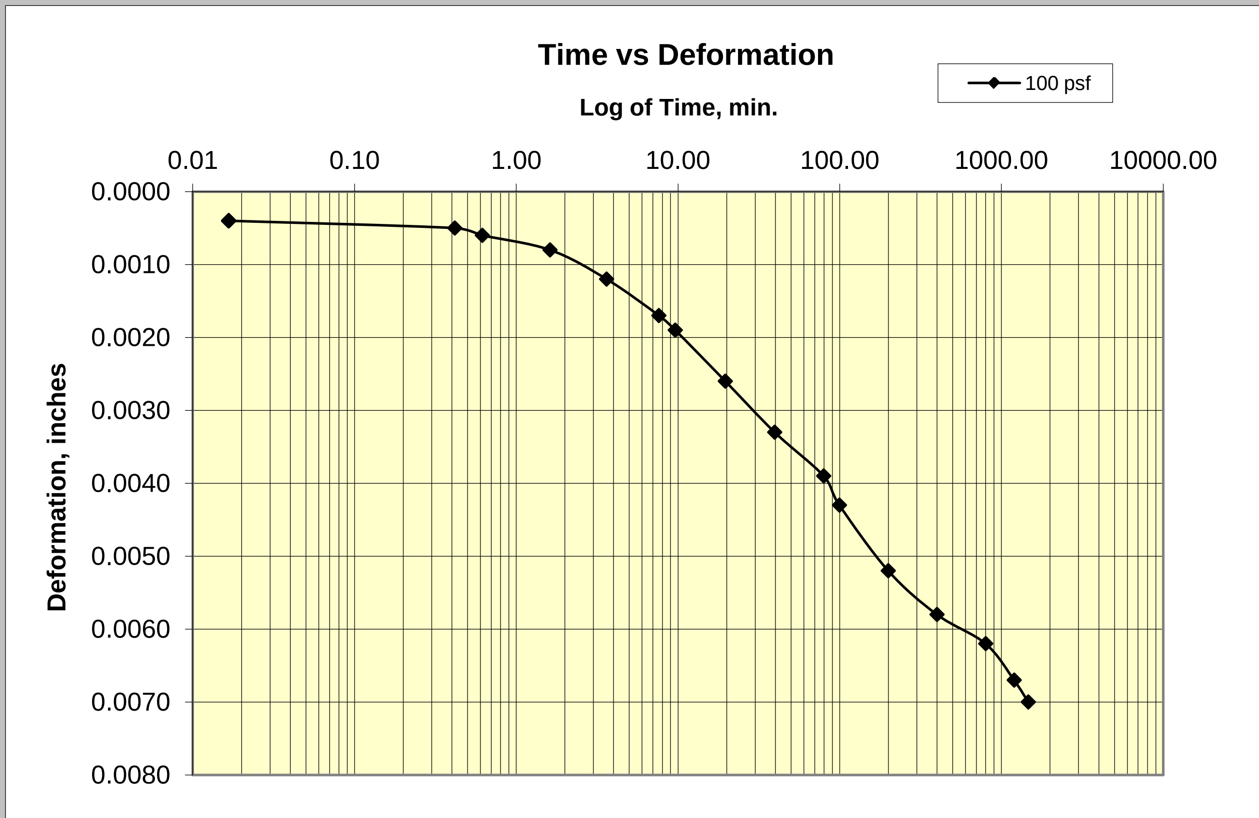


50 PSF

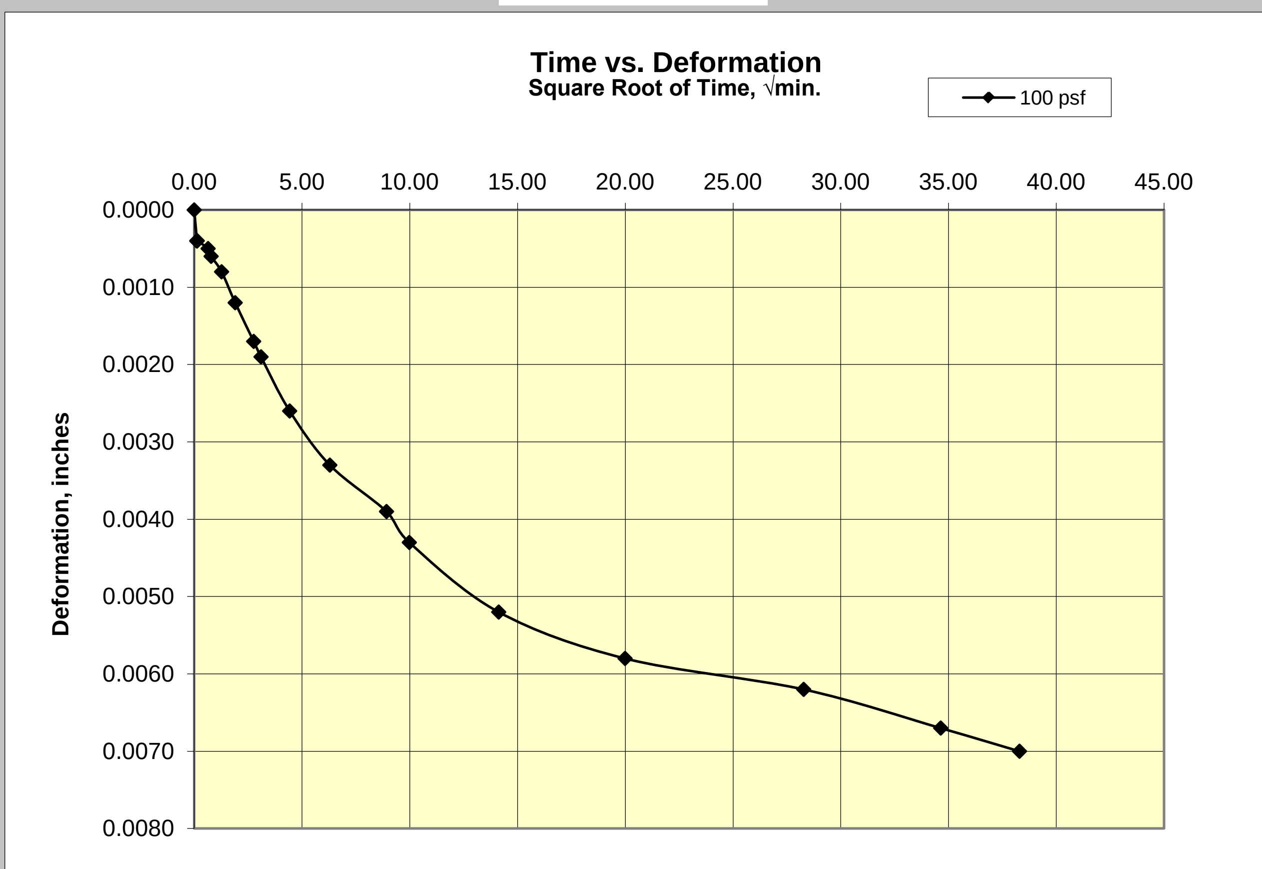


Cooper Testing Labs, Inc.

Load 2	100 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

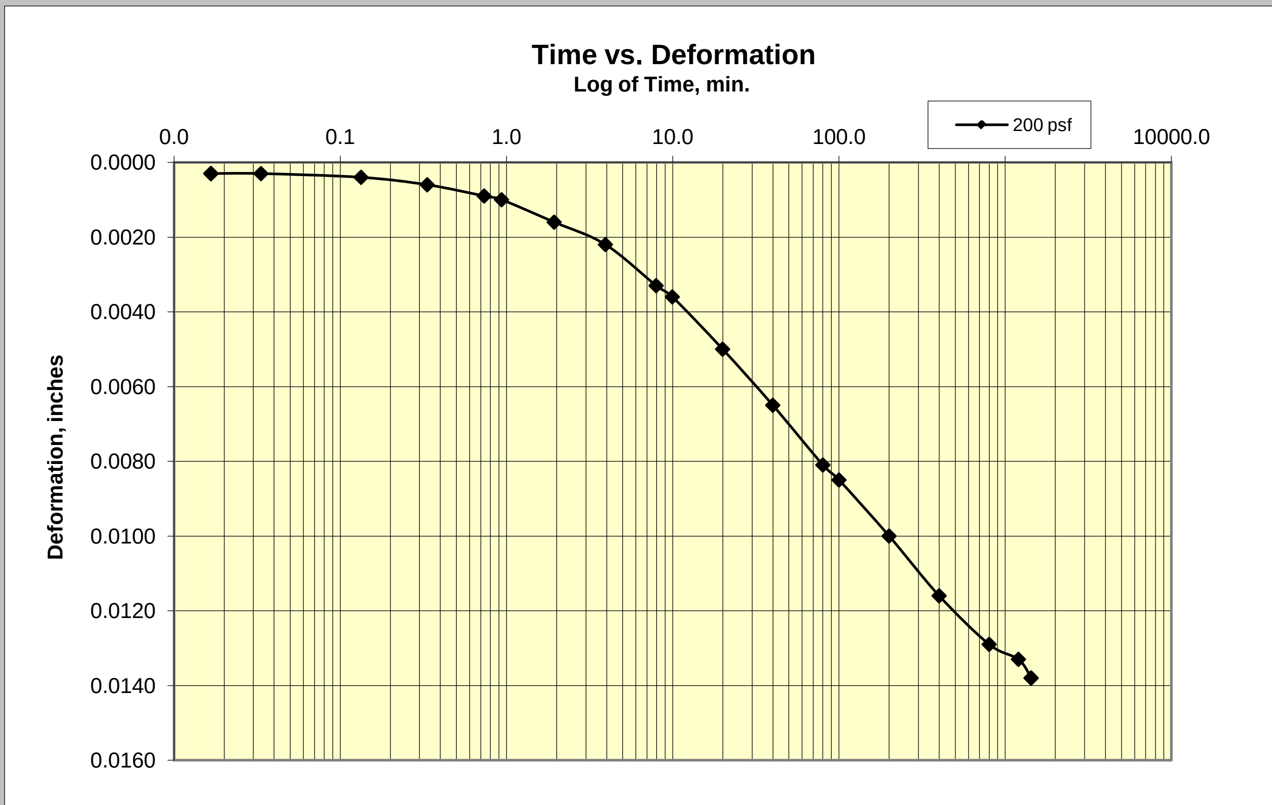


100 PSF

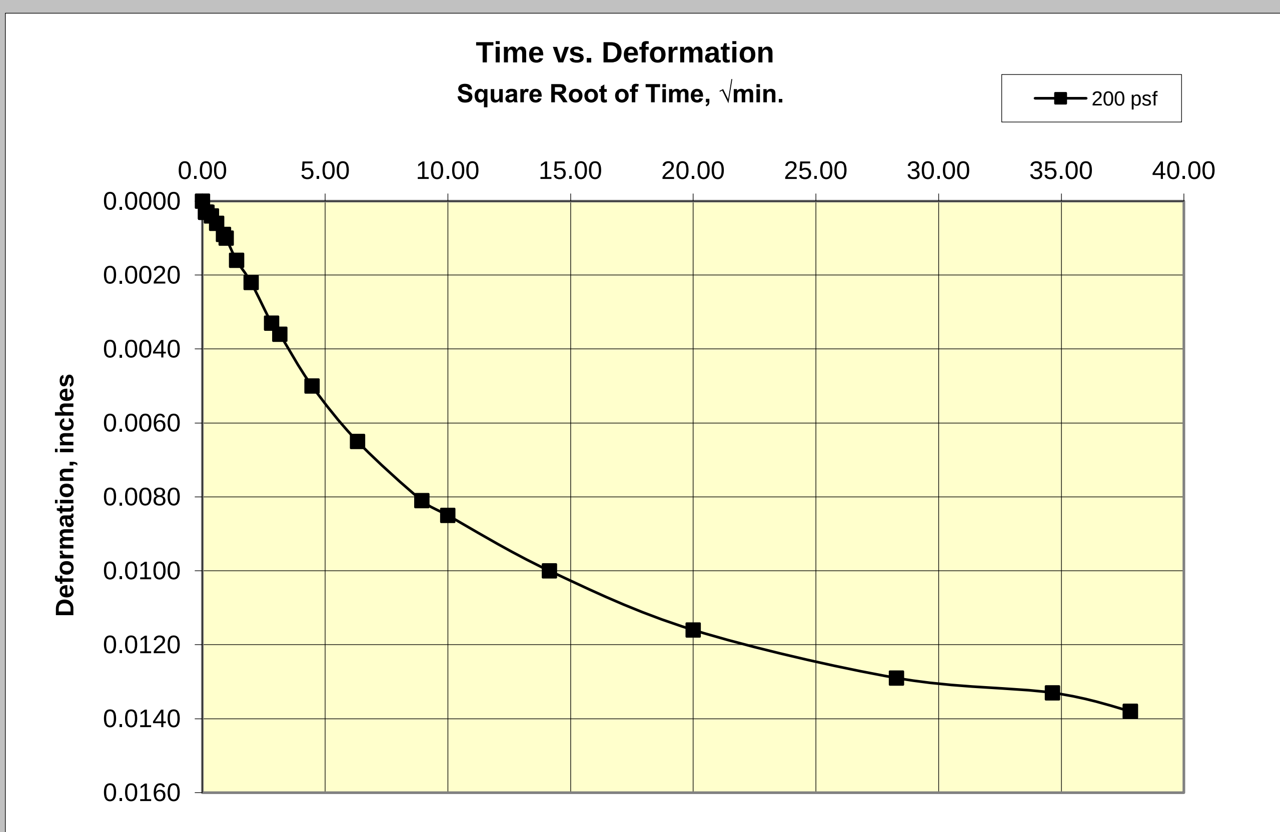


Cooper Testing Labs, Inc.

Load 3 | 200 PSF | AUS-B-03-21.0-23.0 | (22.6 ft)

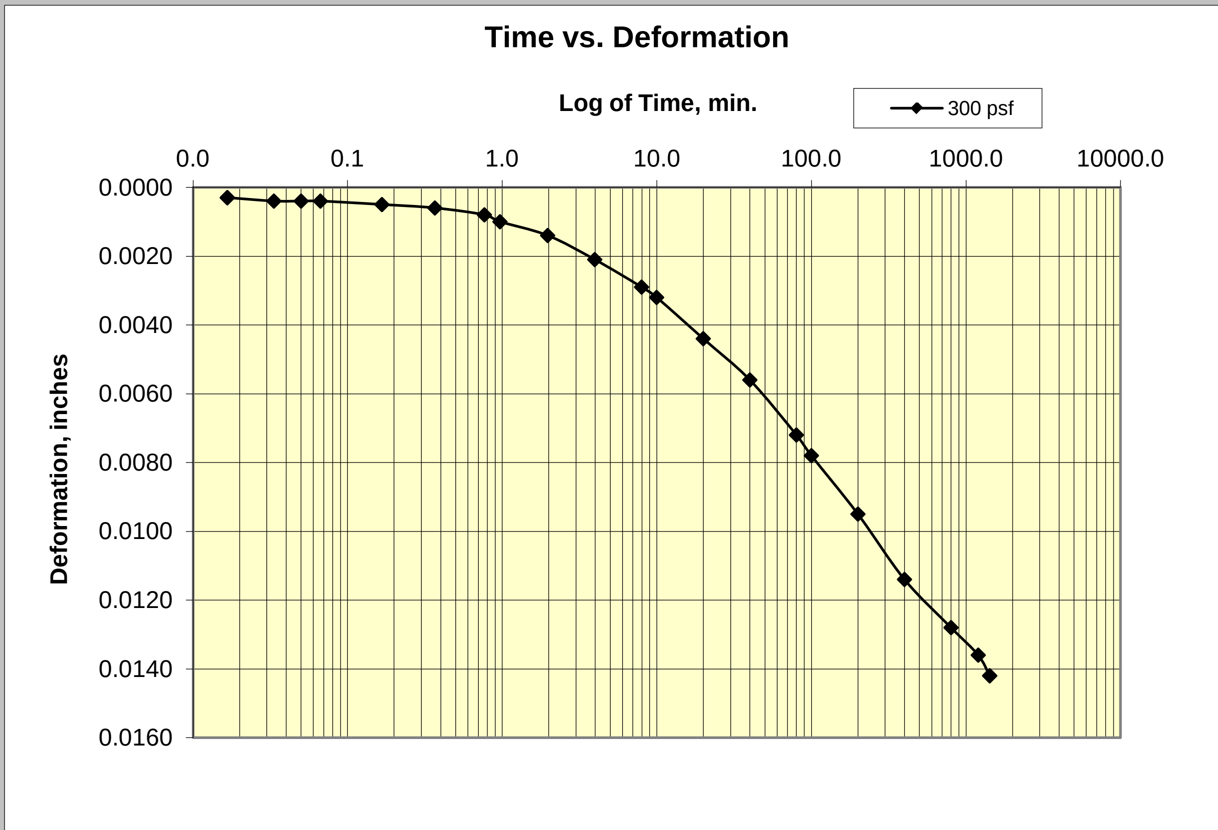


200 PSF

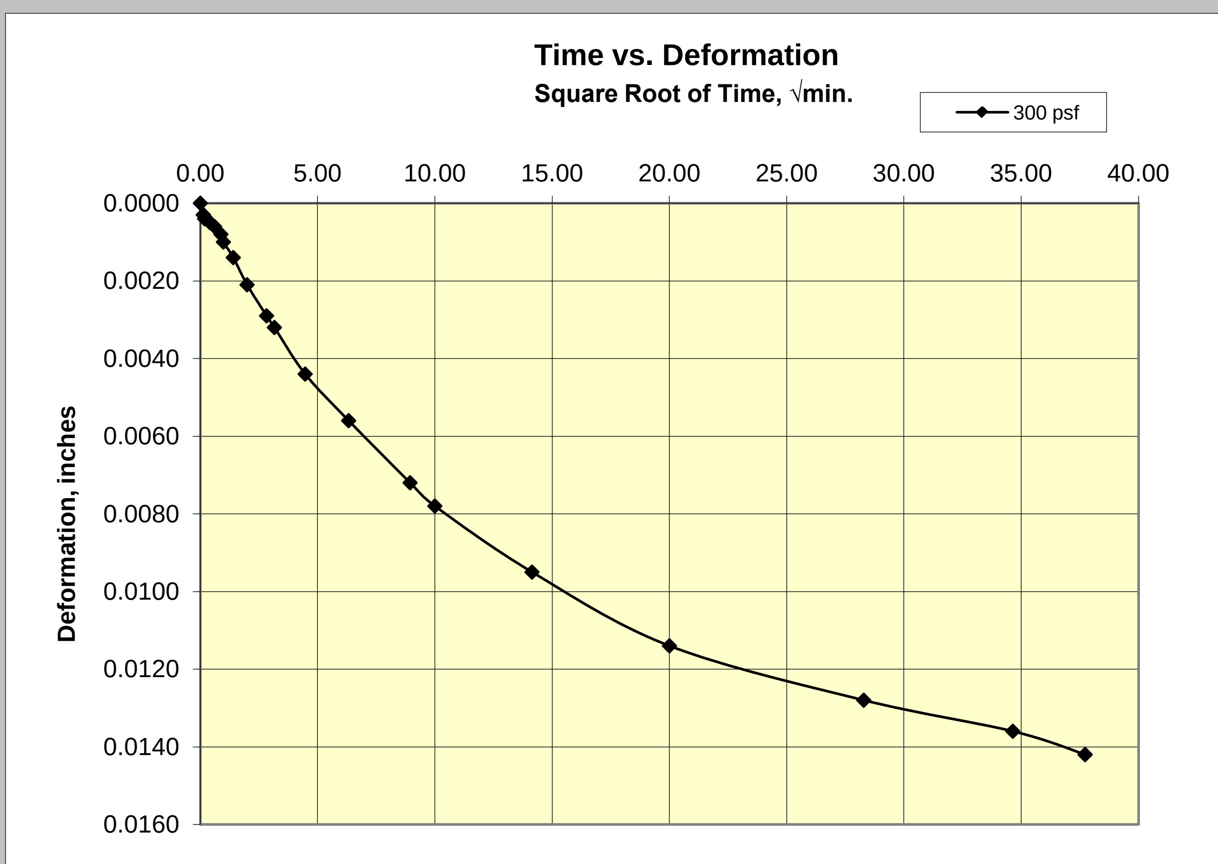


Cooper Testing Labs, Inc.

Load 4	300 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

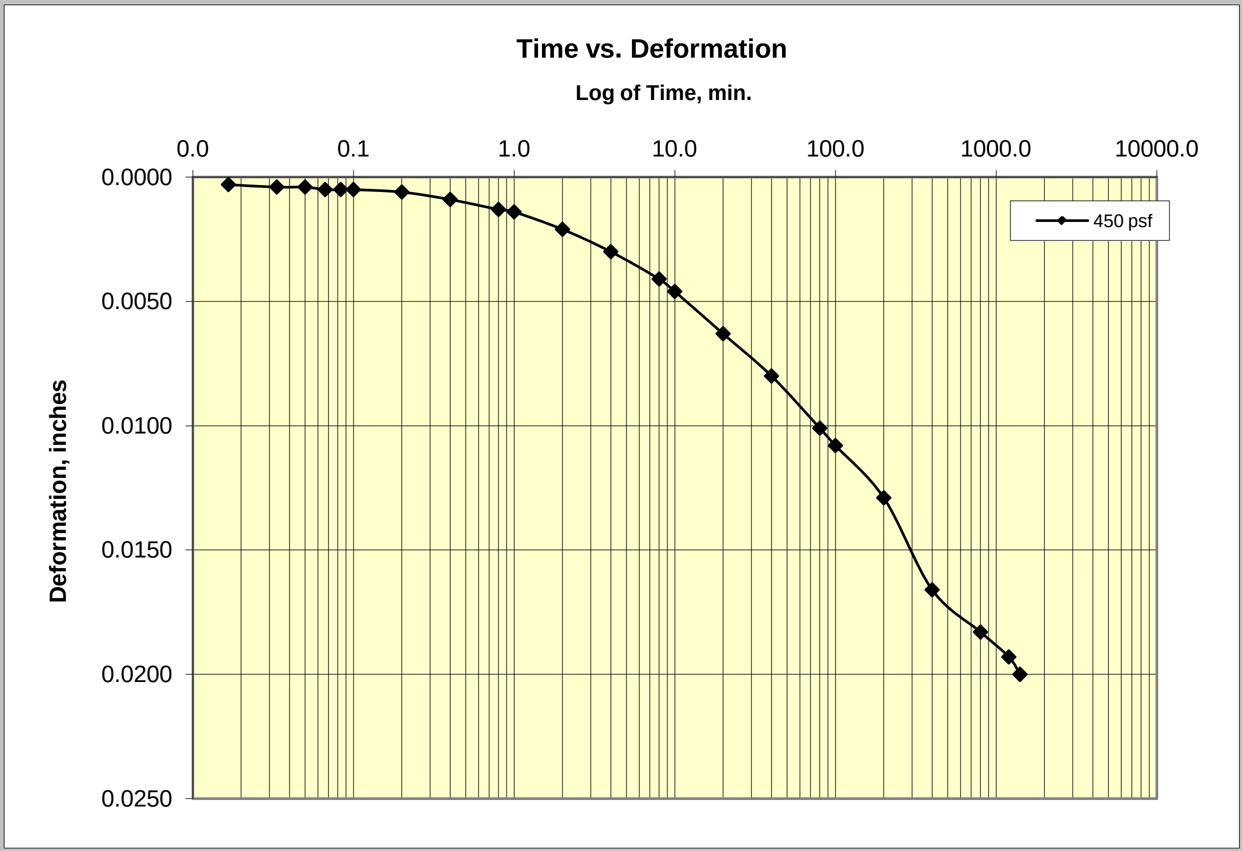


300 PSF

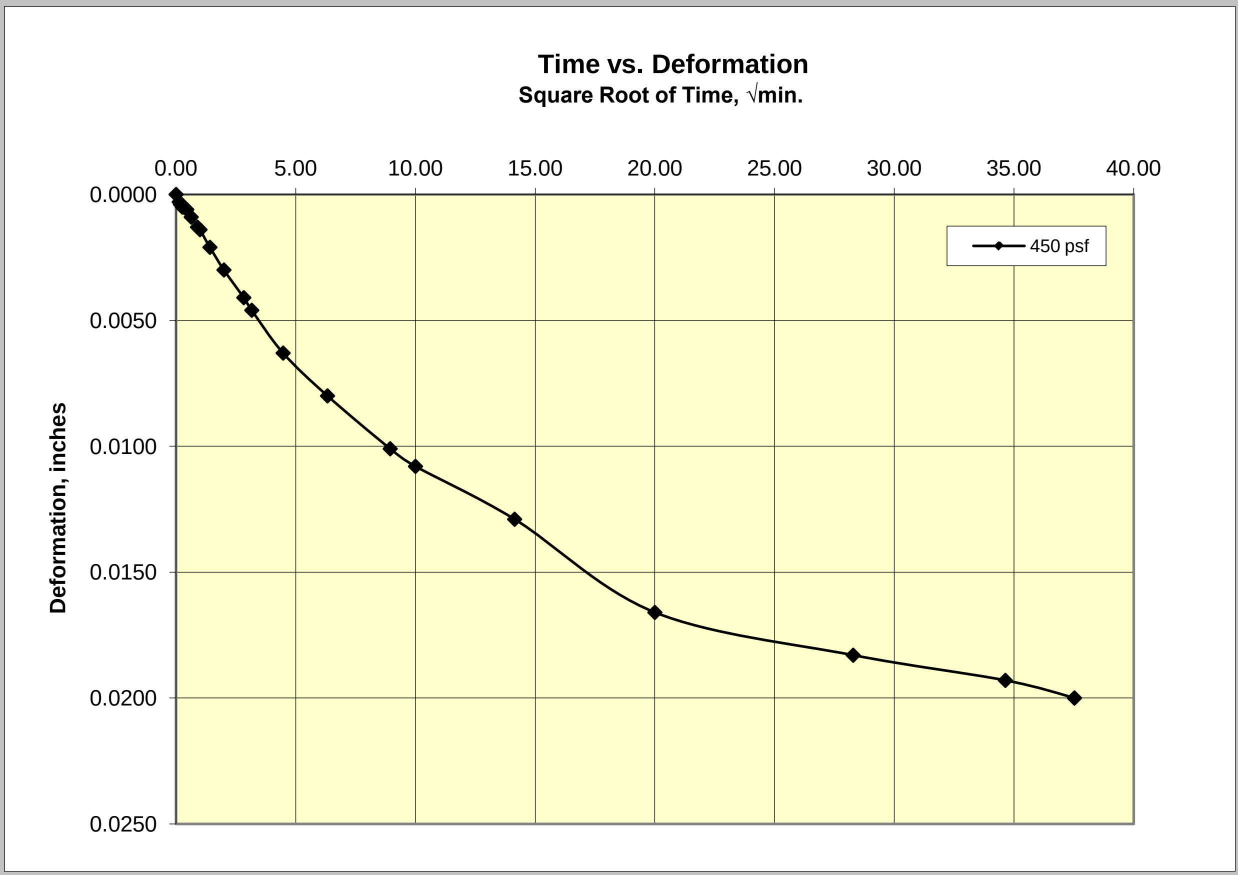


Cooper Testing Labs, Inc.

Load 5	450 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

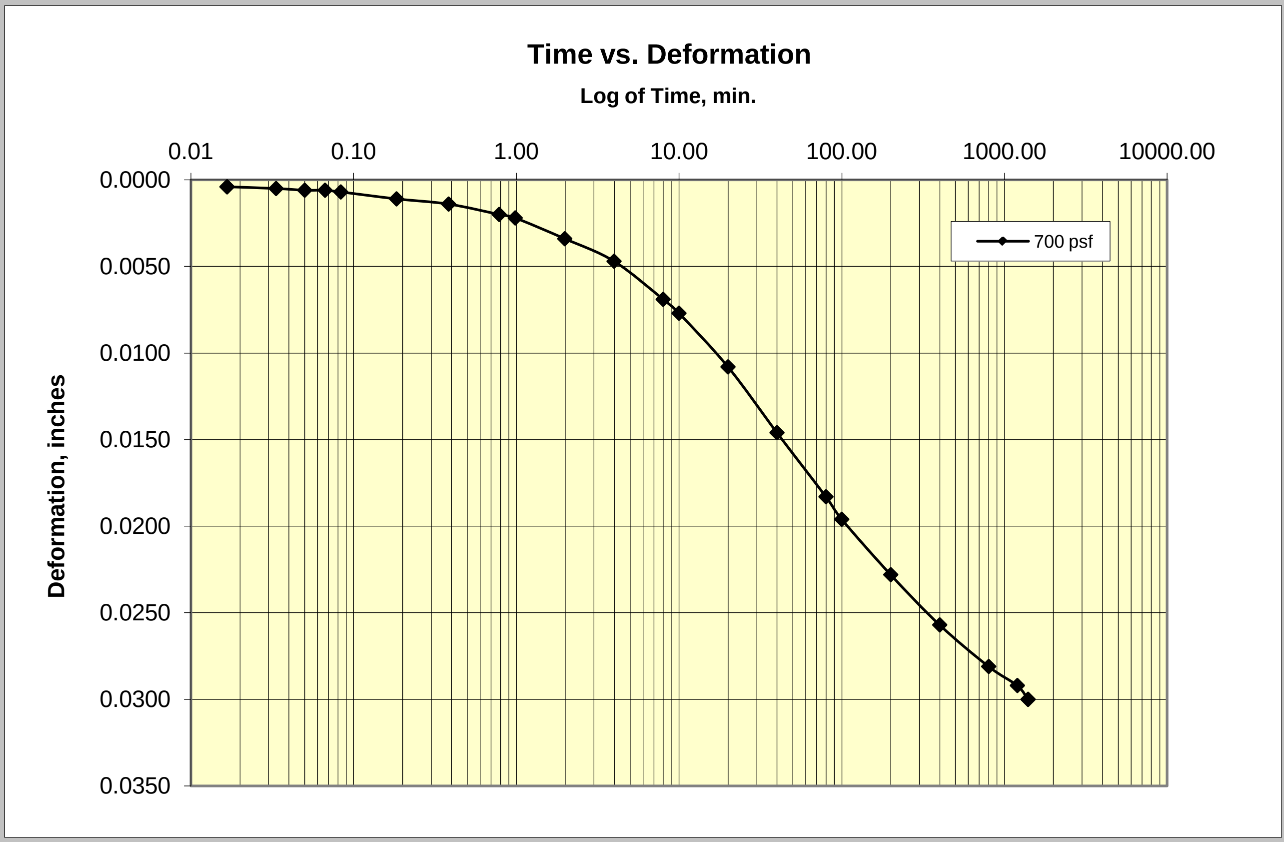


450 PSF

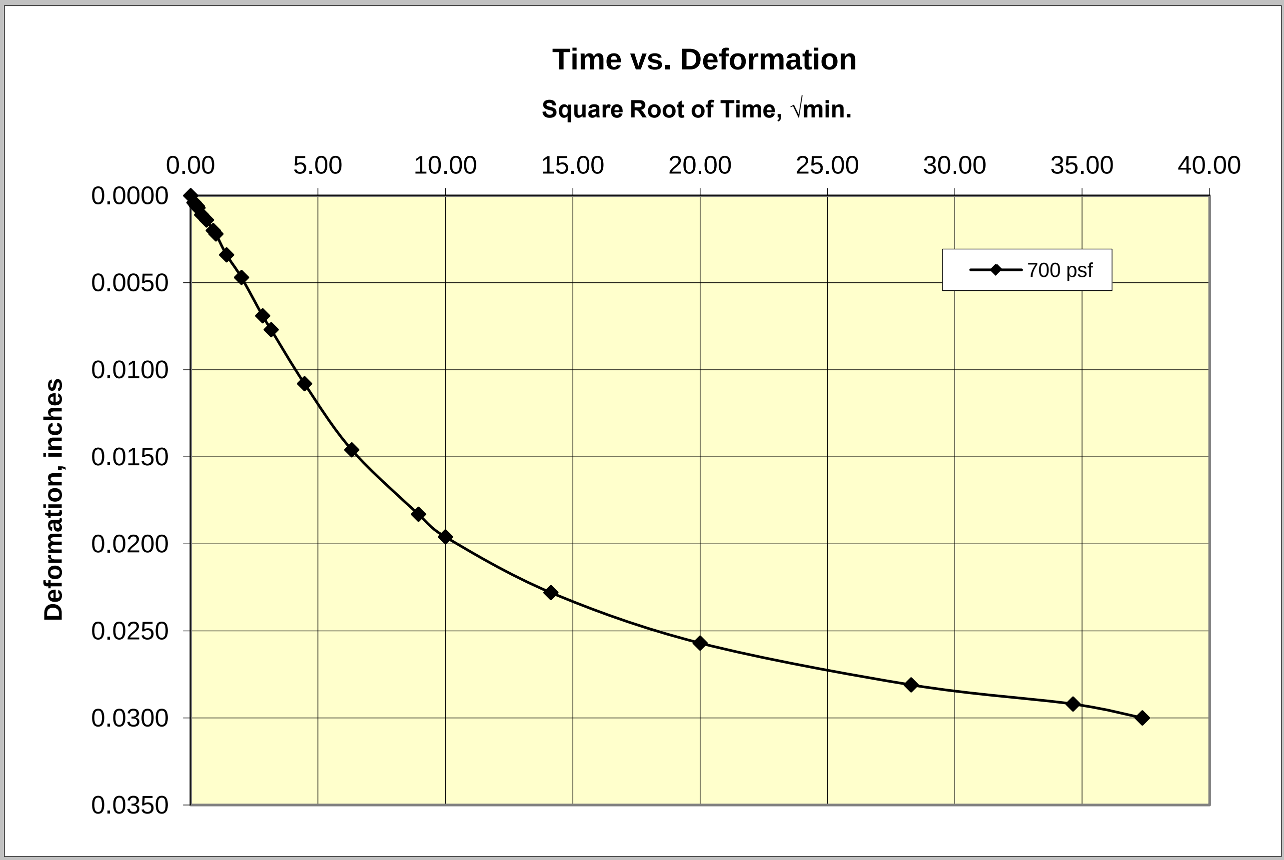


Cooper Testing Labs, Inc.

Load 6	700 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

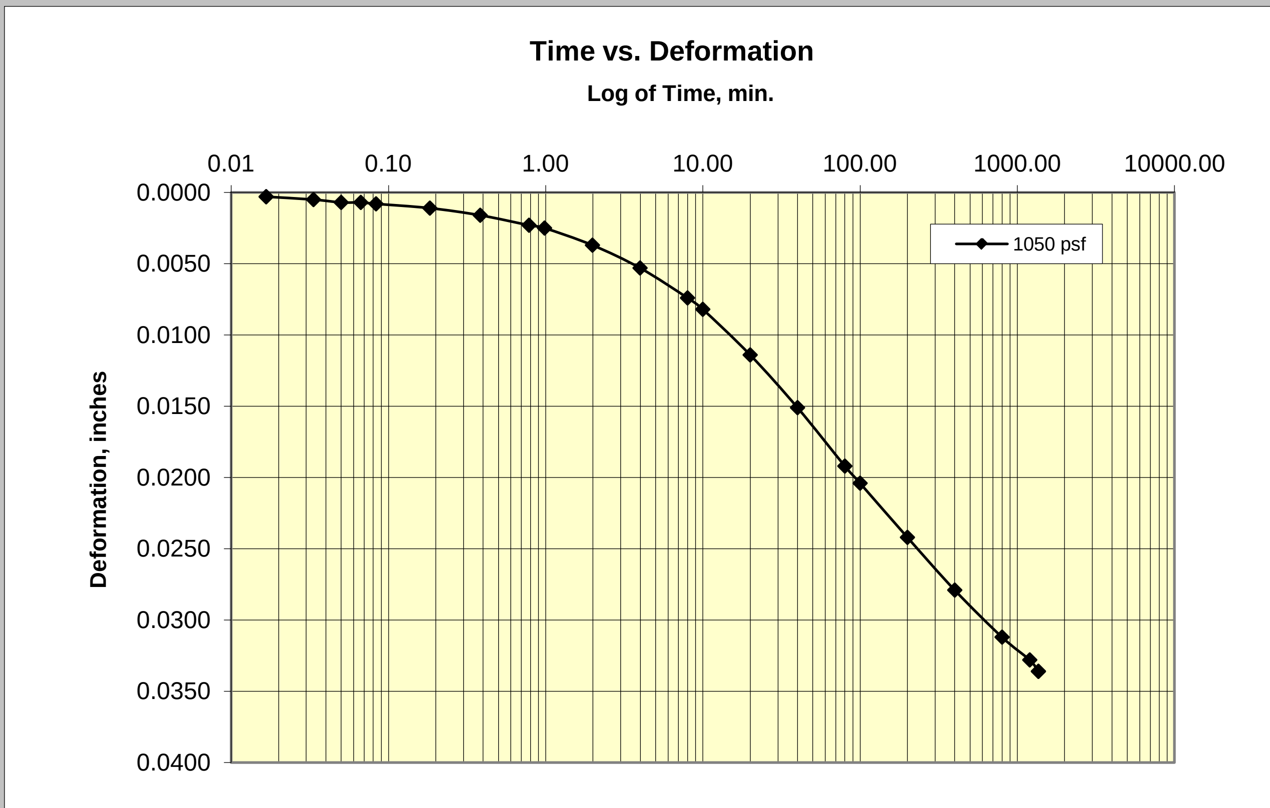


700 PSF

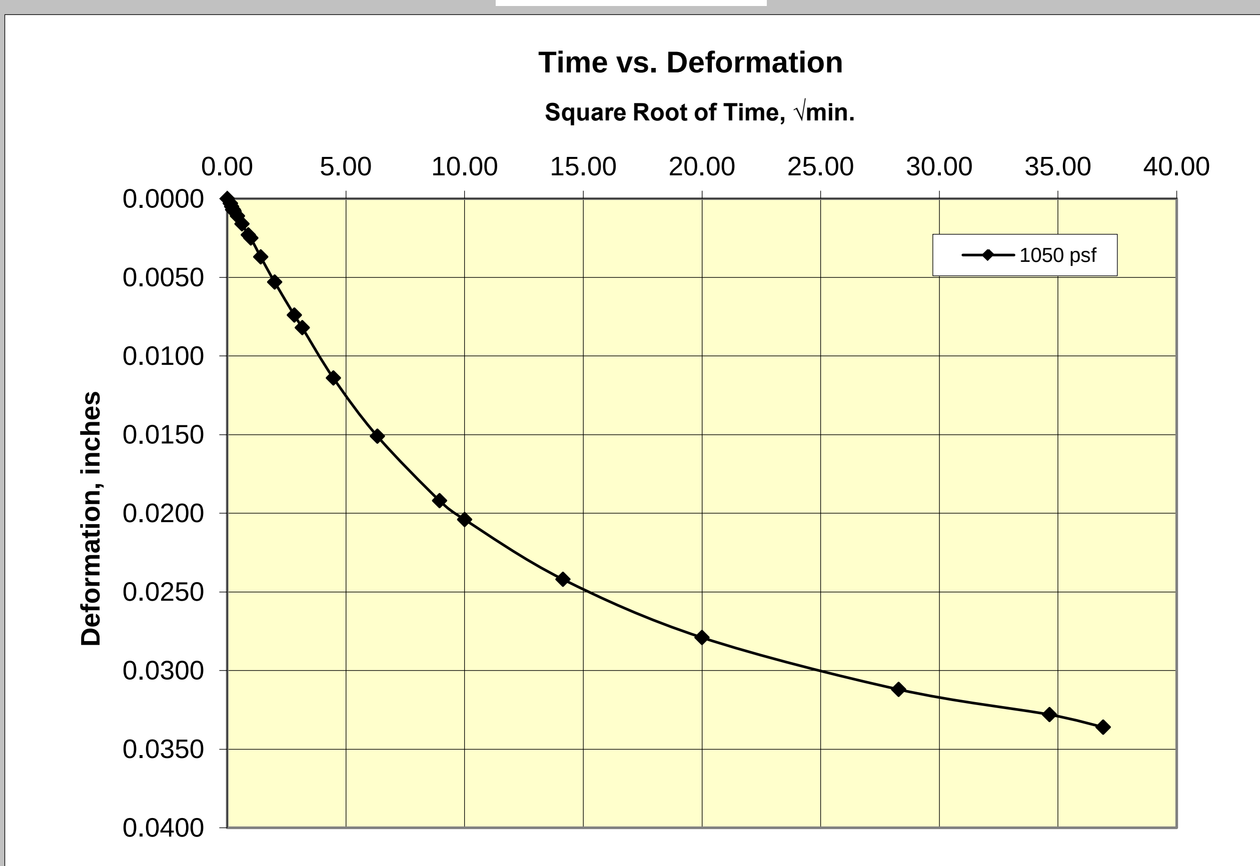


Cooper Testing Labs, Inc.

Load 7 | 1050 PSF | AUS-B-03-21.0-23.0 | (22.6 ft)

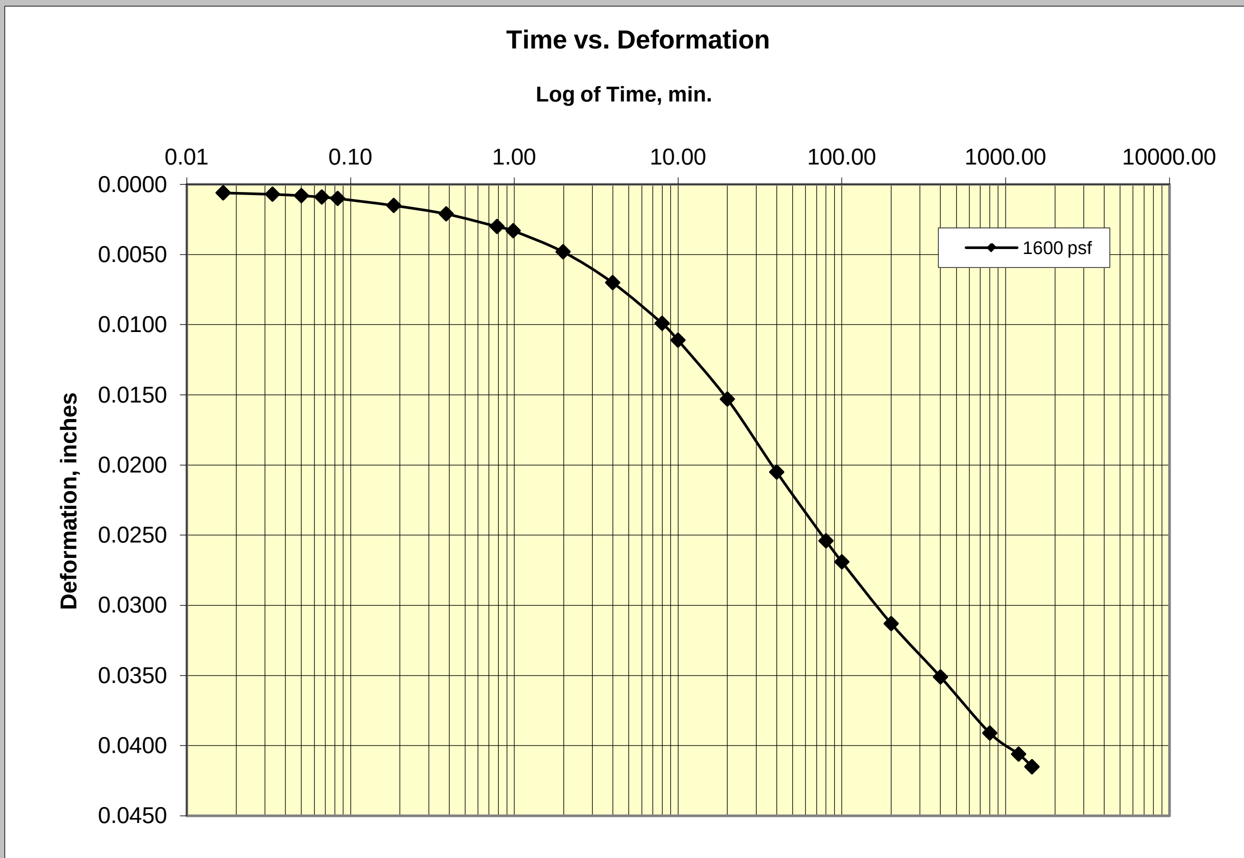


1050 PSF

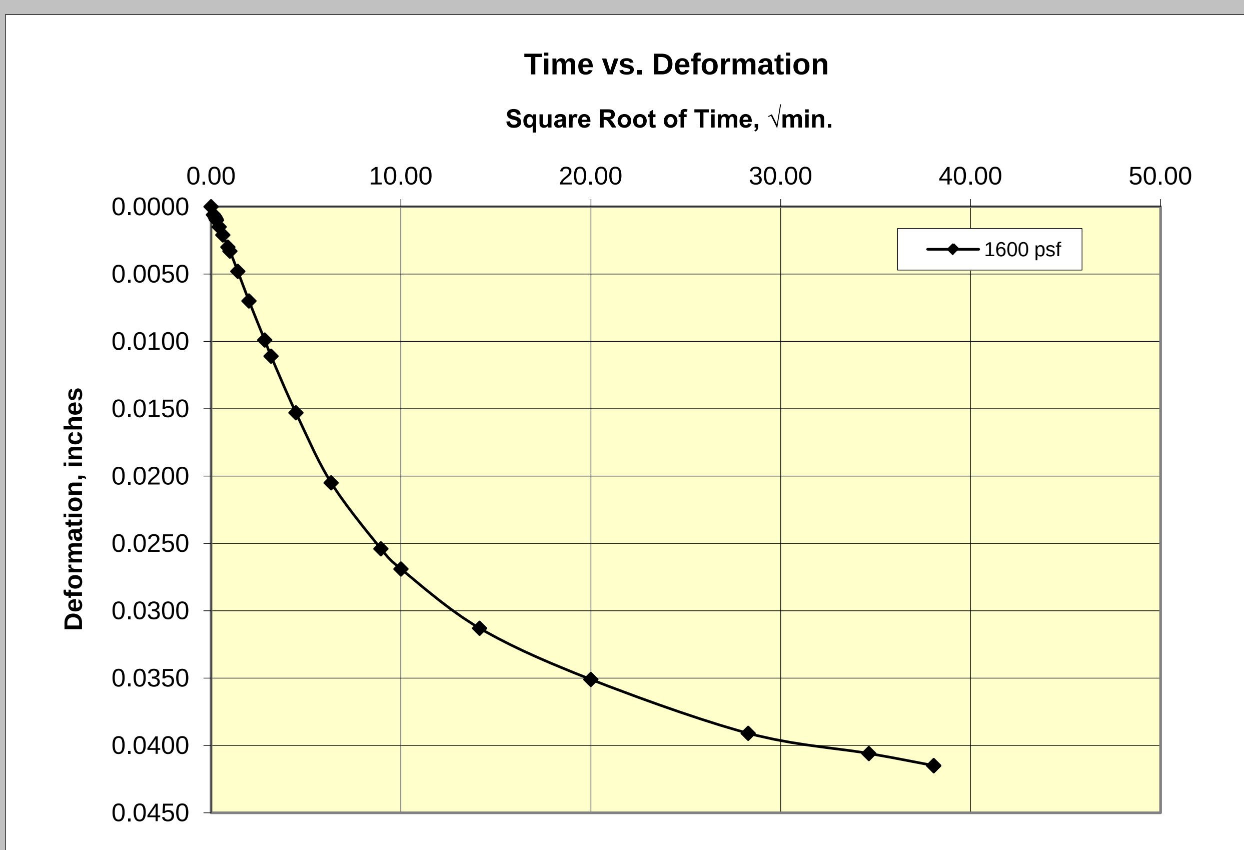


Cooper Testing Labs, Inc.

