A report prepared for

BP Exploration (Alaska) Inc.
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GEOTECHNICAL EXPLORATION
Liberty Development Project
Foggy Island Bay, Alaska

by

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SUMMARY

During March 1997, Duane Miller & Associates (DM&A) drilled and sampled 30 geotechnical borings in Foggy Island Bay for the proposed Liberty Development Project. Borings were drilled at the site of a proposed production island and along three alternative marine pipeline routes. Two routes run south to connect onshore with the proposed Badami Pipeline and one route goes to the west to the existing Endicott facilities. The location of each drill hole is shown on Plate 1.

The geotechnical borings were drilled to depths of 11.0 to 112.5 feet below mudline, using a CME-75 drill rig equipped with hollow stem augers. Samples of the soil were obtained by pushing thin wall samplers and by driving split barrel samplers. The samples were tested in the laboratory for engineering properties. Closed pipe was left in four borings, and ground temperatures were measurements were attempted in March and April. In March, temperature measurements were recorded at two boreholes before weather prohibited further data collection. In April, temperature measurements were taken in all recoverable borings, however a malfunction of the thermistor string resulted in unusable data.

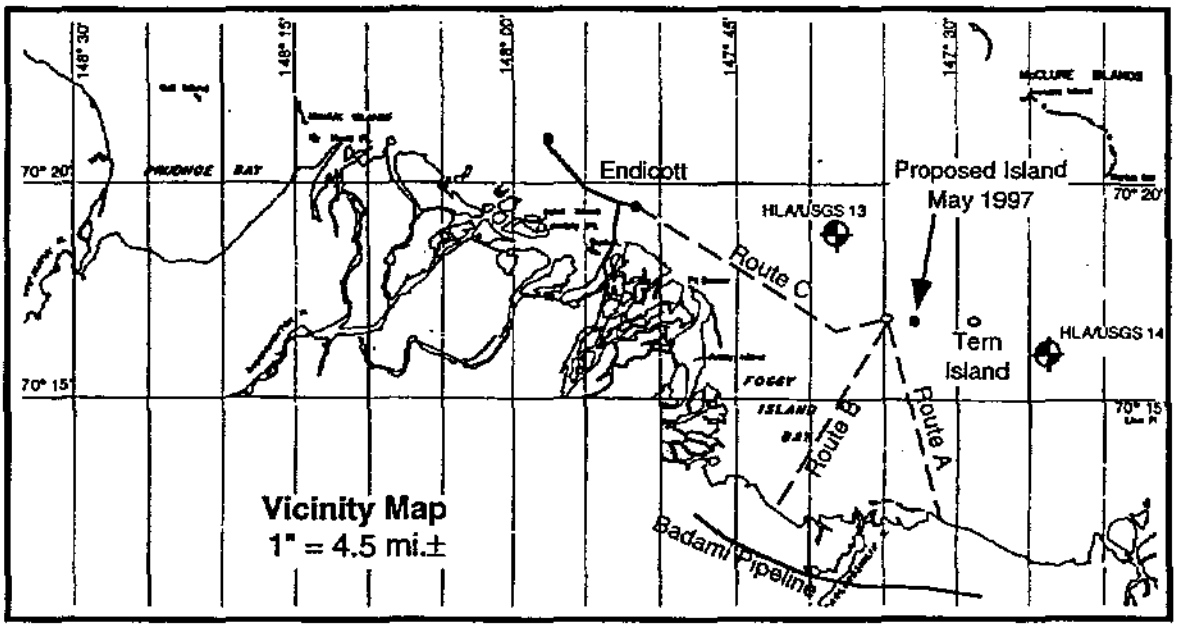
In Foggy Island Bay the offshore borings show Holocene soil to as deep as 18 feet below mudline but generally less than 9 feet deep and commonly missing. The Holocene soils include materials deposited in beach, delta, lagoon and shoal environments. The underlying Pleistocene soils include the marine Flaxman formation and deeper beach and alluvial sand and gravel.

Hard ice-bonded permafrost is present onshore and under the near shore, shallow waters. Ice-bonded permafrost is also found offshore where the stiff, overconsolidated Flaxman formation is present. Bonded permafrost was found at the island location and in one boring on the pipeline route to Endicott.

The soils are generally fine grained in the top ten feet and are commonly medium stiff to stiff except for occasional pockets of soft material where Holocene soils are present. The Holocene fine grained soils are compressible. The Pleistocene soils are heavily overconsolidated so they have small to moderate compressibility.

INTRODUCTION

This report presents the results of the geotechnical investigation conducted for the proposed Liberty Development Project, an offshore petroleum project in Foggy Island Bay. The proposed project will be located southeast of the Endicott Field and about 18 miles east of Deadhorse. The general location of the work is shown in the map below and details of the area are shown on Plate 1.



BP Exploration (Alaska), Inc., (BPXA) is evaluating the feasibility of developing the Liberty field. The potential petroleum field was explored in early 1997 by drilling a slant well from a spray ice island constructed at the remnant of Tern Island. Based on the findings from that exploration well and concurrent geophysical surveys, the proposed production island was relocated about 1/2 mile east of where we had done our drilling.

The oil will be transported from the production island in a steel pipeline. Offshore, the pipeline will be buried in the ocean floor; onshore, the pipeline is expected to be supported above grade on piling. The island and pipeline will be constructed using winter ice roads. Modules will be brought to the island during the ice free summer season. Emergency support and crew changes will be via helicopter.

The geotechnical exploration was started during the fall of 1996 when existing data were collected to allow for an assessment of expected geotechnical conditions. Also to

provide data for the design of the spray ice island, DM&A drilled one boring through the remnant of Tern Island, an abandoned gravel island about two miles to the east of the proposed Liberty Island. Using the existing data a field program was developed for exploring the offshore conditions at the Liberty project. The originally proposed island site and three alternative, offshore pipeline routes were explored in the spring of 1997 by drilling and sampling 30 borings and performing laboratory testing.

This winter's geotechnical work was performed in accordance with our contract with BP Exploration dated January 15, 1997. We coordinated our work with the Liberty Project Management Team through Mr. James C. Lewis of BPXA and Mr. José González Jáuregui of INTEC Engineering, Inc. Ms. Karen Wuestenfeld of BPXA provided permitting and environmental coordination. Field support and housing were provided by the Endicott Operating Unit.

The object of the geotechnical investigation was to explore the soil and permafrost conditions at the proposed production island site and along the three potential pipeline routes. This work was to include testing of the materials for pertinent engineering properties and to provide data for a conceptual design. The geotechnical work was divided into the following tasks:

* Drilling and sampling borings,
* Measuring ground temperatures,
* Primary and secondary laboratory testing in Anchorage, and
* Data analysis and report preparation.

An independent, shallow sea floor evaluation of environmental conditions was performed by Montgomery Watson in conjunction with the startup of the field program.

EXPLORATION

Existing data

The geotechnical evaluation of the project area started with the collection and review of existing data. The surficial geology in Foggy Island Bay has been studied for many years by numerous agencies and at least one subsurface study was conducted by Shell Oil as part of their wildcat oil drilling program in the 1970s and 1980s.

The United States Geological Survey (USGS) has been involved in regional studies in the area since Schraeder first descended the Colville River right after the turn of the century. Leffingwell, who spent at least nine summers on the arctic coastal plain, produced the first definitive geologic study of the region and was the first to identify the geologic and ecological significance of the Flaxman boulder deposits. Surficial studies in the area have been conducted off and on since that time including detailed studies resulting from the Outer Continental Shelf Environmental Assessment Program (OCSEAP) of the 1970s. A complete narrative summary of government work in the area is presented in Public Data File 90-27 by the Alaska Division of Geological and Geophysical Surveys (Rawlinson, 1990).

In 1979 the USGS contracted with Harding Lawson Associates (HLA) to explore the geotechnical conditions in the proposed offshore lease sale area from the Kuparuk River to Flaxman Island. Two of the borings drilled during the spring of 1979 were located near the Liberty area (USGS/HLA 13 and USGS/HLA 14). The locations of those holes is indicated on the Vicinity Map in the Introduction.

Prior to building Tern Island, Shell Oil commissioned HLA to evaluate subsea soil conditions in the vicinity of the present island remnant. The results of the geotechnical investigation for the Tract 42 Well Site are in the HLA report dated February 1981 (HLA Job No. 9644,004.08). The island was instrumented by HLA after its construction and that data is presented in their report dated September 2, 1982 (HLA Job No. 9644,009.08).

A detailed geotechnical exploration was performed by HLA for the Endicott project in 1981 and 1982 and provides information to the west of the Liberty area and at the end of the Route C pipeline alignment.

Extensive sea floor studies also have been conducted to determine the extent of the "boulder patch" areas immediately northwest and northeast of the project site. These seafloor boulders are unique in the arctic and support an unusual abundance of sea life. In addition to the ecological significance of the boulder patch material, the boulders are an indicator of subsurface geology.

Selected references are cited at the end of this report.

Drilling

Between February 16 and 25, 1997, we drilled and sampled 30 borings. All work was conducted in accordance with the following permits:

Alaska Department of Natural Resources, Division of Land, Land Use Permit LAS 19505 (Tundra Travel) and LAS 19628,

Alaska Department of Fish and Game, Division of Habitat and Restoration FG96-III-0031 , and

North Slope Borough Administrative Approval NSB 96-052.

Four holes (Hole I-1 through I-4) were placed in the vicinity of the proposed production island, about two miles west of Tern Island. Ten holes (Hole A-1 through A-10) were placed along pipeline alternative "A" which runs SSE from the proposed production facility to tie in with the Badami Pipeline east of the Kadleroshilik (Kad) River Delta. Twelve holes (Hole B-1A and B-1 through B-11) were drilled along pipeline alternative "B" which runs SSW to join the Badami line on the west side of the Kad River Delta. An additional four holes were placed along pipeline alternative "C" which extends for about eight miles to the WNW to connect the Liberty production facility directly with the existing Endicott Complex. The location of each boring is shown on Plate 1 and a summary of locations, drilling information and conditions encountered at each boring are listed on Plate 2 and 3.

The coordinates of the proposed borings were calculated before the field work began and the hole location was established in the field using a Differential Global Positioning System (GPS). The GPS system employed by LCMF for field staking gave a precision for the initial hole locations at about +/-3 ft. The drilled locations with the exception of Hole A-2, were generally within 5 to 7 ft of the staked location. Hole A-2 , near the beach line was moved 35 feet to the north to avoid a large snow drift. Hole B-1A was drilled about 50 feet southwest of Hole B-1.

The heavy equipment was mobilized along the Tern Island and Badami ice roads. Within the project area the existing ice roads and sea ice were used as much as possible so overland transport was minimized to the short access required to Holes A-1, B-1 and B-1A.

The drill was mounted on a sled, and the drill and operating area were protected from the weather by a framed enclosure. A second sled carried a survival shed and a generator. The drill equipment was supplied and operated by Discovery Drilling of Anchorage. Logistical support was provided by CATCO from their base of operations at Prudhoe Bay. A roller-driven Rolligon (CATCO RD-85) with 8 supporting air bags was used for transport. The drill rig and emergency shelter sleds were moved from site to site by the Rolligon. A 500-gallon fuel tank for day use was mounted on the Rolligon. When needed the RD-85 also served as crew carrier. Fuel supplies were replenished as needed by BP Liberty field contractors.

The crews were housed at BP's Endicott Facility and commuted to the project area by pick-up truck. Meals and office support were obtained at Endicott Operations Center. No on-site camp facilities were utilized except for the small sled-mounted emergency shelter that was kept with the drill rig at all times.

The work was performed on a double shift basis with crews working 12 hours at the drill rig. Each shift had a 4 person crew consisting of a DM&A geologist or engineer, a Discovery Drilling driller and a drill helper, and a CATCO operator. A DM&A technician provided expediting support as needed to both shifts and was responsible for sample packaging and shipping.

The borings were drilled to depths of 11.0 to 105 feet below the mudline using a CME-75 soils drill rig equipped with hollow stem augers. The soils were logged by Mr. Walt Phillips, PG, Ms. Erin Bashaw, EIT, and Mr. Mikal Hendee, EIT, as the borings were drilled. Samples of the soil were obtained by pushing thin wall samplers, by driving split barrel samplers and by grab sampling off the augers. Sampling was generally attempted at five-foot intervals.

In fine grained soils (silts and clays), thin-walled (Shelby) tubes were used where practical (this method is designated as Tw on the boring logs). The Shelby tubes are 3-inch OD (2.87-inch ID) and were pushed into the soil using the hydraulic down pressure of the drill rig. The sample was generally left in the tube, and the ends of the

tube were sealed. The Shelby tubes of unfrozen soil were protected from freezing and were transported in cushioned boxes. For sand and gravel or for fine grained soils that were too stiff for a Shelby tube, the sampling methods consisted of split-barrel samplers advanced into the soil below the tip of the auger by driving with an above ground hammer. The CME-75 was equipped with an automatic hammer system (samples designated as Sha on the boring logs). The hammer weighed 340 pounds and had a drop of 30 inches. The drive samples were obtained in a 3-inch OD by 2.5-inch ID split barrel. Blow counts for each 6-inch increment of the drive were recorded. Six-inch long brass tubes were commonly used in the 3-inch OD sampler, and the tubes were logged and capped for subsequent examination and testing.

On shore, soils were sometimes sampled by grabbing cuttings off the auger flights (designated on the boring logs as Ag for auger grab). The ice content and soil type were logged and the samples were sealed in doubled plastic bags.

If the boring was in frozen soil that did not cave when the auger was pulled, the annulus between the PVC pipe and hole was backfilled with free flowing sand. The tube extends about 4-feet above the ground or ice surface and was marked by a plastic snow pole. The six-foot snow poles are bright orange and fitted with reflecting tape. Of the total of 30 test holes drilled, temperature monitoring pipe was left at 4 locations.

A graphic log of each borings drilled is presented in Appendix A on Plates A-1 through A-38. The soils and ice have been classified in accordance with the Unified Soil Classification System presented on Plate A-39. The boring logs show the type of sampler used and the blow counts required to drive the sampler the last 12 inches.

Laboratory testing

Laboratory testing in Anchorage included primary testing and secondary testing. Primary testing included moisture contents on most samples, salinity tests, moisture/density determinations on undisturbed samples, visual classification with torvane or pocket penetrometer strengths on undisturbed samples, and classification tests (sieve analysis and/or Atterberg Limits) and specific gravity tests. To provide information for corrosion design, samples were also tested for resistivity in accordance with the ASTM G-57 method. Laboratory testing was performed by two different laboratories: R&M Consultant, Inc., (R&M) and Alaska Testlab (ATL).

Salinities were determined using two different methods. R&M determines salinity by measuring the electrical conductivity of diluted pore fluid and correlates the conductivity to salinity using published values for sea water. ATL measures salinity using a titration paper that shows the amount of chloride and then adjusts the chloride to a sea water salinity on a molar basis.

The results of the salinity and moisture contents are graphically shown on the boring logs and are tabulated on the Summary of Samples on Plates B-1 through B-11. The Summary of Samples also shows strength tests, thaw strain values, organic contents, specific gravity and classification test results. Results of the Atterberg Limit tests are shown graphically on Plate B-12, and the results of the particle size determinations are shown on Plates B-13 through B-21. The results of the Resistivity Tests are shown on Plate B-22.

Secondary testing was performed by ATL and included triaxial shear strength and consolidation tests of unfrozen samples and thaw consolidation tests of frozen samples. Both unconsolidated, undrained tests and consolidated, drained triaxial tests were performed. The results of the strength testing are summarized in the Summary of Samples in Appendix B. Laboratory data for the triaxial strength testing are presented in Appendix C. One dimensional consolidation tests were performed on unfrozen fine grain soils; the laboratory data sheets are presented in Appendix D.

Thaw strain tests were performed on 14 frozen samples; the laboratory data sheets are in Appendix E. The thaw strain samples were not extruded from the 2.47-inch diameter tubes but were tested in the tubes. In most cases the samples were close to six inches high. Working in a chest freezer, the end of the samples were hand trimmed to conform to the flat loading platens. Then the samples were loaded with a surcharge and allowed to thaw at room temperature. All but two of the tests were performed as single load tests. Step loads were applied to the other two samples after the thaw was completed so that a full consolidation curve could be developed. The data is discussed later in the report.

Ground temperatures

A 3/4-inch diameter pipe was installed in four borings to allow for the later measurement of ground temperatures. Multiconductor cables with thermistor beads mounted at various intervals were used to obtain ground temperature readings. For

each set of readings the thermistor cable was inserted in the pipe and left to stabilize for at least 45 minutes before the readings were obtained. A 4-1/2 digit multimeter was used to obtain the resistance of each thermistor.

In mid-March temperature readings were obtained at two onshore borings on Line "A" before weather prohibited further data collection. In April, temperature measurements were taken in all four pipes, however a malfunction of the thermistor string resulted in unusable data. We suspect that saltwater had gotten into the cable during the first set of readings in April. The measured temperatures obtained in March are tabulated and graphically presented in Appendix G.

REGIONAL SETTING

Geology

Foggy Island Bay is located on the northern edge of the physiographic province known as the Arctic Coastal Plain (Wharhaftig, 1965). The Arctic Coastal Plain is typified by gentle topography, ice bonded permafrost soils, wet tundra, wind-oriented thaw lakes, and braided and beaded stream channels. The coastal plain slopes gently northward to elevations of only a few feet above sea level at the shore of the Beaufort Sea.

The Foggy Island Bay shoreline is formed by a series of river deltas separated by an eroding coastline. The active delta of the east fork of the Sagavanirktok River forms the western edge of Foggy Island Bay. The Kadleroshilik and Shaviovik Rivers cross the coastal plain and discharge into the bay from the south. Tigvariak Island, an erosional remnant of onshore tundra, forms the eastern limits of Foggy Island Bay.

The ice-rich sediments beneath the onshore coastal plain subside significantly if they thaw (thermokarst collapse). Thermal erosion of the coastline occurs as wave action undercuts the ice-rich organic and silt deposits and blocks of tundra topped peat and icy silt collapse onto the beach (thermo-erosional niching). Thermal erosion is reported to about three feet per year between the Sagavanirktok River delta and Tigvariak Island (Hopkins et al., 1977). At a rate of three feet per year, archaeological sites which may have existed on an ancient coastline would have long ago fallen into the sea. In the surf zone, such remains would be subject to further destruction by wave and ice processes. Therefore, it is believed that even under ideal conditions, offshore archaeological remains would be totally or partially destroyed and difficult or impossible to recognize.

The offshore Holocene soils in Foggy Island Bay include beach, delta, lagoon, marine and shoal deposits, along with the Flaxman Lag. Pleistocene soils include the Flaxman Formation and marine, beach and alluvium. In the borings drilled for this exploration, the offshore Holocene sediments generally consisted of lagoonal and deltaic deposits (silt and organic silts) with some sandier beach and shoal deposits. The Holocene sediments are generally thin and are sometimes missing. The Flaxman Lag (the material that forms the "boulder patch" environments) was not found in the

borings, but this surface cobble and boulder material is best found using geophysical methods or by direct observation by divers.

The uppermost layer of the Pleistocene deposits is part of the Flaxman formation (part of the Gubic formation?), a marine unit probably deposited about 70,000 years ago. A beach deposit of sand and gravelly sand is found at the base of the marine unit and is in turn underlain by alluvial sand and gravel deposited as glacial outwash.

Where the Pleistocene marine deposits outcrop on the sea floor, they are often composed of overconsolidated, stiff to very stiff silt or clay. At Tigvariak Island and along other parts of the coast, scattered gravel, cobbles and boulders are incorporated within the marine deposits. The boulders, commonly called Flaxman boulders, are characterized by mineral constituents foreign to the geology of Alaska. Some of the rock has been traced to bedrock in the Canadian shield. It is believed that the Flaxman boulders represent glacial dropstones which were ice rafted to their present locations during an interglacial period of elevated sea level. As the grounded ice bergs rotted in place, the cobbles and boulders dropped to the seafloor and were then buried in fine grained marine deposits. When the fine-grained marine sediments are eroded away, the coarse material of the Flaxman formation remains as a lag deposit of cobbles and boulders and forms the "boulder patch" environments.

Climate

Foggy Island Bay is within the Arctic Climatic Zone and has an arctic maritime climate. At Prudhoe Bay temperatures range from a mean of 7°C in July to a mean of -30°C in February. The mean annual temperature is about -13°C.

Total annual precipitation ranges from about 10 and 22 cm. Of this, as much as half is rainfall which occurs between June and September. Snowfall is generally greatest in October.

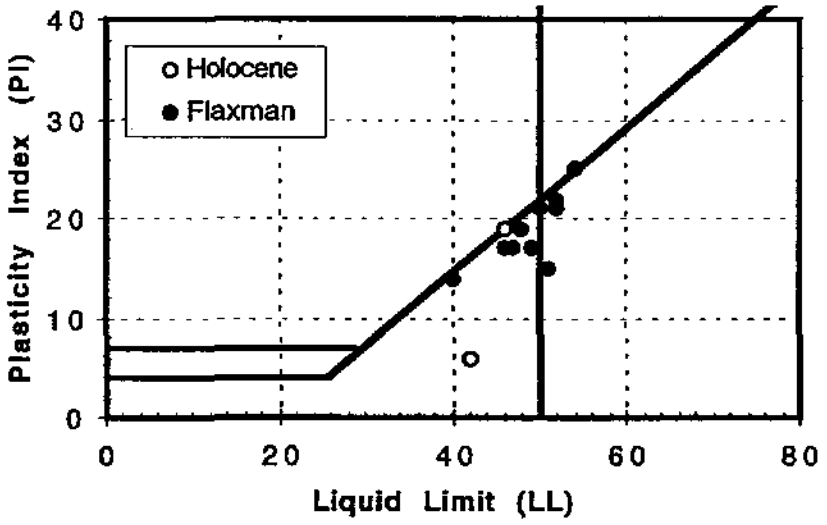
Winds on the coastal plain are generally from the east and northeast in summer and from the west and northwest in Winter. Westerly summer winds, generally associated with storms, are sometimes responsible for surge water that may inundate low-lying areas.

SOIL AND PERMAFROST CONDITIONS

Soil Conditions

The borings show soil conditions that fit with the previously discussed geologic depositions. The conditions at the island site and along the three pipeline alternatives are shown on Plates 4 through 7. Away from the beach line, most of the near sea floor soils consist of silts and clays and silty sand. As expected for lagoonal soils, the near surface deposits frequently contain a considerable amount of organic matter. Pieces of peat and organic silt layers are also encountered.

The Atterberg Limit tests generally show the fine grained materials vary widely in plasticity, from non plastic silt (ML) to plastic clays (CH) and plastic silt (MH). The more plastic material is generally associated with the Flaxman formation. Three other fine-grained samples that tested non-plastic were all from the Holocene sediments.



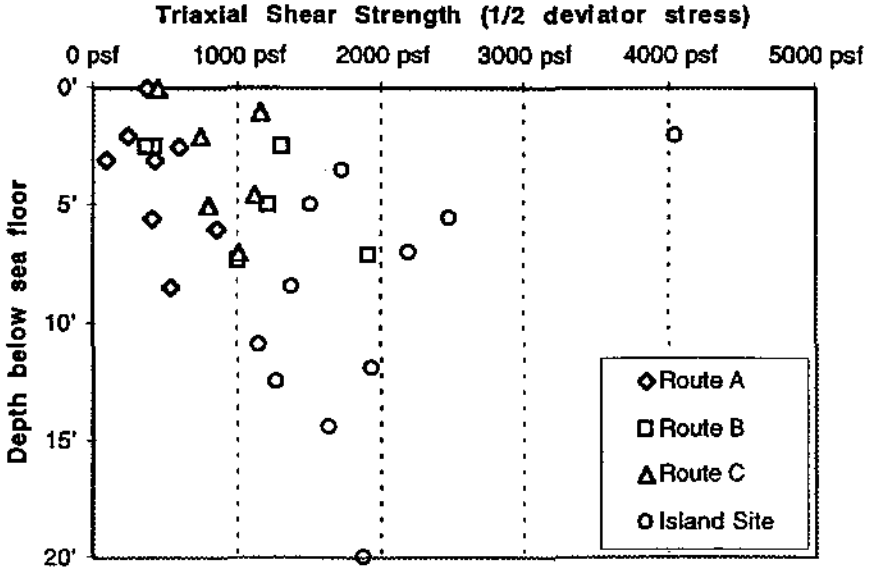
Uniaxial consolidation tests were performed on 10 samples from the island site. The tested samples of Holocene material show a modified compression index of 0.04 to 0.27, with the lower value associated with a silty sand. The overconsolidated materials associated with the Pleistocene Flaxman formation show a modified recompression index of 0.01 to 0.04. The results of the consolidation tests are summarized in the following table.

Summary of Consolidation Tests

Boring	Depth	Soil Type	Geology	Moisture	Density	Cc	Cr
I-1	3.0'	ML+OL	Holocene	50.9%	65 pcf	0.27	0.08
I-1	5.5'	ML	Pleistocene	29.6%	93 pcf	0.12	0.04
I-1	15.5'	MH	Pleistocene	35.0%	85 pcf	0.17	0.04
I-2	9.7'	ML	Pleistocene	28.6%	99 pcf	0.18	0.06
I-3	2.5'	ML	Holocene	28.3%	97 pcf	0.08	0.02
I-3	7.5'	MH	Pleistocene	32.4%	91 pcf	0.12	0.03
I-3	12.5'	ML	Pleistocene	36.2%	86 pcf	0.20	0.04
I-3	20.0'	ML	Pleistocene	28.2%	94 pcf	0.11	0.02
I-4	2.0'	SM	Holocene	32.0%	95 pcf	0.04	0.01
I-4	22.0'	MH	Pleistocene	28.7%	90 pcf	0.13	0.02

If a gravel island with 20 feet of freeboard is constructed over a Holocene layer that is six feet thick with an underlying Pleistocene layer that extends to a depth of 25 feet, and using the higher values for virgin compression ratio (Cc = 0.25) in Holocene layer and the rebound value (Cr = 0.04) for the stiffer underlying material, a total settlement due to consolidation of the sediments would be about three feet. Depending on the internal drainage conditions (presence of sand lenses), the settlement would take six months to two years to be essentially complete.

Much of the fine grained soil is overconsolidated with shear strengths greater than 1000 psf. The weakest materials are in the top five feet and found along the north-south pipeline routes (Routes A and B). The soils at the island site are stiff to very stiff.



Bonded Permafrost

Permafrost is defined as a material that remains below 32° F for two or more years. Except for a thin layer near the sea floor, all of the offshore soils remain below 32°F. However, for engineering purposes, the critical issue is whether the material is bonded with ice. Because of variations in salt content and the associated freezing point depression, temperature alone does not define the engineering characteristics of the material. As expected, ice bonded permafrost was observed in the onshore borings and beach borings (A-1, A-2, B-1, B-1A and B-2). The onshore area contains massive ice as polygonal wedges.

Offshore, the surface of the bonded permafrost appears to drop away steeply. No bonded material was observed either Boring A-3 or B-3 drilled just inside the 6-foot isobath. Both borings were drilled to depths greater than 30 feet below mudline.

Bonded permafrost was found offshore in deeper waters in Boring C-3 (11 feet of water) and at the island, Borings I-1 and I-4 (about 20 feet of water). This permafrost under deeper water is believed to be related to the presence of the Flaxman formation silt and clay. The silt and clay are heavily overconsolidated and have a low permeability. Consequently, the diffusion of seawater salts into the material is slower than for silty sand or sand materials. The intrusion of salt is what depresses the thaw point of the material and leads to a loss of ice bonding. Similar ice bonded conditions were found in the HLA/USGS Boring 13 and at many locations at the Endicott site.

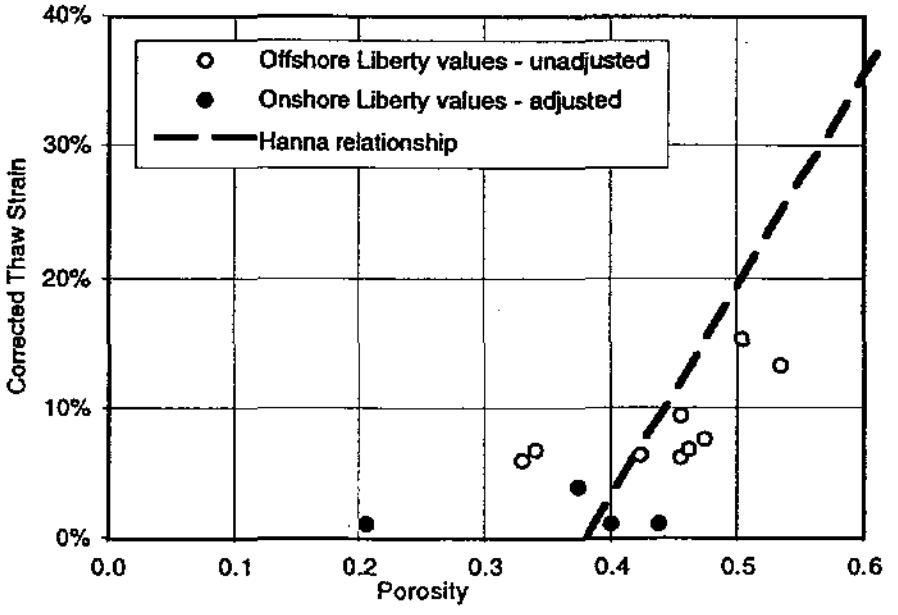
Thaw Strains

All of the samples tested for thaw strain were also tested for density, moisture content and pore water salinity, and typical samples were tested for classification. The following table shows the pertinent data from the laboratory testing. Many hammer blows (N-value) were needed during the drive sampling of the tested samples from the onshore and near shore borings (B-1, B-1A and B-2). The measured dry density and moisture contents indicate that the samples are under-saturated. This is not reasonable. Therefore, we have corrected the dry densities to values corresponding to ice saturation for the measured moisture content, and we have also adjusted the measured thaw strain to correct for the internal fracturing present before testing. Values of thaw strain were not reduced below 1%. The sample from Boring I-1 at 46 feet appears to have an incorrect moisture content so we have not included it in the plot of data.

					Uncorrected Lab Values					Adjusted Values		
Bor. No.	Depth	Salt	USCS	N-value	Moist Cont	Lab Dry Dens.	Lab Porosity	Thaw Strain	Ice Sat.	Sat. Dry Dens.	Thaw Strain	S=100% Porosity
B-1	11.0'	3 ppt	SM	48	27.0%	71 pcf	0.571	14.40%	59%	93 pcf	1.00%	0.439
B-1	14.5'	2 ppt	SP-SM	54	23.0%	83 pcf	0.499	11.30%	67%	99 pcf	1.00%	0.400
B-1A	14.0'	3 ppt	SM	100	20.7%	85 pcf	0.486	25.50%	63%	103 pcf	3.77%	0.375
B-2	10.1'	56 ppt	SM	90	9.0%	124 pcf	0.250	4.30%	78%	131 pcf	1.00%	0.207
C-3	20.0'	21 ppt	ML	0	38.6%	77 pcf	**0.534**	**13.10%**	97%	78 pcf	11.59%	0.528
C-3	20.5'	3 ppt	ML	8	35.9%	82 pcf	**0.504**	**15.30%**	102%	81 pcf	16.32%	0.510
C-3	25.5'	0 ppt	SM	0	25.7%	90 pcf	**0.456**	**6.00%**	89%	95 pcf	0.57%	0.427
C-3	26.0'	0 ppt	SM	34	27.7%	87 pcf	**0.474**	**7.50%**	89%	92 pcf	1.93%	0.445
C-3	30.8'	5 ppt	SM	55	27.7%	89 pcf	**0.462**	**6.70%**	94%	92 pcf	3.51%	0.445
I-1	45.5'	2 ppt	SP-SM	110	25.1%	90 pcf	**0.456**	**9.30%**	87%	96 pcf	2.81%	0.421
I-1	46.0'	1 ppt	SP-SM		34.7%	94 pcf	0.432	8.10%	133%			
I-1	65.5'	10 ppt	SM	160	16.5%	111 pcf	**0.329**	**5.90%**	98%	112 pcf	5.03%	0.323
I-1	66.0'	6 ppt	SM		17.3%	109 pcf	**0.341**	**6.70%**	97%	110 pcf	5.56%	0.334
I-4	52.5'	2 ppt	SM	93	24.1%	95 pcf	**0.424**	**6.30%**	95%	97 pcf	4.02%	0.411

Bold values in dashed boxes are plotted in the following chart

These adjustments were not applied to the offshore samples where the measured densities and moisture contents are closer to total saturation. The potential corrections are shown in the preceding table and range between the uncorrected and adjusted values probably reflects the range of error in the testing. The following chart shows the thaw strain data versus the porosity of the sample and compares the data with the relationship developed by Hanna for silts and fine sands.



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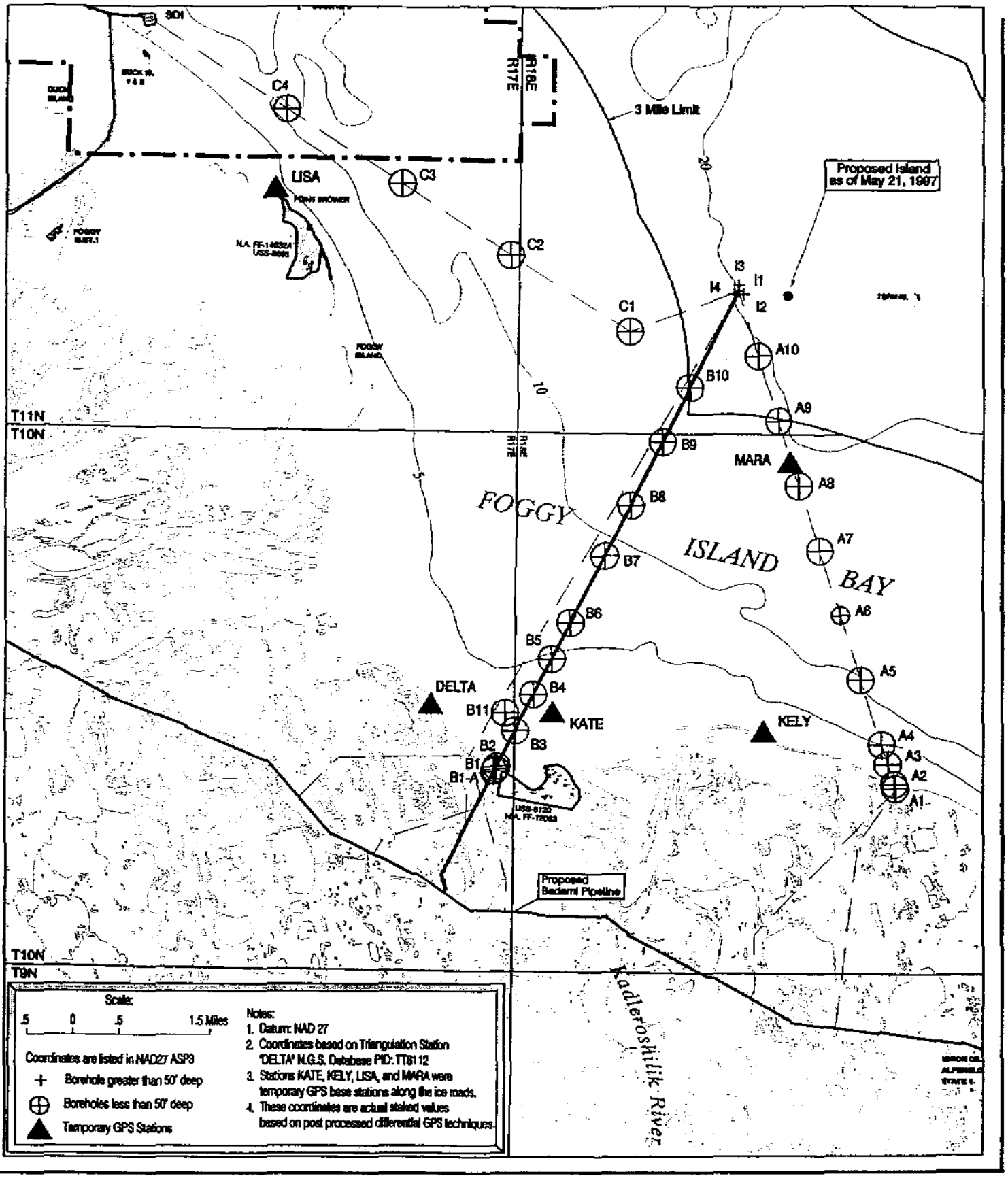
Reimnitz, E., and Kempema, Ross and Minkler; 1980; Overconsolidated surficial deposits on the Beaufort Sea Shelf, USGS Open File Report 80-draft

ILLUSTRATIONS



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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997
Map File No. ip13373a.dgn

BORING LOCATIONS
Liberty Development
Beaufort Sea, Alaska

PLATE
1

Summary of Liberty Borings

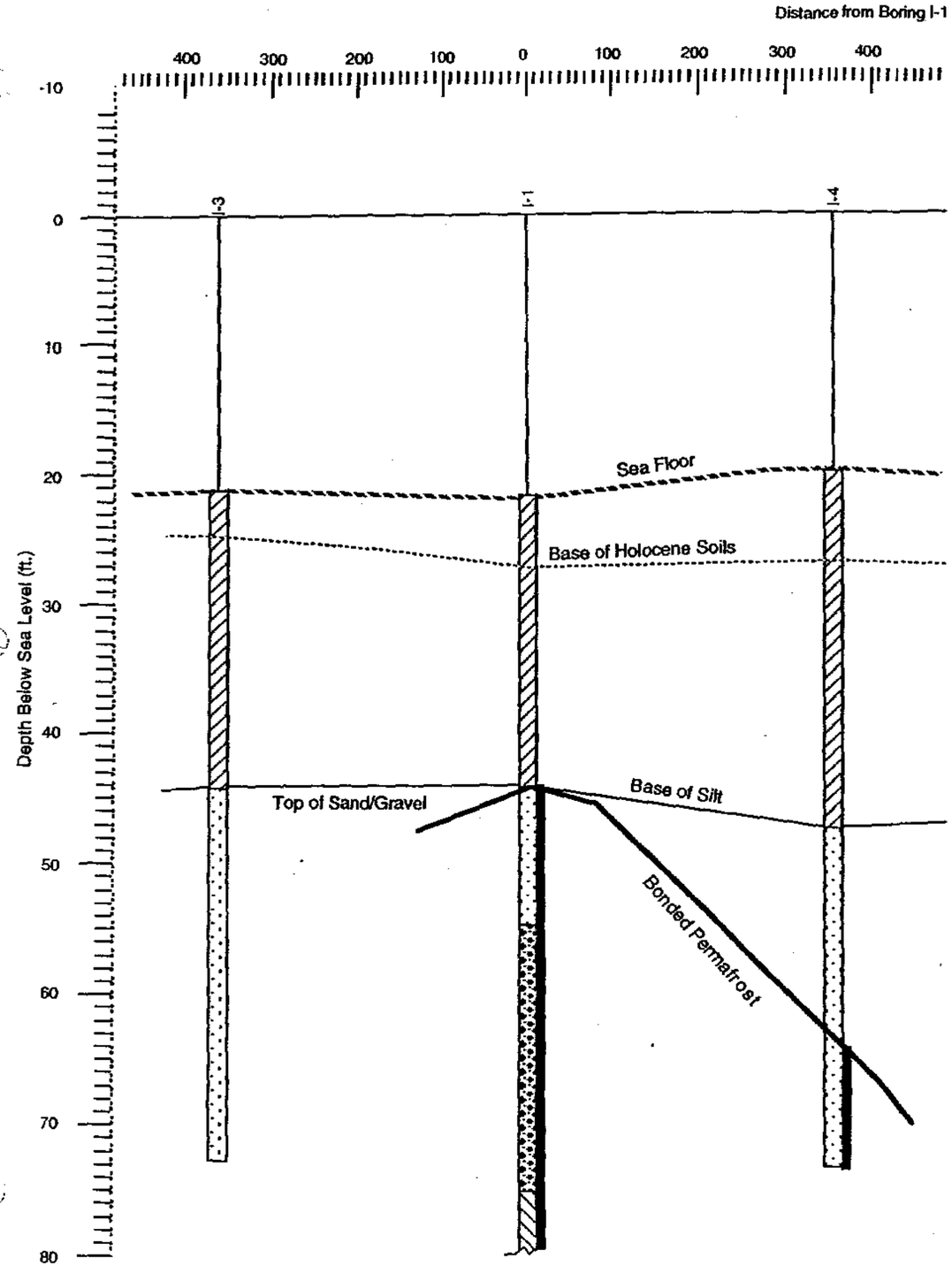
Bor. No.	As Drilled ASP Zone 3 Northing	As Drilled ASP Zone 3 Easting	Elev.*	Date/Time Finished	Water Depth	Ice Thick-ness	Boring Depth*	Bonded Perma-frost	PVC Pipe	Base of Holocene Lagoon	Base of Silt	Top of Sand/ Gravel	Comments
A-1	5,925,145 ft	313,256 ft	7.0'	2/16 18:30	ne	ne	30.0'	yes	30'	ne	9'	9'	onshore tundra
A-2	5,925,385 ft	313,200 ft	-3.6'	2/18 0:00	ne	3.6'	31.5'	yes	none	5'	5'	5'	
A-3	5,926,564 ft	312,842 ft	-5.9'	2/19 18:30	5.9'	3.5'	31.5'	no	30'	ne	ne	17'	shoal sand to 17'
A-4	5,927,743 ft	312,496 ft	-6.2'	2/20 1:45	6.2'	4.0'	32.8'	no	none	3.5'	3.5'	5'	
A-5	5,931,558 ft	311,346 ft	-10.8'	2/20 6:30	10.8'	3.5'	28.2'	no	none	10'	10'	10'	interbedded silt and sand to 10'
A-6	5,935,382 ft	310,204 ft	-17.7'	2/20 13:30	17.7'	3.9'	29.5'	no	none	7'	7'	16'	Silty sand from 7' to 16'
A-7	5,939,201 ft	309,070 ft	-19.3'	2/17 1:00	19.3'	4.2'	30.0'	no	none	11.5'	9.5'	14'	
A-8	5,943,021 ft	307,941 ft	-19.3'	2/18 11:00	19.3'	4.3'	37.5'	no	none	10'	10'	27'	Silty sand from 10' to 27'
A-9	5,946,839 ft	306,798 ft	-19.8'	2/18 16:30	19.8'	4.2'	33.5'	no	none	10'	19'	22.5'	Silty sand from 19' to 22.5'
A-10	5,950,658 ft	305,654 ft	-19.0'	2/21 22:05	19.0'	4.0'	34.5'	no	none	11'	23'	23'	
B-1	5,926,747 ft	289,876 ft	7.0'	2/19 5:00	ne	ne	30.0'	yes	none	ne	ne	12'	Tundra organics to 4', Ice wedge below
B-1A	5,926,712 ft	289,841 ft	7.0'	2/25 6:30	ne	ne	30.0'	yes	none	ne	ne	15'	Peat to 0.5' over Silty sand
B-2	5,926,908 ft	289,968 ft	0.0'	2/19 1:15	ne	1.3'	31.2'	yes	none	ne	ne	1.5'	
B-3	5,928,987 ft	291,067 ft	-5.6'	2/18 21:45	5.6'	4.3'	36.2'	no	none	11.5'	9.5'	11.5'	Silt layer from 7' to 9.5'
B-4	5,931,094 ft	292,175 ft	-5.7'	2/18 18:00	5.7'	3.8'	22.0'	no	none	7'	7'	10'	
B-5	5,933,178 ft	293,273 ft	-6.7'	2/20 18:00	6.7'	4.0'	26.5'	no	none	7.5'	7.5'	10.5'	

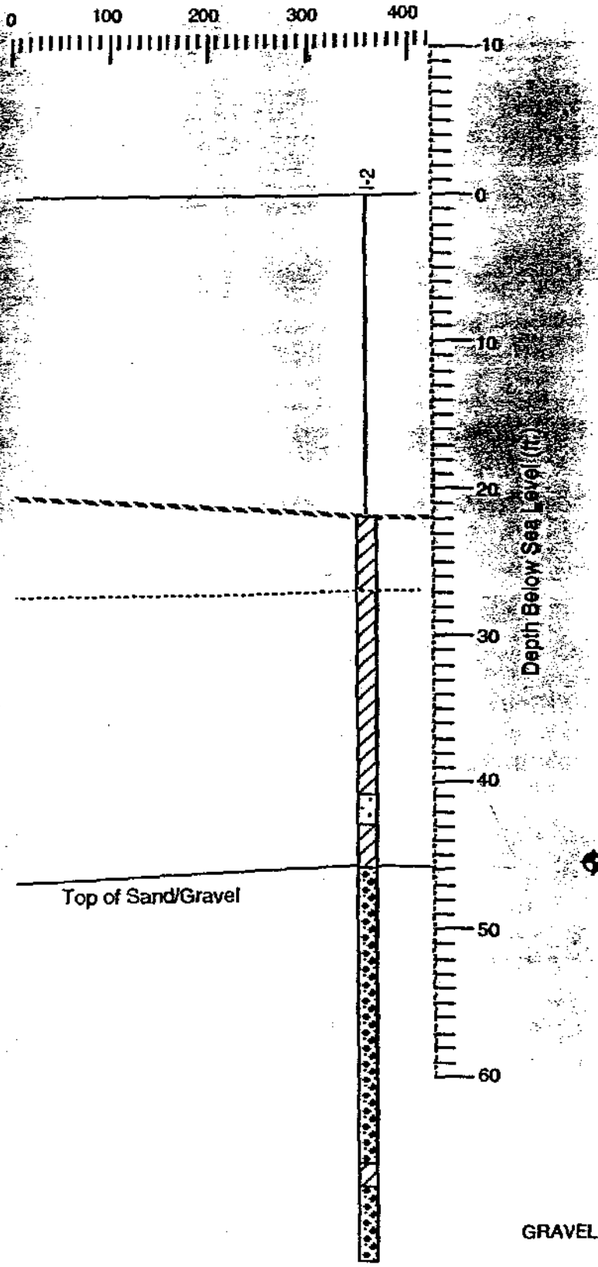
Summary of Liberty Borings

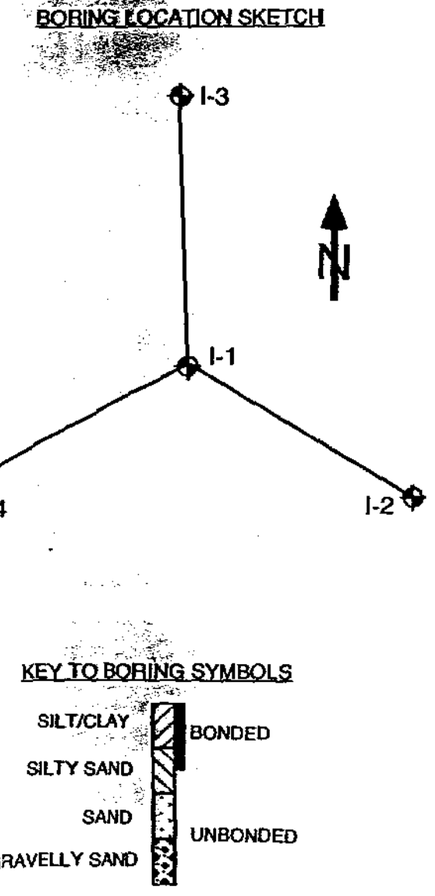
Bor. No.	As Drilled ASP Zone 3 Northing	As Drilled ASP Zone 3 Easting	Elev.*	Date/Time Finished	Water Depth	Ice Thick-ness	Boring Depth*	Bonded Perma-frost	PVC Pipe	Base of Holocene Lagoon	Base of Silt	Top of Sand/ Gravel	Comments
B-6	5,935,285 ft	294,379 ft	-6.5'	2/20 0:10	6.5'	3.8'	36.5'	no	none	12'	12'	12'	
B-7	5,939,157 ft	296,424 ft	-7.1'	2/21 5:30	7.1'	4.2'	41.6'	no	none	18'	30'	30'	Peat layer from 16.5' to 17.5'
B-8	5,942,084 ft	297,978 ft	-15.5'	2/18 2:00	15.5'	3.8'	27.0'	no	none	6'	11'	11'	
B-9	5,945,758 ft	299,909 ft	-17.3'	2/18 4:00	17.3'	4.0'	49.6'	no	none	9.5'	36'	36'	
B-10	5,948,920 ft	301,578 ft	-13.0'	2/21 14:30	13.0'	4.0'	49.0'	no	none	7.5'	28'	28'	Sand from mudline to 7.5'
B-11	5,930,040 ft	291,621 ft	-5.0'	2/19 9:30	5.0'	4.0'	10.0'	no	none	8'	ne	8'	between B-3 and B-4
C-1	5,952,264 ft	298,091 ft	-14.8'	2/25 1:30	14.8'	4.3'	29.5'	no	none	3.5'	BOH	ne	Sand from mudline to 3.5'
C-2	5,956,813 ft	291,289 ft	-15.2'	2/24 22:30	15.2'	4.2'	29.0'	no	none	0'	BOH	ne	
C-3	5,961,067 ft	284,970 ft	-11.3'	2/24 17:50	11.3'	4.5'	31.5'	some	32'	0'	30'	30'	
C-4	5,965,516 ft	278,327 ft	-10.8'	2/24 11:30	10.8'	4.4'	27.0'	no	none	3.5'	20'	20'	Sand and Sandy Silt below 3.5'
I-1	5,954,484 ft	304,526 ft	-21.5'	2/23 5:30	21.5'	3.5'	105.0'	some	105'	5.5'	22.5'	22.5'	
I-2	5,954,304 ft	304,821 ft	-21.7'	2/22 5:30	21.7'	4.8'	50.5'	no	none	7.5'	24'	24'	
I-3	5,954,846 ft	304,516 ft	-21.1'	2/23 18:30	21.1'	4.0'	51.5'	no	none	3.5'	23'	23'	
I-4	5,954,317 ft	304,216 ft	-19.7'	2/24 0:30	19.7'	4.2'	53.5'	yes	no	7'	23'	23'	Bonded below 44.5'

* Boring depths are from mudline. Elevations assume water level = MSL

ne = none encountered, BOH is Bottom of Hole







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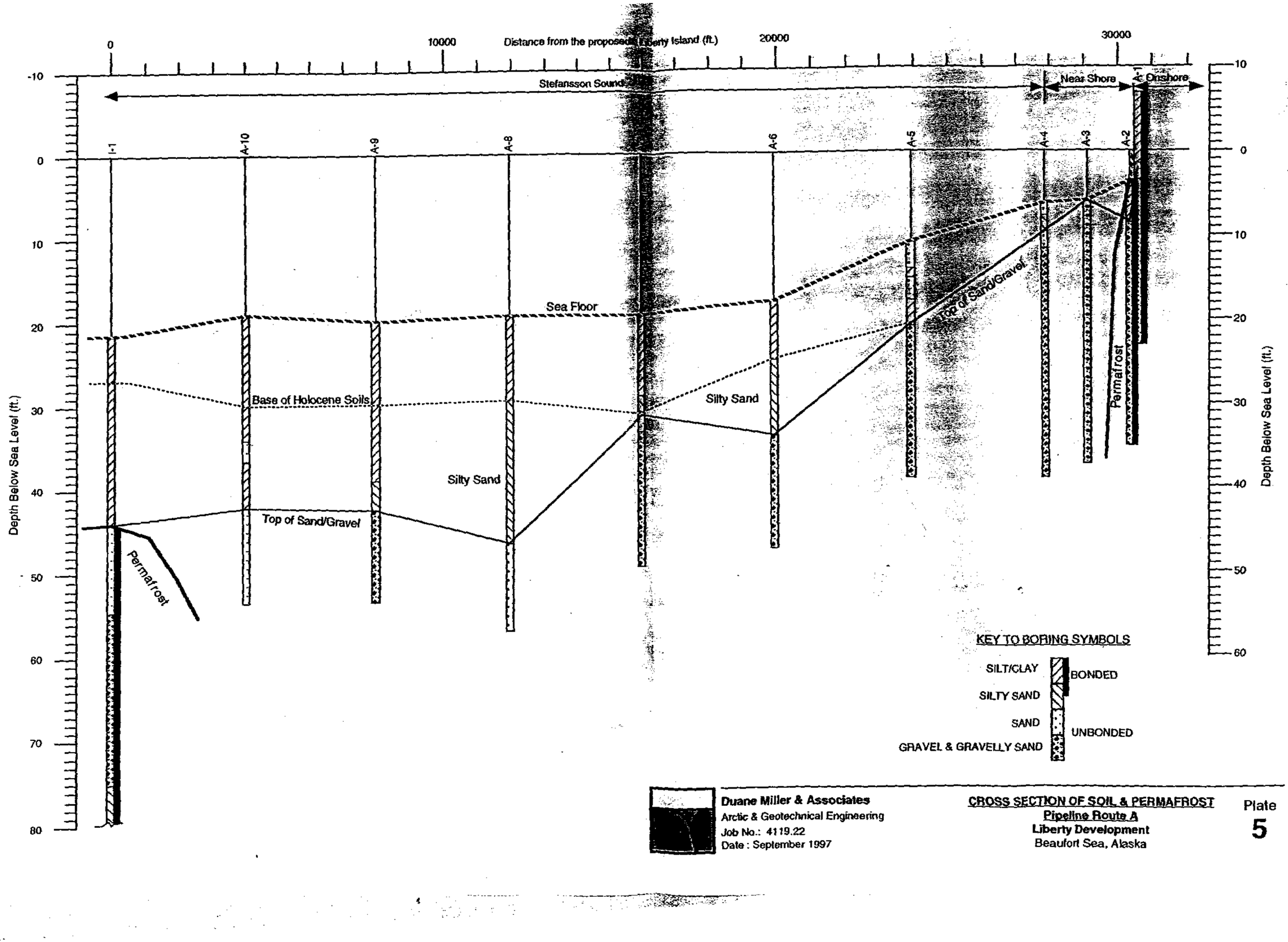
CROSS SECTION OF SOIL & PERMAFROST
Proposed Island
Liberty Development
Beaufort Sea, Alaska

Plate
4



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Job No.: 4119.22
Date : September 1997

CROSS SECTION OF SOIL & PERMAFROST
Pipeline Route A
Liberty Development
Beaufort Sea, Alaska

Plate
5

Distance from the proposed Liberty Island (ft.)

0 10000 20000 30000

Stefansson Sound | Near Shore | Onshore

B-1 B-1A B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 I-1

Depth Below Sea Level (ft.)

-10 0 10 20 30 40 50 60 70 80

Sea Floor

Silty Sand

Base of Holocene Soils

Top of Sand/Gravel

Base of Silt

Top of Sand/Gravel

Permafrost

Depth Below Sea Level (ft.)

-10 0 10 20 30 40 50 60

KEY TO BORING SYMBOLS

SILT/CLAY — BONDED

SILTY SAND

SAND — UNBONDED

GRAVEL & GRAVELLY SAND

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CROSS SECTION OF SOIL & PERMAFROST
Pipeline Route B
Liberty Development
Beaufort Sea, Alaska

Plate
6

Distance from the proposed Liberty Island (ft.)

0 10000 20000 30000 40000 50000

Stefansson Sound

Endicott

HMSP @ Endicott

I-1 C-1 C-2 C-3 C-4

Sea Floor

Base of Holocene Soils

Silty Sand

Silty Sand

Base of Silt

Permafrost

Permafrost

Top of Sand/Gravel

Permafrost

Depth Below Sea Level (ft.)

-10 0 10 20 30 40 50 60 70 80

KEY TO BORING SYMBOLS

SILT/CLAY — BONDED

SILTY SAND

SAND — UNBONDED

GRAVEL & GRAVELLY SAND

Duane Miller & Associates
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Job No.: 4119.22
Date : September 1997

CROSS SECTION OF SOIL & PERMAFROST
Pipeline Route C
Liberty Development
Beaufort Sea, Alaska

Plate
7

APPENDIX A

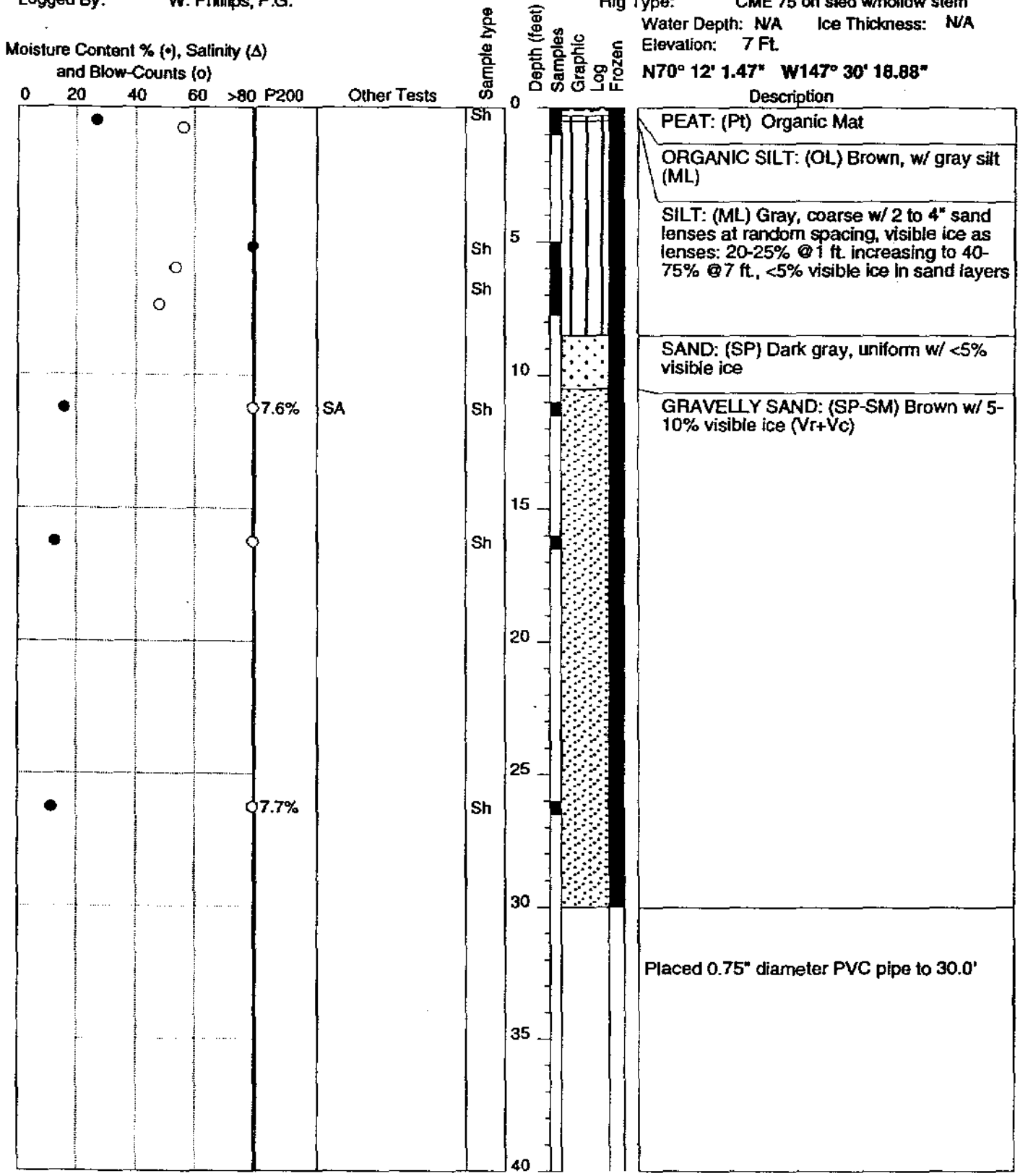
BORING LOGS and KEY TO DATA

DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : A-1

Date Drilled: February 16, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME 75 on sled w/hollow stem
Water Depth: N/A Ice Thickness: N/A
Elevation: 7 Ft.
N70° 12' 1.47" W147° 30' 18.88"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-1
Liberty Development
Beaufort Sea, Alaska

Plate
A-1

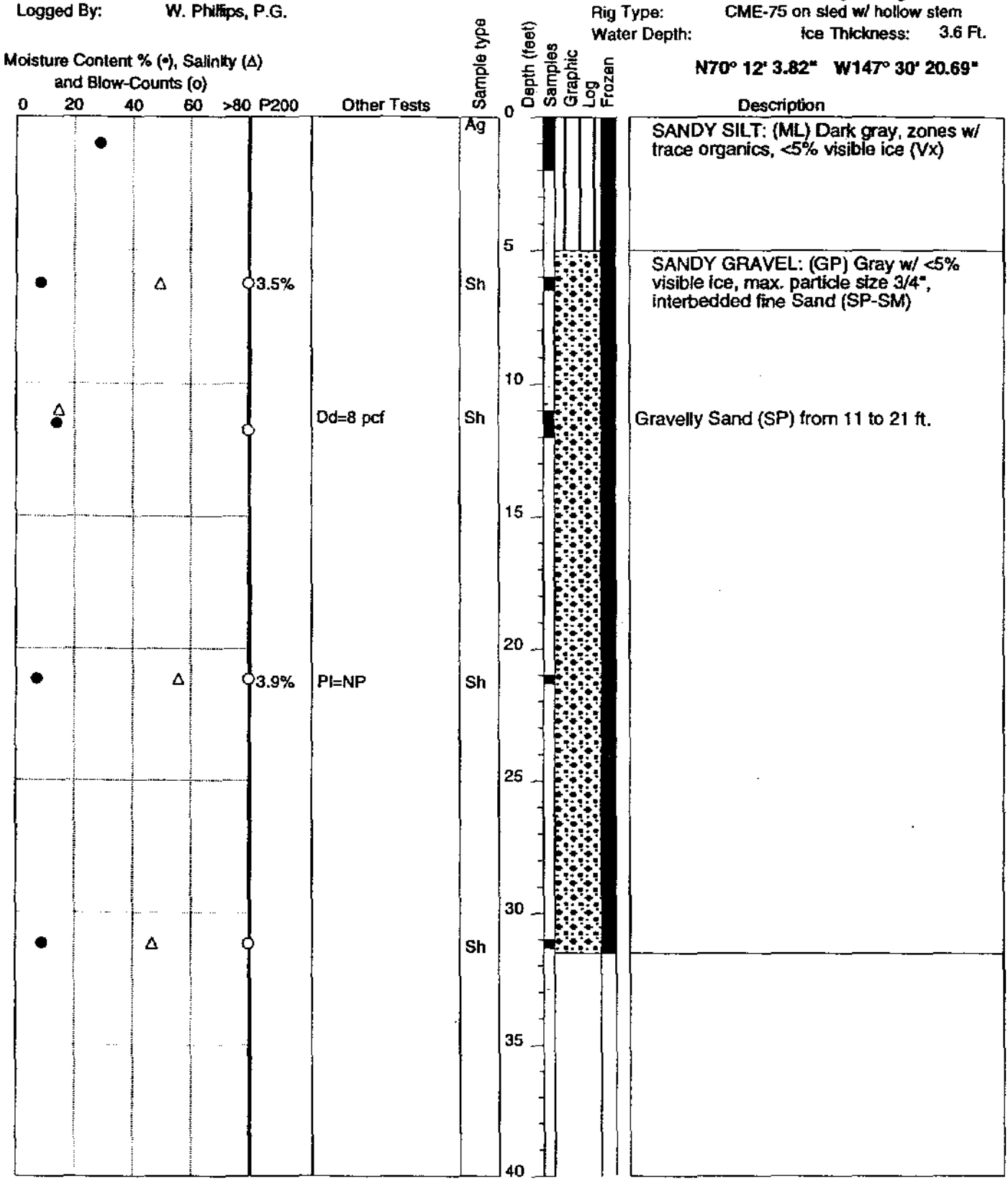
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : A-2

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: Ice Thickness: 3.6 Ft.