Load 8	1600 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

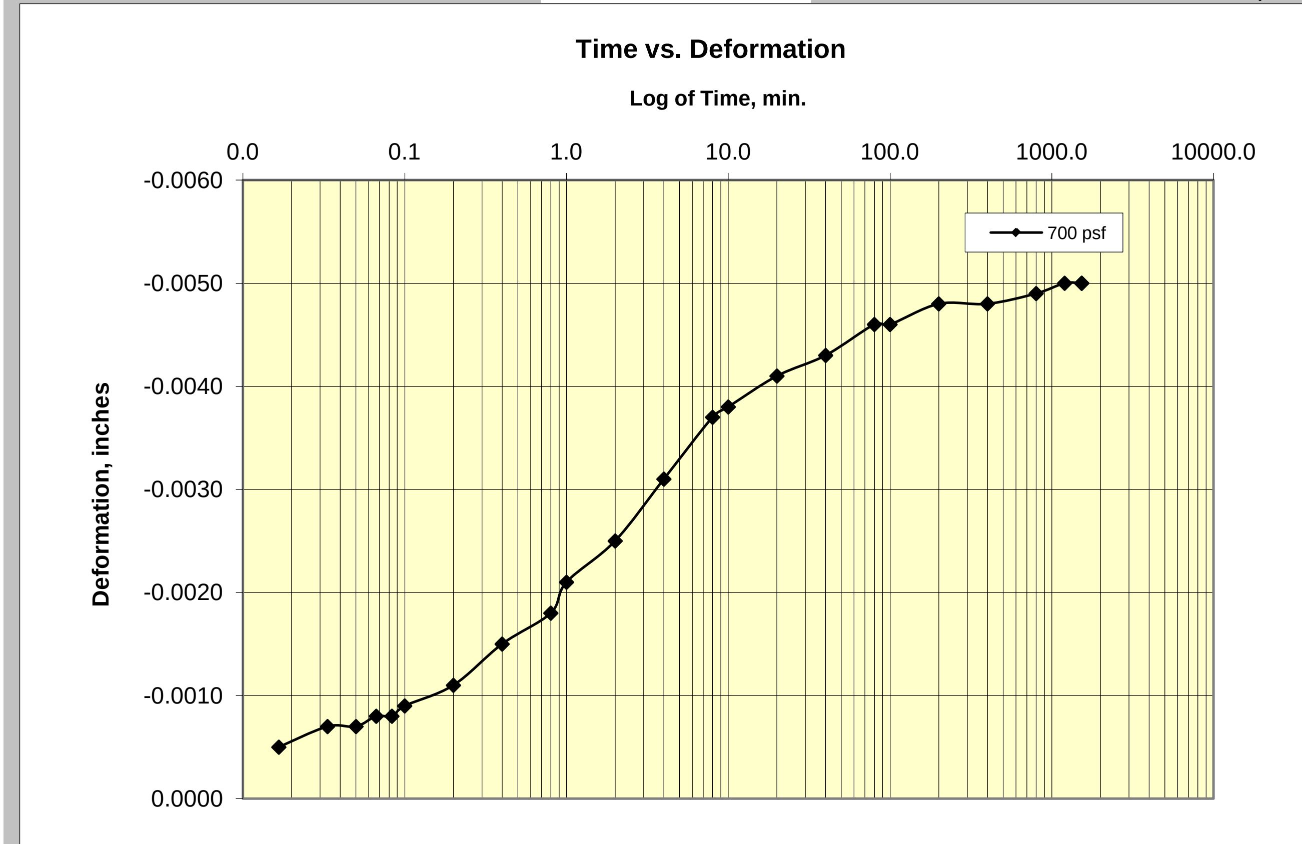


1600 PSF

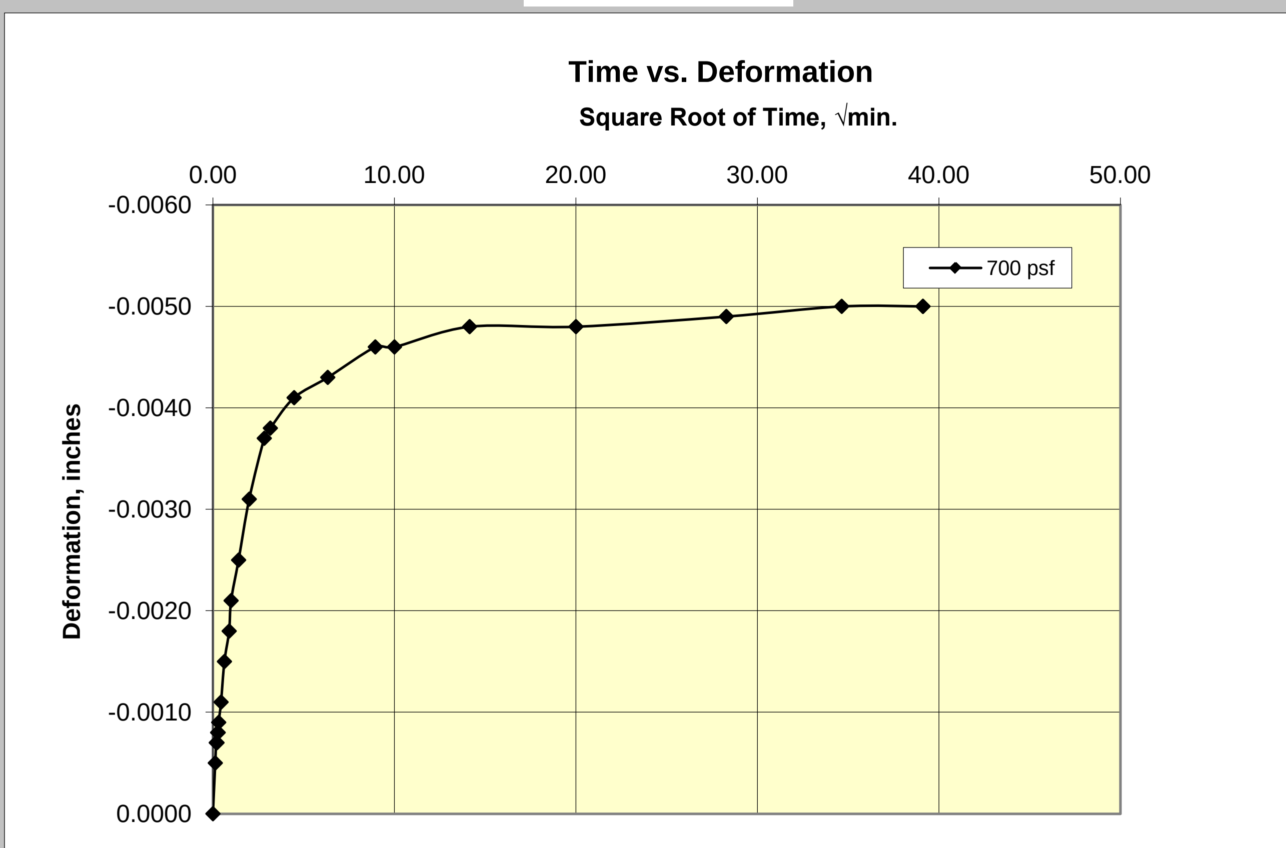


Cooper Testing Labs, Inc.

Load 9	700 PSF	AUS-B-03-21.0-23.0	(22.6 ft)



700 PSF



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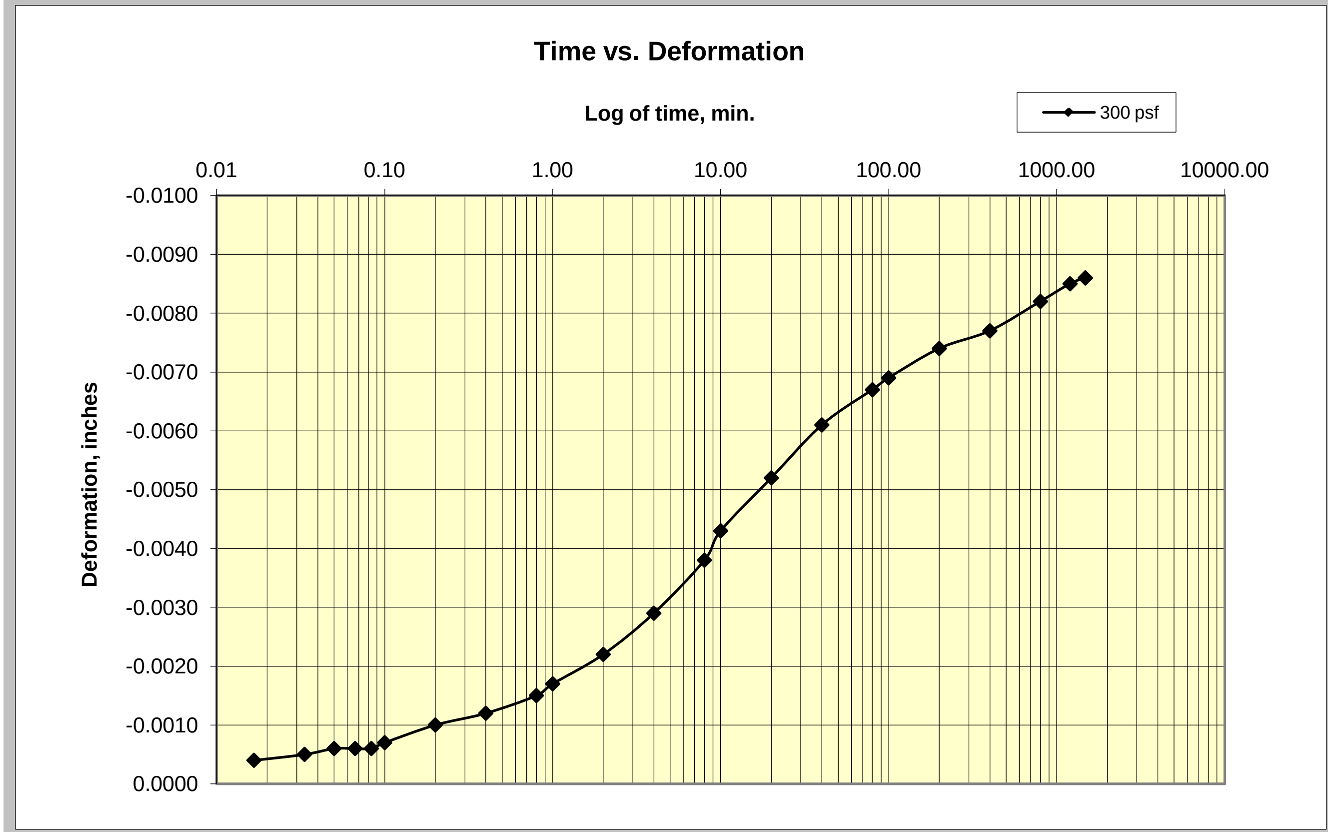
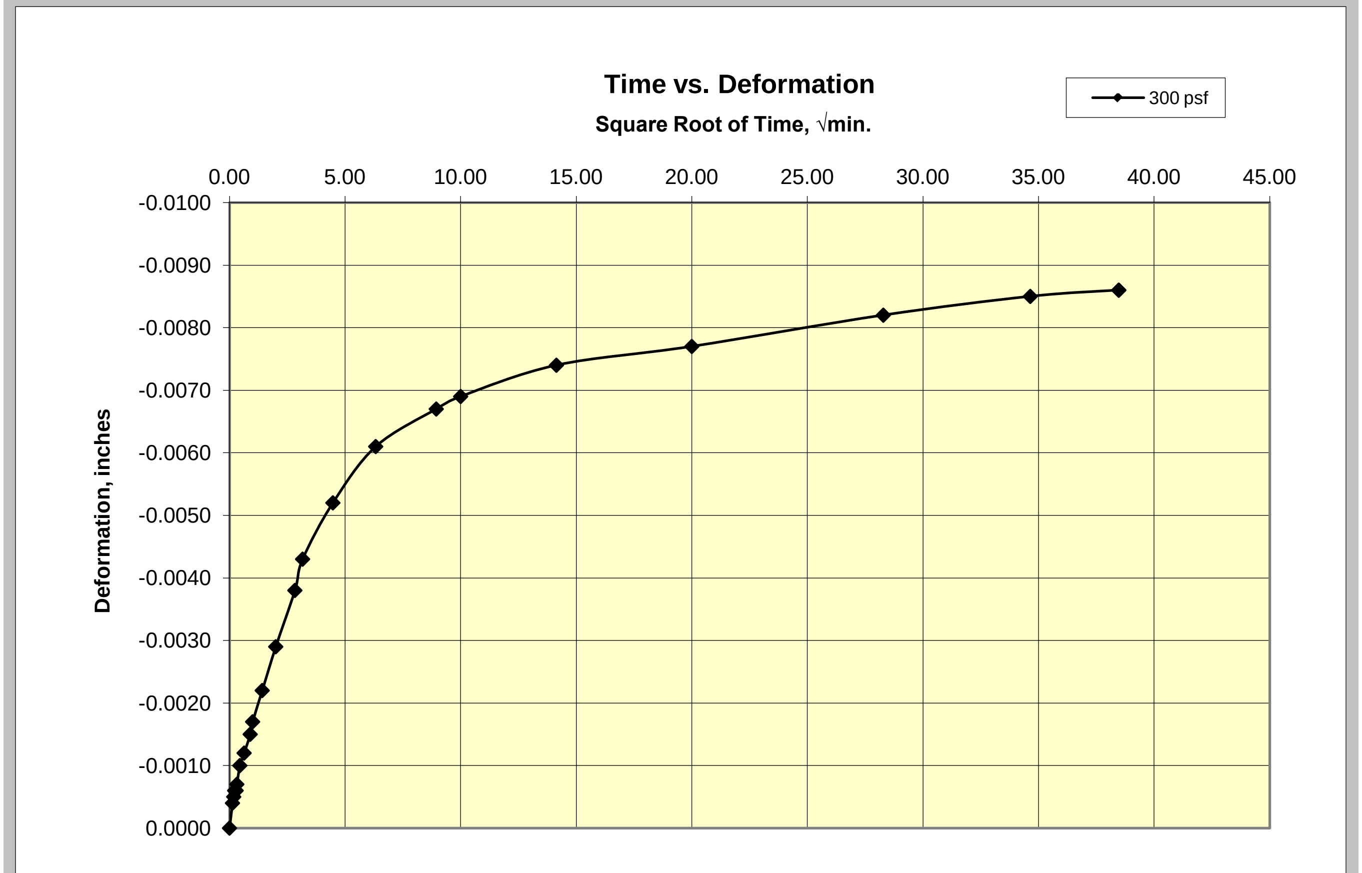
Cooper Testing Labs, Inc.

Load 10	300 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

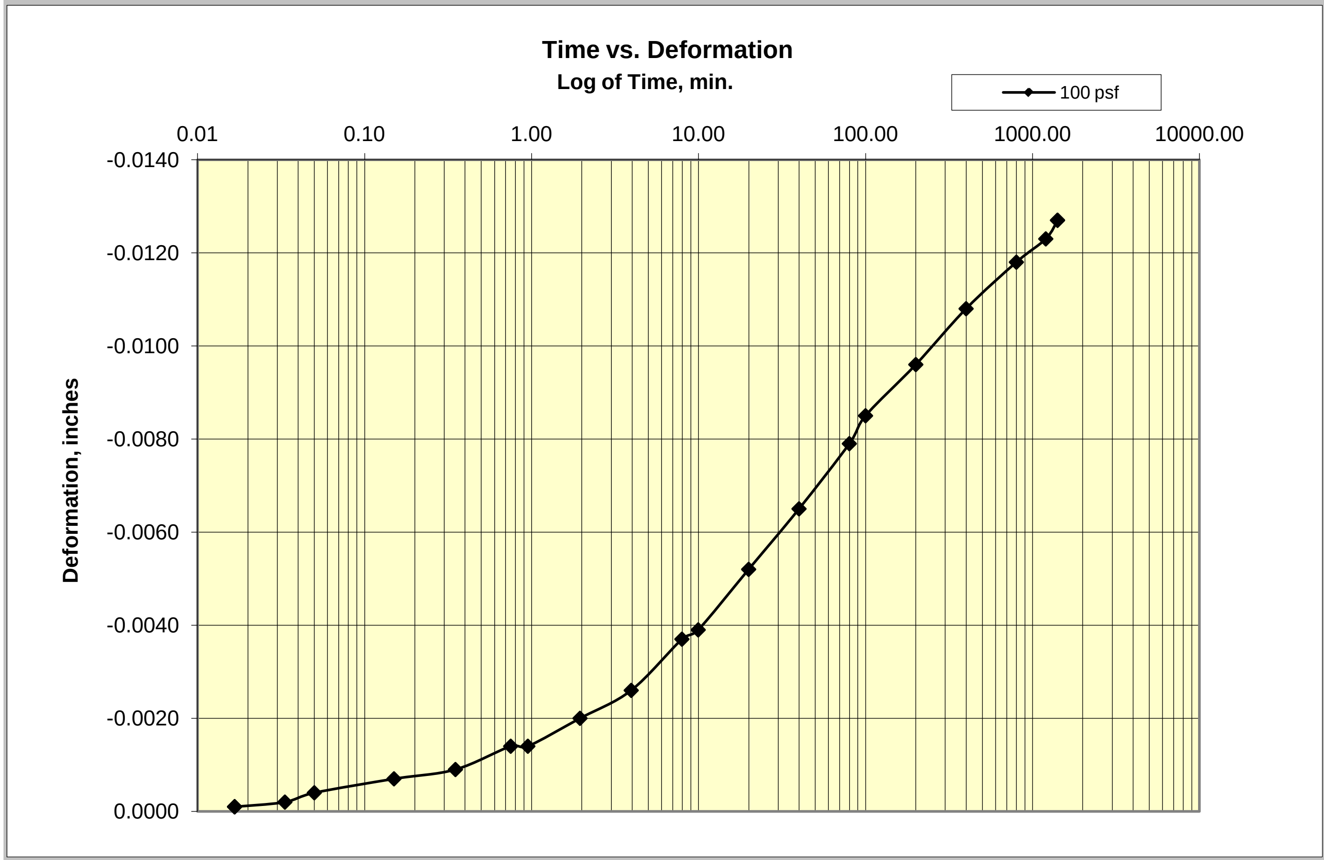


300 PSF

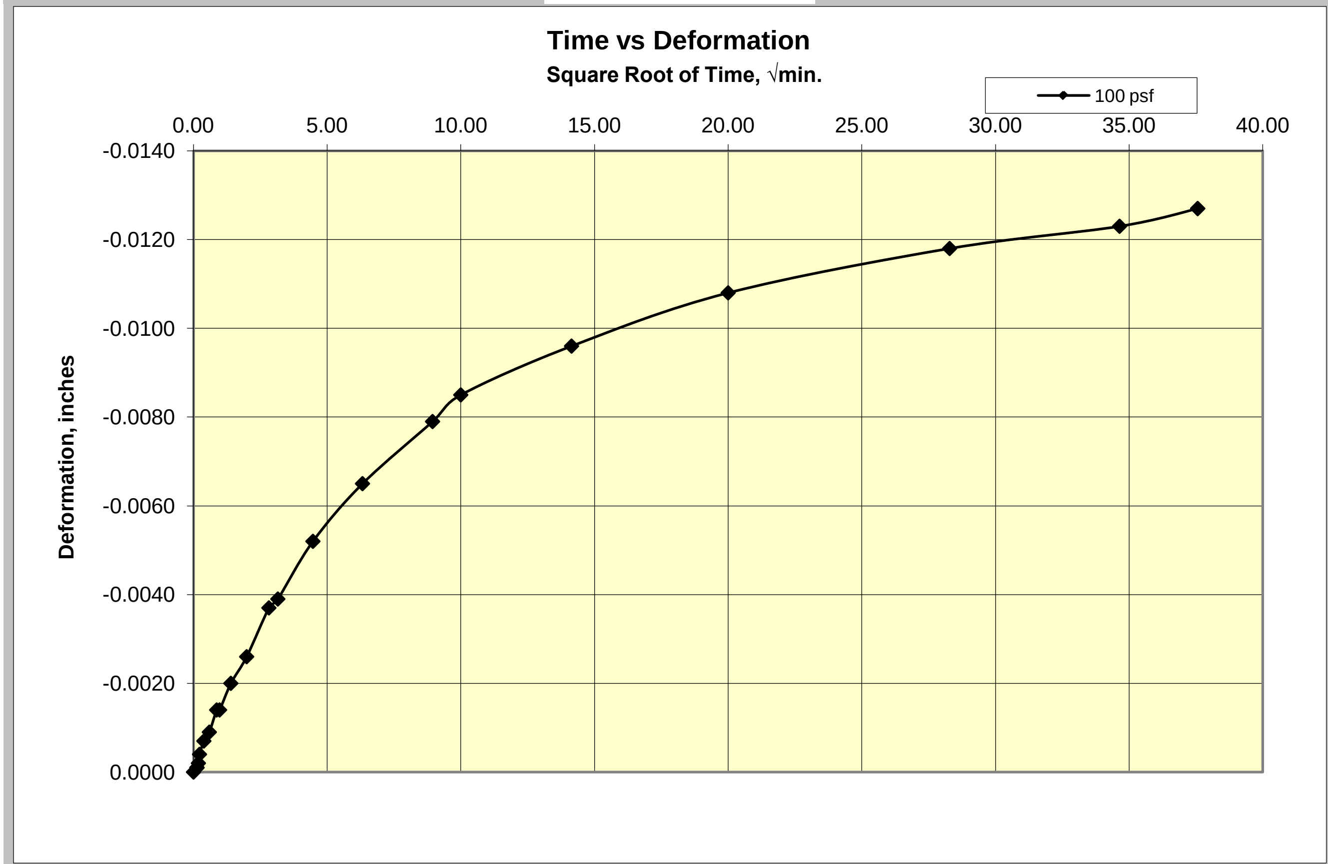


Cooper Testing Labs, Inc.

Load 11	100 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

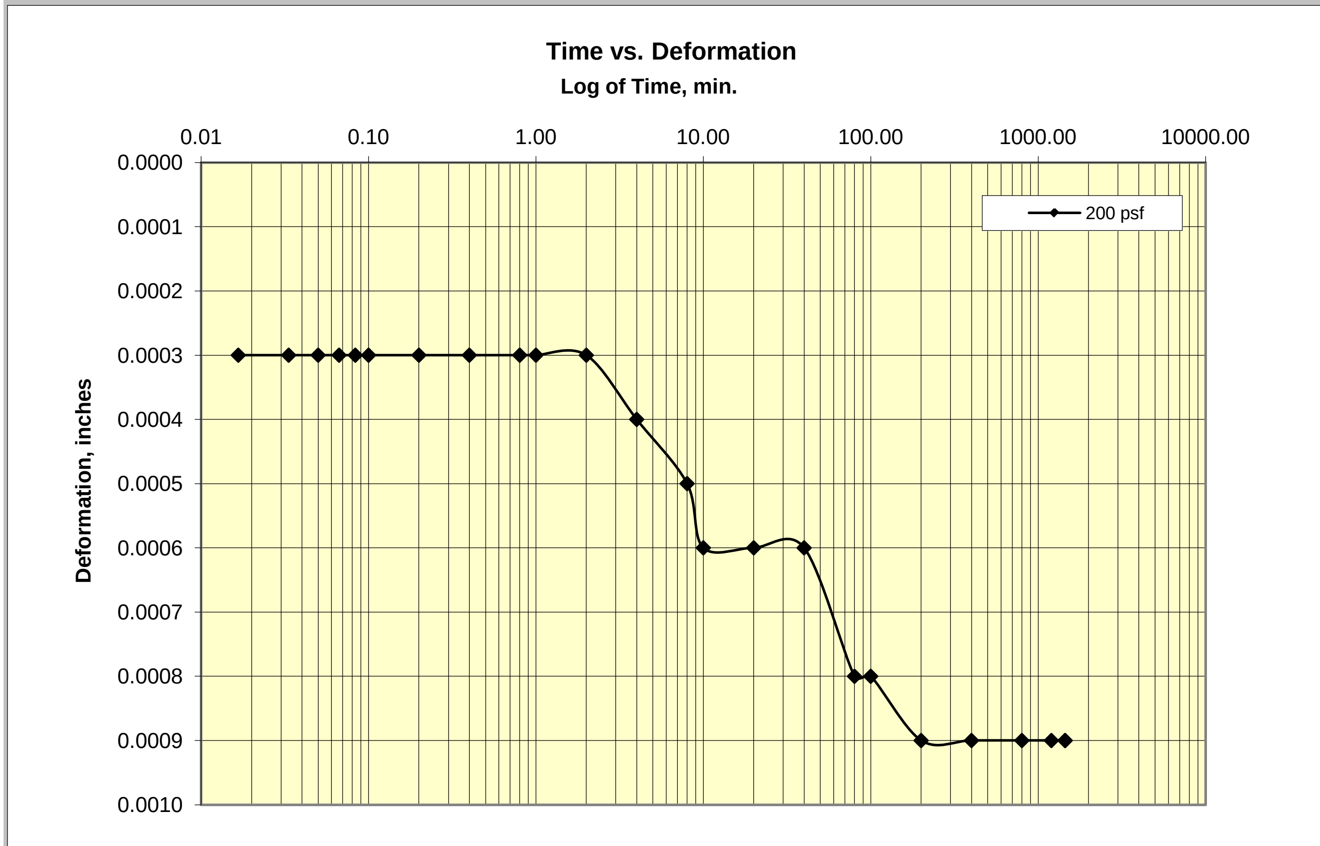


100 PSF

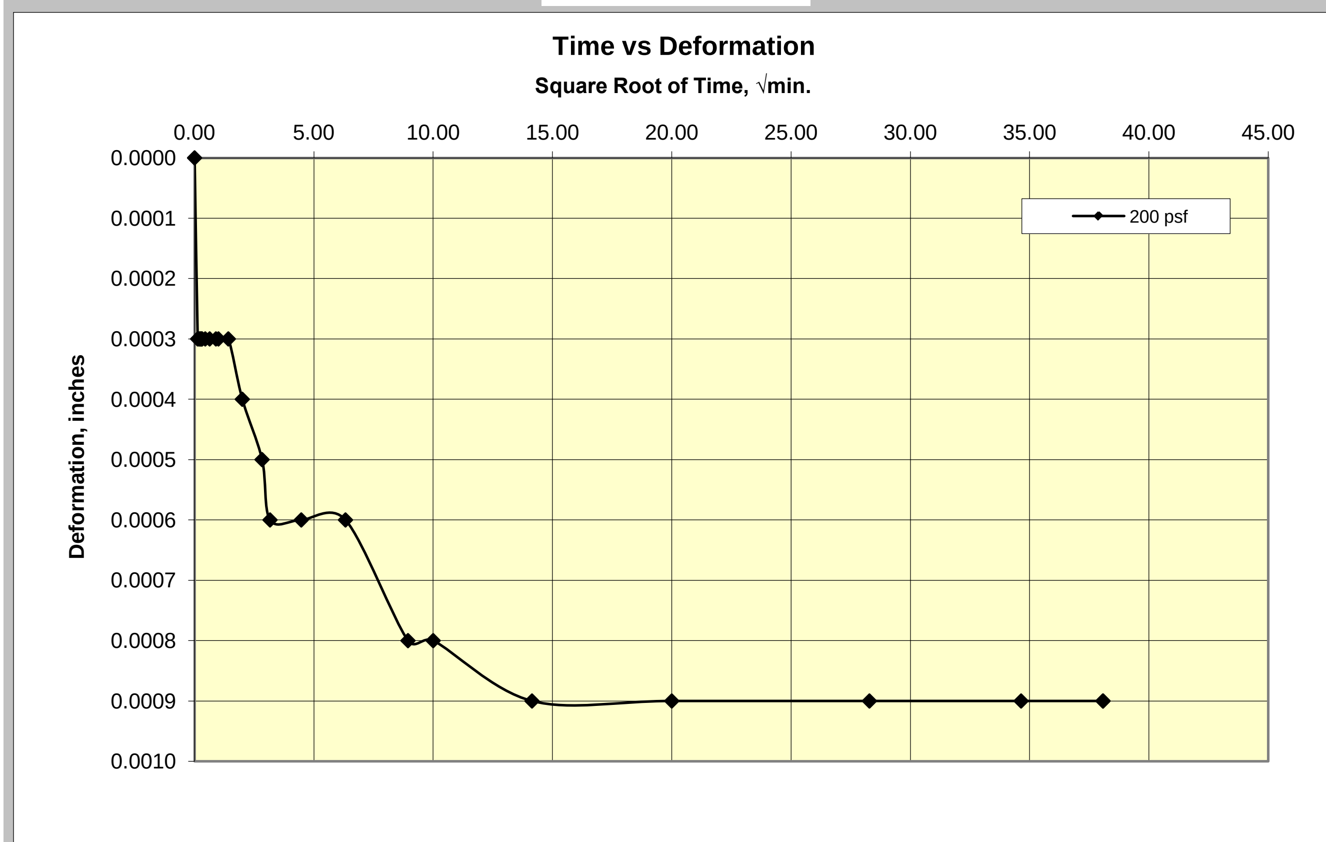


Cooper Testing Labs, Inc.

Load 12	200 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

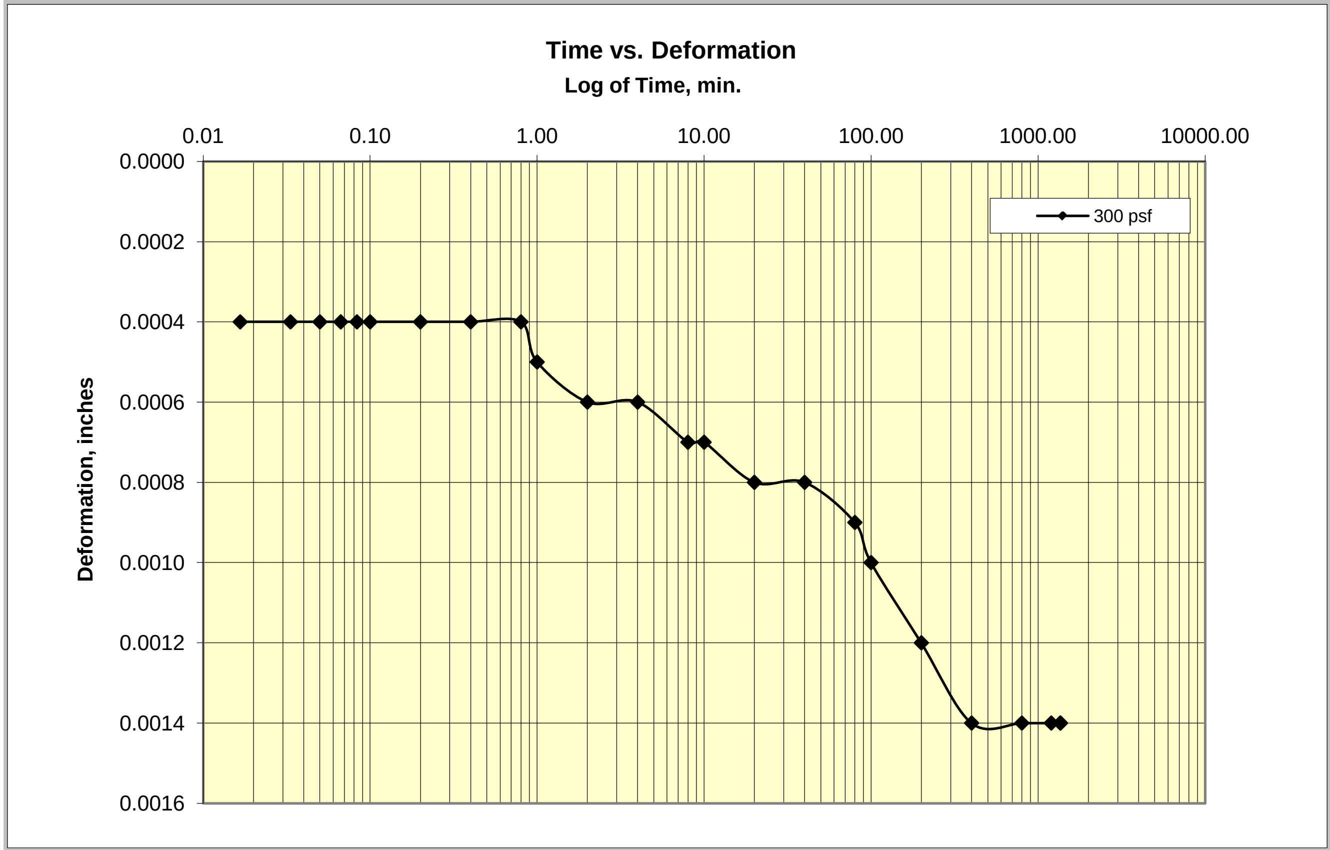


200 PSF

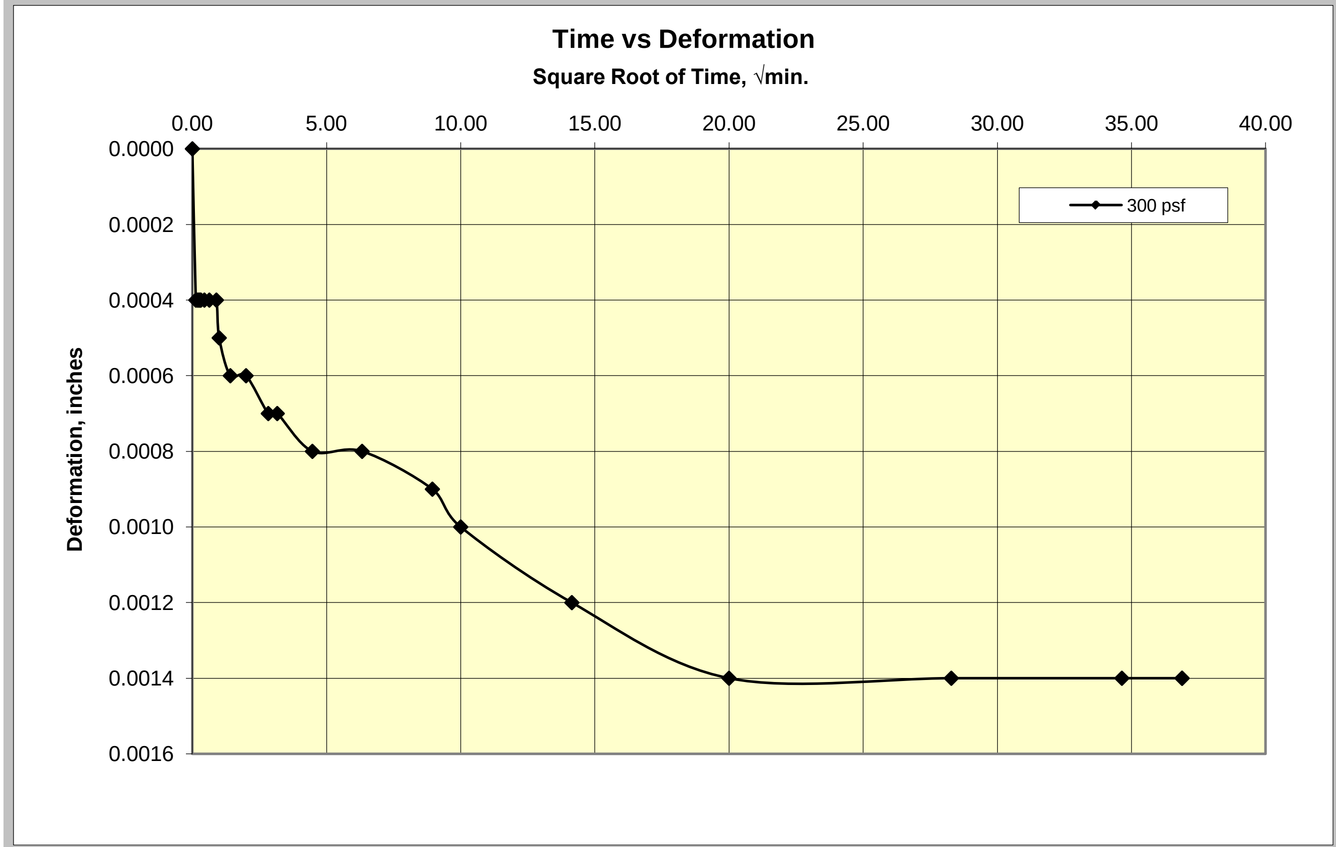


Cooper Testing Labs, Inc.

Load 13	300 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

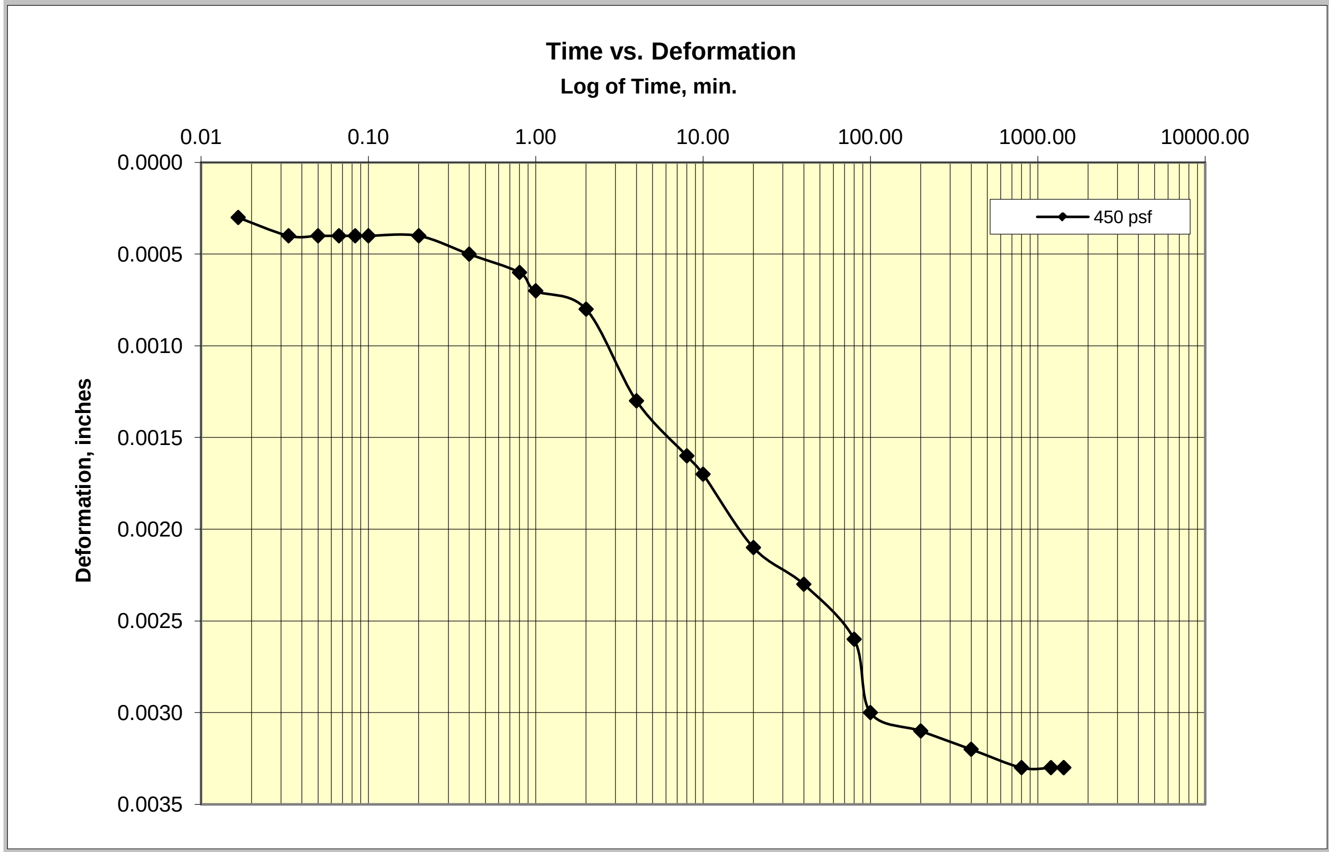


300 PSF

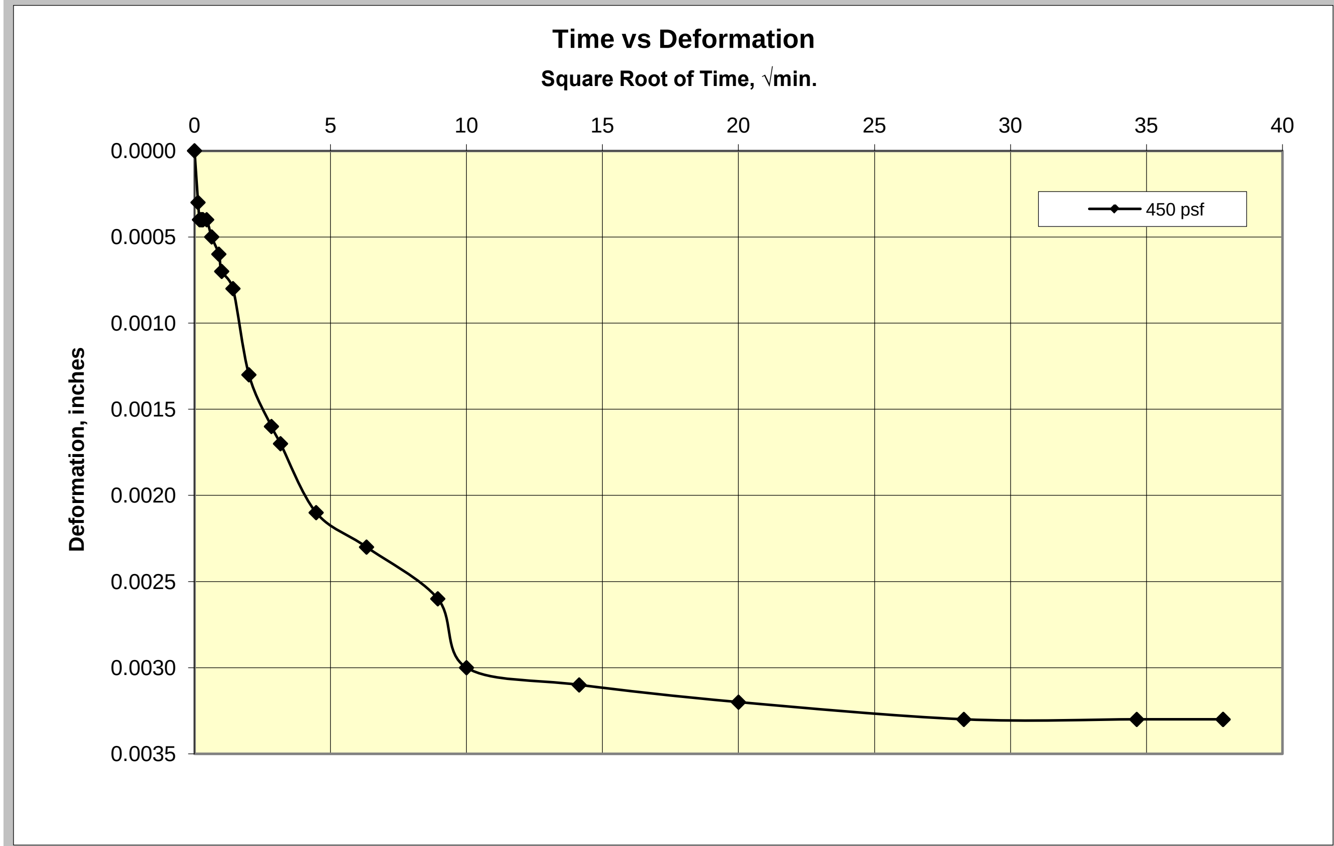


Cooper Testing Labs, Inc.

Load 14	450 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

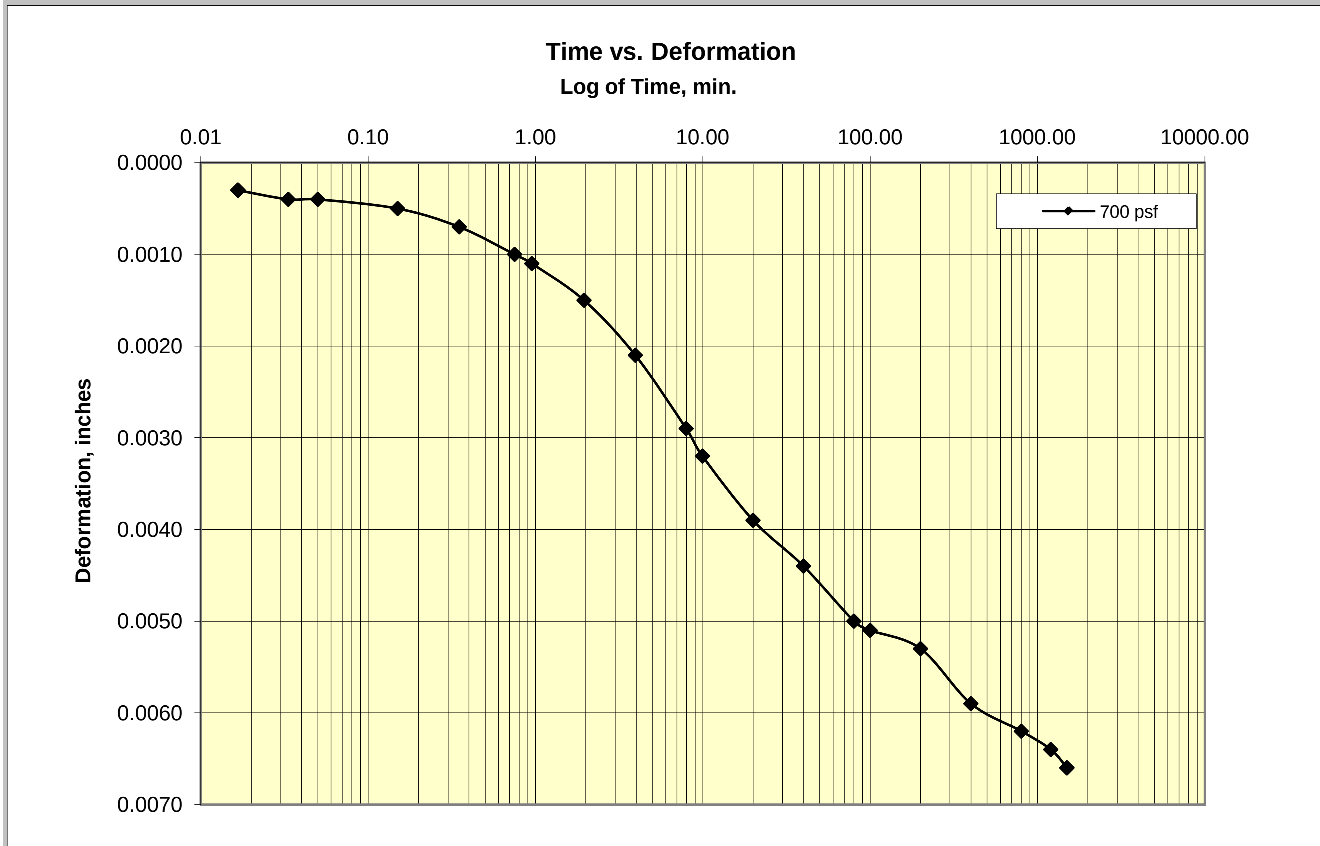


450 PSF

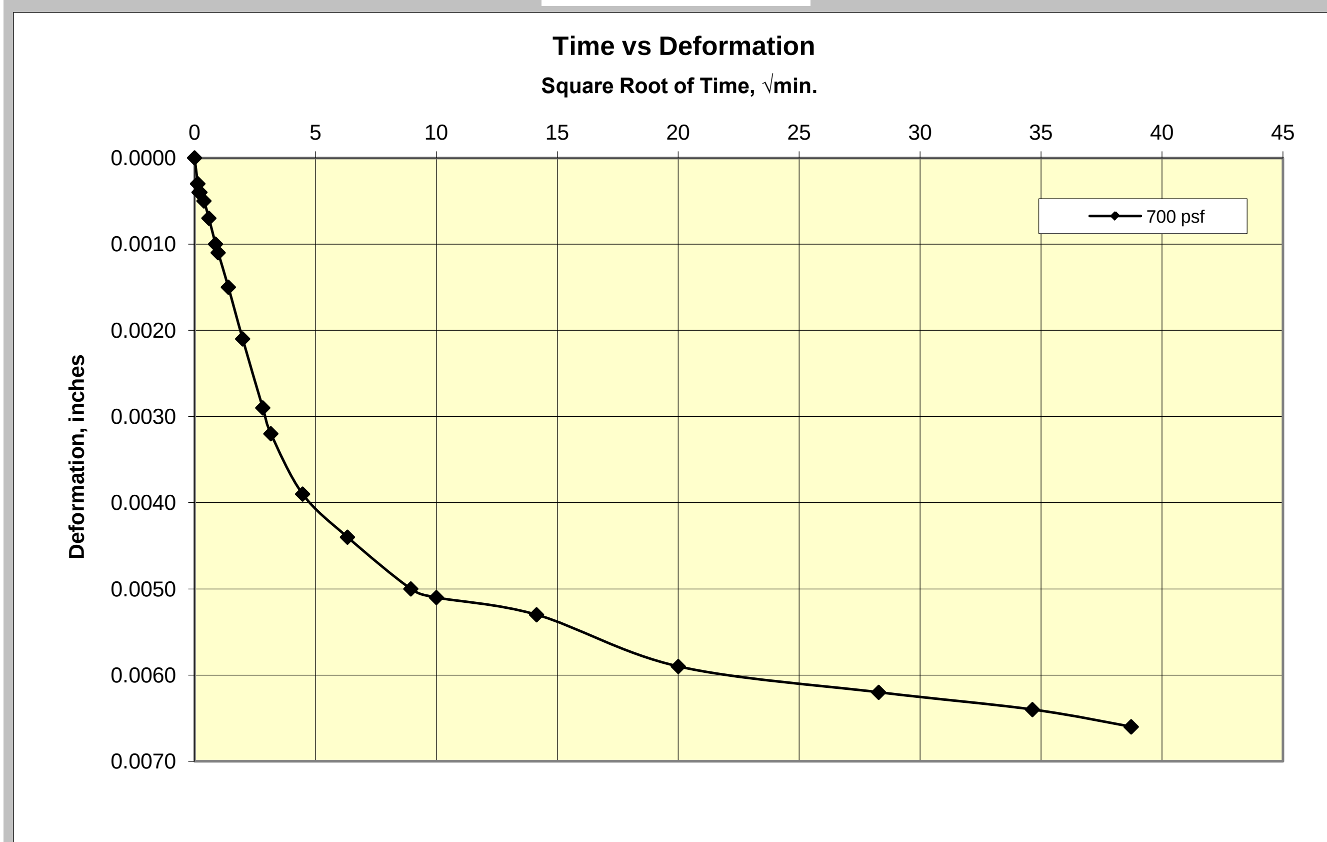


Cooper Testing Labs, Inc.