N70° 12' 3.82" W147° 30' 20.69"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-2
Liberty Development
Beaufort Sea, Alaska

Plate
A-2

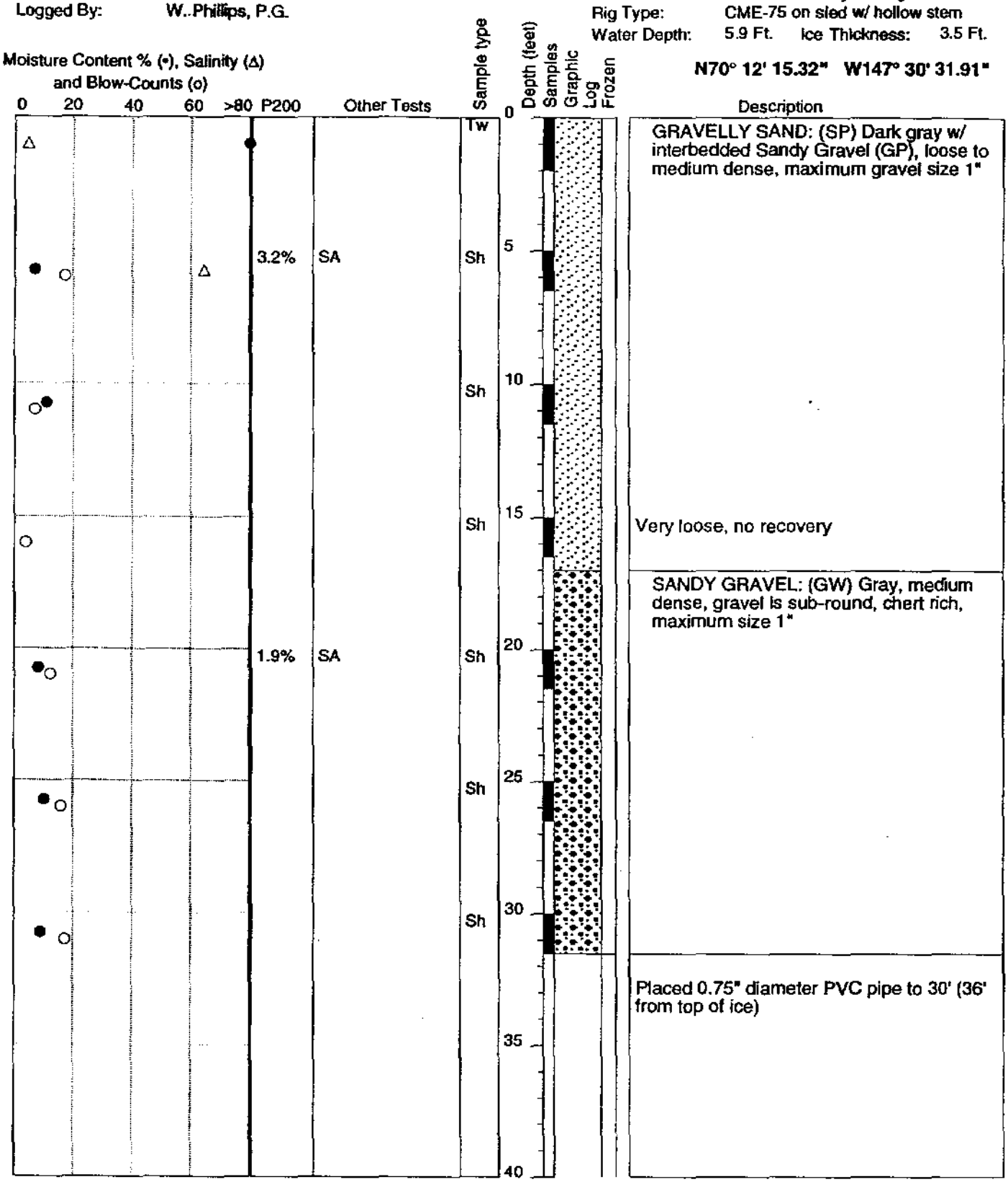
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No.: 4119.22
Logged By: W..Phillips, P.G.

Log of HOLE : A-3

Date Drilled: February 19, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 5.9 Ft. Ice Thickness: 3.5 Ft.

N70° 12' 15.32" W147° 30' 31.91"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-3
Liberty Development
Beaufort Sea, Alaska

Plate
A-3

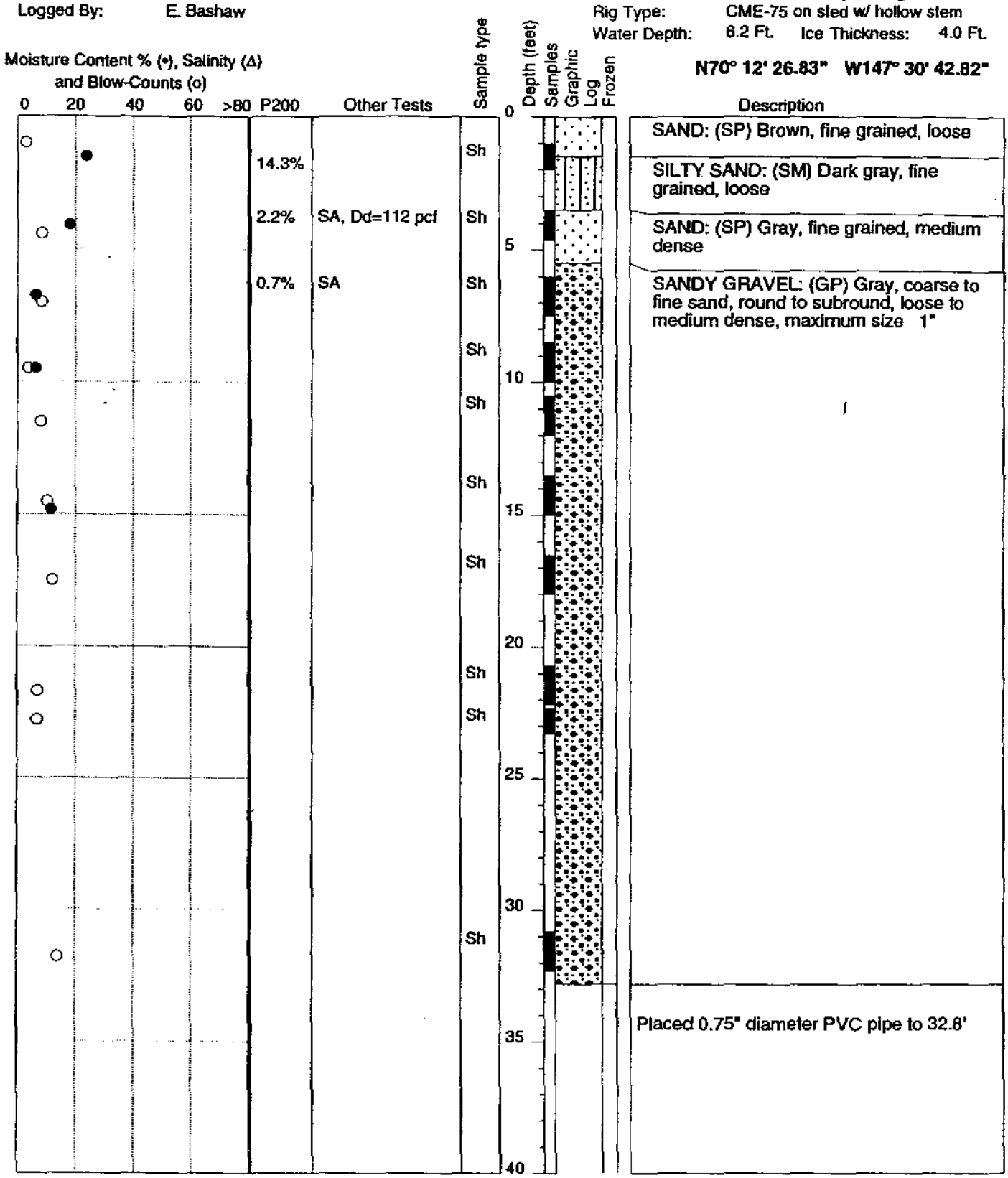
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : A-4

Date Drilled: February 20, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 6.2 Ft. Ice Thickness: 4.0 Ft.

N70° 12' 26.83" W147° 30' 42.82"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-4
Liberty Development
Beaufort Sea, Alaska

Plate
A-4

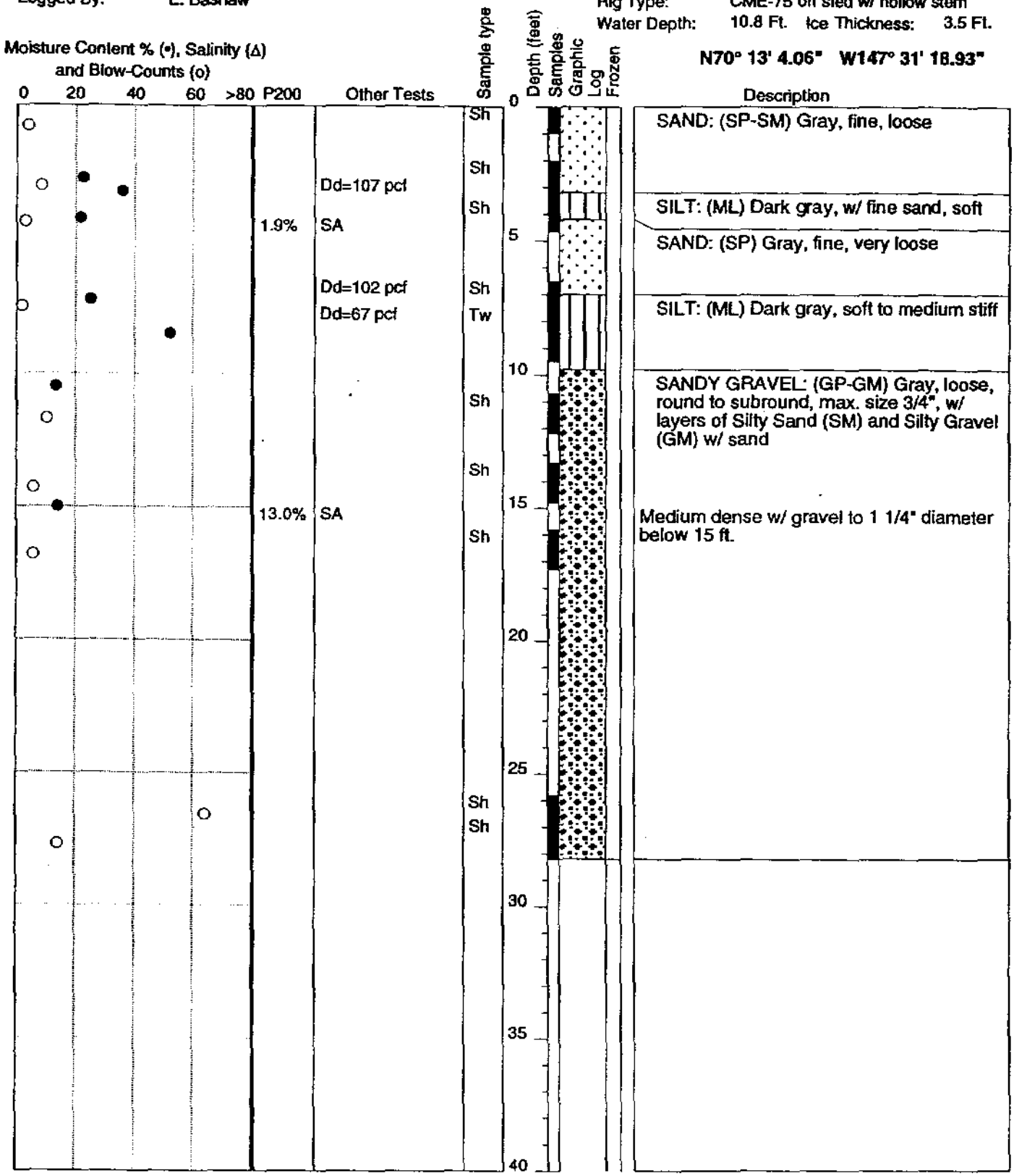
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No.: 4119.22
Logged By: E. Bashaw

Log of HOLE : A-5

Date Drilled: February 20, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 10.8 Ft. Ice Thickness: 3.5 Ft.

N70° 13' 4.06" W147° 31' 18.93"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-5
Liberty Development
Beaufort Sea, Alaska

Plate
A-5

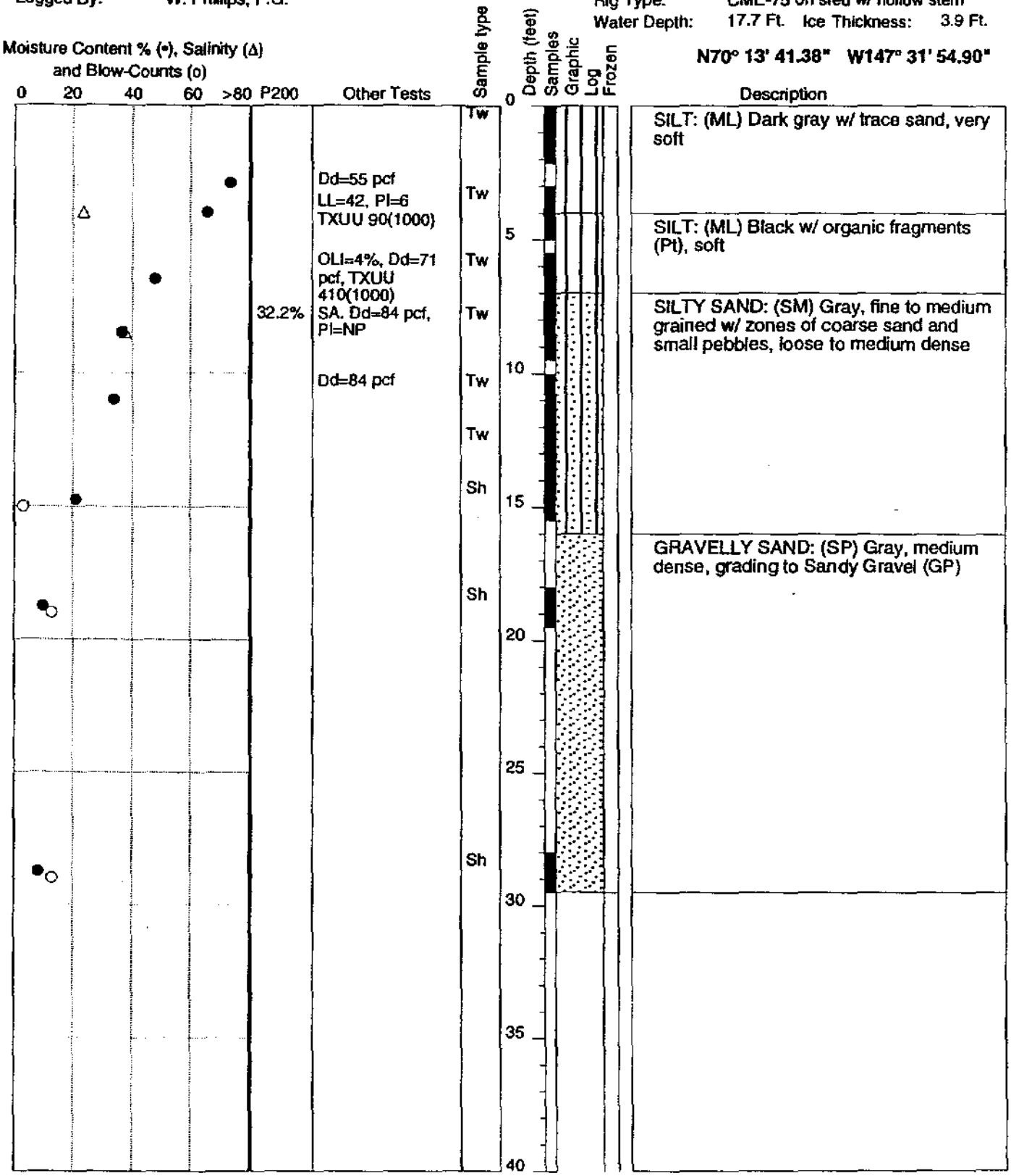
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : A-6

Date Drilled: February 20, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 17.7 Ft. Ice Thickness: 3.9 Ft.

N70° 13' 41.38" W147° 31' 54.90"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-6
Liberty Development
Beaufort Sea, Alaska

Plate
A-6

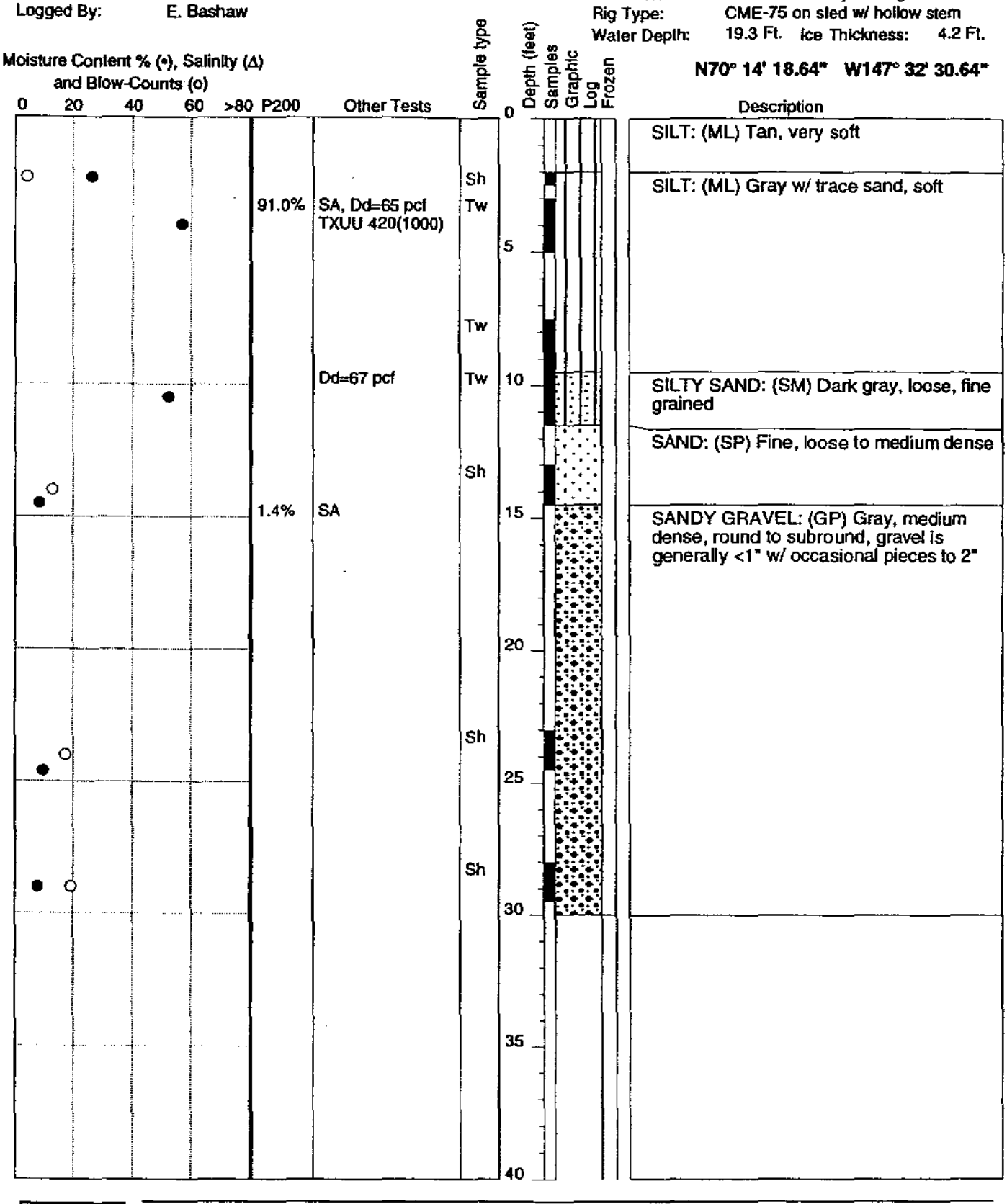
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : A-7

Date Drilled: February 17, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.3 Ft. Ice Thickness: 4.2 Ft.

N70° 14' 18.64" W147° 32' 30.64"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-7
Liberty Development
Beaufort Sea, Alaska

Plate
A-7

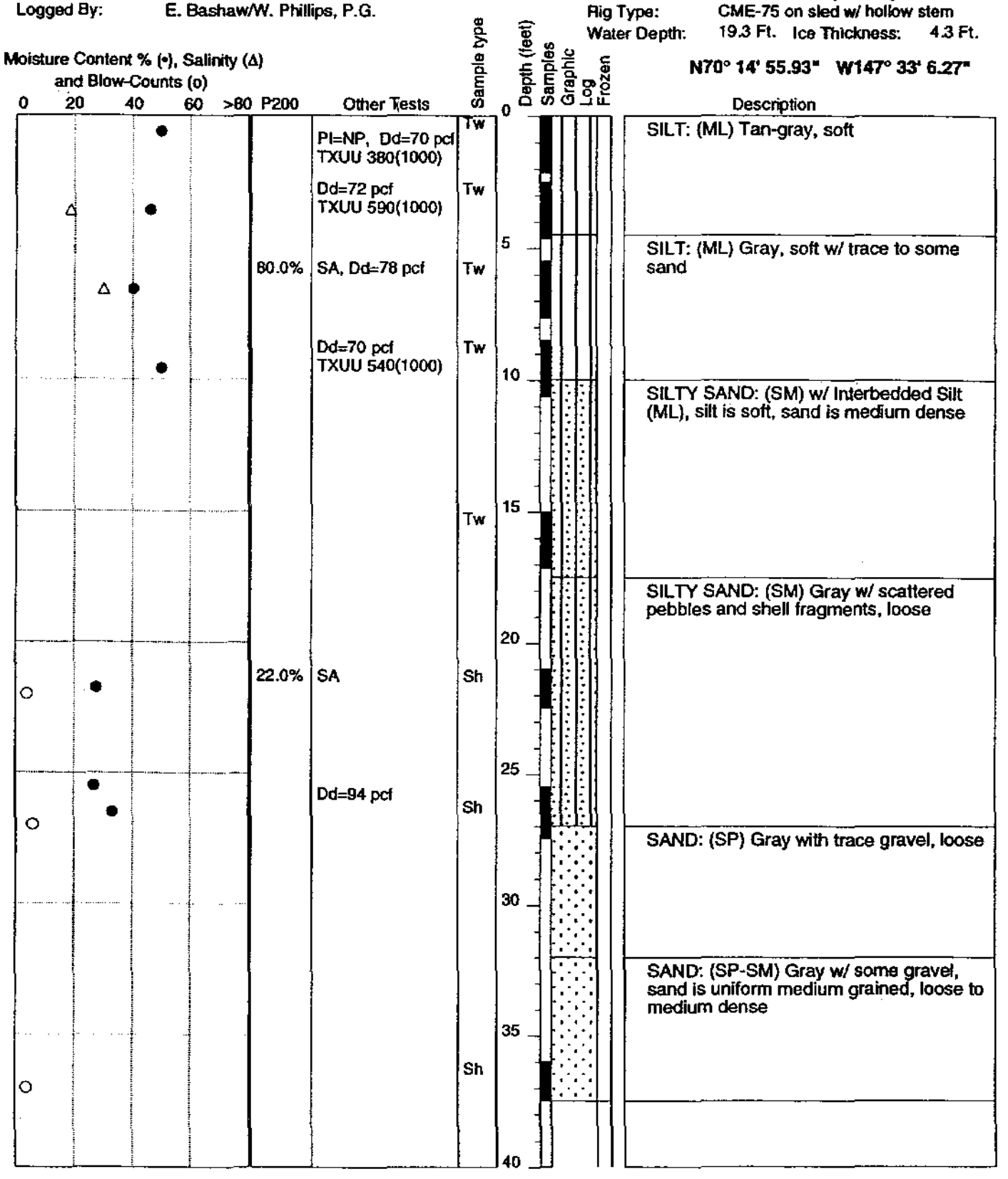
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: E. Bashaw/W. Phillips, P.G.

Log of HOLE : A-8

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.3 Ft. Ice Thickness: 4.3 Ft.

N70° 14' 55.93" W147° 33' 6.27"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-8
Liberty Development
Beaufort Sea, Alaska

Plate
A-8

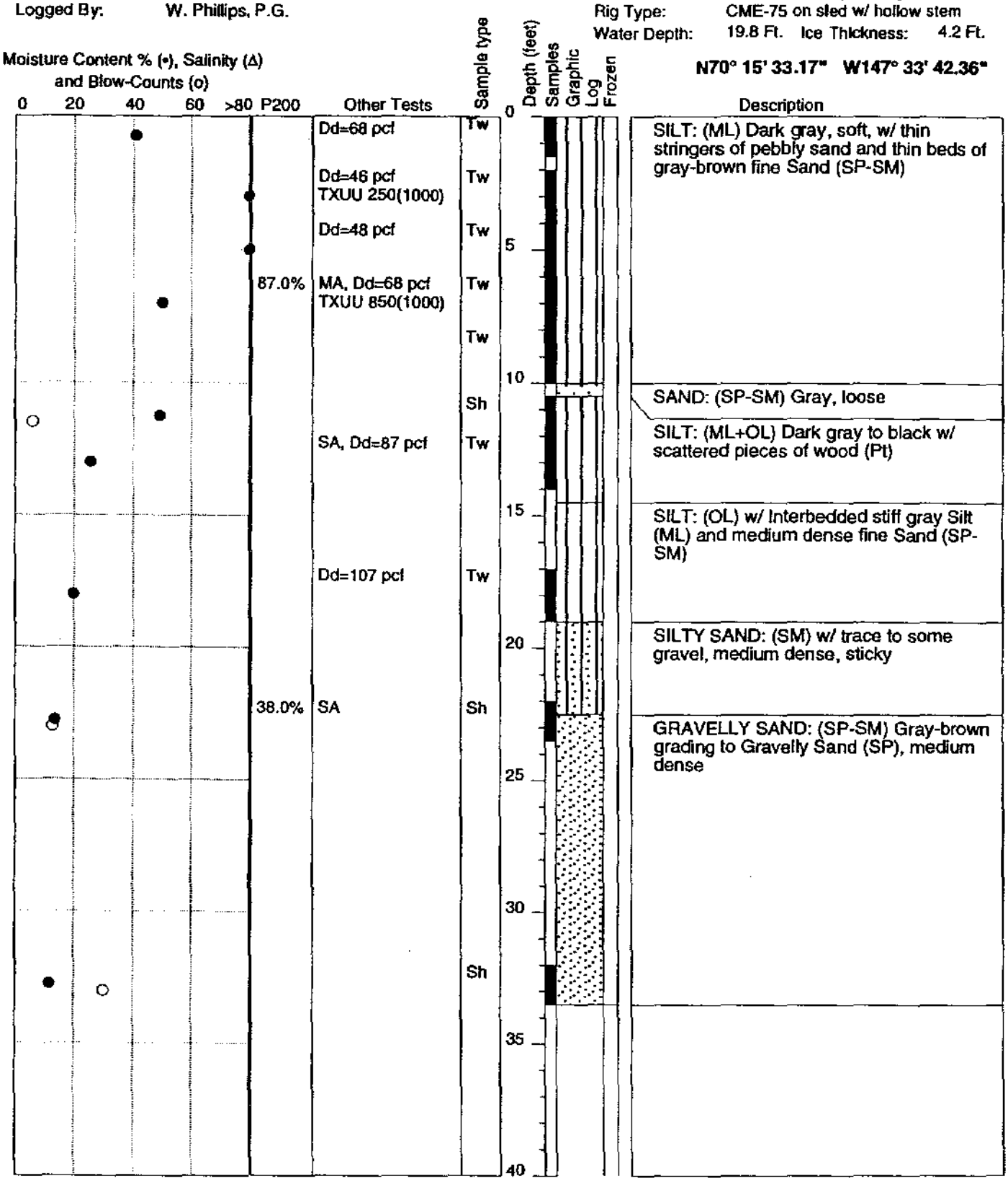
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : A-9

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.8 Ft. Ice Thickness: 4.2 Ft.

N70° 15' 33.17" W147° 33' 42.36"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-9
Liberty Development
Beaufort Sea, Alaska

Plate
A-9

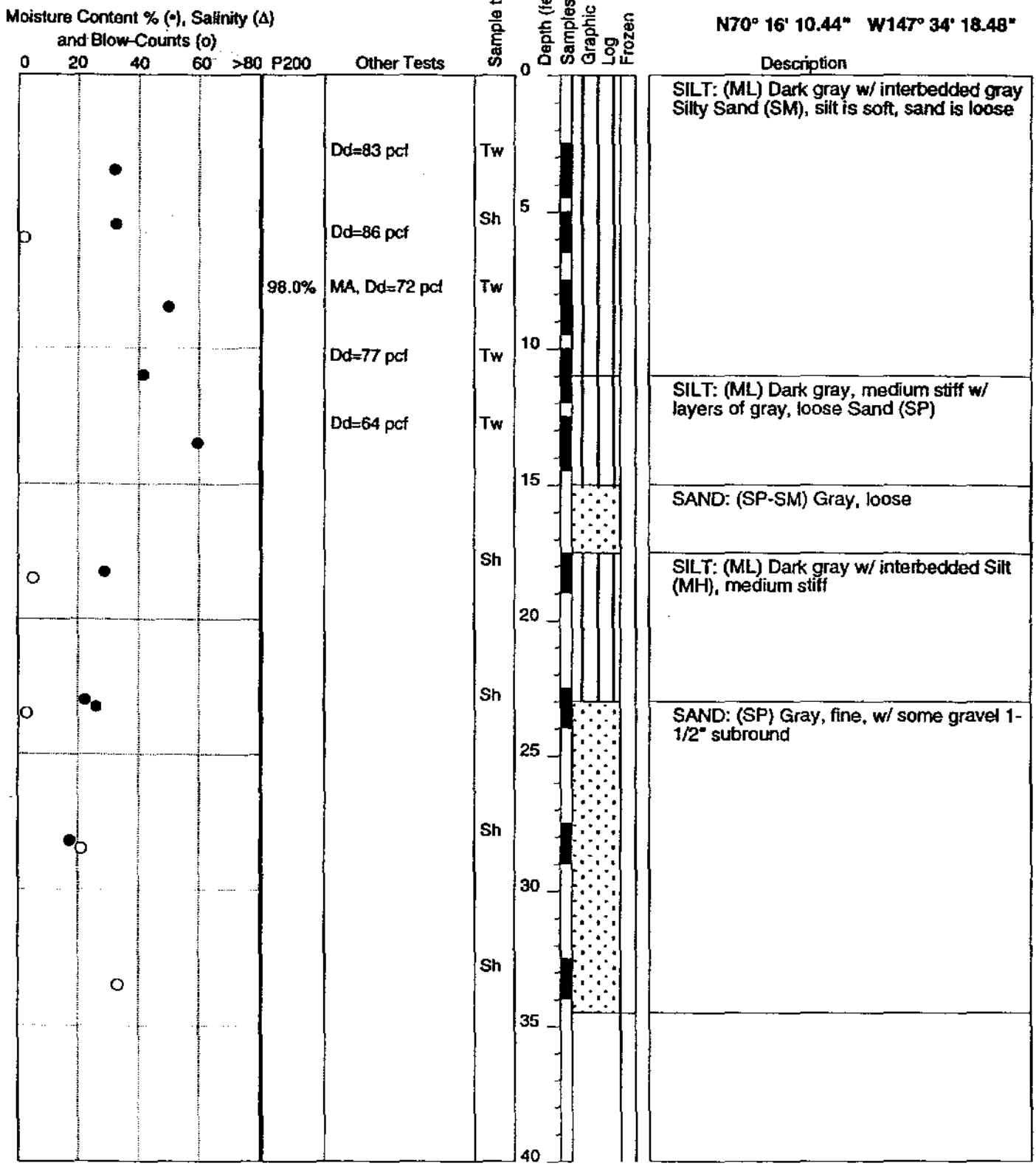
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE : A-10

Date Drilled: February 21, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.0 Ft. Ice Thickness: 4.0 Ft.

N70° 16' 10.44" W147° 34' 18.48"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING A-10
Liberty Development
Beaufort Sea, Alaska

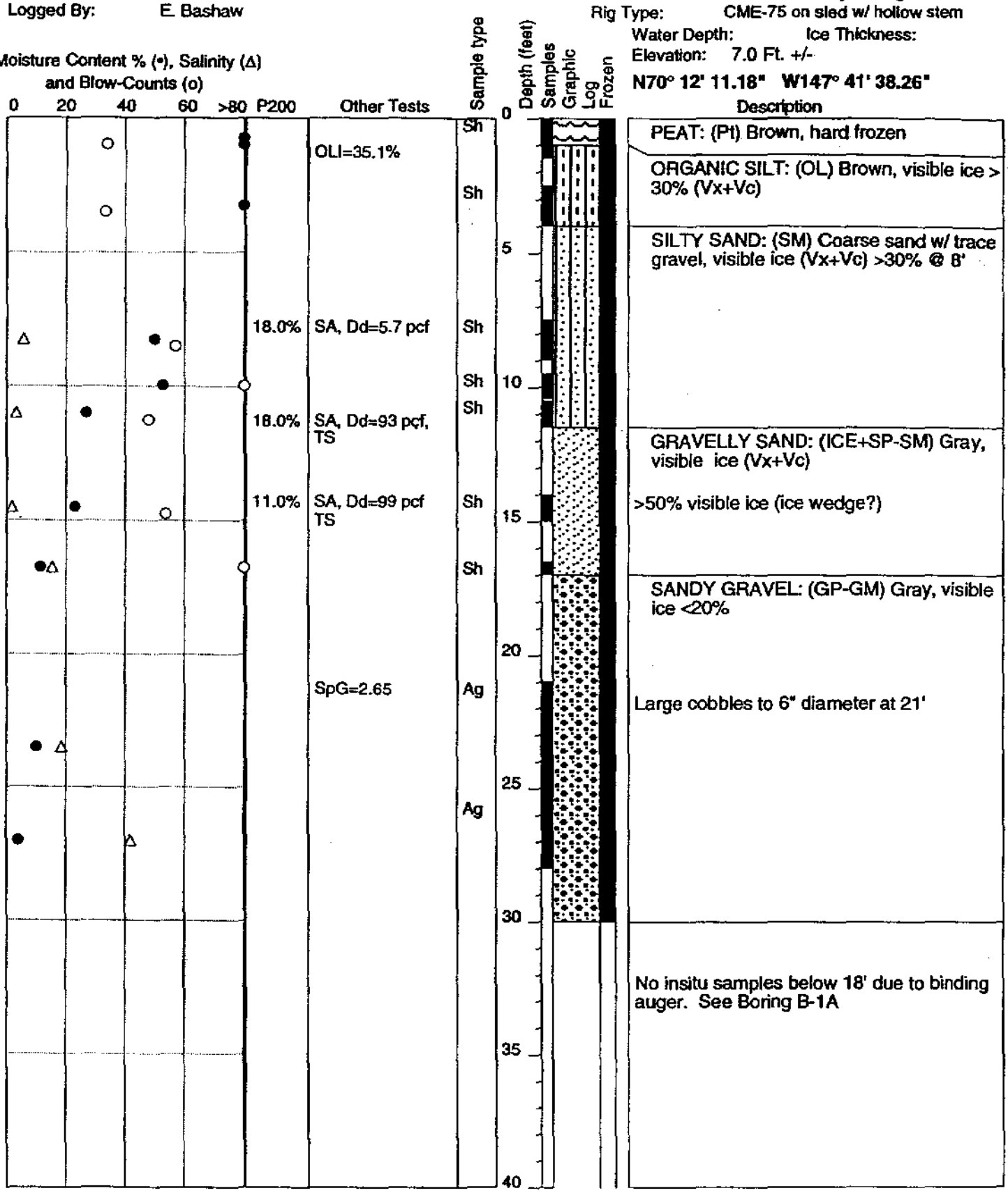
Plate
A-10

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-1

Date Drilled: February 19, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: Ice Thickness:
Elevation: 7.0 Ft. +/-
N70° 12' 11.18" W147° 41' 38.26"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: September 1997

LOG of BORING B-1
Liberty Development
Beaufort Sea, Alaska

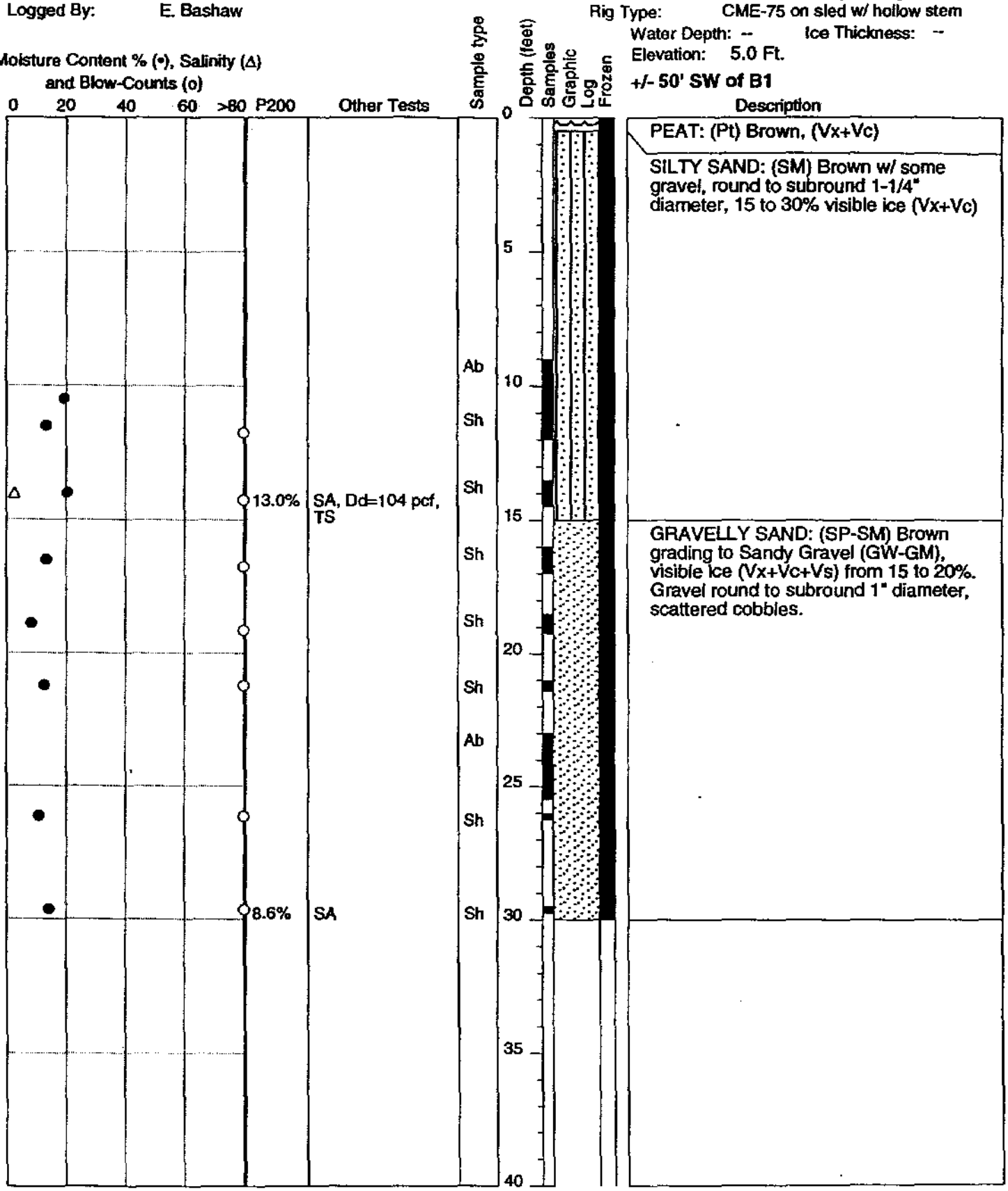
Plate
A-11

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-1A

Date Drilled: February 25, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: -- Ice Thickness: --
Elevation: 5.0 Ft.
+/- 50' SW of B1



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: September 1997

LOG of BORING B-1A
Liberty Development
Beaufort Sea, Alaska

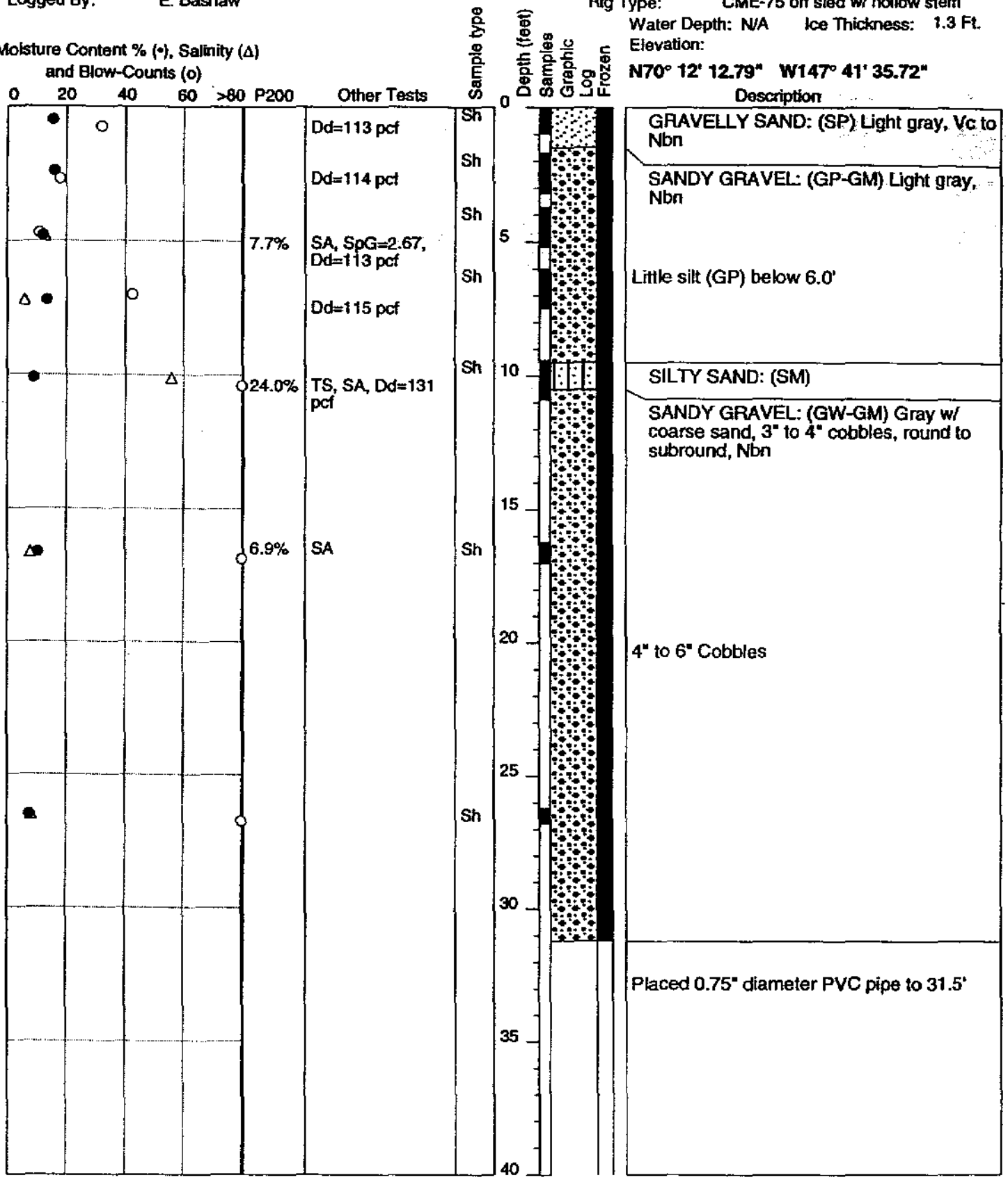
Plate
A-12

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-2

Date Drilled: February 19, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: N/A Ice Thickness: 1.3 Ft.
Elevation:
N70° 12' 12.79" W147° 41' 35.72"



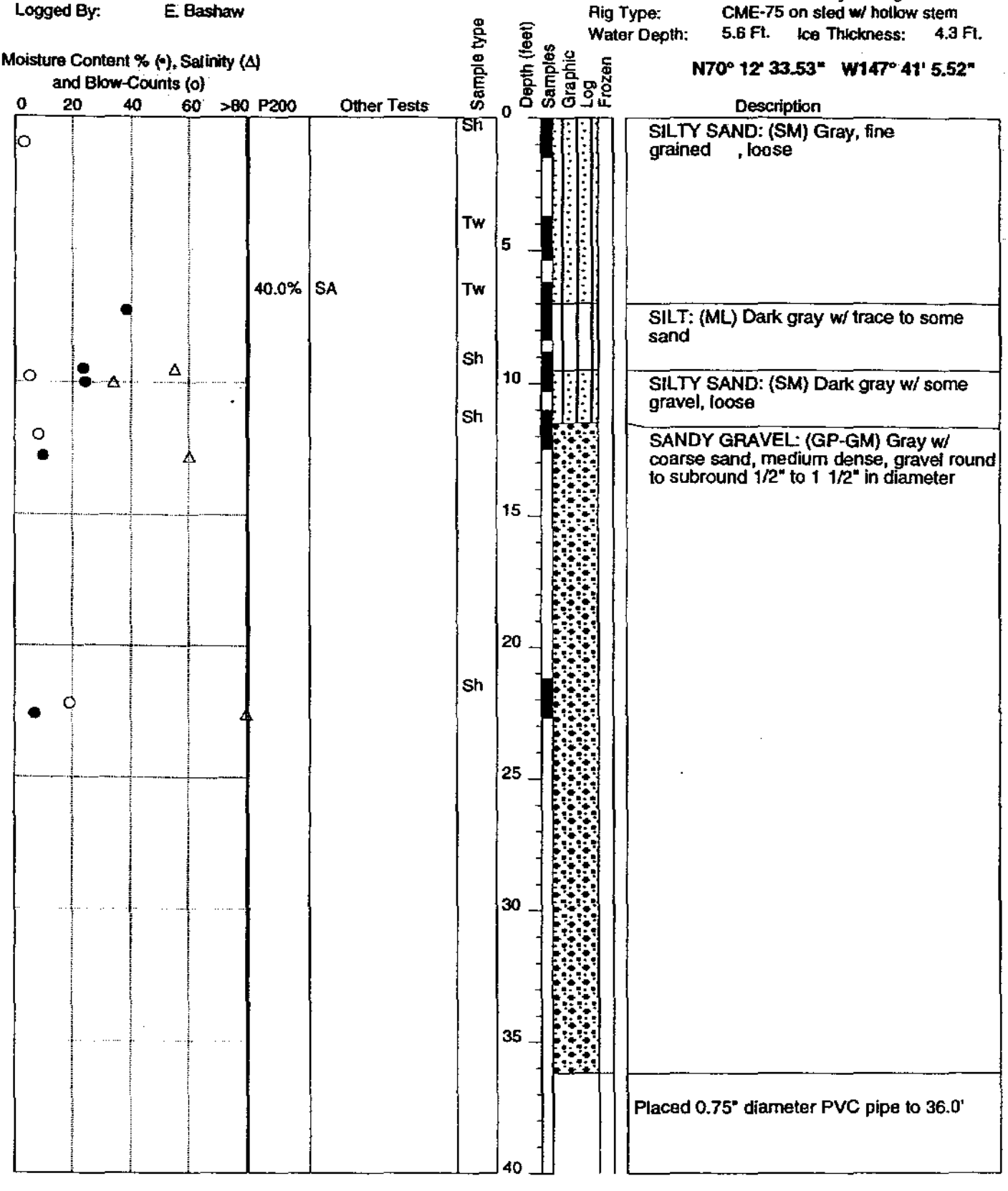
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-3

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 5.6 Ft. Ice Thickness: 4.3 Ft.

N70° 12' 33.53" W147° 41' 5.52"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-3
Liberty Development
Beaufort Sea, Alaska

Plate
A-14

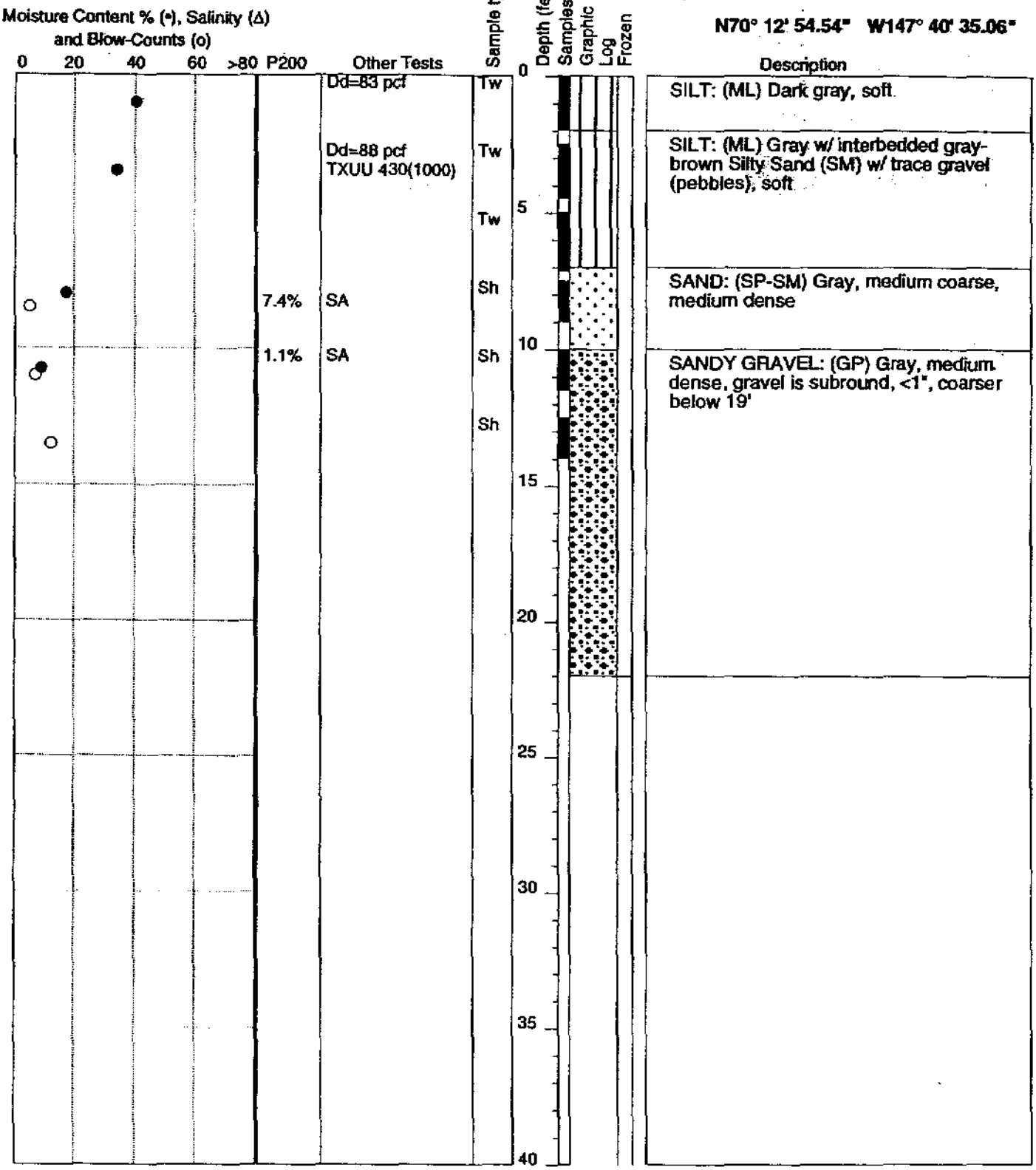
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-4

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 5.7 Ft. Ice Thickness: 3.8 Ft.

N70° 12' 54.54" W147° 40' 35.06"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-4
Liberty Development
Beaufort Sea, Alaska

Plate
A-15

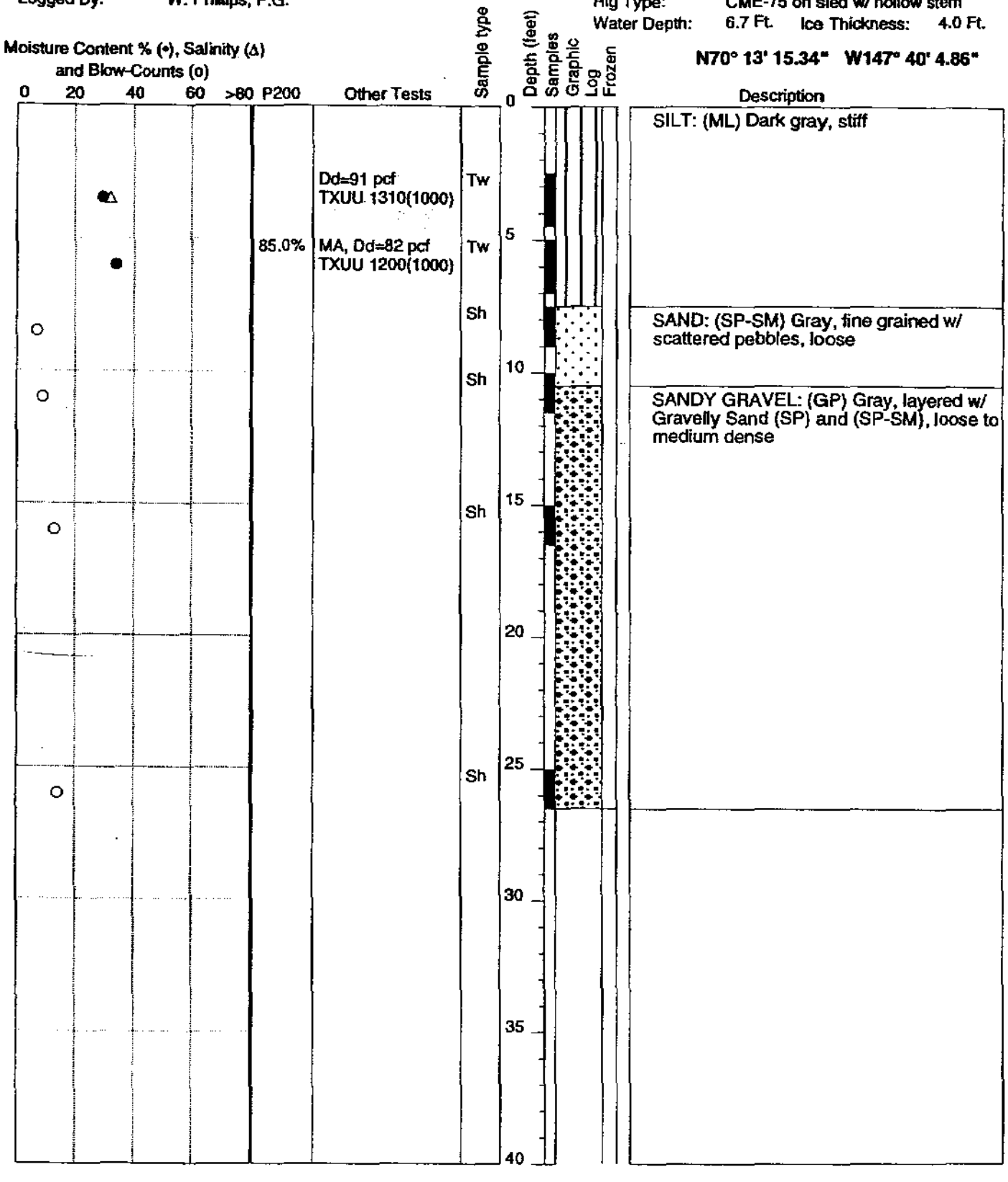
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-5

Date Drilled: February 20, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 6.7 Ft. Ice Thickness: 4.0 Ft.

N70° 13' 15.34" W147° 40' 4.86"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-5
Liberty Development
Beaufort Sea, Alaska

Plate
A-16

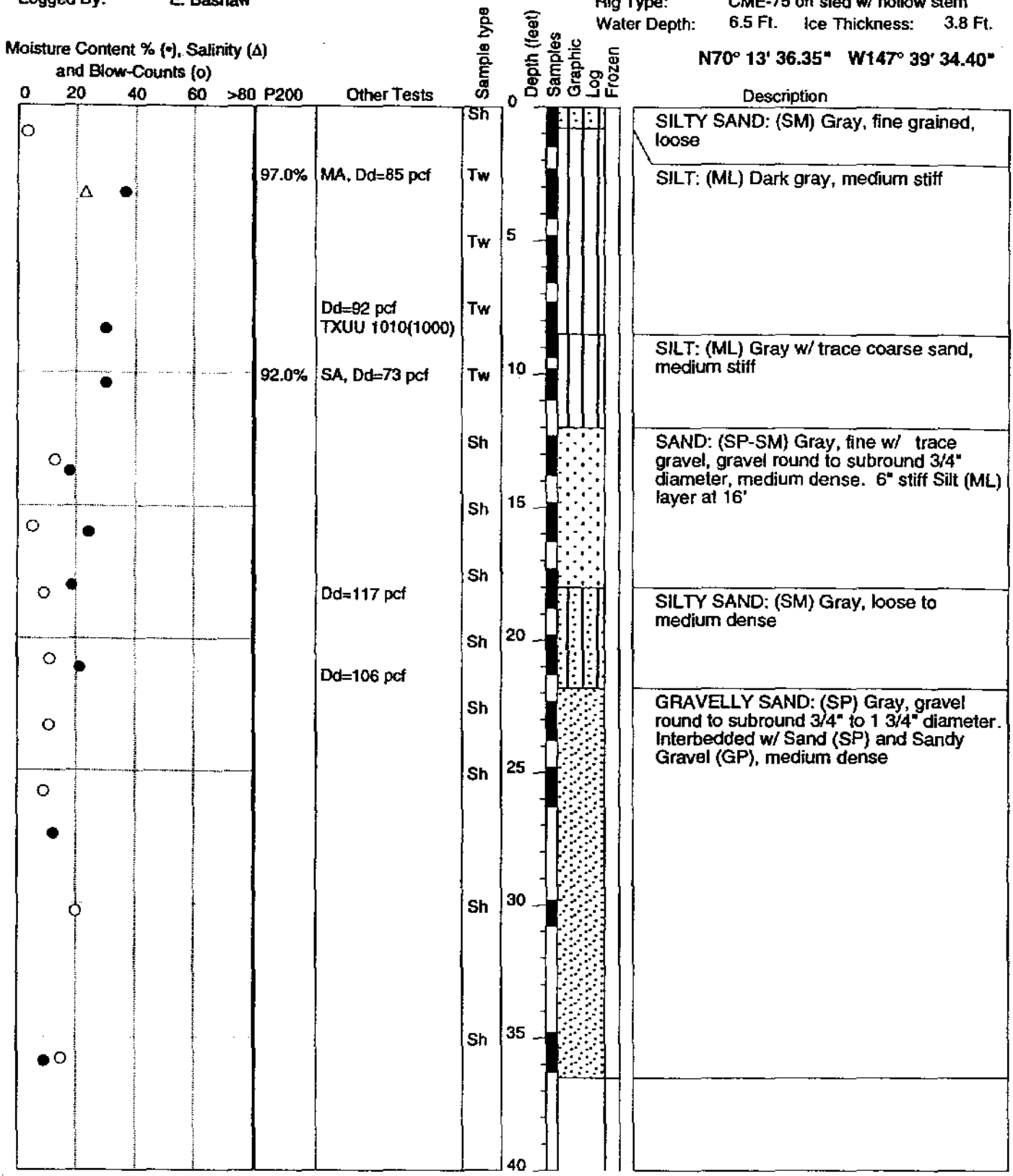
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-6

Date Drilled: February 20, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 6.5 Ft. Ice Thickness: 3.8 Ft.

N70° 13' 36.35" W147° 39' 34.40"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-6
Liberty Development
Beaufort Sea, Alaska

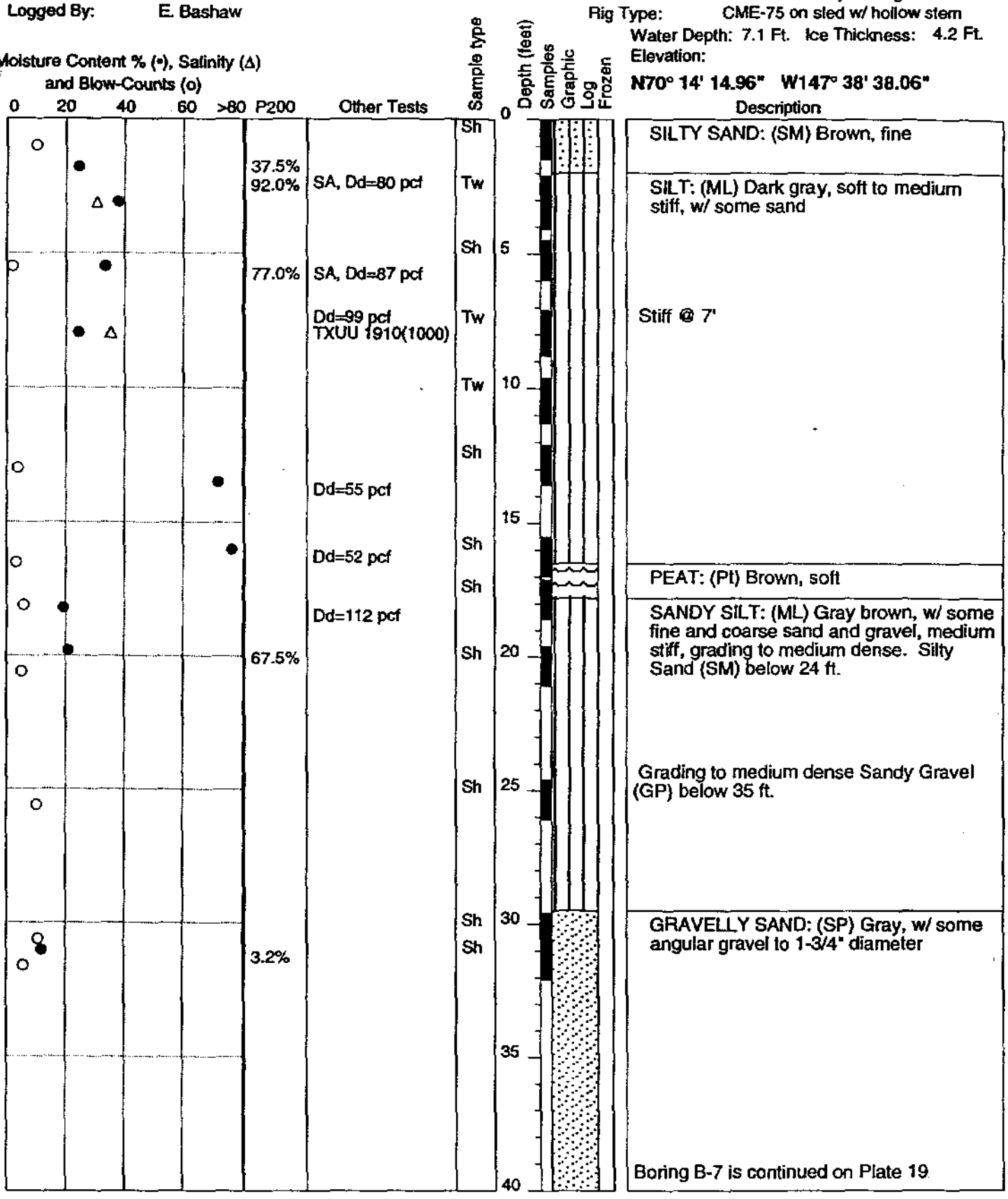
Plate
A-17

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-7

Date Drilled: February 21, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 7.1 Ft. Ice Thickness: 4.2 Ft.
Elevation:
N70° 14' 14.96" W147° 38' 38.06"



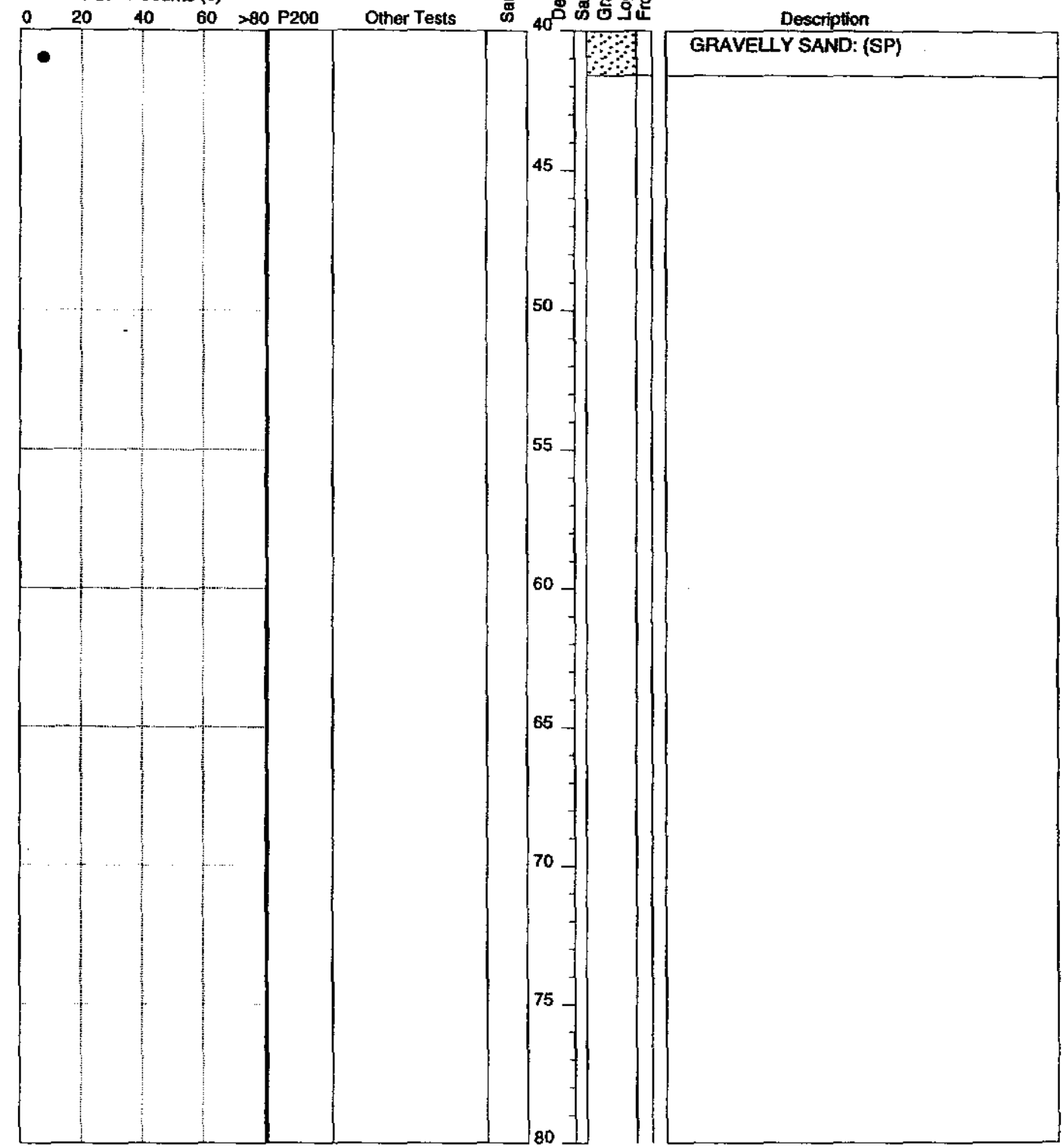
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : B-7 Cont.

Date Drilled: February 21, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 7.1 Ft. Ice Thickness: 4.2 Ft.

N70° 14' 14.96" W147° 38' 38.06"



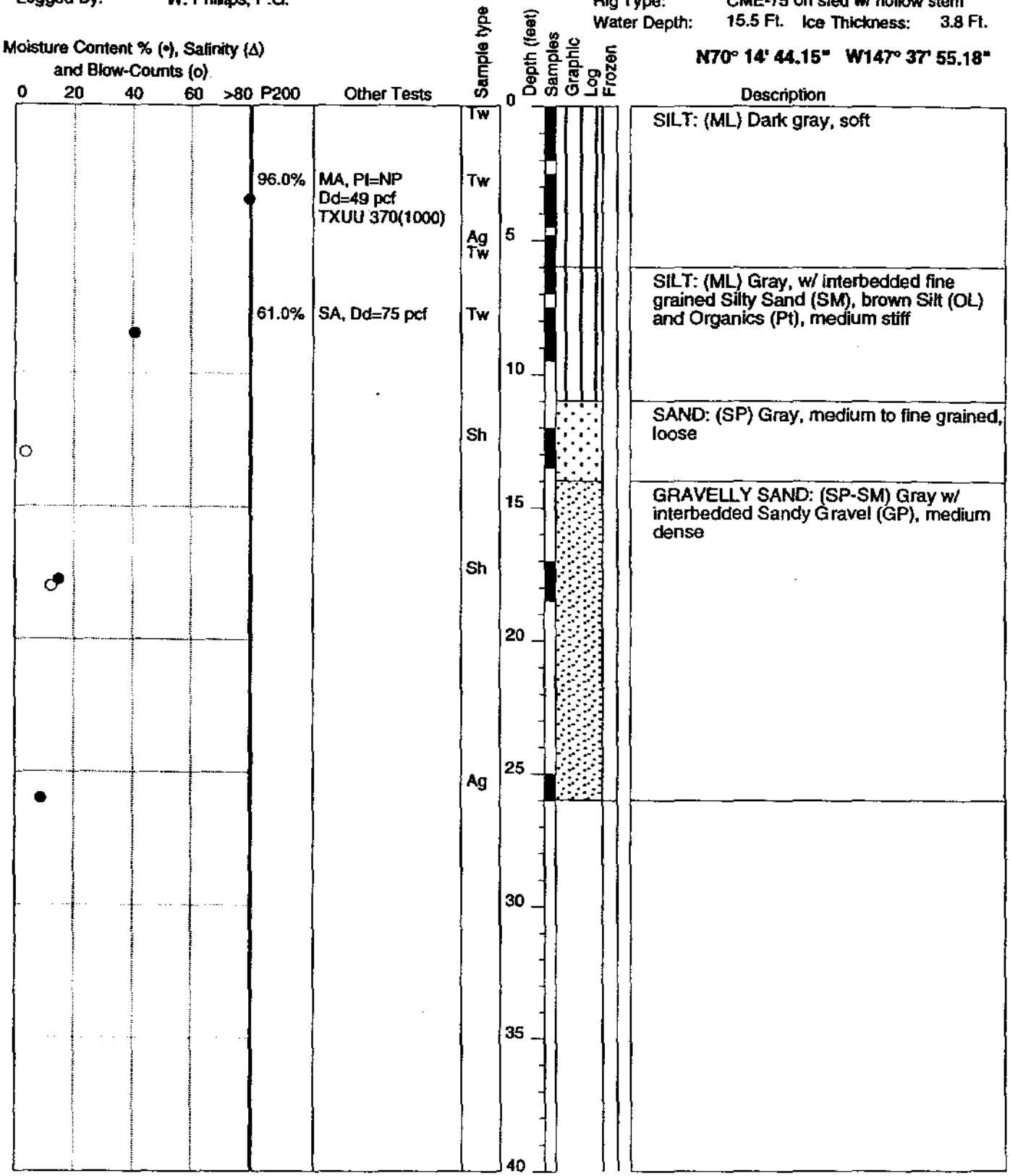
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-8

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 15.5 Ft. Ice Thickness: 3.8 Ft.

N70° 14' 44.15" W147° 37' 55.18"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-8
Liberty Development
Beaufort Sea, Alaska

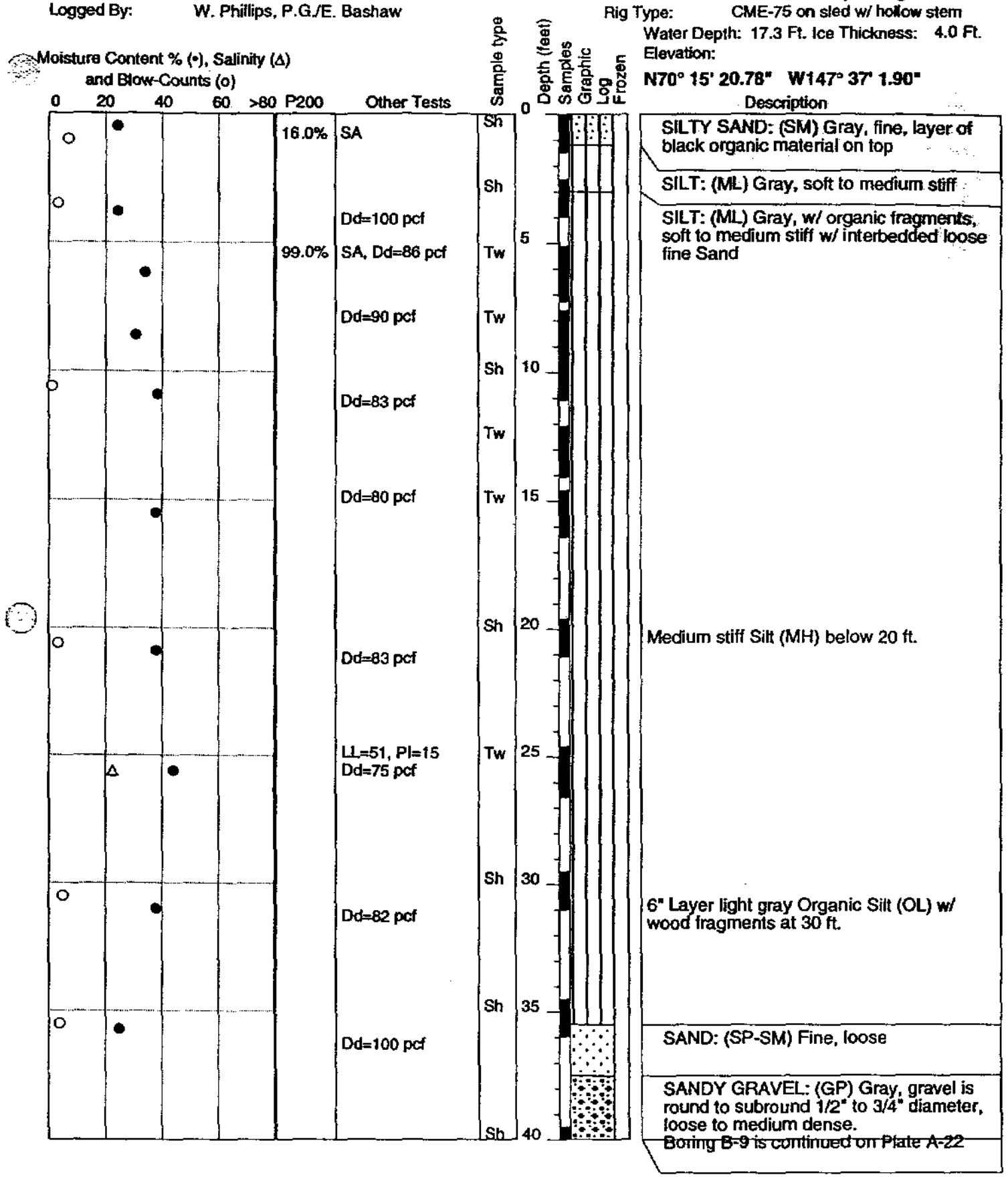
Plate
A-20

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE : B-9

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 17.3 Ft. Ice Thickness: 4.0 Ft.
Elevation:
N70° 15' 20.78" W147° 37' 1.90"



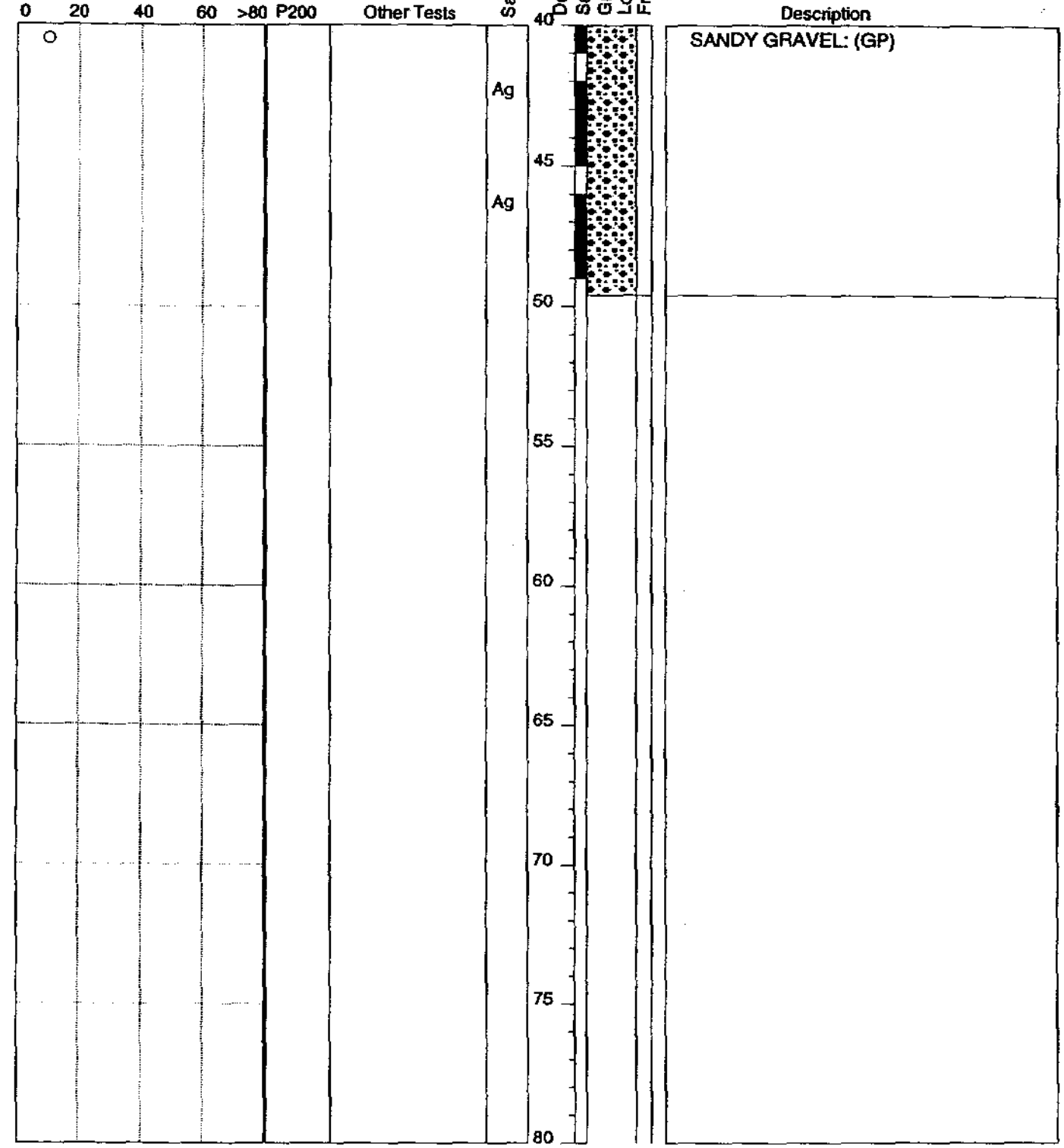
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE : B-9 Cont.

Date Drilled: February 18, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 17.3 Ft. Ice Thickness: 4.0 Ft.

N70° 15' 20.78" W147° 37' 1.90"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-9 cont.
Liberty Development
Beaufort Sea, Alaska

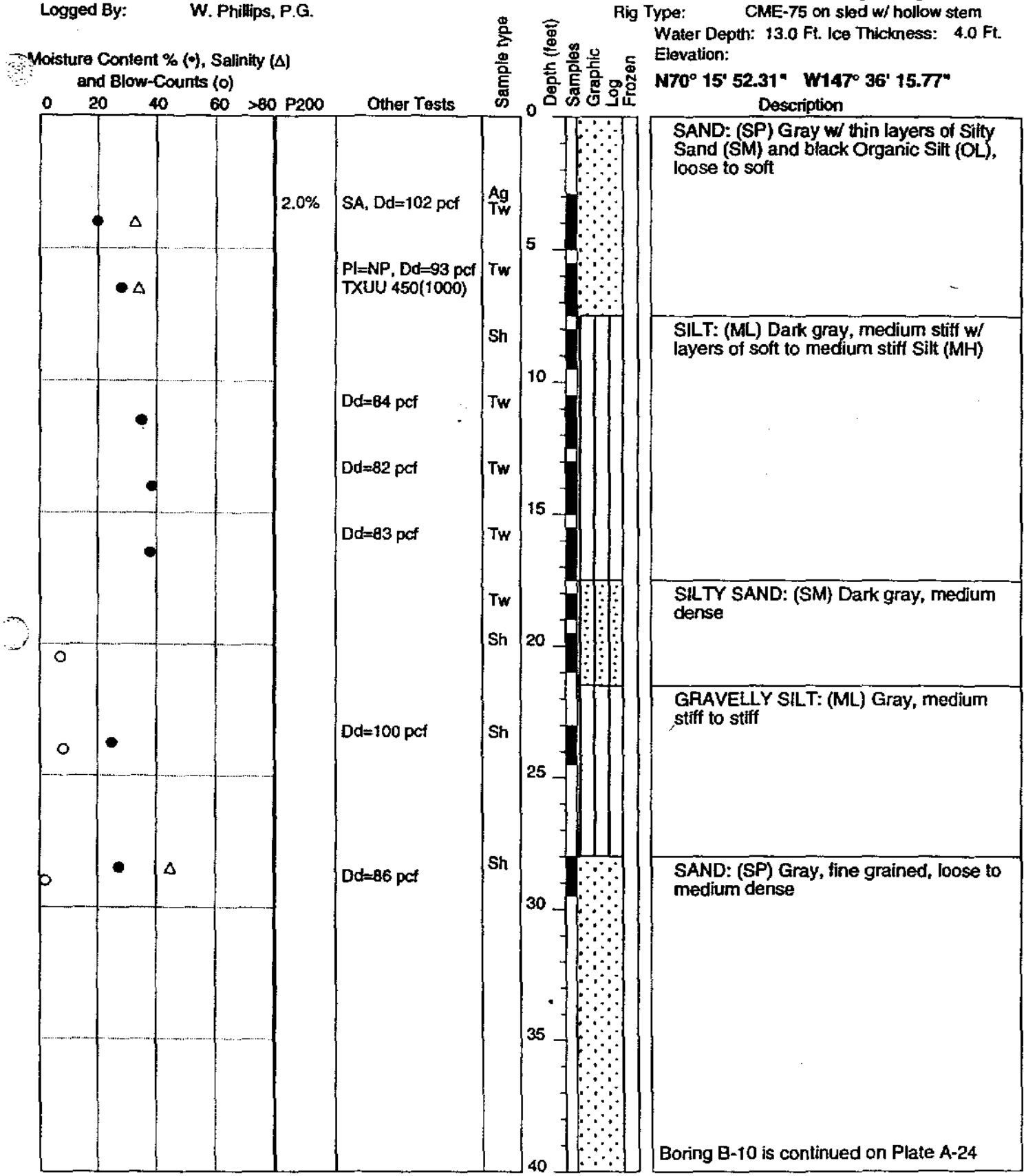
Plate
A-22

DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-10

Date Drilled: February 21, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 13.0 Ft. Ice Thickness: 4.0 Ft.
Elevation:
N70° 15' 52.31" W147° 36' 15.77"



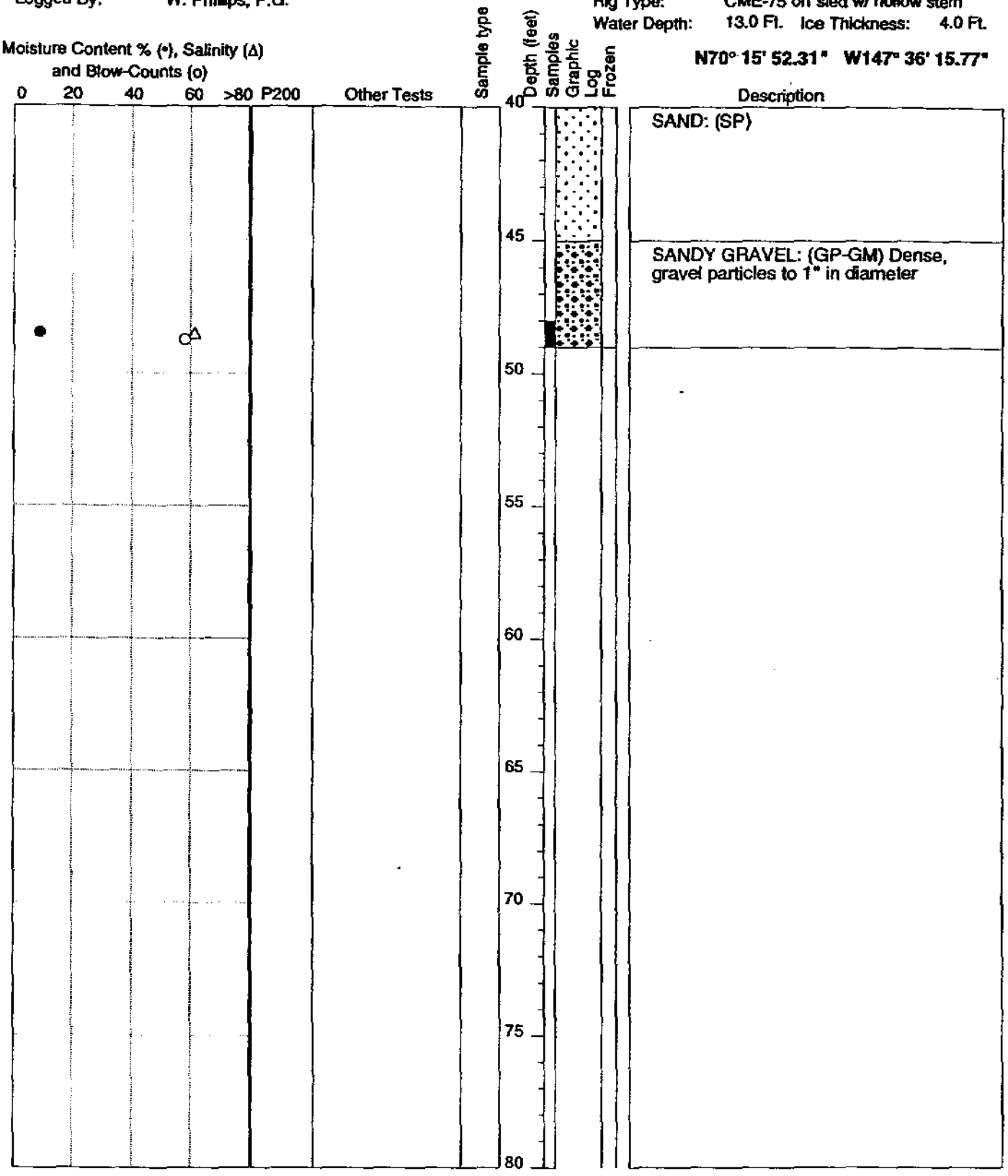
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-10 Cont.

Date Drilled: February 21, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 13.0 Ft. Ice Thickness: 4.0 Ft.

N70° 15' 52.31" W147° 36' 15.77"



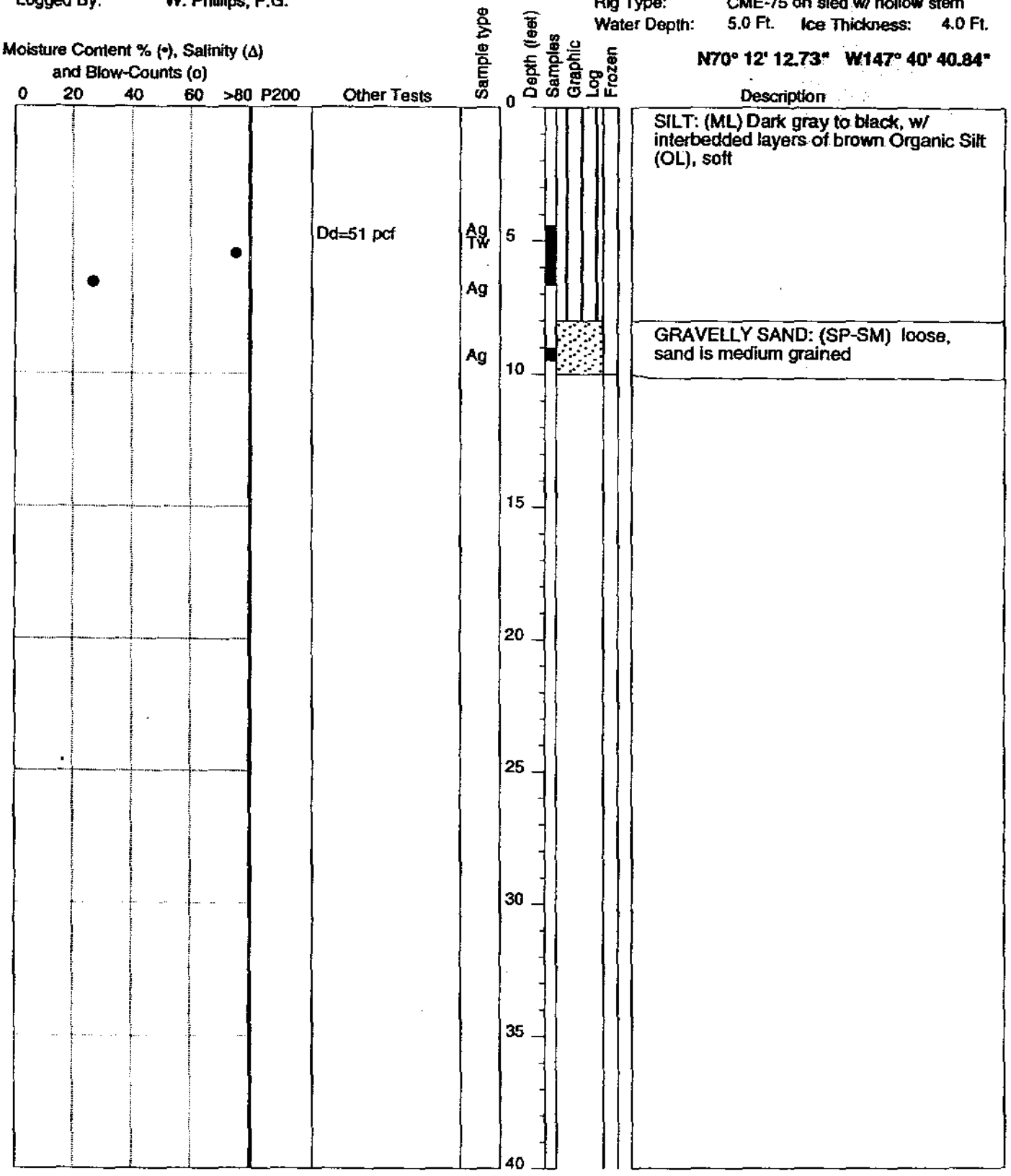
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : B-11

Date Drilled: February 29, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 5.0 Ft. Ice Thickness: 4.0 Ft.

N70° 12' 12.73" W147° 40' 40.84"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING B-11
Liberty Development
Beaufort Sea, Alaska

Plate
A-25

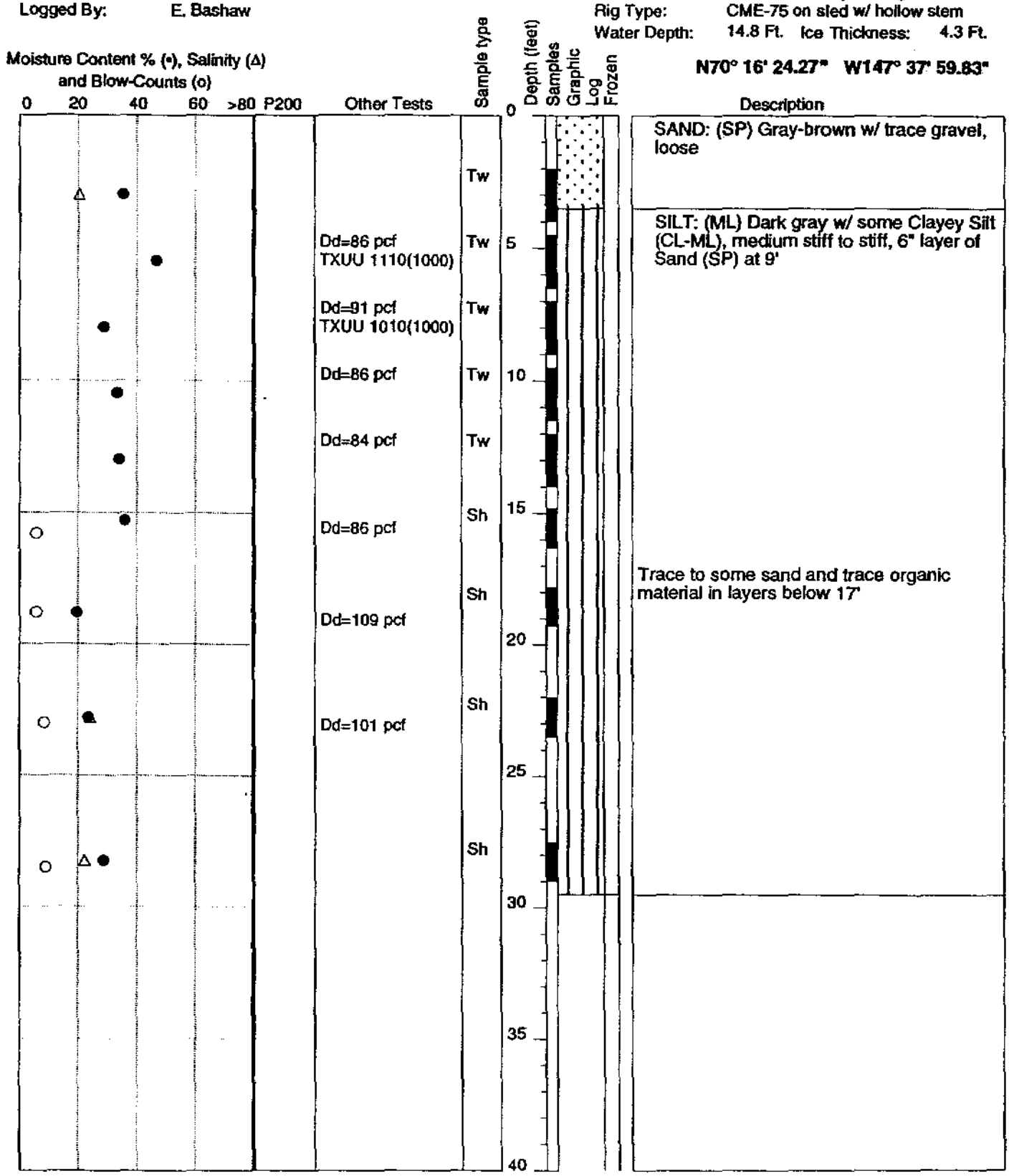
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No.: 4119.22
Logged By: E. Bashaw

Log of HOLE: C-1

Date Drilled: February 25, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 14.8 Ft. Ice Thickness: 4.3 Ft.

N70° 16' 24.27" W147° 37' 59.83"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING C-1
Liberty Development
Beaufort Sea, Alaska

Plate
A-26

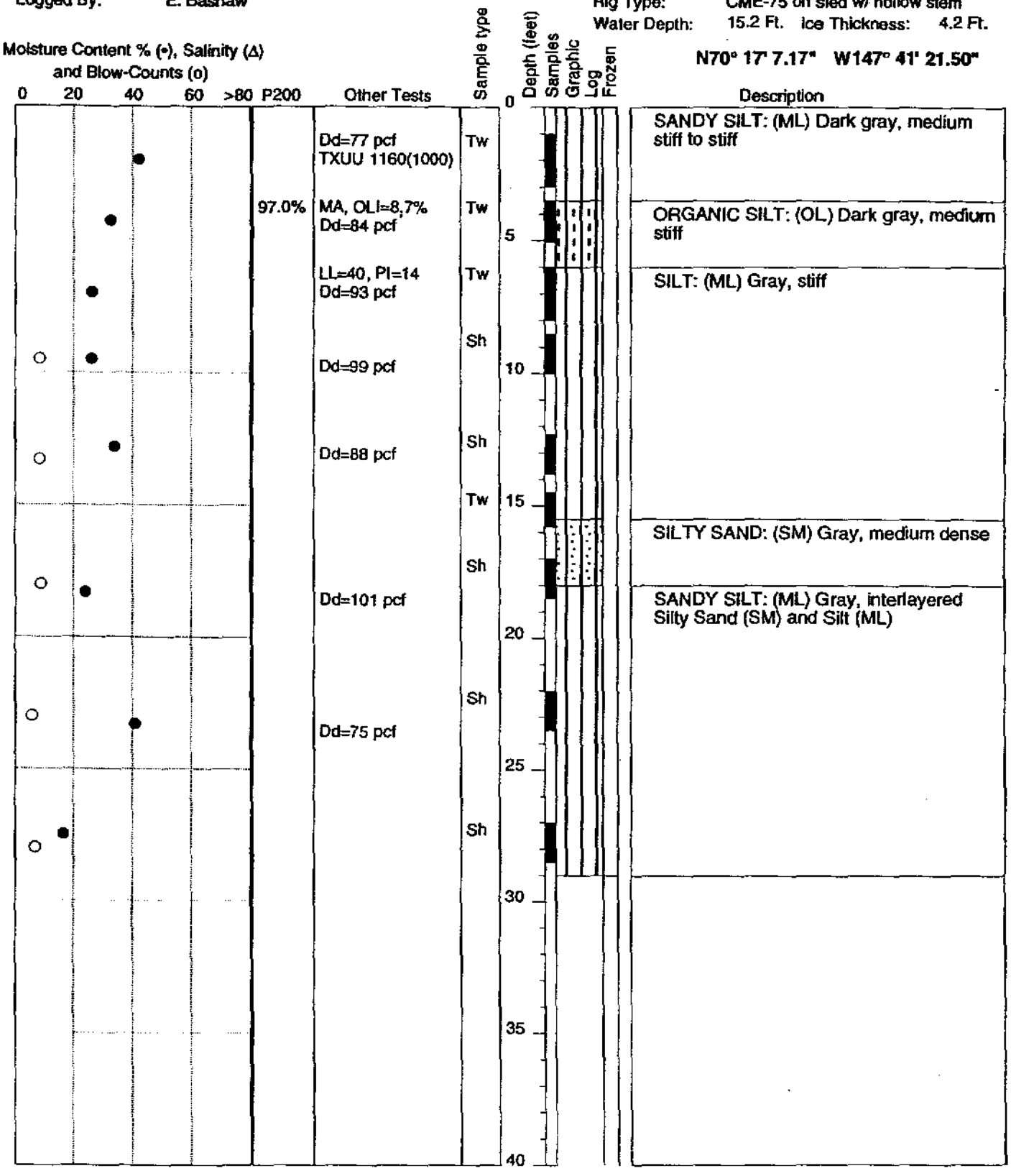
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : C-2

Date Drilled: February 24, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 15.2 Ft. Ice Thickness: 4.2 Ft.

N70° 17' 7.17" W147° 41' 21.50"



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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING C-2
Liberty Development
Beaufort Sea, Alaska

Plate
A-27

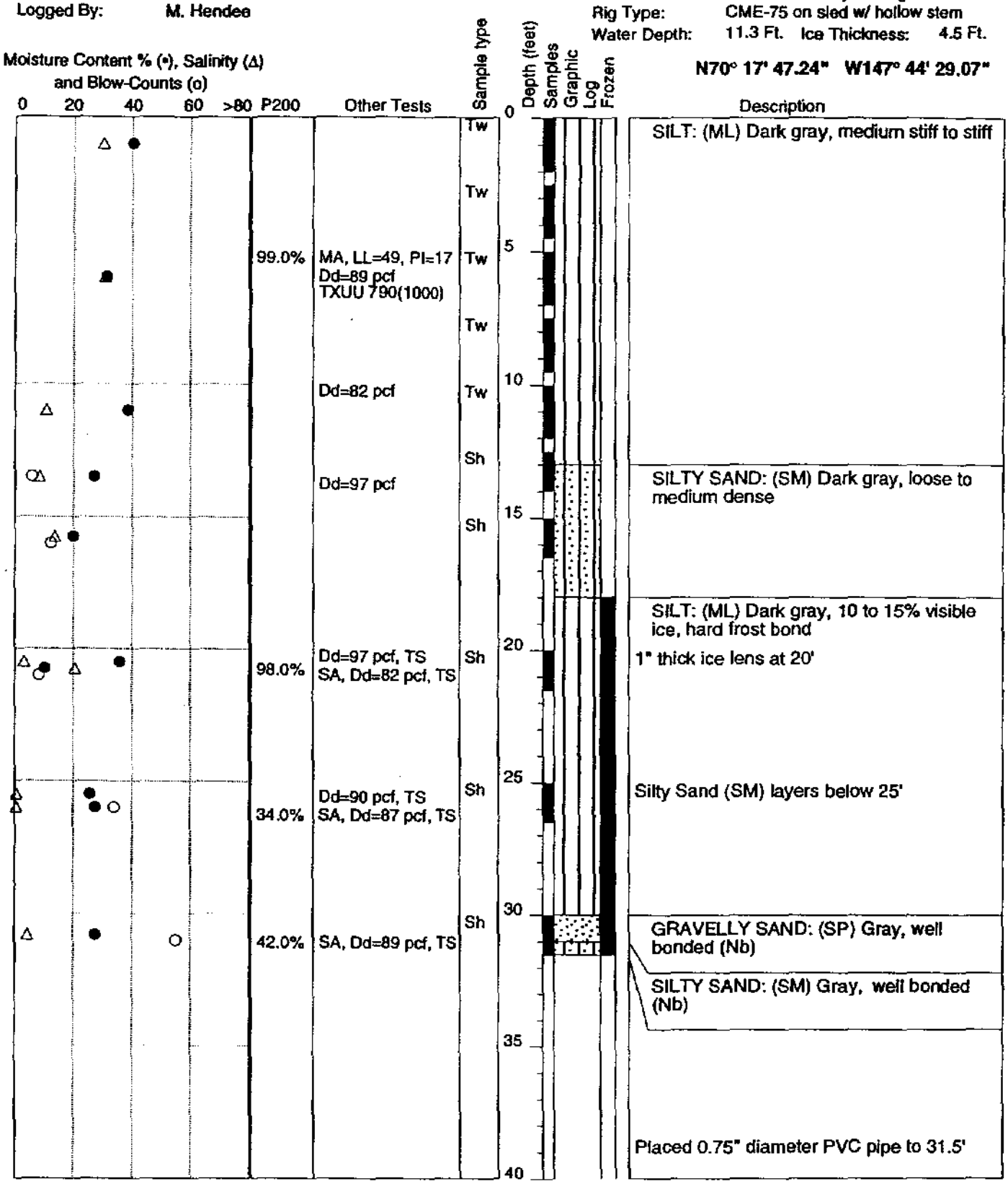
DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No.: 4119.22
Logged By: M. Hendee

Log of HOLE : C-3

Date Drilled: February 24, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 11.3 Ft. Ice Thickness: 4.5 Ft.

N70° 17' 47.24" W147° 44' 29.07"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING C-3
Liberty Development
Beaufort Sea, Alaska

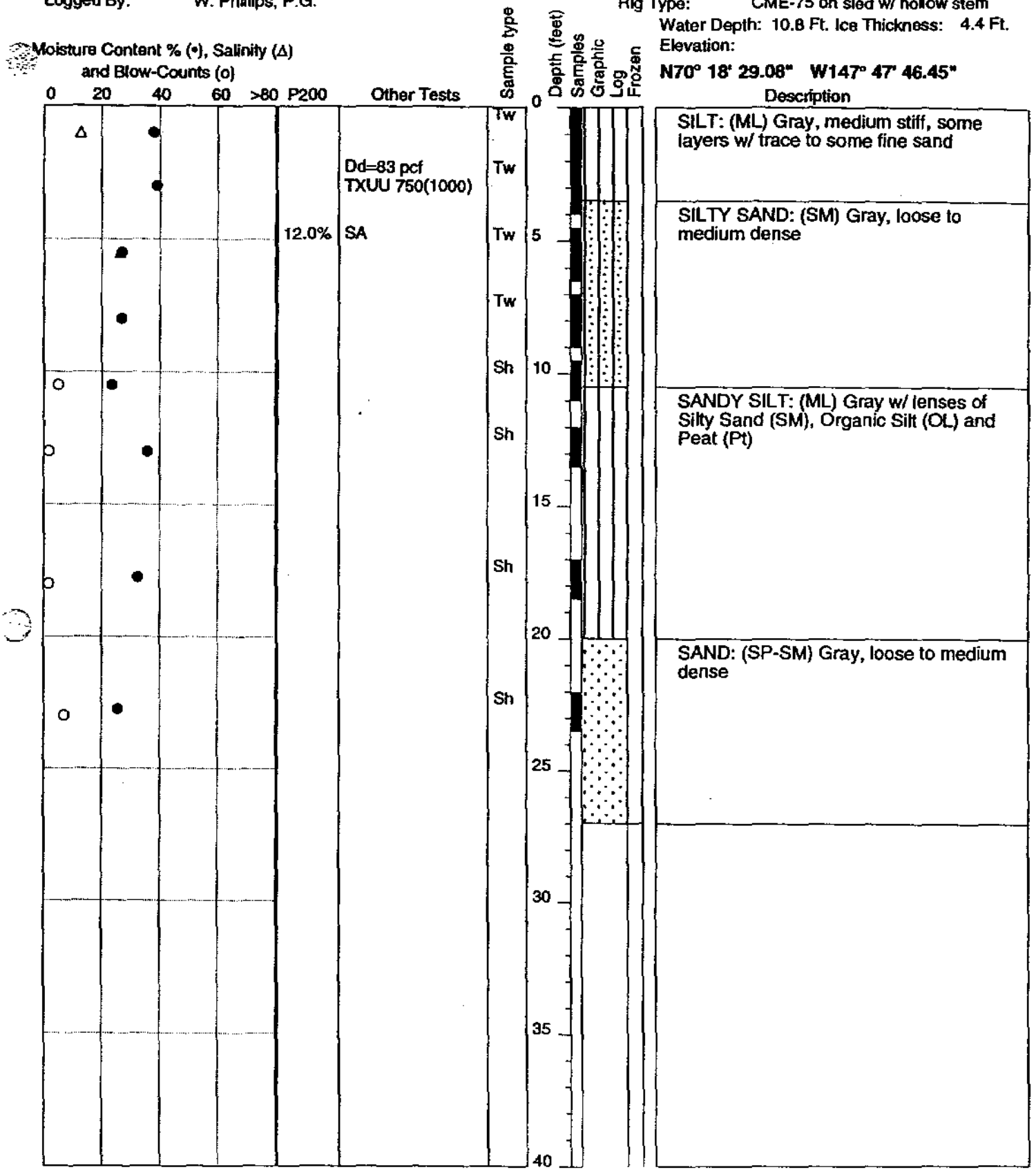
Plate
A-28

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G.

Log of HOLE : C-4

Date Drilled: February 24, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 10.8 Ft. Ice Thickness: 4.4 Ft.
Elevation:
N70° 18' 29.08" W147° 47' 46.45"

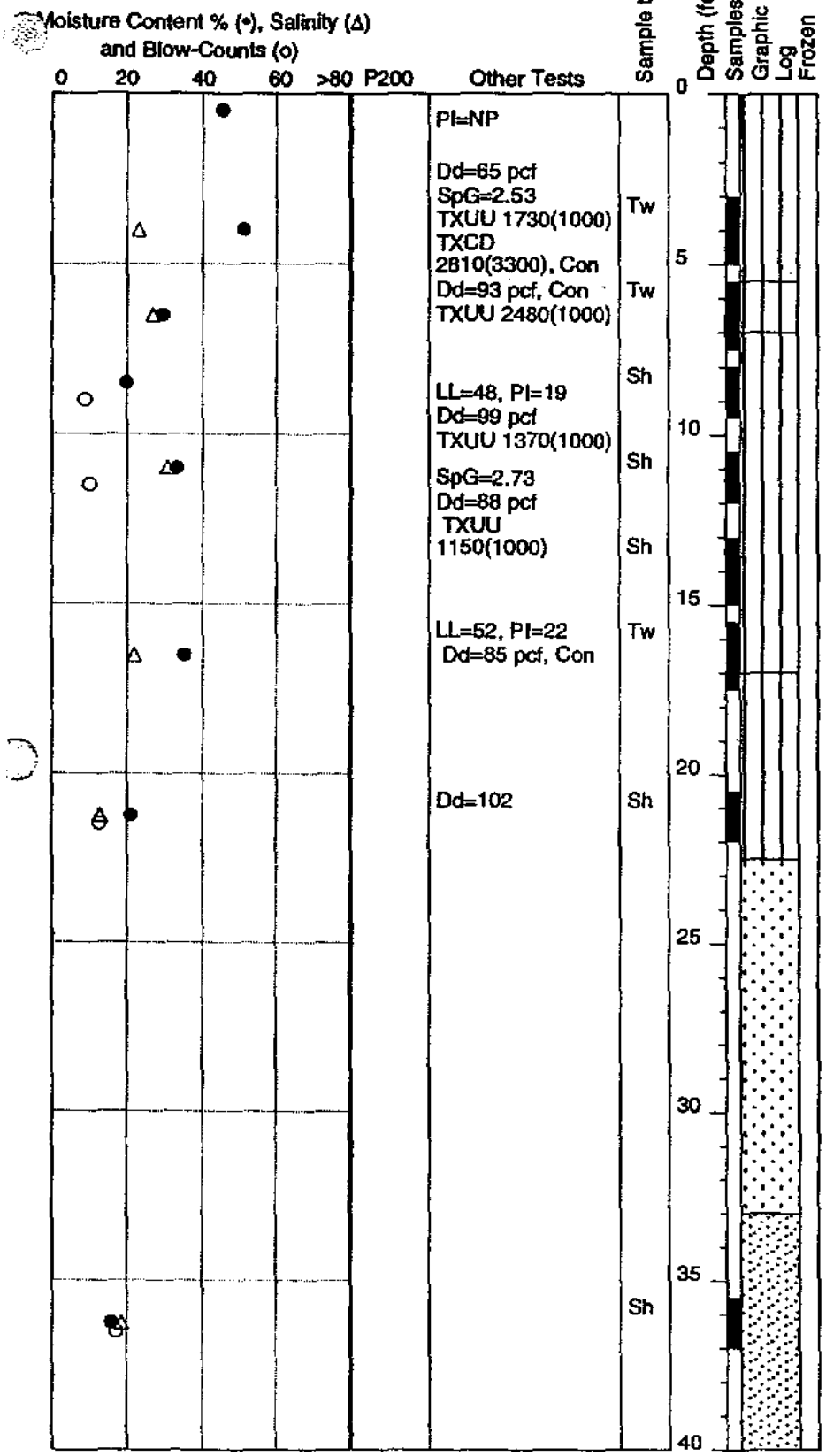


DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE : I-1

Date Drilled: February 23, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.5 Ft. Ice Thickness: 3.5 Ft.
Elevation:
N70° 16' 47.76" W147° 34' 54.21"



Description

SILT: (ML+OL) Dark gray to black, soft to medium stiff

SILT: (ML) Gray, medium stiff

SILT: (MH) Gray w/ lenses of Sandy Silt (ML), medium stiff to stiff

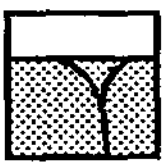
SANDY SILT: (ML) w/ trace gravel to 1" diameter, medium stiff

Stiff Silt (ML) layer at 21 to 22 ft.

SAND: (SW) Gray, fine grained, medium dense

GRAVELLY SAND: (SP-SM) Gray, medium dense, grading to Sand w/ trace to some gravel below 50'

Boring I-1 is continued on Plate 31



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Job No.: 4119.22
Date: September 1997

LOG of BORING I-1
Liberty Development
Beaufort Sea, Alaska

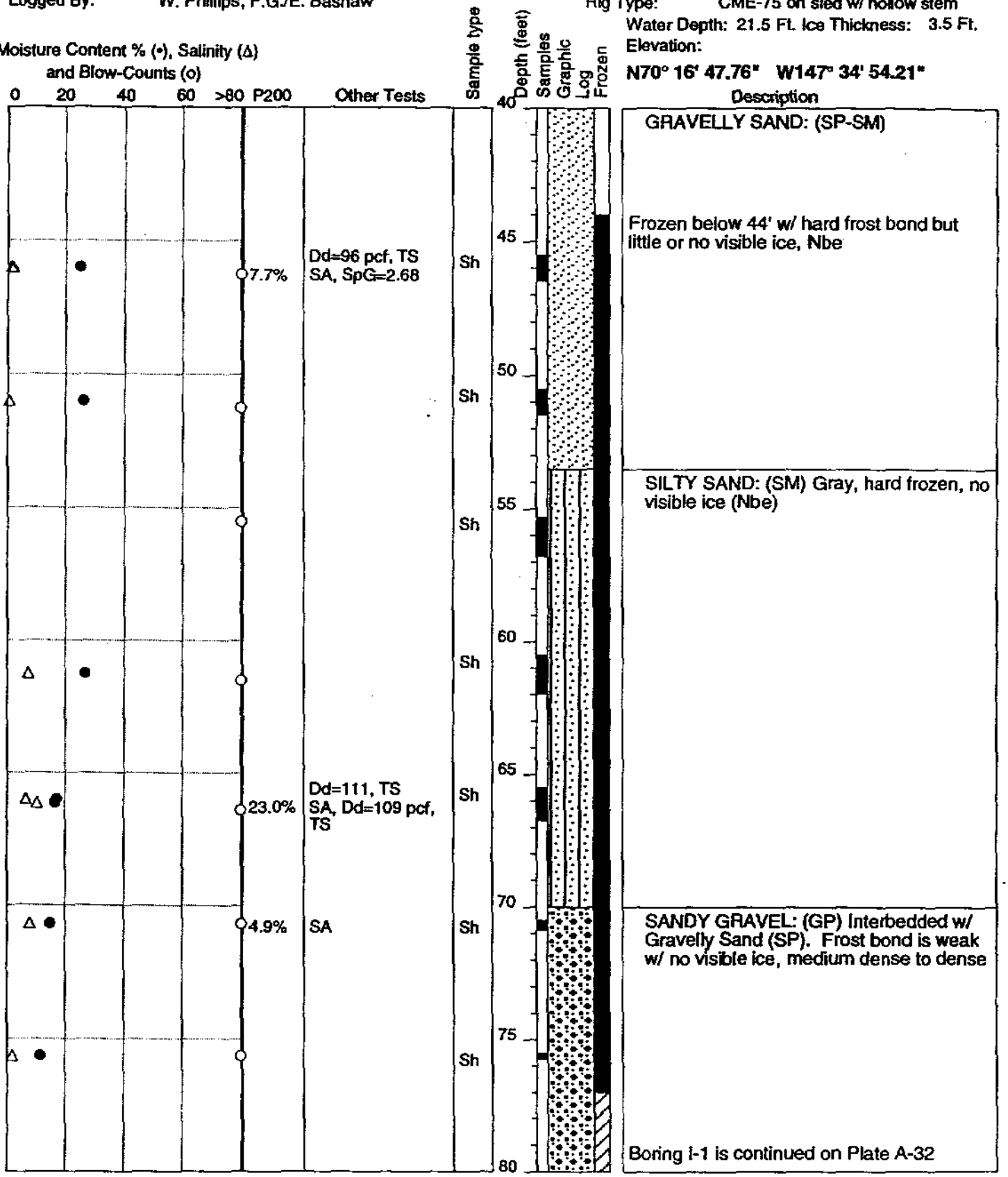
Plate
A-30

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE : I-1 Cont.