Load 15	700 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

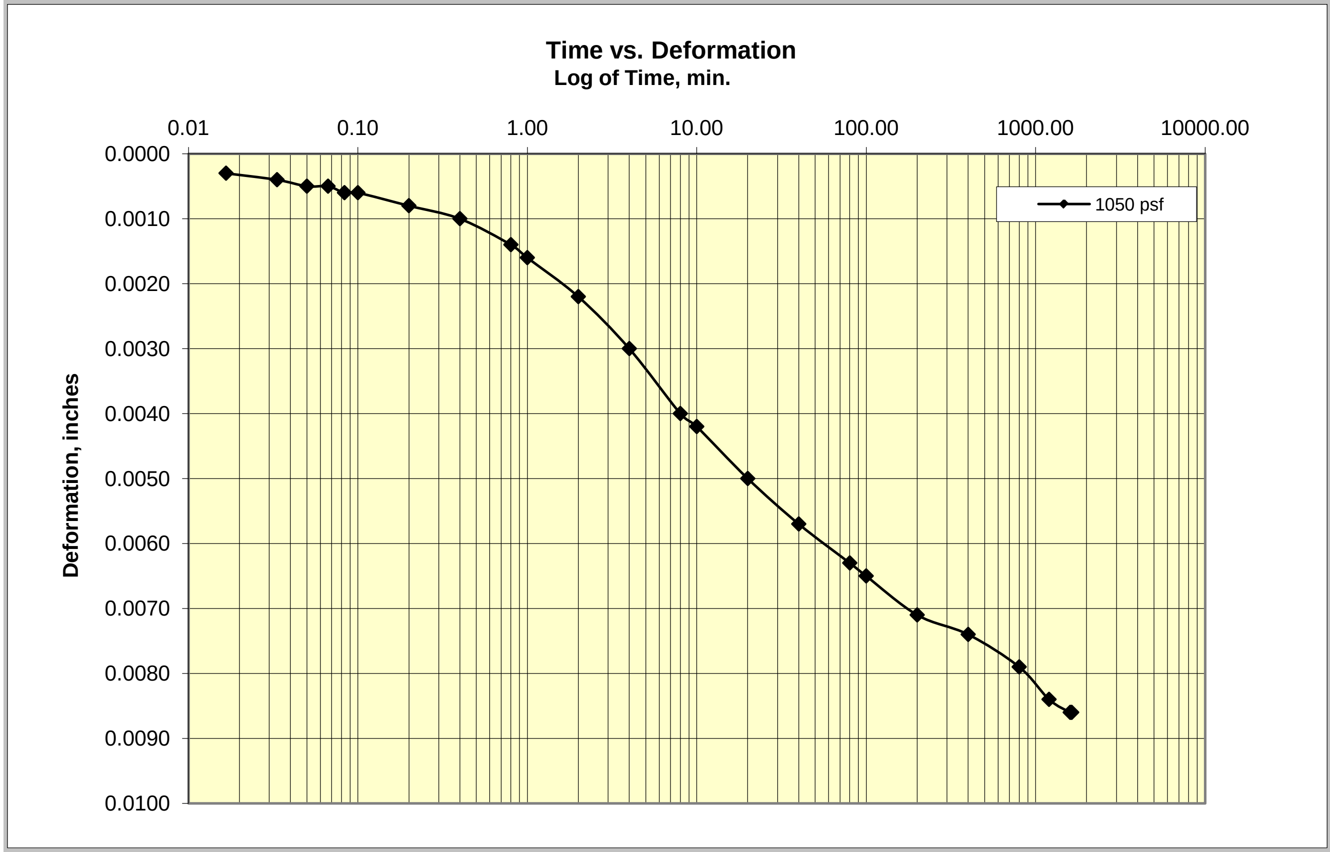


700 PSF

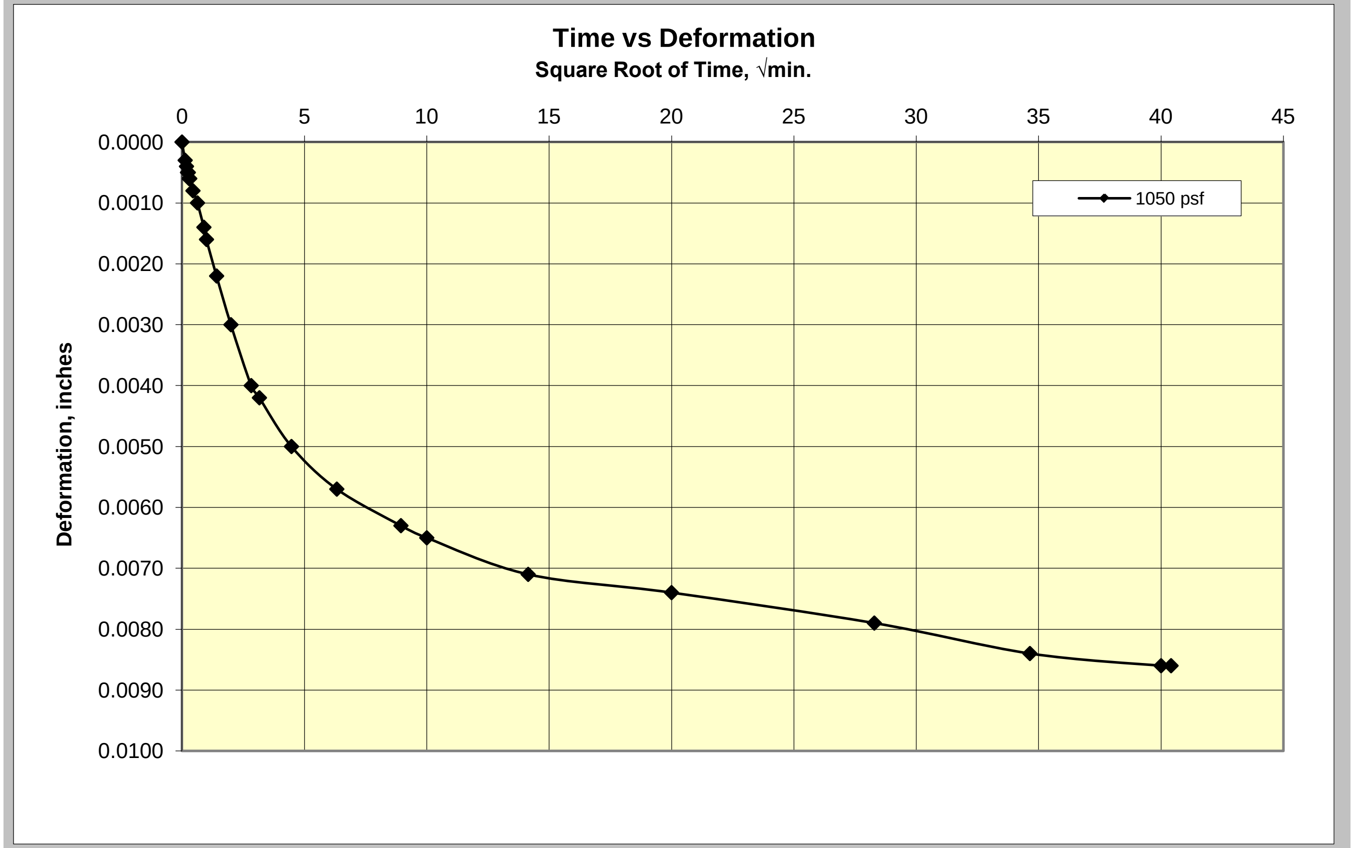


Cooper Testing Labs, Inc.

Load 16 | 1050 PSF | AUS-B-03-21.0-23.0 | (22.6 ft)

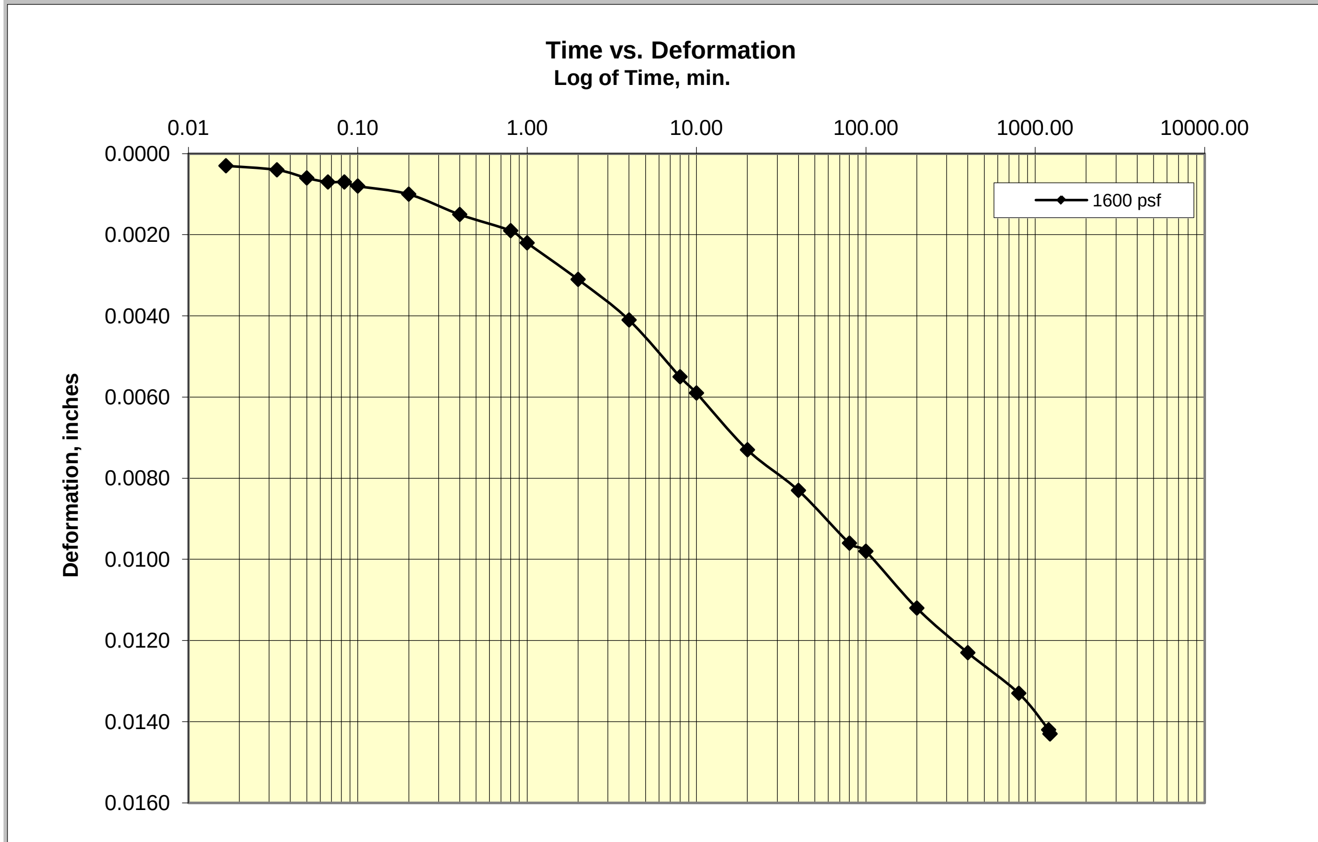


1050 PSF

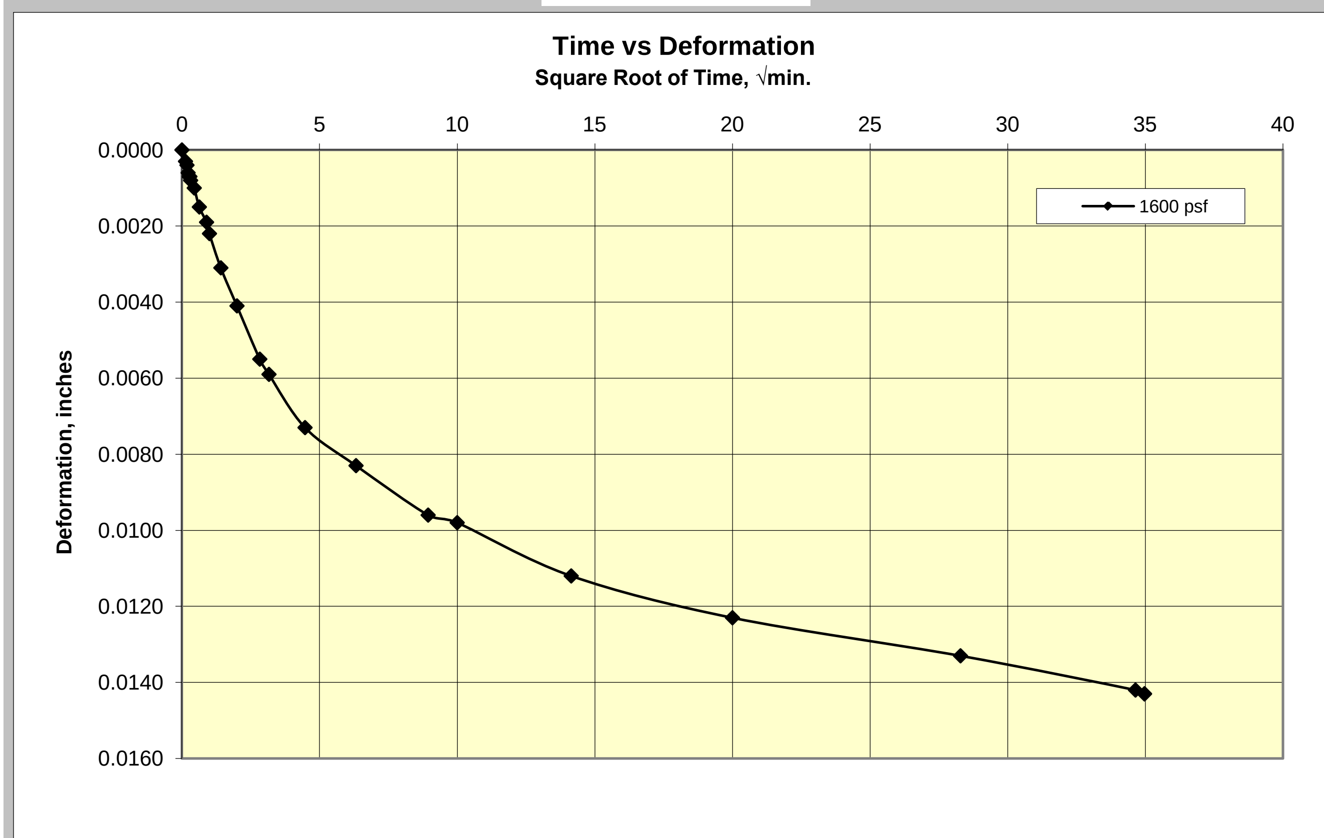


Cooper Testing Labs, Inc.

Load 17	1600 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

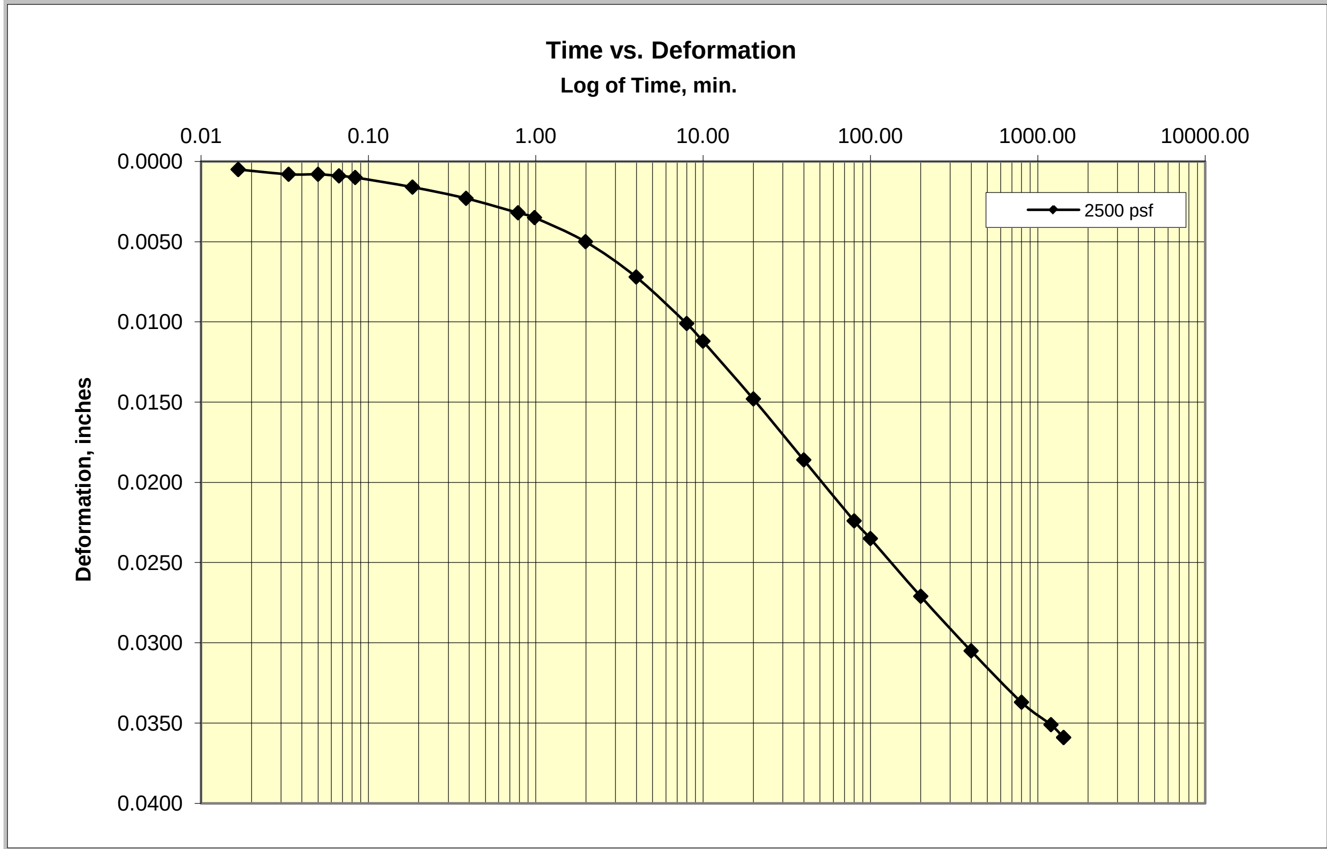


1600 PSF

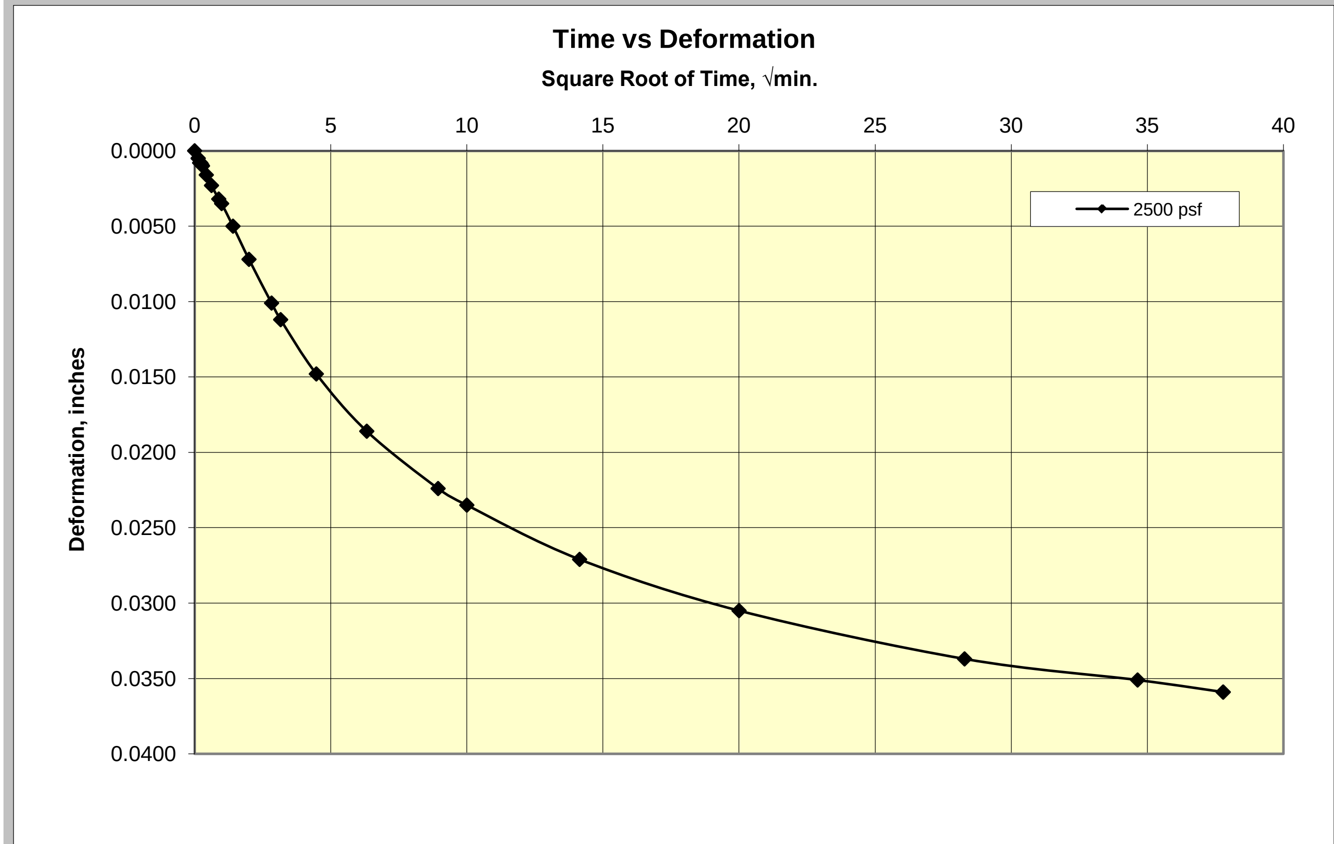


Cooper Testing Labs, Inc.

Load 18	2500 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

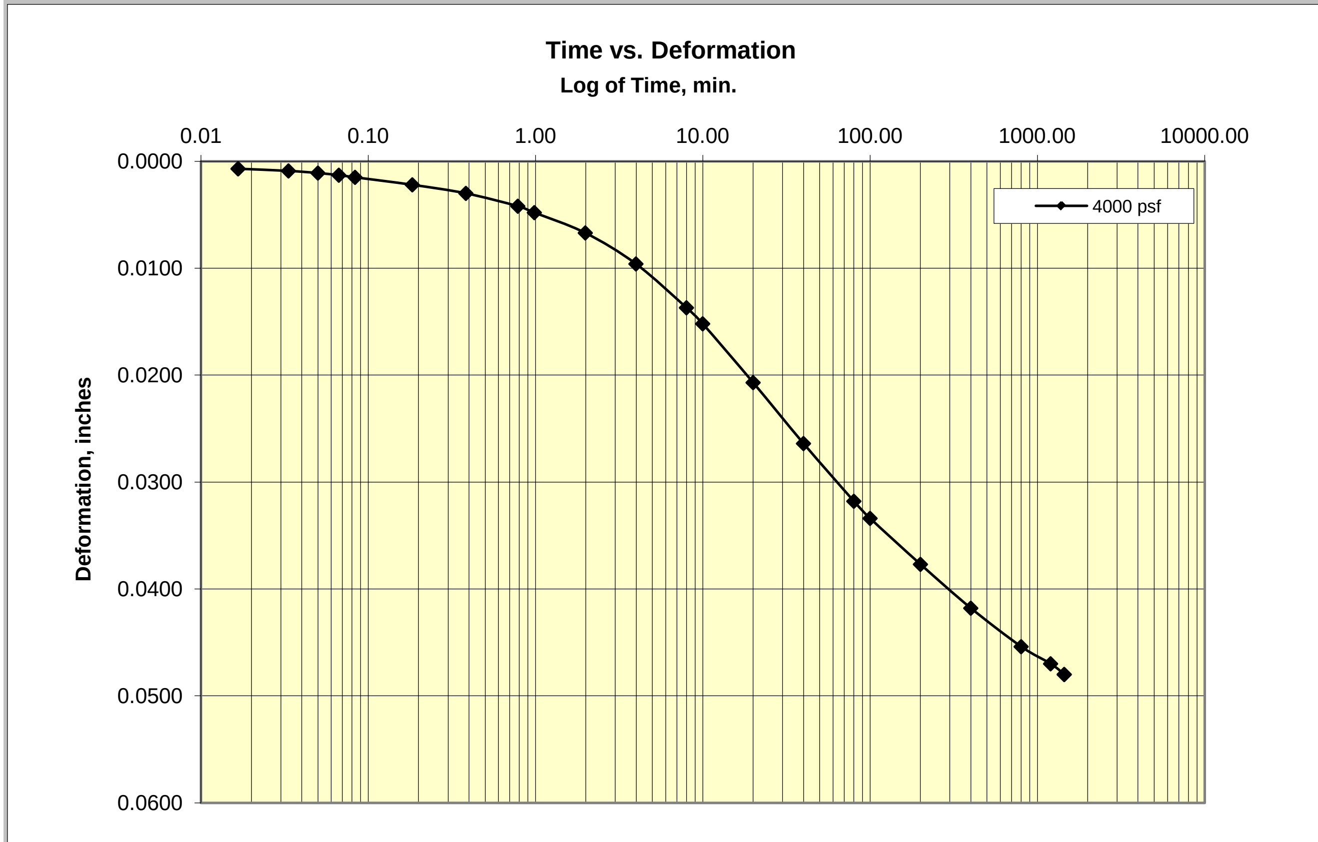


2500 PSF

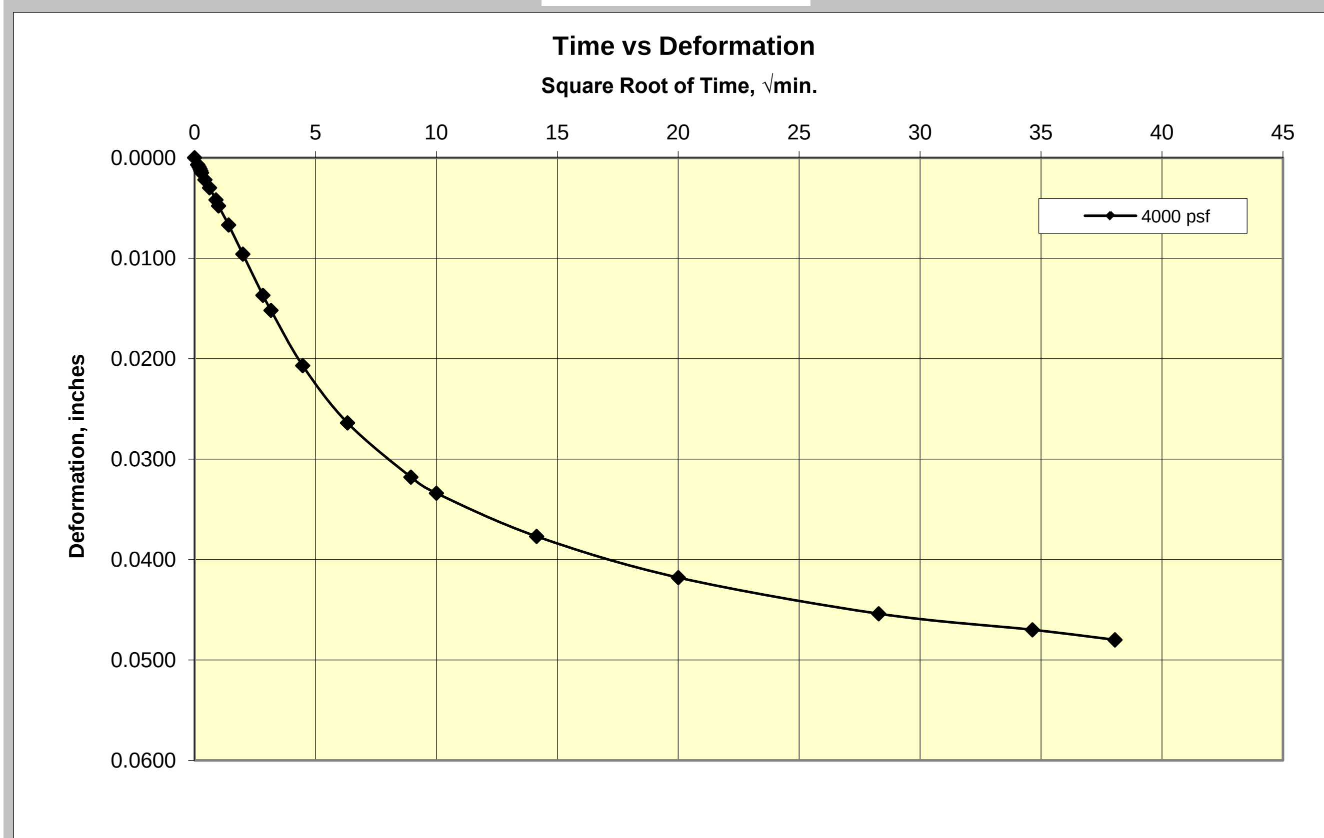


Cooper Testing Labs, Inc.

Load 19	4000 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

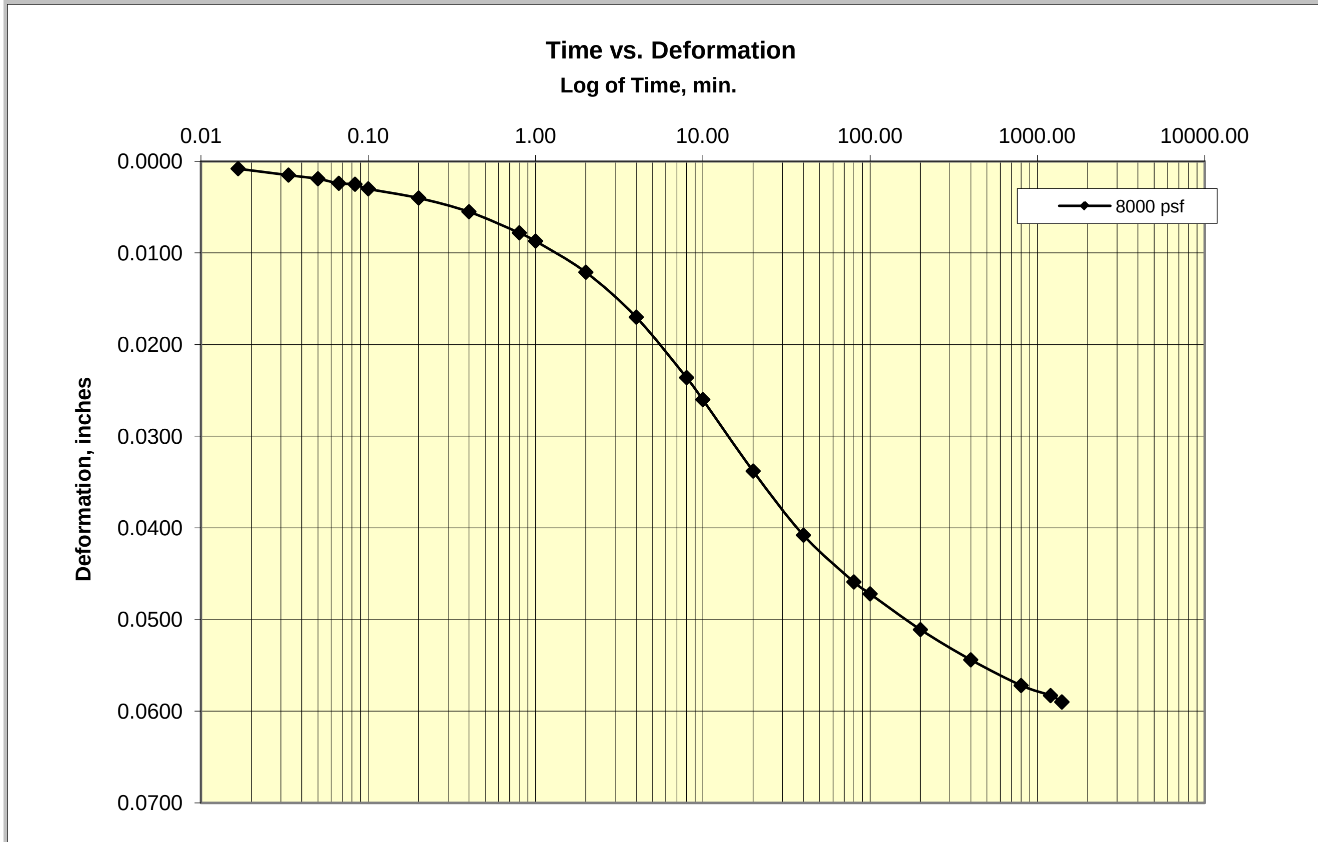


4000 PSF

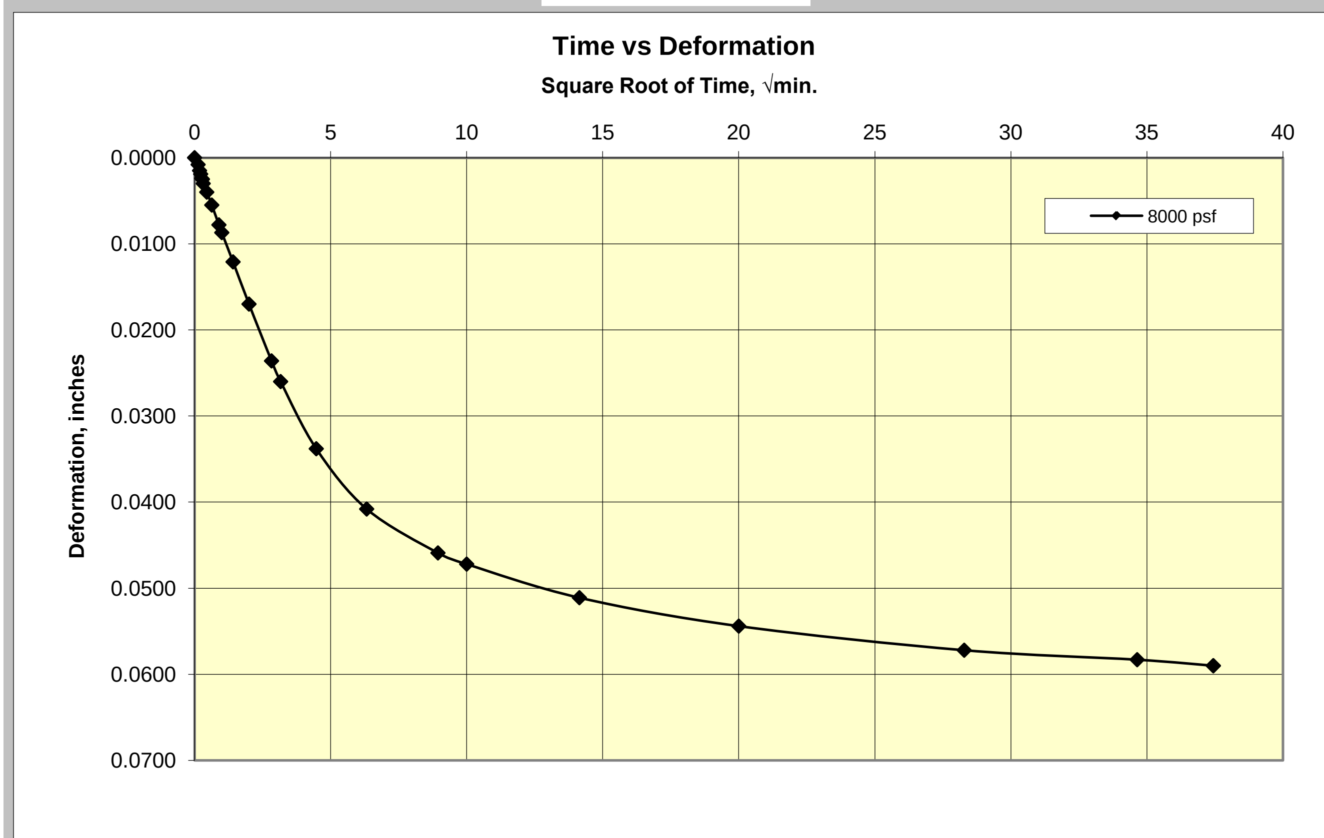


Cooper Testing Labs, Inc.

Load 20	8000 PSF	AUS-B-03-21.0-23.0	(22.6 ft)

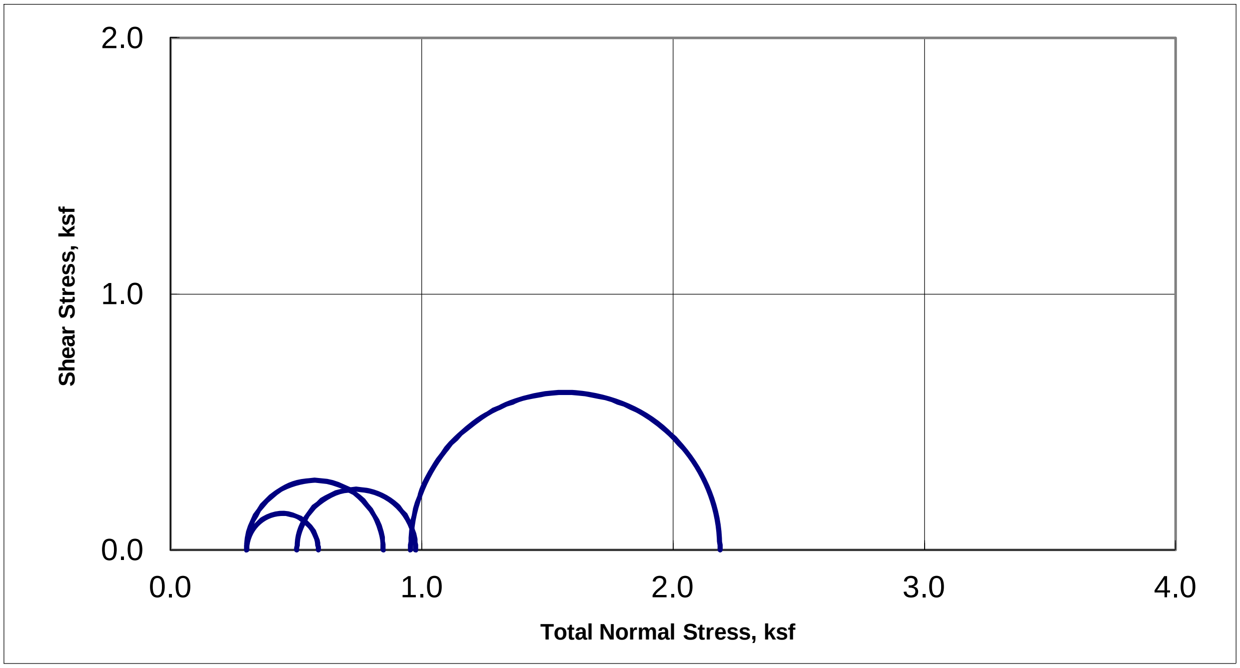


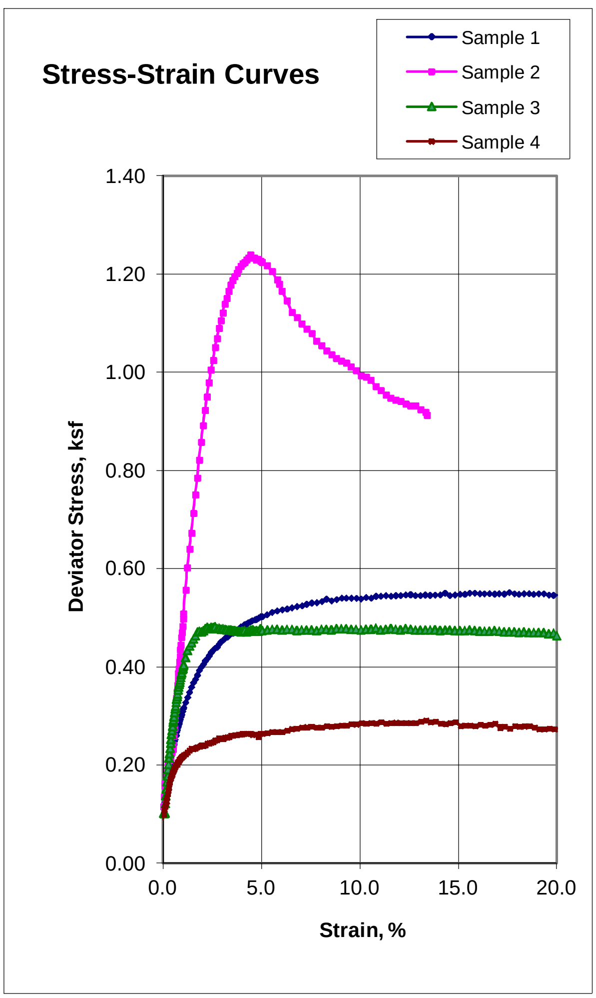
8000 PSF



Cooper Testing Labs, Inc.
937 Commercial Street
Palo Alto, CA 94303

Unconsolidated-Undrained Triaxial Test
ASTM D-2850





Sample Data				
	1	2	3	4
Moisture %	49.8	111.8	78.4	83.1
Dry Den,pcf	71.1	40.7	54.1	51.5
Void Ratio	1.397	3.190	2.125	2.309
Saturation %	97.4	95.7	100.0	98.2
Height in	5.99	5.98	5.99	5.99
Diameter in	2.88	2.88	2.90	2.88
Cell psi	2.1	6.6	3.5	2.1
Strain %	11.30	4.40	2.10	10.10
Deviator, ksf	0.551	1.240	0.482	0.291
Rate %/min	1.00	1.00	1.00	1.00
in/min	0.060	0.060	0.060	0.060
Job No.:	477-013a			
Client:	Arcadis			
Project:	B0002251.0001.00006			
Boring:	AUS-B-01	AUS-B-01	AUS-B-02	AUS-B-03
Sample:	ST-01	ST-04	ST-02	ST-01
Depth ft:	7-9(Tip-6)	22-24(Tip-7)	12-14(Tip-5)	7-9

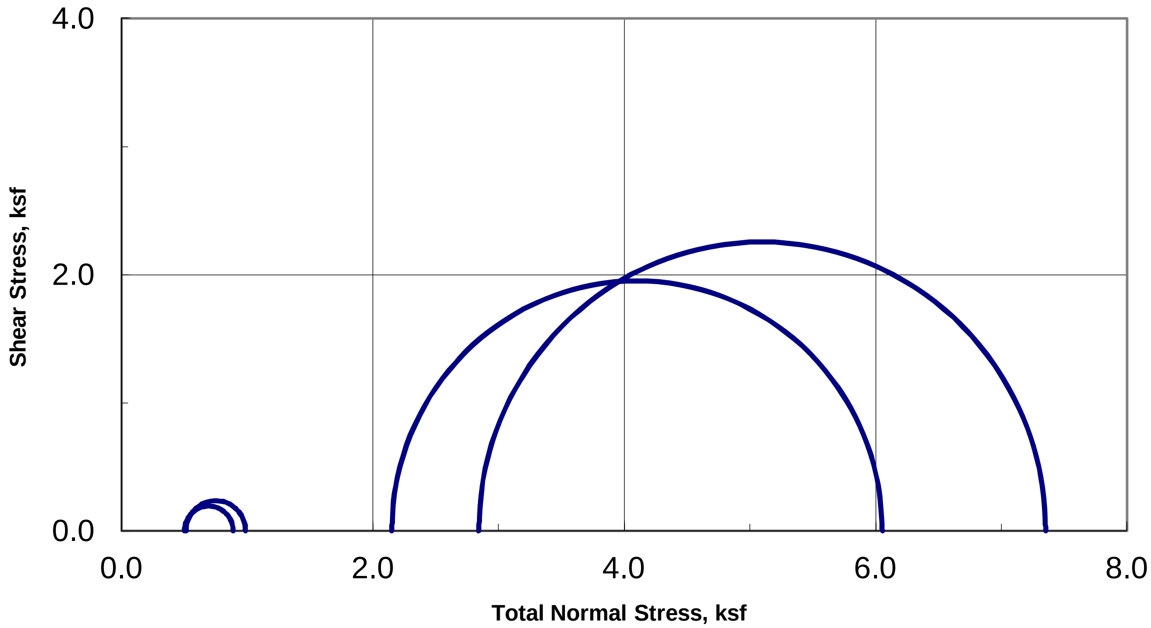
Visual Soil Description

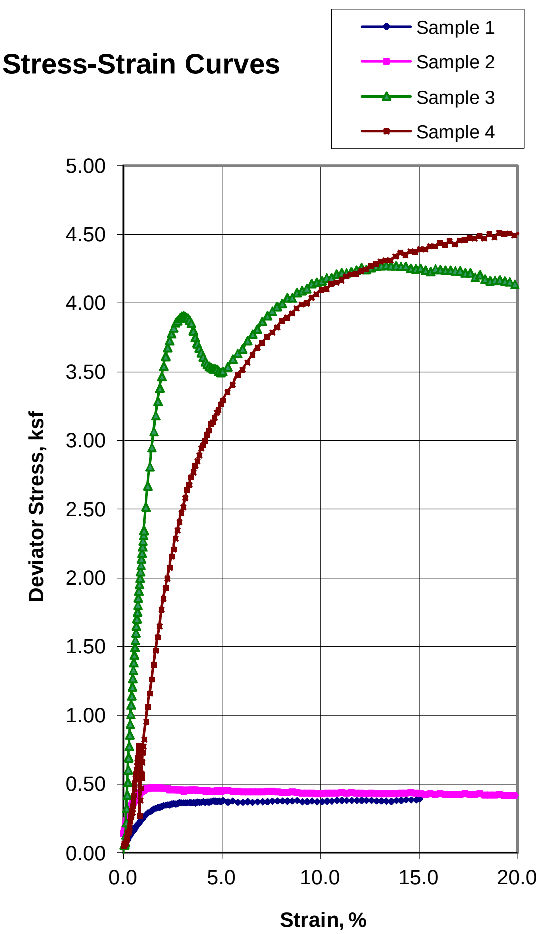
Sample #	
1	Gray Lean CLAY w/ Sand (Bay Mud)
2	Greenish Gray Elastic SILT w/ organics (Bay Mud)
3	Gray Fat CLAY (Bay Mud)
4	Gray Fat CLAY w/ shells (Bay Mud)

Remarks:

Cooper Testing Labs, Inc.
937 Commercial Street
Palo Alto, CA 94303

Unconsolidated-Undrained Triaxial Test
ASTM D-2850





Sample Data	1	2	3	4
Moisture %	79.1	90.8	23.2	19.2
Dry Den,pcf	53.6	47.6	103.0	109.9
Void Ratio	2.143	2.541	0.636	0.534
Saturation %	99.7	96.5	98.3	97.1
Height in	5.99	6.00	5.98	6.00
Diameter in	2.86	2.88	2.88	2.88
Cell psi	3.5	3.6	14.9	19.7
Strain %	15.00	1.40	3.00	19.10
Deviator, ksf	0.395	0.478	4.276	4.515
Rate %/min	1.00	1.00	1.00	1.00
in/min	0.060	0.060	0.060	0.060
Job No.:	477-013b			
Client:	Arcadis			
Project:	B0002251.0001.00006			
Boring:	AUS-B-03	AUS-B-03	AUS-B-03	AUS-B-03
Sample:	ST-02	ST-03	ST-06	ST-07
Depth ft:	12-14.5(Tip-7)	17-19	41-43.5	51.5-53.5

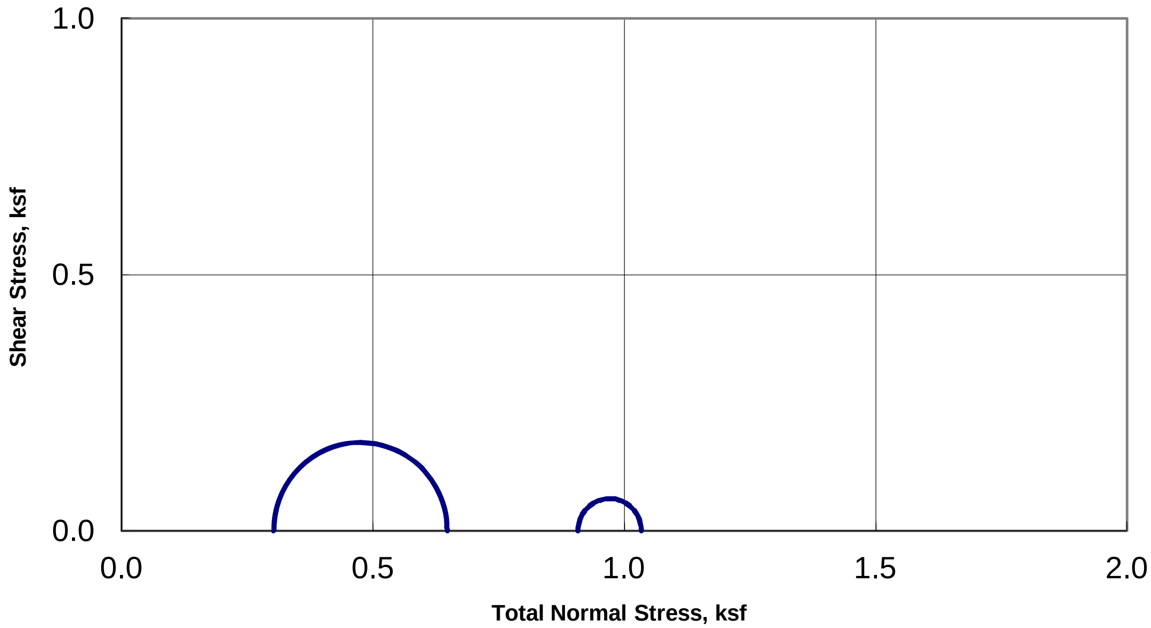
Visual Soil Description

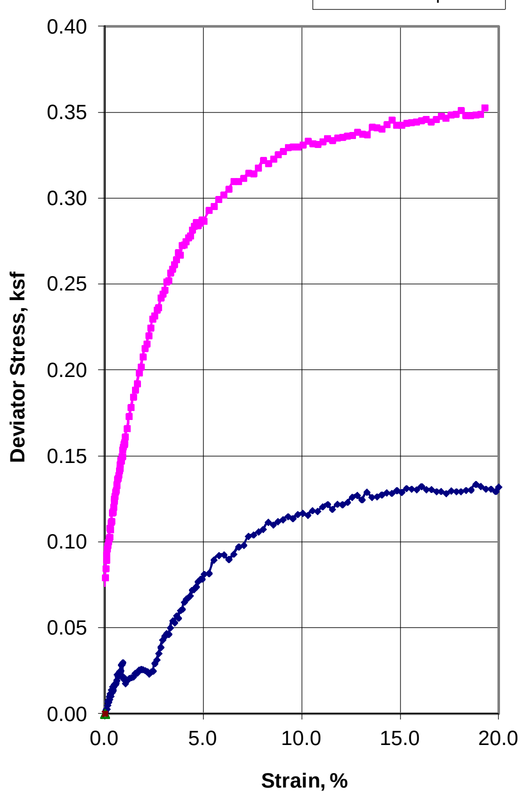
Sample #	
1	Gray Fat CLAY w/ shell fragments (Bay Mud)
2	Gray Fat CLAY (Bay Mud)
3	Greenish Gray Lean CLAY
4	Greenish Gray Sandy Lean CLAY

Remarks:

Cooper Testing Labs, Inc.
937 Commercial Street
Palo Alto, CA 94303

Unconsolidated-Undrained Triaxial Test
ASTM D-2850





Sample Data	1	2	3	4
Moisture %	60.5	88.3		
Dry Den,pcf	62.6	47.3		
Void Ratio	1.691	2.561		
Saturation %	96.6	93.2		
Height in	5.99	5.99		
Diameter in	2.87	2.88		
Cell psi	6.3	2.1		
Strain %	12.60	16.10		
Deviator, ksf	0.134	0.353		
Rate %/min	1.00	1.00		
in/min	0.060	0.060		
Job No.:	477-013c			
Client:	Arcadis			
Project:	B0002251.0001.00006			
Boring:	AUS-B-02	AUS-B-03		
Sample:	ST-01	ST-04		
Depth ft:	7-9(Tip-14)	21-23(Tip-7)		

Visual Soil Description

Sample #	
1	Dark Greenish Gray Fat CLAY w/ Sand & shell fragments (Bay Mud)
2	Gray Fat CLAY (Bay Mud)
3	
4	

Remarks:

ARCADIS

Appendix D

Field Photo Log

Appendix D

Field Photo Log

General Photos

View looking northwest at Yosemite Slough

Mud-rotary drill rig

Investigation-derived waste (IDW) drums with secondary containment

Sealing Shelby tube sample

View of exposed pilings looking northwest at Yosemite Slough

Rock core drill bit

Processing rock core sample

Rectangular vane used for vane shear test

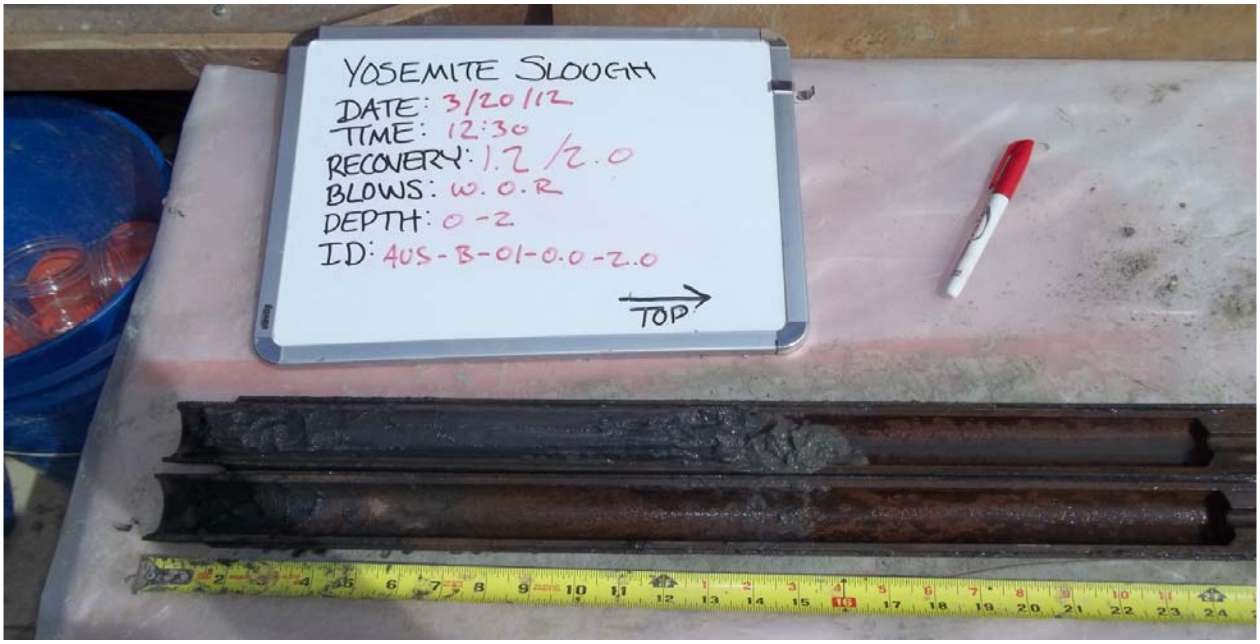
Vane shear test equipment

Secured IDW storage

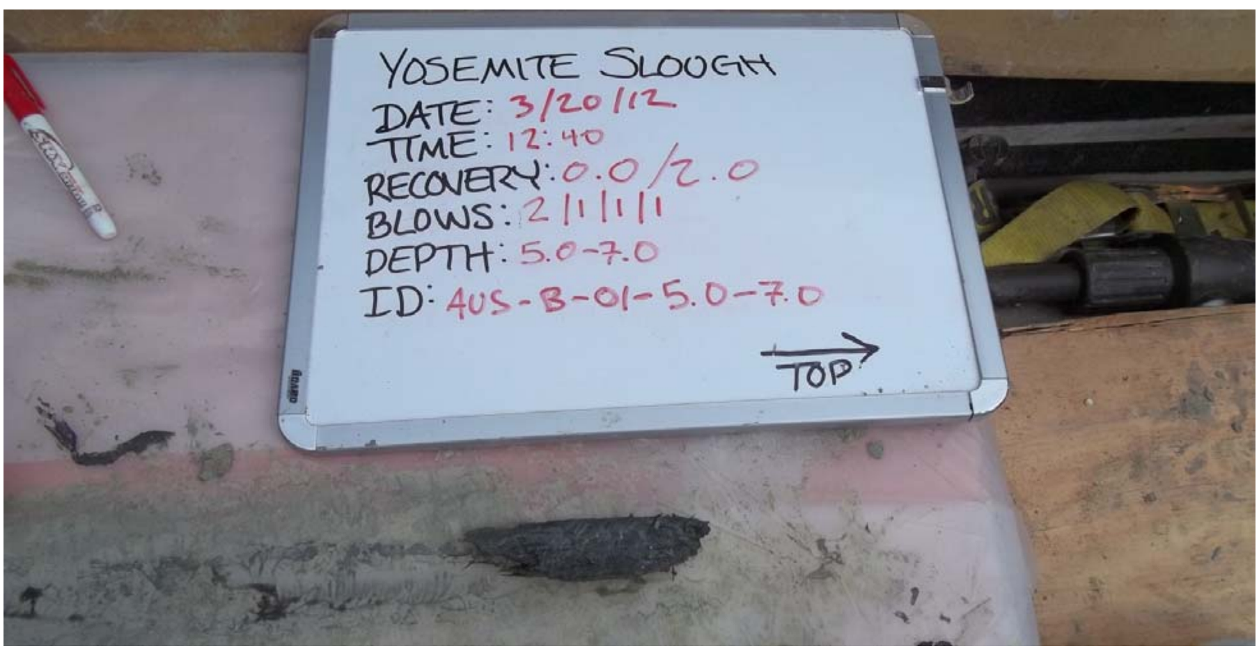
Appendix D

Field Photo Log

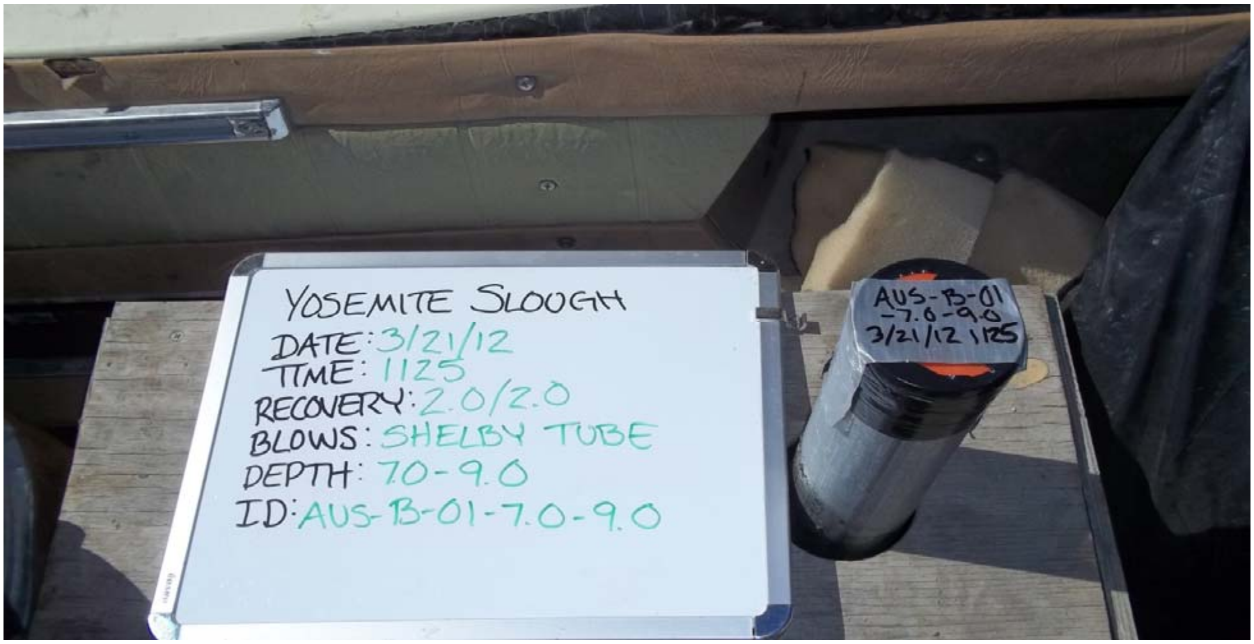
AUS-B-01



Split-spoon sample AUS-B-01-0.0-2.0

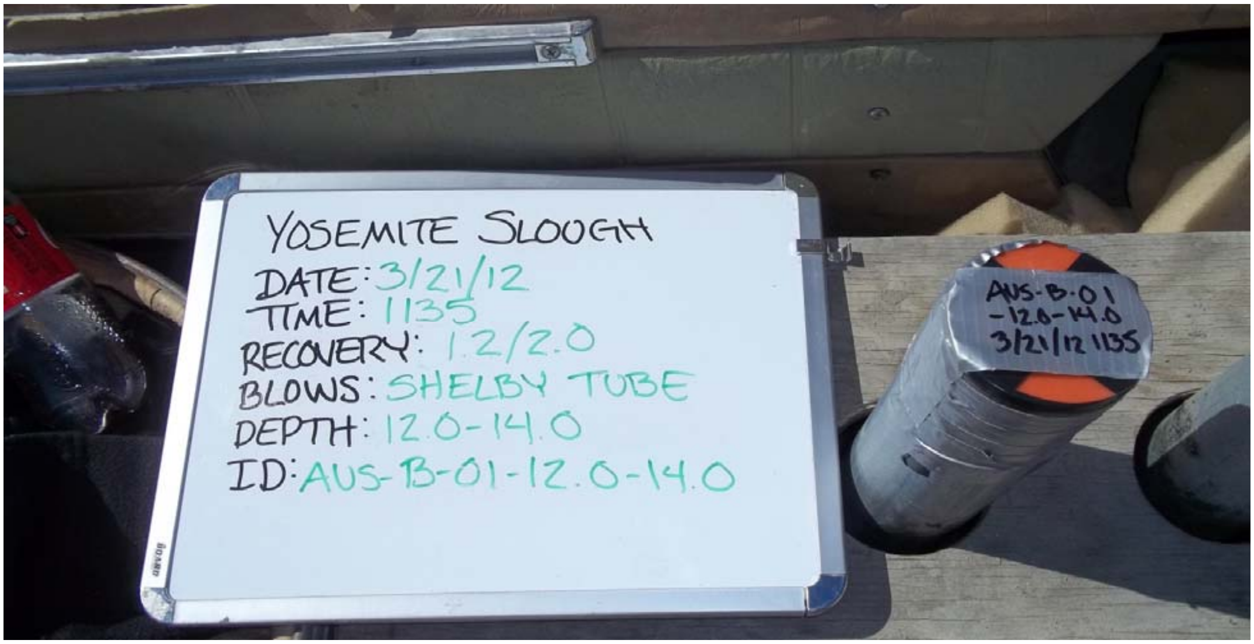


Split-spoon sample AUS-B-01-5.0-7.0

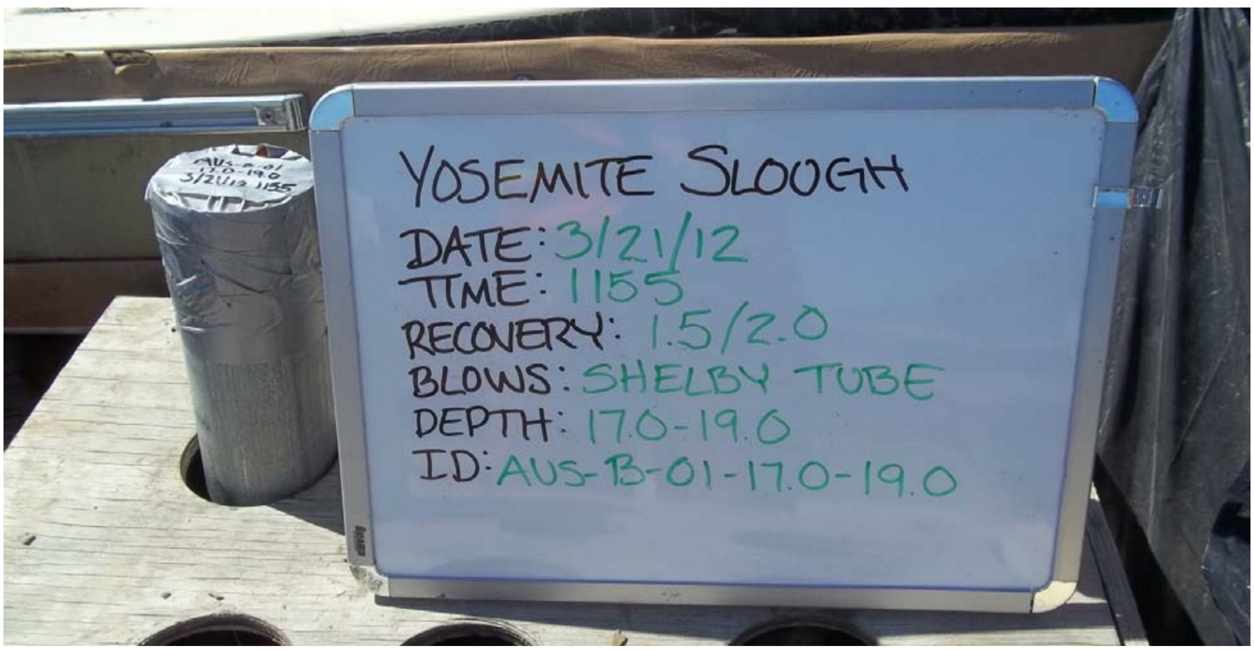


Shelby tube sample AUS-B-01-7.0-9.0

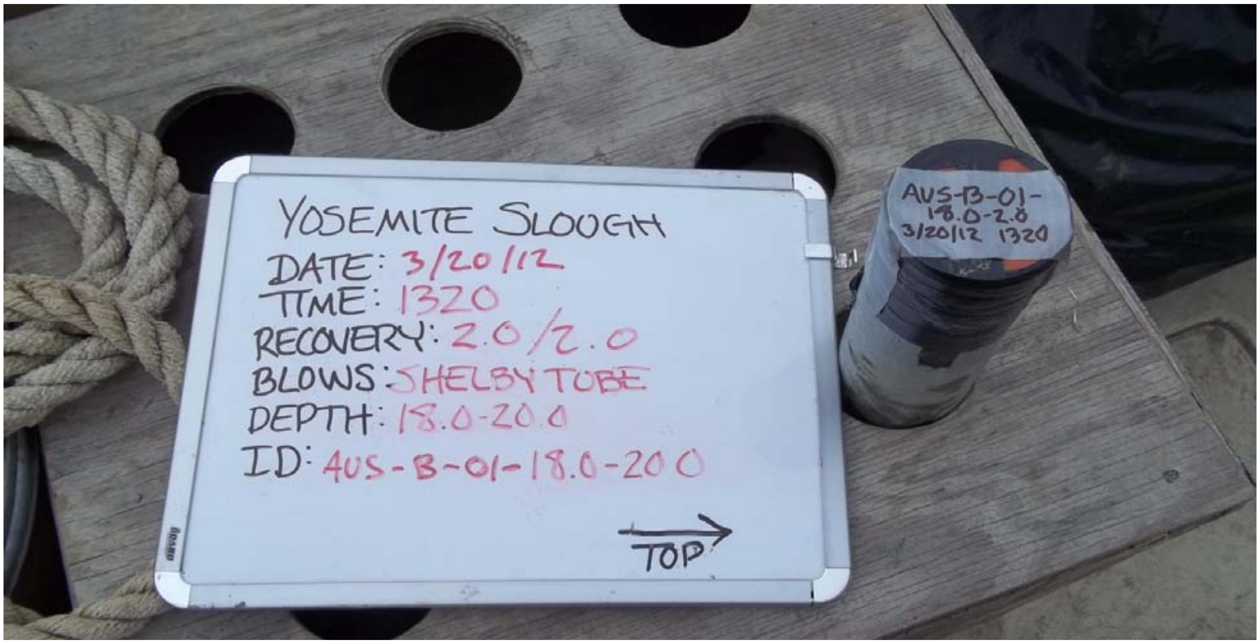
Split-spoon sample AUS-B-01-10.0-12.0



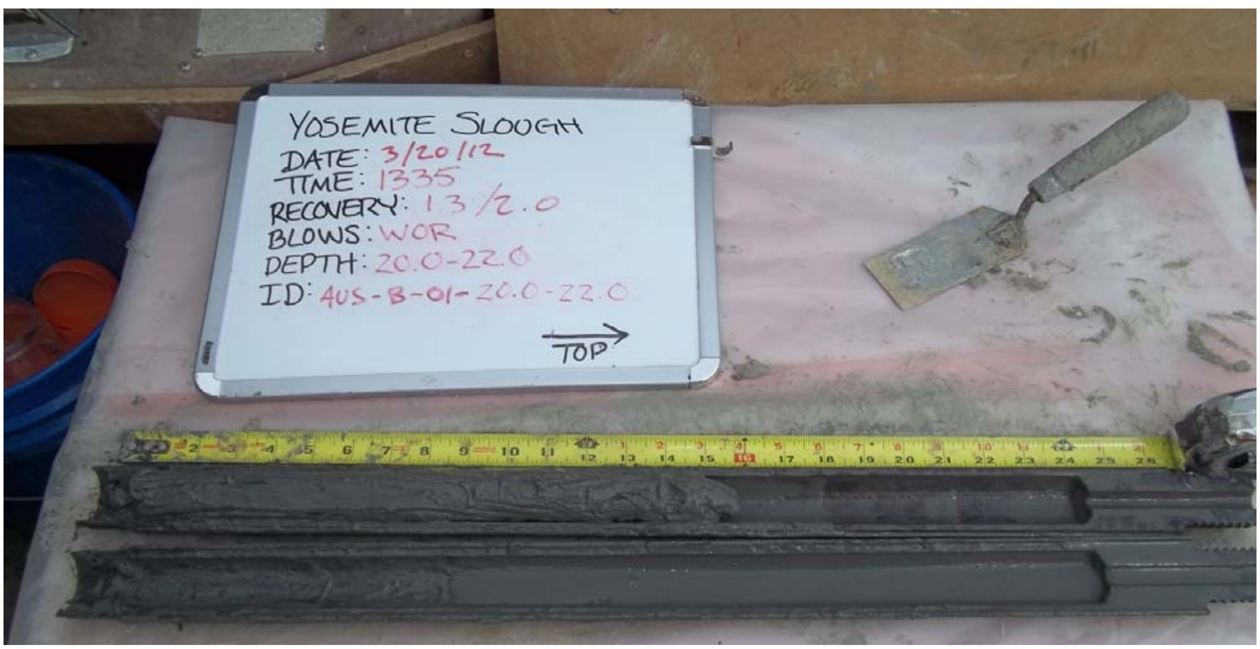
Shelby tube sample AUS-B-01-12.0-14.0



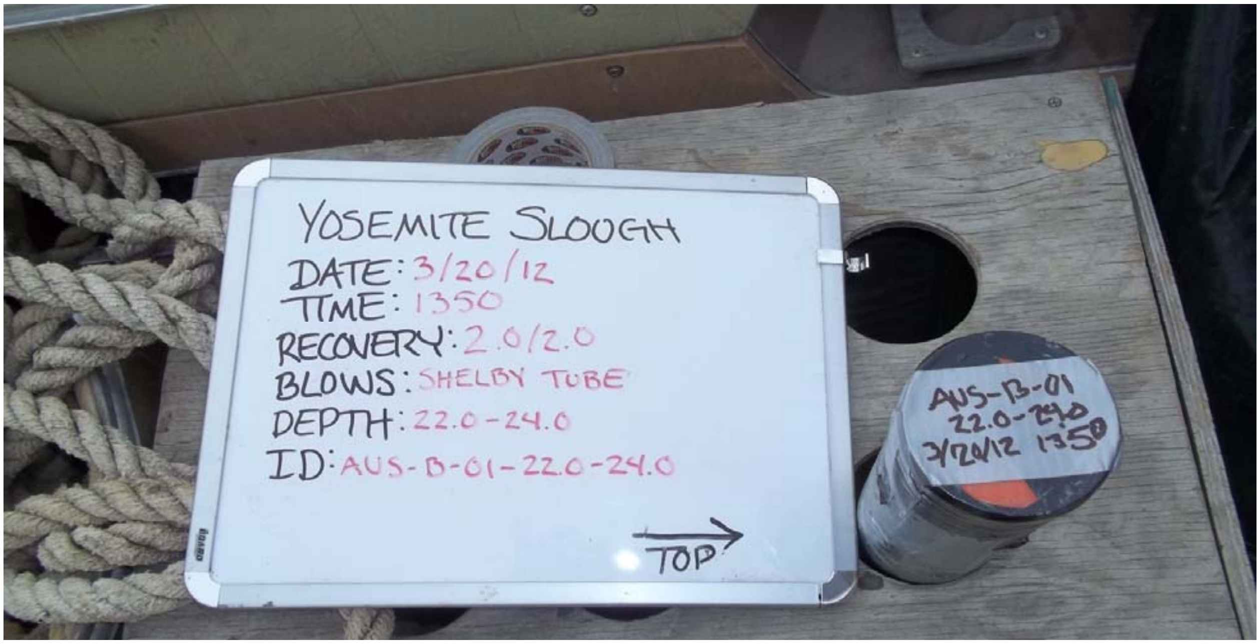
Shelby tube sample AUS-B-01-17.0-19.0



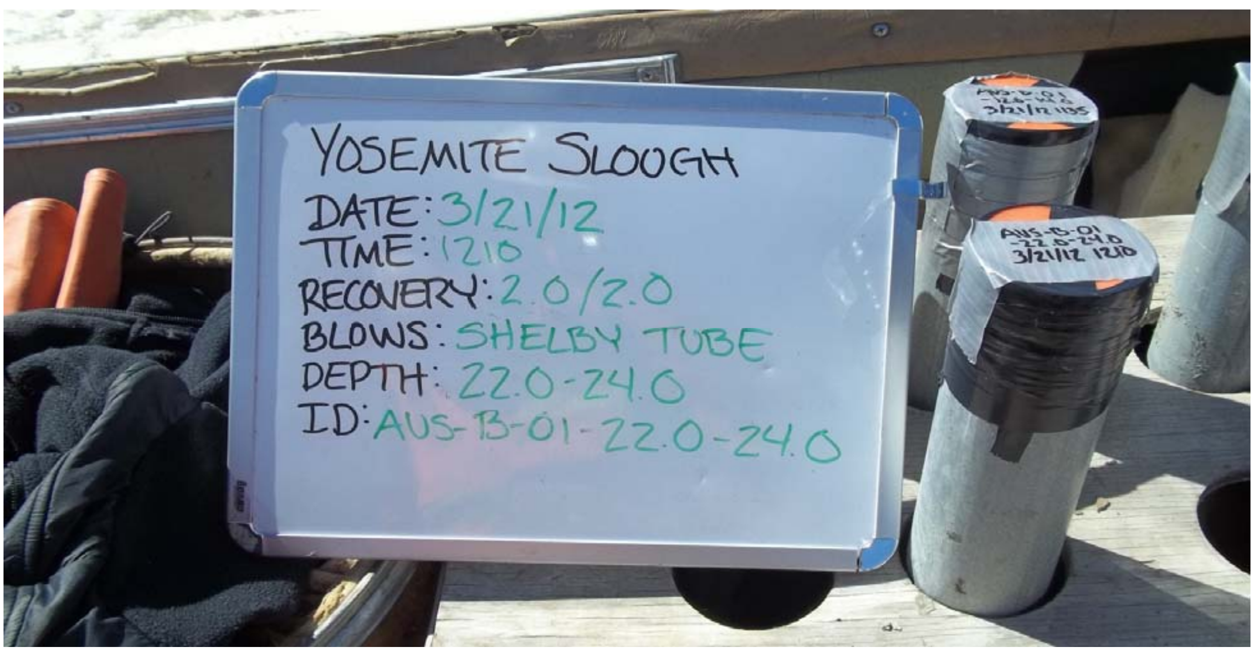
Shelby tube sample AUS-B-01-18.0-20.0



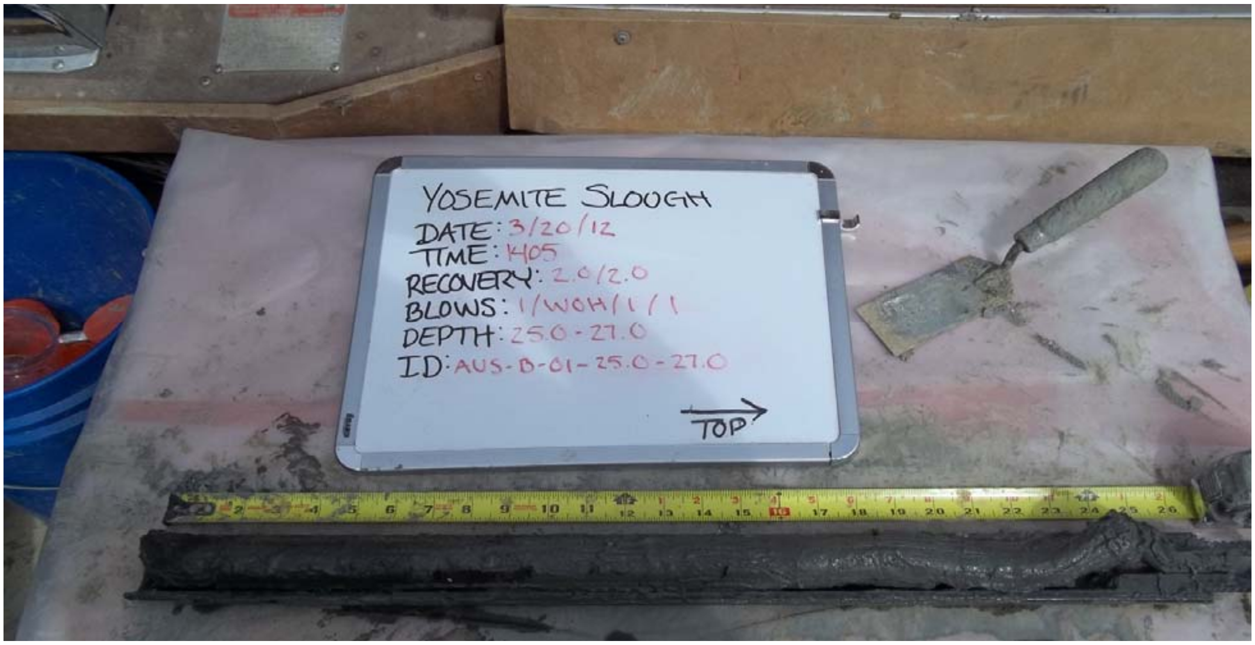
Split-spoon sample AUS-B-01-20.0-22.0



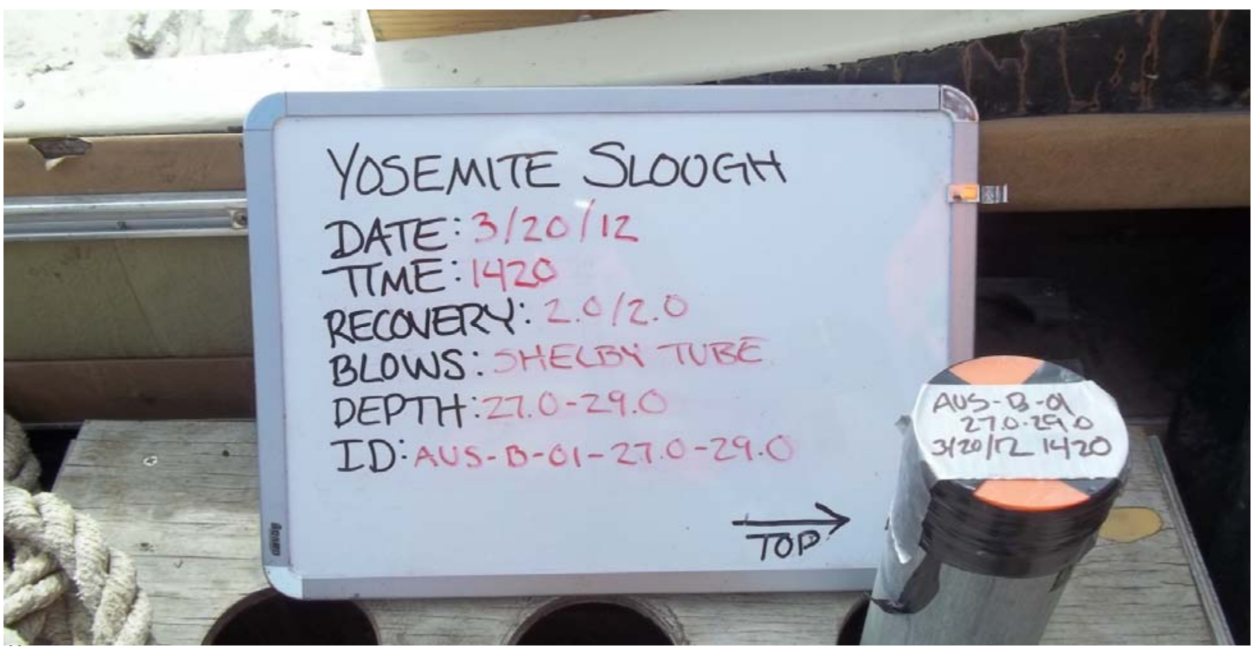
Shelby tube sample AUS-B-01-22.0-24.0



Shelby tube sample AUS-B-01-22.0-24.0



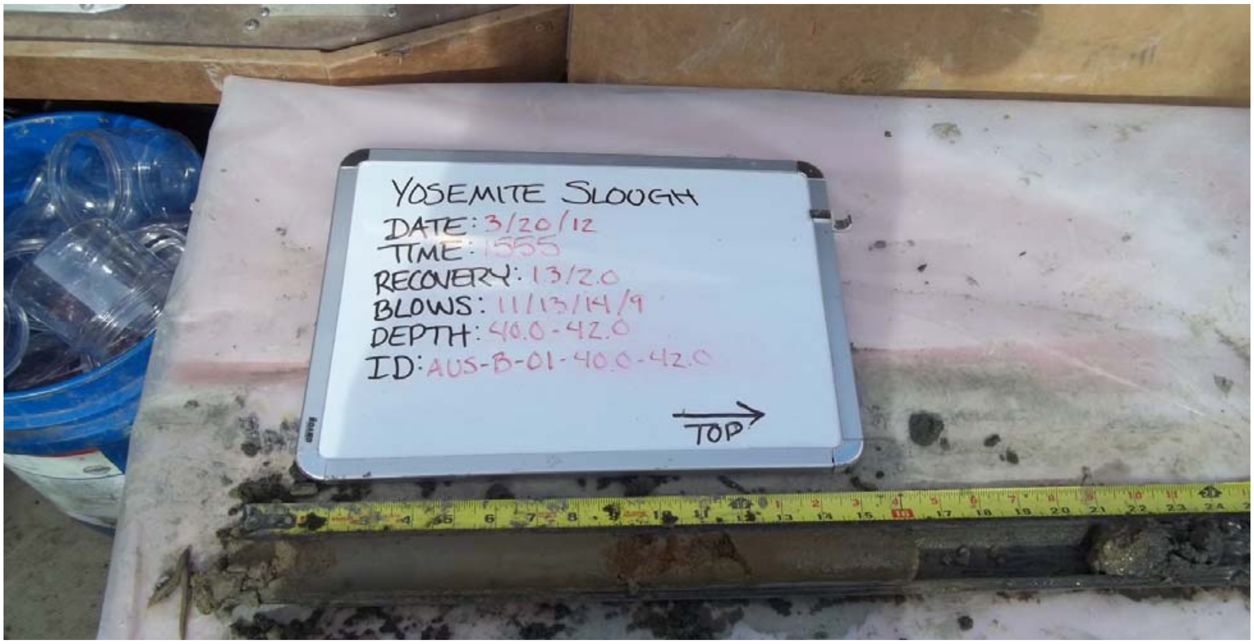
Split-spoon sample AUS-B-01-25.0-27.0



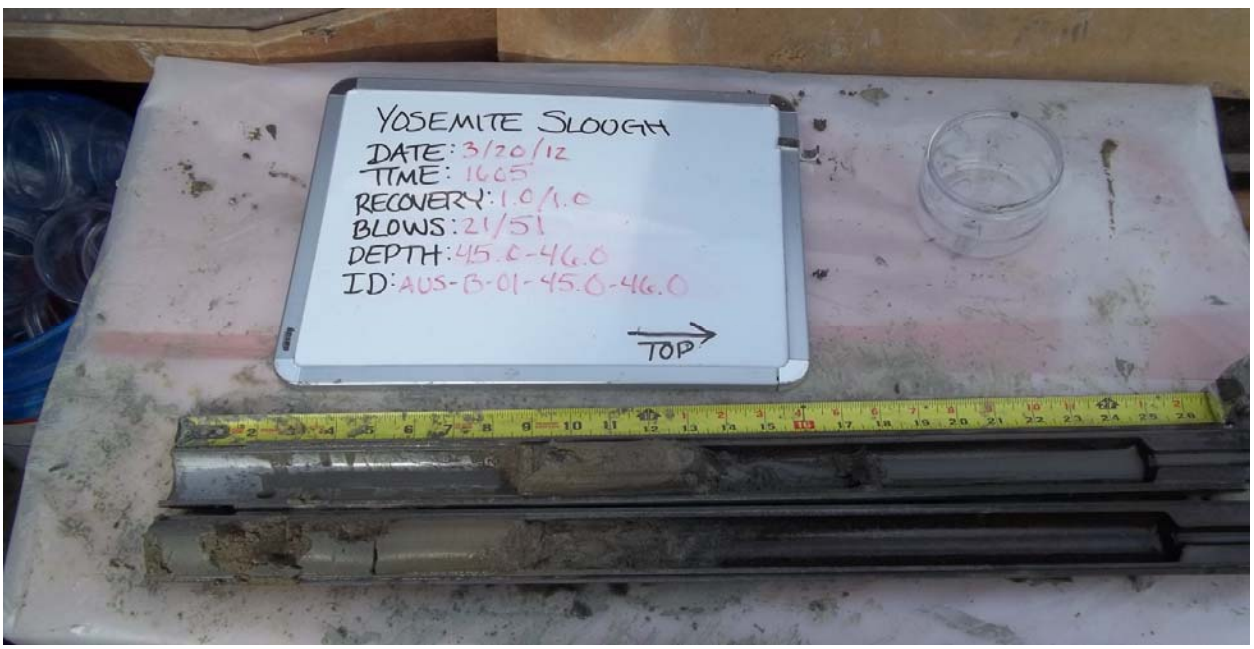
Shelby tube sample AUS-B-01-27.0-29.0

Split-spoon sample AUS-B-01-30.0-32.0

Split-spoon sample AUS-B-01-35.0-37.0

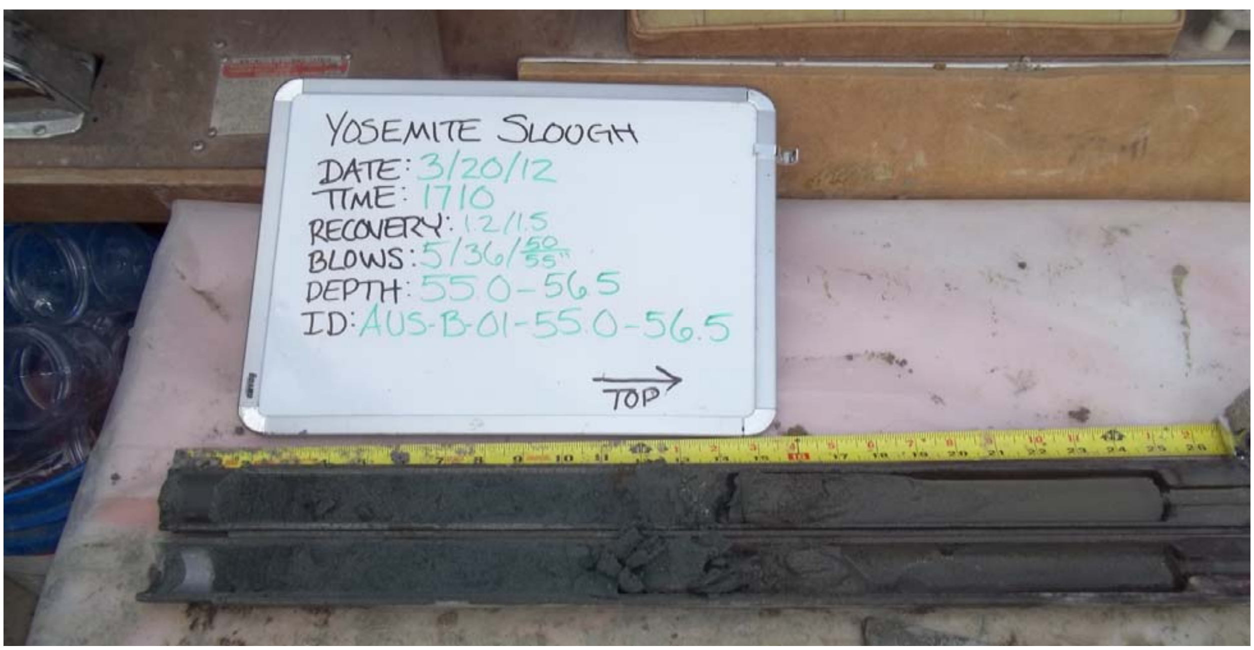


Split-spoon sample AUS-B-01-40.0-42.0



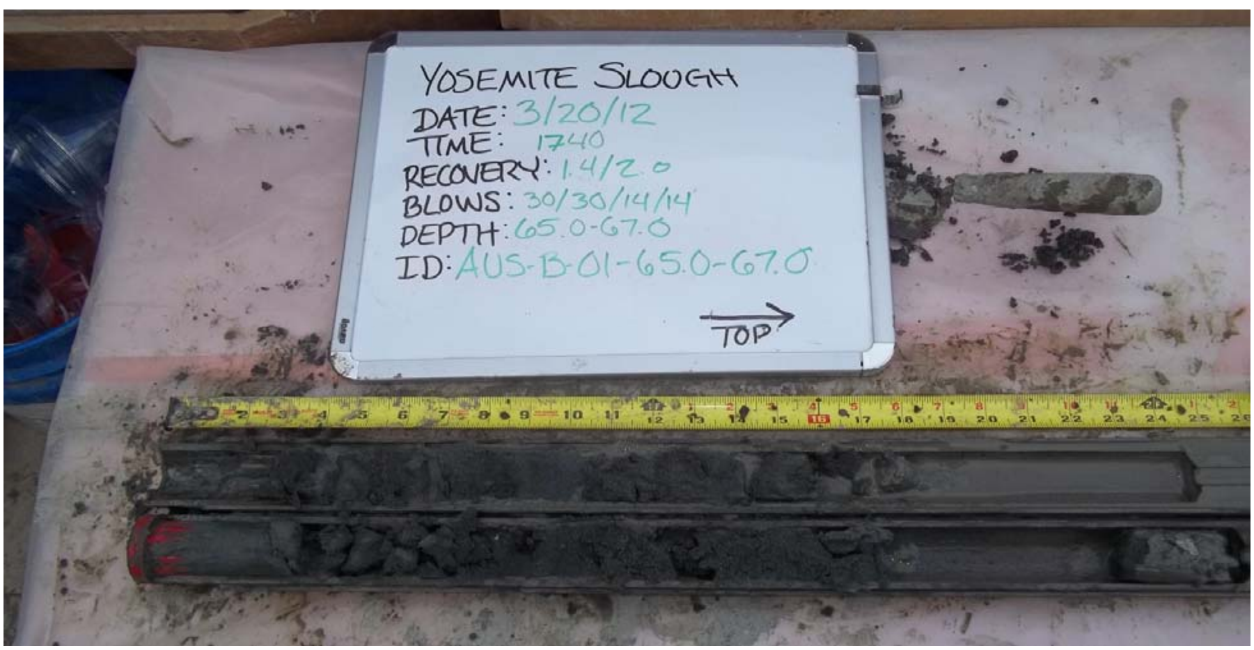
Split-spoon sample AUS-B-01-45.0-46.0

Split-spoon sample AUS-B-01-50.0-52.0



Split-spoon sample AUS-B-01-55.0-56.5

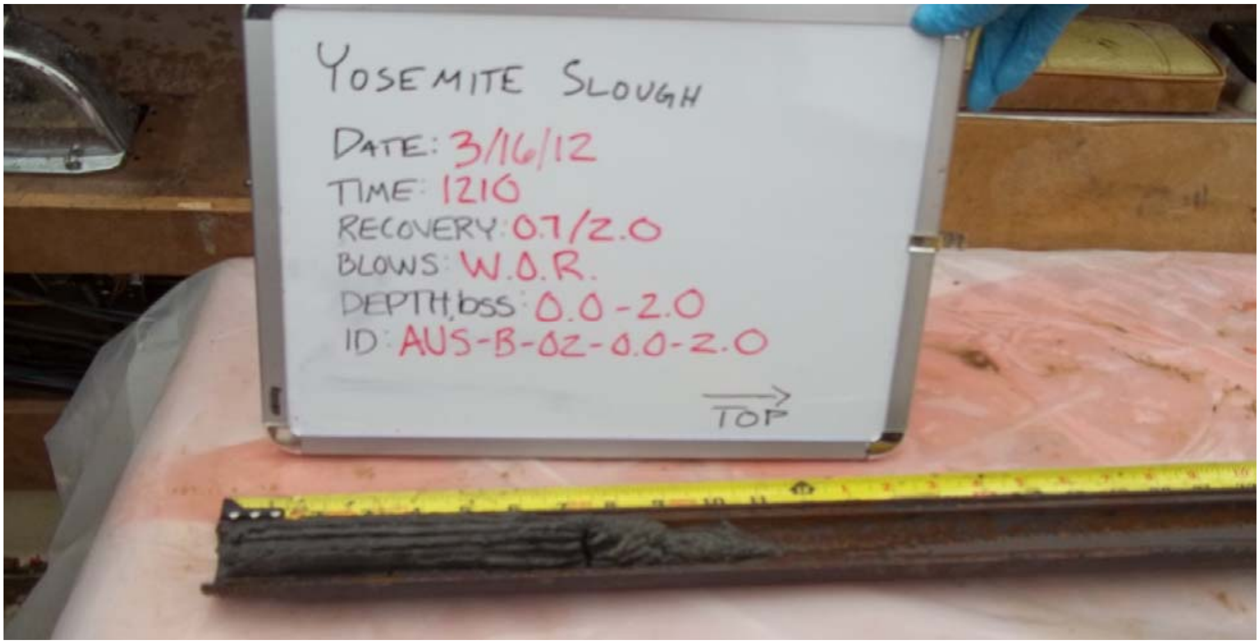
Split-spoon sample AUS-B-01-60.0-62.0



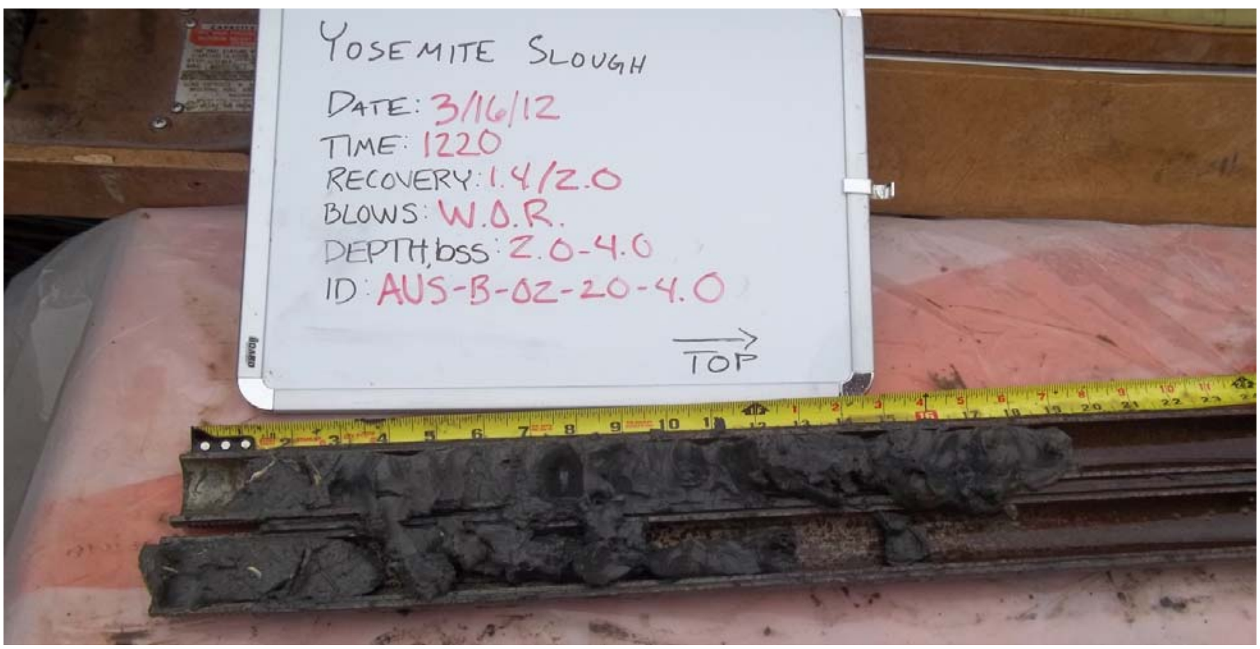
Split-spoon sample AUS-B-01-65.0-67.0

Split-spoon sample AUS-B-01-70.0-72.0

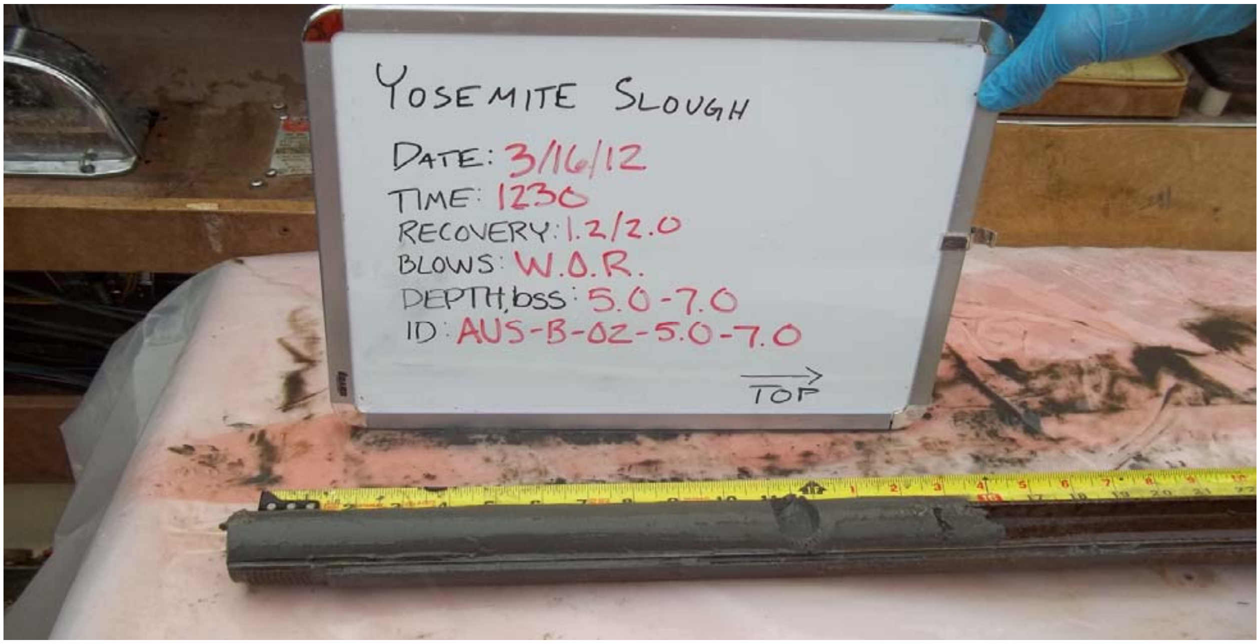
AUS-B-02



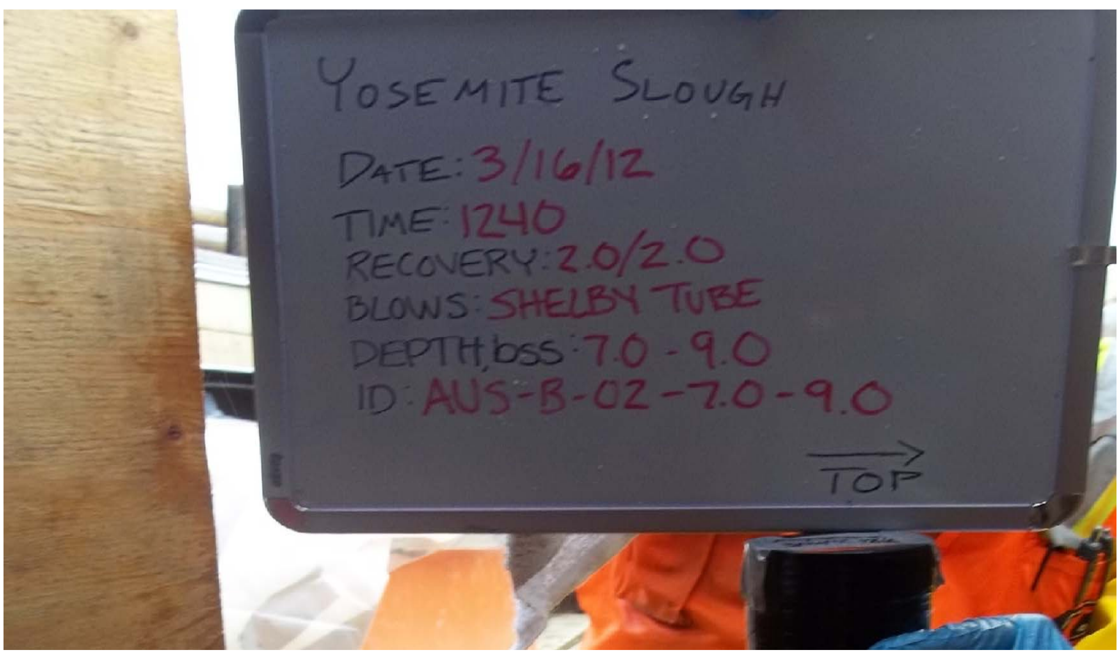
Split-spoon sample AUS-B-02-0.0-2.0



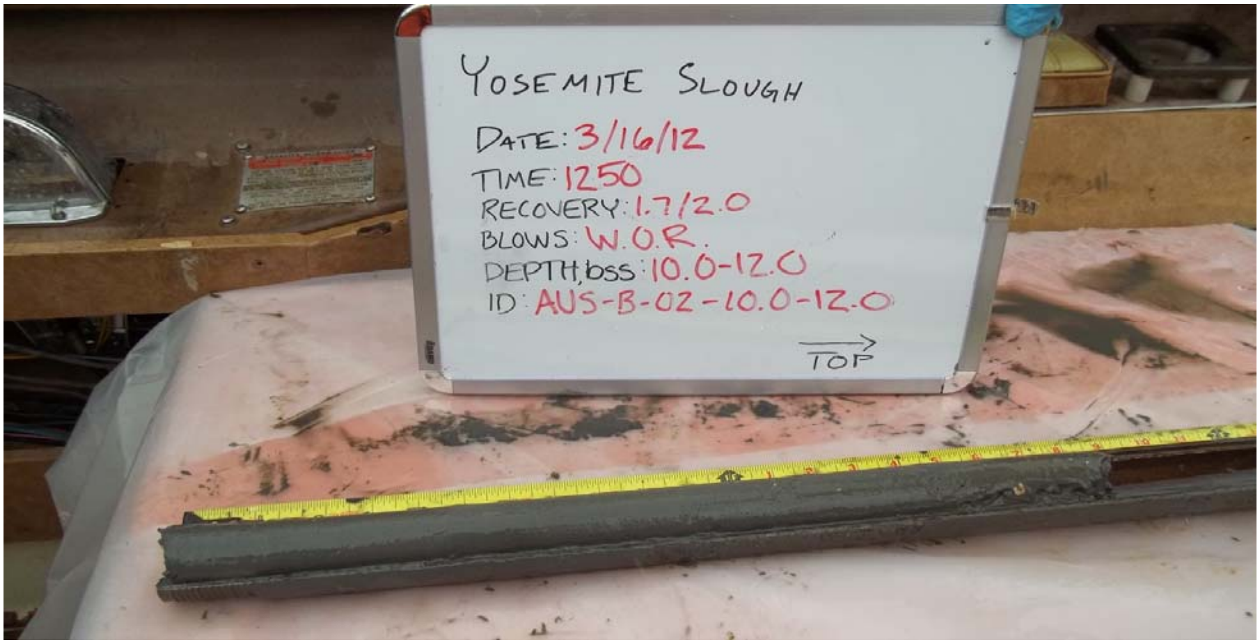
Split-spoon sample AUS-B-02-2.0-4.0



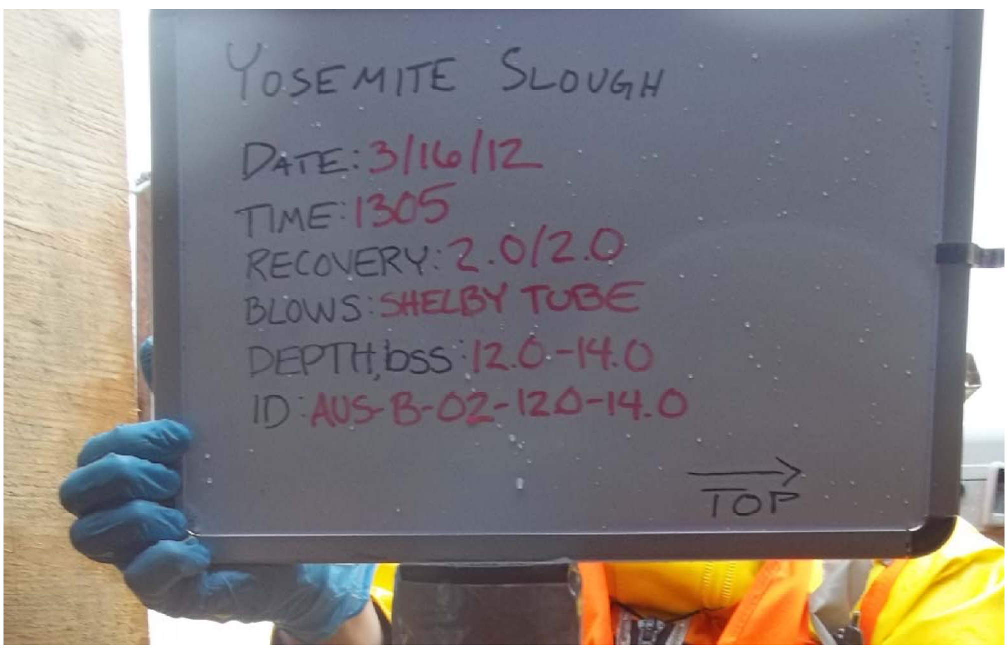
Split-spoon sample AUS-B-02-5.0-7.0



Shelby tube sample AUS-B-02-7.0-9.0

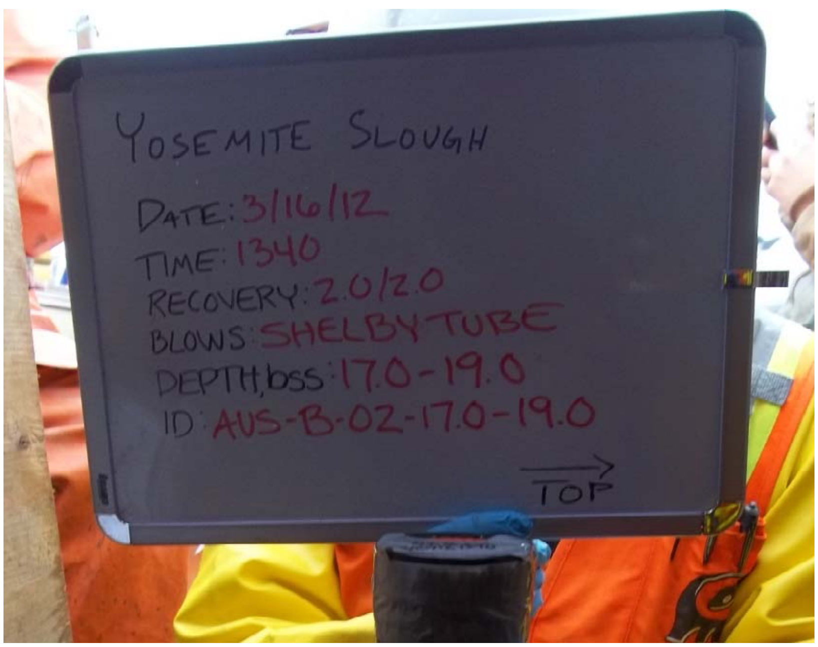


Split-spoon sample AUS-B-02-10.0-12.0

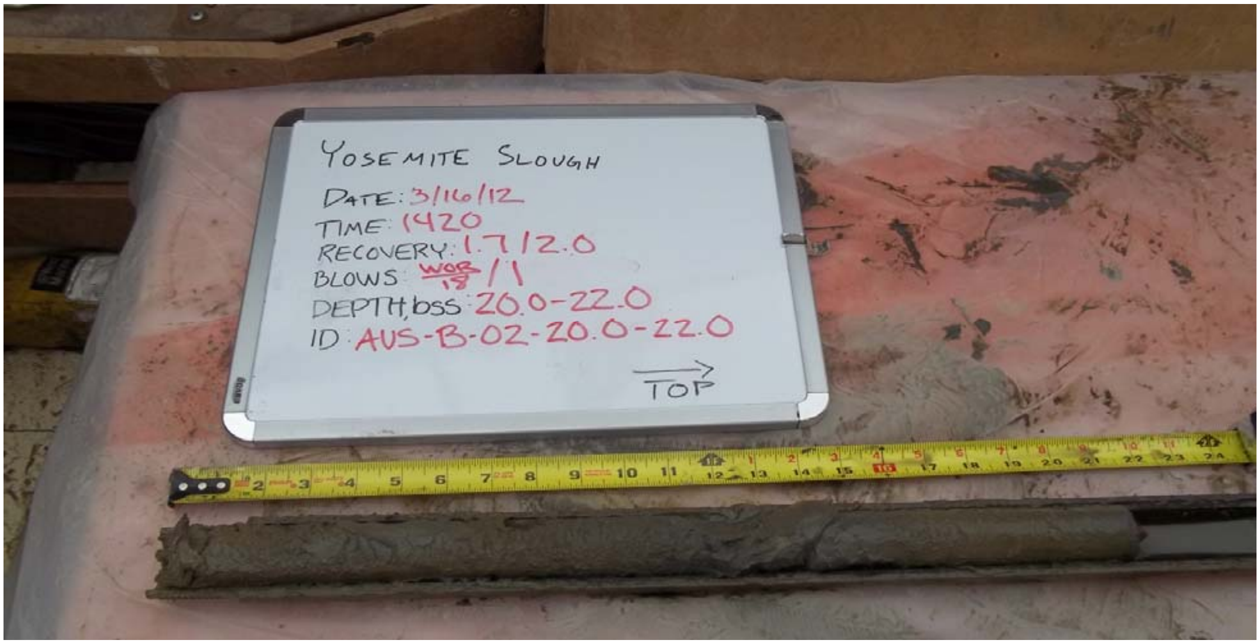


Shelby tube sample AUS-B-02-12.0-14.0

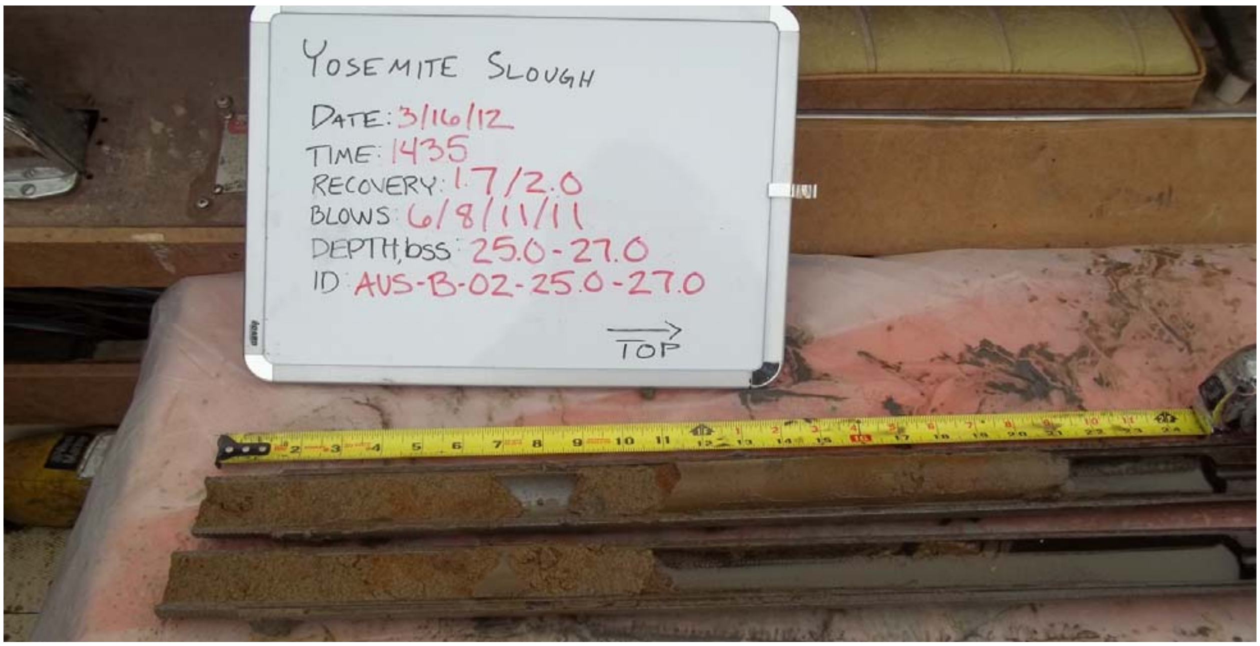
Split-spoon sample AUS-B-02-15.0-17.0



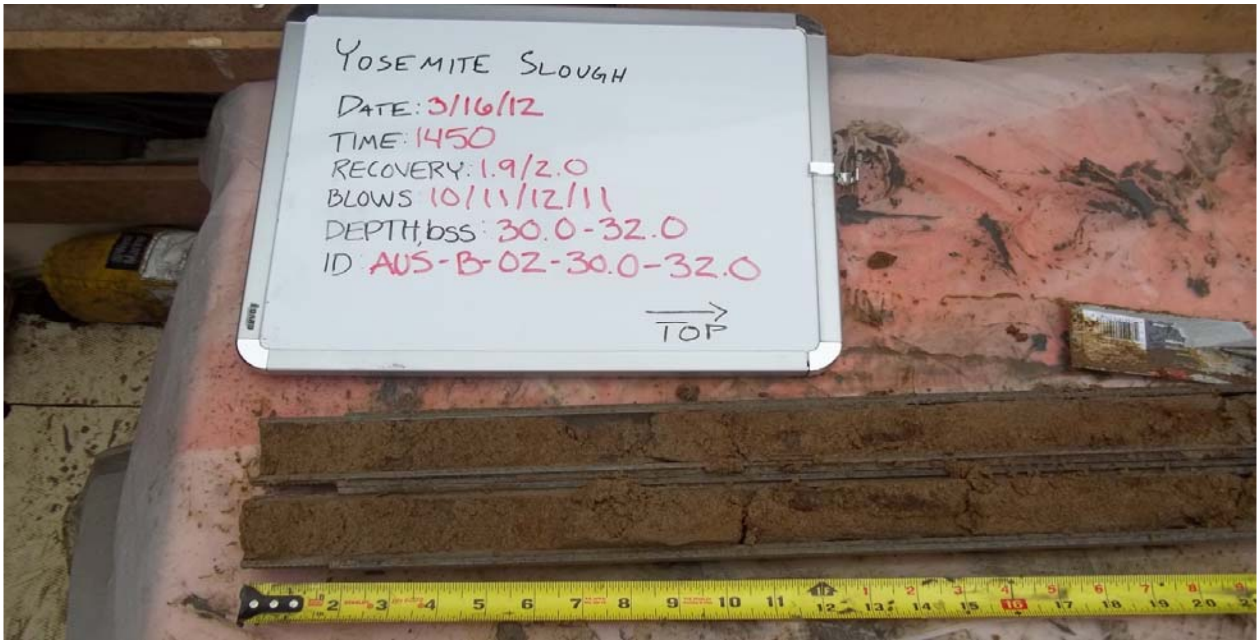
Shelby tube sample AUS-B-02-17.0-19.0



Split-spoon sample AUS-B-02-20.0-22.0

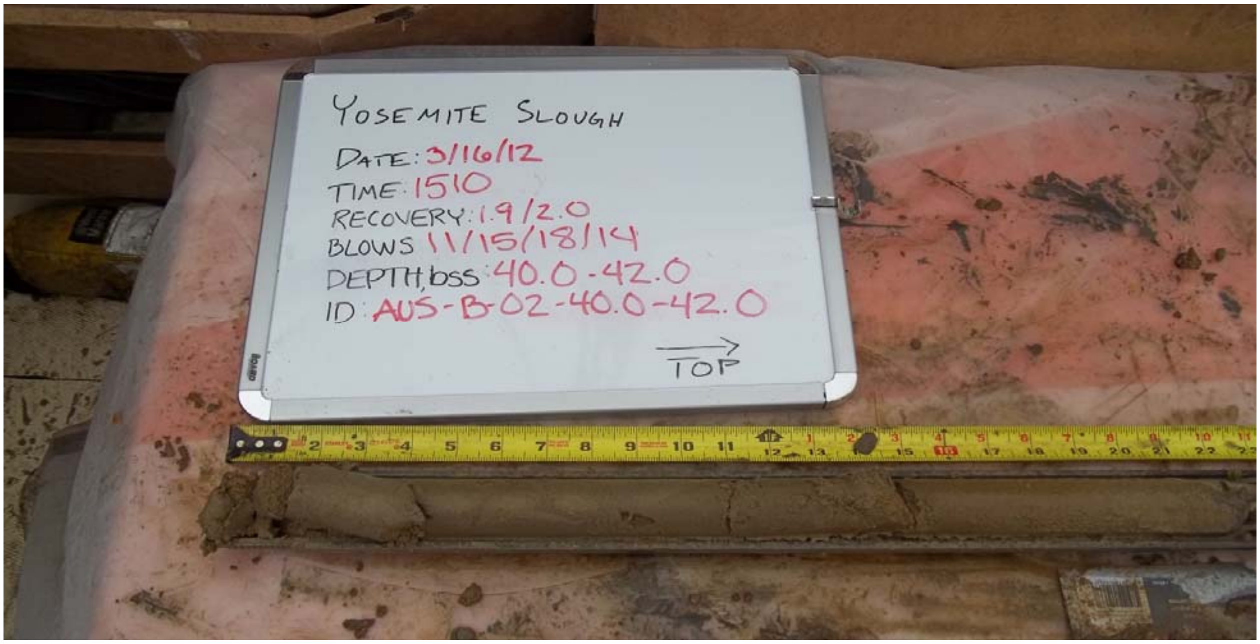


Split-spoon sample AUS-B-02-25.0-27.0

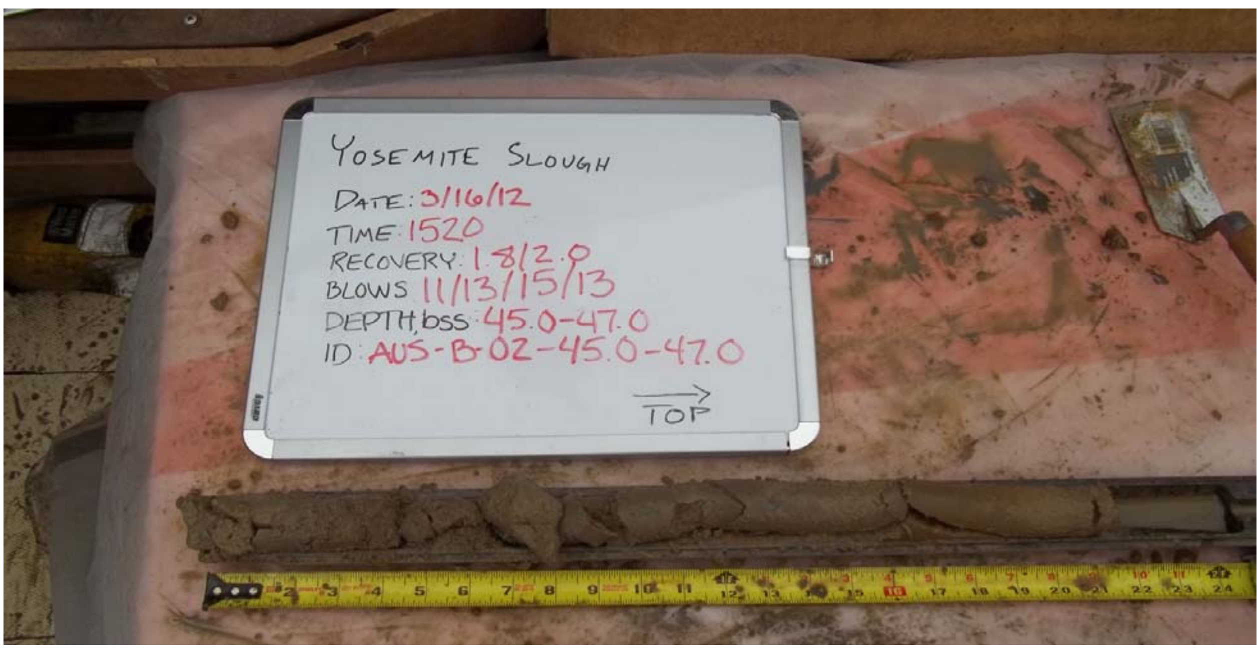


Split-spoon sample AUS-B-02-30.0-32.0

Split-spoon sample AUS-B-02-35.0-37.0

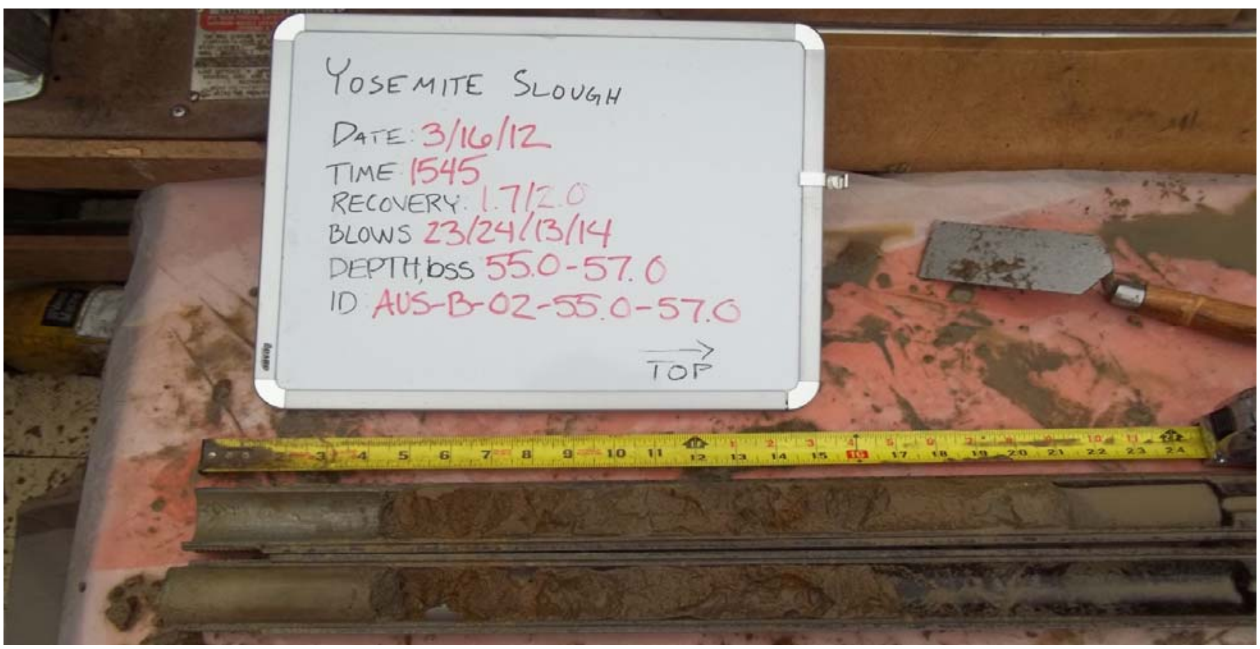


Split-spoon sample AUS-B-02-40.0-42.0



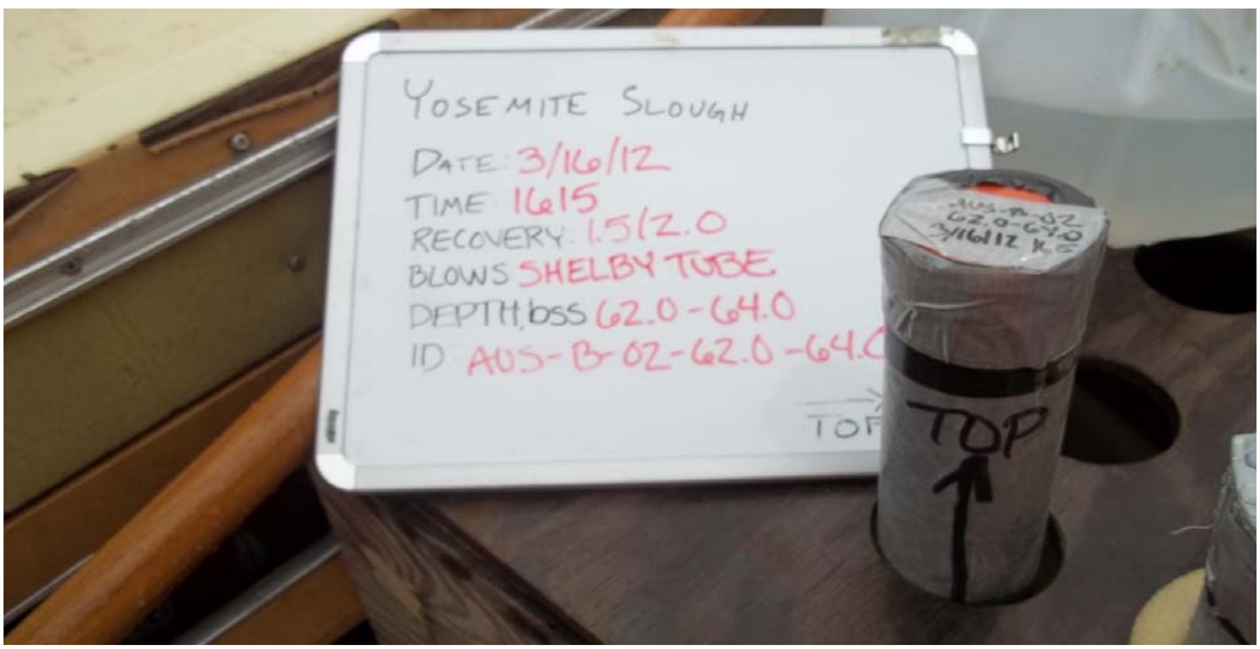
Split-spoon sample AUS-B-02-45.0-47.0

Split-spoon sample AUS-B-02-50.0-52.0

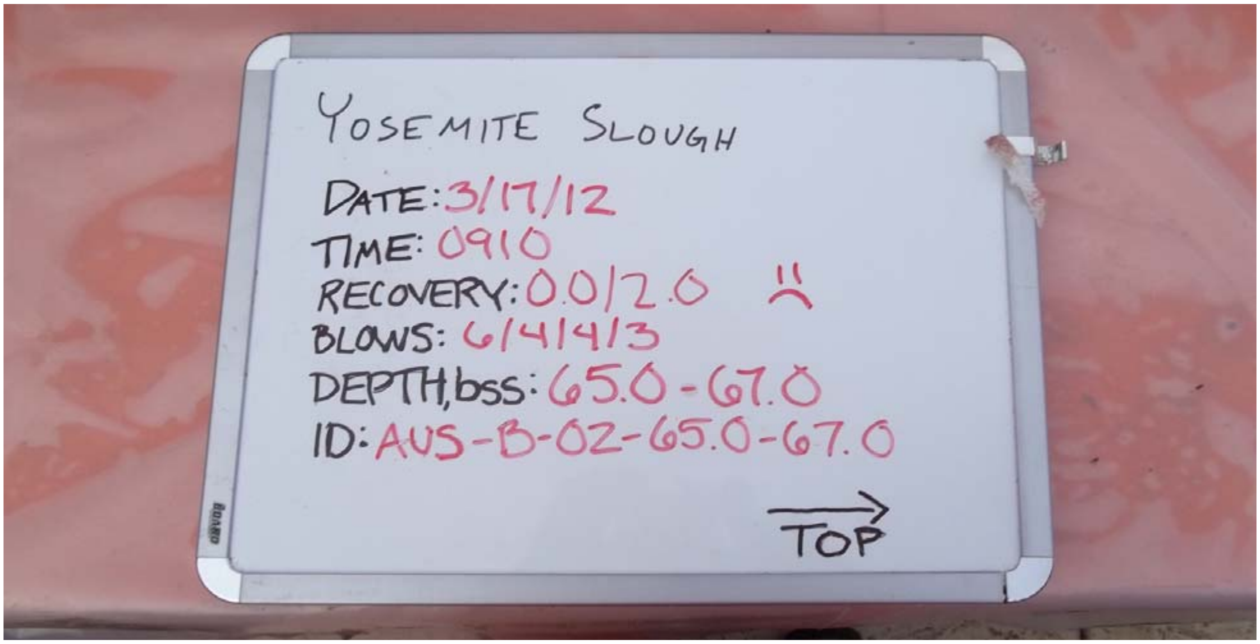


Split-spoon sample AUS-B-02-55.0-57.0

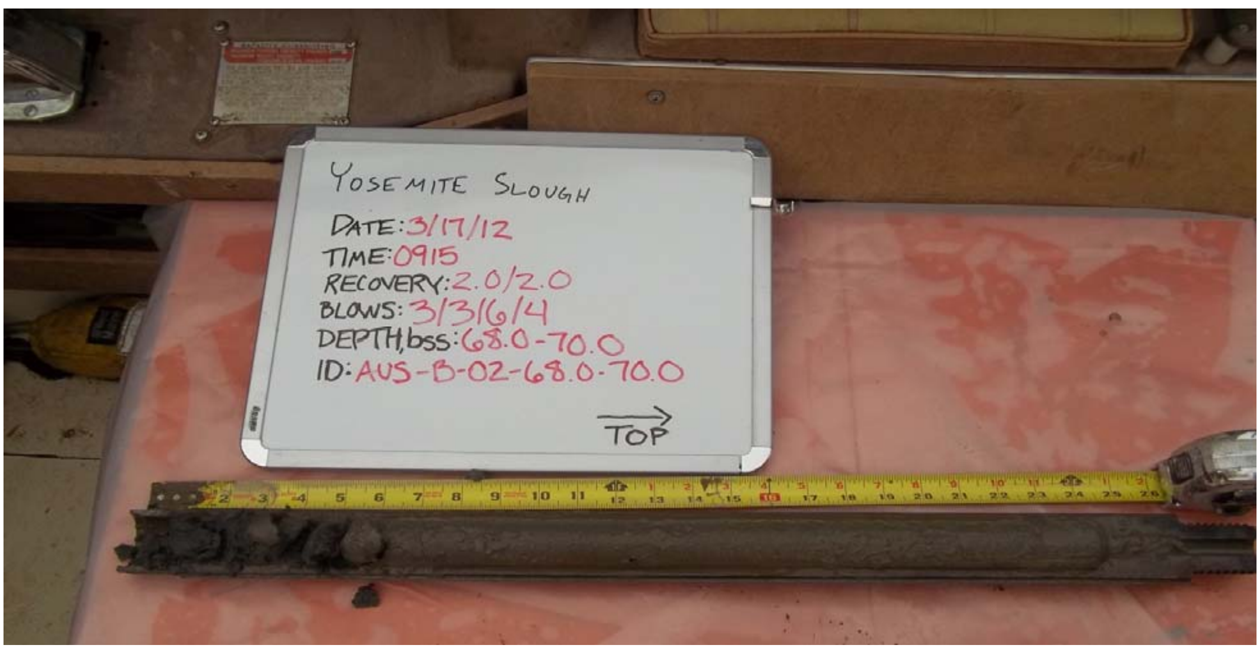
Split-spoon sample AUS-B-02-60.0-62.0



Shelby tube sample AUS-B-02-62.0-64.0



Split-spoon sample AUS-B-02-65.0-67.0

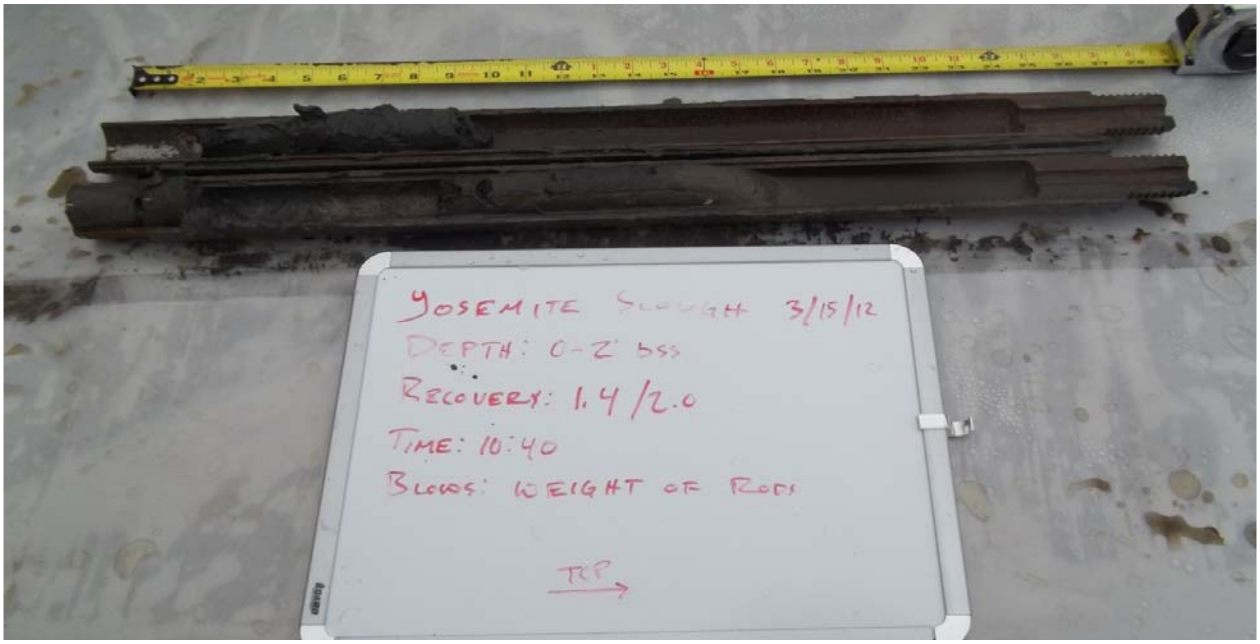


Split-spoon sample AUS-B-02-68.0-70.0

Appendix D

Field Photo Log

AUS-B-03



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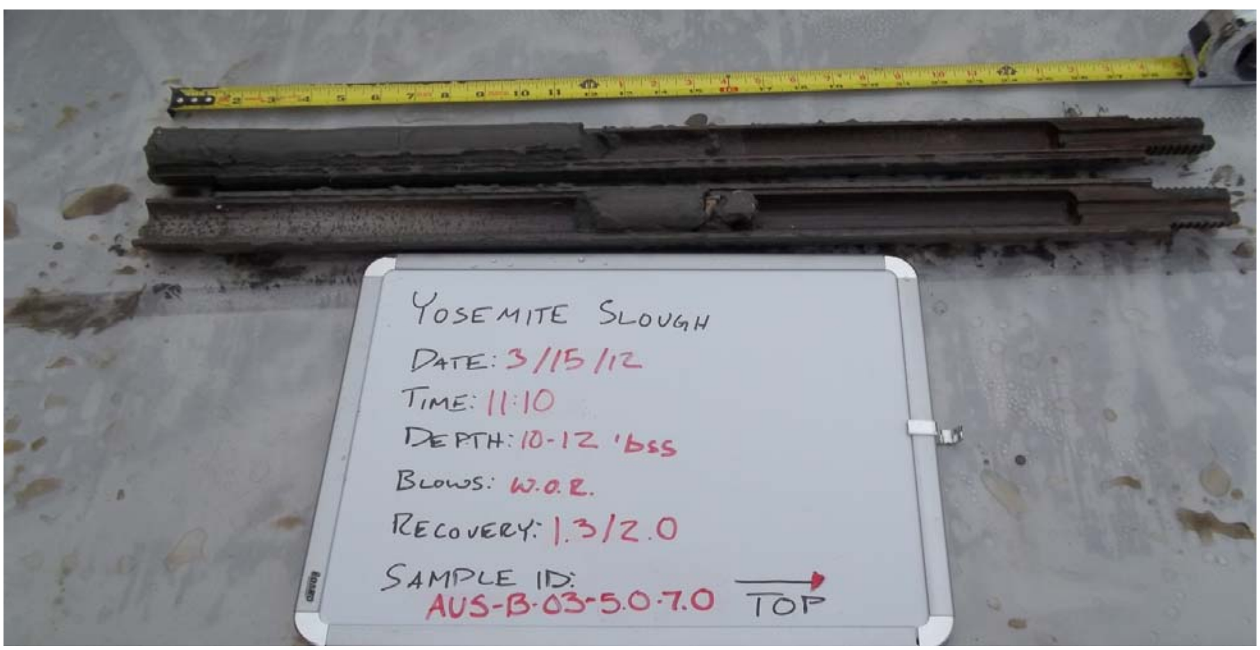
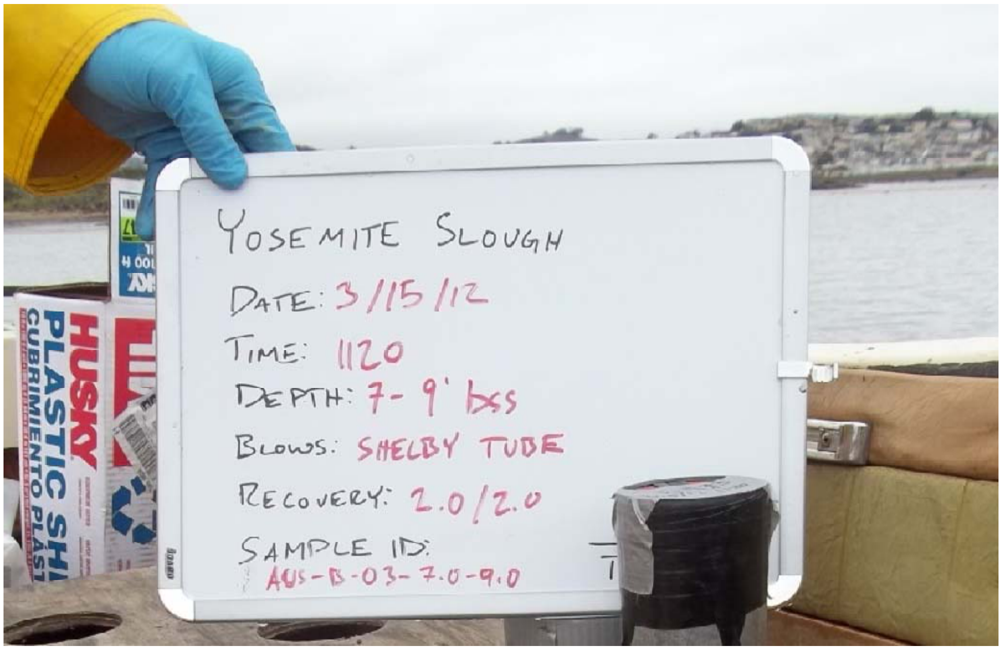
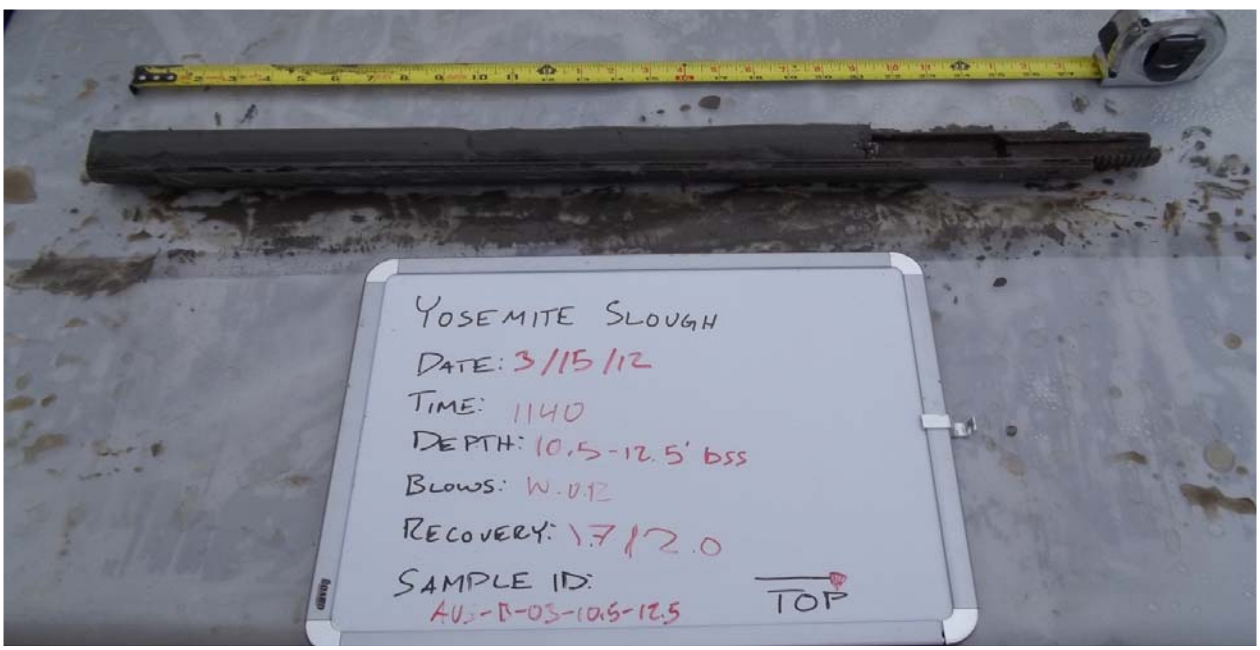