Date Drilled: February 23, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.5 Ft. Ice Thickness: 3.5 Ft.
Elevation:
N70° 16' 47.76" W147° 34' 54.21"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: September 1997

LOG of BORING I-1
Liberty Development
Beaufort Sea, Alaska

Plate
A-31

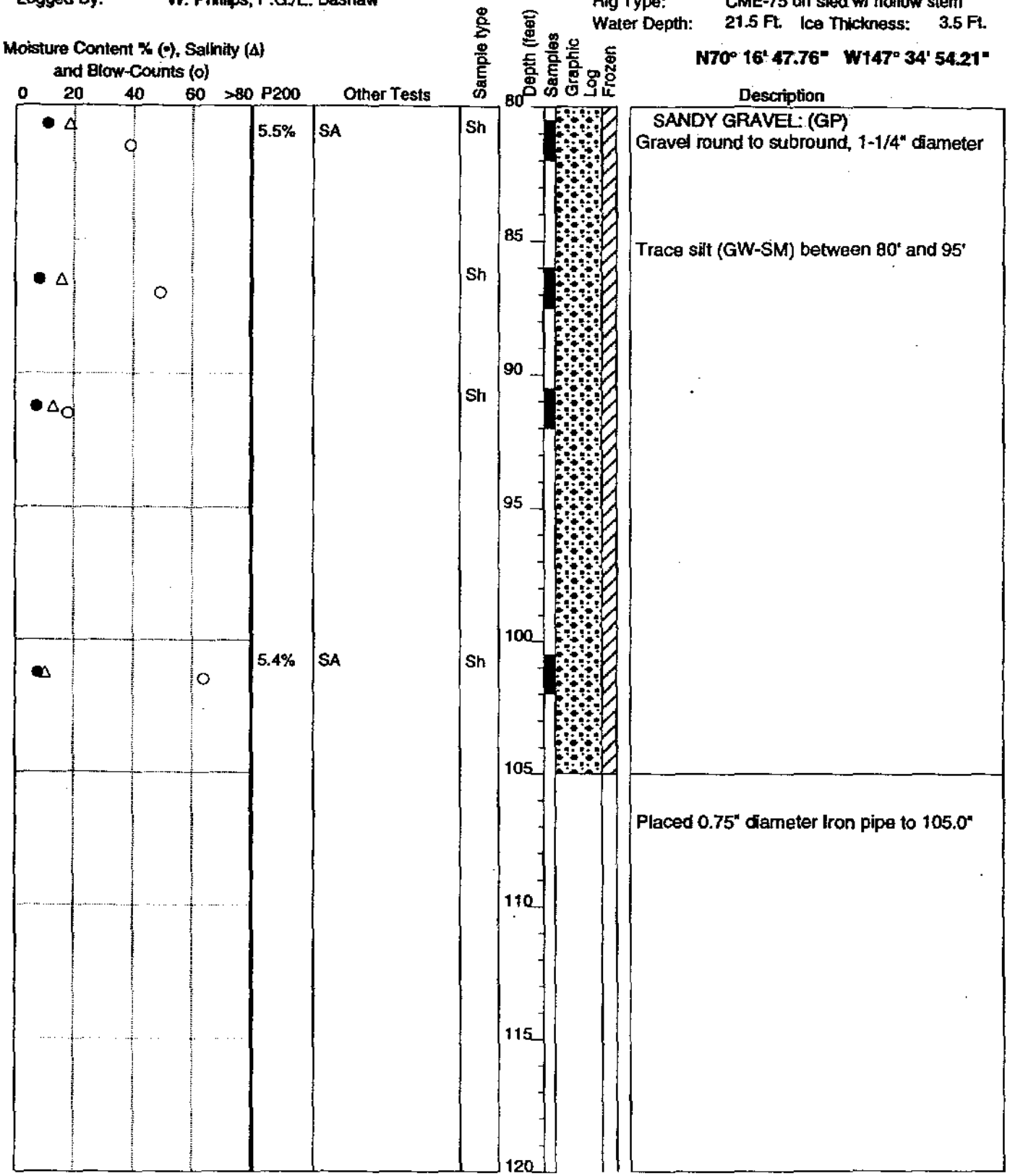
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No.: 4119.22
Logged By: W. Phillips, P.G./E. Bashaw

Log of HOLE: I-1 Cont.

Date Drilled: February 23, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.5 Ft. Ice Thickness: 3.5 Ft.

N70° 16' 47.76" W147° 34' 54.21"



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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-1 cont.
Liberty Development
Beaufort Sea, Alaska

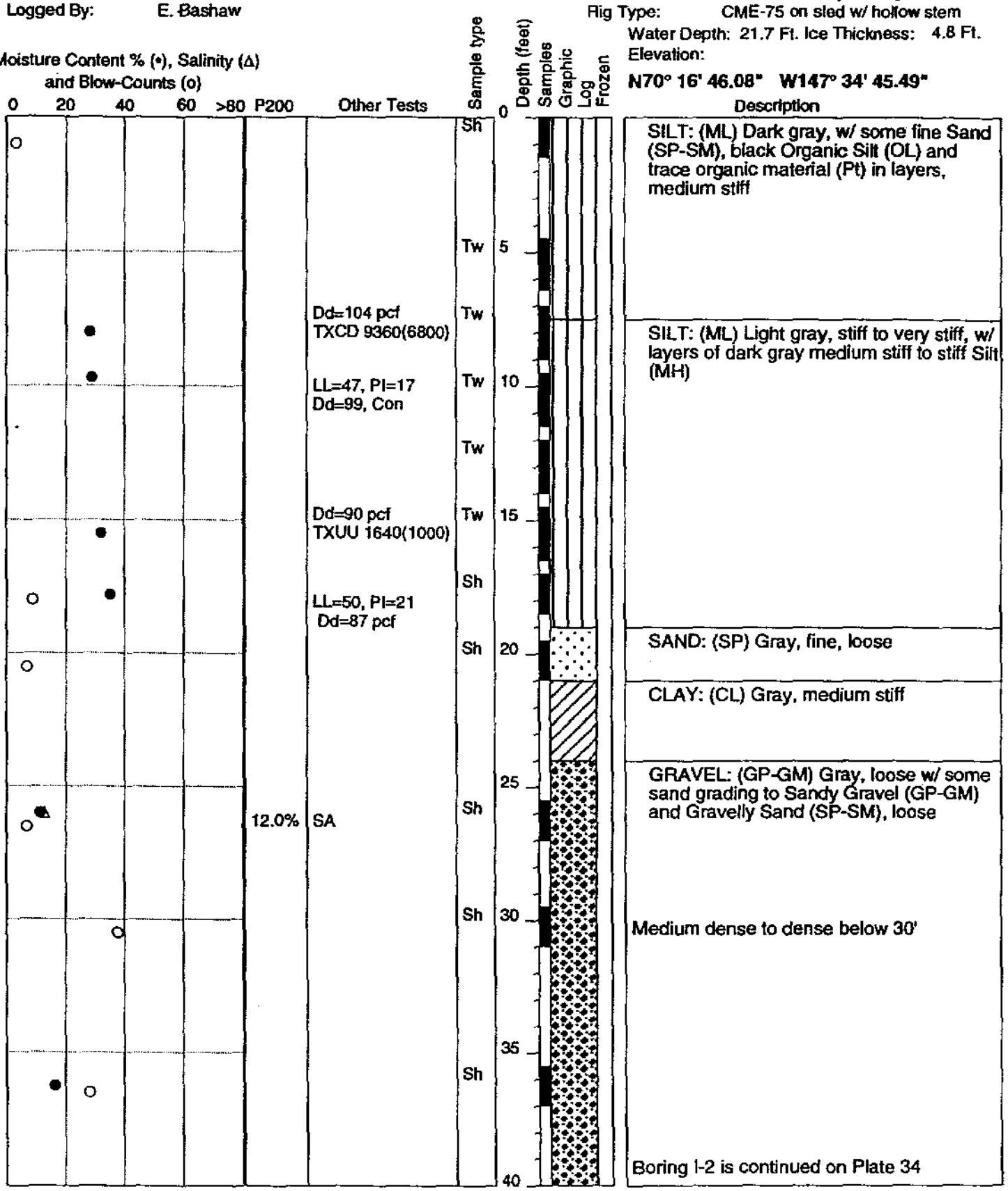
Plate
A-32

DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No.: 4119.22
Logged By: E. Bashaw

Log of HOLE : I-2

Date Drilled: February 22, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.7 Ft. Ice Thickness: 4.8 Ft.
Elevation:
N70° 16' 46.08" W147° 34' 45.49"



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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-2
Liberty Development
Beaufort Sea, Alaska

Plate
A-33

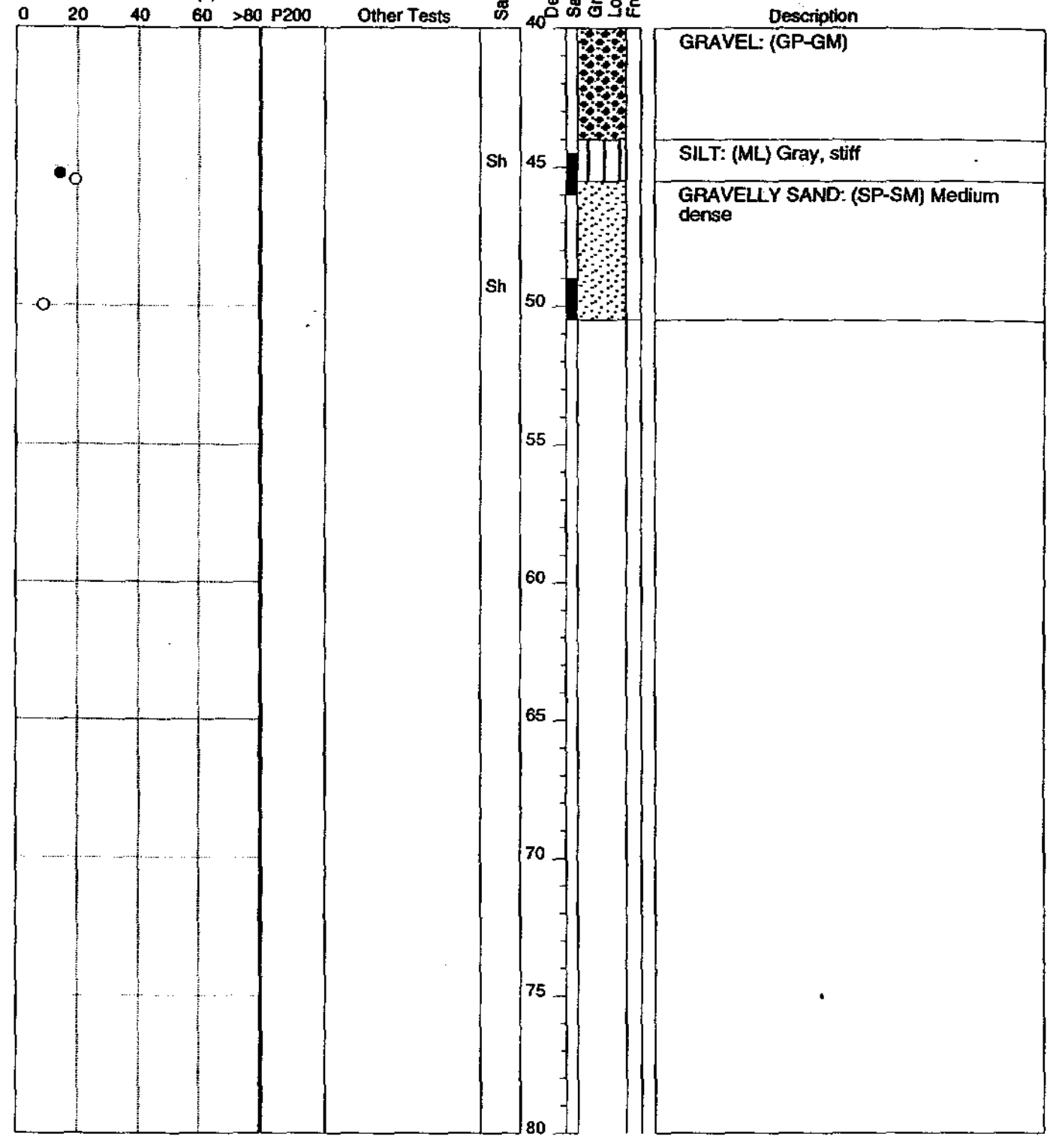
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : I-2 Cont.

Date Drilled: February 22, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.7 Ft. Ice Thickness: 4.8 Ft.

N70° 16' 46.08" W147° 34' 45.49"



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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-2 cont.
Liberty Development
Beaufort Sea, Alaska

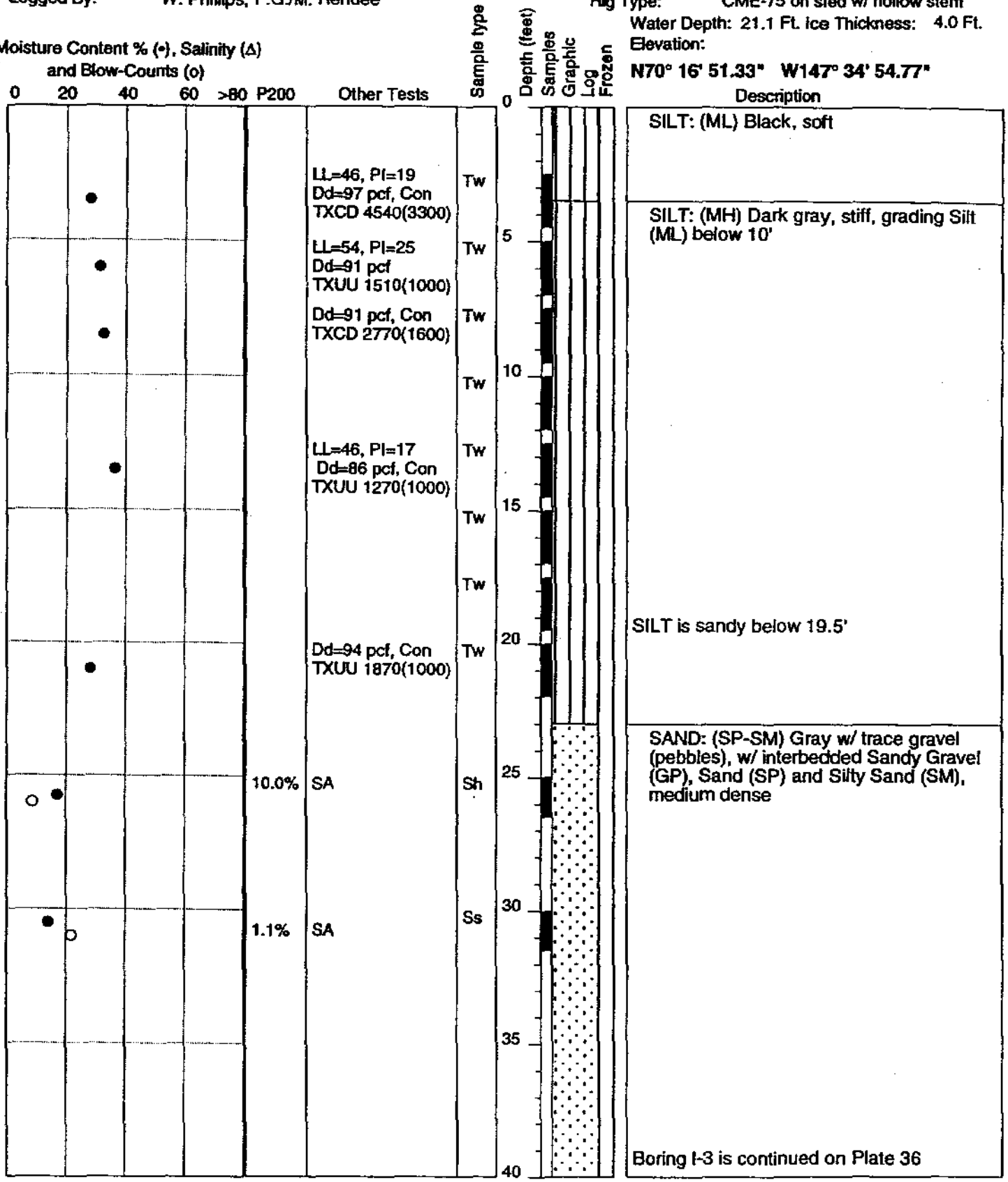
Plate
A-34

DUANE MILLER & ASSOCIATES

Project: **Liberty**
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./M. Hendee

Log of HOLE : I-3

Date Drilled: February 23, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.1 Ft. Ice Thickness: 4.0 Ft.
Elevation:
N70° 16' 51.33" W147° 34' 54.77"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-3
Liberty Development
Beaufort Sea, Alaska

Plate
A-35

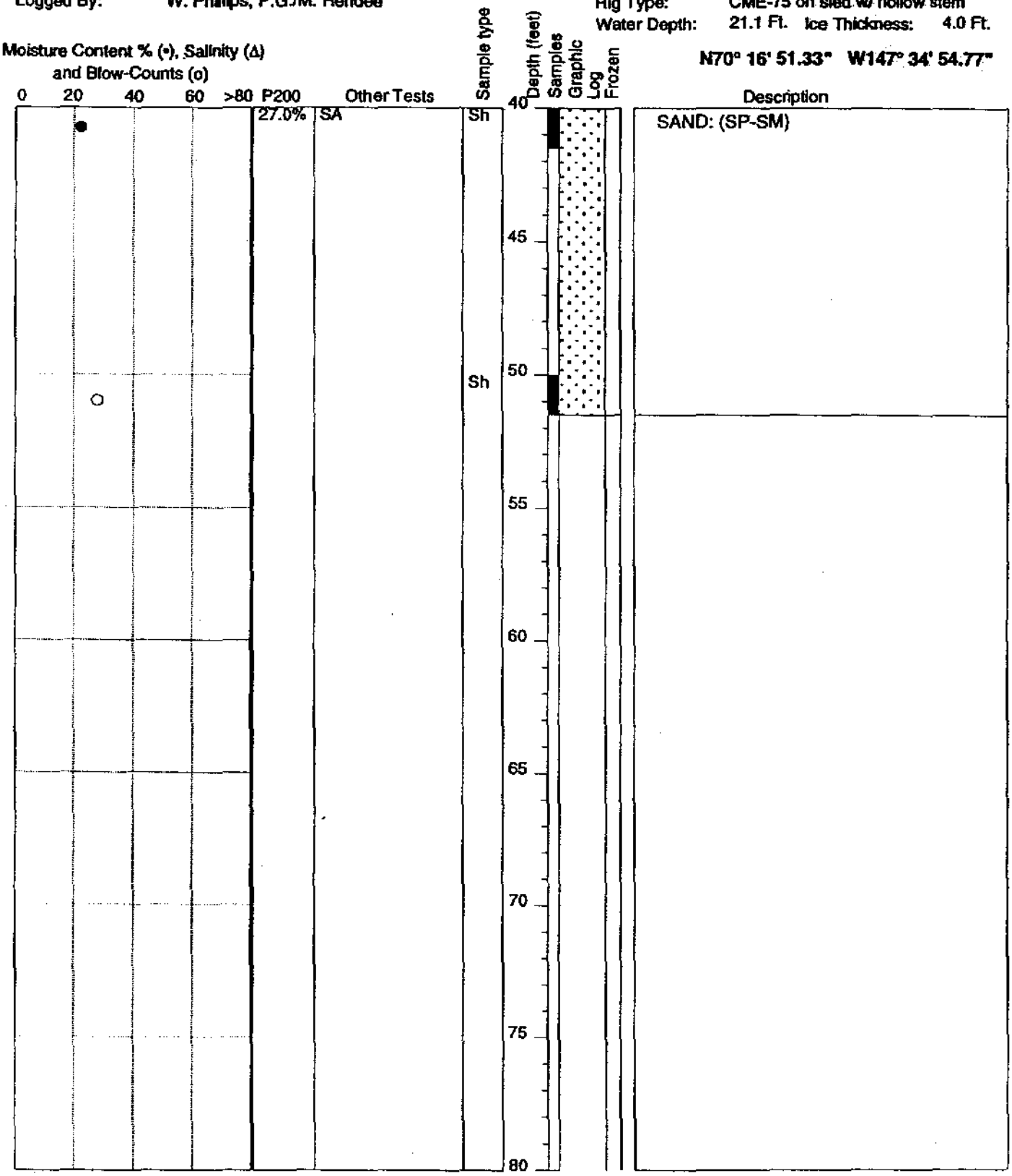
DUANE MILLER & ASSOCIATES

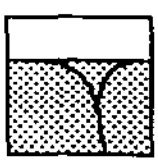
Project: Liberty
DM&A Job No. : 4119.22
Logged By: W. Phillips, P.G./M. Hendee

Log of HOLE : I-3 Cont.

Date Drilled: February 23, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 21.1 Ft. Ice Thickness: 4.0 Ft.

N70° 16' 51.33" W147° 34' 54.77"





Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-3 cont.
Liberty Development
Beaufort Sea, Alaska

Plate
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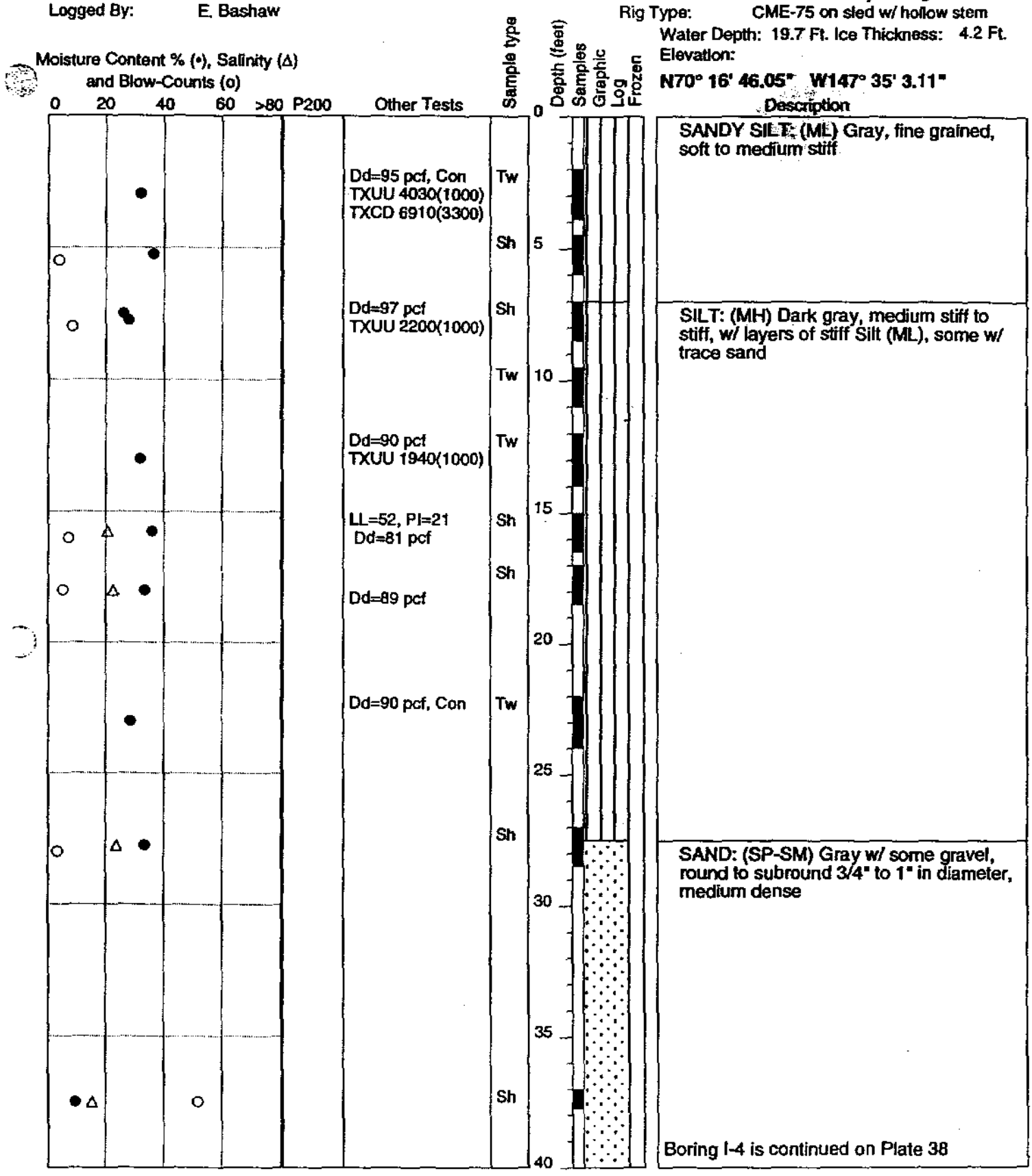
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No. : 4119.22
Logged By: E. Bashaw

Log of HOLE : I-4

Date Drilled: February 24, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.7 Ft. Ice Thickness: 4.2 Ft.
Elevation:
N70° 16' 46.05" W147° 35' 3.11"



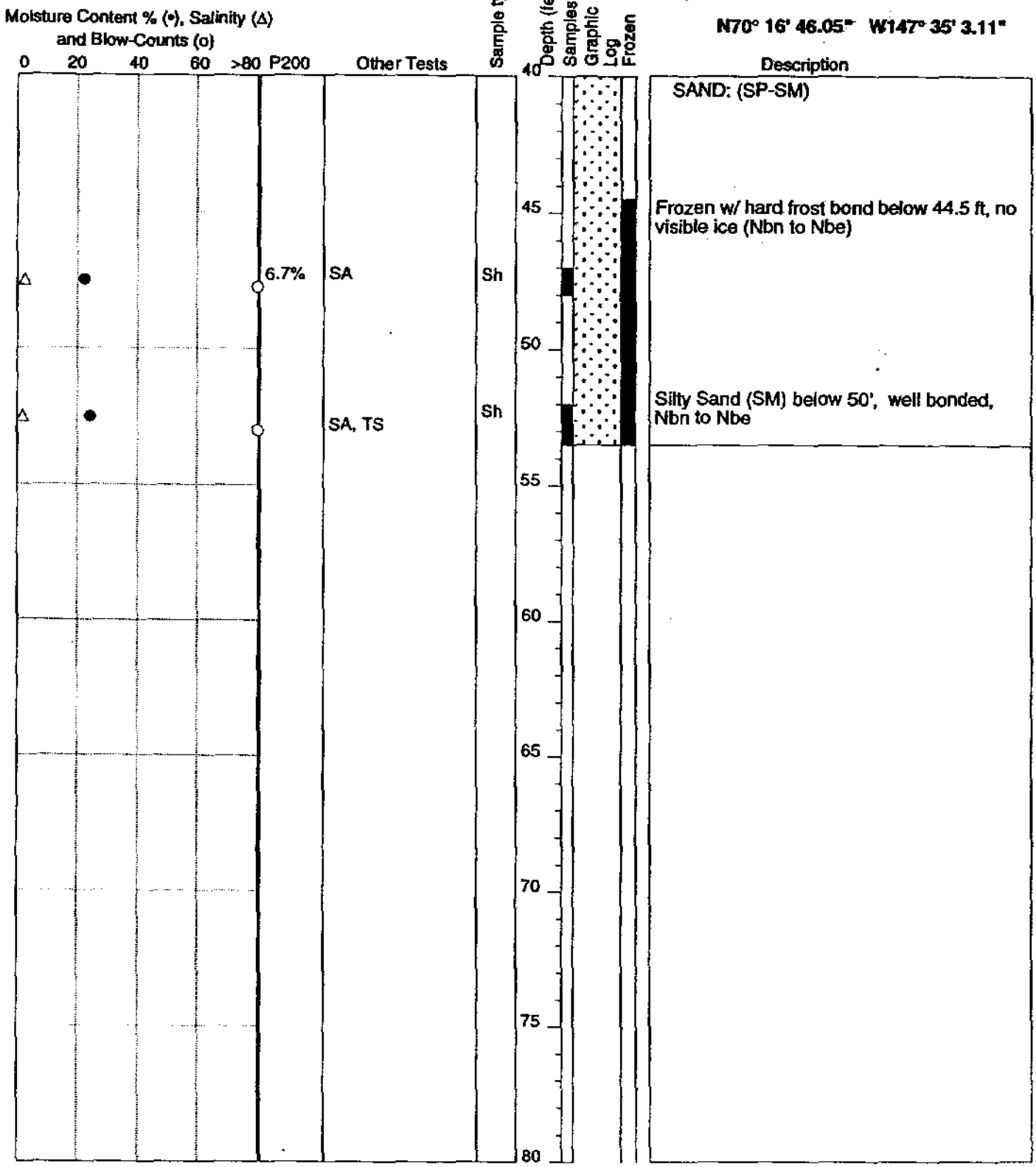
DUANE MILLER & ASSOCIATES

Project: Liberty
DM&A Job No.: 4119.22
Logged By: E. Bashaw

Log of HOLE: I-4 Cont.

Date Drilled: February 24, 1997
Contractor: Catco/Discovery Drilling
Rig Type: CME-75 on sled w/ hollow stem
Water Depth: 19.7 Ft. Ice Thickness: 4.2 Ft.

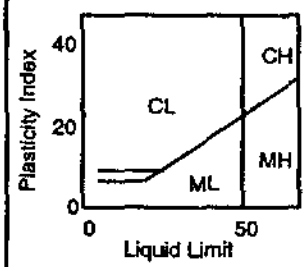
N70° 16' 46.05" W147° 35' 3.11"



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

LOG of BORING I-4 cont.
Liberty Development
Beaufort Sea, Alaska

Plate
A-38

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% larger than #200 sieve, >0.07 mm	**GRAVELS** More than half of the coarse fraction is larger than #4 sieve size, > 4.75 mm.	Clean gravels with little or no fines	GW	Well graded gravels, sandy gravel
			GP	Poorly graded gravels, sandy gravel
		Gravels with more than 12% fines	GM	Silty gravels, silt sand gravel mixtures
			GC	Clayey gravels, clay sand gravel mixtures
	SANDS More than half of the coarse fraction is smaller than #4 sieve size	Clean sands with little or no fines	SW	Well graded sand, gravelly sand
			SP	Poorly graded sands, gravelly sand
		Sands with more than 12% fines	SM	Silty sand, silt gravel sand mixtures
			SC	Clayey sand, clay gravel sand mixtures
FINE GRAINED SOILS >50%finer than #200 sieve, 0.07 mm	Plasticity Chart 	**SILTS and CLAYS** Liquid limit less than 50	ML	Inorganic silt and very fine sand, rock flour
			CL	Inorganic clay, gravelly and sandy clay, silty clay
			OL	Organic silts and clay of low plasticity
		SILTS and CLAYS Liquid limit greater than 50	MH	Inorganic silt
			CH	Inorganic clay, fat clay
			OH	Organic silt and clay of high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soil

KEY TO SAMPLE TYPE

Ag = Auger grab
Ab = Auger bulk
Sh = 2.5" ID split barrel w/340 lb. manual hammer
Sha= 2.5" ID split barrel w/340 lb. automatic hammer
Sxa = 1.4" ID split barrel w/340 lb automatic hammer
Tw = Shelby tube
Wc = Rotary wash cuttings

KEY TO TEST DATA

Dd = Dry Density (pcf)
Deg = Degredation
LL = Liquid Limit
PI = Plasticity Index
NP = Non Plastic
SpG = Specific Gravity
SA = Sieve Analysis
MA = Sieve and Hydrometer Analysis
OLI = Organic Loss on Ignition (%)
TS = Thaw Strain
TC = Thaw Consolidation
TCf = Thaw Consolidation (field)
TXUU = Unconsolidated Undrained Triaxial (psf)
TXCD = Consolidated Drained Triaxial (psf)

XXX (YYY)
$XXX=(\sigma_1-\sigma_3)/2$
$YYY=\sigma_3$

UNIFIED SOIL CLASSIFICATION SYSTEM

GROUP	ICE VISIBILITY	DESCRIPTION		SYMBOL	
N	Segregated ice not visible by eye	Poorly bonded or friable		Nf	
		Well bonded	No excess ice	Nb	Nbn
			Excess microscopic ice		Nbe
V	Segregated ice is visible by eye and is one inch or less in thickness	Individual ice crystals or inclusions		Vx	
		Ice coatings on particles		Vc	
		Random or irregularly oriented ice		Vr	
		Stratified or distinctly oriented ice		Vs	
ICE	Ice greater than one inch in thickness	Ice with soil inclusions		ICE + soil type	
		Ice without soil inclusions		ICE	

ICE CLASSIFICATION SYSTEM

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Arctic & Geotechnical Engineering
Job No.: 4119.22
Date: June 1997

SOIL and ICE CLASSIFICATION and KEY TO DATA
Liberty Development
Beaufort Sea, Alaska

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APPENDIX B

PRIMARY LAB TESTING

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
A-1	0.0'	Pt	Yes	56															
A-1	0.3'	OL	Yes																
A-1	0.5'	ML	Yes		26.9%														
A-1	5.2'	ML	Yes	54	131.9%														
A-1	6.5'	ML	Yes	48															
A-1	11.0'	SP	Yes	180	16.3%			32%	60%	7.6%									SA
A-1	16.0'	GP	Yes	170	12.6%														
A-1	26.0'	GP	Yes	220	11.3%					7.7%									
A-2	0.0'	ML	Yes	grab	28.9%														
A-2	6.0'	GP	Yes	130	8.6%		49 ppt			3.5%									
A-2	11.0'	SP	Yes	144	14.2%														
A-2	21.0'	SP	Yes	255	7.2%		56 ppt			3.9%		NP							
A-2	31.0'	GP	Yes	300	9.1%		47 ppt												
A-3	0.0'	SP	No	shelby															
A-3	5.0'	GP	No	17	7.0%		65 ppt	61%	36%	3.2%									SA
A-3	10.0'	SP	No	7	10.7%														
A-3	15.0'	SP	No	4															
A-3	20.0'	GW	No	12	8.5%			62%	36%	1.9%									SA
A-3	25.0'	GP	No	16	10.3%														
A-3	30.0'	GP	No	17	9.0%														
A-4	0.0'	SP	No	3															
A-4	1.5'	SM	No		23.6%					14.3%									
A-4	3.5'	SP	No	8	17.7%	112 pcf		5%	93%	2.2%									SA
A-4	6.0'	GP	No	8	6.7%			76%	23%	0.7%									SA
A-4	9.5'	GP	No	4	6.4%														
A-4	10.5'	GP	No	8															
A-4	14.8'	GP	No	10	11.3%														

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

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Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
A-4	16.5'	GP	No	12															
A-4	20.7'	GP	No	7															
A-4	22.3'	GP	No	7															
A-4	30.8'	GP	No	14															
A-5	0.0'	SP-SM	No	4															
A-5	2.7'	SP-SM	No	8	22.4%	107 pcf													
A-5	3.2'	ML	No	3	35.9%														
A-5	4.2'	SP	No		21.9%			0%	98%	1.9%									SA
A-5	6.5'	SP	No	2	24.9%	102 pcf													
A-5	7.5'	ML	No	shelby	52.8%	67 pcf													
A-5	10.5'	GP-GM	No	10	13.2%														
A-5	13.3'	GP	No	6															
A-5	15.8'	SM	No	6	14.4%					13.0%									SA
A-5	25.8'	GP	No	64															
A-5	26.7'	GP	No	14															
A-6	0.0'	ML	No	shelby															
A-6	2.8'	ML	No	grab															
A-6	3.0'	ML+Pt	No	shelby	73.4%	55 pcf	24 ppt				42	6	36			TXUU	90 psf	1000 psf	
A-6	5.5'	ML+Pt	No	shelby	47.9%	71 pcf								4.0%		TXUU	410 psf	1000 psf	
A-6	7.5'	SM	No	shelby	36.5%	84 pcf	38 ppt	0%	68%	32.2%		NP							SA
A-6	10.0'	SM	No	shelby	33.8%	84 pcf													
A-6	12.0'	SM	No	shelby															
A-6	14.0'	SM	No	3	21.3%														
A-6	18.0'	GP	No	13	9.4%														
A-6	28.0'	GP	No	13	8.1%														
A-7	2.0'	ML	No	4	26.5%														
A-7	3.0'	ML	No	shelby	57.2%	85 pcf		0%	9%	91.0%						TXUU	420 psf	1000 psf	SA

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-2

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
A-7	7.5'	ML	No	shelby															
A-7	9.5'	SM	No	shelby	52.3%	67 pcf													
A-7	14.0'	GP	No	13	8.0%			65%	34%	1.4%									SA
A-7	23.0'	GP	No	17	9.9%														
A-7	28.0'	GP	No	19	7.4%														
A-8	0.0'	ML	No	shelby	50.0%	70 pcf						NP				TXUU	380 psf	1000 psf	
A-8	2.5'	ML	No	shelby	46.2%	72 pcf	19 ppt									TXUU	590 psf	1000 psf	
A-8	5.5'	ML	No	shelby	40.4%	78 pcf	30 ppt	0%	20%	80.0%									SA
A-8	8.5'	ML	No	shelby	50.0%	70 pcf										TXUU	540 psf	1000 psf	
A-8	15.0'	SM	No	shelby															
A-8	21.0'	SM	No	4	27.6%			0%	78%	22.0%									SA
A-8	25.5'	SM	No	shelby	26.9%	94 pcf													
A-8	26.0'	SM	No	6	33.0%														
A-8	36.0'	SP-SM	No	4															
A-9	0.0'	ML	No	shelby	41.2%	66 pcf													
A-9	2.0'	OL	No	shelby	94.8%	46 pcf										TXUU	250 psf	1000 psf	
A-9	4.0'	OL	No	shelby	99.0%	48 pcf													
A-9	6.0'	ML	No	shelby	50.2%	68 pcf		0%	13%	87.0%						TXUU	850 psf	1000 psf	MA
A-9	8.0'	ML	No	shelby															
A-9	10.5'	ML+Pt	No	6	49.1%														
A-9	12.0'	ML	No	shelby	25.8%	87 pcf													SA
A-9	17.0'	SM	No	shelby	20.1%	107 pcf													
A-9	22.0'	SM	No	13	13.7%			12%	50%	38.0%									SA
A-9	32.0'	SP-SM	No	30	11.6%														
A-10	2.5'	ML	No	shelby	32.3%	83 pcf													
A-10	5.5'	ML	No	2	32.5%	86 pcf													
A-10	7.5'	ML	No	shelby	50.1%	72 pcf		0%	2%	98.0%									MA

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-3

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
A-10	10.0'	ML	No	shelby	41.3%	77 pcf													
A-10	12.5'	ML	No	shelby	59.6%	64 pcf													
A-10	17.5'	ML	No	5	28.6%														
A-10	22.5'	ML	No	3	26.5%														
A-10	23.0'	SP	No		22.4%														
A-10	27.5'	SP	No	21	17.0%														
A-10	32.5'	SP	No	33															
B-1	0.0'	Pt	Yes	34	174.9%														
B-1	1.0'	OL	Yes		214.4%									35.1%					
B-1	2.5'	OL	Yes	33	238.4%														
B-1	7.5'	SM	Yes	57	49.8%		6 ppt	8%	74%	18.0%									SA
B-1	9.5'	SM	Yes	86	52.3%														
B-1	11.0'	SM	Yes	48	27.0%	93 pcf	3 ppt	18%	64%	18.0%					1.0%				SA
B-1	14.5'	SP-SM	Yes	54	23.0%	99 pcf	2 ppt	3%	86%	11.0%					1.0%				SA
B-1	16.5'	SP-SM	Yes	130	11.3%		16 ppt												
B-1	21.0'	GP-GM	Yes	grab	10.2%		19 ppt												SpG=2.65
B-1	26.0'	GP-GM	Yes	grab	3.9%		42 ppt												
B-2	0.5'	SP	Yes	32	15.3%	113 pcf													
B-2	2.4'	GP-GM	Yes	18	15.8%	114 pcf													
B-2	4.8'	GP-GM	Yes	11	12.0%	113 pcf	13 ppt	49%	43%	7.7%									SA, SpG=2.67
B-2	6.5'	GP	Yes	42	13.7%	115 pcf	6 ppt												
B-2	10.1'	SM	Yes	90	9.0%	104 pcf	56 ppt	0%	76%	24.0%					3.8%				SA
B-2	16.2'	GW-GM	Yes	180	10.2%		8 ppt	59%	34%	6.9%									SA
B-2	26.2'	GP	Yes	600	7.9%		8 ppt												
B-3	0.0'	SM	No	3															
B-3	3.7'	SM	No	shelby															
B-3	6.2'	SM	No	shelby	38.4%			4%	56%	40.0%									SA

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-4

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
B-3	9.5'	ML	No	5	23.4%		55 ppt												
B-3	10.0'	SM	No		24.2%		34 ppt												
B-3	11.0'	GP-GM	No	8	9.7%		60 ppt												
B-3	22.0'	GP-GM	No	19	6.9%		85 ppt												
B-4	0.0'	ML	No	shelby	40.0%	83 pcf													
B-4	2.5'	ML	No	shelby	33.8%	88 pcf										TXUU	430 psf	1000 psf	
B-4	5.0'	ML	No	shelby															
B-4	8.0'	SP-SM	No	5	17.0%			4%	89%	7.4%									SA
B-4	10.0'	GP	No	7	9.1%			58%	41%	1.1%									SA
B-4	12.5'	GP	No	12															
B-5	2.5'	ML	No	shelby	29.5%	91 pcf	32 ppt									TXUU	1310 psf	1000 psf	
B-5	5.0'	ML	No	shelby	34.1%	82 pcf		0%	15%	85.0%						TXUU	1200 psf	1000 psf	MA
B-5	7.5'	SP-SM	No	7															
B-5	10.0'	SP-SM	No	9															
B-5	15.0'	GP-GM	No	13															
B-5	25.0'	SP-SM	No	14															
B-6	0.0'	SP-SM	No	3															
B-6	2.3'	ML	No	shelby	36.3%	85 pcf	23 ppt	0%	3%	97.0%									MA
B-6	4.8'	ML	No	shelby															
B-6	7.3'	ML	No	shelby	30.4%	92 pcf										TXUU	1010 psf	1000 psf	
B-6	9.8'	SP	No	shelby	30.4%	73 pcf		0%	8%	92.0%									SA
B-6	13.0'	SP-SM	No	13	17.7%														
B-6	16.0'	ML	No	5	24.0%														
B-6	18.0'	SM	No	9	18.7%	117 pcf													
B-6	20.6'	SM	No	11	21.2%	106 pcf													
B-6	22.3'	GP	No	11															
B-6	24.8'	SP	No	9	11.9%														

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

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B-5

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
B-6	29.8'	SP	No	20															
B-6	35.5'	SP	No	15	6.8%														
B-7	1.0'	SM	No	10	24.6%					37.5%									
B-7	2.1'	ML	No	shelby	38.0%	80 pcf	31 ppt	0%	8%	92.0%									SA
B-7	5.5'	ML	No	2	33.0%	87 pcf		0%	23%	77.0%									MA
B-7	7.1'	ML	No	shelby	24.3%	99 pcf	35 ppt									TXUU	1910 psf	1000 psf	
B-7	9.6'	SM	No	shelby															
B-7	13.0'	ML	No	4	71.7%	55 pcf													
B-7	16.0'	ML	No	3	76.2%	52 pcf													
B-7	16.5'	Pt	No																
B-7	17.7'	ML	No	6	19.2%	112 pcf													
B-7	19.8'	ML	No	5	20.9%					67.5%									
B-7	24.6'	SM	No	10															
B-7	29.6'	SP	No	11															
B-7	31.0'	GP	No	6	11.9%					3.2%									
B-7	40.0'	GP	No	7	7.7%														
B-8	0.0'	ML	No	shelby															
B-8	2.5'	ML	No	shelby	63.8%	49 pcf		0%	4%	96.0%		NP				TXUU	370 psf	1000 psf	MA
B-8	5.0'	ML	No	shelby															
B-8	7.5'	ML	No	shelby	41.0%	75 pcf		0%	39%	61.0%									SA
B-8	12.0'	SP	No	4															
B-8	17.0'	GP	No	12	15.0%														
B-8	25.0'	GP	No	grab	8.8%														
B-9	0.5'	SM	No	7	24.1%			1%	83%	16.0%									SA
B-9	3.8'	ML	No	3	24.6%	100 pcf													
B-9	5.1'	ML	No	shelby	33.8%	86 pcf		0%	1%	99.0%									SA
B-9	7.6'	ML	No	shelby	30.7%	90 pcf													

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-6

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
B-9	10.0'	ML	No	1	38.2%	83 pcf													
B-9	12.1'	ML	No	shelby															
B-9	14.6'	ML	No	shelby	37.6%	80 pcf													
B-9	20.1'	ML	No	3	37.8%	83 pcf													
B-9	24.6'	MH	No	shelby	44.4%	75 pcf	23 ppt				51	15	36						
B-9	30.5'	OL	No	5	37.6%	82 pcf													
B-9	35.5'	SM	No	4	24.8%	100 pcf													
B-9	39.5'	GP	No	10															
B-9	42.0'	GP	No	grab															
B-9	46.0'	GP	No	grab															
B-10	3.0'	SP	No	shelby	19.7%	102 pcf	33 ppt	0%	98%	2.0%									SA
B-10	5.5'	SM	No	shelby	28.1%	93 pcf	34 ppt					NP				TXUU	450 psf	1000 psf	
B-10	8.0'	ML	No																
B-10	10.5'	ML	No	shelby	35.5%	84 pcf													
B-10	13.0'	ML	No	shelby	38.5%	82 pcf													
B-10	15.5'	ML	No	shelby	37.9%	83 pcf													
B-10	18.0'	SM	No	shelby															
B-10	19.5'	SM	No	7															
B-10	23.0'	ML	No	8	24.8%	100 pcf													
B-10	28.5'	SP	No	2	27.4%	86 pcf	45 ppt												
B-10	48.0'	SP	No	58	8.7%		61 ppt												
B-11	4.5'	ML	No	shelby	75.7%	51 pcf													
B-11	6.5'	OL	No	grab	27.1%														
B-11	9.0'	SP-SM	No	grab															
B-1A	9.0'	SM	Yes	grab	19.0%														
B-1A	11.0'	SM	Yes	98	13.2%														
B-1A	14.0'	SM	Yes	100	20.7%	85 pcf	3 ppt	19%	68%	13.0%					25.5%				SA

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SUMMARY OF SAMPLES
Liberty Development
Beaufort Sea, Alaska

Plate
B-7

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
B-1A	16.0'	SP	Yes	116	13.6%														
B-1A	18.5'	SP-SM	Yes	252	8.2%														
B-1A	21.0'	GP-GM	Yes	180	12.6%														
B-1A	23.0'	GP-GM	Yes	grab															
B-1A	26.0'	GP-GM	Yes	200	10.6%														
B-1A	29.5'	GW-GM	Yes	200	14.4%			57%	34%	8.6%									SA
C-1	2.0'	SP	No	shelby	35.5%		21 ppt												
C-1	4.5'	ML	No	shelby	46.4%	86 pcf										TXUU	1110 psf	1000 psf	
C-1	7.0'	ML	No	shelby	29.1%	91 pcf										TXUU	1010 psf	1000 psf	
C-1	9.5'	ML	No	shelby	33.1%	86 pcf													
C-1	12.0'	ML	No	shelby	34.1%	84 pcf													
C-1	15.3'	ML	No	6	35.6%	86 pcf													
C-1	18.8'	ML	No	6	19.6%	109 pcf													
C-1	22.8'	ML	No	8	23.8%	101 pcf	24 ppt												
C-1	27.5'	ML	No	9	28.5%		22 ppt												
C-2	1.0'	ML	No	shelby	42.2%	77 pcf										TXUU	1160 psf	1000 psf	
C-2	3.5'	OL	No	shelby	32.4%	64 pcf		0%	3%	97.0%				8.7%					MA
C-2	6.0'	CL-ML	No	shelby	26.2%	93 pcf					40	14	26						
C-2	9.5'	CL-ML	No	6	26.2%	99 pcf													
C-2	12.8'	CL-ML	No	8	33.8%	88 pcf													
C-2	14.5'	CL-ML	No	shelby															
C-2	18.0'	ML	No	9	24.5%	101 pcf													
C-2	22.8'	ML	No	6	41.2%	75 pcf													
C-2	27.0'	SM	No	7	16.4%														
C-3	0.0'	ML	No	shelby	40.4%	79 pcf	30 ppt									TXUU	440 psf	1000 psf	
C-3	2.5'	ML	No	shelby															
C-3	5.0'	ML	No	shelby	31.6%	89 pcf	31 ppt	0%	1%	99.0%	49	17	32			TXUU	790 psf	1000 psf	MA

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Sept 1997

SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-8

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
C-3	7.5'	ML	No	shelby															
C-3	10.0'	ML	No	shelby	38.6%	82 pcf	11 ppt												
C-3	13.5'	SM	No	6	27.1%	97 pcf	8 ppt												
C-3	15.0'	SM	No	12	19.6%		14 ppt												
C-3	20.0'	ML	Yes		38.6%	77 pcf	21 ppt								13.1%				
C-3	20.5'	ML	Yes	8	35.9%	82 pcf	3 ppt	0%	2%	98.0%					15.3%				SA
C-3	25.5'	SM	Yes		25.7%	90 pcf	0 ppt								6.0%				
C-3	26.0'	SM	Yes	34	27.7%	87 pcf	0 ppt	0%	66%	34.0%					7.5%				SA
C-3	30.8'	SM	Yes	55	27.7%	89 pcf	5 ppt	0%	58%	42.0%					6.7%				SA
C-4	0.0'	ML	No	shelby	37.6%		13 ppt												
C-4	2.0'	ML	No	shelby	39.0%	83 pcf										TXUU	750 psf	1000 psf	
C-4	4.5'	SP-SM	No	shelby	28.6%		27 ppt	0%	88%	12.0%									SA
C-4	7.0'	SM	No	shelby	26.9%														
C-4	10.5'	ML		5	23.7%														
C-4	13.0'	ML	No	2	35.7%														
C-4	17.0'	SM	No	2	32.5%														
C-4	22.0'	SM	No	7	25.6%														
I-1	0.5'	ML+OL	No	shelby	45.5%							NP							
I-1	3.5'	ML+OL	No	shelby	50.9%	65 pcf	23 ppt									TXUU	1730 psf	1000 psf	
I-1	4.0'	ML+OL	No	shelby	50.9%	65 pcf	23 ppt									TXCD	2810 psf	3300 psf	Consol, SpG=2.53
I-1	5.5'	ML	No	shelby	29.6%	93 pcf	27 ppt									TXUU	2480 psf	1000 psf	Consol
I-1	8.5'	ML	No	9	20.0%	99 pcf					48	19	29			TXUU	1370 psf	1000 psf	
I-1	11.0'	MH	No	10	33.5%	88 pcf	31 ppt									TXUU	1150 psf	1000 psf	SpG=2.73
I-1	13.5'	MH	No			85 pcf													
I-1	15.5'	MH	No	shelby	35.0%	85 pcf	22 ppt				52	22	3						Consol
I-1	20.5'	SM	No	13	21.4%	102 pcf	13 ppt												
I-1	35.5'	SP-SM	No	17	16.2%		18 ppt												

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SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-9

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
I-1	45.5'	SP-SM	Yes	110	25.1%	96 pcf	2 ppt								9.3%				
I-1	46.0'	SP-SM	Yes				1 ppt	8%	84%	7.7%									SA
I-1	50.5'	SP-SM	Yes	84	26.3%		1 ppt												
I-1	55.5'	SM	Yes	300															
I-1	60.5'	SM	Yes	84	26.6%		7 ppt												
I-1	65.5'	SM	Yes	160	16.5%	111 pcf	10 ppt								5.9%				
I-1	66.0'	SM	Yes		17.3%	109 pcf	6 ppt	3%	74%	23.0%					6.7%				SA
I-1	70.5'	SP	Yes	267	14.5%		8 ppt	45%	50%	4.9%									SA
I-1	75.5'	SP	Yes	400	11.7%		2 ppt												
I-1	80.7'	GP-GM	?	39	10.6%		18 ppt	51%	44%	5.5%									SA
I-1	86.5'	GP-GM	?	49	8.1%		16 ppt												
I-1	90.5'	GP-GM	?	18	6.9%		13 ppt												
I-1	100.5'	GP-GM	?	64	7.5%		10 ppt	53%	42%	5.4%									SA
I-2	0.0'	ML	No	3															
I-2	4.5'	OL	No	shelby															
I-2	7.0'	SM	No	shelby	28.2%	104 pcf										TXCD	9360 psf	6800 psf	
I-2	9.7'	ML	No	shelby	28.6%	99 pcf					47	17	30						Consol
I-2	12.0'	ML	No	shelby															
I-2	14.5'	MH	No	shelby	32.1%	90 pcf										TXUU	1640 psf	1000 psf	
I-2	17.8'	MH	No	9	35.1%	87 pcf					50	21	29						
I-2	19.5'	SP	No	7															
I-2	26.0'	GP-GM	No	7	11.3%		13 ppt	77%	11%	12.0%									SA
I-2	29.5'	GP-GM	No	38															
I-2	35.5'	SP-SM	No	28	16.5%														
I-2	44.5'	ML	No	19	14.1%														
I-2	49.0'	SP-SM	No	9															
I-3	2.5'	ML	No	shelby	28.3%	97 pcf					46	19	27			TXCD	4540 psf	3300 psf	Consol

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Sept 1997

SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-10

Boring	Depth	Soil Type (USCS)	Frz?	Sampling blows/ft	Moisture Content	Dry Density	Salinity	Gravel >#4	Sand #4-#200	Fines <#200	Atterberg Limits LL	PI	PL	Organic Content	Thaw Strain	Shear Strength Tests Test	1/2 deviator	Sigma 3	Other Tests
I-3	5.0'	MH	No	shelby	31.1%	91 pcf					54	25	29			TXUU	1510 psf	1000 psf	
I-3	7.5'	MH	No	shelby	32.4%	91 pcf										TXCD	2770 psf	1600 psf	Consol
I-3	10.0'	MH	No	shelby															
I-3	12.5'	ML	No	shelby	36.2%	86 pcf					46	17	29			TXUU	1270 psf	1000 psf	Consol
I-3	15.0'	ML	No	shelby															
I-3	17.5'	ML	No	shelby															
I-3	20.0'	ML	No	shelby	28.2%	94 pcf										TXUU	1870 psf	1000 psf	Consol
I-3	25.0'	SP-SM	No	9	17.2%			2%	88%	10.0%									SA
I-3	30.5'	SP	No	22	14.3%			21%	78%	1.1%									SA
I-3	40.0'	SM	No	14	22.2%			4%	69%	27.0%									SA
I-3	50.0'	SP	No	28															
I-4	2.0'	SM	No	shelby	32.0%	95 pcf										TXUU	4030 psf	1000 psf	Consol
I-4	2.0'	SM	No	shelby	32.0%	95 pcf										TXCD	6910 psf	3300 psf	Consol
I-4	4.5'	ML	No	4	36.8%														
I-4	7.0'	MH	No		28.2%	97 pcf										TXUU	2200 psf	1000 psf	
I-4	7.5'	MH	No	8	26.4%	97 pcf													
I-4	9.5'	MH	No	shelby															
I-4	12.0'	MH	No	shelby	32.3%	90 pcf										TXUU	1940 psf	1000 psf	
I-4	15.0'	MH	No	7	35.6%	81 pcf	20 ppt				52	21	31						
I-4	18.0'	MH	No	5	33.5%	89 pcf	22 ppt												
I-4	22.0'	MH	No	shelby	28.7%	90 pcf													Consol
I-4	27.0'	MH	No	3	33.1%		24 ppt												
I-4	37.0'	SP-SM	No	52	9.7%		15 ppt												
I-4	47.0'	SP-SM	Yes	142	22.5%		3 ppt	5%	88%	6.7%									SA
I-4	52.5'	SM	Yes	93	24.1%	95 pcf	2 ppt	0%	87%	13.0%					6.3%				SA

SA = sieve analysis, MA = hydrometer and sieve analysis, SpG = specific gravity, Consol = consolidation test

Duane Miller & Associates

Sept 1997

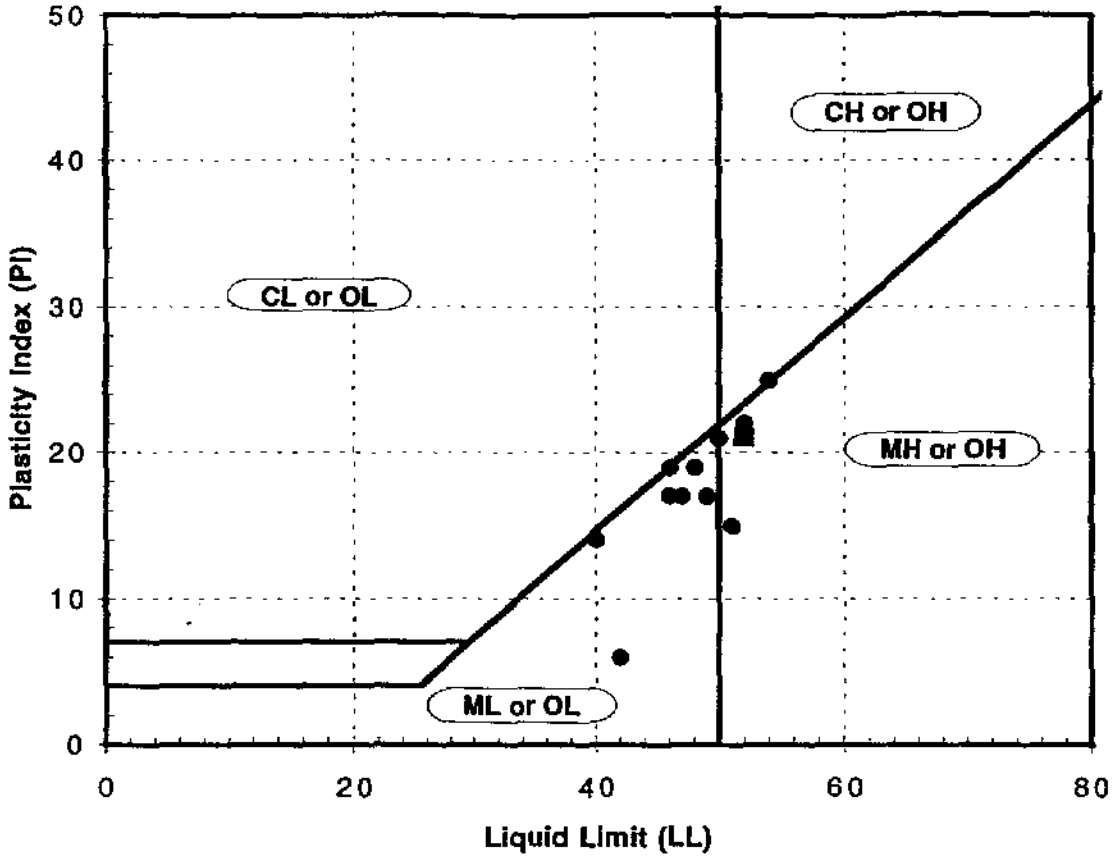
SUMMARY OF SAMPLES

Liberty Development

Beaufort Sea, Alaska

Plate

B-11



Sample Location	Liquid Limit	Plastic Limit	Plasticity Index	Natural Moisture Content	USCS
Boring A-2 @ 21.0'			NP	7.2%	SP
Boring A-6 @ 3.0'	42	36	6	66.2%	ML + Pt
Boring A-6 @ 7.5'			NP	36.5%	SM
Boring A-8 @ 0.0'			NP	50.0%	ML
Boring B-8 @2.5			NP	83.8%	ML
Boring B-9 @ 24.6'	51	36	15	22.6%	MH
Boring B-10 @ 5.5'			NP	28.1%	SM
Boring C-2 @ 6.0'	40	26	14	26.2%	CL-ML
Boring C-3 @ 5.0'	49	32	17	31.6%	ML
Boring I-1 @ 0.5'			NP	45.5%	ML + OL
Boring I-1 @ 8.5'	48	29	19	20.0%	ML
Boring I-1 @ 15.5'	52	30	22	35.0%	MH
Boring I-2 @ 9.7'	47	30	17	28.6%	ML
Boring I-2 @ 17.8'	50	29	21	35.1%	MH
Boring I-3 @ 2.5'	46	27	19	28.3%	ML
Boring I-3 @ 5.0'	54	29	25	31.1%	MH
Boring I-3 @ 12.5'	46	29	17	36.2%	ML
Boring I-4 @ 15.0'	52	31	21	35.6%	MH

Duane Miller & Associates
Job No. 4119.22
June 1997

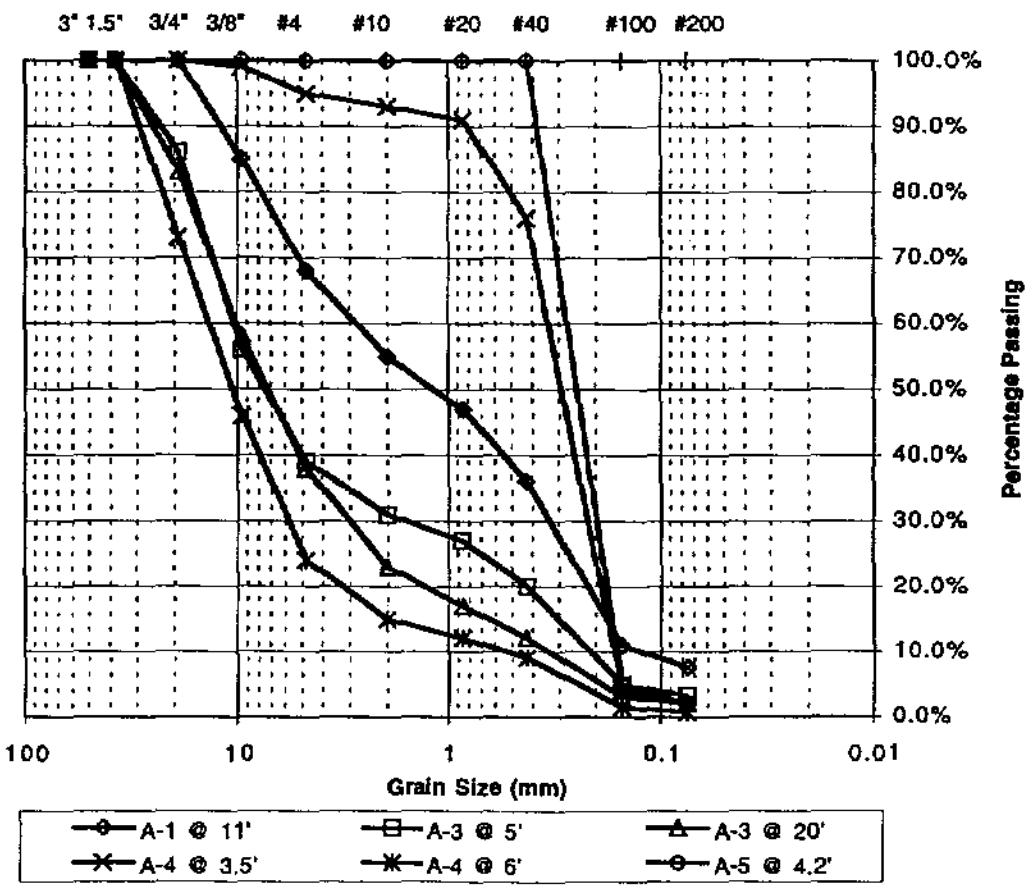
PLASTICITY CHART
Liberty Development
Beaufort Sea, Alaska

Plate
B-12

Boring =>	A-1	A-3	A-3	A-4	A-4	A-5
Depth =>	11.0 ft.	5.0 ft.	20.0 ft.	3.5 ft.	6.0 ft.	4.2 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	86.0%	83.0%	100.0%	73.0%	100.0%
3/8" =>	85.0%	56.0%	58.0%	99.0%	46.0%	100.0%
#4 =>	68.0%	39.0%	38.0%	95.0%	24.0%	100.0%
#10 =>	55.0%	31.0%	23.0%	93.0%	15.0%	100.0%
#20 =>	47.0%	27.0%	17.0%	91.0%	12.0%	100.0%
#40 =>	36.0%	20.0%	12.0%	76.0%	9.0%	100.0%
#100 =>	11.0%	5.0%	3.0%	4.0%	1.5%	5.0%
#200 =>	7.6%	3.2%	1.9%	2.2%	0.7%	1.9%
0.02 mm						
0.005 mm						
0.002 mm						

Analysis of Data

D10 size =>	0.122 mm	0.070 mm	0.337 mm	0.164 mm	0.535 mm	0.158 mm
D30 size =>	0.331 mm	1.615 mm	2.995 mm	0.218 mm	5.738 mm	0.197 mm
D50 size =>	1.172 mm	7.438 mm	7.200 mm	0.292 mm	10.527 mm	0.246 mm
D60 size =>	2.789 mm	10.420 mm	10.042 mm	0.337 mm	13.609 mm	0.274 mm
Coeff. of Uniformity, Cu =	22.80	148.85	29.78	2.06	25.41	1.73
Coeff. of Curvature, Cc =	0.32	3.58	2.65	0.87	4.52	0.90
Gravel (+#4) percentage =	32.0%	61.0%	62.0%	5.0%	76.0%	0.0%
AASHTO Gravel (+#10) =	45.0%	69.0%	77.0%	7.0%	85.0%	0.0%
Sand percentage =	60.4%	35.8%	36.1%	92.8%	23.3%	98.1%
Fines percentage =	7.6%	3.2%	1.9%	2.2%	0.7%	1.9%
Unified Soil Class Symbol =	SP-SM	GP	GW	SP	GP	SP



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Job No. 4119.22
May 1997

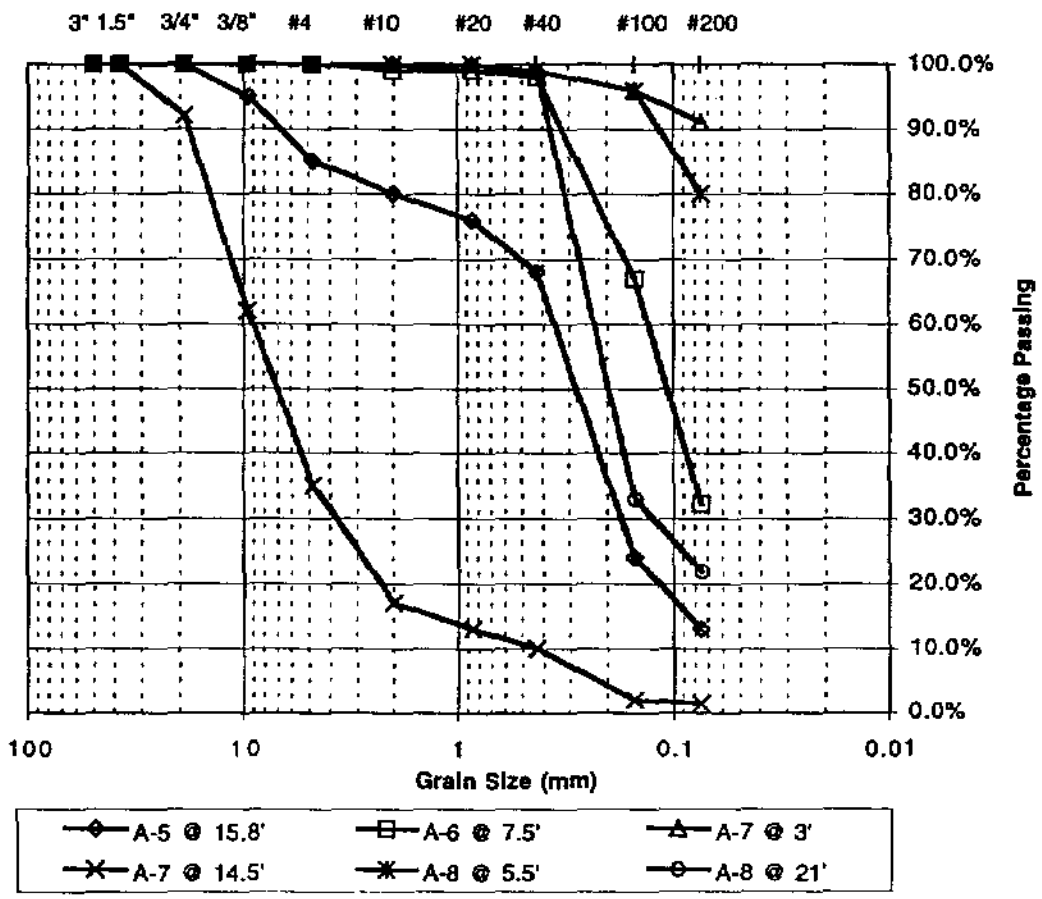
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-13

Boring =>	A-5	A-6	A-7	A-7	A-8	A-8
Depth =>	15.8 ft.	7.5 ft.	3.0 ft.	14.5 ft.	5.5 ft.	21.0 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	100.0%	92.0%	100.0%	100.0%
3/8" =>	95.0%	100.0%	100.0%	62.0%	100.0%	100.0%
#4 =>	85.0%	100.0%	100.0%	35.0%	100.0%	100.0%
#10 =>	80.0%	99.0%	100.0%	17.0%	100.0%	100.0%
#20 =>	76.0%	99.0%	99.0%	13.0%	100.0%	100.0%
#40 =>	68.0%	98.0%	99.0%	10.0%	99.0%	99.0%
#100 =>	24.0%	67.0%	96.0%	2.0%	96.0%	33.0%
#200 =>	13.0%	32.2%	91.0%	1.4%	80.0%	22.0%
0.02 mm						
0.005 mm						
0.002 mm						

Analysis of Data

D10 size =>				0.425 mm		
D30 size =>	0.173 mm			3.735 mm		0.124 mm
D50 size =>	0.278 mm	0.107 mm		6.981 mm		0.196 mm
D60 size =>	0.352 mm	0.130 mm		9.025 mm		0.230 mm
Coeff. of Uniformity, Cu =				21.23		
Coeff. of Curvature, Cc =				3.64		
Gravel (+#4) percentage =	15.0%	0.0%	0.0%	65.0%	0.0%	0.0%
AASHTO Gravel (+#10) =	20.0%	1.0%	0.0%	83.0%	0.0%	0.0%
Sand percentage =	72.0%	67.8%	9.0%	33.6%	20.0%	78.0%
Fines percentage =	13.0%	32.2%	91.0%	1.4%	80.0%	22.0%
Unified Soil Class Symbol =	SM	SM	ML	GP	ML	SM



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Job No. 4119.22
May 1997

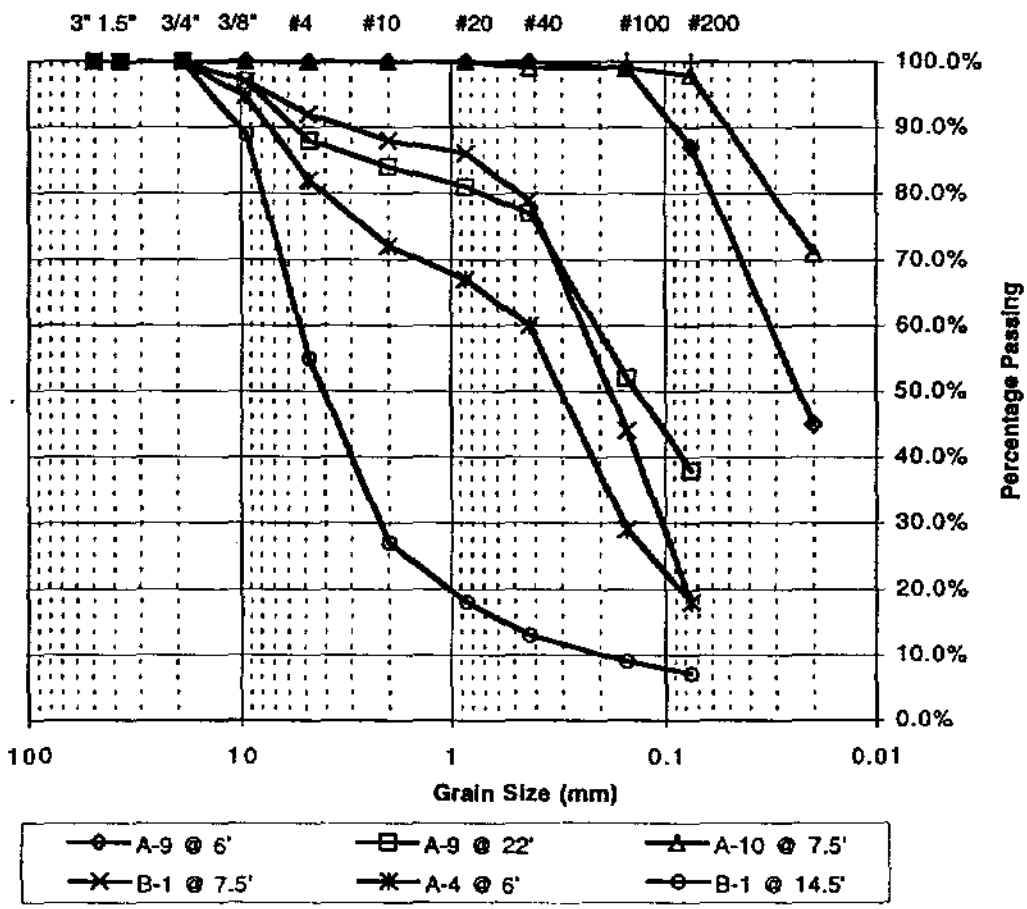
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-14

Boring =>	A-9	A-9	A-10	B-1	B-1	B-1
Depth =>	6.0 ft.	22.0 ft.	7.5 ft.	7.5 ft.	11.0 ft.	14.5 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/8" =>	100.0%	97.0%	100.0%	97.0%	94.7%	89.0%
#4 =>	100.0%	88.0%	100.0%	92.0%	82.0%	55.0%
#10 =>	100.0%	84.0%	100.0%	88.0%	72.0%	27.0%
#20 =>	100.0%	81.0%	100.0%	86.0%	67.0%	18.0%
#40 =>	100.0%	77.0%	99.0%	79.0%	60.0%	13.0%
#100 =>	99.0%	52.0%	99.0%	44.0%	29.0%	9.0%
#200 =>	87.0%	38.0%	98.0%	18.0%	18.0%	7.2%
0.02 mm	45%		71%			
0.005 mm						
0.002 mm	16%		22%			

Analysis of Data

D10 size =>						0.195 mm
D30 size =>				0.103 mm	0.155 mm	2.194 mm
D50 size =>		0.136 mm		0.179 mm	0.304 mm	4.070 mm
D60 size =>		0.209 mm		0.241 mm	0.425 mm	5.260 mm
Coeff. of Uniformity, Cu =						27.03
Coeff. of Curvature, Cc =						4.70
Gravel (+#4) percentage =	0.0%	12.0%	0.0%	8.0%	18.0%	45.0%
AASHTO Gravel (+#10) =	0.0%	16.0%	0.0%	12.0%	28.0%	73.0%
Sand percentage =	13.0%	50.0%	2.0%	74.0%	64.0%	47.8%
Fines percentage =	87.0%	38.0%	98.0%	18.0%	18.0%	7.2%
Unified Soil Class Symbol =	ML	SM	ML	SM	SM	SP-SM



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Job No. 4119.22
May 1997

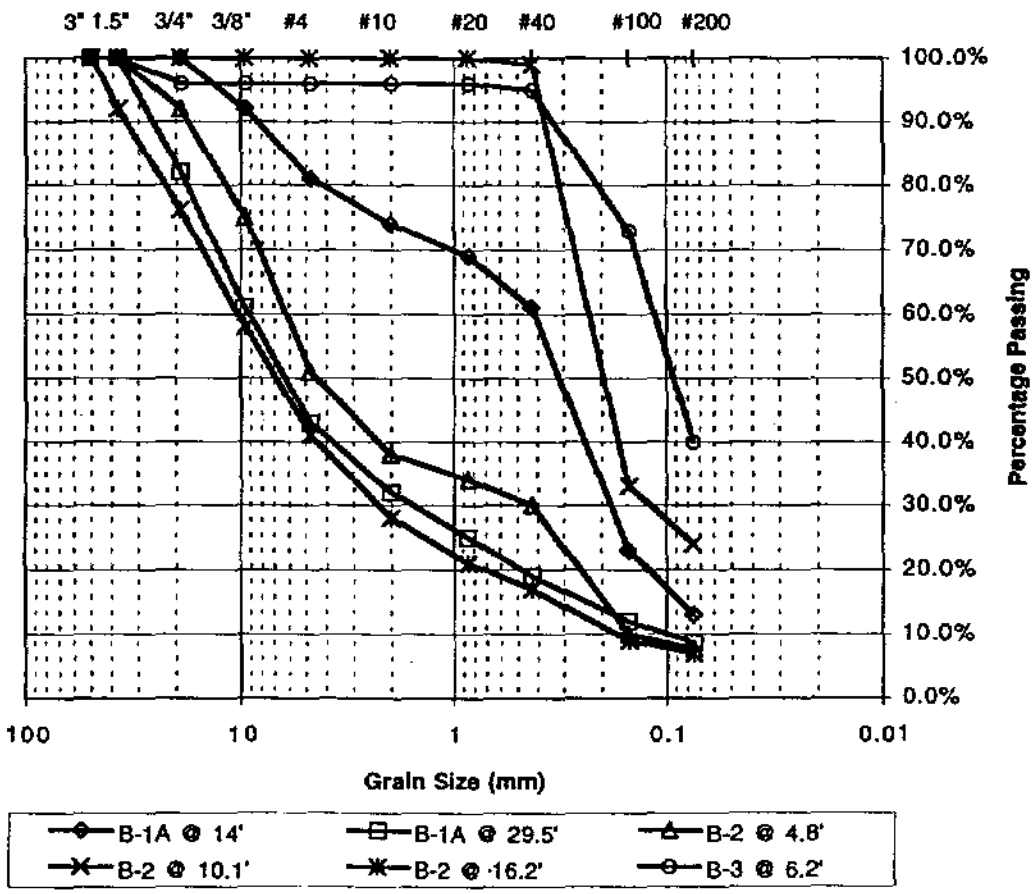
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-15

Boring =>	B-1A	B-1A	B-2	B-2	B-2	B-3
Depth =>	14.0 ft.	29.5 ft.	4.8 ft.	10.1 ft.	16.2 ft.	6.2 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	92.0%	100.0%
3/4" =>	100.0%	82.0%	92.0%	100.0%	76.0%	96.0%
3/8" =>	92.0%	61.0%	75.0%	100.0%	58.0%	96.0%
#4 =>	81.0%	43.0%	51.0%	100.0%	41.0%	96.0%
#10 =>	74.0%	32.0%	38.0%	100.0%	28.0%	96.0%
#20 =>	69.0%	25.0%	34.0%	100.0%	21.0%	96.0%
#40 =>	61.0%	19.0%	30.0%	99.0%	17.0%	95.0%
#100 =>	23.0%	12.0%	10.0%	33.0%	9.0%	73.0%
#200 =>	13.0%	8.6%	7.7%	24.0%	6.9%	40.0%
0.02 mm						
0.005 mm						
0.002 mm						

Analysis of Data

D10 size =>		0.100 mm	0.150 mm		0.171 mm	
D30 size =>	0.182 mm	1.566 mm	0.425 mm	0.119 mm	2.285 mm	
D50 size =>	0.314 mm	6.220 mm	4.444 mm	0.196 mm	6.856 mm	0.093 mm
D60 size =>	0.414 mm	9.141 mm	6.160 mm	0.230 mm	10.261 mm	0.114 mm
Coeff. of Uniformity, Cu =		91.62	41.07		60.05	
Coeff. of Curvature, Cc =		2.69	0.20		2.98	
Gravel (+#4) percentage =	19.0%	57.0%	49.0%	0.0%	59.0%	4.0%
AASHTO Gravel (+#10) =	26.0%	68.0%	62.0%	0.0%	72.0%	4.0%
Sand percentage =	68.0%	34.4%	43.3%	76.0%	34.1%	56.0%
Fines percentage =	13.0%	8.6%	7.7%	24.0%	6.9%	40.0%
Unified Soil Class Symbol =	SM	GW-GM	GP-GM	SM	GW-GM	SM



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Job No. 4119.22
May 1997

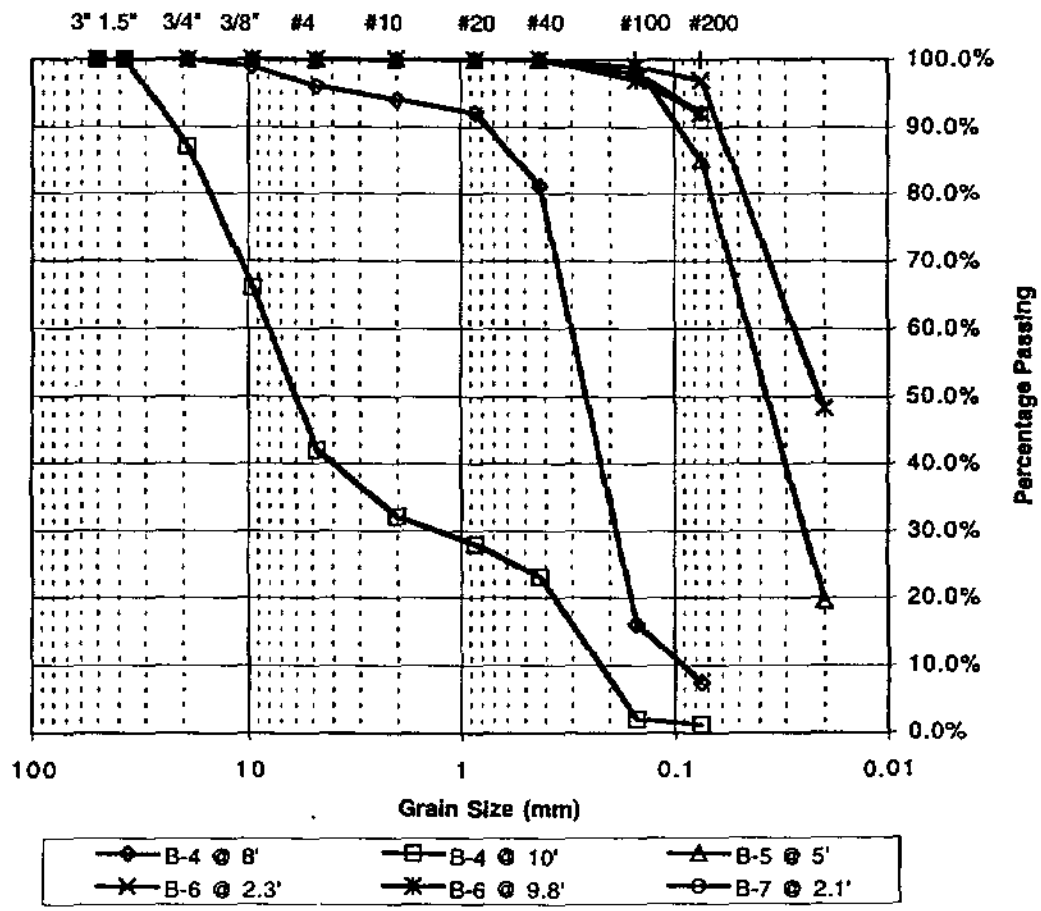
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-16

Boring =>	B-4	B-4	B-5	B-6	B-6	B-7
Depth =>	8.0 ft.	10.0 ft.	5.0 ft.	2.3 ft.	9.8 ft.	2.1 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	87.0%	100.0%	100.0%	100.0%	100.0%
3/8" =>	99.0%	66.0%	100.0%	100.0%	100.0%	100.0%
#4 =>	96.0%	42.0%	100.0%	100.0%	100.0%	100.0%
#10 =>	94.0%	32.0%	100.0%	100.0%	100.0%	100.0%
#20 =>	92.0%	28.0%	100.0%	100.0%	100.0%	100.0%
#40 =>	81.0%	23.0%	100.0%	100.0%	100.0%	100.0%
#100 =>	16.0%	2.0%	99.0%	99.0%	97.0%	98.0%
#200 =>	7.4%	1.1%	85.0%	97.0%	92.0%	92.0%
0.02 mm			20%	48%		
0.005 mm						
0.002 mm			8%	9%		

Analysis of Data

D10 size =>	0.092 mm	0.223 mm	0.003 mm	0.002 mm		
D30 size =>	0.188 mm	1.304 mm	0.025 mm	0.005 mm		
D50 size =>	0.259 mm	5.985 mm	0.038 mm	0.022 mm		
D60 size =>	0.304 mm	7.989 mm	0.046 mm	0.029 mm		
Coeff. of Uniformity, Cu =	3.28	35.82	18.40	14.50		
Coeff. of Curvature, Cc =	1.26	0.95	5.43	0.43		
Gravel (+#4) percentage =	4.0%	58.0%	0.0%	0.0%	0.0%	0.0%
AASHTO Gravel (+#10) =	6.0%	68.0%	0.0%	0.0%	0.0%	0.0%
Sand percentage =	88.6%	40.9%	15.0%	3.0%	8.0%	8.0%
Fines percentage =	7.4%	1.1%	85.0%	97.0%	92.0%	92.0%
Unified Soil Class Symbol =	SP-SM	GP	ML	ML	ML	ML



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May 1997

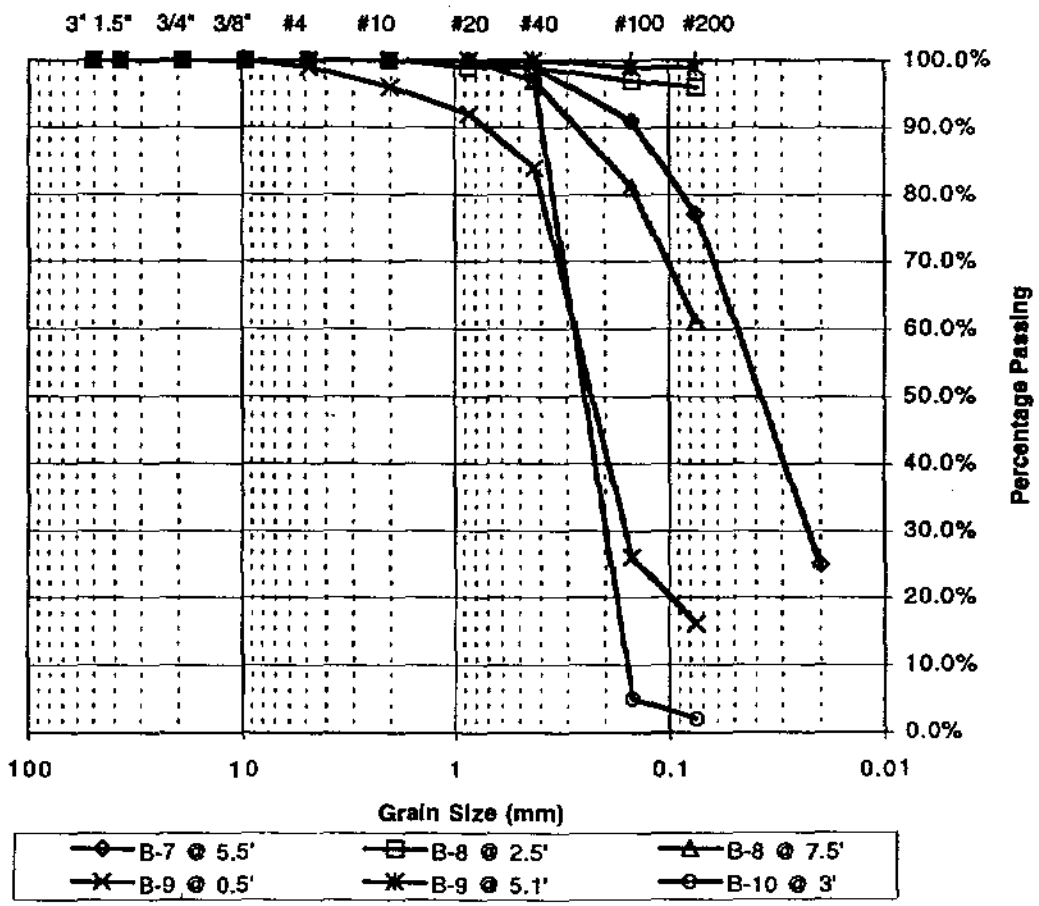
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-17

Boring =>	B-7	B-8	B-8	B-9	B-9	B-10
Depth =>	5.5 ft.	2.5 ft.	7.5 ft.	0.5 ft.	5.1 ft.	3.0 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/8" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
#4 =>	100.0%	100.0%	100.0%	99.0%	100.0%	100.0%
#10 =>	100.0%	100.0%	100.0%	96.0%	100.0%	100.0%
#20 =>	100.0%	99.0%	100.0%	92.0%	100.0%	100.0%
#40 =>	99.0%	99.0%	97.0%	84.0%	100.0%	97.0%
#100 =>	91.0%	97.0%	81.0%	26.0%	99.0%	5.0%
#200 =>	77.0%	96.0%	61.0%	16.0%	99.0%	2.0%
0.02 mm	25%	50%				
0.005 mm	11%					
0.002 mm	8%	14%				

Analysis of Data

D10 size =>	0.003 mm					0.159 mm
D30 size =>	0.023 mm			0.161 mm		0.199 mm
D50 size =>	0.029 mm			0.231 mm		0.250 mm
D60 size =>	0.040 mm			0.276 mm		0.280 mm
Coeff. of Uniformity, Cu =	13.33					1.76
Coeff. of Curvature, Cc =	4.41					0.89
Gravel (+#4) percentage =	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%
Sand percentage =	23.0%	4.0%	39.0%	83.0%	1.0%	98.0%
Fines percentage =	77.0%	96.0%	61.0%	16.0%	99.0%	2.0%
Unified Soil Class Symbol =	ML	ML	ML	SM	ML	SP



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May 1997

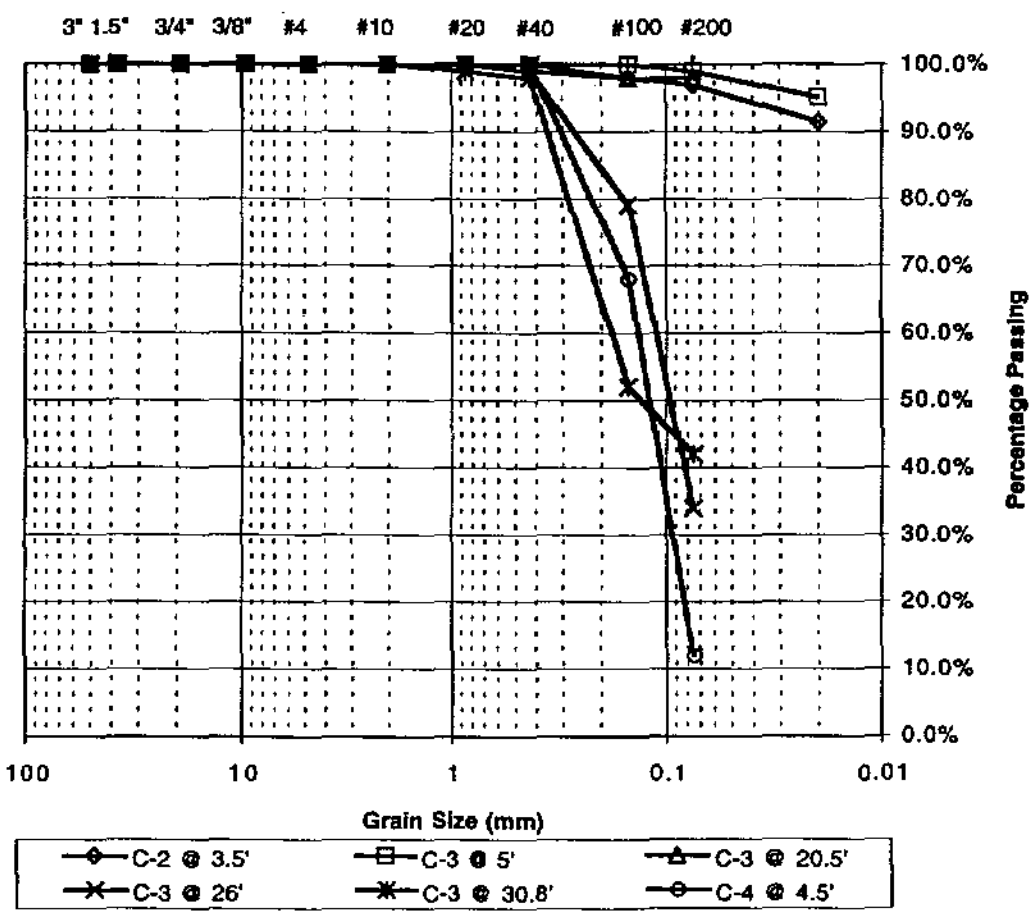
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-18

Boring =>	C-2	C-3	C-3	C-3	C-3	C-4
Depth =>	3.5 ft.	5.0 ft.	20.5 ft.	26.0 ft.	30.8 ft.	4.5 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/8" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
#4 =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
#10 =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
#20 =>	100.0%	100.0%	100.0%	100.0%	99.0%	100.0%
#40 =>	99.0%	100.0%	100.0%	99.0%	98.0%	100.0%
#100 =>	98.0%	100.0%	98.0%	79.0%	52.0%	68.0%
#200 =>	97.0%	99.0%	98.0%	34.0%	42.0%	12.0%
0.02 mm	92%	95%				
0.005 mm						
0.002 mm	45%	38%				

Analysis of Data

D10 size =>						
D30 size =>						0.094 mm
D50 size =>				0.096 mm	0.131 mm	0.120 mm
D60 size =>				0.112 mm	0.180 mm	0.136 mm
Coeff. of Uniformity, Cu =						
Coeff. of Curvature, Cc =						
Gravel (+#4) percentage =	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sand percentage =	3.0%	1.0%	2.0%	66.0%	58.0%	88.0%
Fines percentage =	97.0%	99.0%	98.0%	34.0%	42.0%	12.0%
Unified Soil Class Symbol =	OL	ML	ML	SM	SM	SP



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May 1997

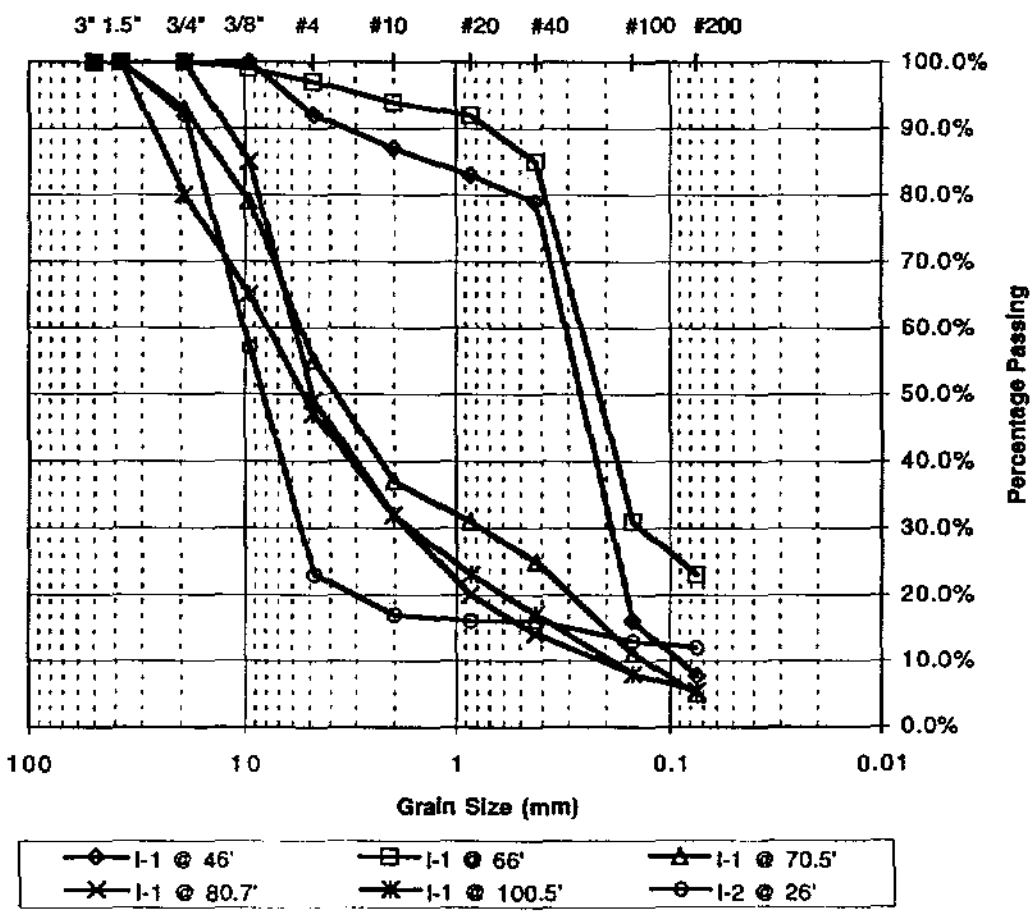
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-19

Boring =>	I-1	I-1	I-1	I-1	I-1	I-2
Depth =>	46.0 ft.	66.0 ft.	70.5 ft.	80.7 ft.	100.5 ft.	26.0 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	93.0%	100.0%	80.0%	92.0%
3/8" =>	100.0%	99.0%	79.0%	85.0%	65.0%	57.0%
#4 =>	92.0%	97.0%	55.0%	49.0%	47.0%	23.0%
#10 =>	87.0%	94.0%	37.0%	32.0%	32.0%	17.0%
#20 =>	83.0%	92.0%	31.0%	20.0%	23.0%	16.0%
#40 =>	79.0%	85.0%	25.0%	14.0%	17.0%	16.0%
#100 =>	16.0%	31.0%	11.0%	8.0%	8.0%	13.0%
#200 =>	7.7%	23.0%	4.9%	5.5%	5.4%	12.0%
0.02 mm						
0.005 mm						
0.002 mm						

Analysis of Data

D10 size =>	0.091 mm		0.134 mm	0.212 mm	0.189 mm	
D30 size =>	0.189 mm	0.138 mm	0.757 mm	1.734 mm	1.654 mm	5.479 mm
D50 size =>	0.263 mm	0.216 mm	3.735 mm	4.842 mm	5.332 mm	8.237 mm
D60 size =>	0.310 mm	0.262 mm	5.488 mm	5.870 mm	7.836 mm	10.082 mm
Coeff. of Uniformity, Cu =	3.42		40.99	27.66	41.45	
Coeff. of Curvature, Cc =	1.27		0.78	2.41	1.85	
Gravel (+#4) percentage =	8.0%	3.0%	45.0%	51.0%	53.0%	77.0%
AASHTO Gravel (+#10) =	13.0%	6.0%	63.0%	68.0%	68.0%	83.0%
Sand percentage =	84.3%	74.0%	50.1%	43.5%	41.6%	11.0%
Fines percentage =	7.7%	23.0%	4.9%	5.5%	5.4%	12.0%
Unified Soil Class Symbol =	SP-SM	SM	SP	GW-GM	GW-GM	GP-GM



Duane Miller & Associates
Job No. 4119.22
May 1997

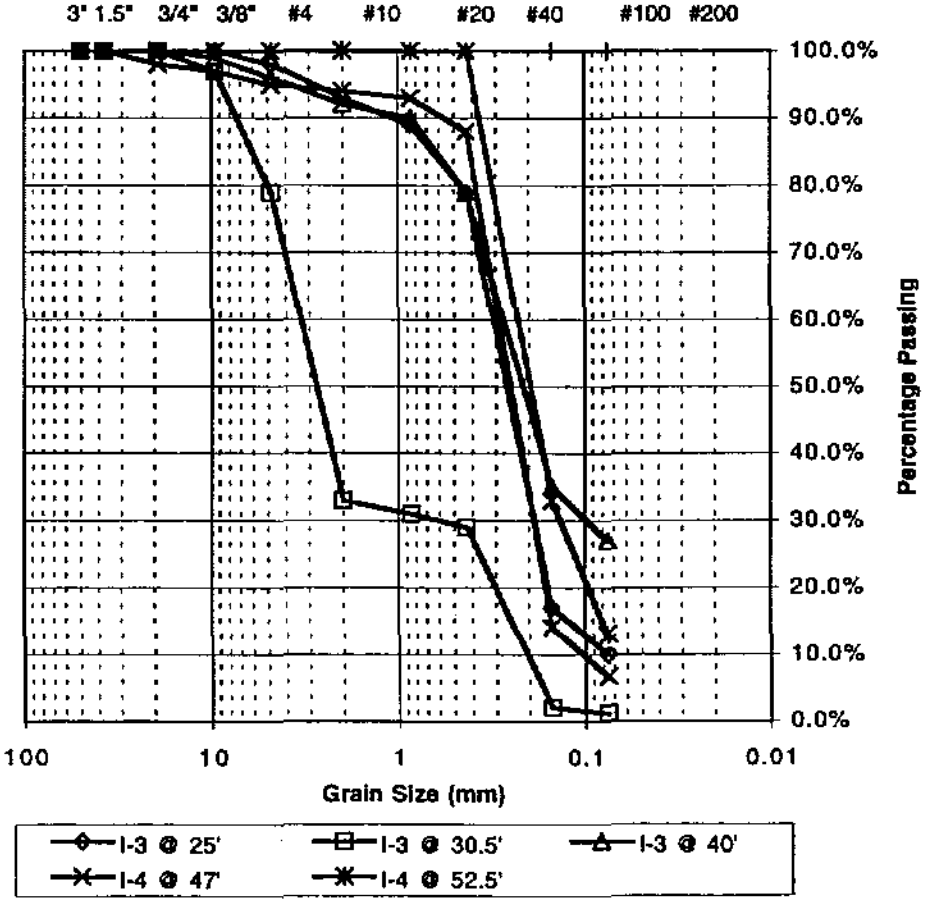
SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-20

Boring =>	I-3	I-3	I-3	I-4	I-4
Depth =>	25.0 ft.	30.5 ft.	40.0 ft.	47.0 ft.	52.5 ft.
3" =>	100.0%	100.0%	100.0%	100.0%	100.0%
1 1/2" =>	100.0%	100.0%	100.0%	100.0%	100.0%
3/4" =>	100.0%	100.0%	100.0%	98.0%	100.0%
3/8" =>	100.0%	97.0%	99.0%	97.0%	100.0%
#4 =>	98.0%	79.0%	96.0%	95.0%	100.0%
#10 =>	93.0%	33.0%	92.0%	94.0%	100.0%
#20 =>	89.0%	31.0%	90.0%	93.0%	100.0%
#40 =>	79.0%	29.0%	79.0%	88.0%	100.0%
#100 =>	17.0%	2.0%	35.0%	14.0%	33.0%
#200 =>	10.0%	1.1%	27.0%	6.7%	13.0%
0.02 mm					
0.005 mm					
0.002 mm					

Analysis of Data

D10 size =>		0.204 mm		0.103 mm	
D30 size =>	0.187 mm	0.601 mm	0.097 mm	0.188 mm	0.135 mm
D50 size =>	0.261 mm	2.753 mm	0.214 mm	0.249 mm	0.195 mm
D60 size =>	0.309 mm	3.323 mm	0.271 mm	0.287 mm	0.228 mm
Coeff. of Uniformity, Cu =		16.27		2.79	
Coeff. of Curvature, Cc =		0.53		1.20	
Gravel (+#4) percentage =	2.0%	21.0%	4.0%	5.0%	0.0%
AASHTO Gravel (+#10) =	7.0%	67.0%	8.0%	6.0%	0.0%
Sand percentage =	88.0%	77.9%	69.0%	88.3%	87.0%
Fines percentage =	10.0%	1.1%	27.0%	6.7%	13.0%
Unified Soil Class Symbol =	SP-SM	SP	SM	SP-SM	SM



Duane Miller & Associates
Job No. 4119.22
May 1997

SIEVE DATA
Liberty Development
Beaufort Sea, Alaska

Plate
B-21

LABORATORY TEST REPORT

R&M CONSULTANTS, INC. 3101 VANGUARD DR. ANCHORAGE, ALASKA 99507 PH 907-522-1707

Resistivity ASTM G-57

CLIENT/PROJECT: Duane Miller & Associates
TEST ON: Field Samples
SOURCE: Liberty Development
SAMPLED FROM: Test Holes

R&M PROJECT: 651017
LAB NO: 7125
DATE REPORTED: 4/16/97
DATE RECEIVED: 3/12/97

	Test Hole	Depth	ohm-centimeter	% Moisture
1/	A-6	7.5	61	36.5
2/	C-4	4.5	140	26.6
3/	B-10	3.0	130	19.7
4/	B-7	2.1	78	38
5/	C-1	2.0	85	35.5
6/	C-4	0.0	86	37.6
7/	A-3	5.0	200	10
8/	B-10	5.5	130	21.8
9/	I-1	3.0	61	58.4
10/	I-1	5.5	120	35.3
11/	B-5	2.5	78	32
12/	B-7	7.1	95	28.2

Notes: Tests were conducted with a Geotest (Nilsson) Model 400, 4-Pin Soil Resistance Meter

Tested By: RB Checked By: DKJ

Signed By:

Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.22
Date : September 1997

RESISTIVITY TEST DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
B-22

APPENDIX C

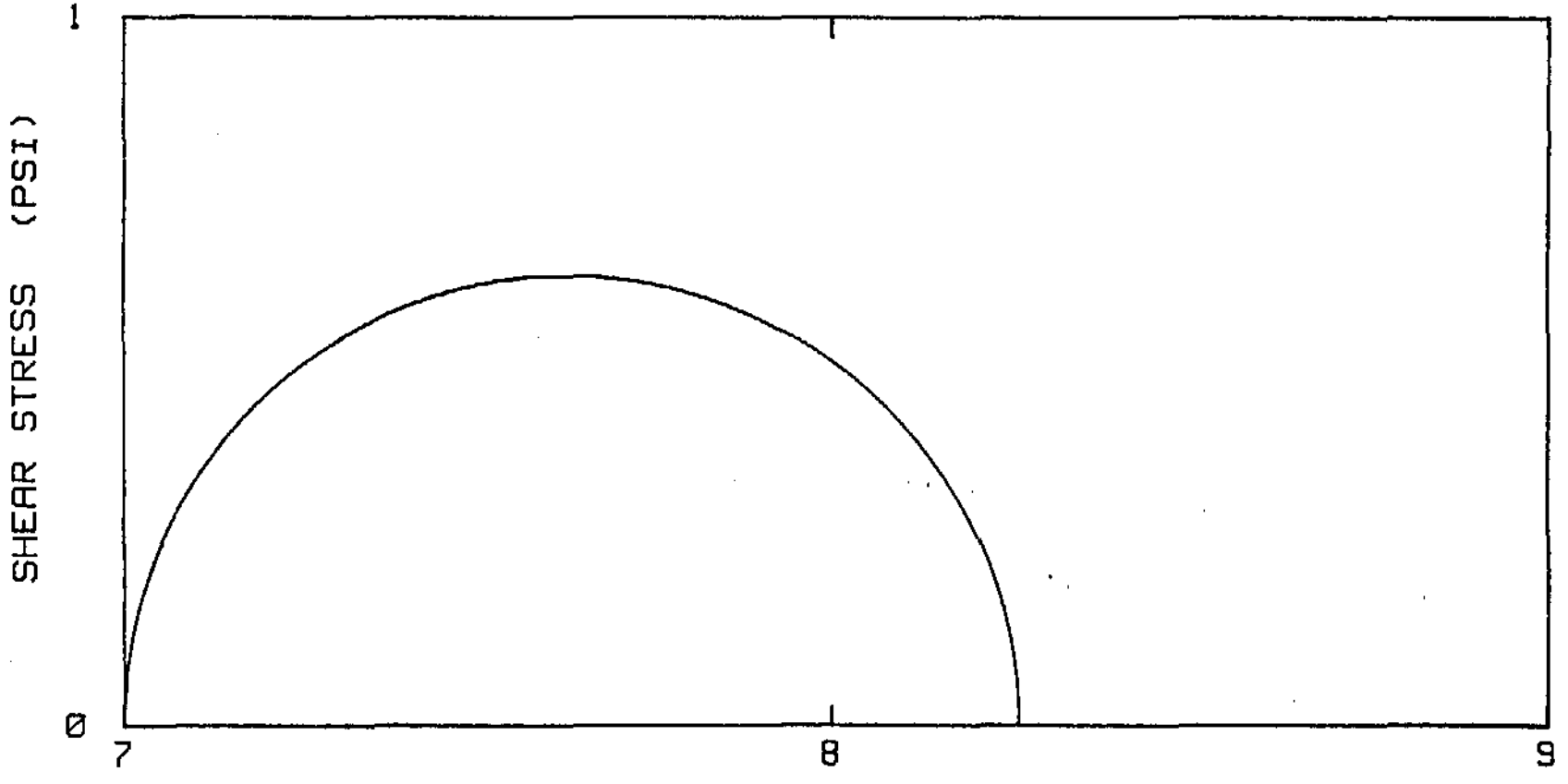
STRENGTH TESTING

Triaxial Data

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-6
SAMPLE #
DEPTH: 3'

DATE : 17 Mar 1996 07:52:45

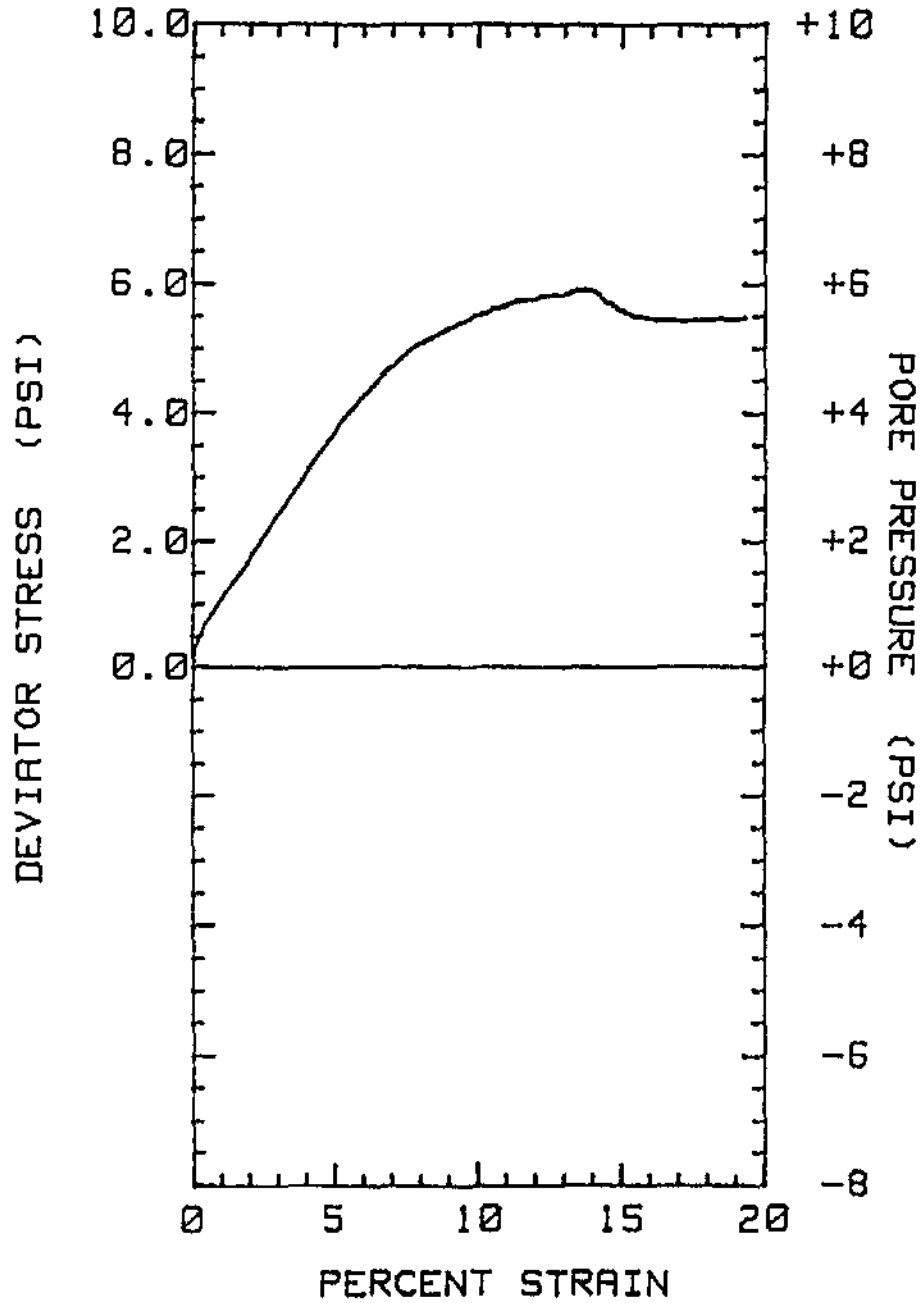
LAB # T97007; σ_3 = 7.0 psi; γ_d = 55.1 pcf



ALASKA TESTLAB

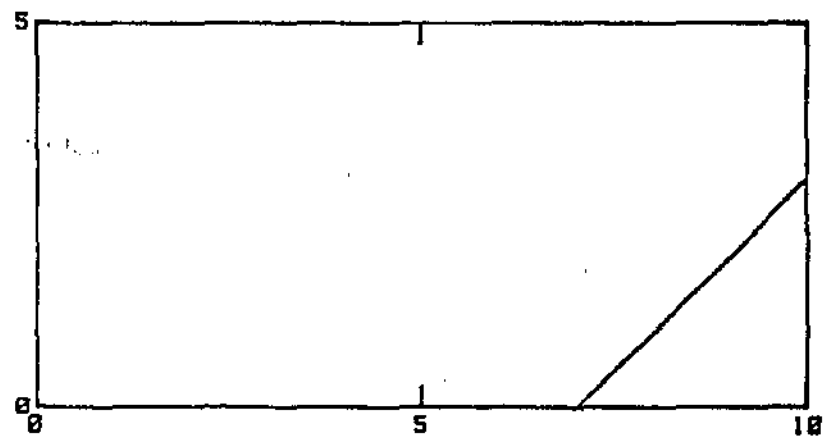
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-6 DEPTH : 5.5'
SAMPLE #
INITIAL DRY DENSITY: 71.8 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97008
DATE: 17 Mar 1996 12:55:05



ALASKA TESTLAB

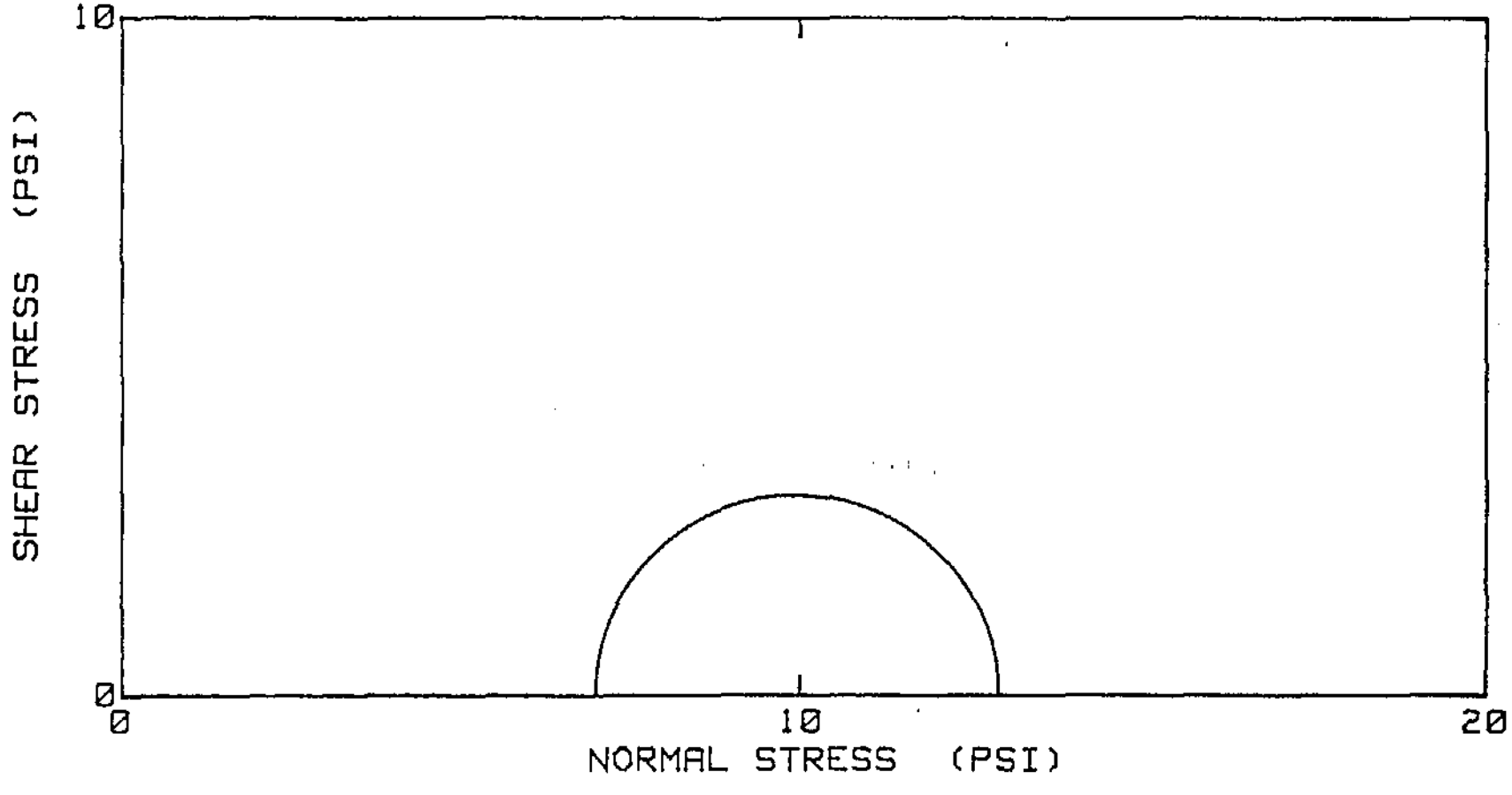
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-6
SAMPLE #
DEPTH: 5.5'

DATE : 17 Mar 1996 12:55:05

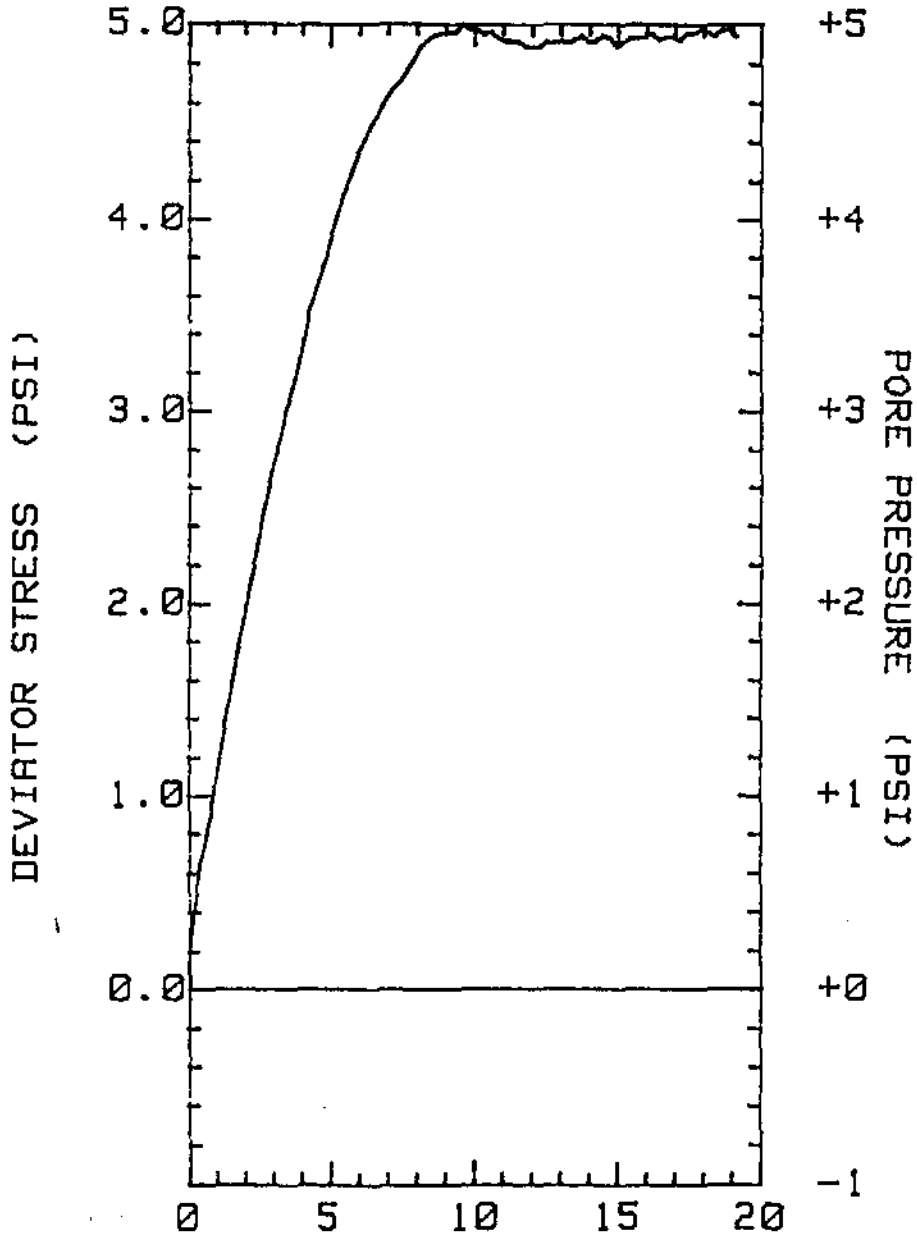
LAB # T97008; σ_3 = 7.0 psi; γ_d = 71.0 pcf