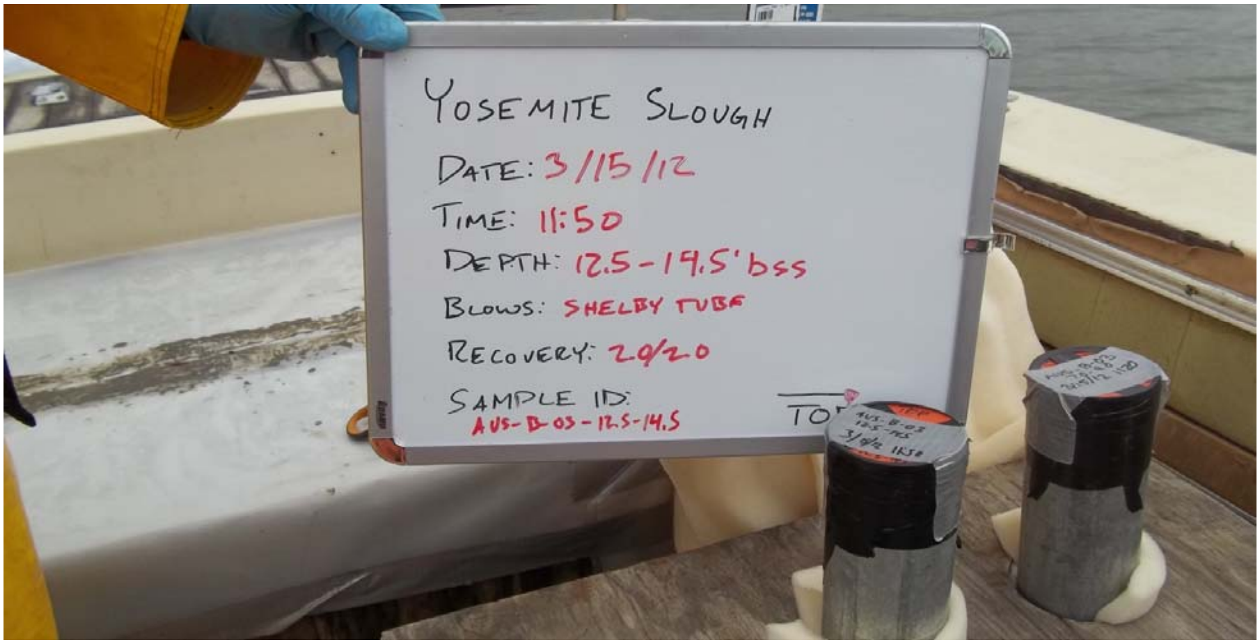
Split-spoon sample AUS-B-03-5.0-7.0



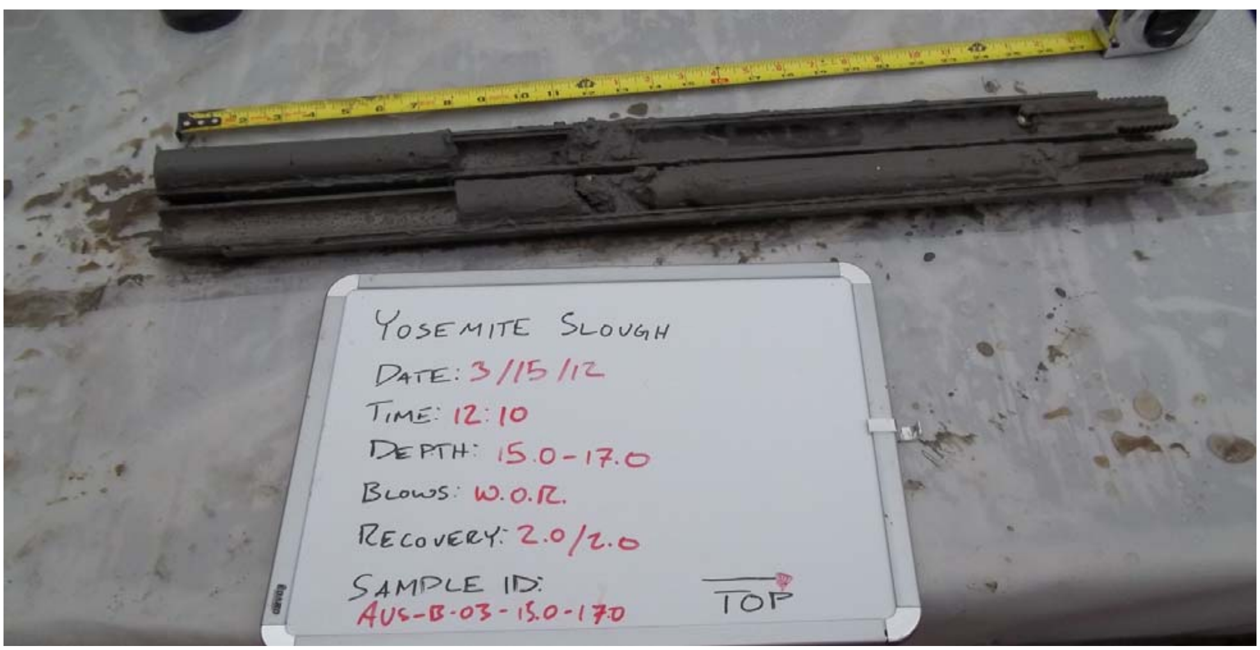
Shelby tube sample AUS-B-03-7.0-9.0



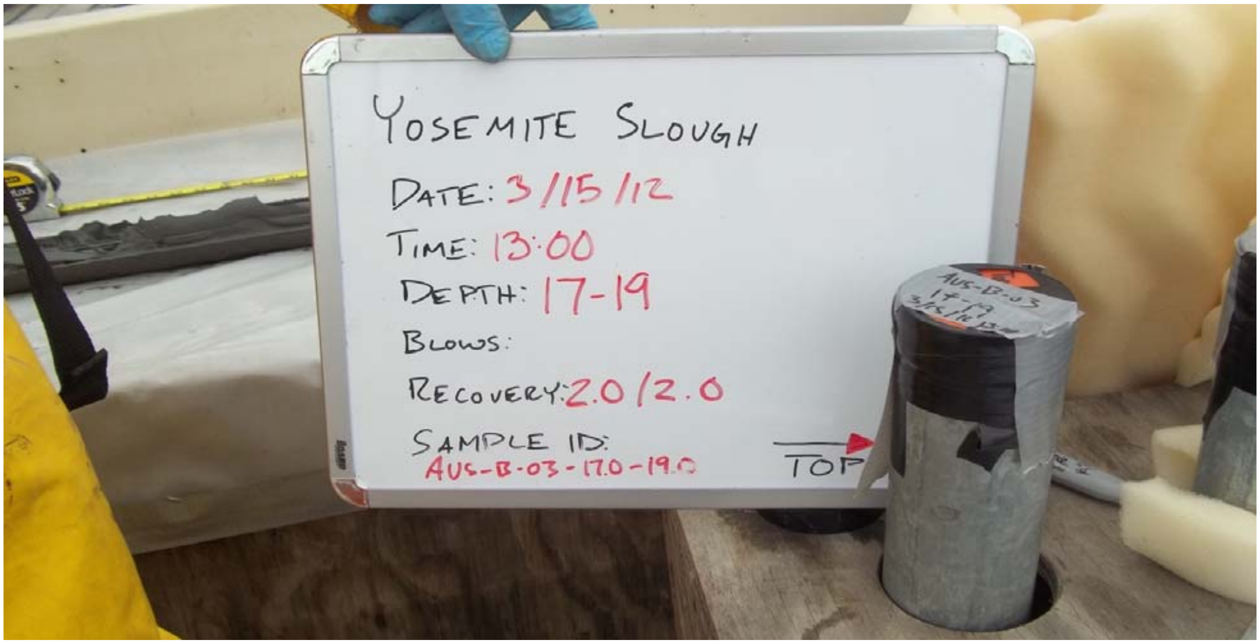
Split-spoon sample AUS-B-03-10.5-12.5



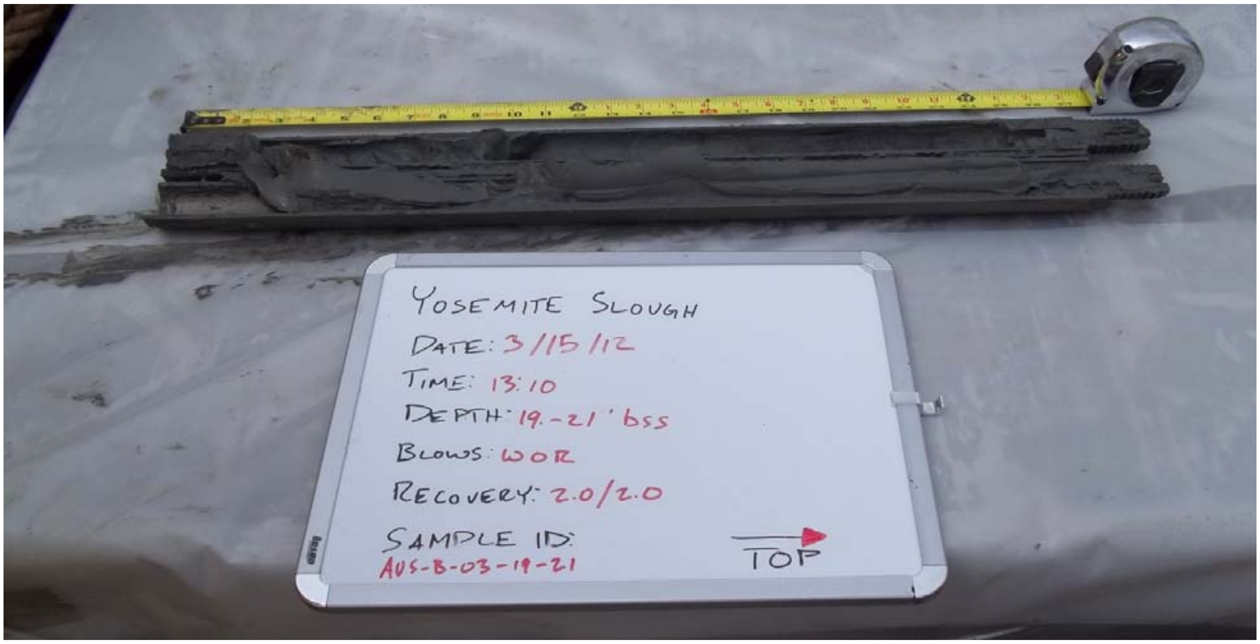
Shelby tube sample AUS-B-03-12.5-14.5



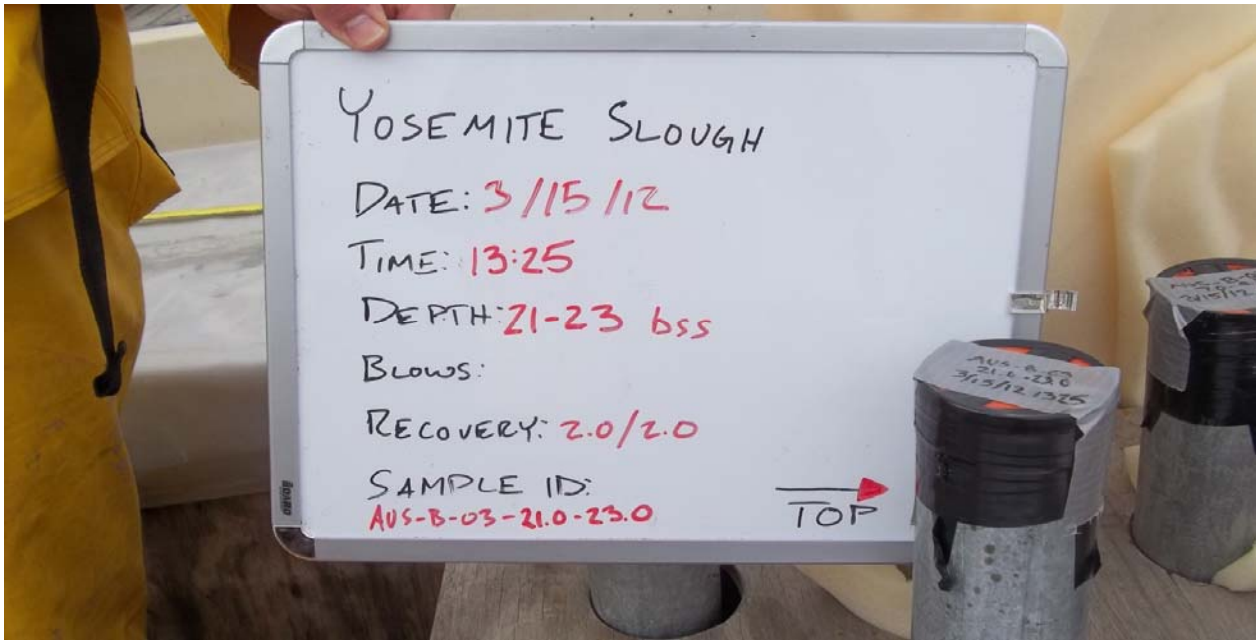
Split-spoon sample AUS-B-03-15.0-17.0



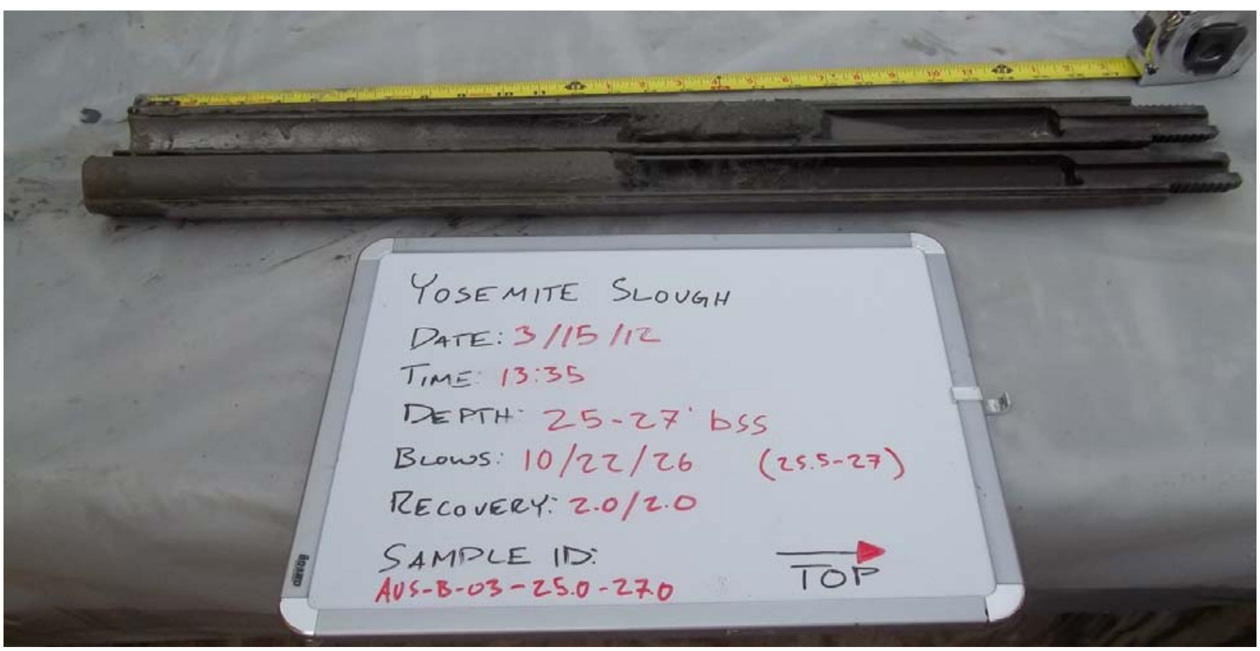
Shelby tube sample AUS-B-03-17.0-19.0



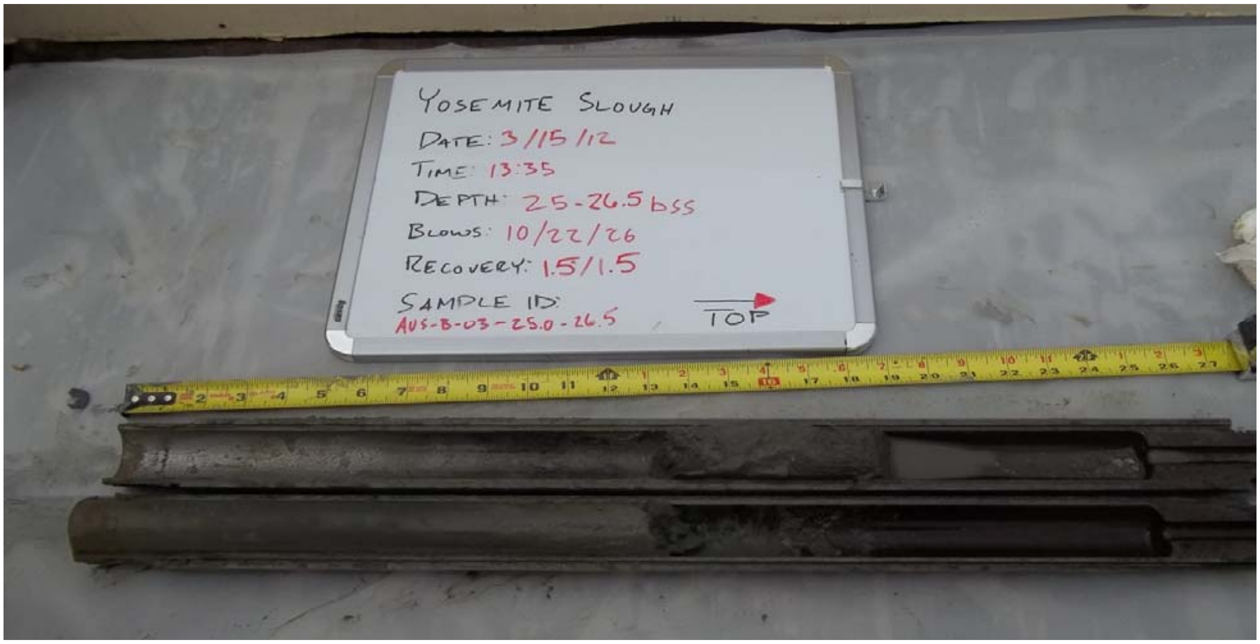
Split-spoon sample AUS-B-03-19.0-21.0



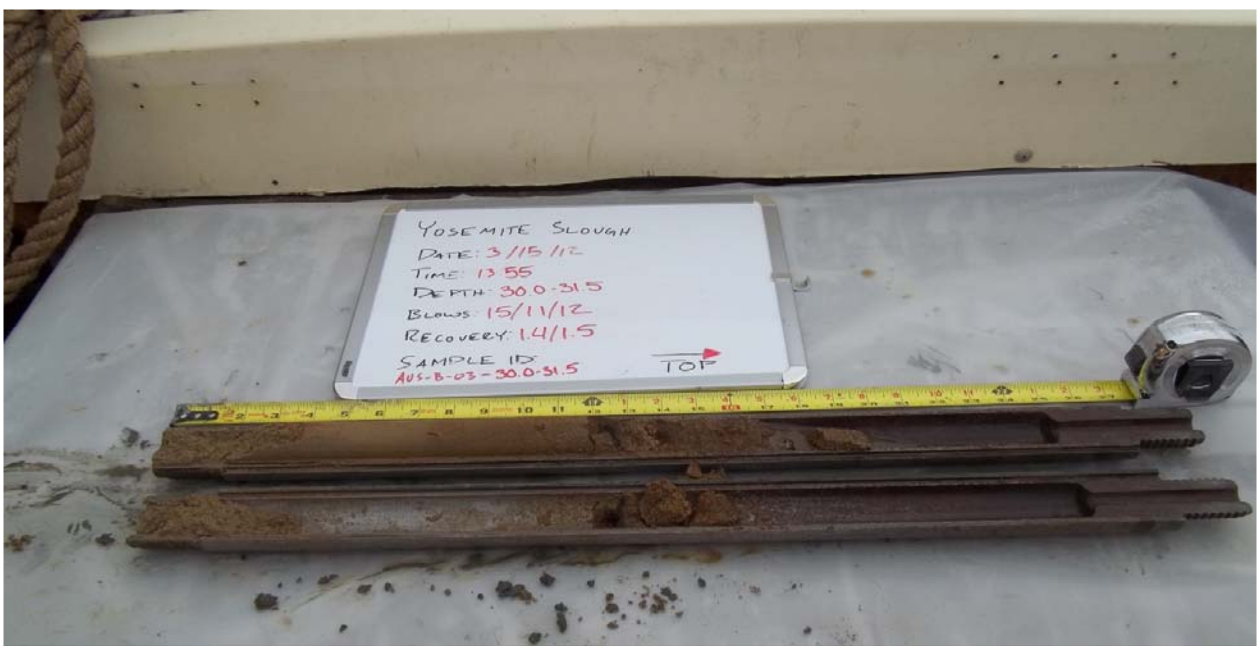
Shelby tube sample AUS-B-03-21.0-23.0



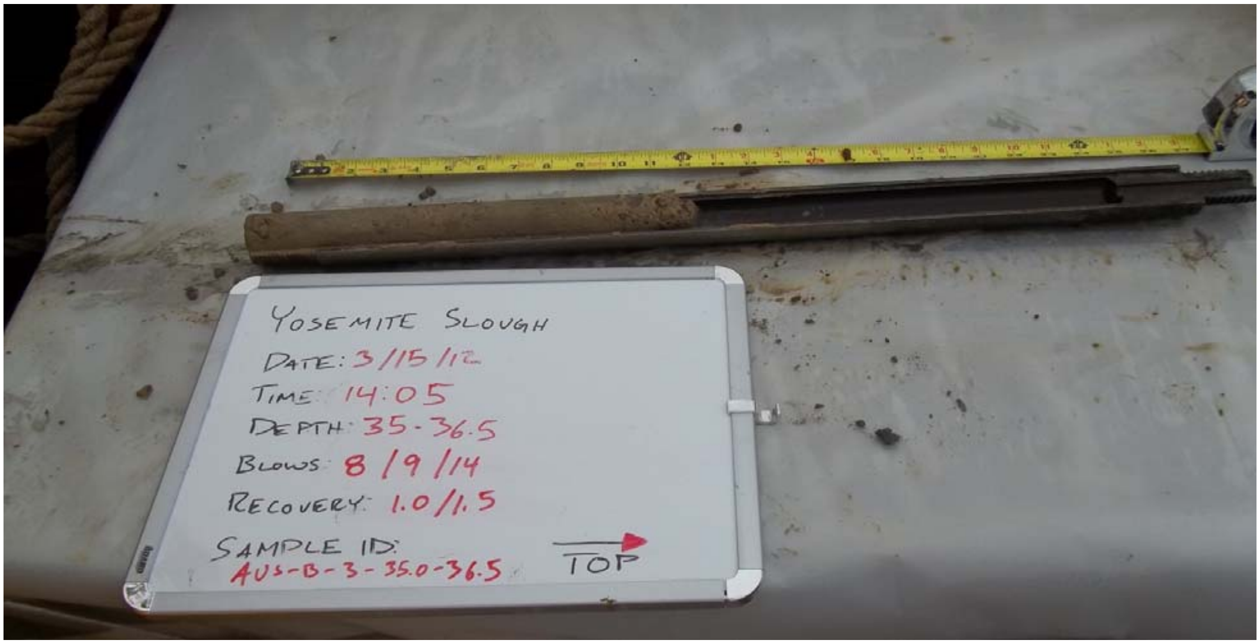
Split-spoon sample AUS-B-03-25.0-27.0



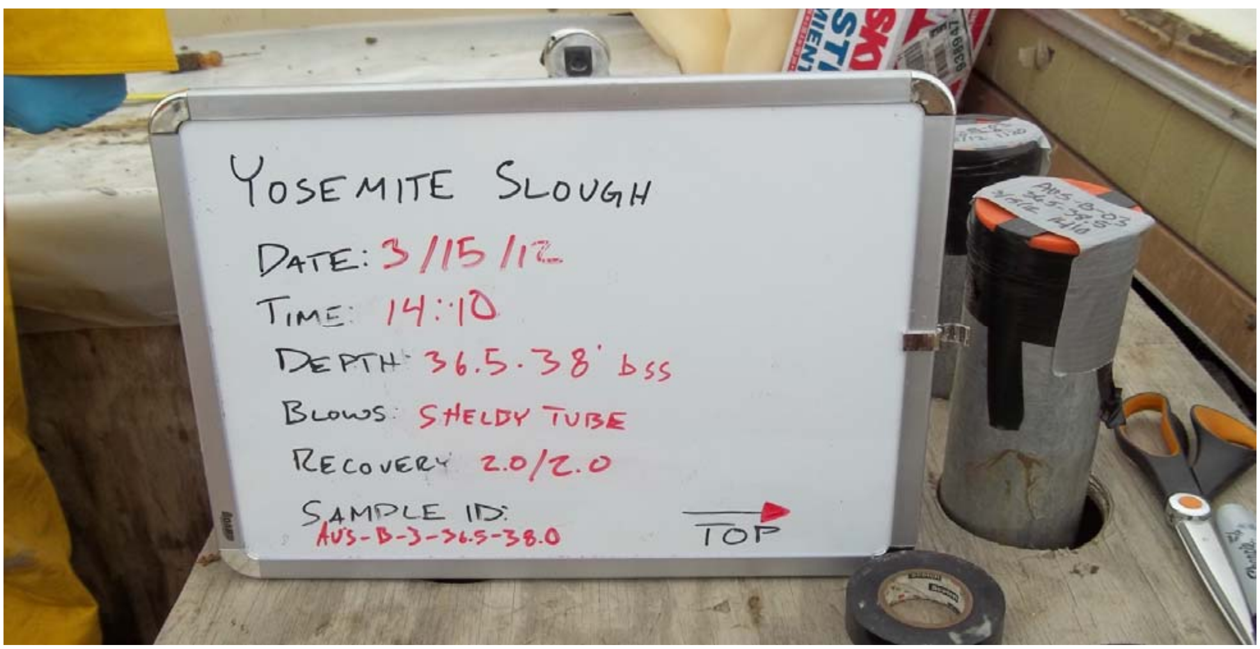
Split-spoon sample AUS-B-03-25.0-26.5



Split-spoon sample AUS-B-03-30.0-31.5

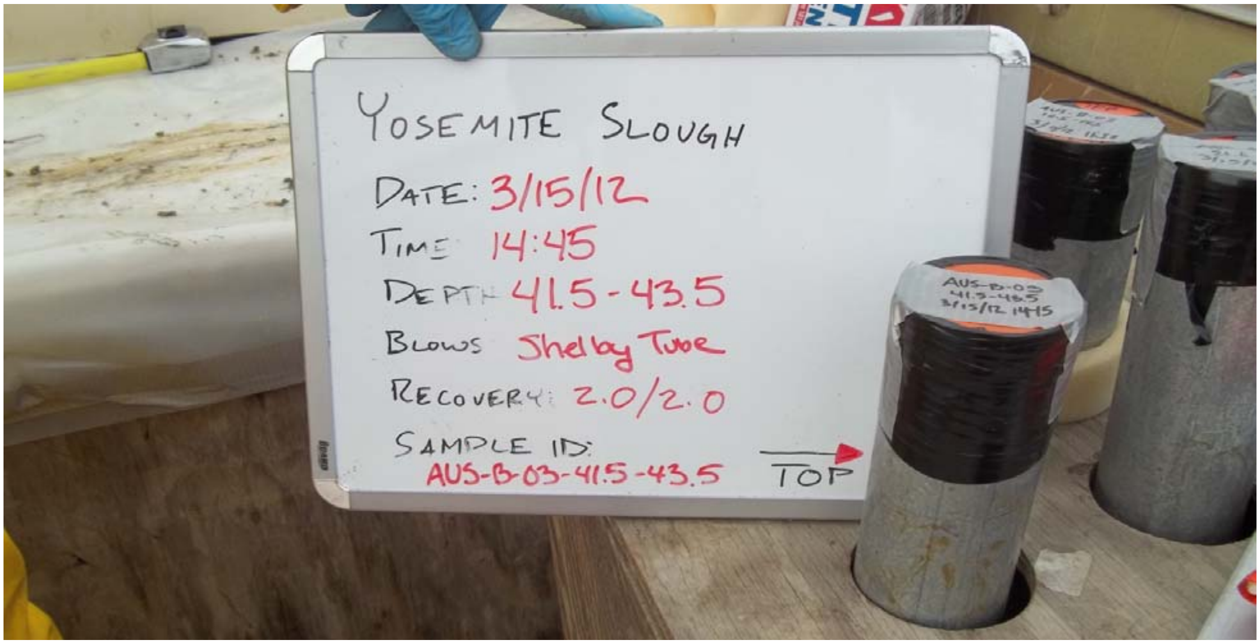


Split-spoon sample AUS-B-03-35.0-36.5

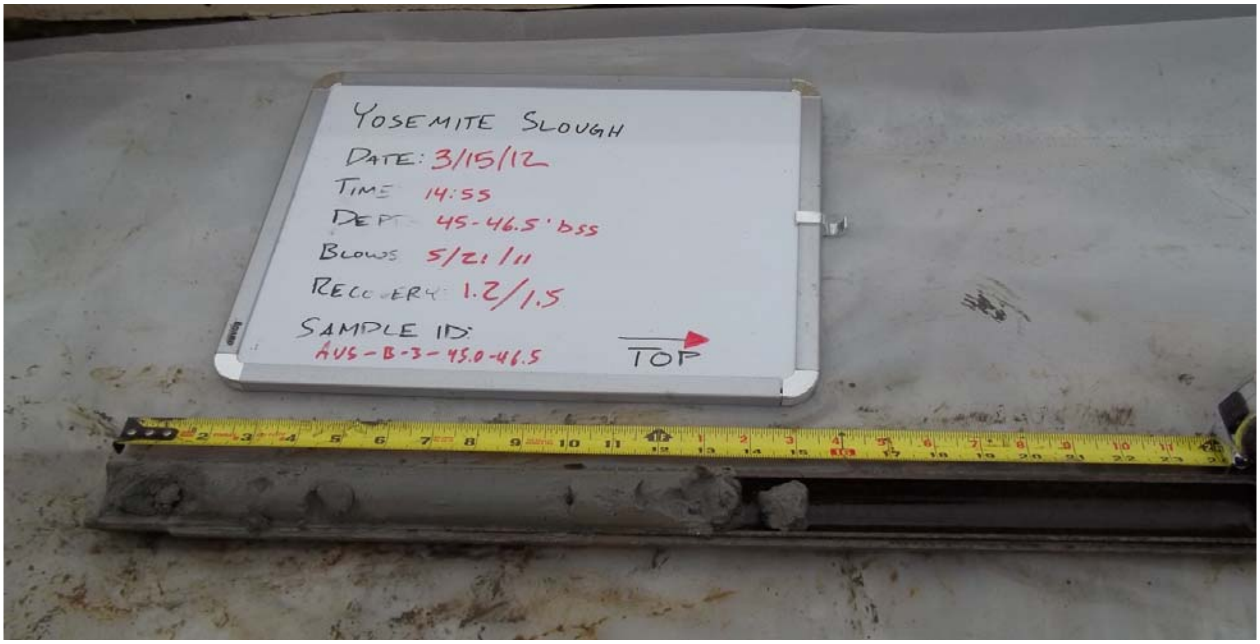


Shelby tube sample AUS-B-03-36.5-38.0

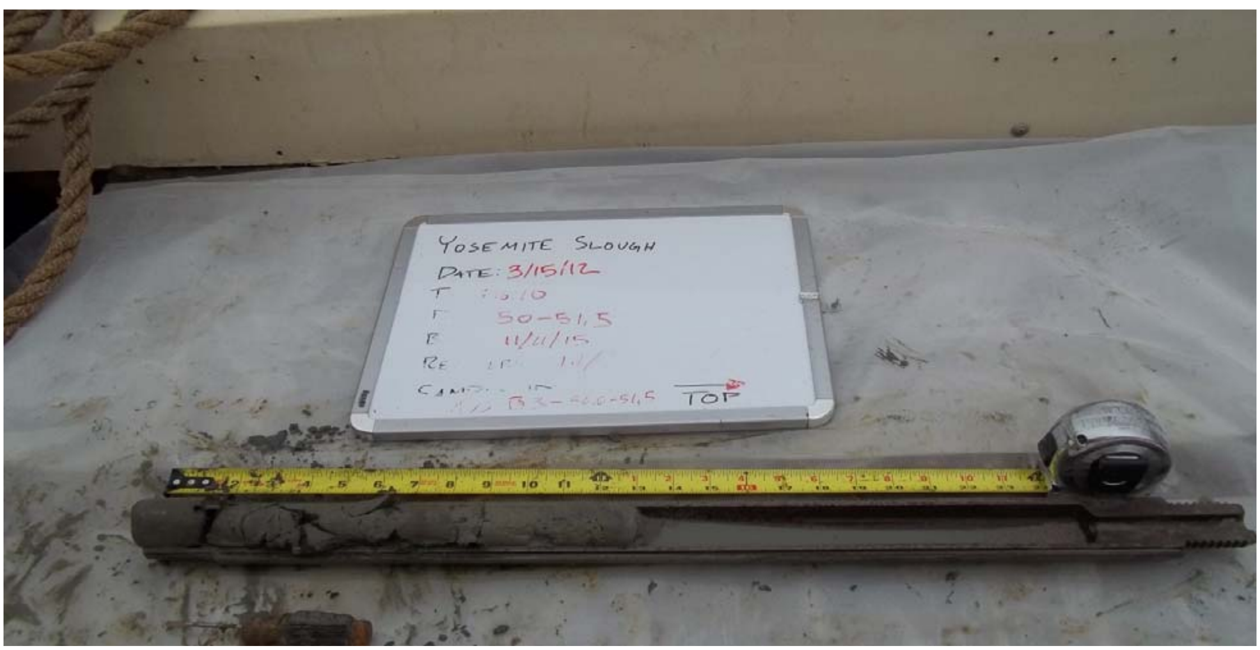
Split-spoon sample AUS-B-03-40.0-41.5



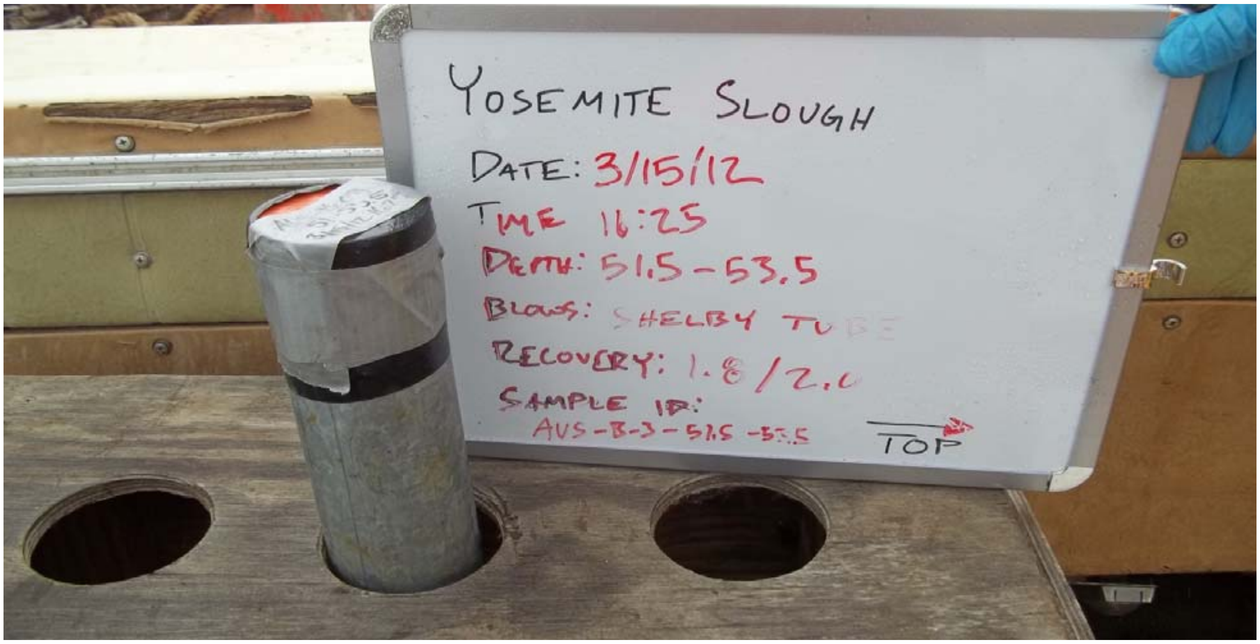
Shelby tube sample AUS-B-03-41.5-43.5



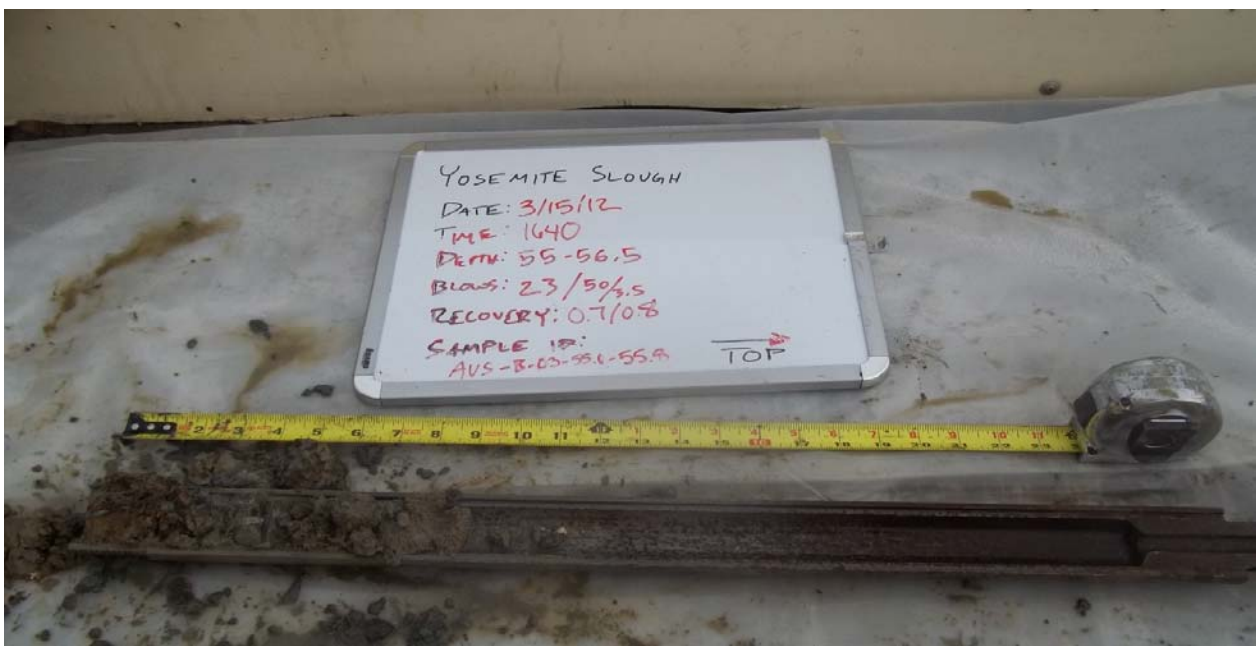
Split-spoon sample AUS-B-03-45.0-46.5



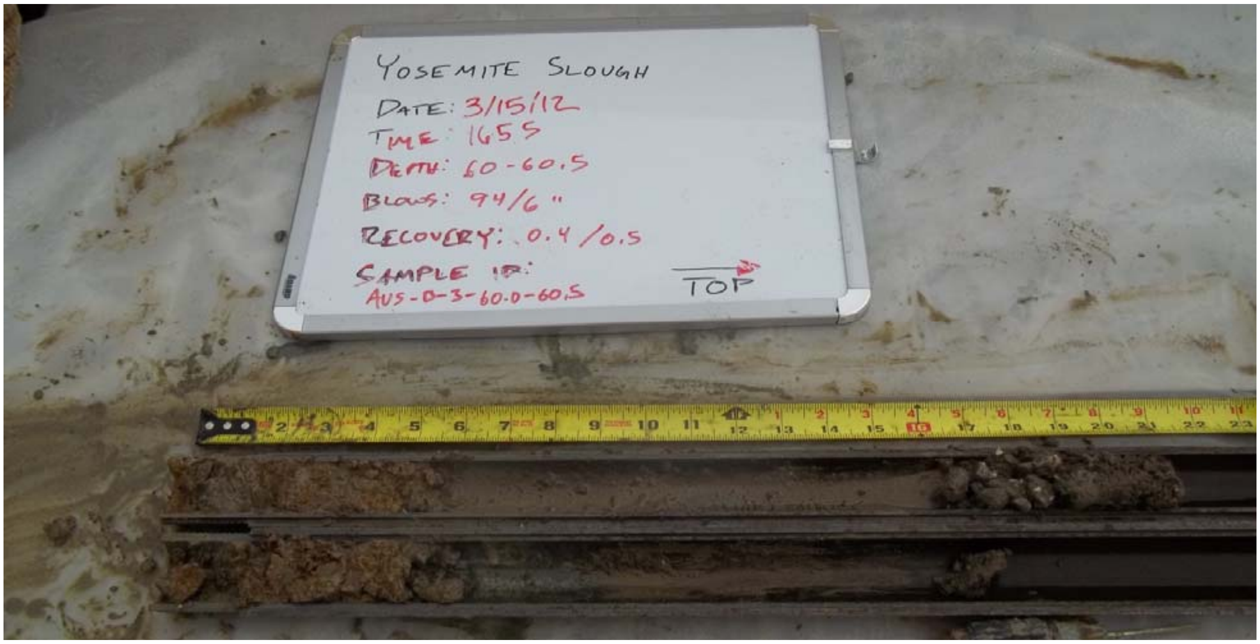
Split-spoon sample AUS-B-03-50.0-51.5



Shelby tube sample AUS-B-03-51.5-53.5



Split-spoon sample AUS-B-03-55.0-56.5

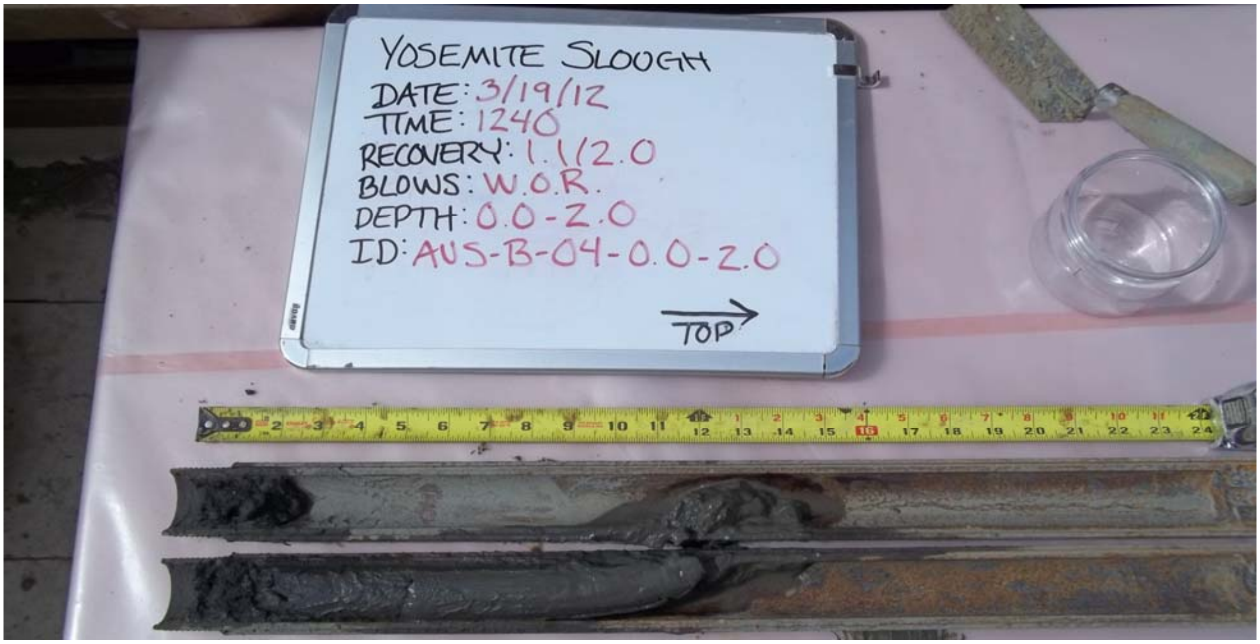


Split-spoon sample AUS-B-03-60.0-60.5

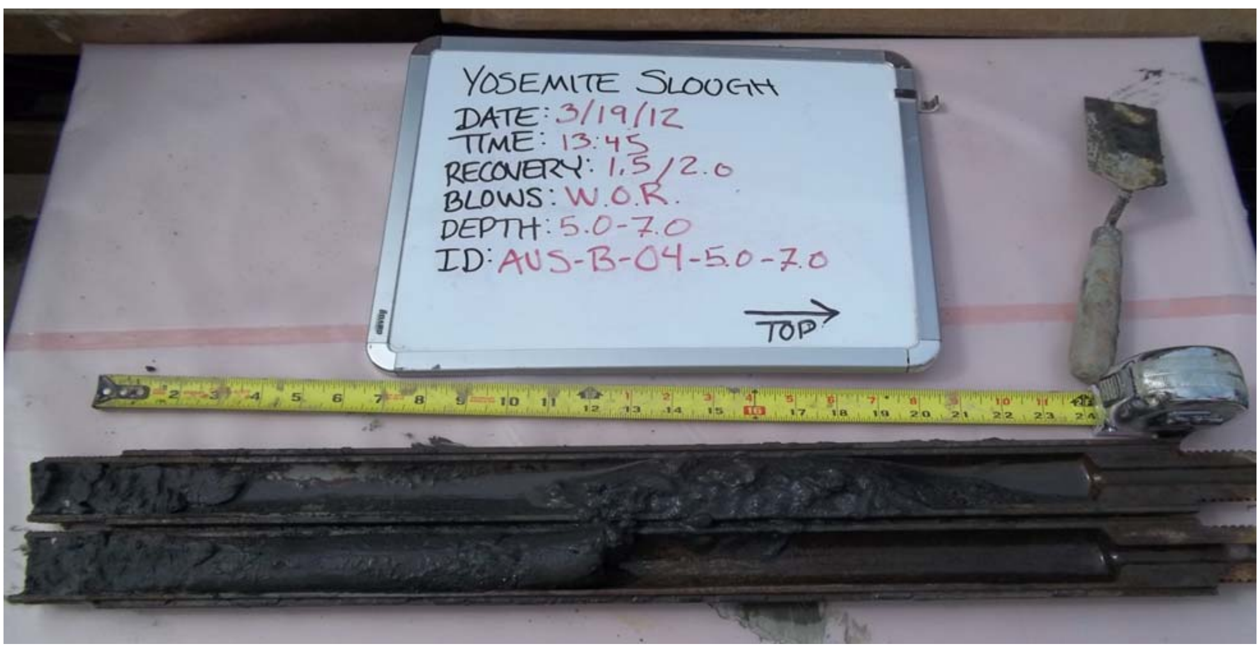
Appendix D

Field Photo Log

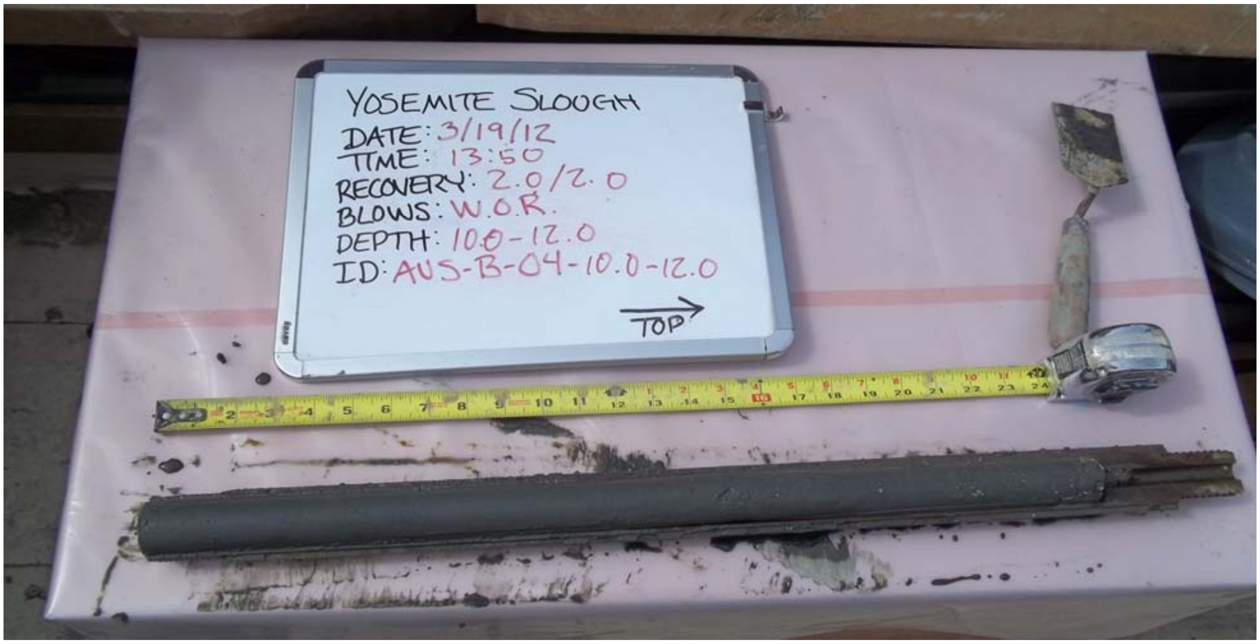
AUS-B-04



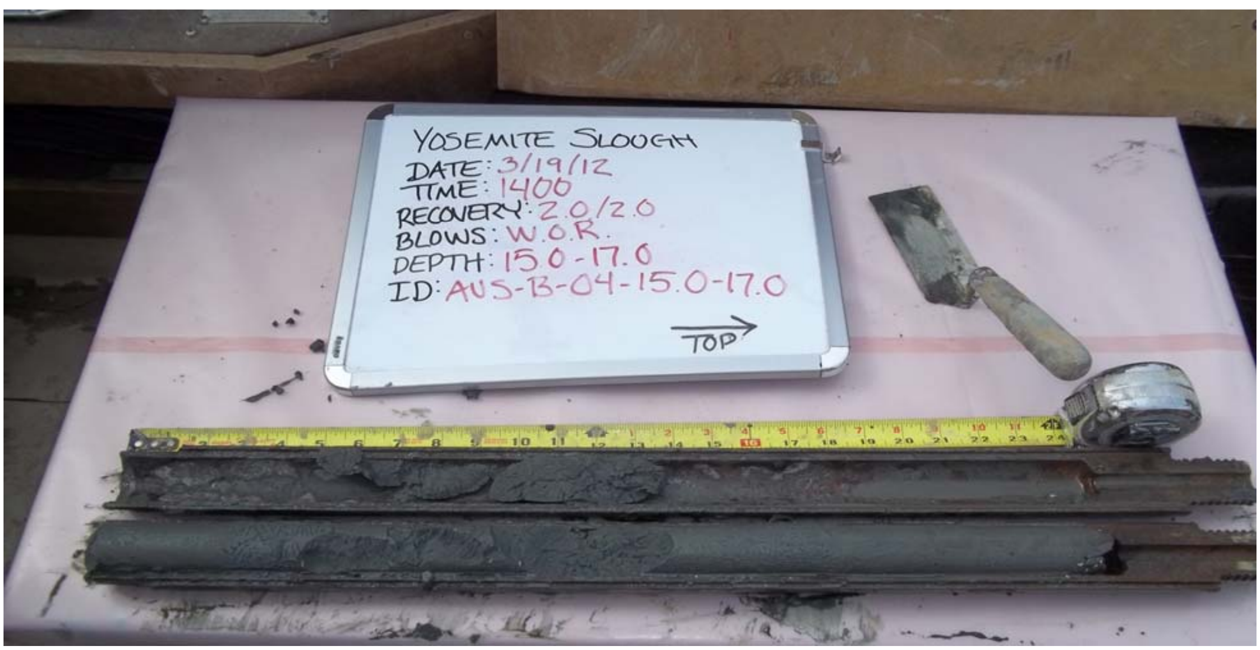