ALASKA TESTLAB

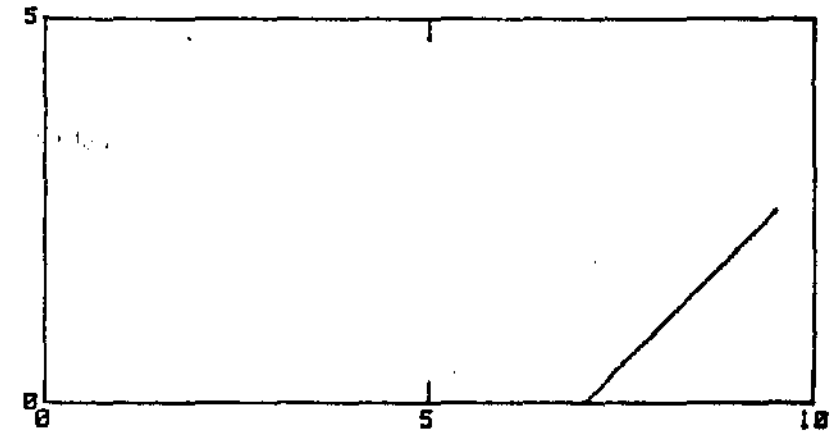
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-7 DEPTH : 3'
SAMPLE #
INITIAL DRY DENSITY: 64.7 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97089
DATE: 17 Mar 1996 16:13:02



ALASKA TESTLAB

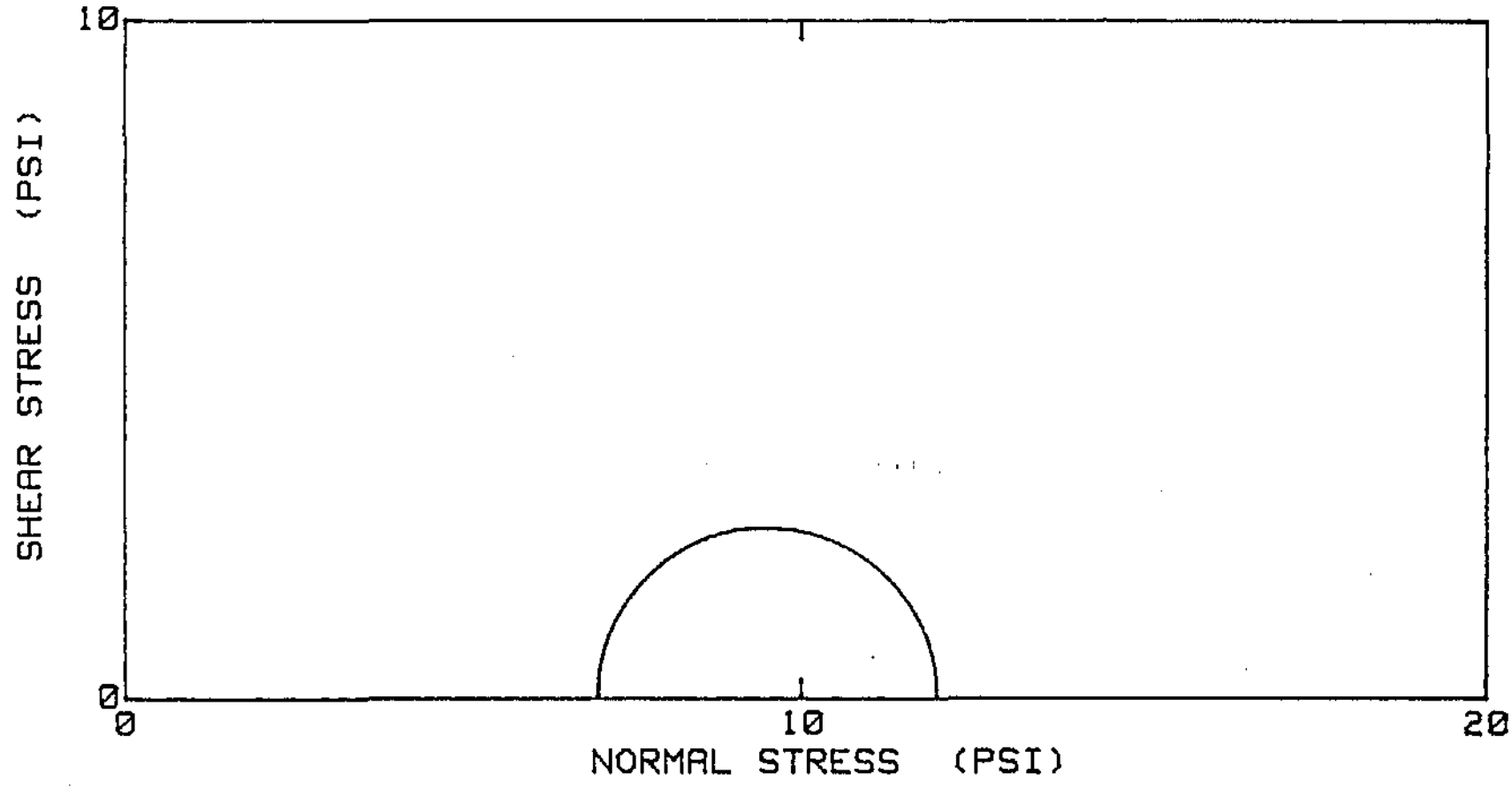
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
W.O. # A27153
BORING # A-7
SAMPLE #
DEPTH: 3'

DATE : 17 Mar 1996 16:13:02

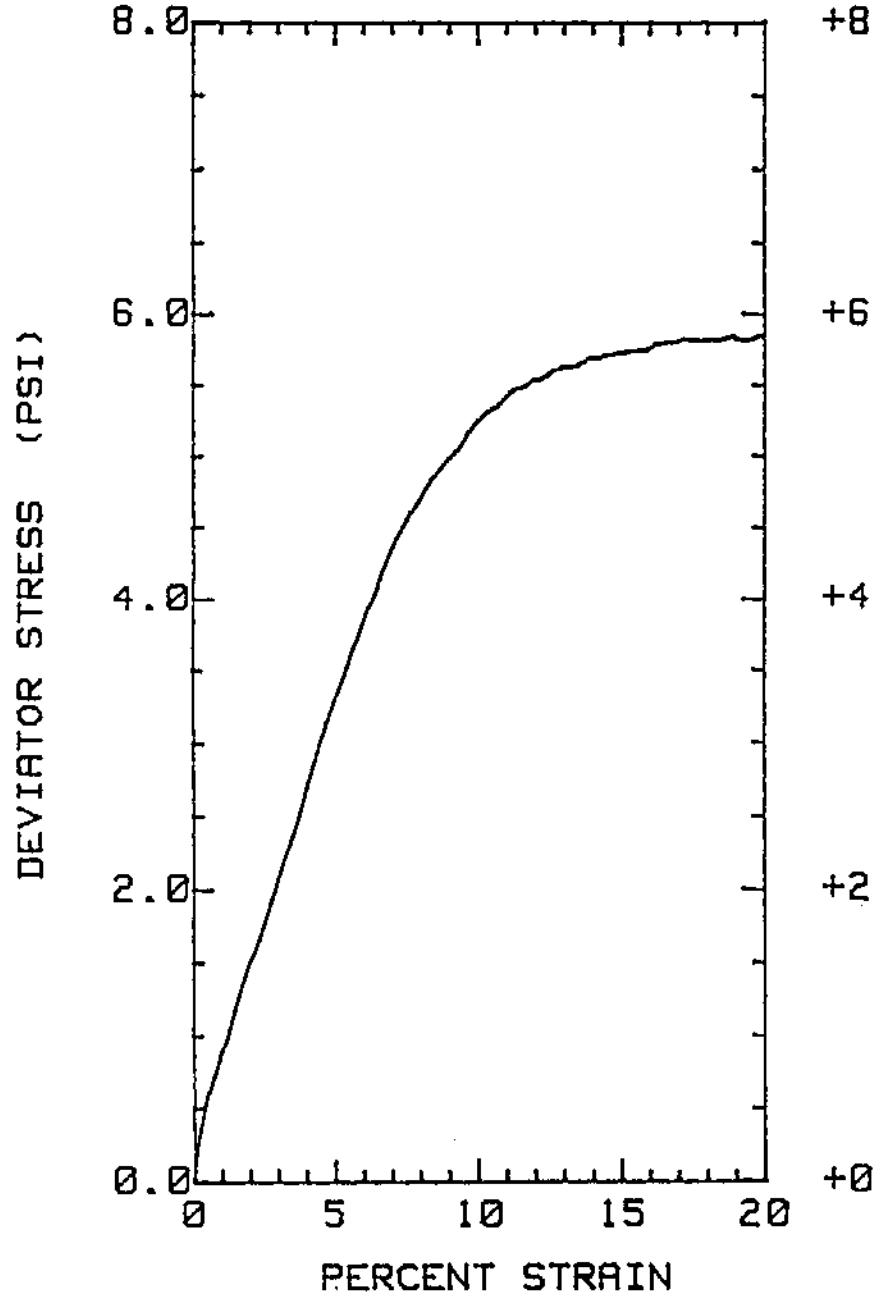
LAB # T97009; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 64.7 pcf



ALASKA TESTLAB

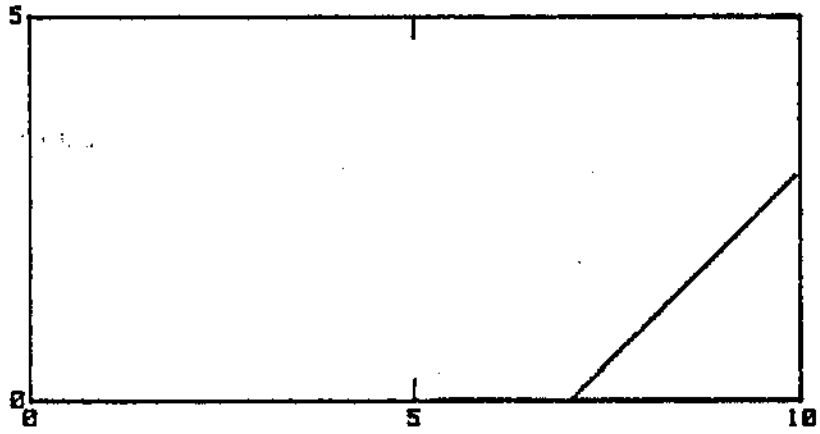
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # A-8 DEPTH : 0.6'
SAMPLE #
INITIAL DRY DENSITY: 70.0 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97010
DATE: 18 Mar 1996 07:49:38

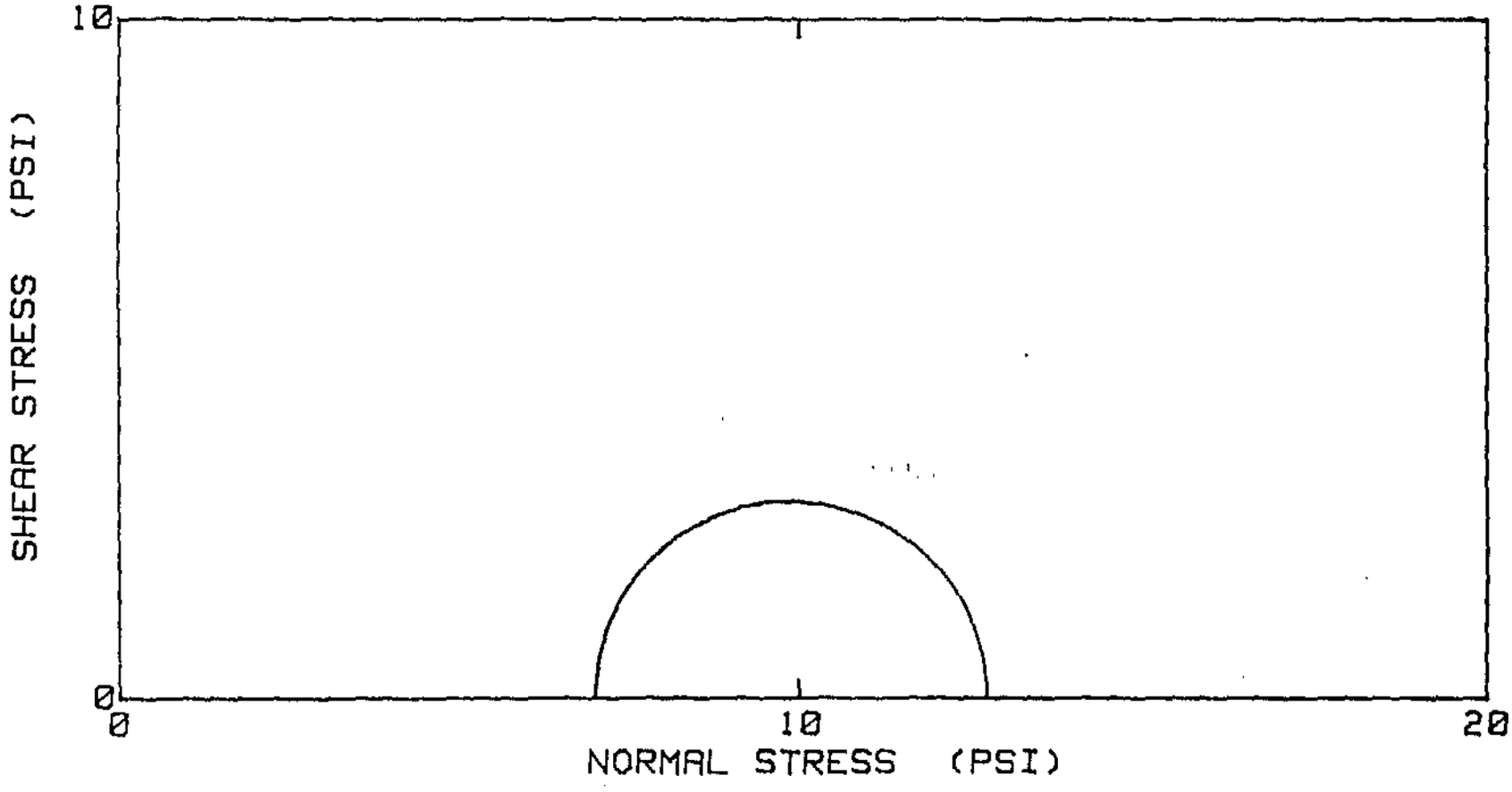


ALASKA TESTLAB | *Unconsolidated Undrained Triaxial Compression* | WO # A27153 FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-8
SAMPLE #
DEPTH: 0.6'

DATE : 18 Mar 1996 07:49:38

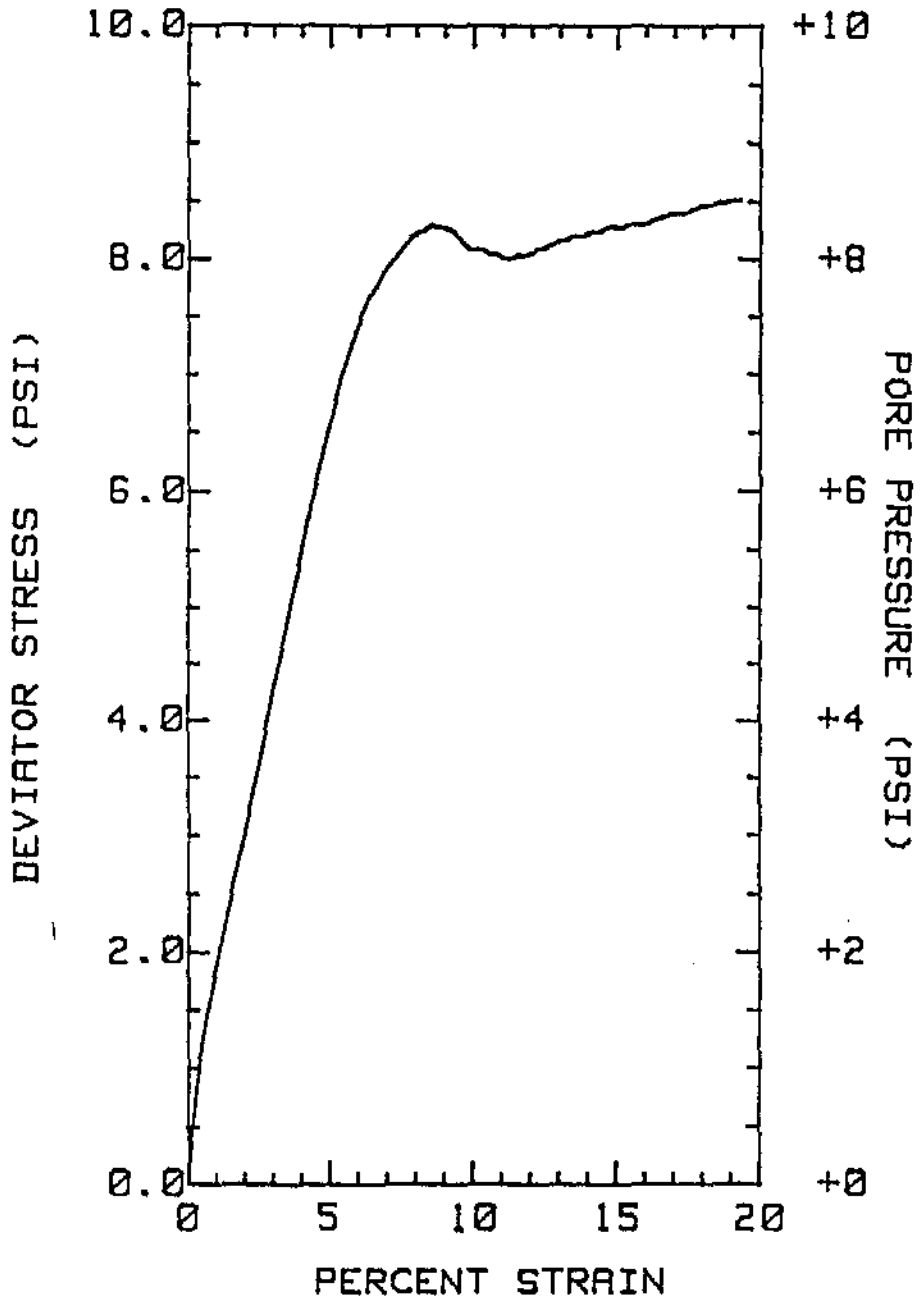
LAB # T97010; σ_3 = 7.0 psi; γ_d = 70.0 pcf



ALASKA TESTLAB

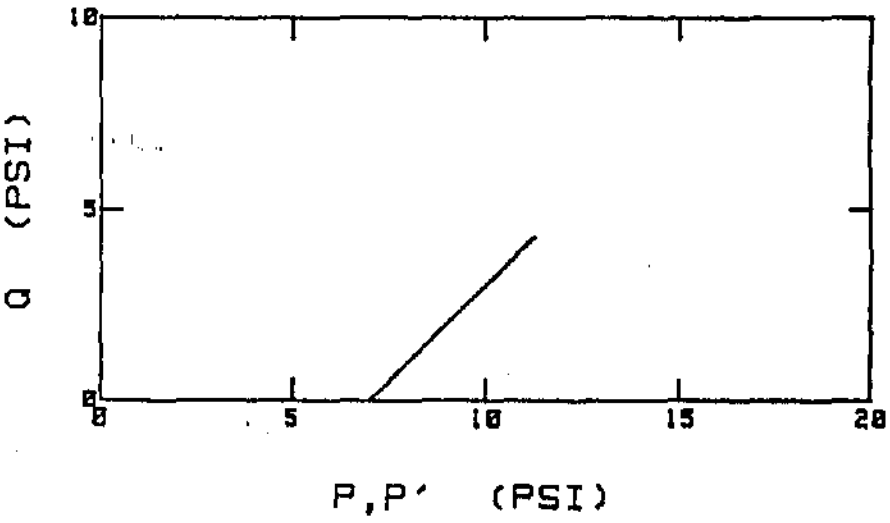
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # A-8 DEPTH : 2.5'
SAMPLE #
INITIAL DRY DENSITY: 72.4 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # TS7011
DATE: 18 Mar 1996 12:32:49



ALASKA TESTLAB

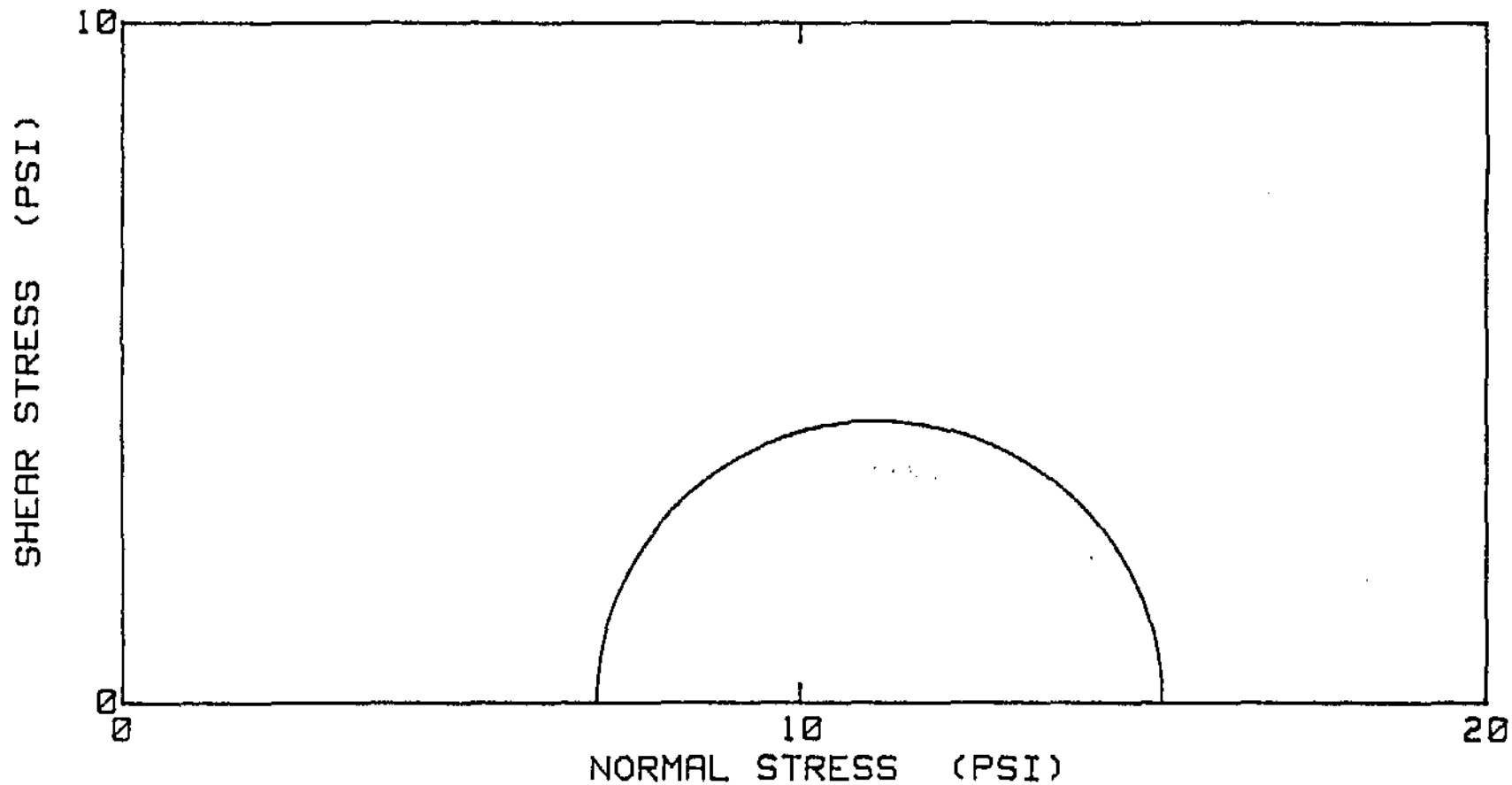
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-8
SAMPLE #
DEPTH: 2.5'

DATE : 18 Mar 1996 12:32:49

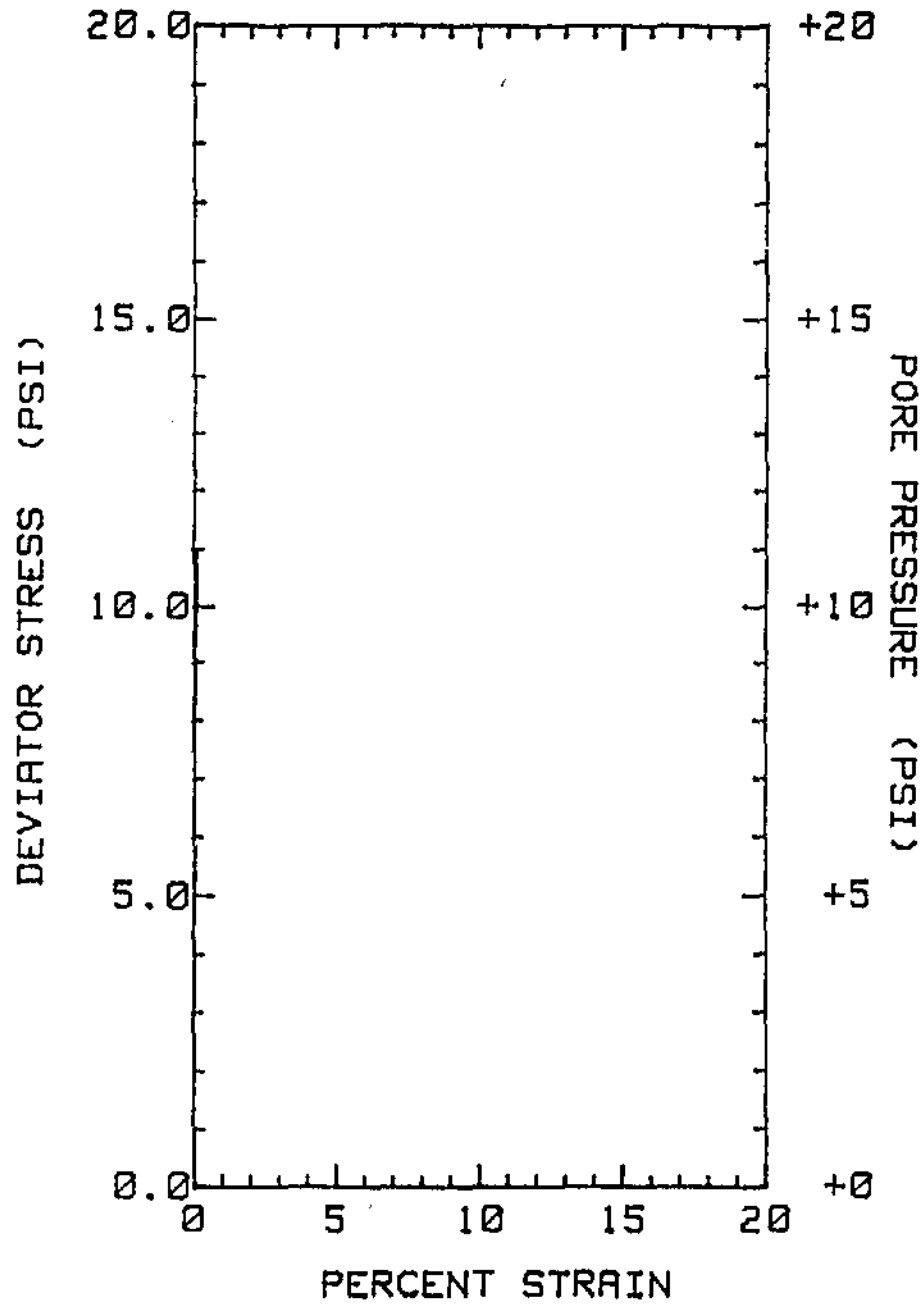
LAB # T97011; σ_3 = 7.0 psi; γ_d = 72.4 pcf



ALASKA TESTLAB

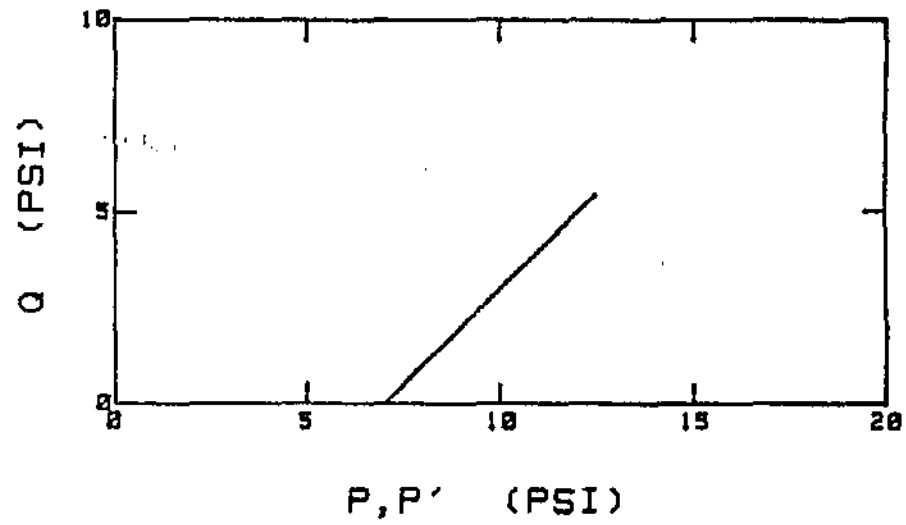
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-8 DEPTH : 5.5'
SAMPLE #
INITIAL DRY DENSITY: 78.2 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97012
DATE: 18 Mar 1996 12:40:59



ALASKA TESTLAB

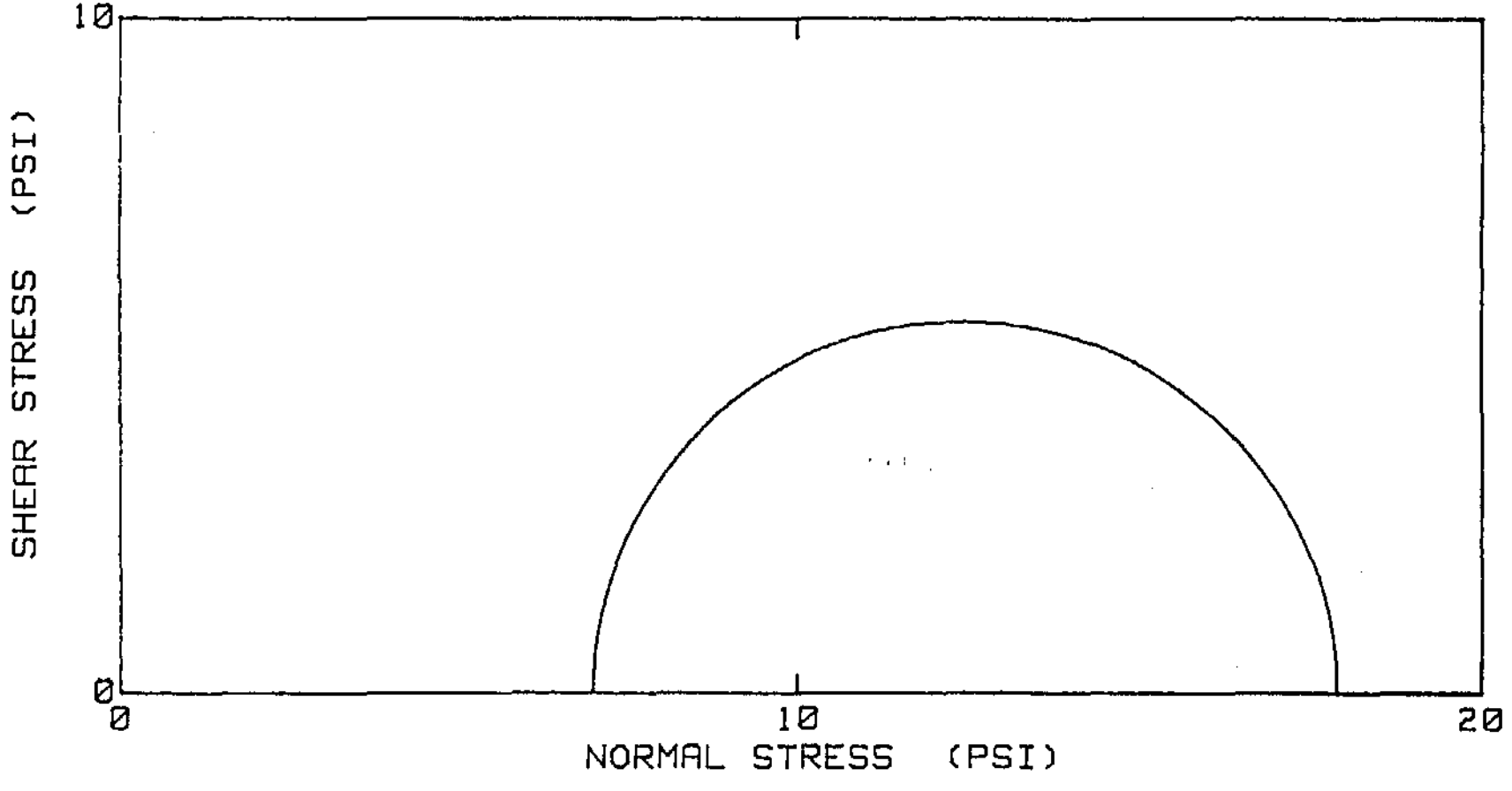
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-8
SAMPLE #
DEPTH: 5.5'

DATE : 19 Mar 1996 12:40:59

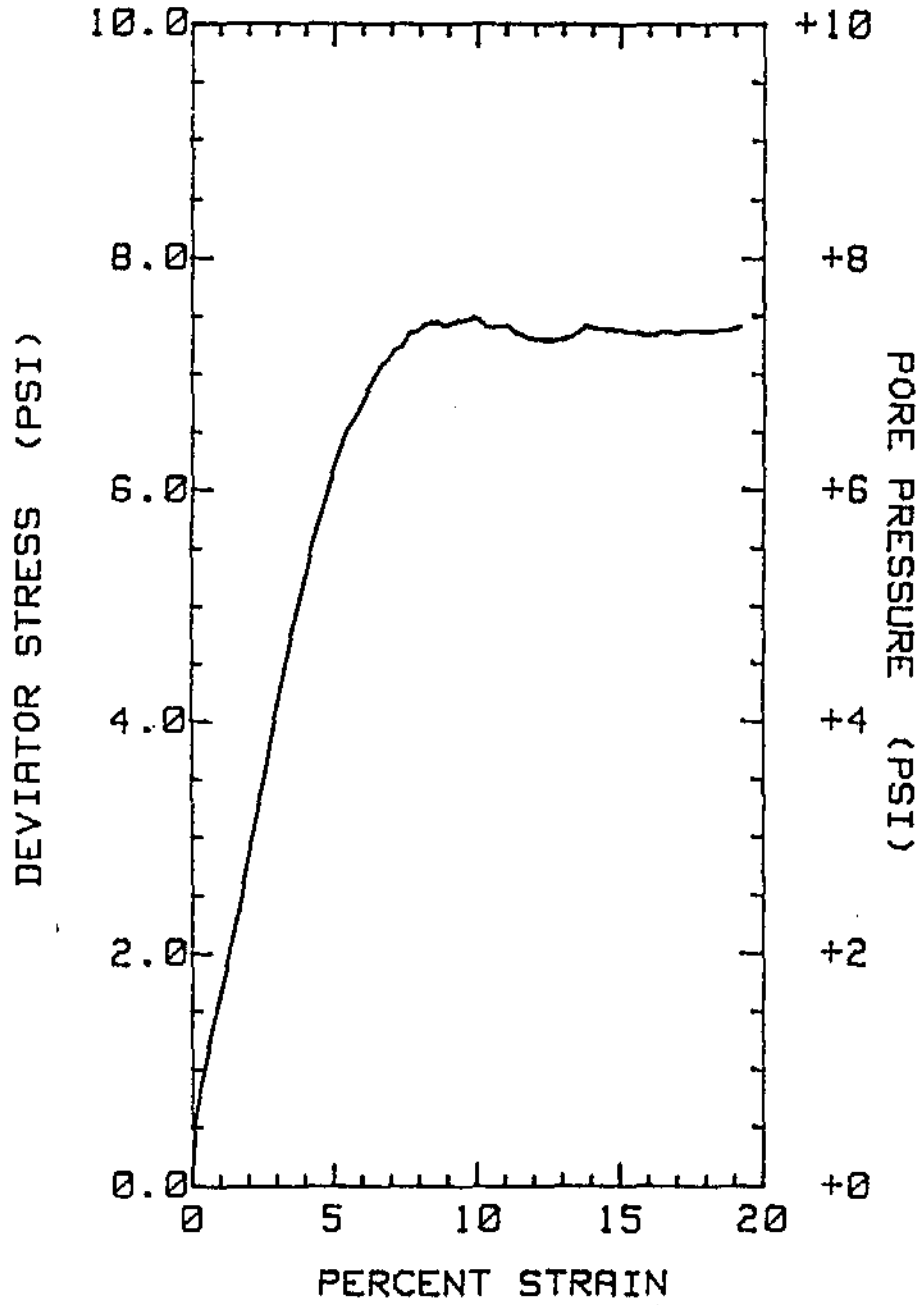
LAB # T97012; σ_3 = 7.0 psi; γ_d = 78.2 pcf



ALASKA TESTLAB

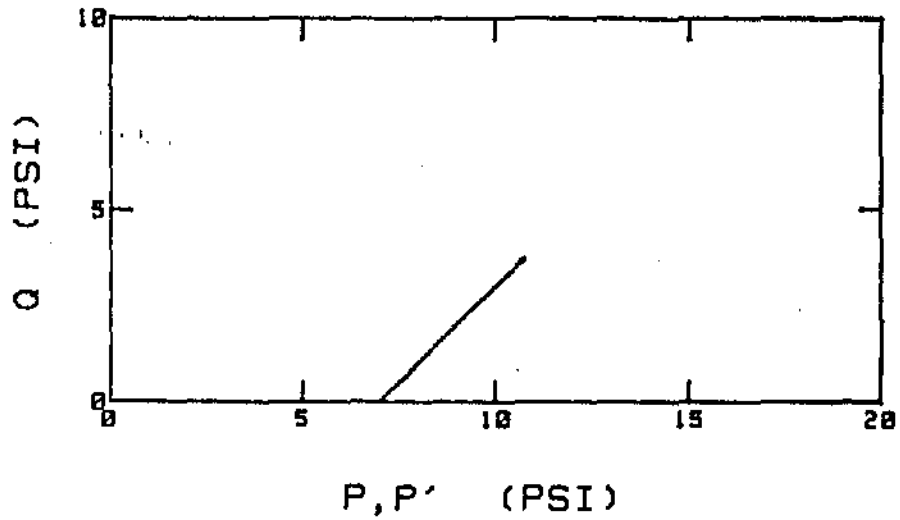
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-8 DEPTH : 8.5'
SAMPLE #
INITIAL DRY DENSITY: 70.1 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97813
DATE: 28 Mar 1998 07:54:29



ALASKA TESTLAB

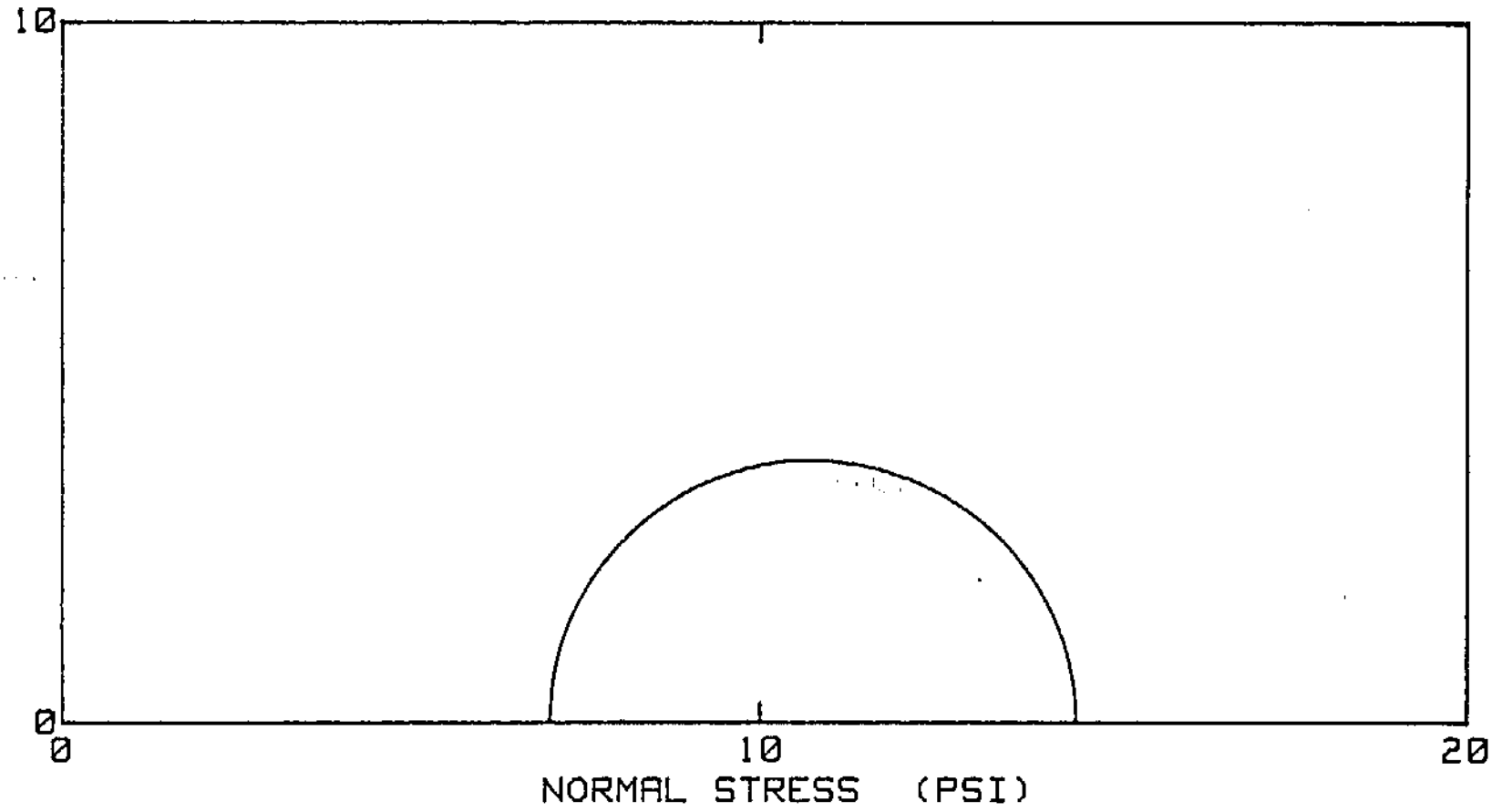
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-8
SAMPLE #
DEPTH: 8.5'

DATE : 20 Mar 1996 07:54:29

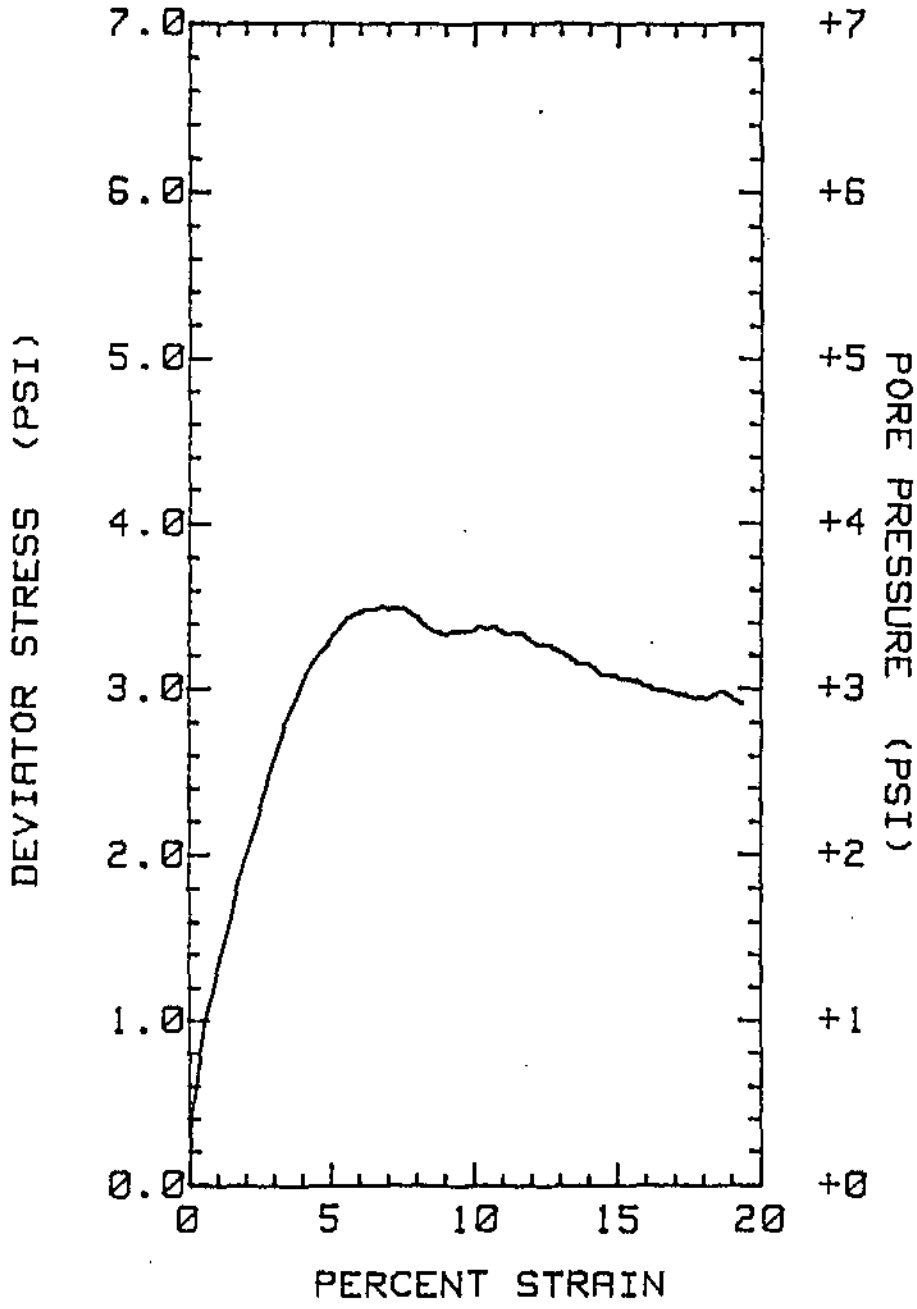
LAB # T97013; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 70.1 pcf



ALASKA TESTLAB

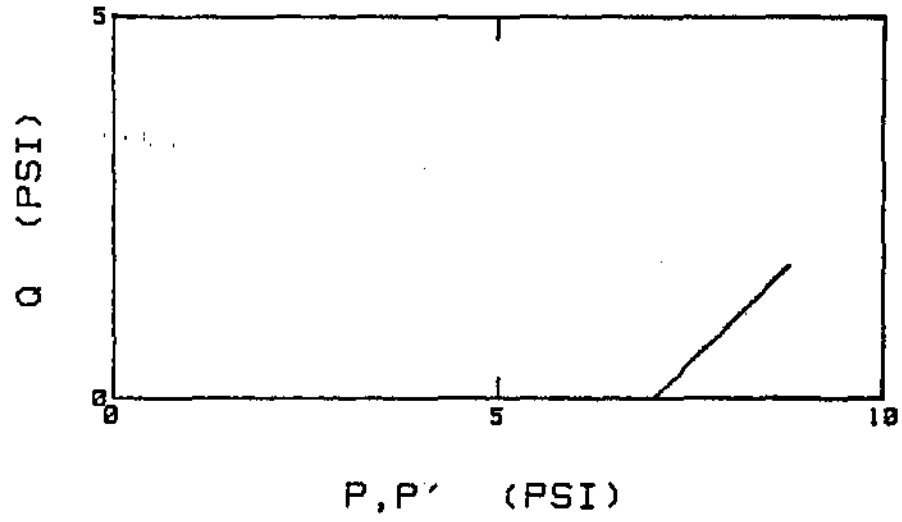
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-9 DEPTH : 2.0'
SAMPLE #
INITIAL DRY DENSITY: 46.2 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97014
DATE: 20 Mar 1996 12:34:45



ALASKA TESTLAB

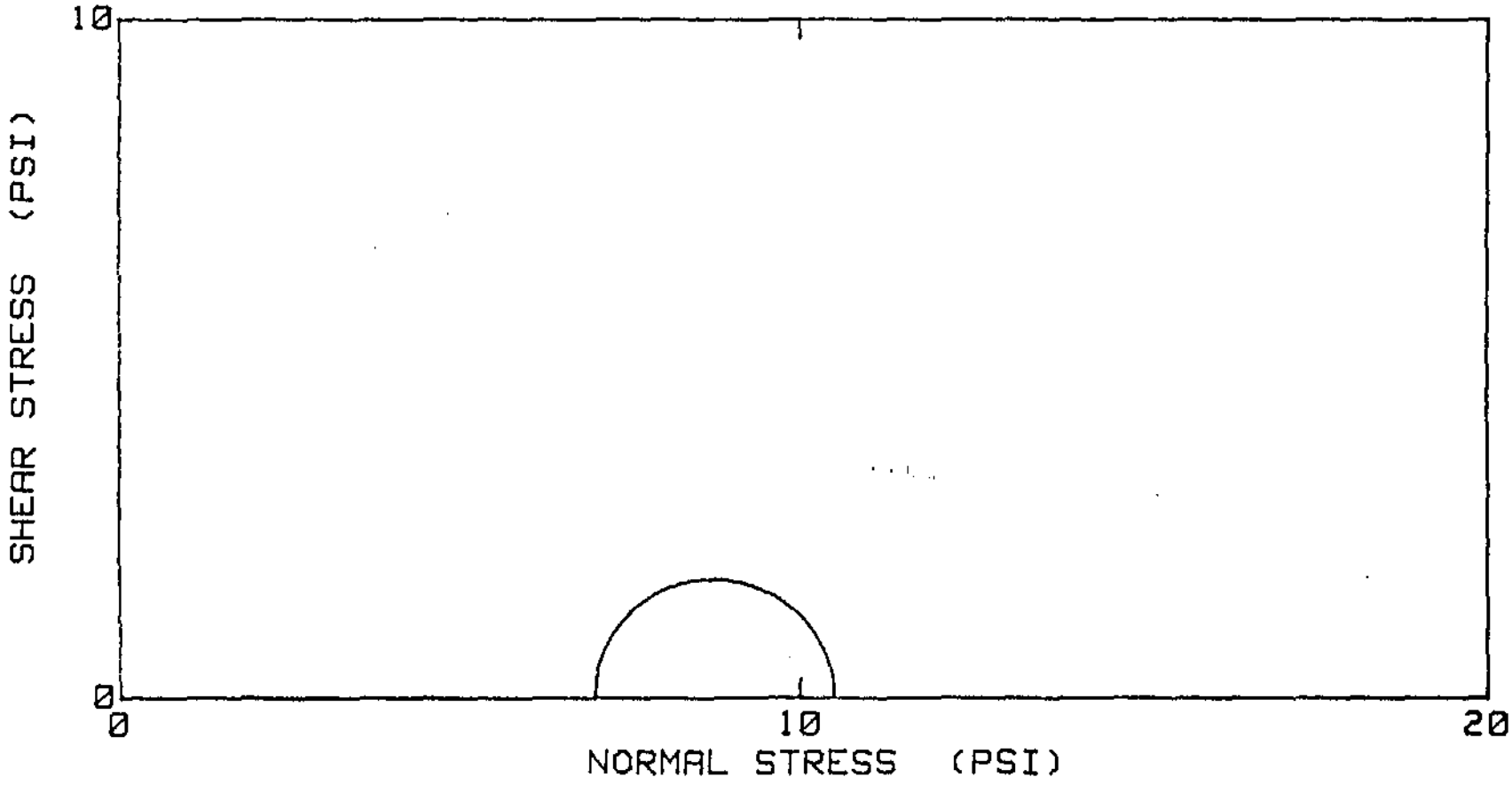
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-9
SAMPLE #
DEPTH: 2.0'

DATE : 20 Mar 1996 12:34:45

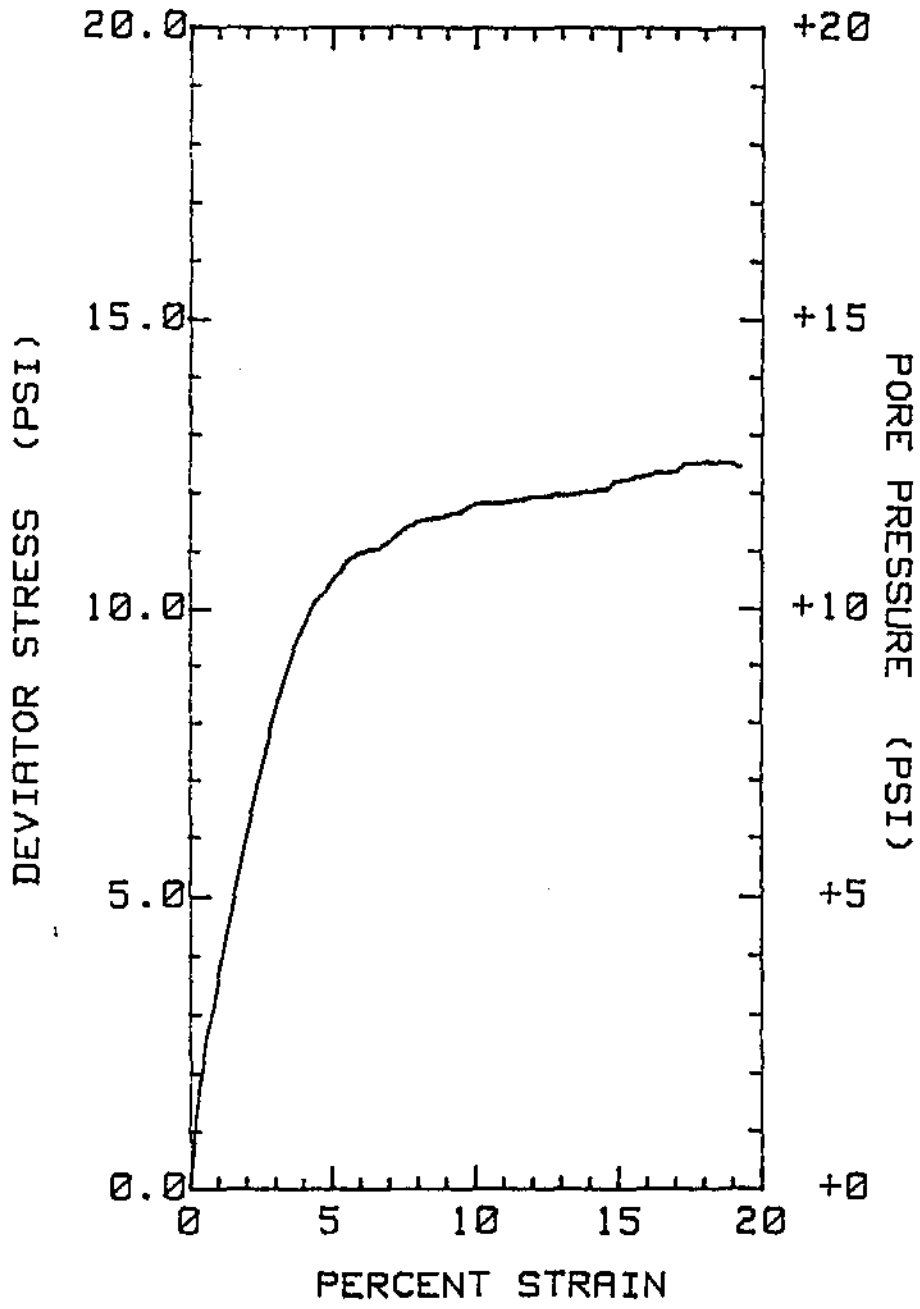
LAB # T97014; $\bar{\sigma_3}$ = 7.0 psi; γ_d = 46.2 pcf



ALASKA TESTLAB

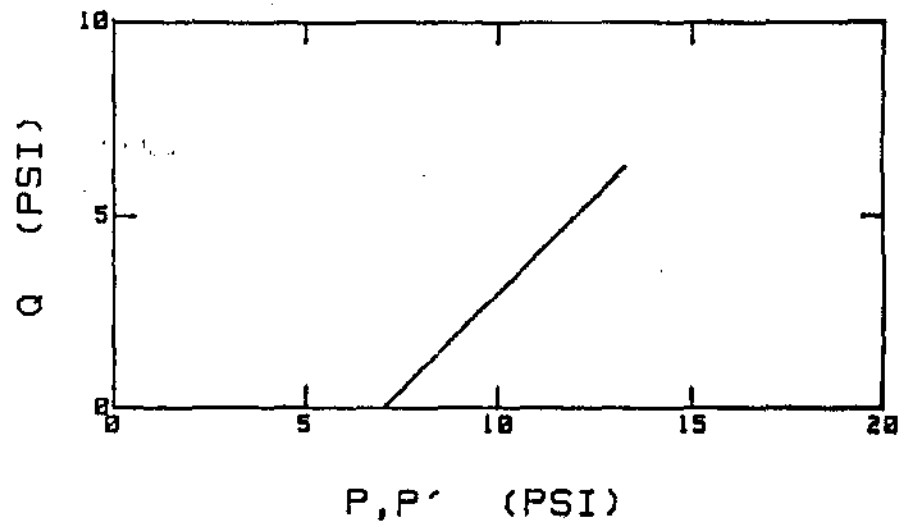
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # A-9 DEPTH : 6.8'
SAMPLE #
INITIAL DRY DENSITY: 68.4 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97015
DATE: 21 Mar 1996 07:56:19



ALASKA TESTLAB

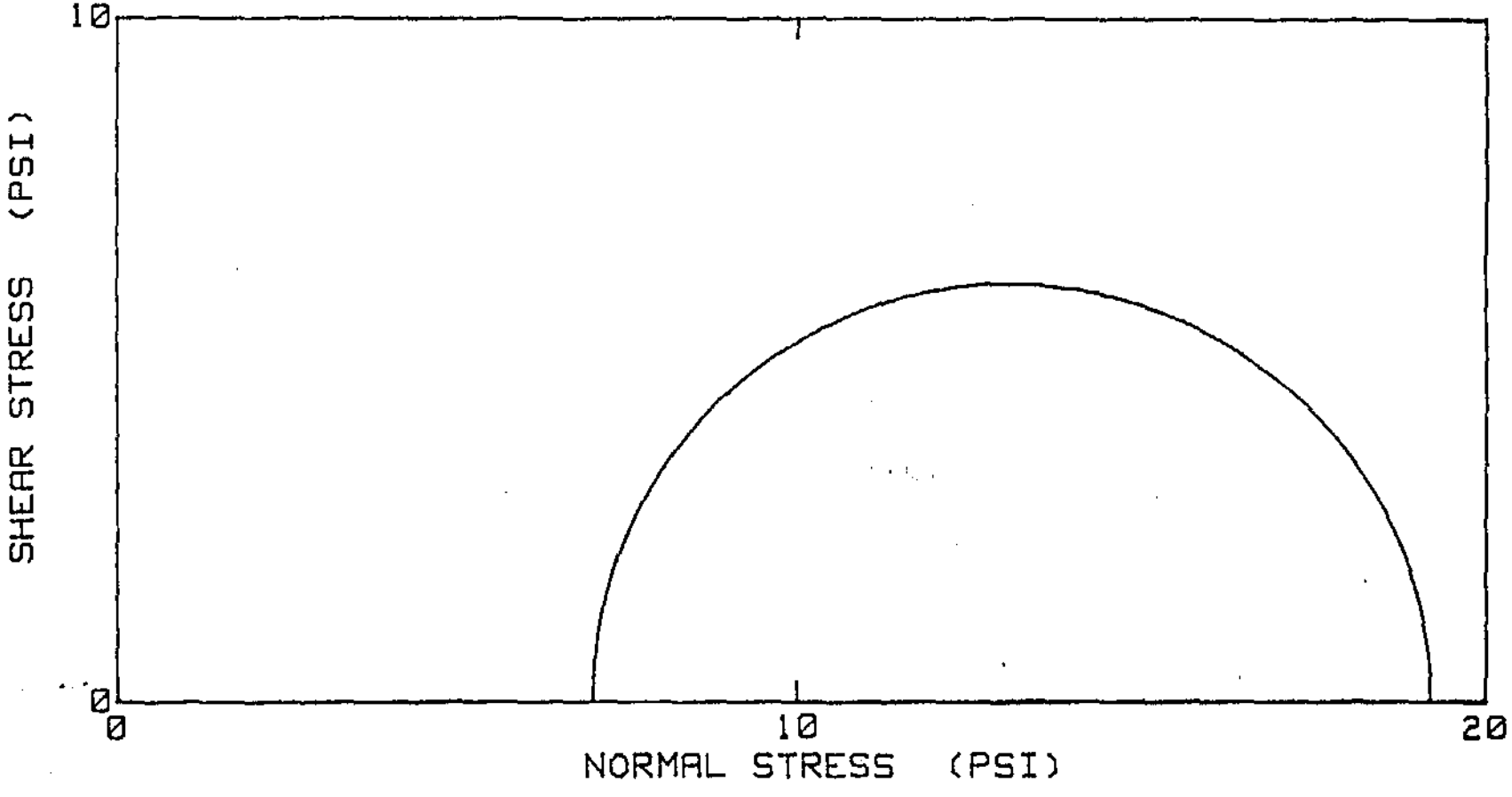
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # A-9
SAMPLE #
DEPTH: 6.0'