Split-spoon sample AUS-B-04-0.0-2.0



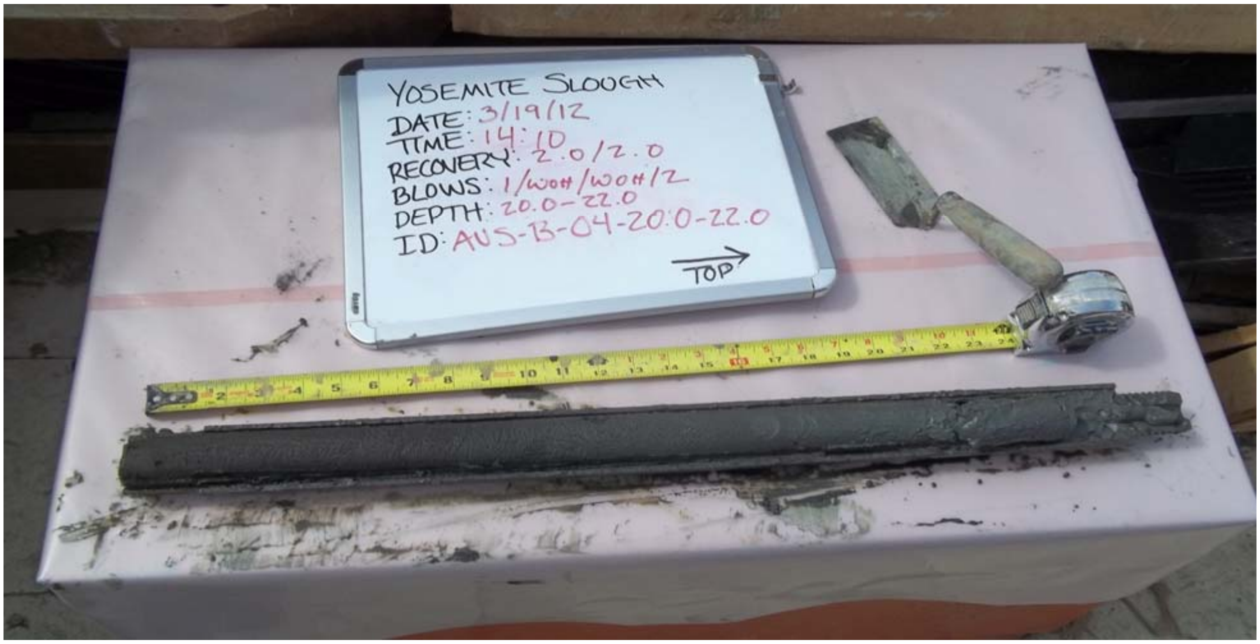
Split-spoon sample AUS-B-04-5.0-7.0



Split-spoon sample AUS-B-04-10.0-12.0

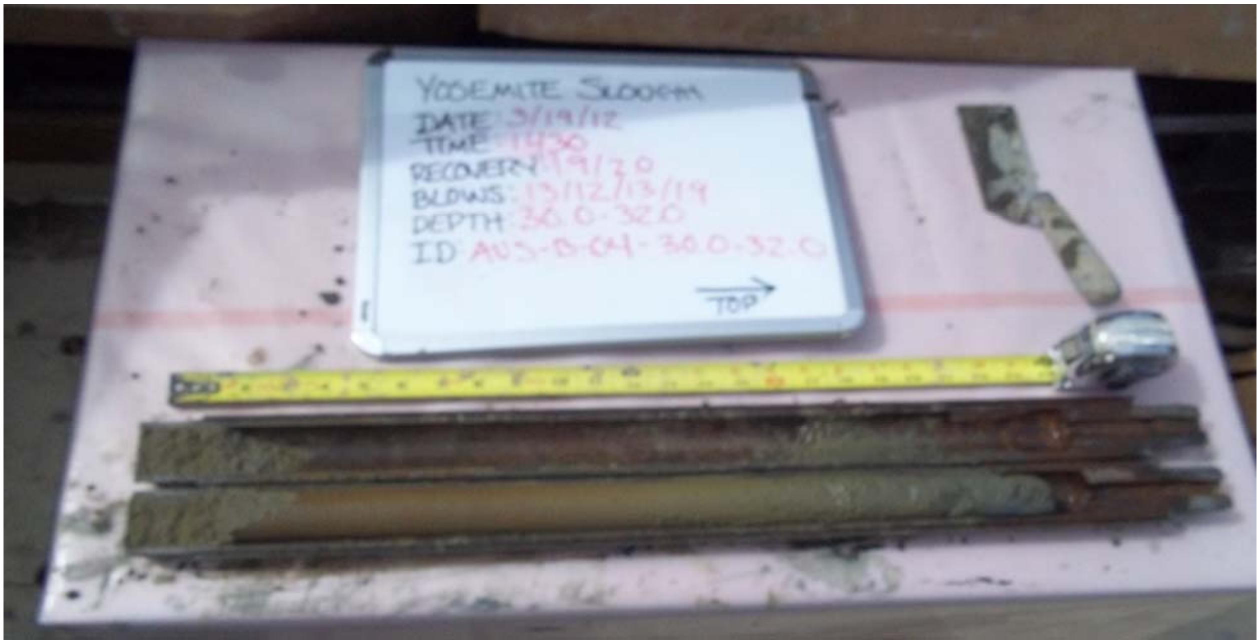


Split-spoon sample AUS-B-04-15.0-17.0

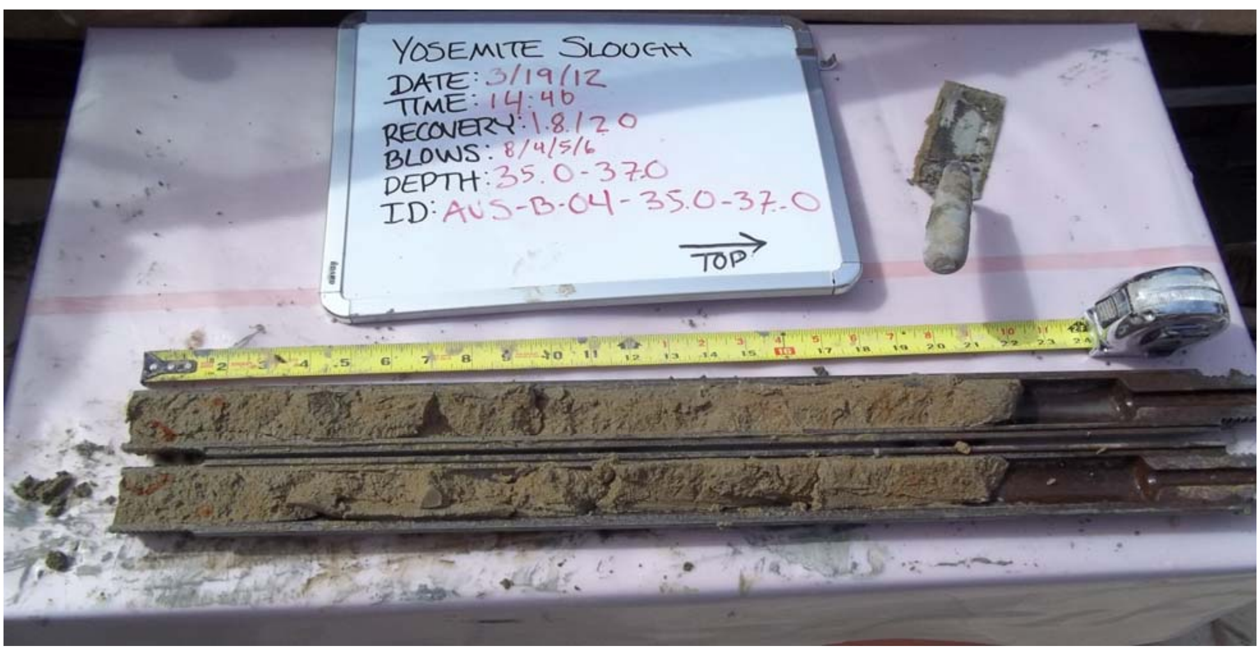


Split-spoon sample AUS-B-04-20.0-22.0

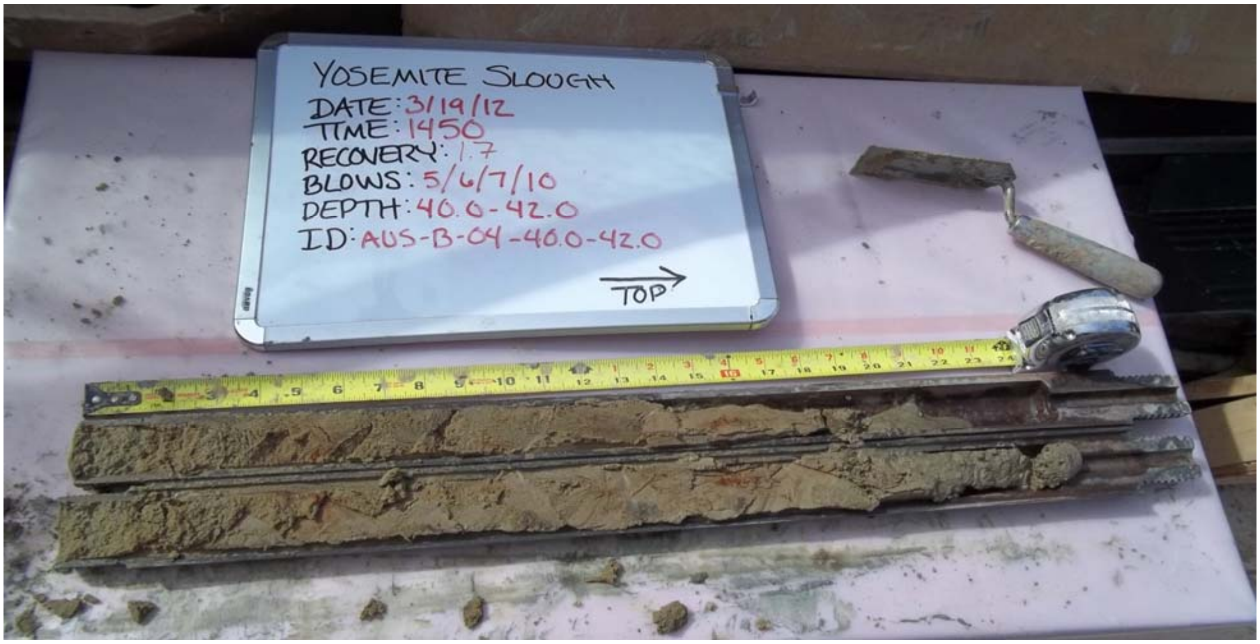
Split-spoon sample AUS-B-04-25.0-27.0



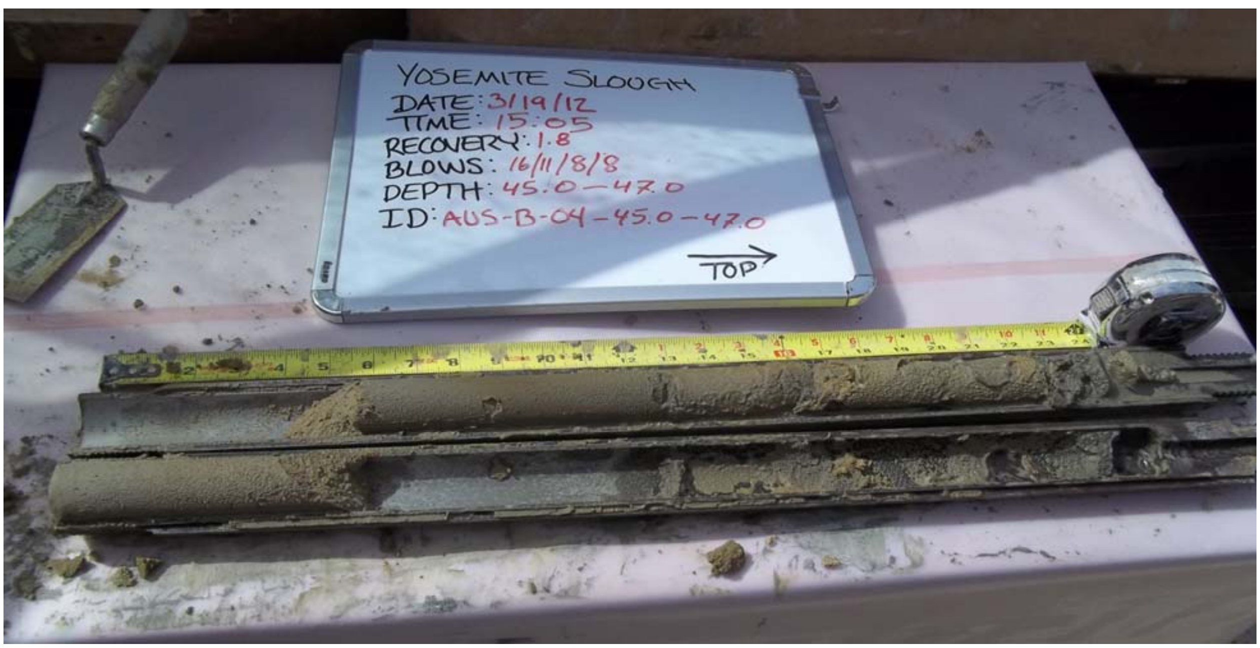
Split-spoon sample AUS-B-04-30.0-32.0



Split-spoon sample AUS-B-04-35.0-37.0

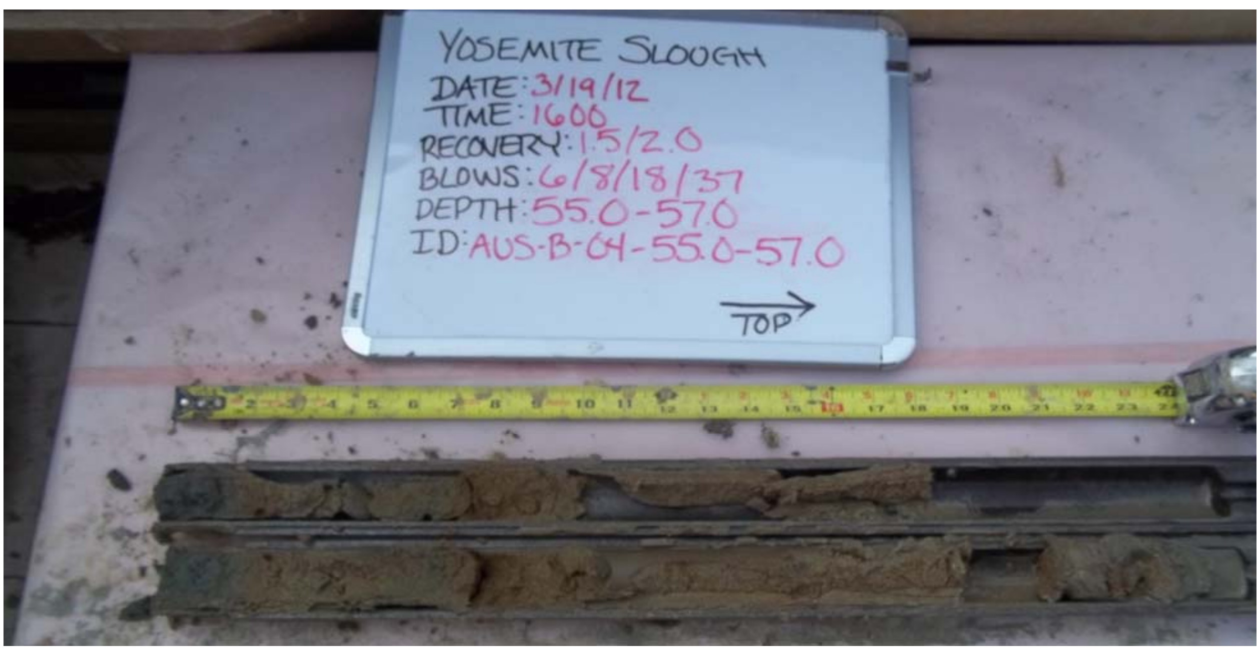


Split-spoon sample AUS-B-04-40.0-42.0

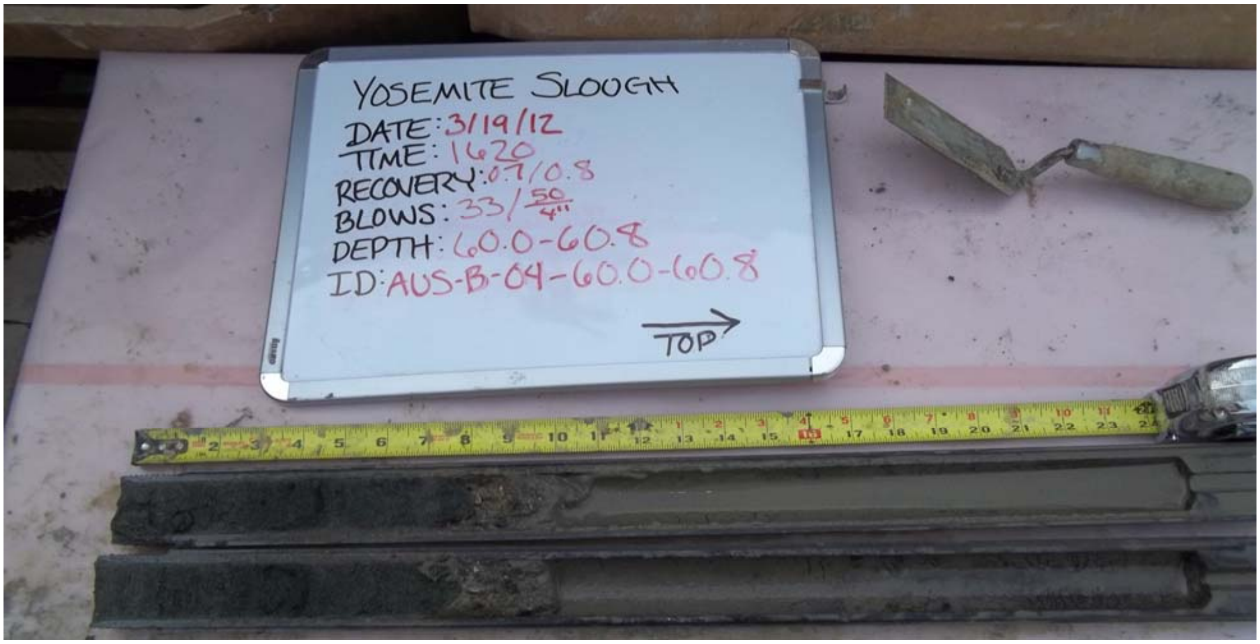


Split-spoon sample AUS-B-04-45.0-47.0

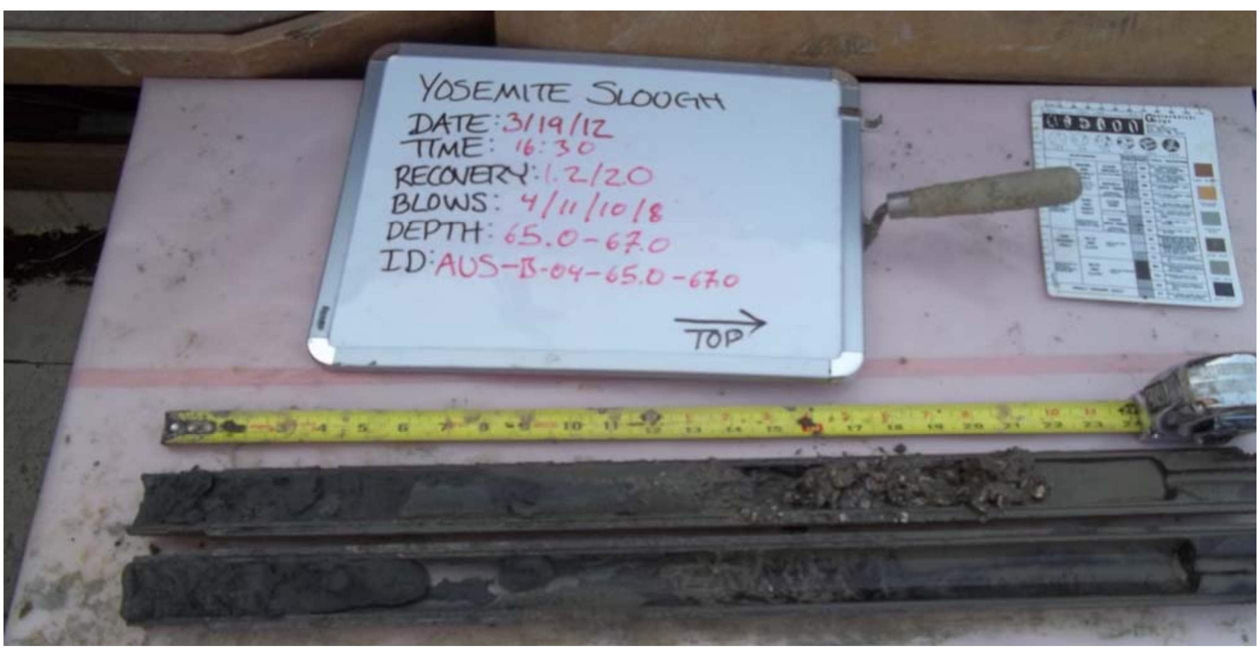
Split-spoon sample AUS-B-04-50.0-51.5



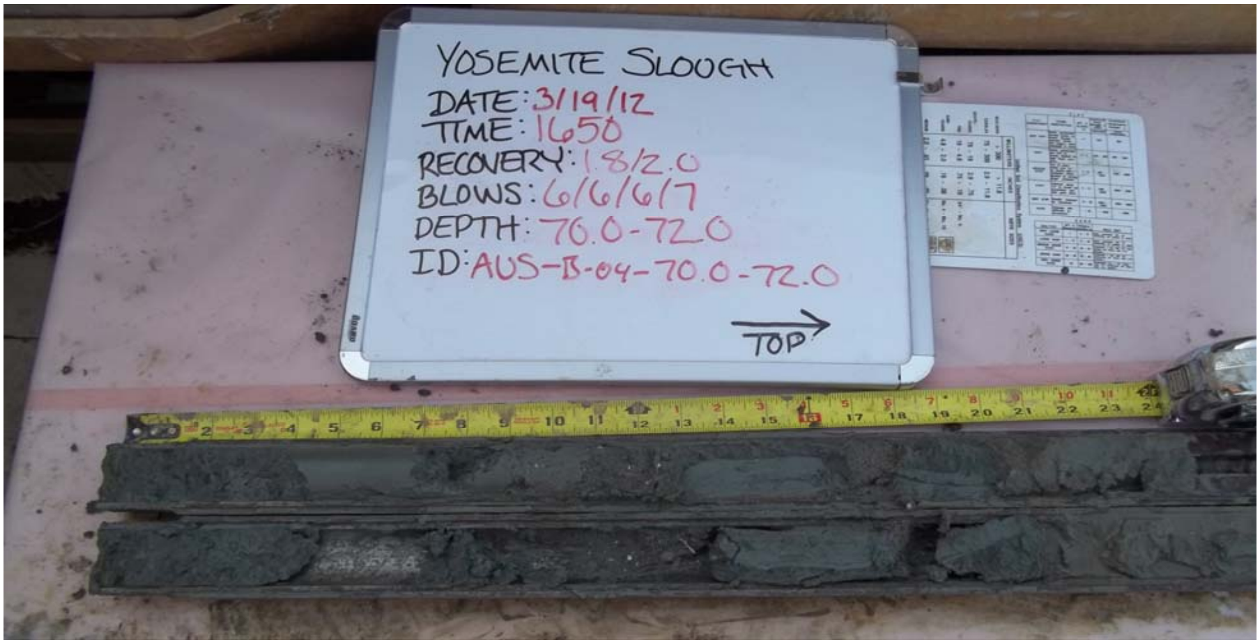
Split-spoon sample AUS-B-04-55.0-57.0



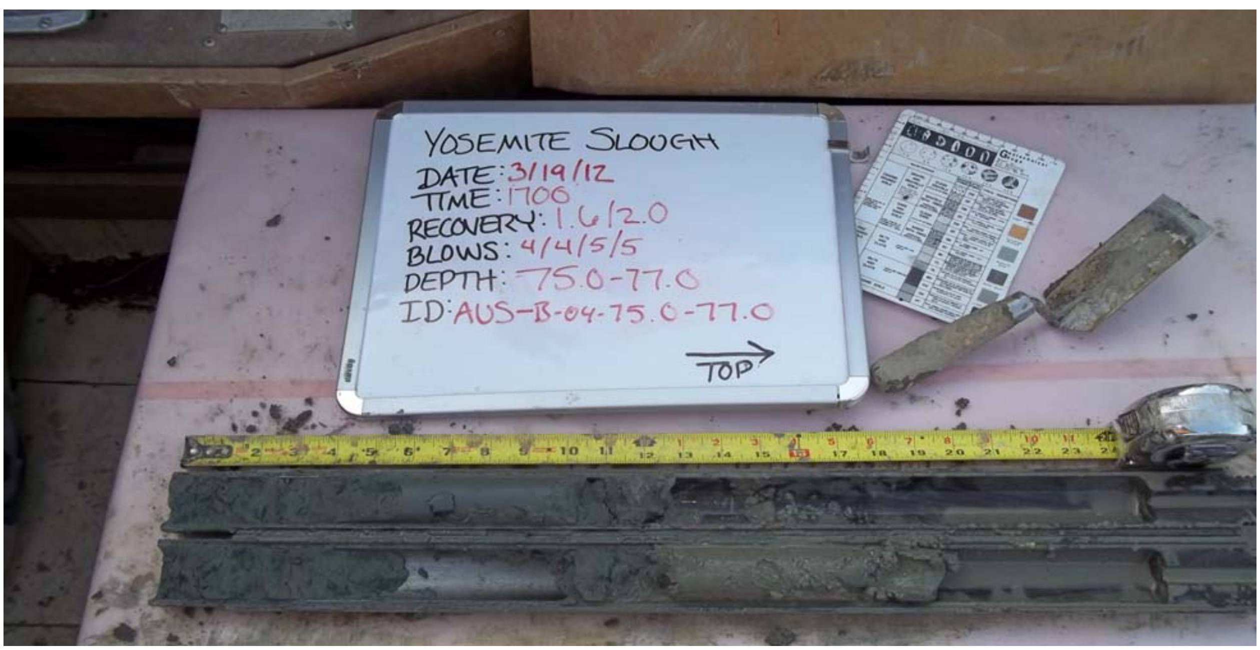
Split-spoon sample AUS-B-04-60.0-60.8



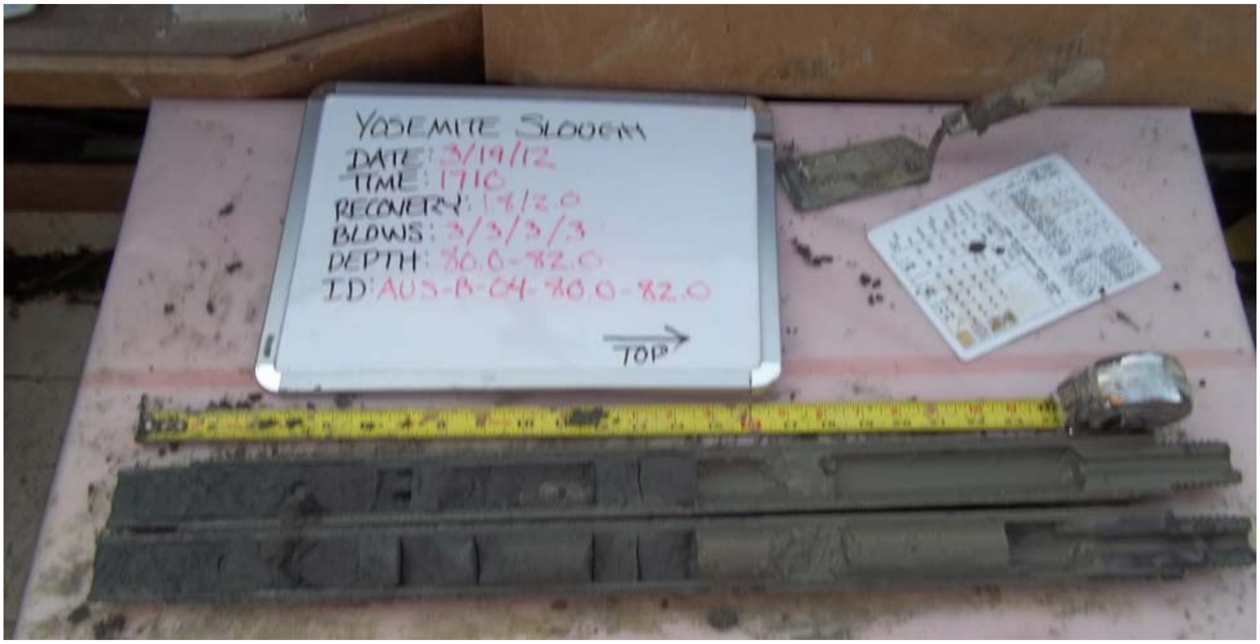
Split-spoon sample AUS-B-04-65.0-67.0



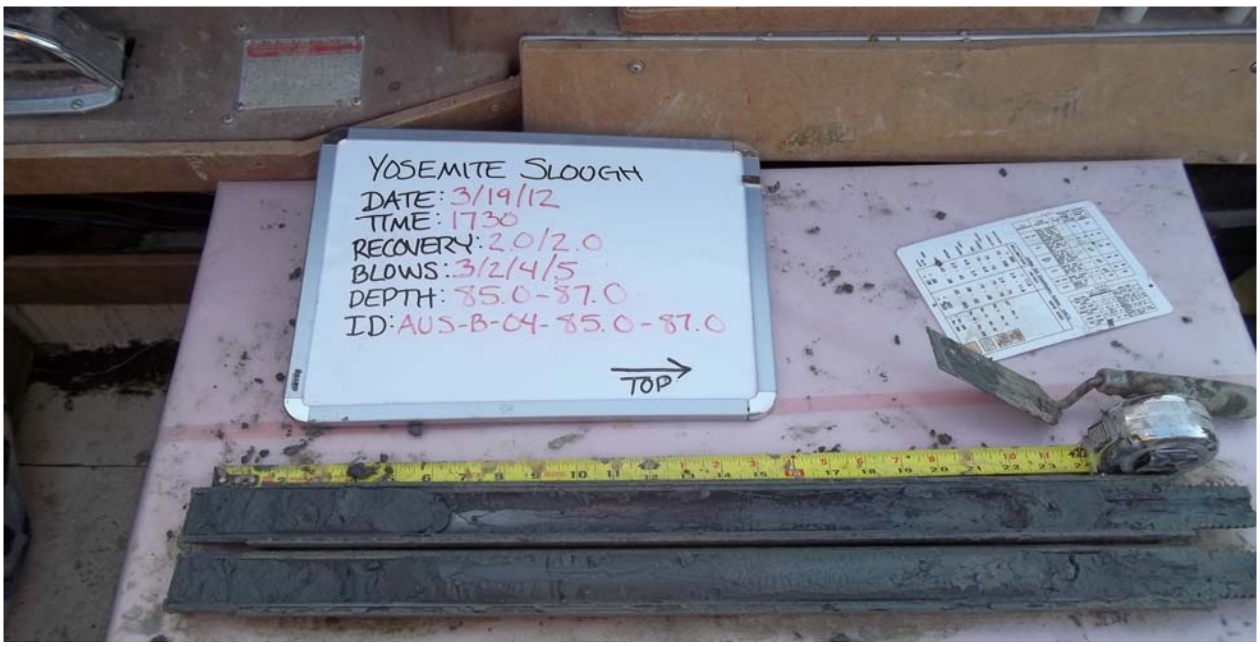
Split-spoon sample AUS-B-04-70.0-72.0



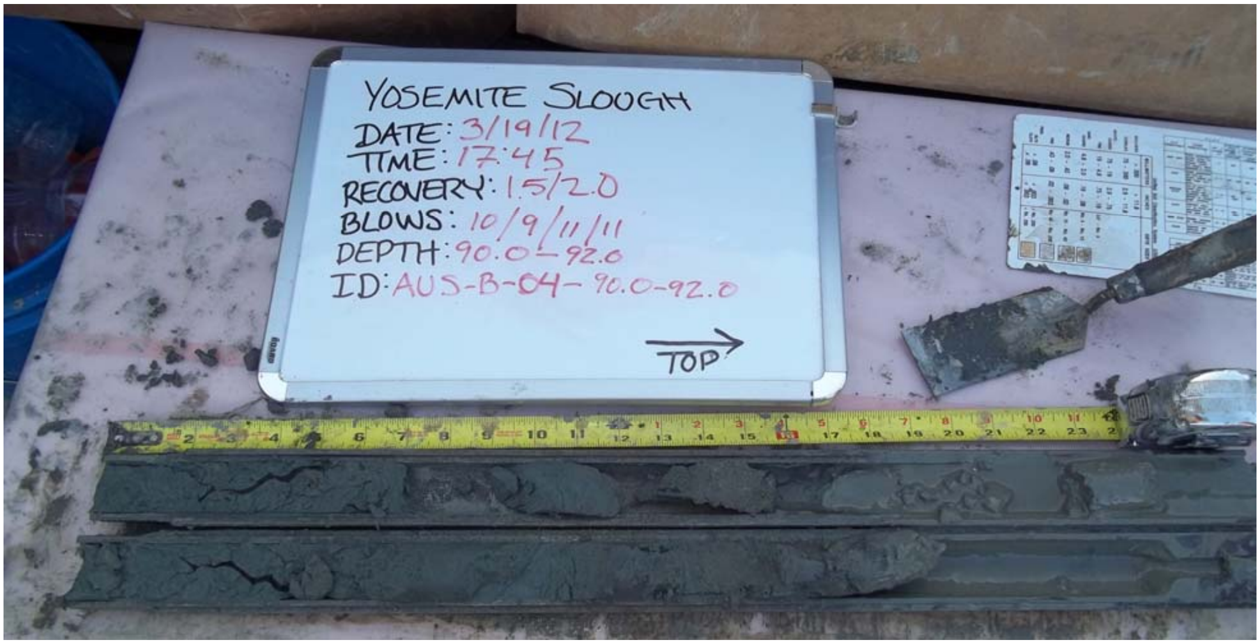
Split-spoon sample AUS-B-04-75.0-77.0



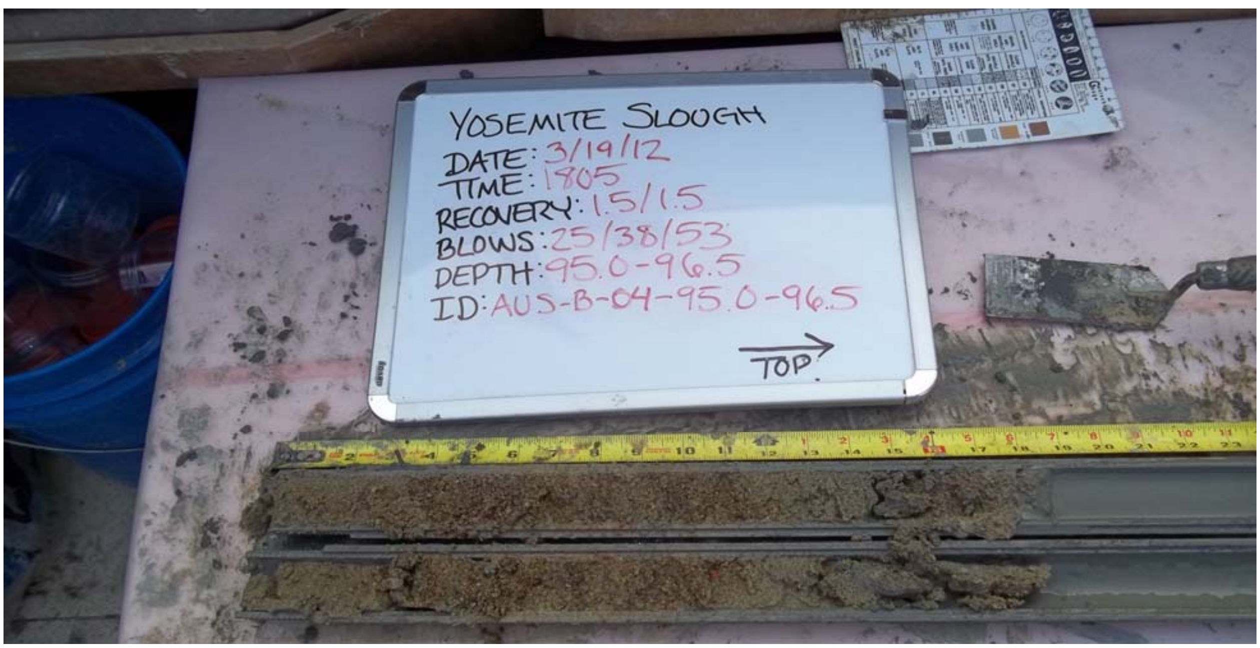
Split-spoon sample AUS-B-04-80.0-82.0



Split-spoon sample AUS-B-04-85.0-87.0



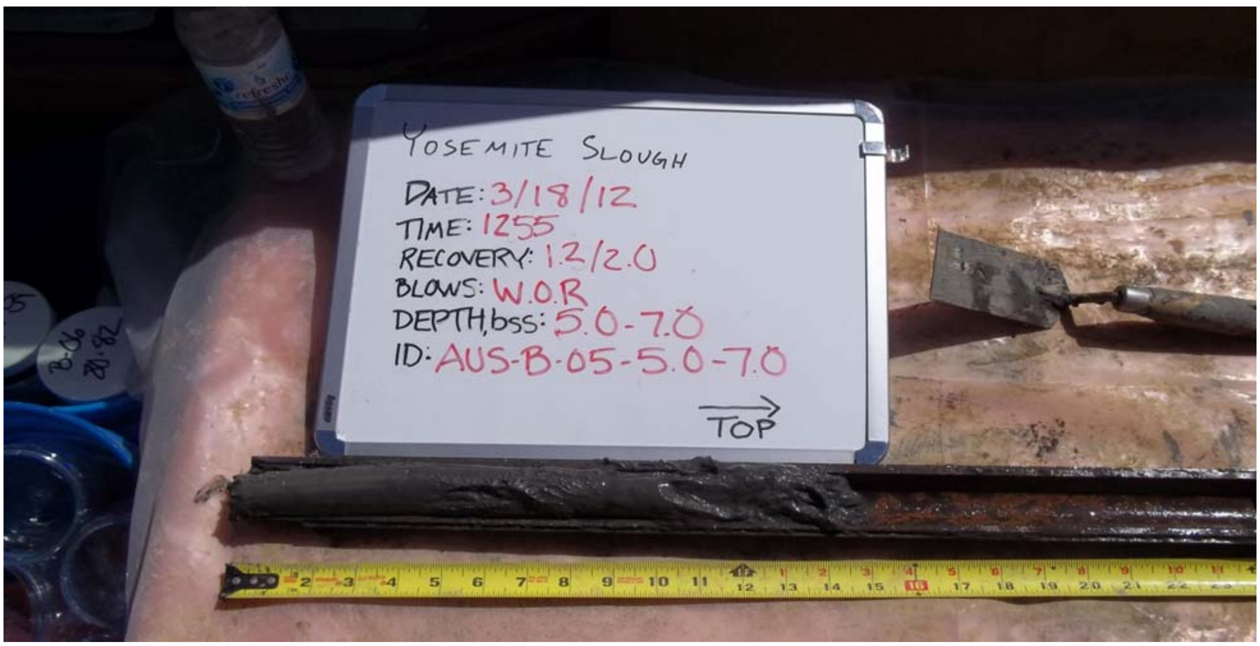
Split-spoon sample AUS-B-04-90.0-92.0



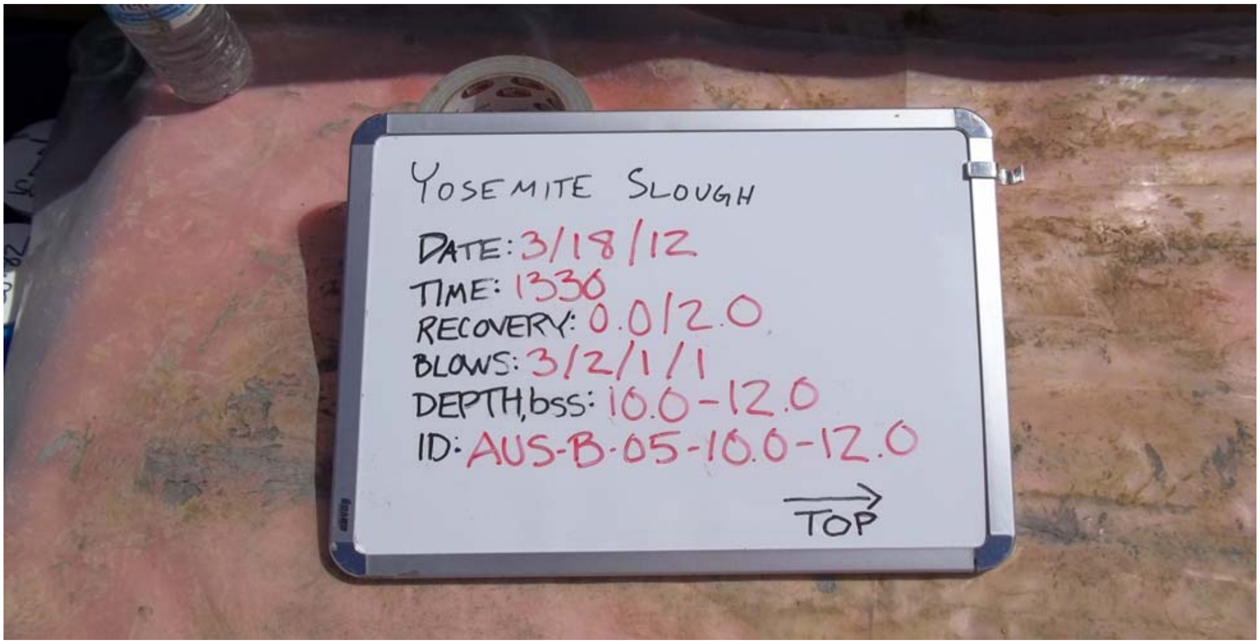
Split-spoon sample AUS-B-04-95.0-96.5

AUS-B-05

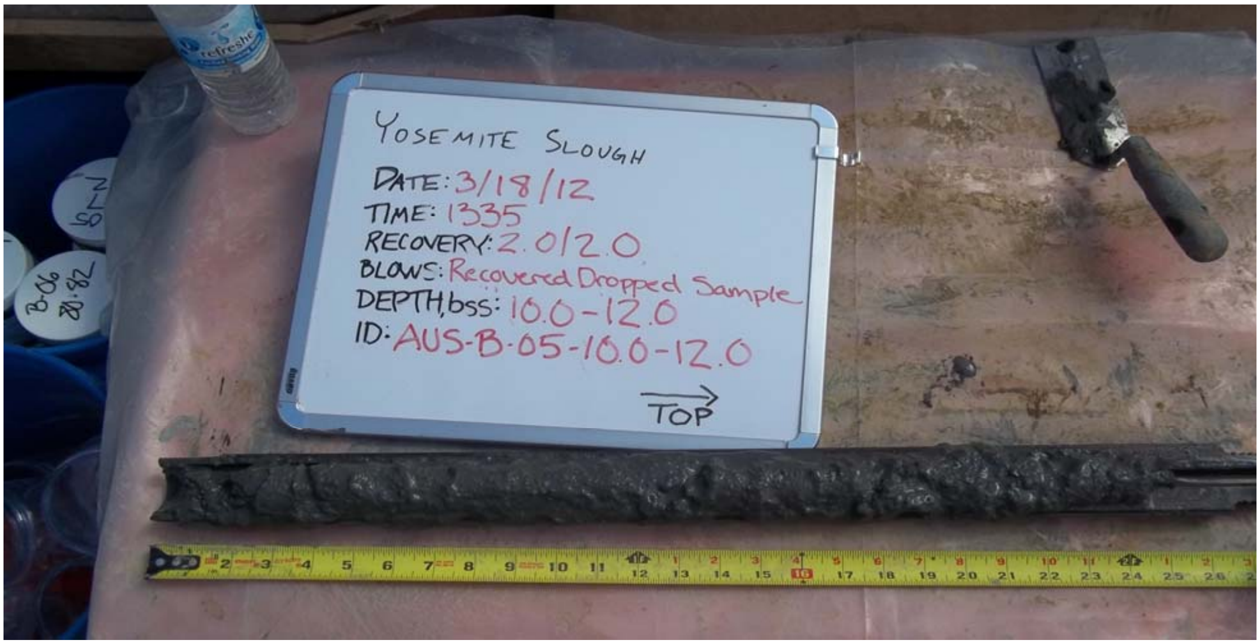
Split-spoon sample AUS-B-05-0.0-2.0



Split-spoon sample AUS-B-05-5.0-7.0



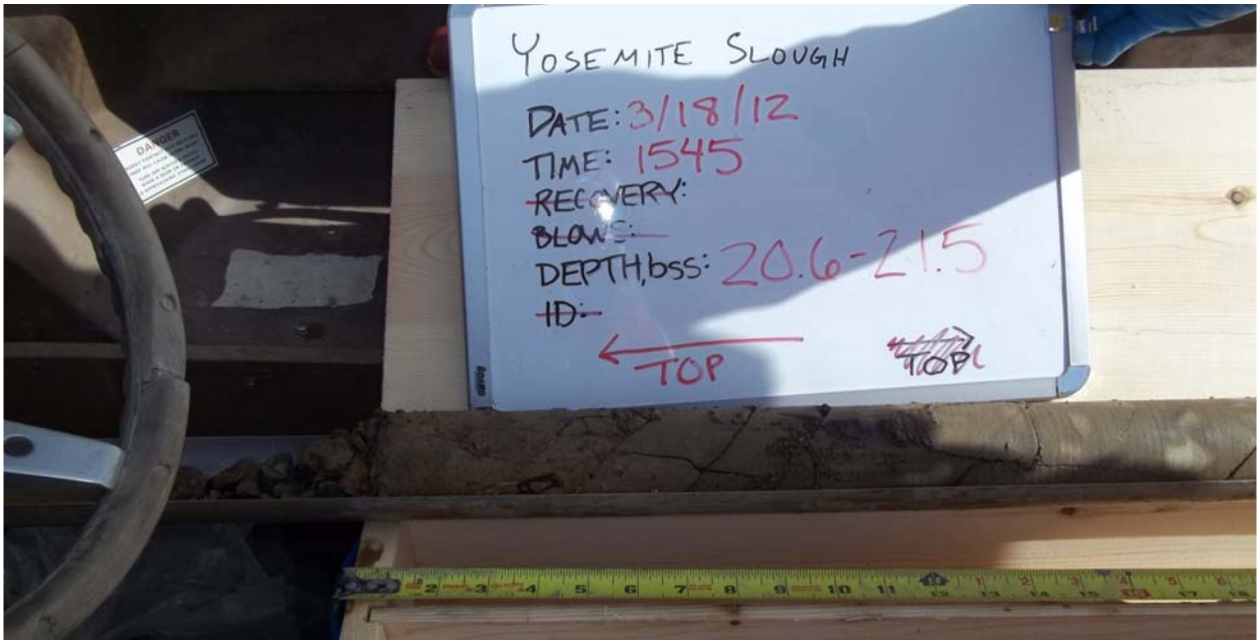
Split-spoon sample AUS-B-05-10.0-12.0, attempt 1



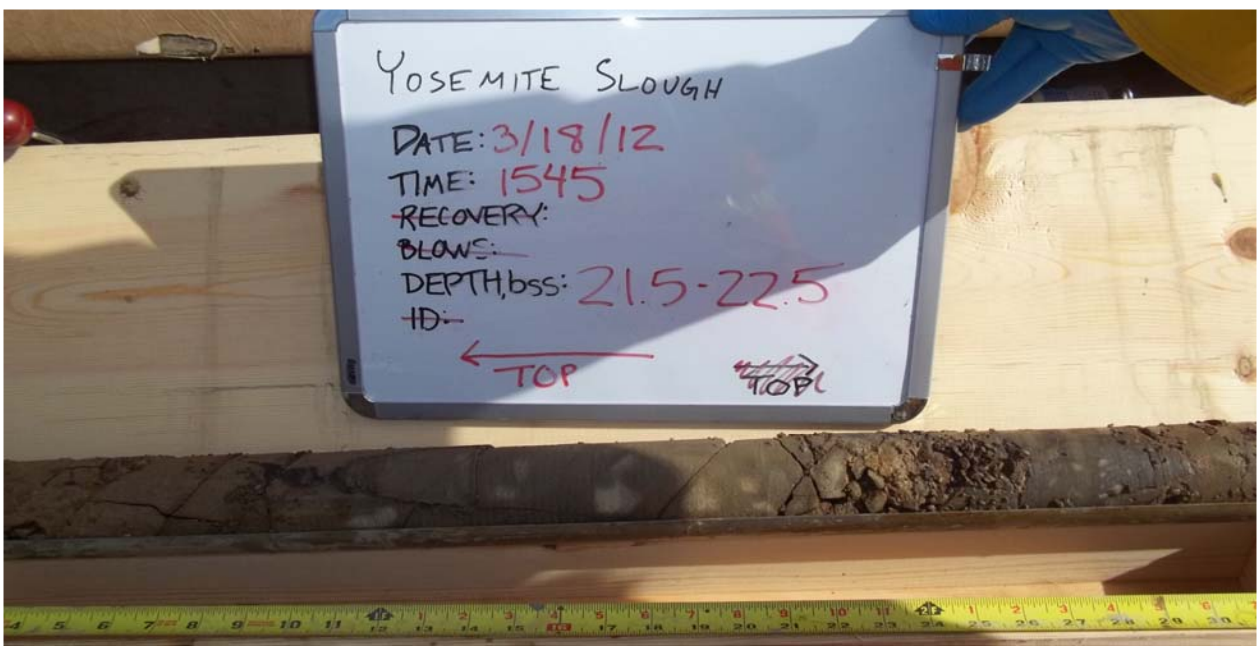
Split-spoon sample AUS-B-05-10.0-12.0, attempt 2

Split-spoon sample AUS-B-05-15.0-17.0

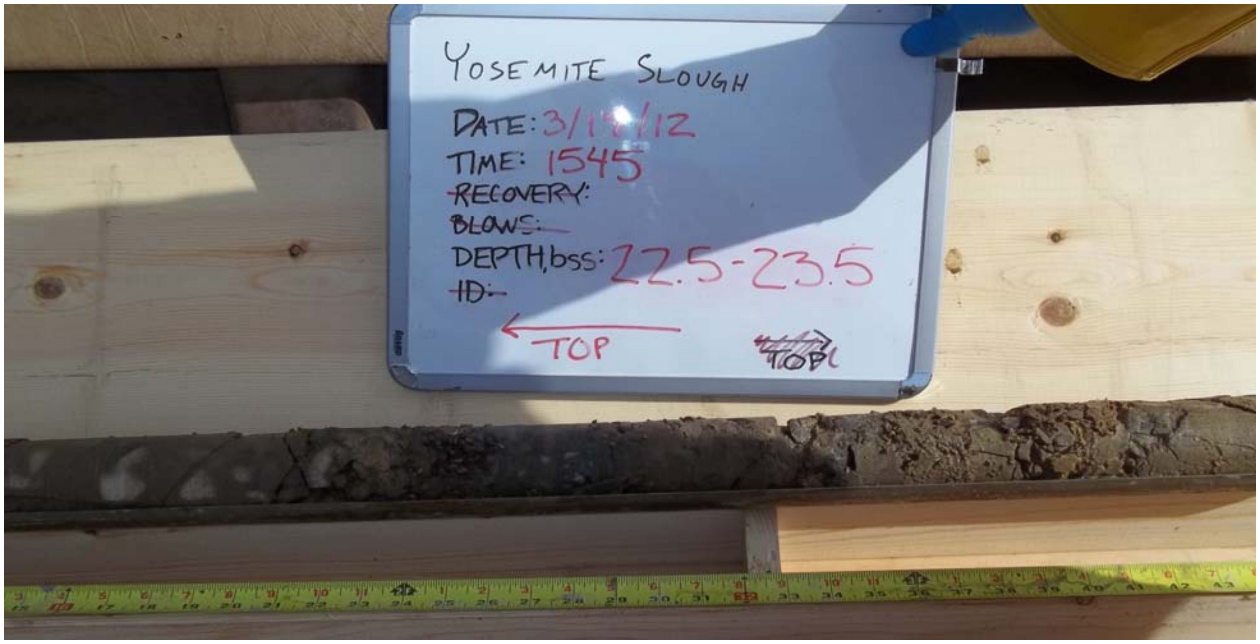
Split-spoon sample AUS-B-05-20.0-22.0



Rock core sample AUS-B-05-20.6-21.5

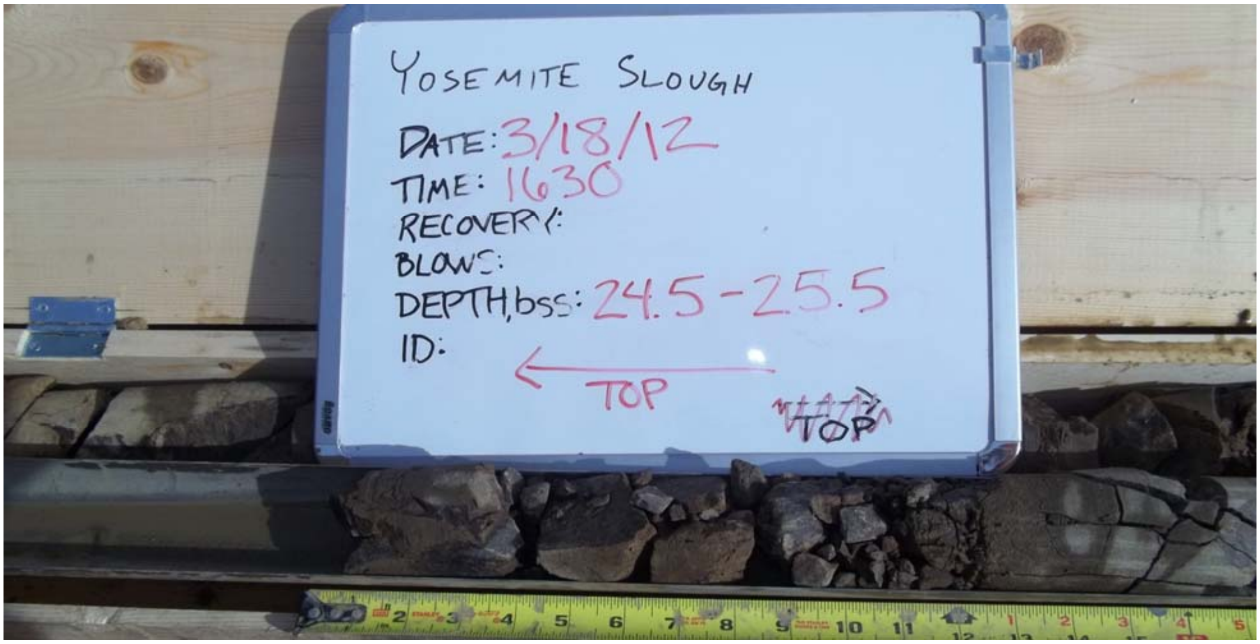


Rock core sample AUS-B-05-21.5-22.5



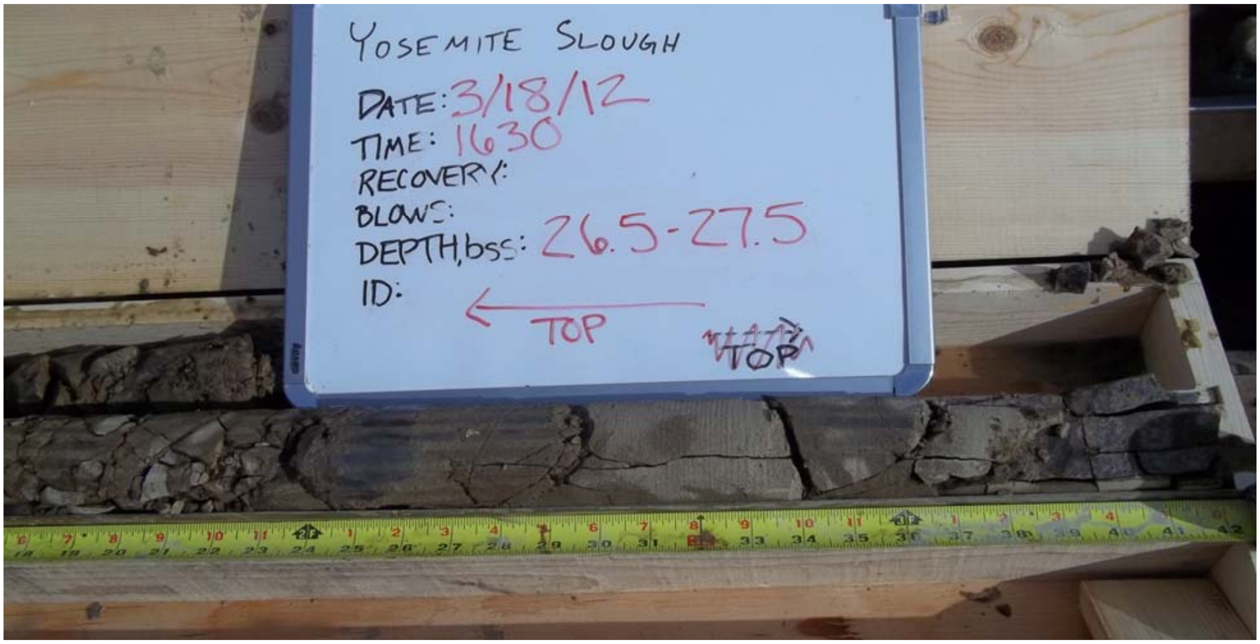
Rock core sample AUS-B-05-22.5-23.5

Rock core sample AUS-B-05-23.5-24.5

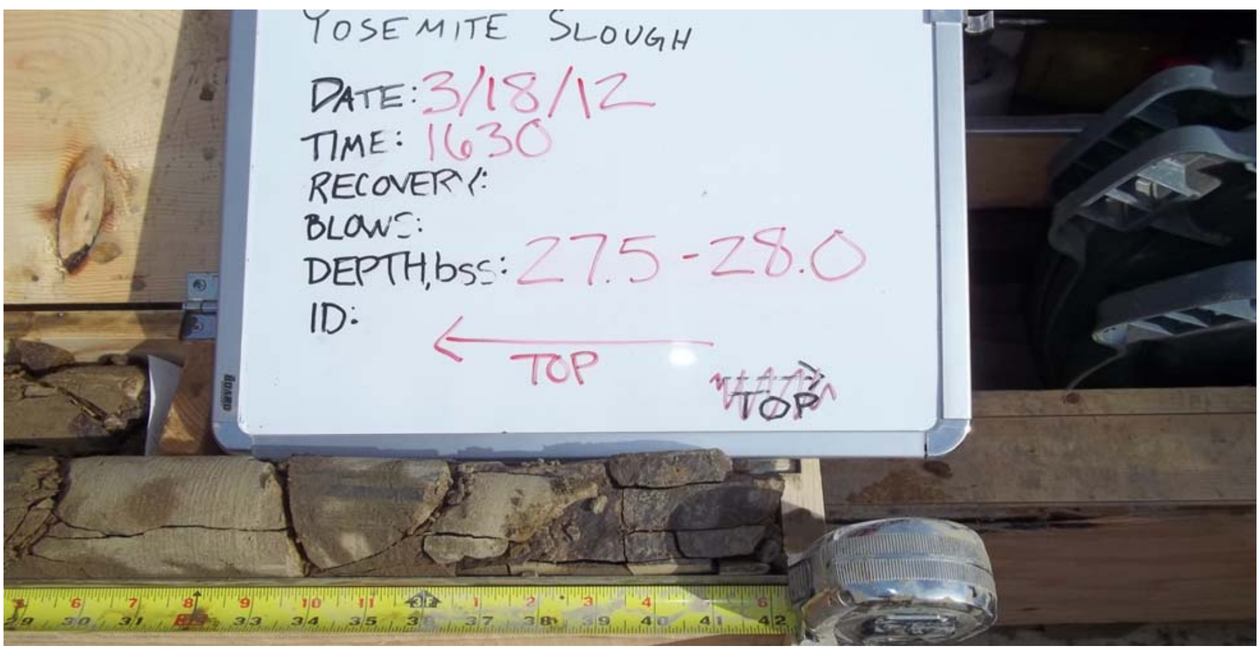


Rock core sample AUS-B-05-24.5-25.5

Rock core sample AUS-B-05-25.5-26.5



Rock core sample AUS-B-05-26.5-27.5



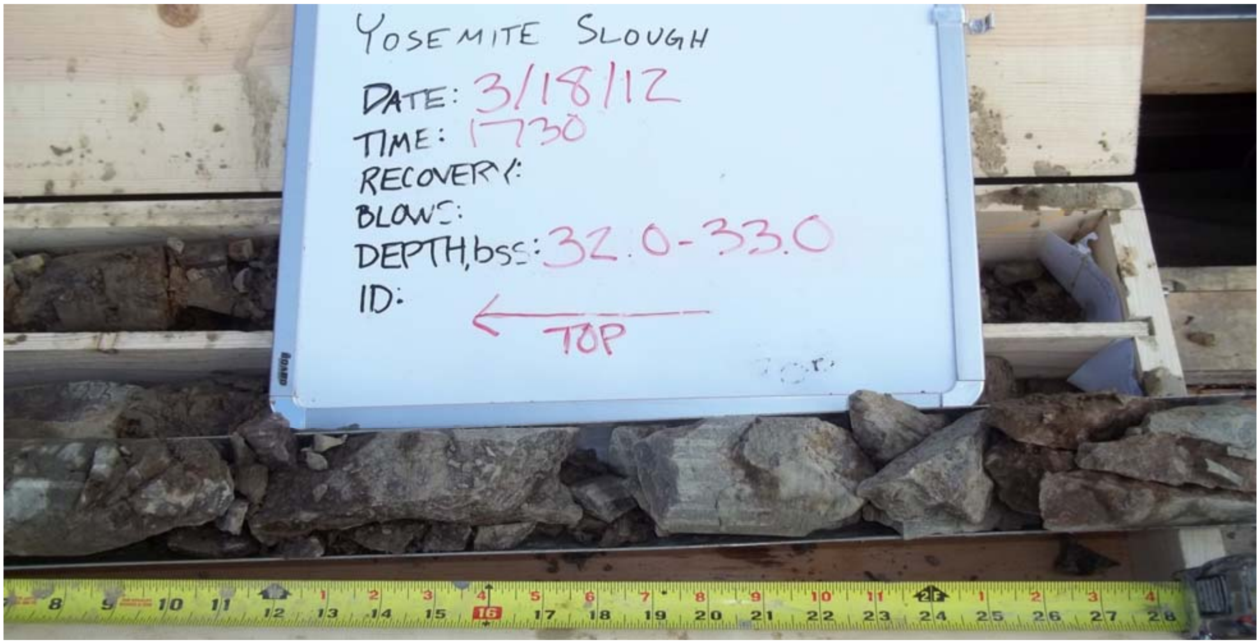
Rock core sample AUS-B-05-27.5-28.0

Rock core sample AUS-B-05-28.0-29.0

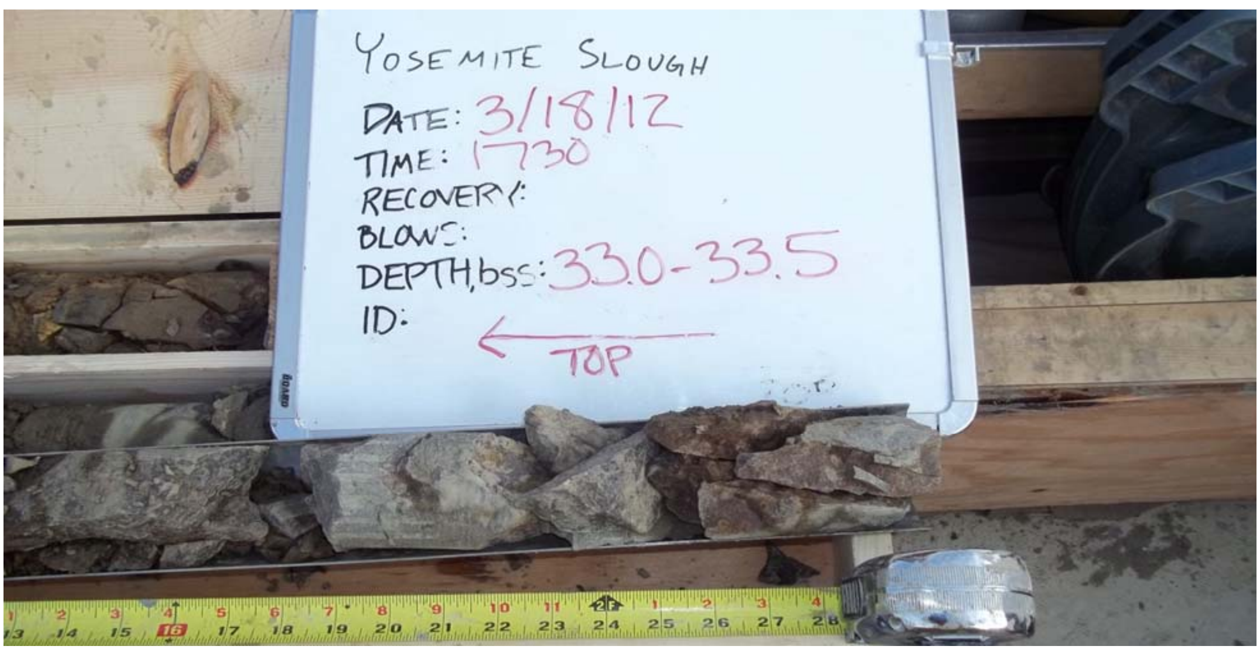
Rock core sample AUS-B-05-29.0-30.0

Rock core sample AUS-B-05-30.0-31.0

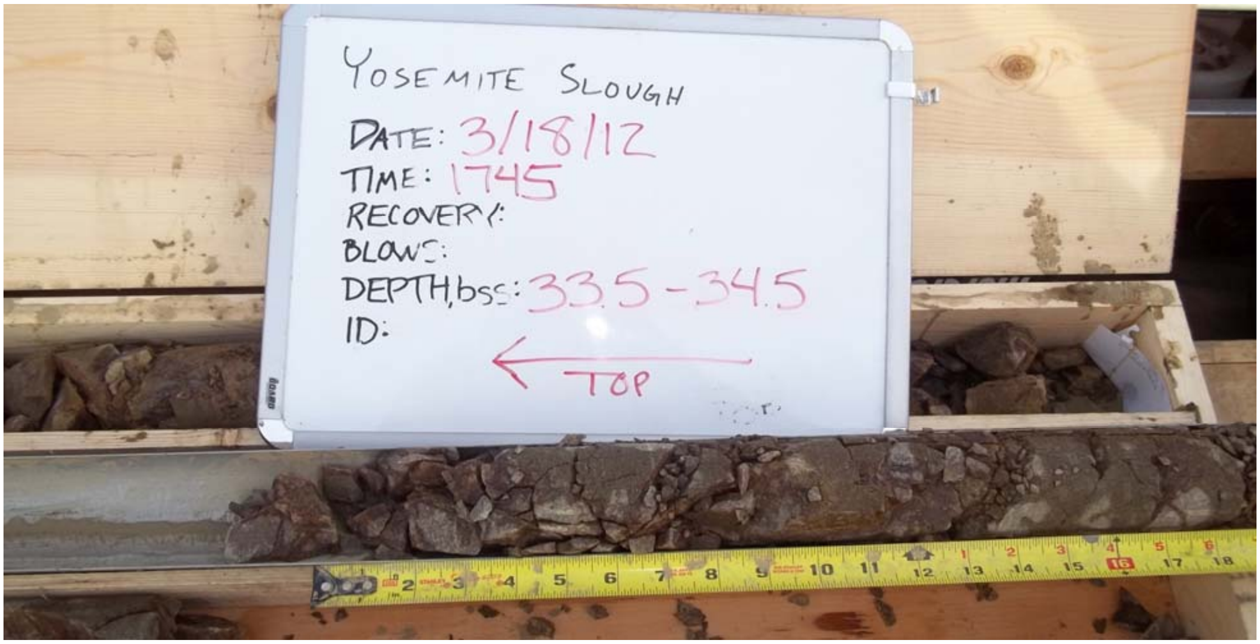
Rock core sample AUS-B-05-31.0-32.0



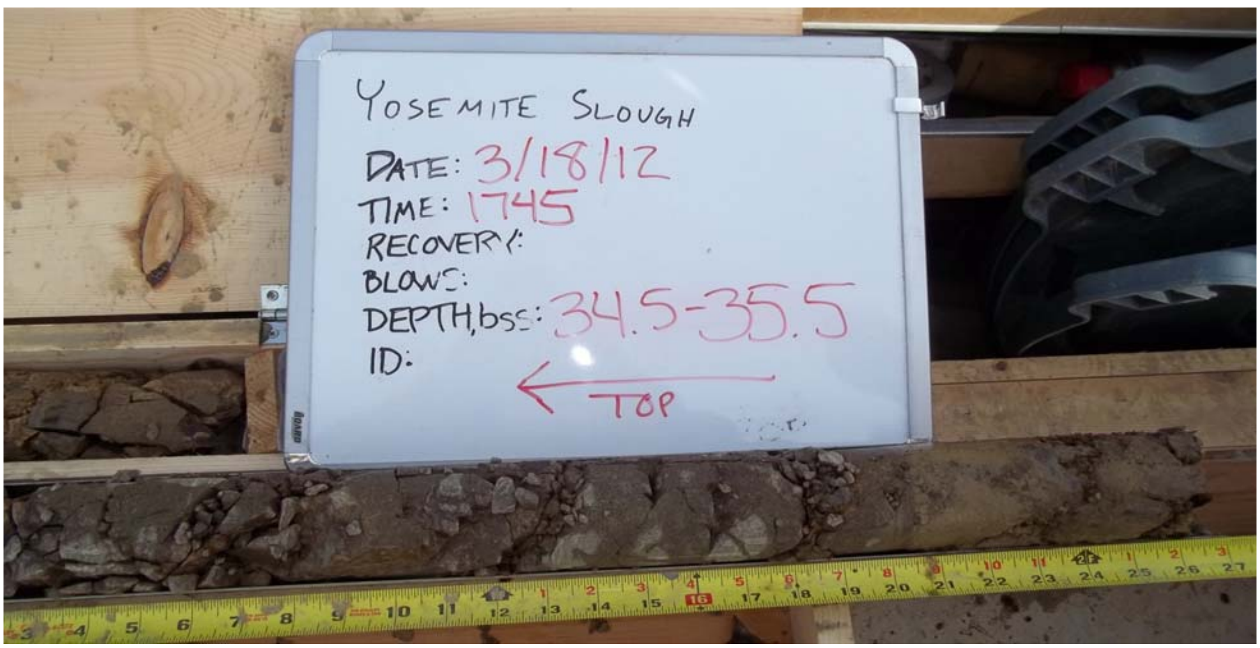
Rock core sample AUS-B-05-32.0-33.0



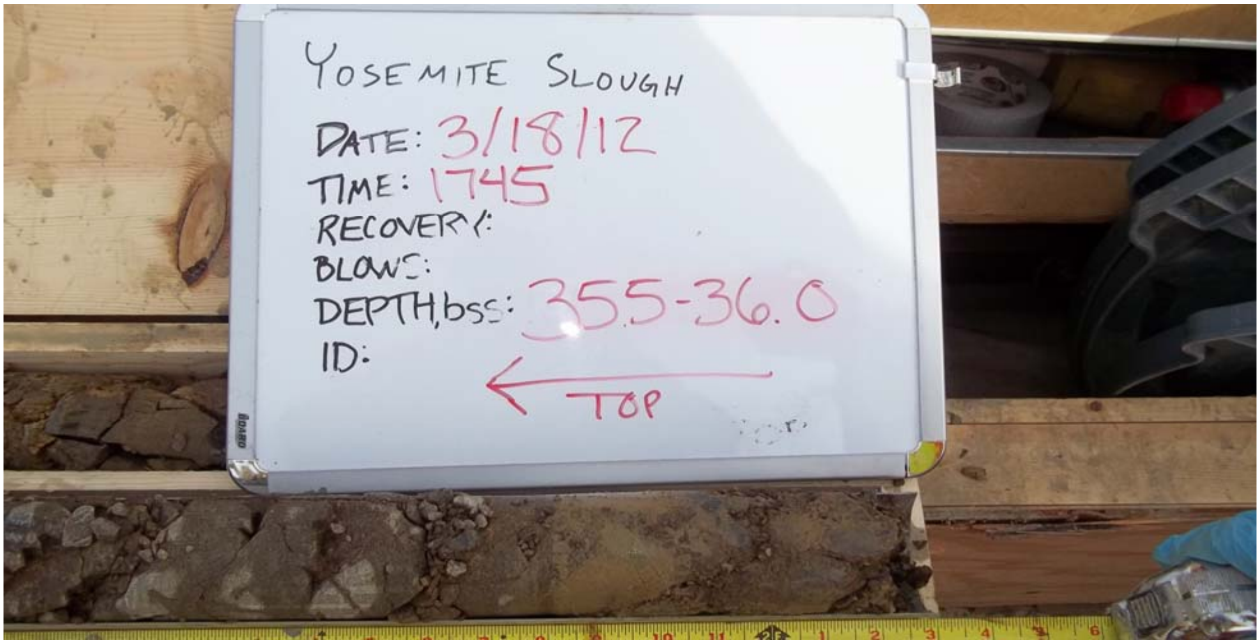
Rock core sample AUS-B-05-33.0-33.5



Rock core sample AUS-B-05-33.5-34.5

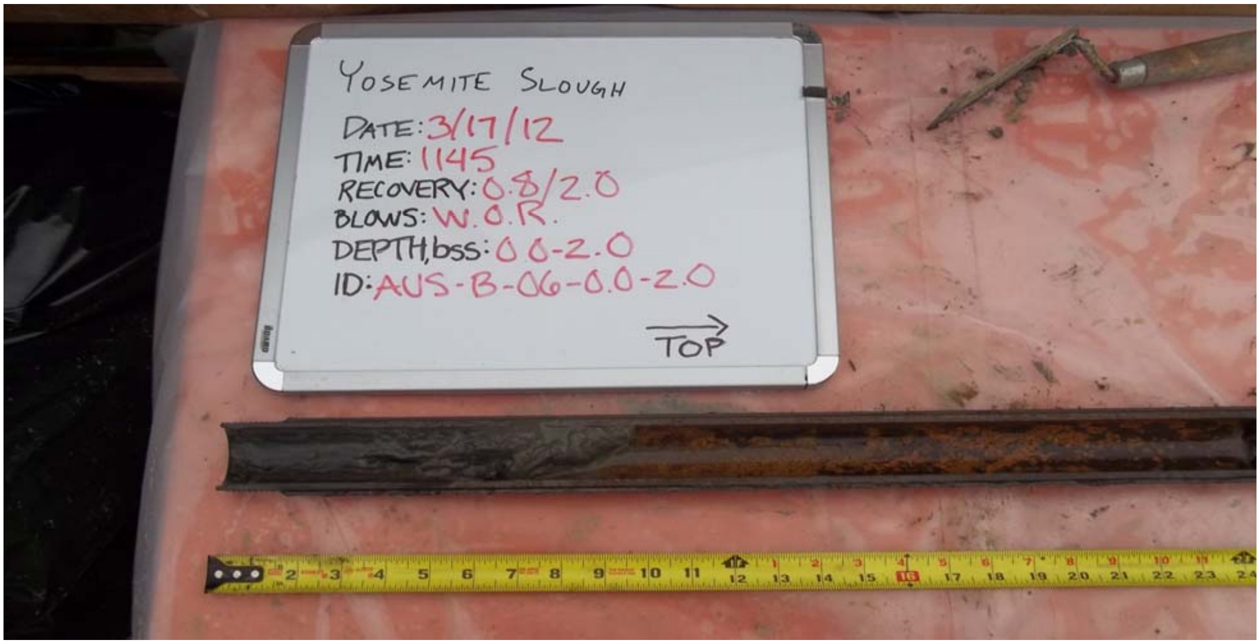


Rock core sample AUS-B-05-34.5-35.5

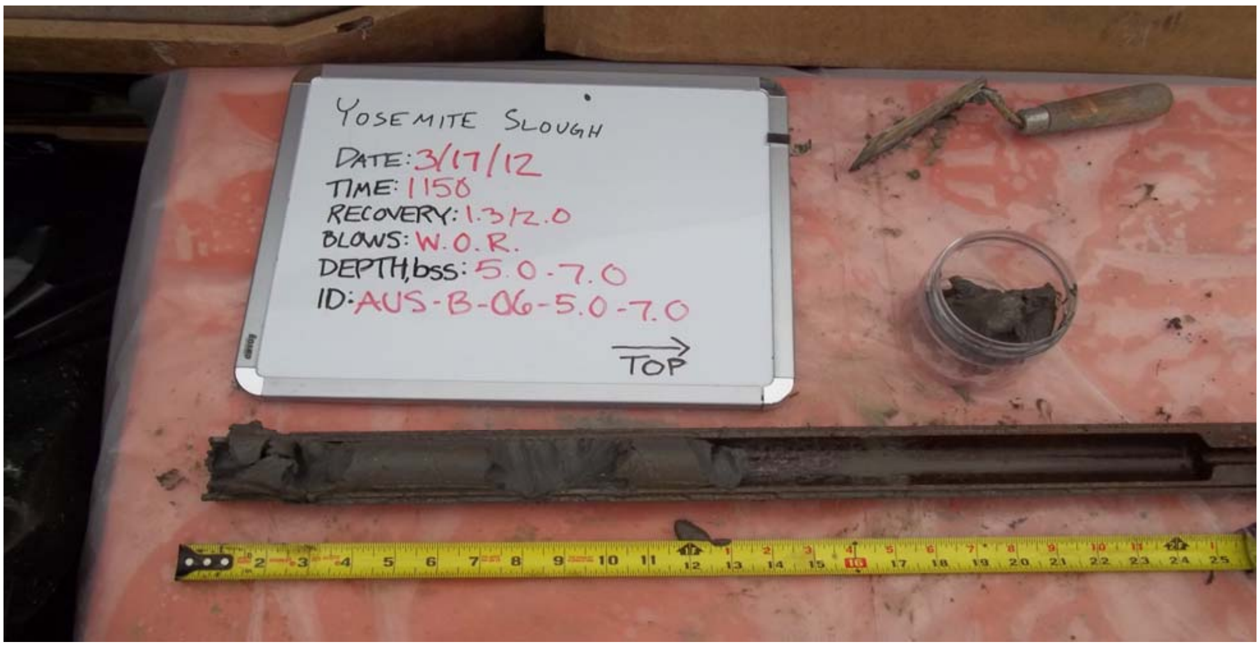


Rock core sample AUS-B-05-35.5-36.0

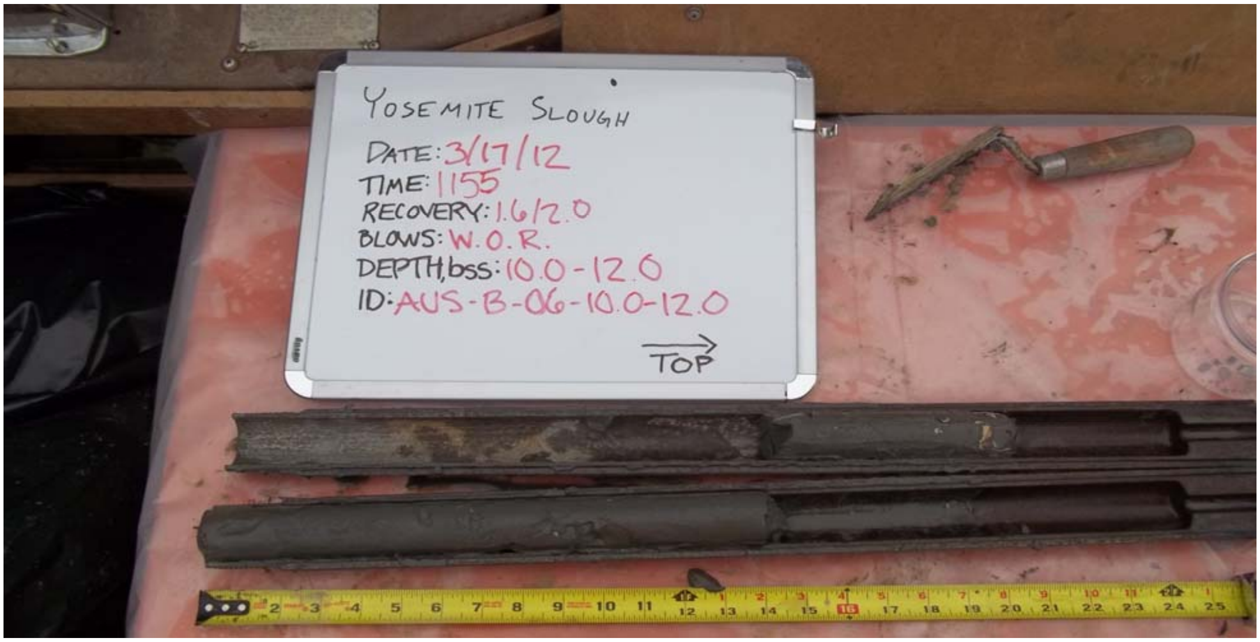
AUS-B-06



Split-spoon sample AUS-B-06-0.0-2.0



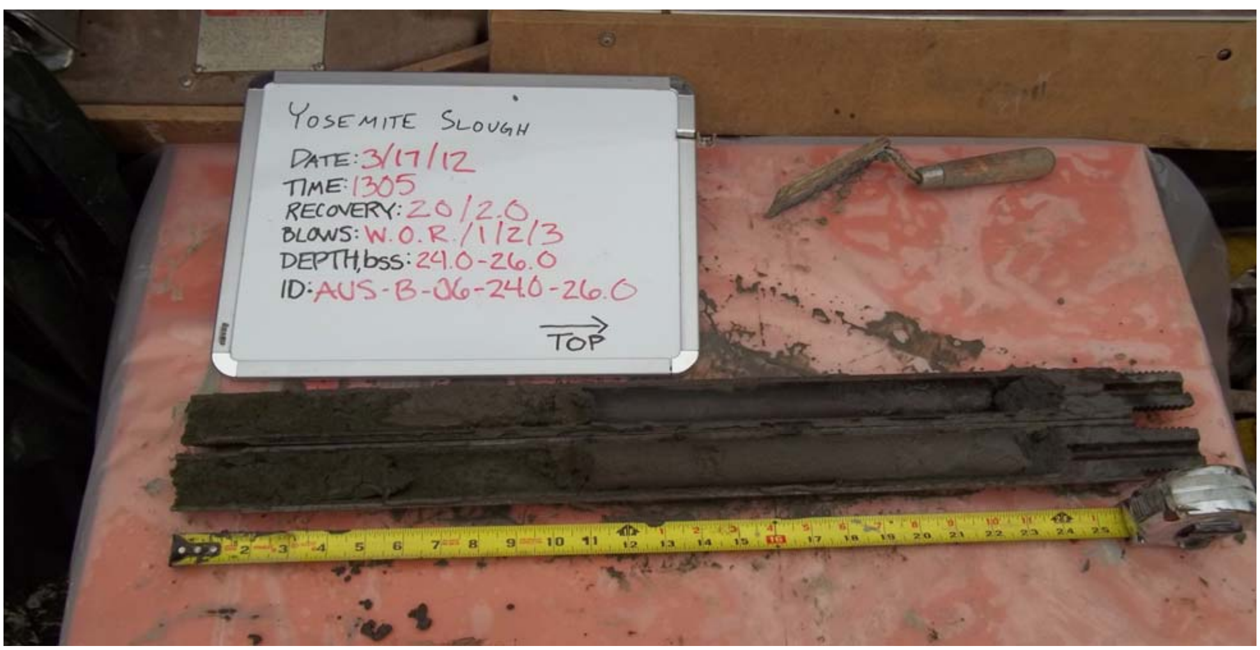
Split-spoon sample AUS-B-06-5.0-7.0



Split-spoon sample AUS-B-06-10.0-12.0

Split-spoon sample AUS-B-06-15.0-17.0

Split-spoon sample AUS-B-06-21.0-23.0



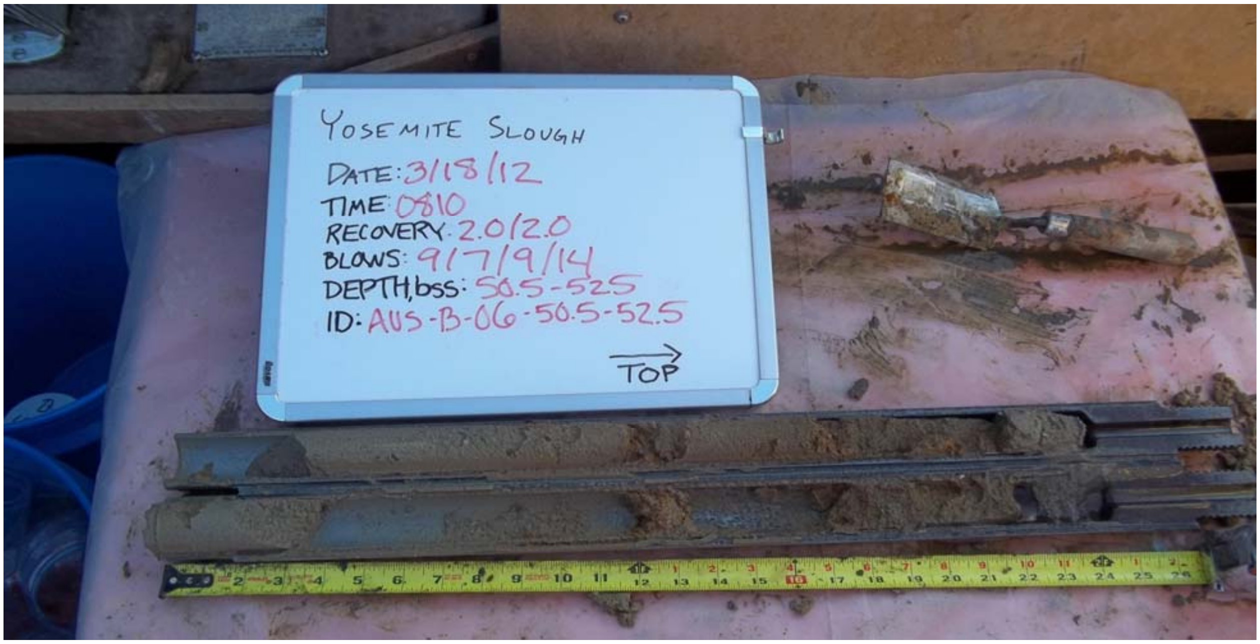
Split-spoon sample AUS-B-06-24.0-26.0

Split-spoon sample AUS-B-06-29.0-31.0

Split-spoon sample AUS-B-06-35.0-37.0

Split-spoon sample AUS-B-06-41.0-42.5

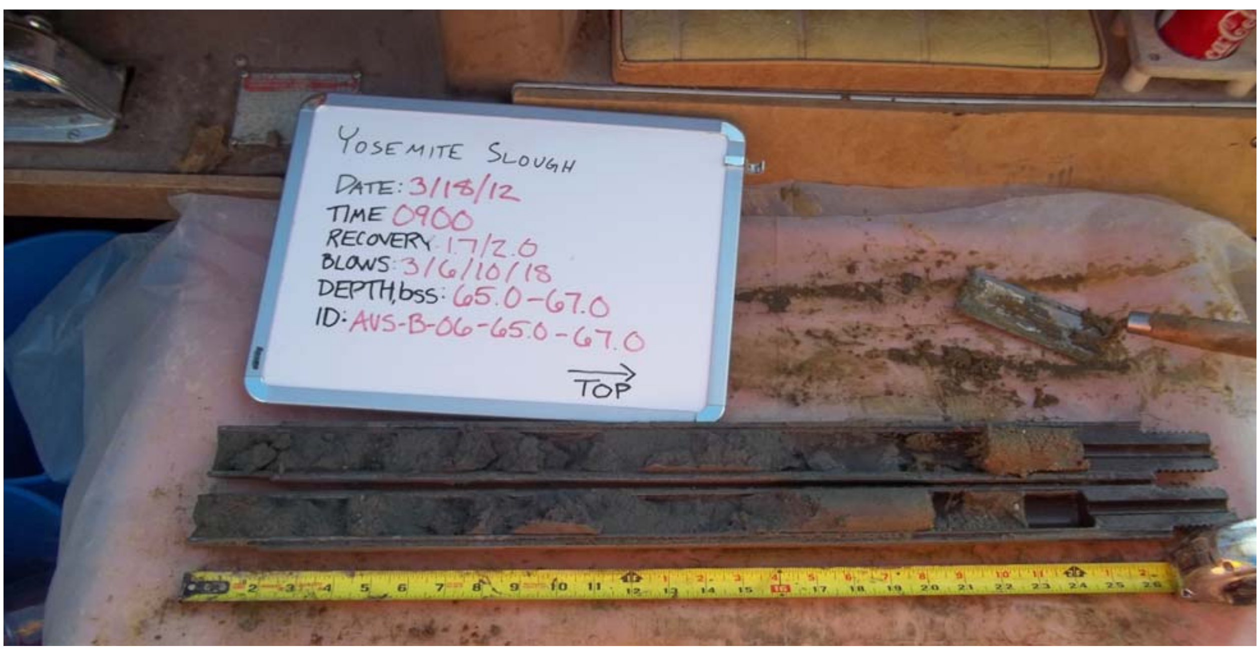
Split-spoon sample AUS-B-06-44.0-46.0



Split-spoon sample AUS-B-06-50.5-52.5

Split-spoon sample AUS-B-06-55.0-57.0

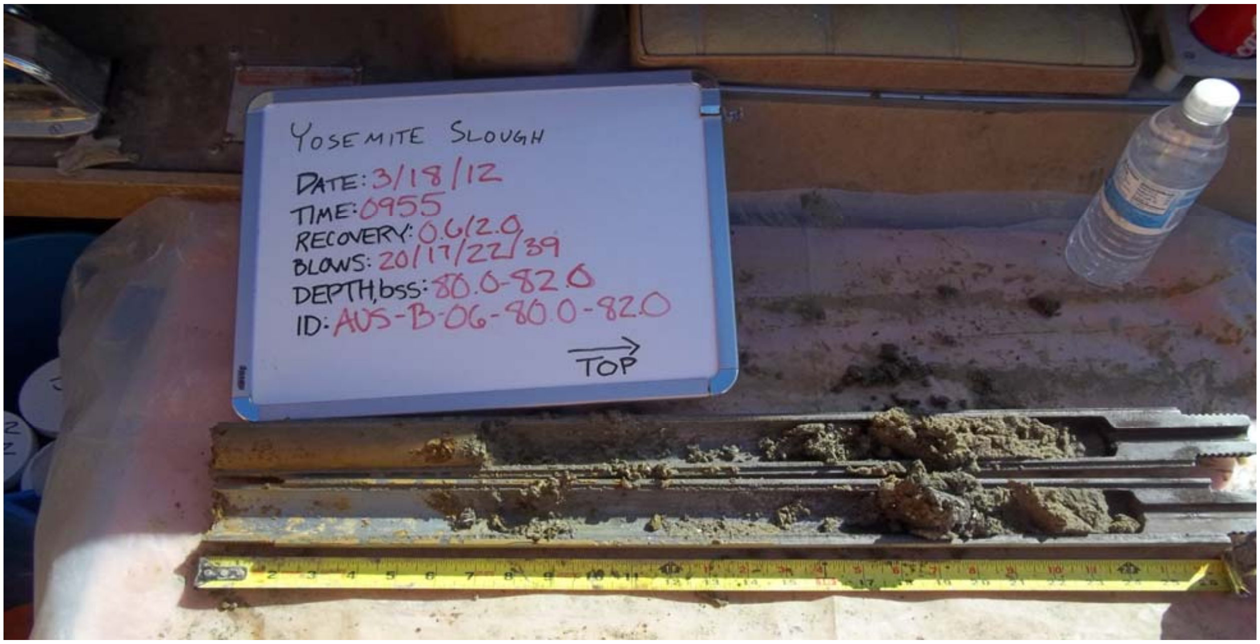
Split-spoon sample AUS-B-06-60.0-62.0



Split-spoon sample AUS-B-06-65.0-67.0

Split-spoon sample AUS-B-06-70.0-72.0

Split-spoon sample AUS-B-06-75.0-77.0



Split-spoon sample AUS-B-06-80.0-82.0