DATE : 21 Mar 1996 07:56:19

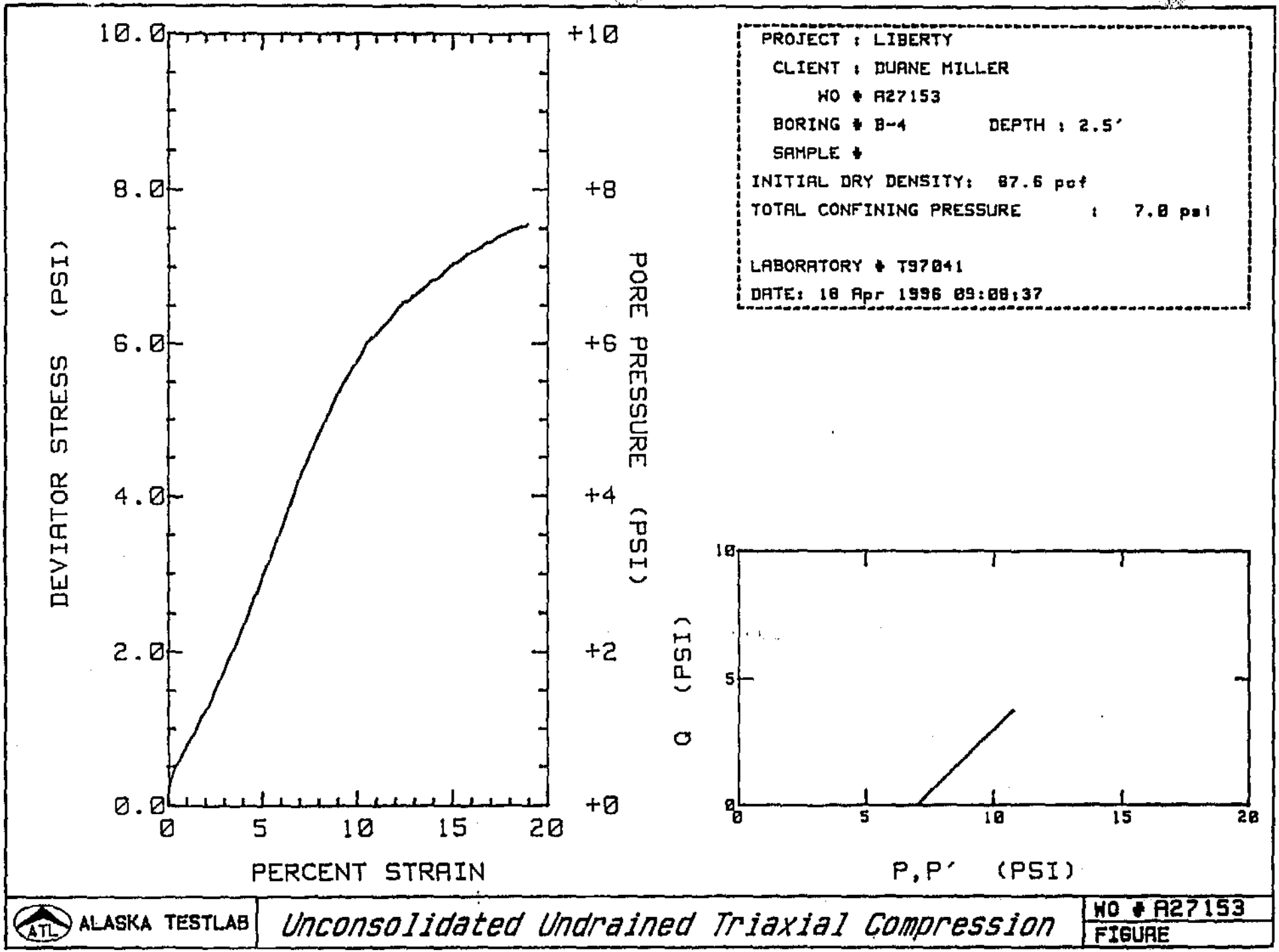
LAB # T97015; σ_3 = 7.0 psi; γ_d = 68.4 pcf



ALASKA TESTLAB

Mohr Diagram - UU Tests

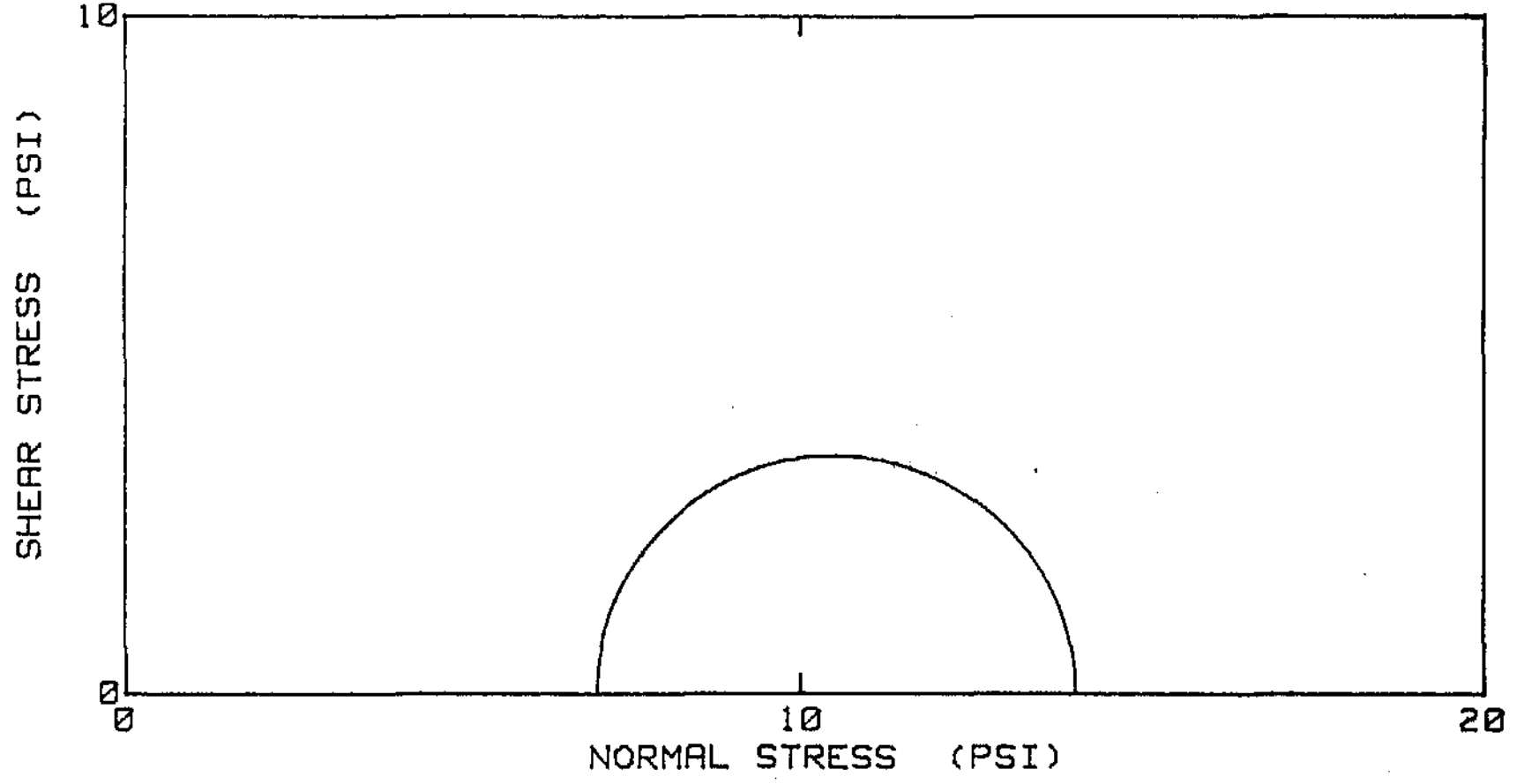
WO # A27153
FIGURE


PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # B-4 DEPTH : 2.5'
SAMPLE #
INITIAL DRY DENSITY: 87.6 pcf
TOTAL CONFINING PRESSURE : 7.0 psi
LABORATORY # T97041
DATE: 10 Apr 1996 09:08:37
DEVIATOR STRESS (PSI)
PORE PRESSURE (PSI)
PERCENT STRAIN
Q (PSI)
P,P' (PSI)
ALASKA TESTLAB
Unconsolidated Undrained Triaxial Compression
WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-4
SAMPLE #
DEPTH: 2.5'

DATE : 18 Apr 1996 09:08:37

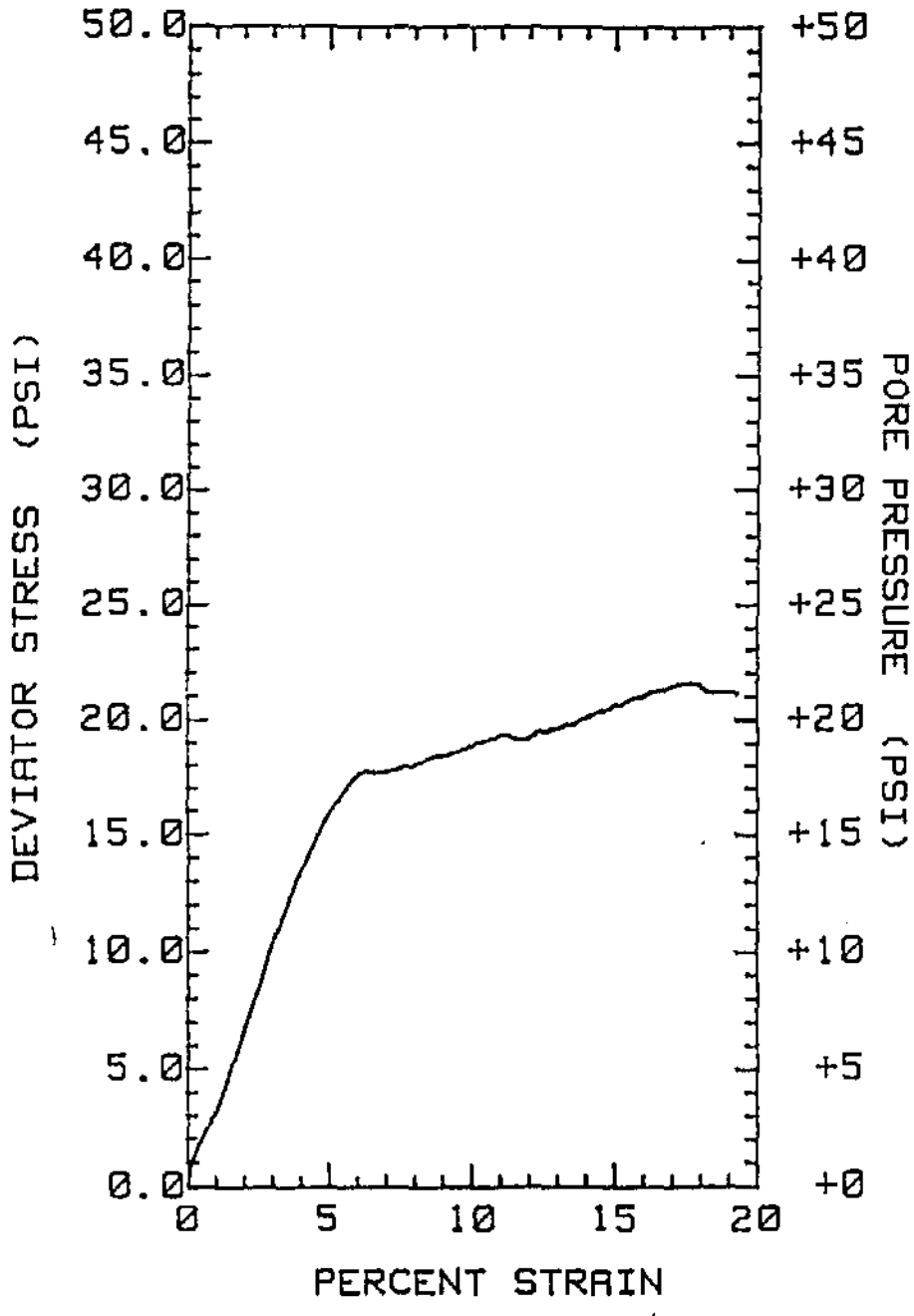
LAB # T97041; σ_3 = 7.0 psi; γ_d = 87.6 pcf



ALASKA TESTLAB

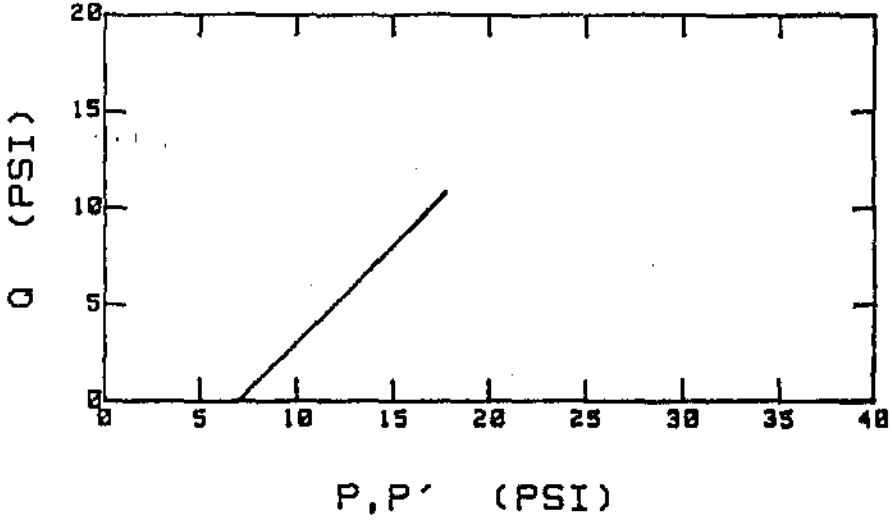
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # B-5 DEPTH : 2.5
SAMPLE #
INITIAL DRY DENSITY: 91.2 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97016
DATE: 28 Mar 1996 14:44:47



ALASKA TESTLAB

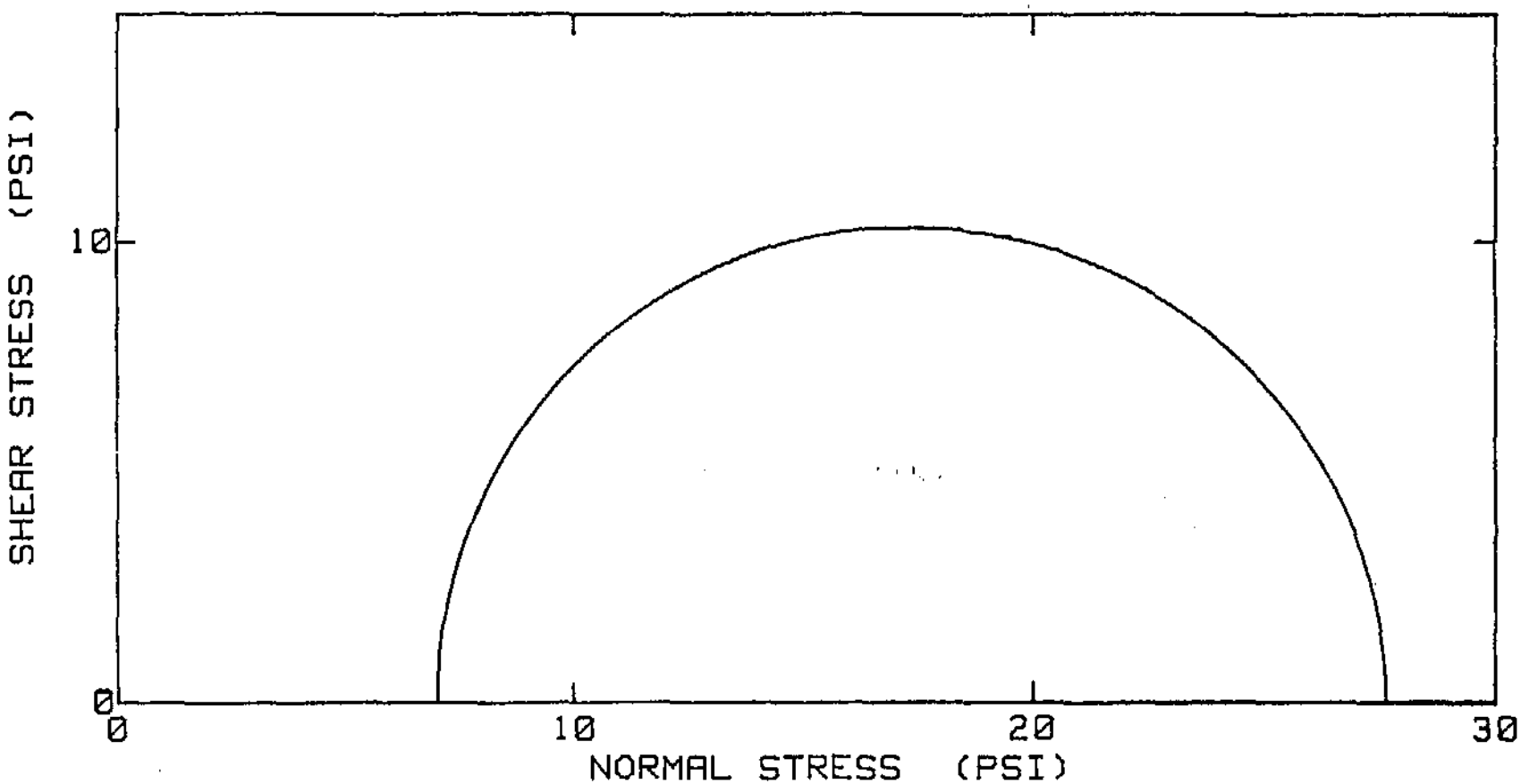
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-5
SAMPLE #
DEPTH: 2.5

DATE : 28 Mar 1996 14:44:47

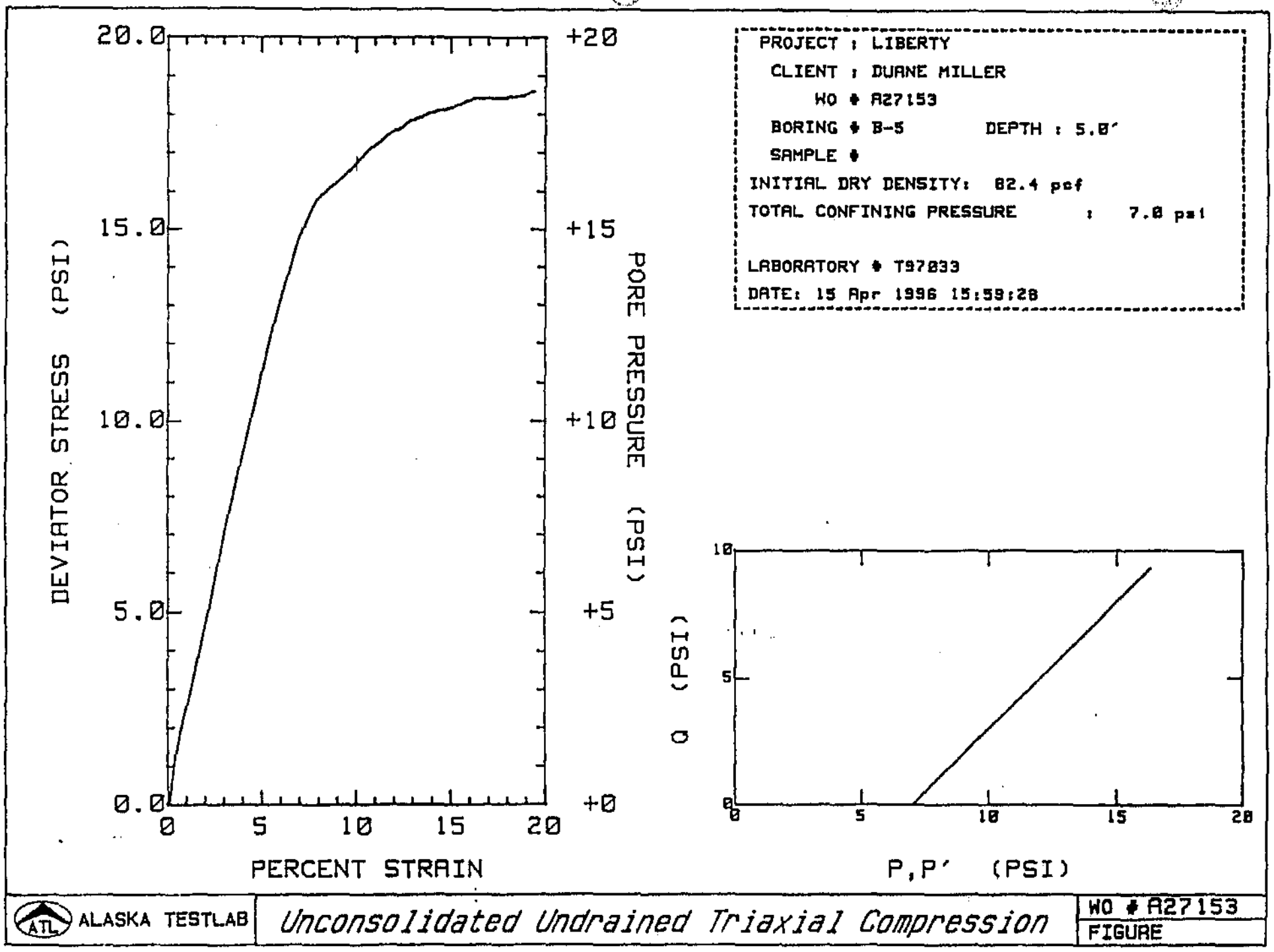
LAB # T97016; σ_3 = 7.0 psi; γ_d = 91.2 pcf



ALASKA TESTLAB

Mohr Diagram - UU Tests

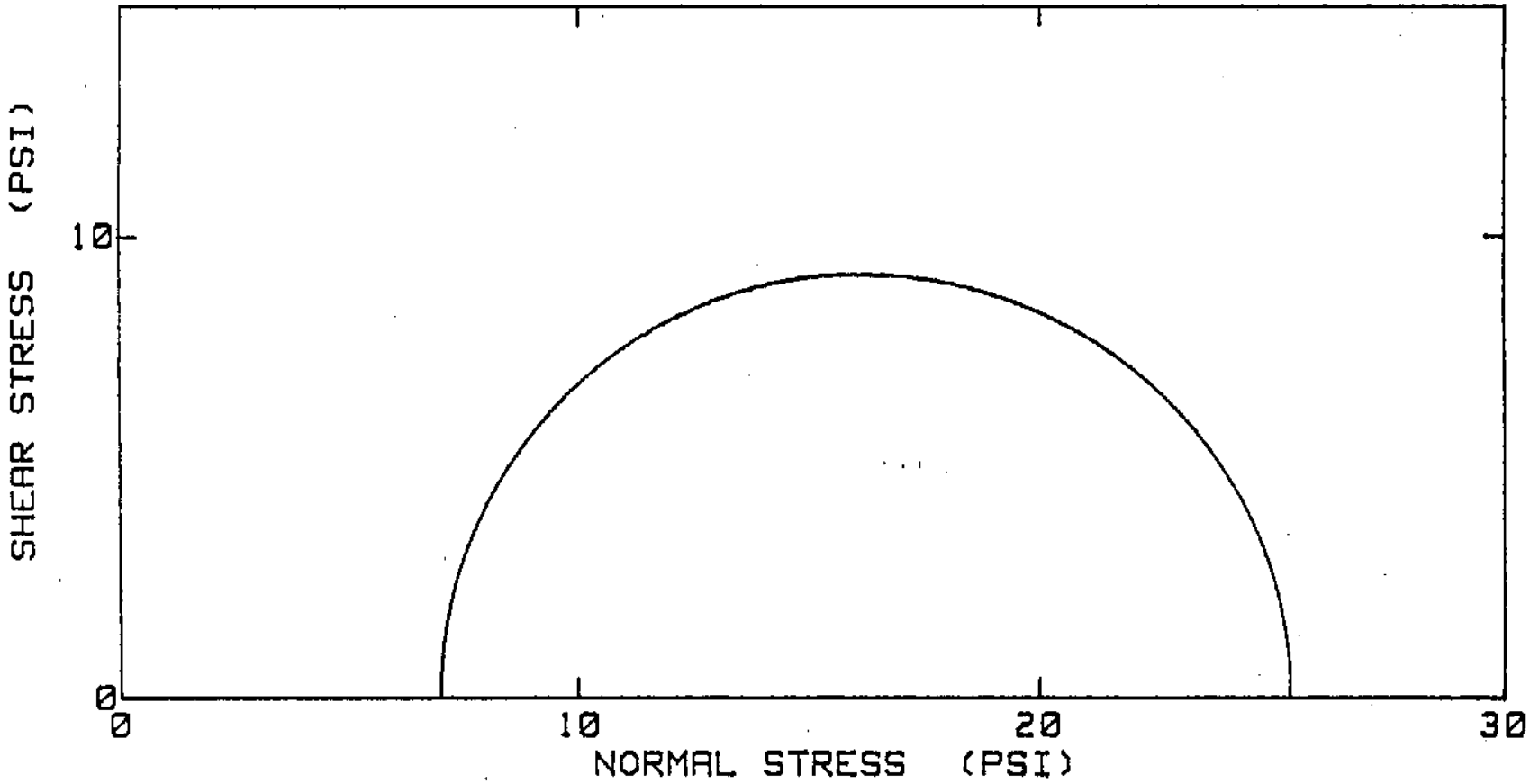
WO # A27153
FIGURE


PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # B-5 DEPTH : 5.0'
SAMPLE #
INITIAL DRY DENSITY: 82.4 pcf
TOTAL CONFINING PRESSURE : 7.0 psi
LABORATORY # T97033
DATE: 15 Apr 1996 15:59:28
DEVIATOR STRESS (PSI)
PORE PRESSURE (PSI)
PERCENT STRAIN
Q (PSI)
P,P' (PSI)
ALASKA TESTLAB
Unconsolidated Undrained Triaxial Compression
WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-6
SAMPLE #
DEPTH: 7.3'

DATE : 18 Apr 1996 10:01:35

LAB # T97042; σ_3 = 7.0 psi; γ_d = 91.9 pcf



ALASKA TESTLAB

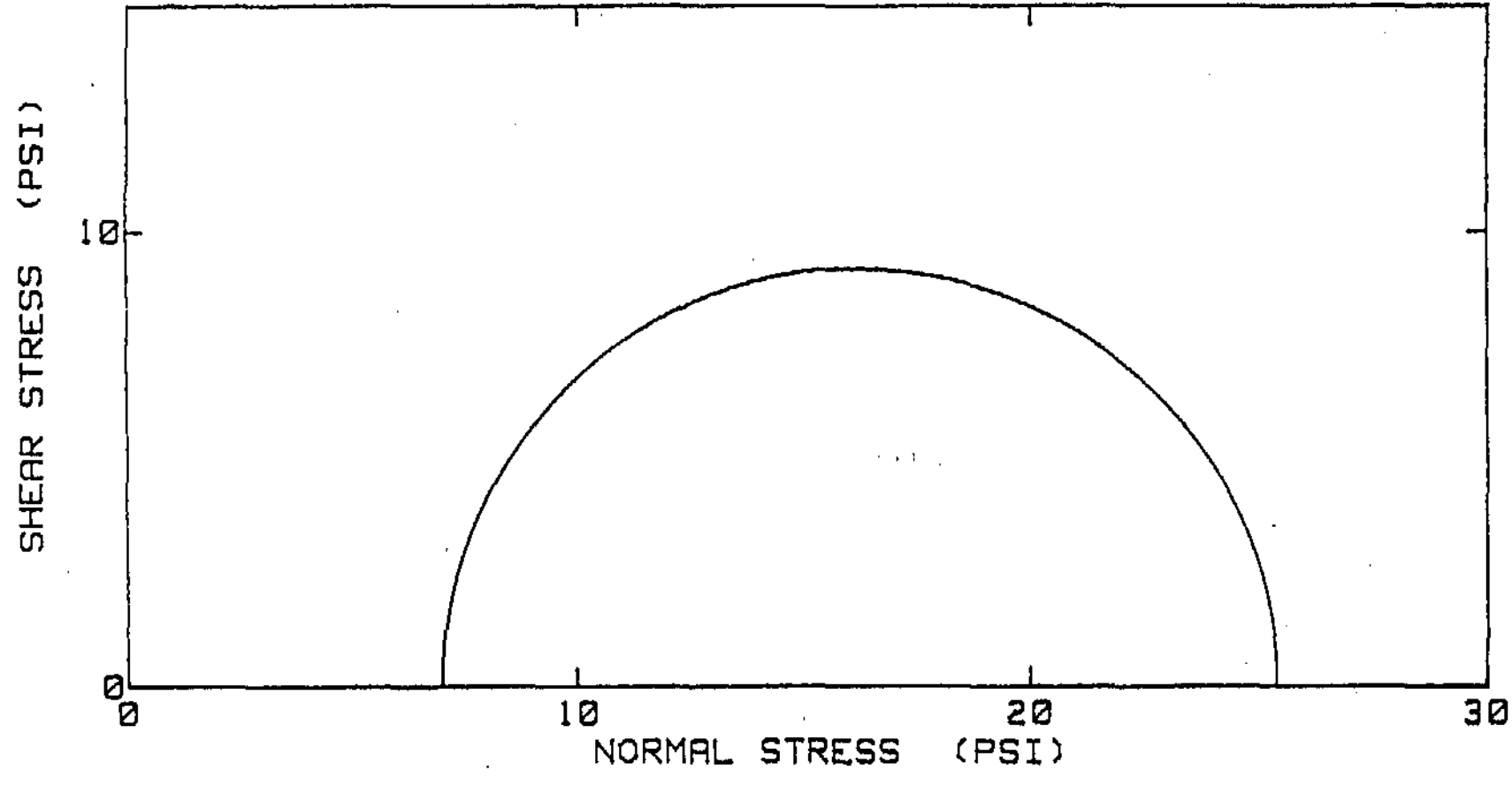
Mohr Diagram - UU Tests

WO # A27153

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-6
SAMPLE #
DEPTH: 7.3'

DATE : 18 Apr 1996 10:01:35

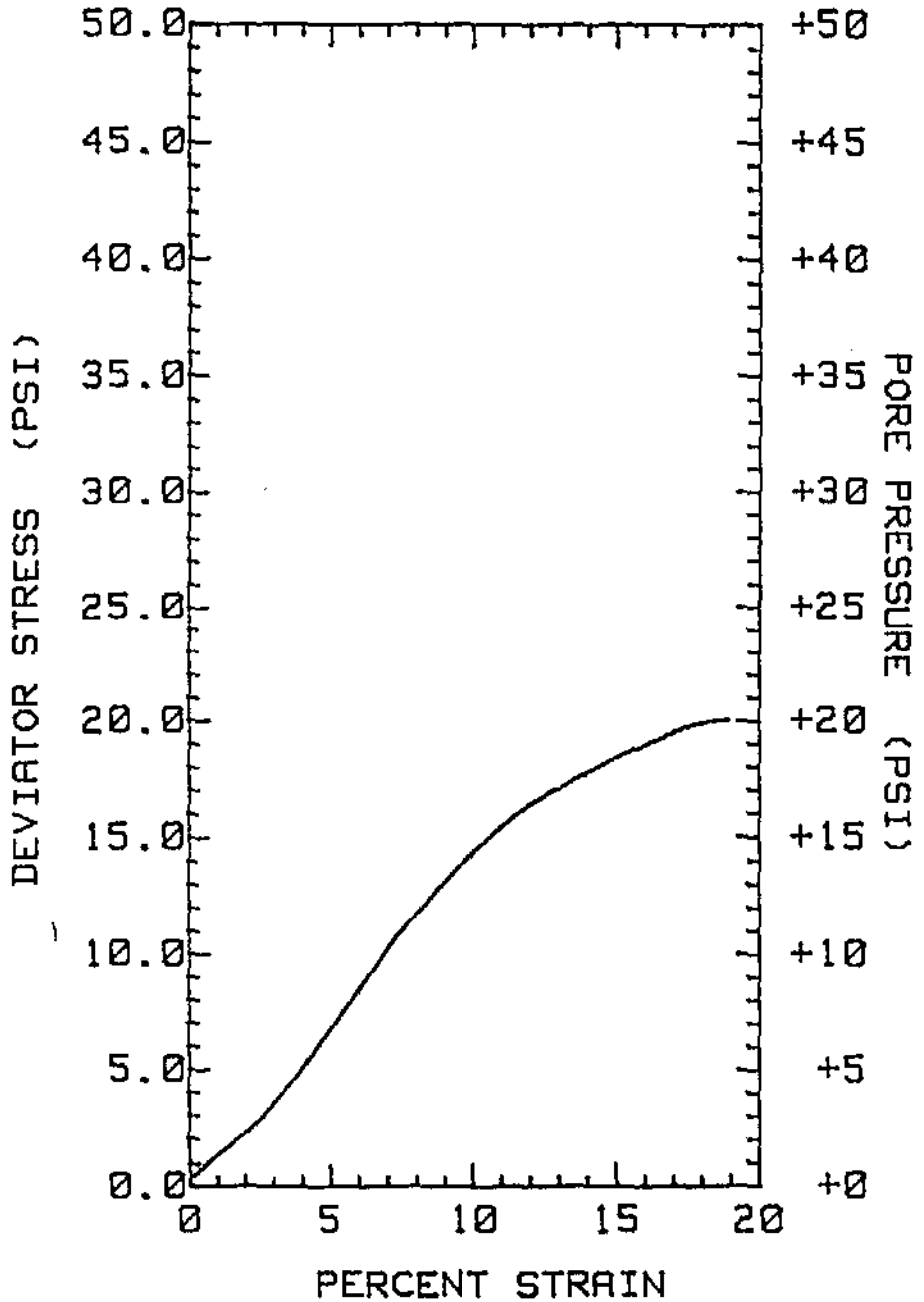
LAB # T97042; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 91.9 pcf



ALASKA TESTLAB

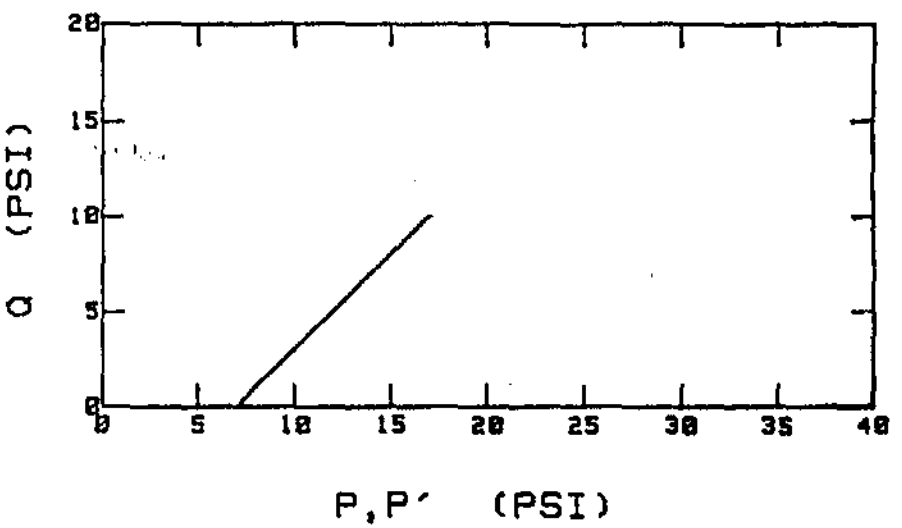
Mohr Diagram - UU Tests

WO # A27153



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # B-6 DEPTH : 7.3'
SAMPLE #
INITIAL DRY DENSITY: 91.9 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97042
DATE: 18 Apr 1996 10:01:35



ALASKA TESTLAB

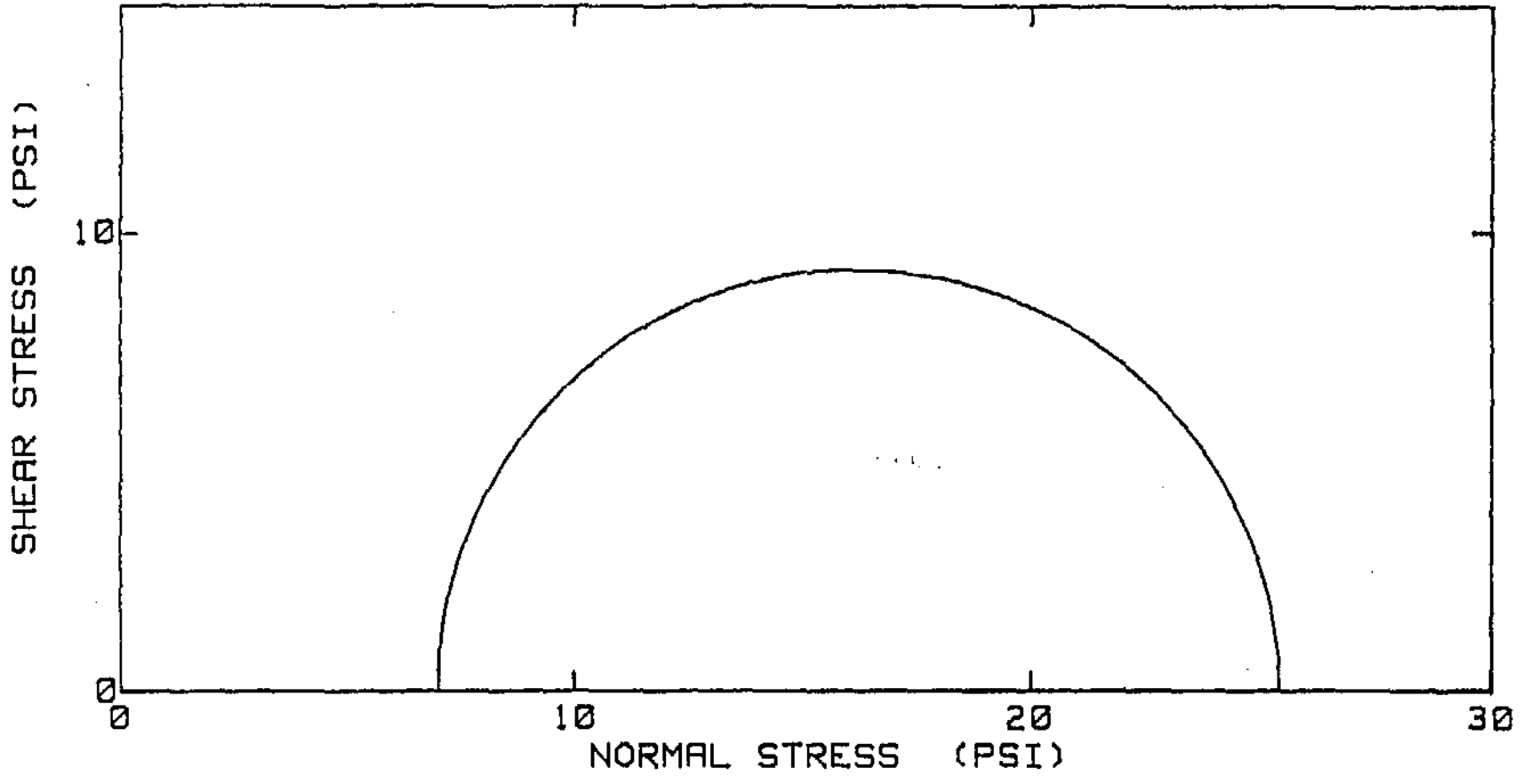
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-6
SAMPLE #
DEPTH: 7.3'

DATE : 18 Apr 1996 10:01:35

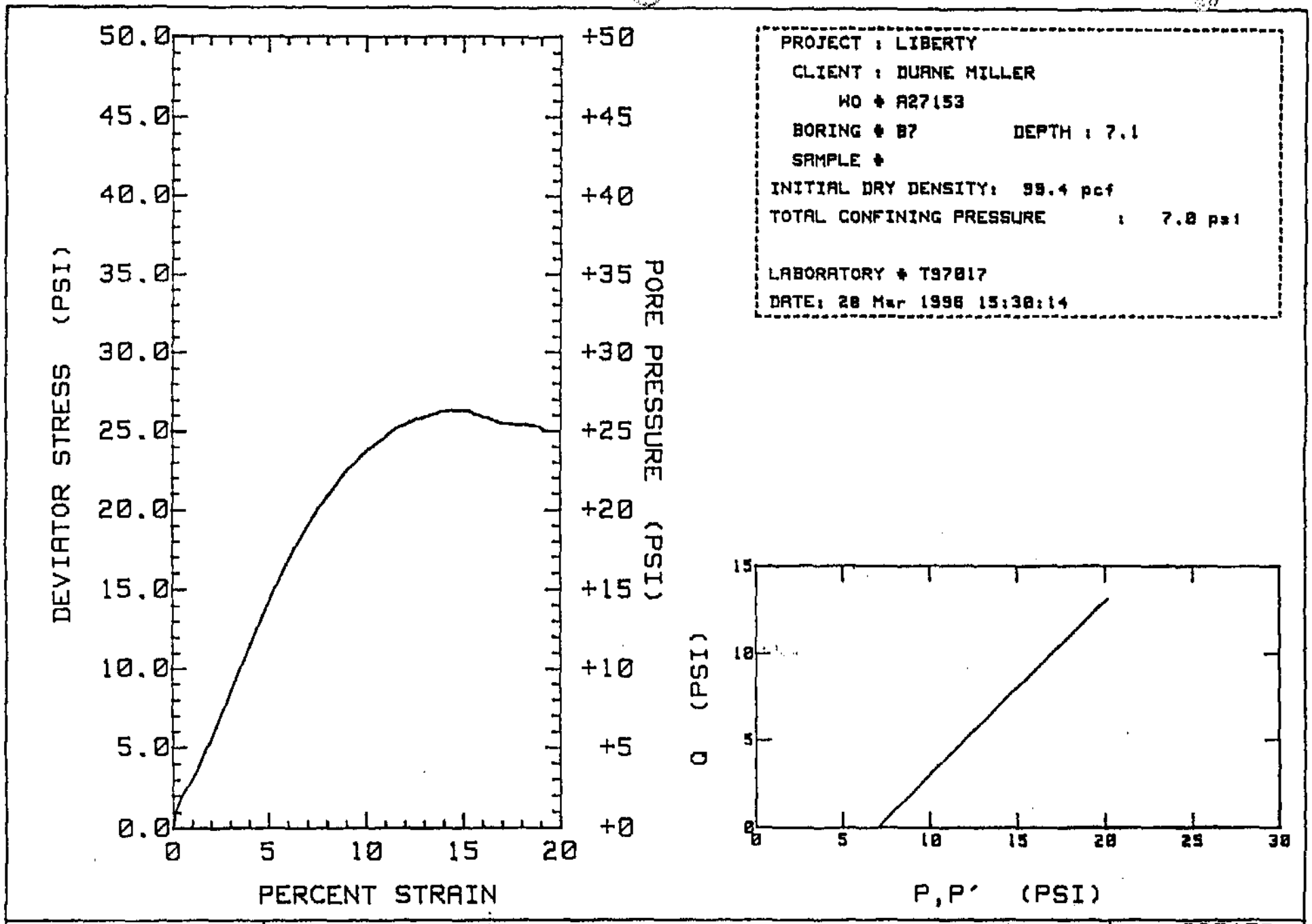
LAB # T97042; $\bar{\sigma_3}$ = 7.0 psi; γ_d = 91.9 pcf



ALASKA TESTLAB

Mohr Diagram - UU Tests

WO # A27153
FIGURE



ALASKA TESTLAB

Unconsolidated Undrained Triaxial Compression

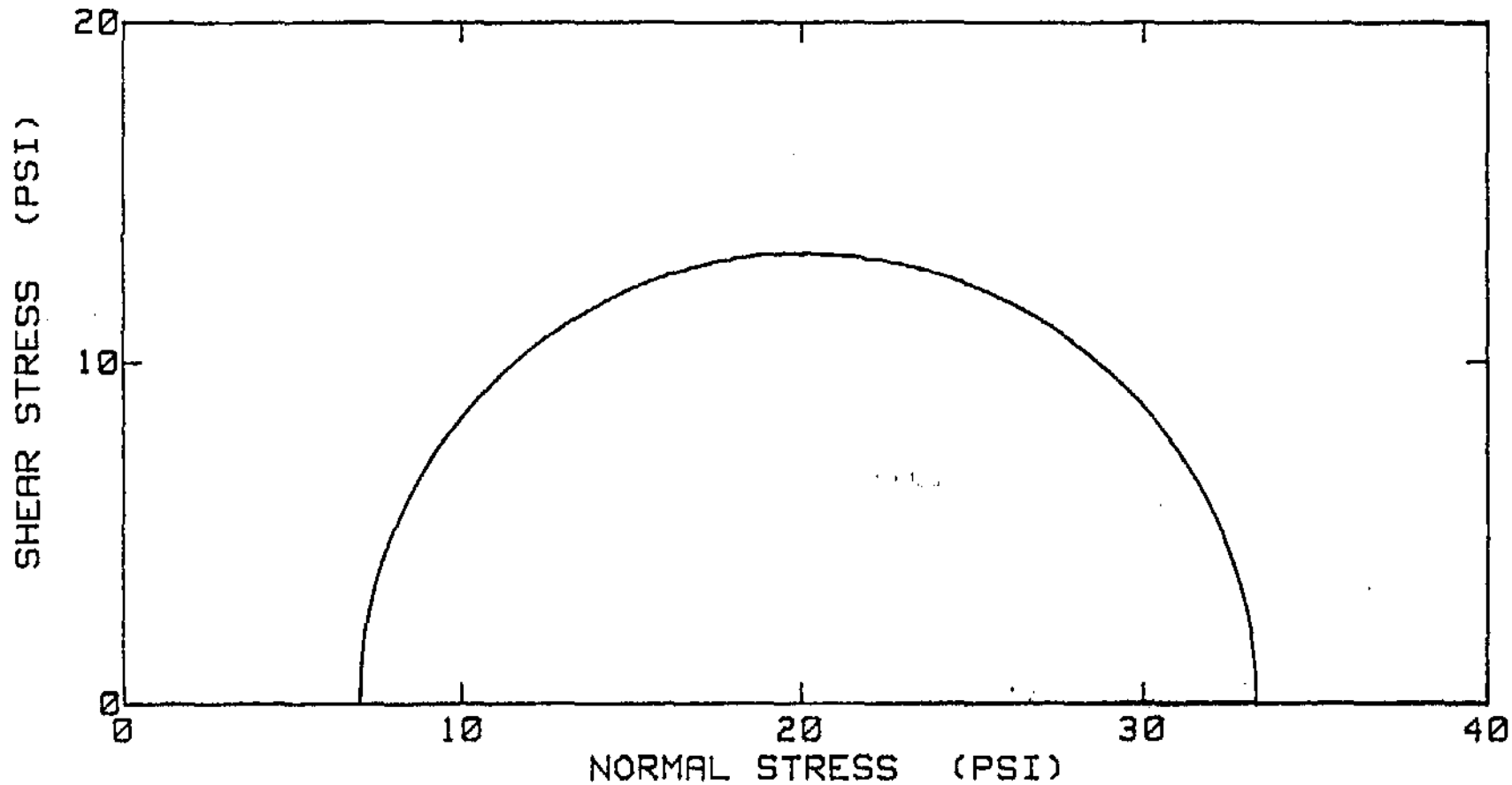
WO # A27153

FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B7
SAMPLE #
DEPTH: 7.1

DATE : 28 Mar 1996 15:30:14

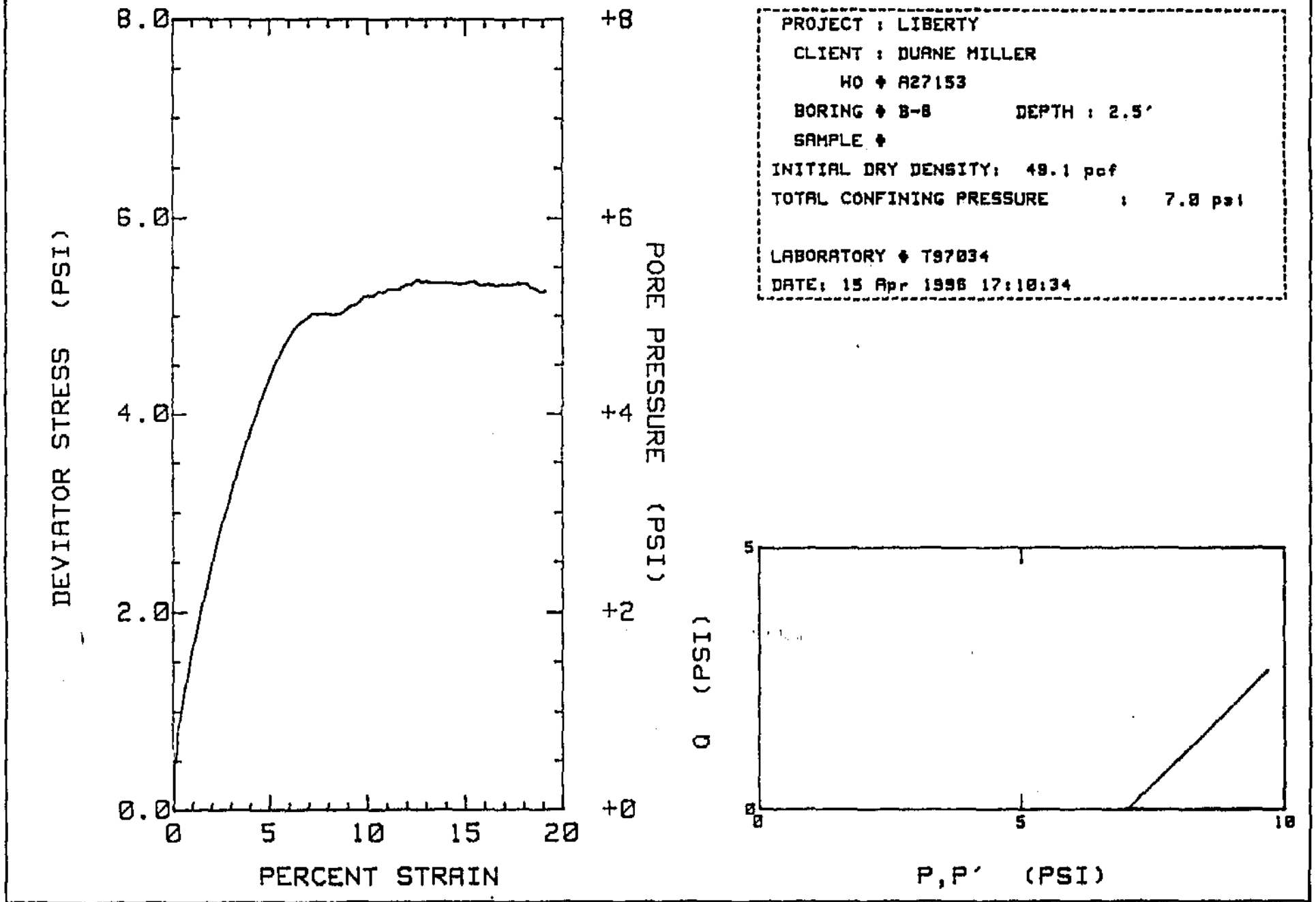
LAB # T97017; σ_3 = 7.0 psi; γ_d = 99.4 pcf



ALASKA TESTLAB

Mohr Diagram - UU Tests

WO # A27153
FIGURE



ALASKA TESTLAB

Unconsolidated Undrained Triaxial Compression

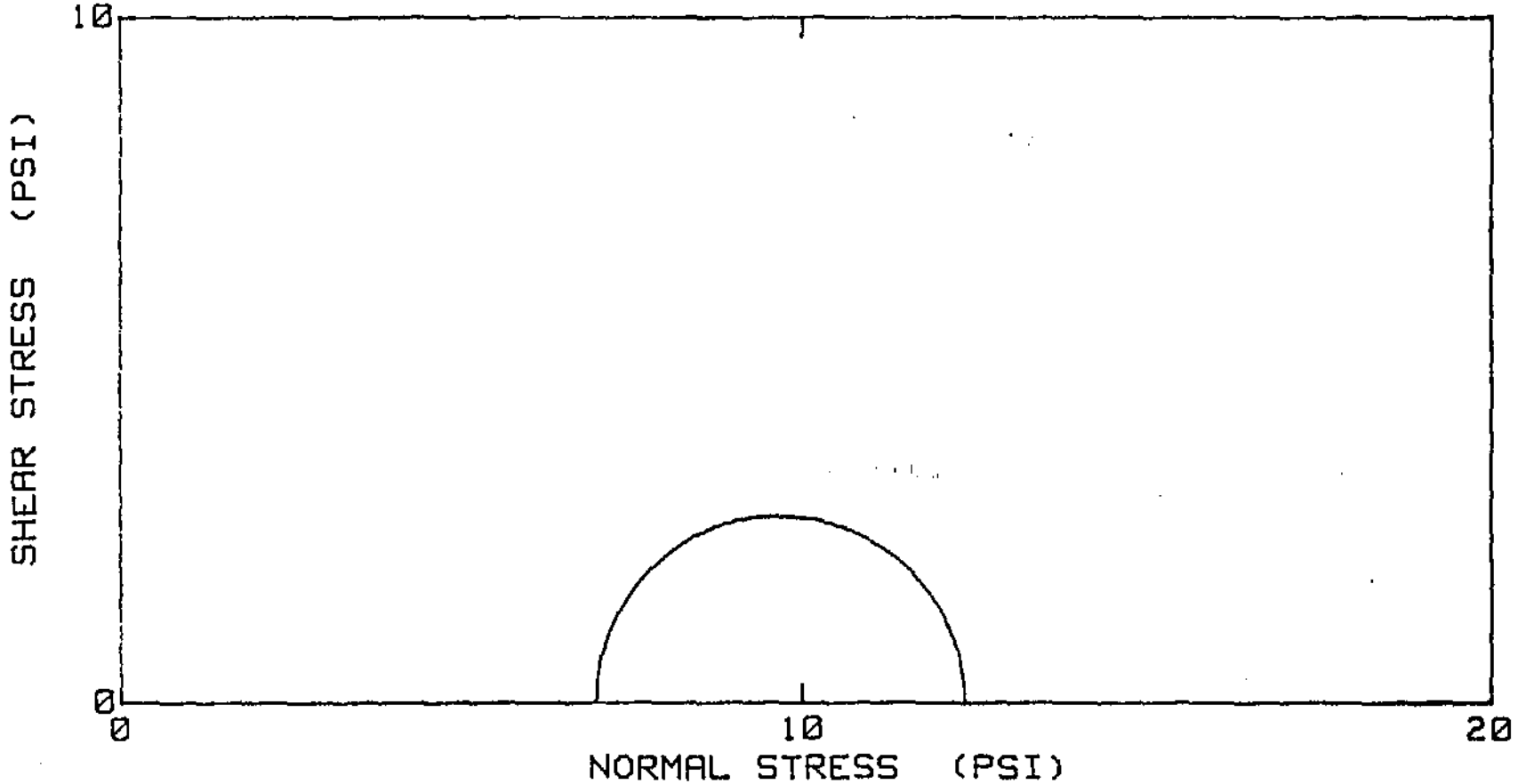
WO # A27153

FIGURE

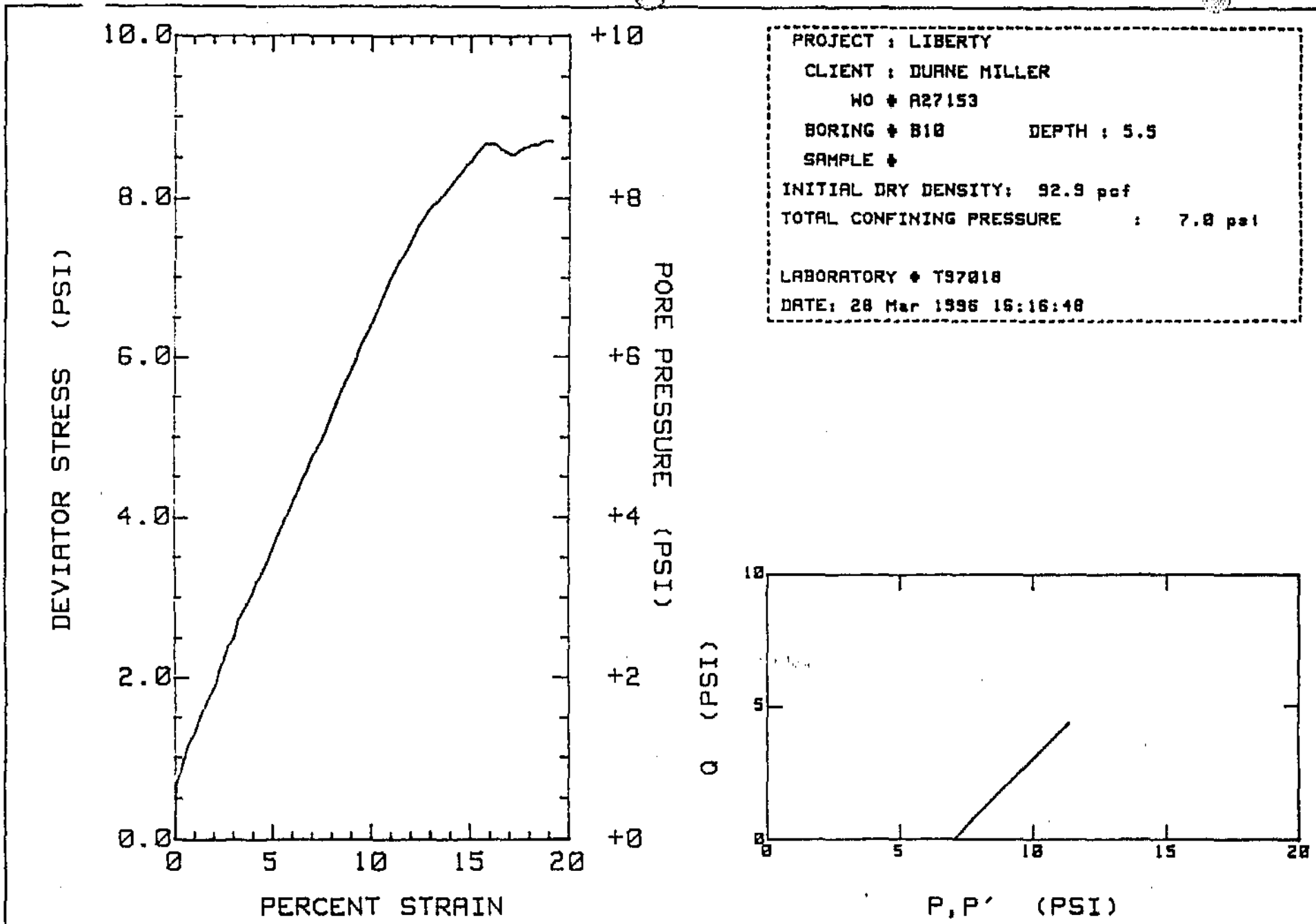
PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B-8
SAMPLE #
DEPTH: 2.5'

DATE : 15 Apr 1996 17:10:34

LAB # T97034; $\bar{\sigma_3}$ = 7.0 psi; γ_d = 49.1 pcf



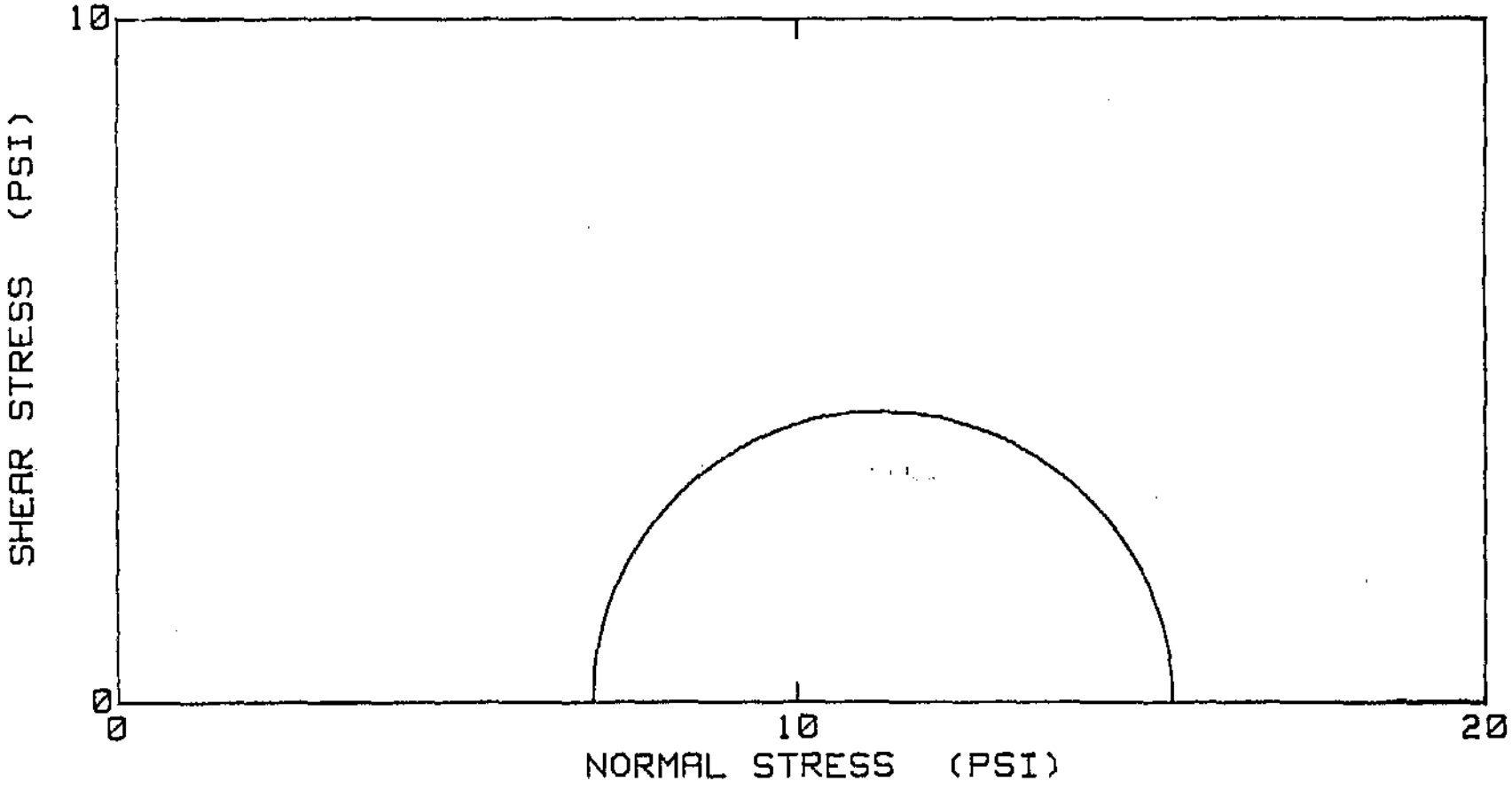
ALASKA TESTLAB	*Mohr Diagram - UU Tests*	WO # A27153 FIGURE


PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # B10 DEPTH : 5.5
SAMPLE #
INITIAL DRY DENSITY: 92.9 pcf
TOTAL CONFINING PRESSURE : 7.0 psi
LABORATORY # T97018
DATE: 28 Mar 1996 16:16:48
DEVIATOR STRESS (PSI)
PORE PRESSURE (PSI)
PERCENT STRAIN
Q (PSI)
P,P' (PSI)
ALASKA TESTLAB
Unconsolidated Undrained Triaxial Compression
WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # B10
SAMPLE #
DEPTH: 5.5

DATE : 28 Mar 1996 16:16:48

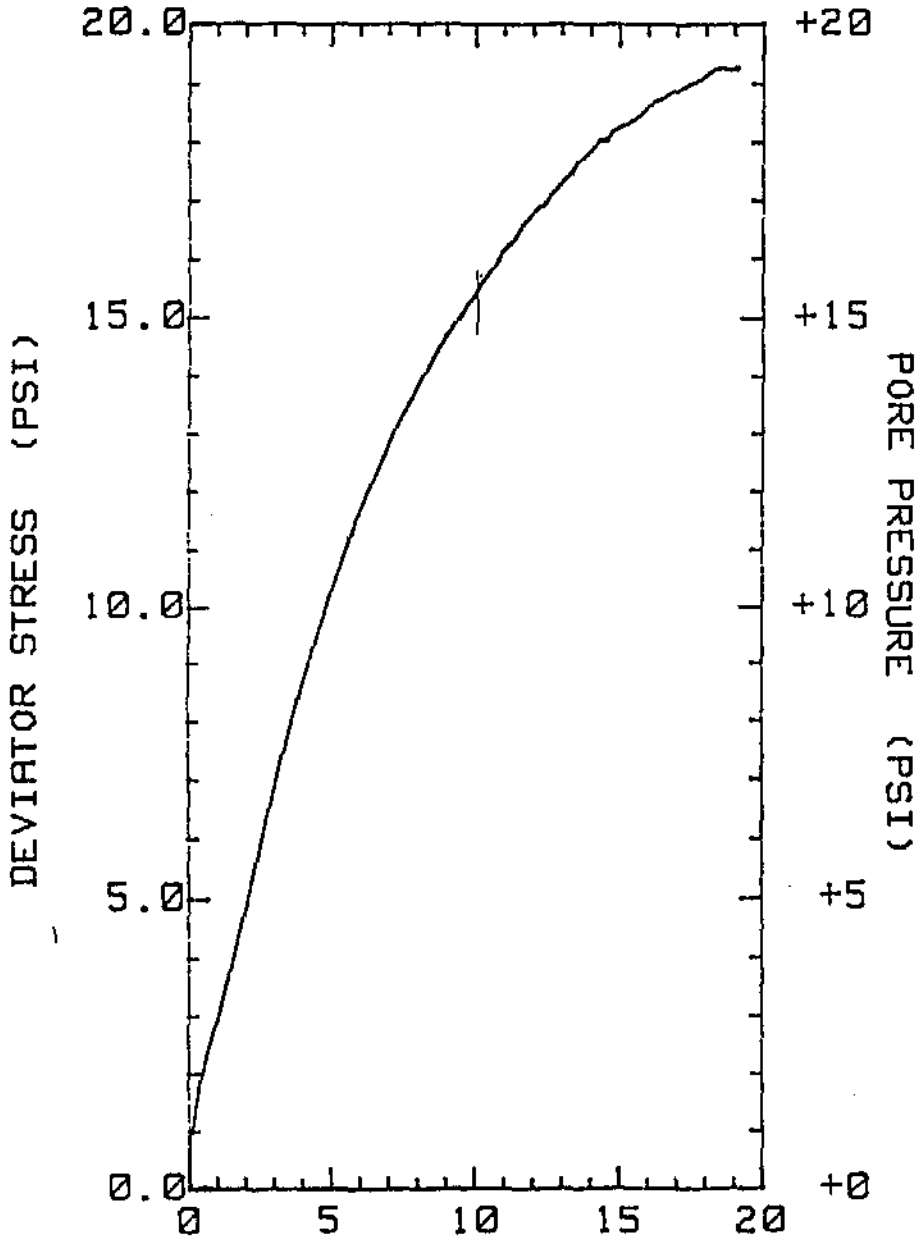
LAB # T97018; σ_3 = 7.0 psi; γ_d = 92.9 pcf



ALASKA TESTLAB

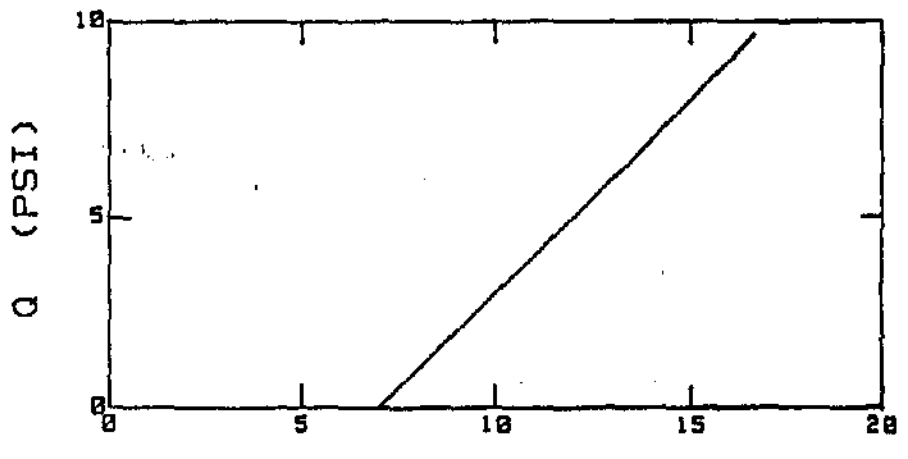
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # C-1 DEPTH : 4.5'
SAMPLE #
INITIAL DRY DENSITY: 86.3 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97036
DATE: 16 Apr 1996 10:00:05



ALASKA TESTLAB

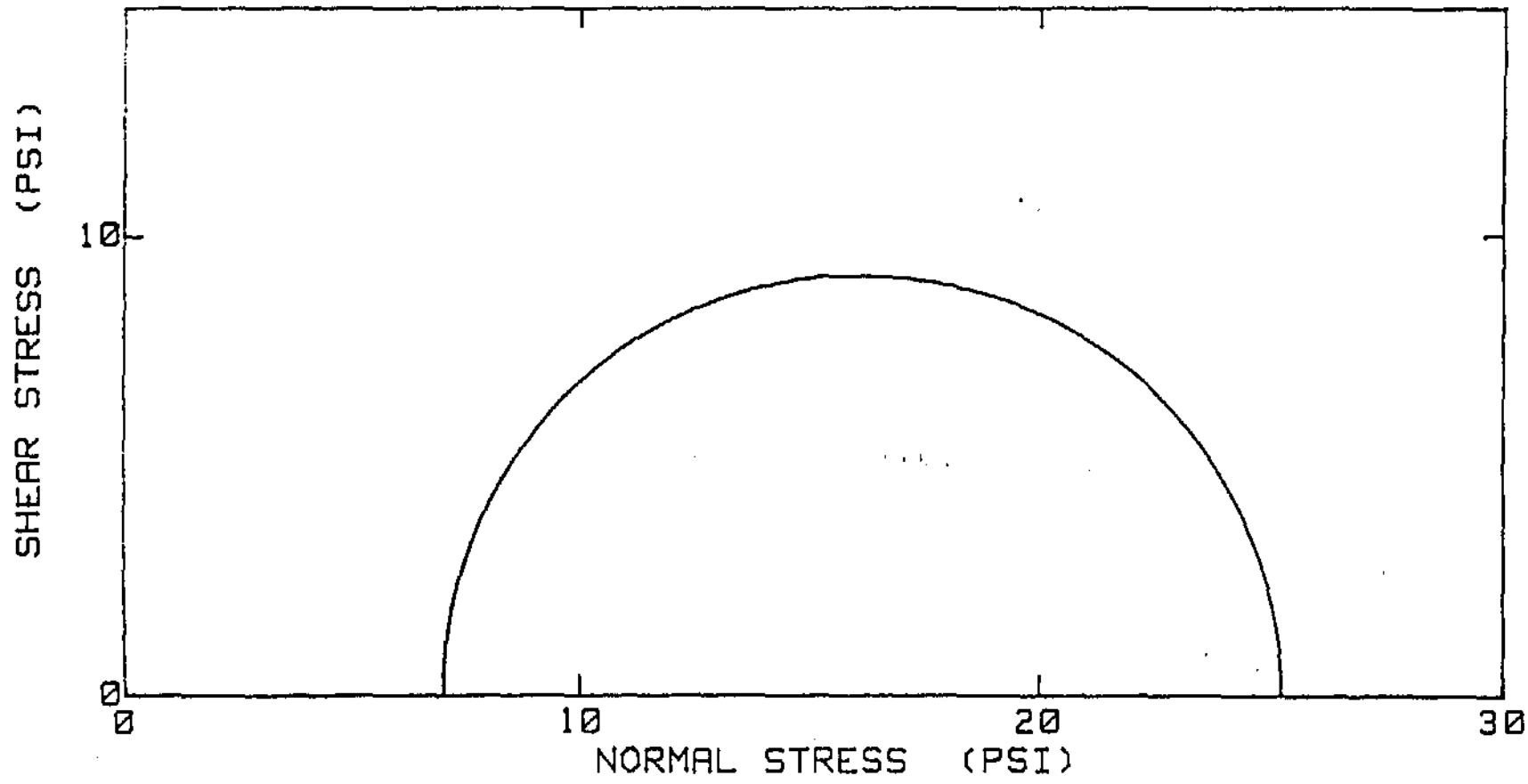
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
W.O. # A27153
BORING # C-1
SAMPLE #
DEPTH: 4.5'

DATE : 16 Apr 1996 10:00:05

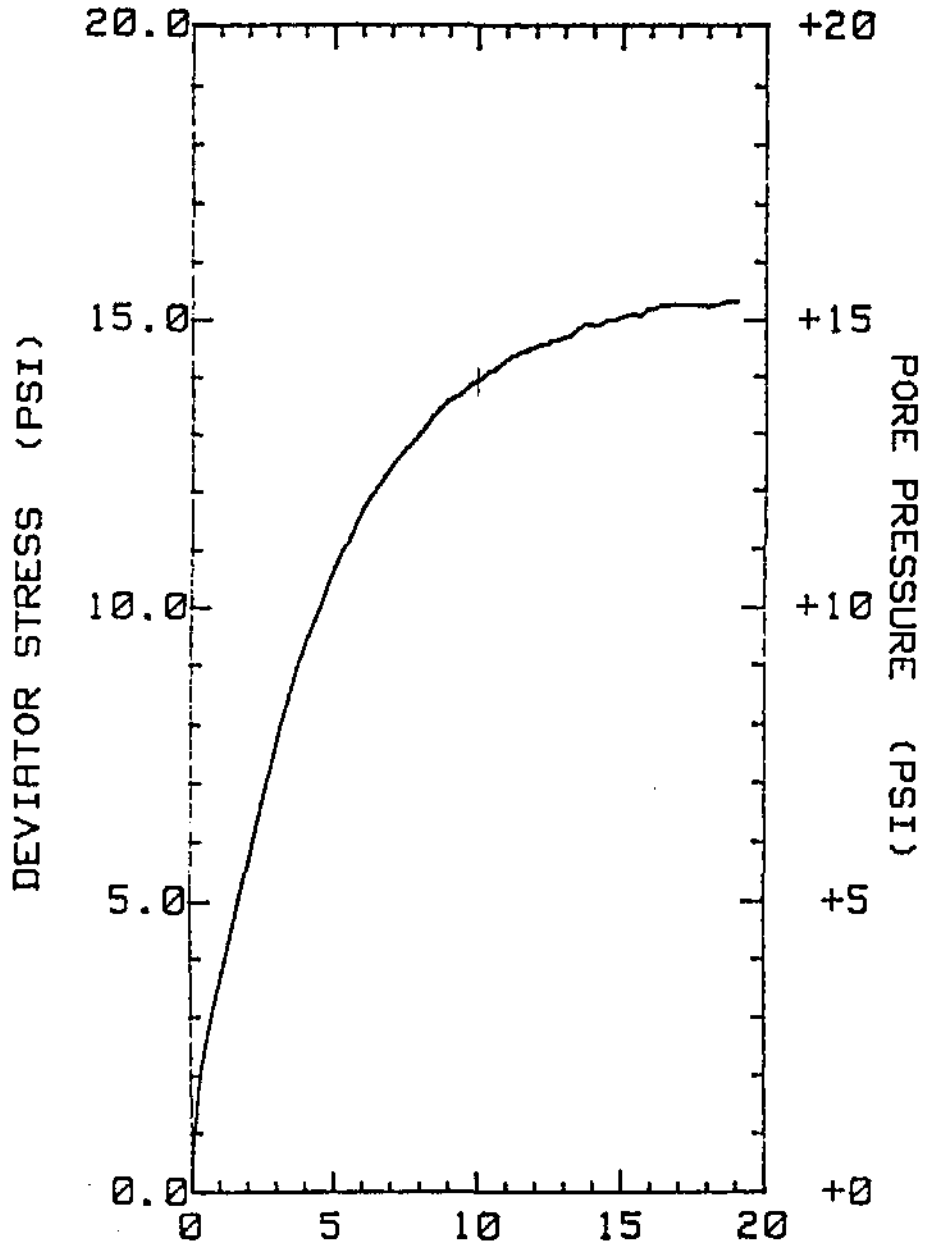
LAB # T97036; $\bar{\sigma_3}$ = 7.0 psi; γ_d = 86.3 pcf



ALASKA TESTLAB

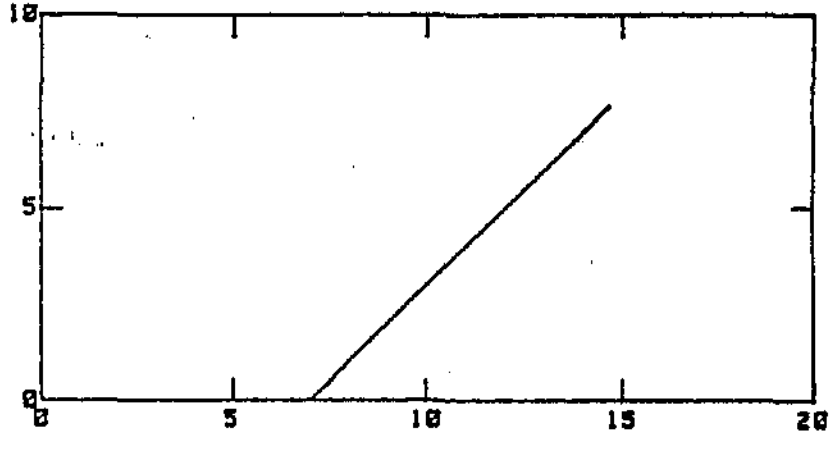
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # C-1 DEPTH : 7.8'
SAMPLE #
INITIAL DRY DENSITY: 91.4 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97032
DATE: 15 Apr 1996 12:56:34



ALASKA TESTLAB

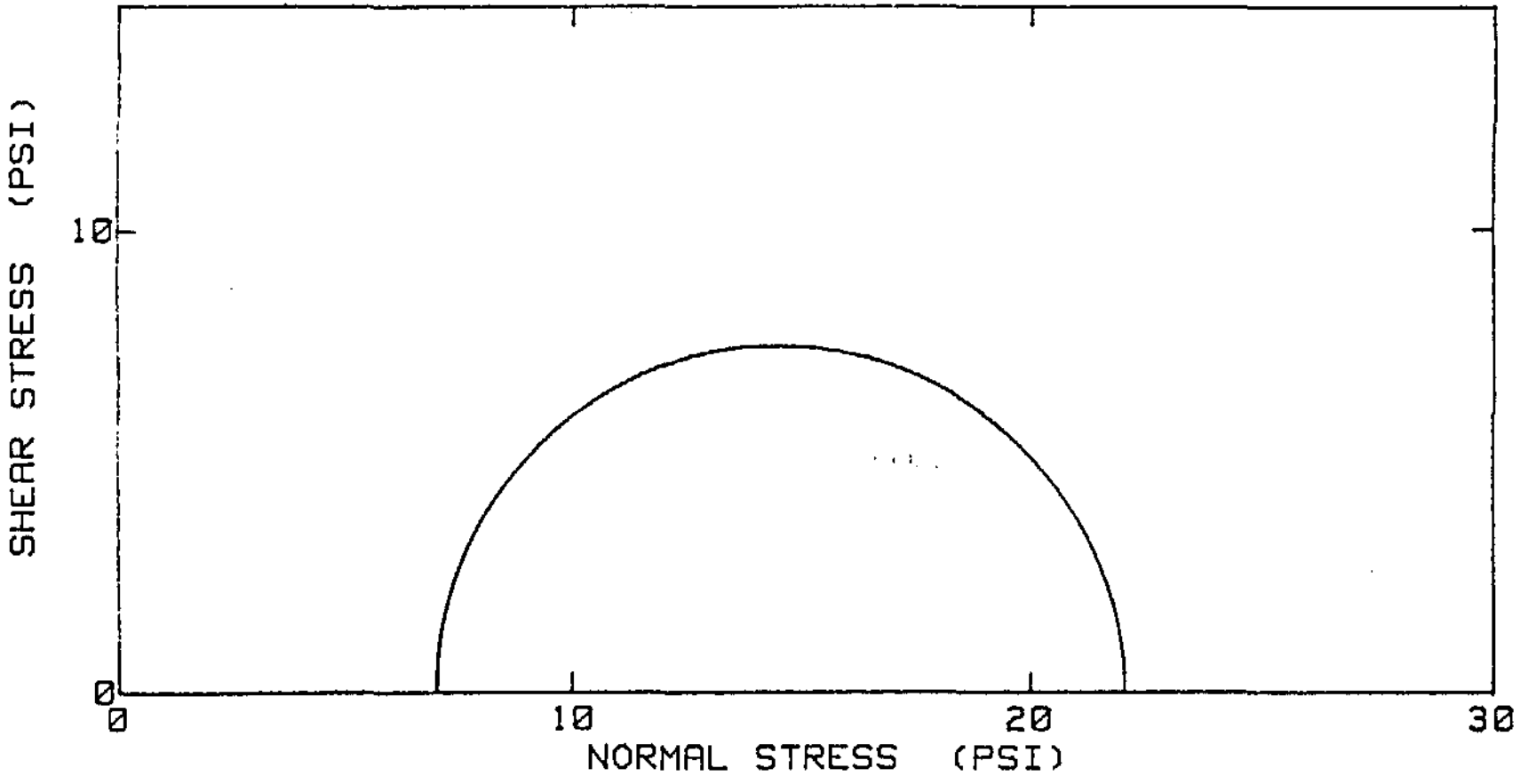
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # C-1
SAMPLE #
DEPTH: 7.0'

DATE : 15 Apr 1996 12:56:34

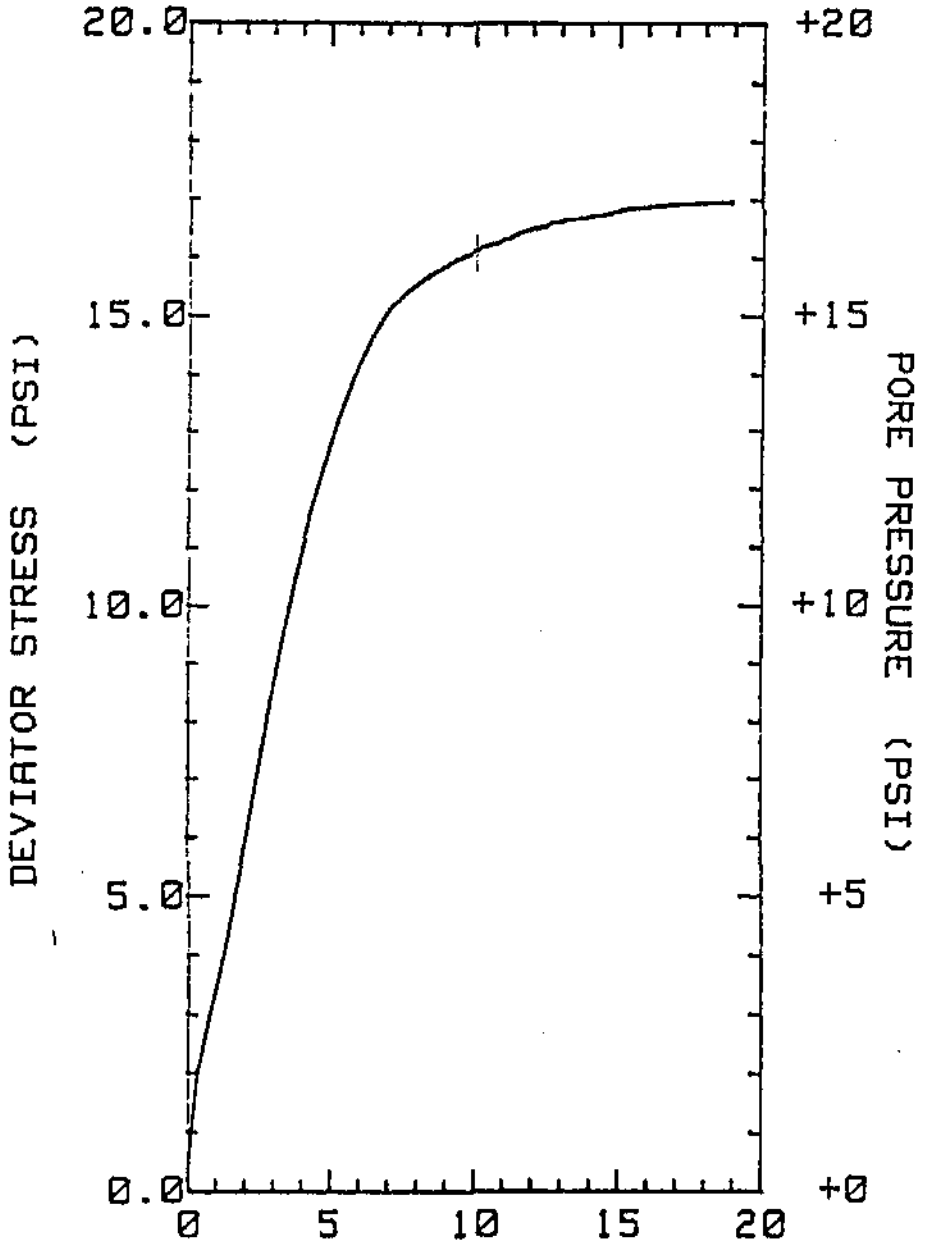
LAB # T97032; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 91.4 pcf



ALASKA TESTLAB

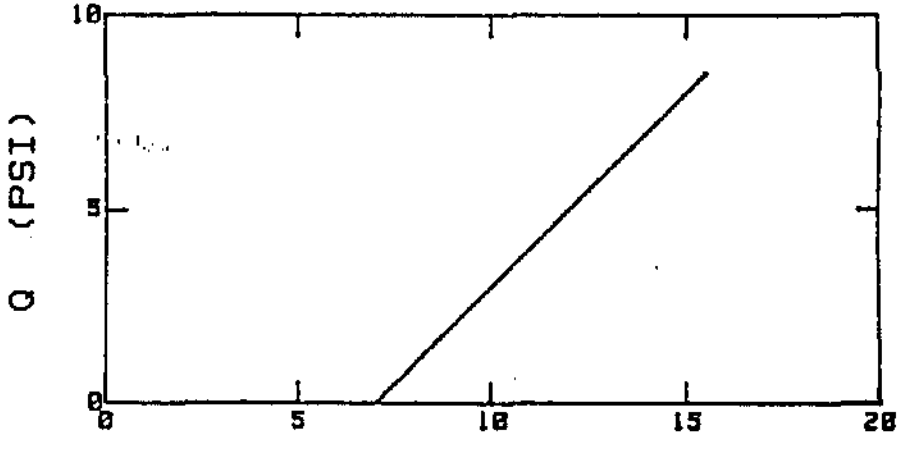
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # C-2 DEPTH : 1.0'
SAMPLE #
INITIAL DRY DENSITY: 76.7 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97037
DATE: 16 Apr 1996 10:49:37



ALASKA TESTLAB

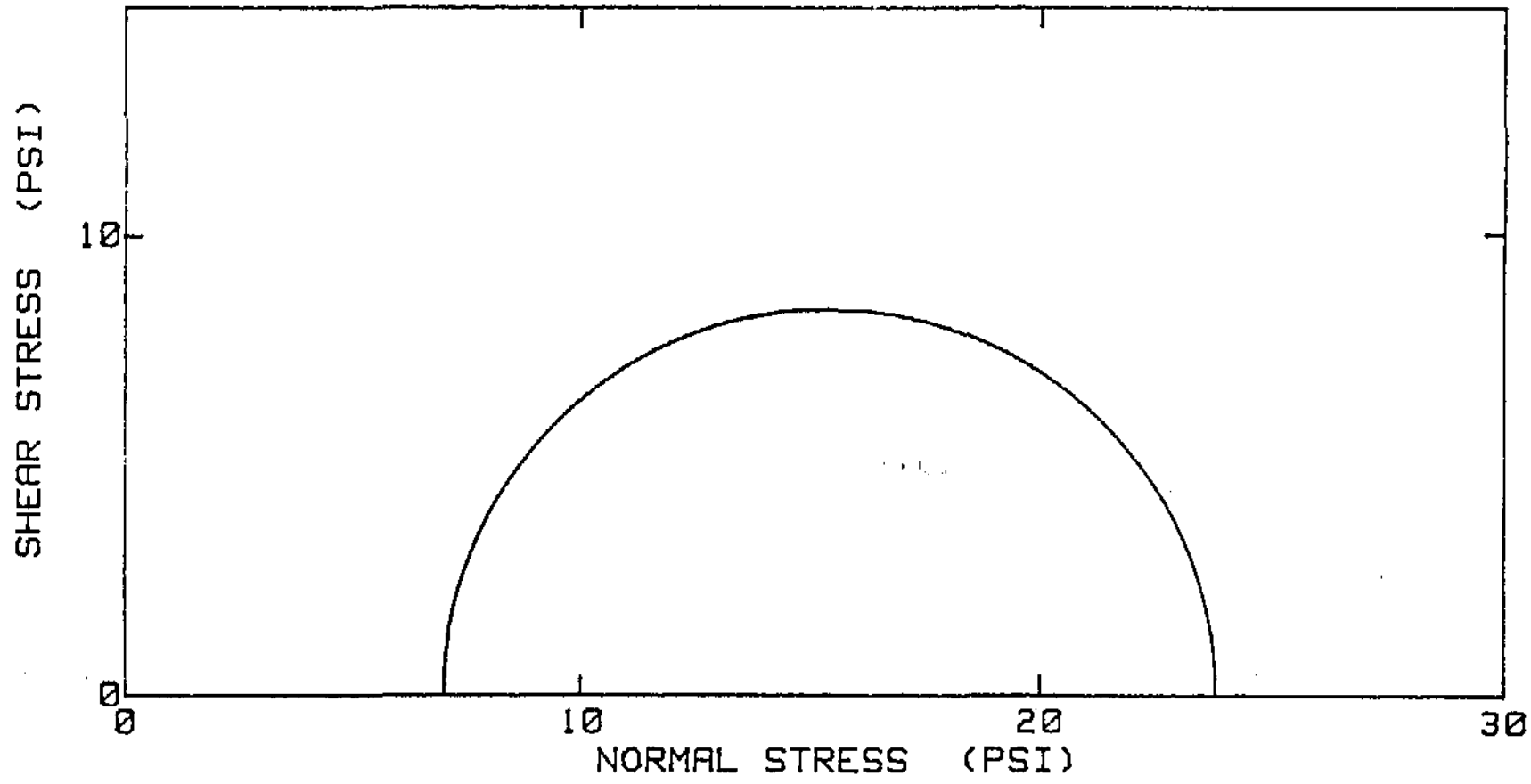
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # C-2
SAMPLE #
DEPTH: 1.0'

DATE : 16 Apr 1996 10:49:37

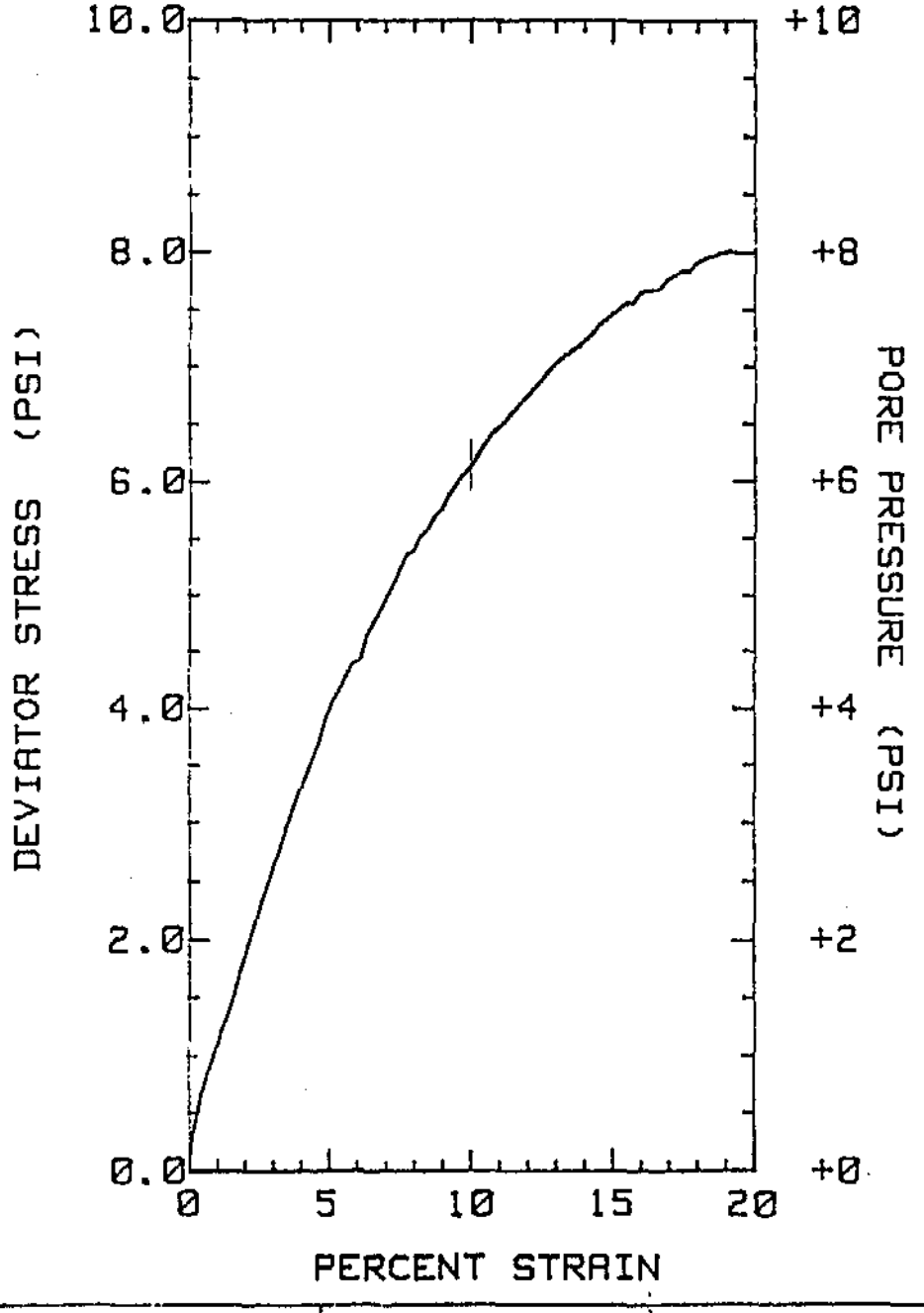
LAB # T97037; $\bar{\sigma_3}$ = 7.0 psi; γ_d = 76.7 pcf



ALASKA TESTLAB

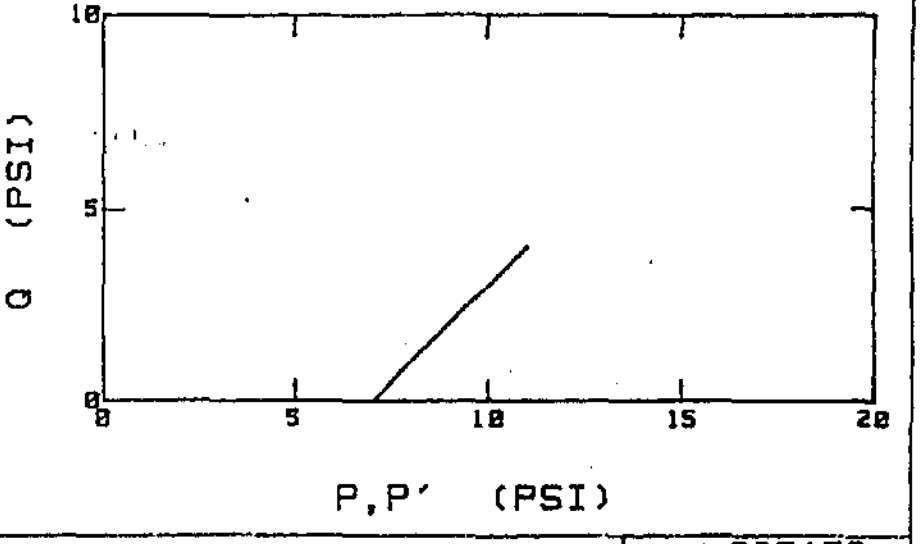
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : BURNE MILLER
WO # A27153
BORING # C-3 DEPTH : 0.0'
SAMPLE #
INITIAL DRY DENSITY: 78.9 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97035
DATE: 16 Apr 1996 09:19:00



ALASKA TESTLAB

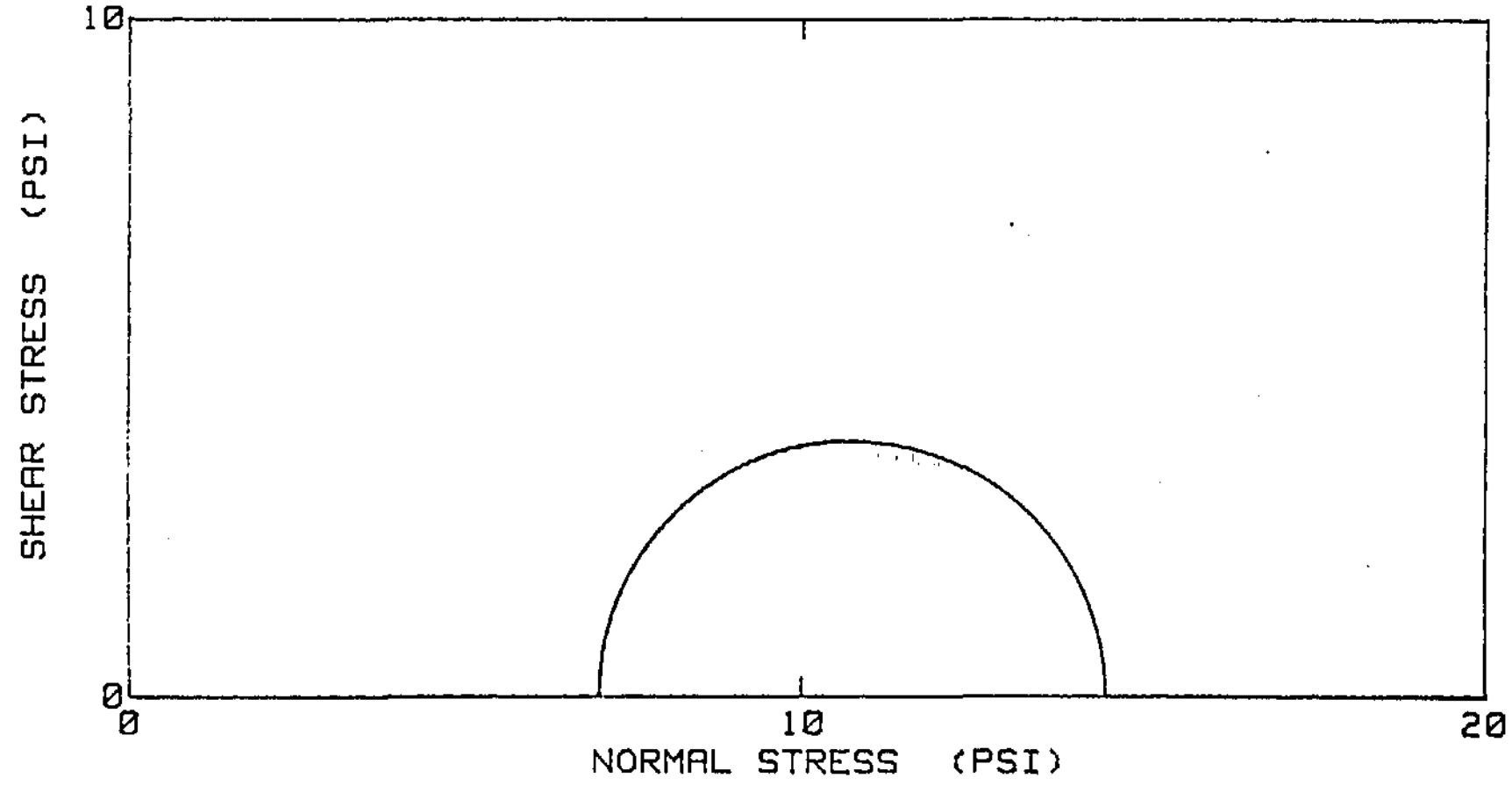
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
W.O. # A27153
BORING # C-3
SAMPLE #
DEPTH: 0.0'

DATE : 16 Apr 1996 09:19:00

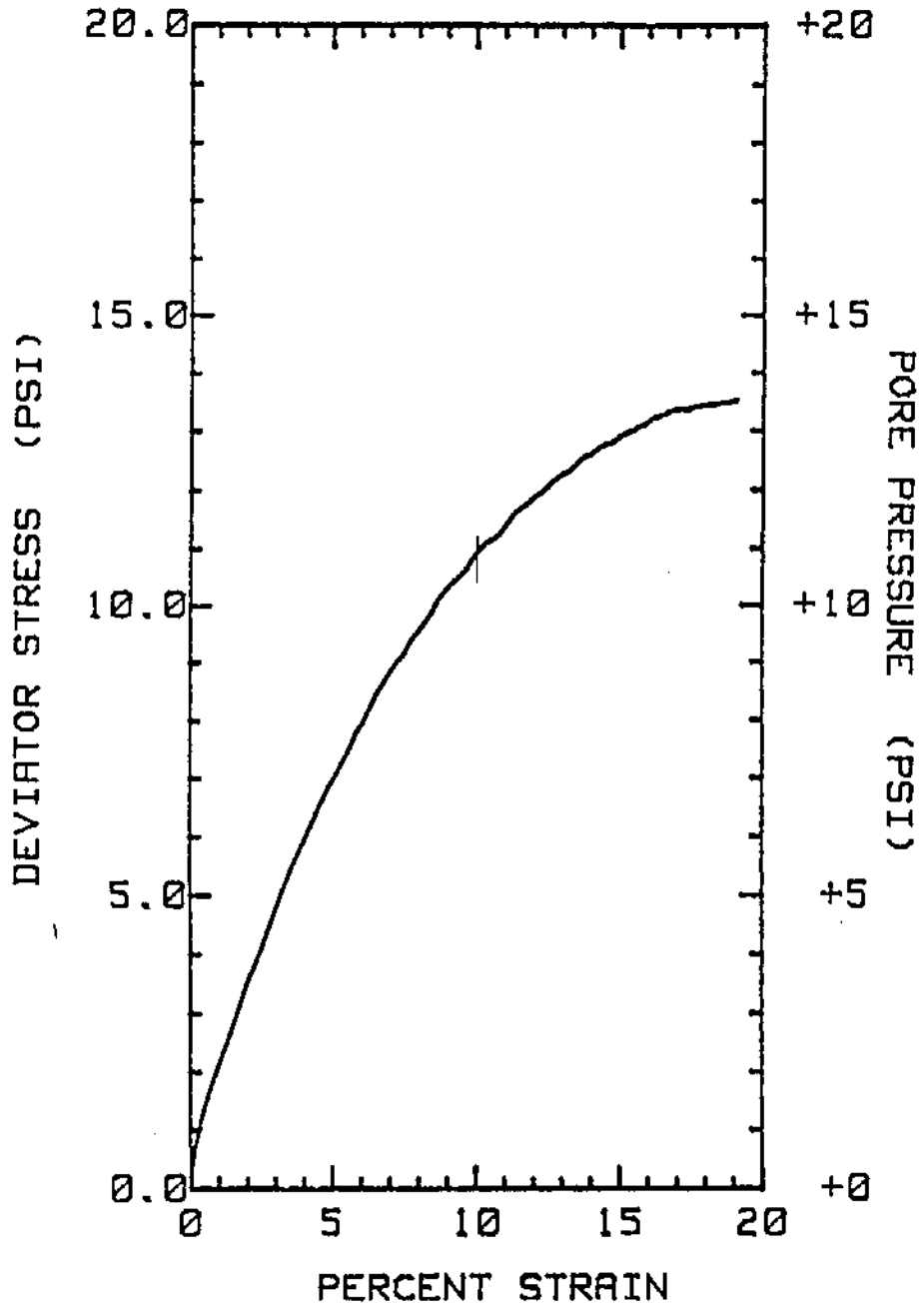
LAB # T97035; σ_3 = 7.0 psi; γ_d = 78.9 pcf



ALASKA TESTLAB

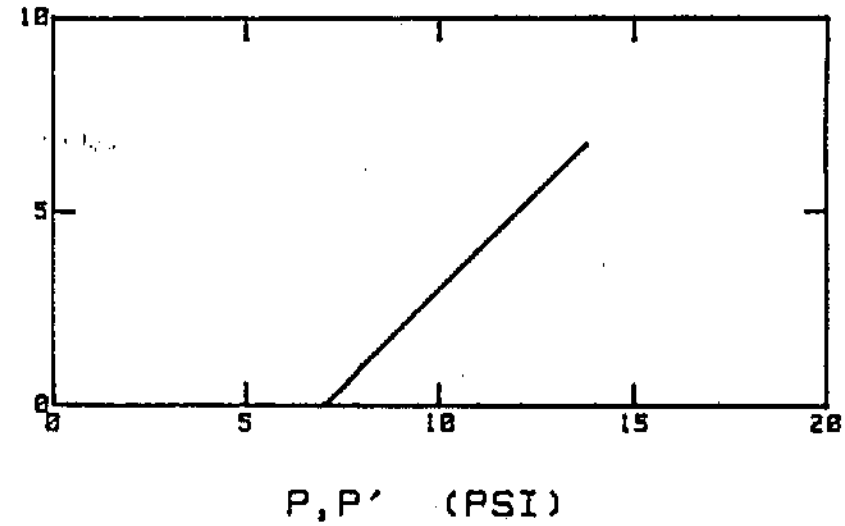
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # C-3 DEPTH : 5.8'
SAMPLE #
INITIAL DRY DENSITY: 89.3 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97039
DATE: 16 Apr 1996 14:08:43



ALASKA TESTLAB

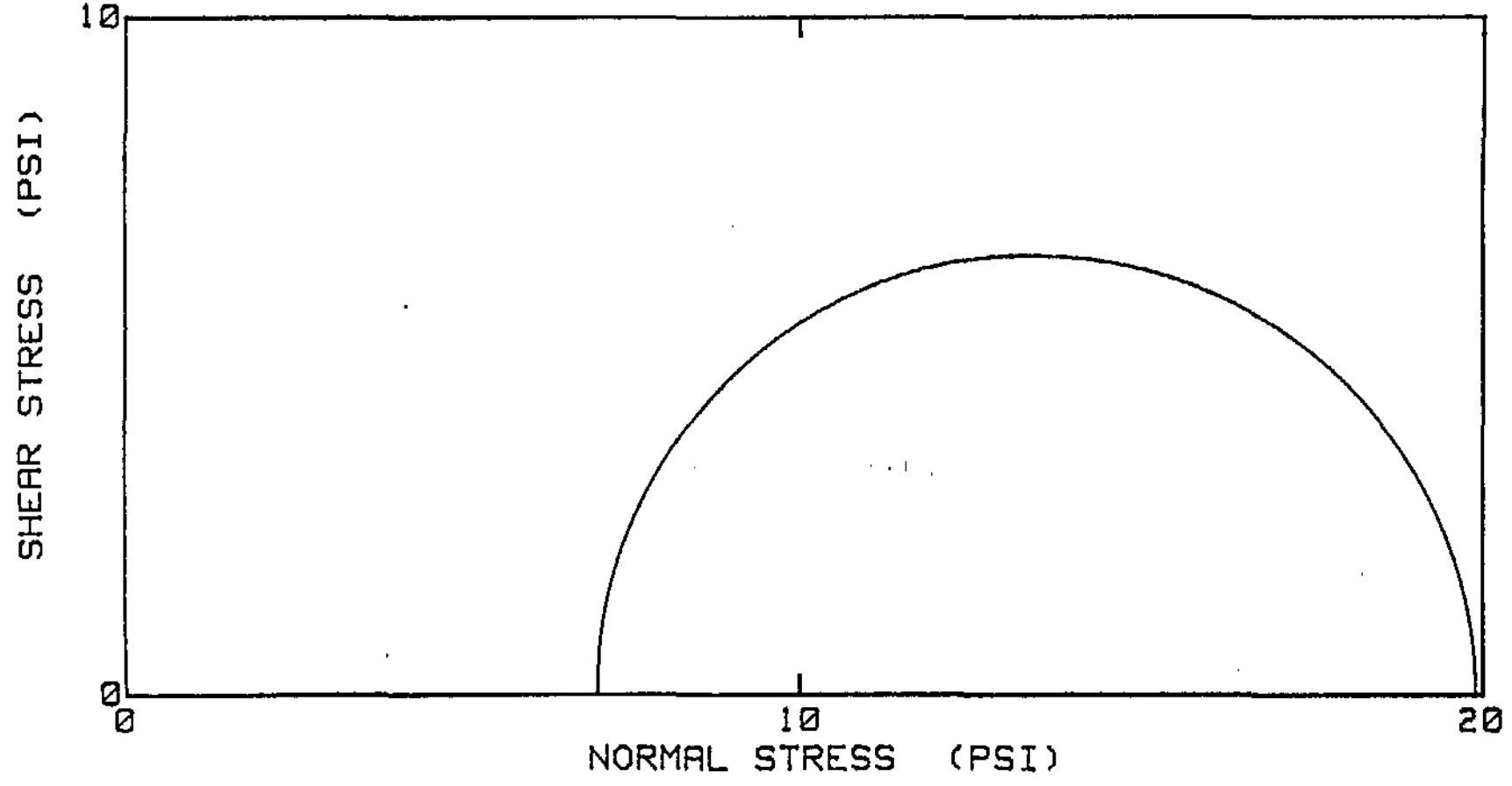
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
W.O. # A27153
BORING # C-3
SAMPLE #
DEPTH: 5.0'

DATE : 16 Apr 1996 14:08:43

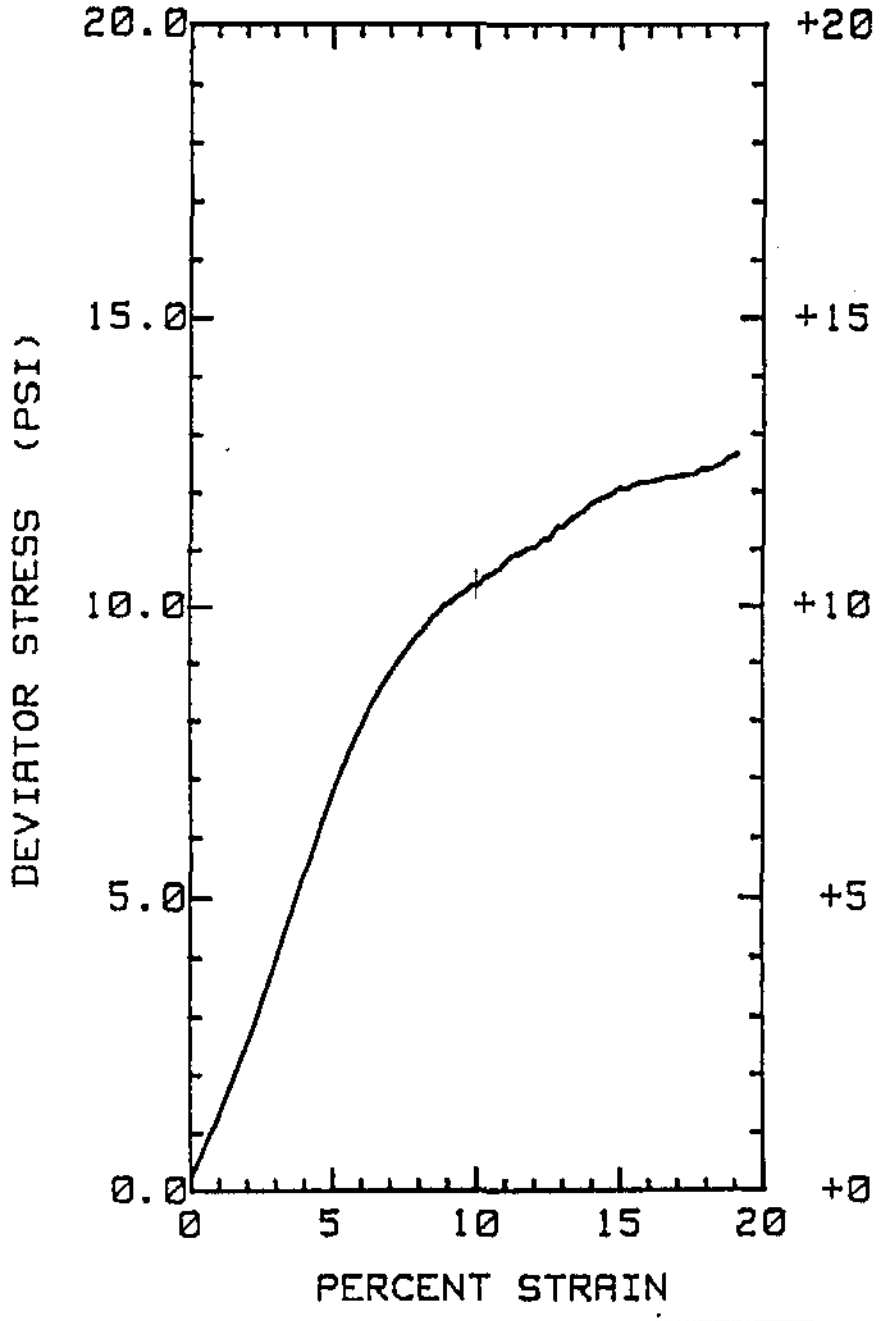
LAB # T97039; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 89.3 pcf



ALASKA TESTLAB

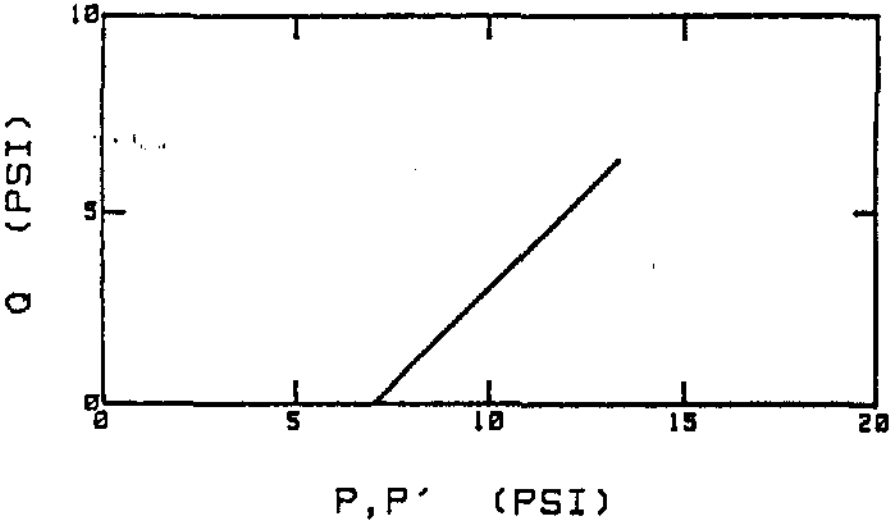
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : BURNE MILLER
WO # A27153
BORING # C-4 DEPTH : 2.0'
SAMPLE #
INITIAL DRY DENSITY: 82.5 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97038
DATE: 16 Apr 1998 13:27:37



ALASKA TESTLAB

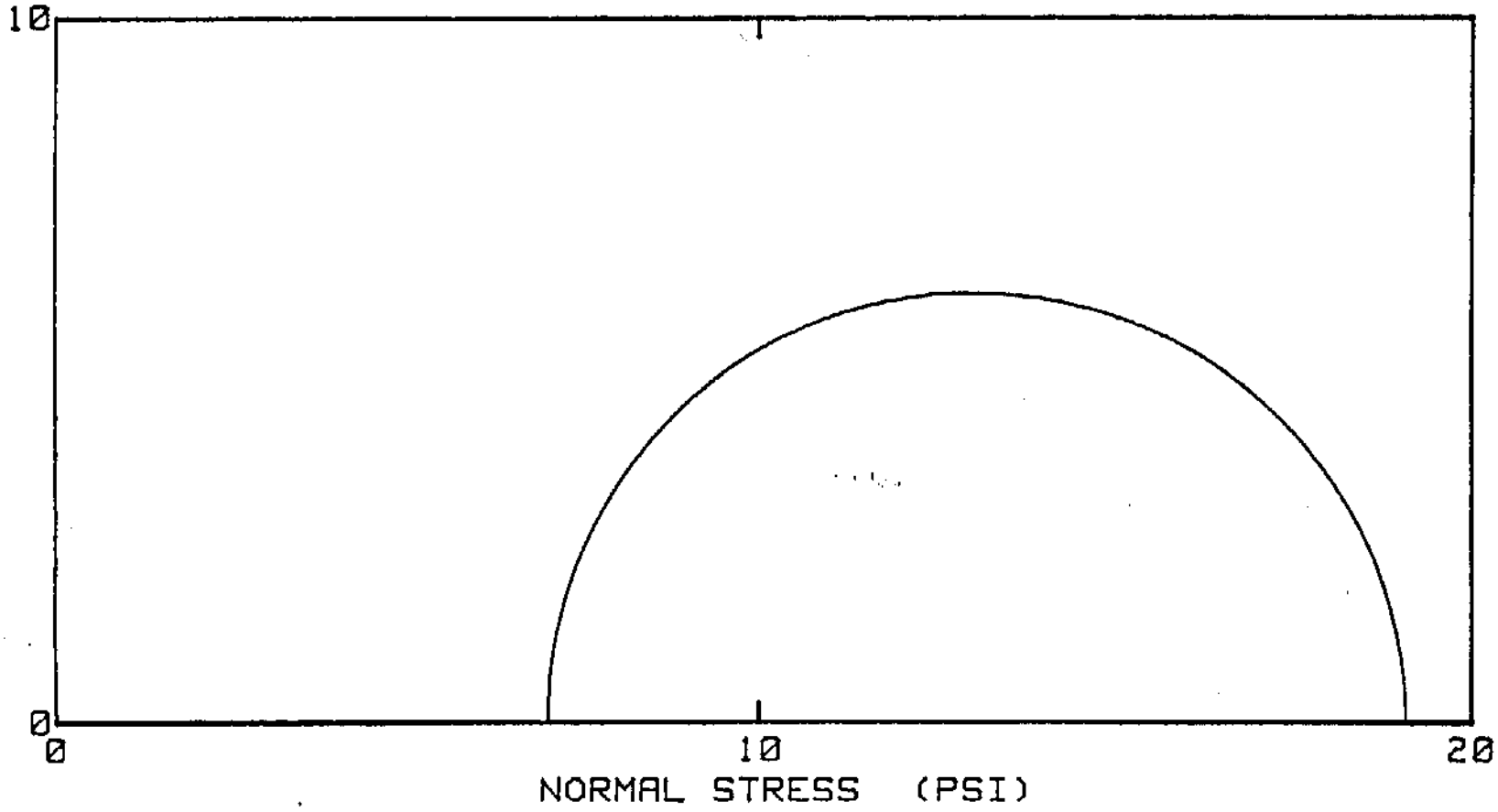
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # C-4
SAMPLE #
DEPTH: 2.0'

DATE : 16 Apr 1996 13:27:37

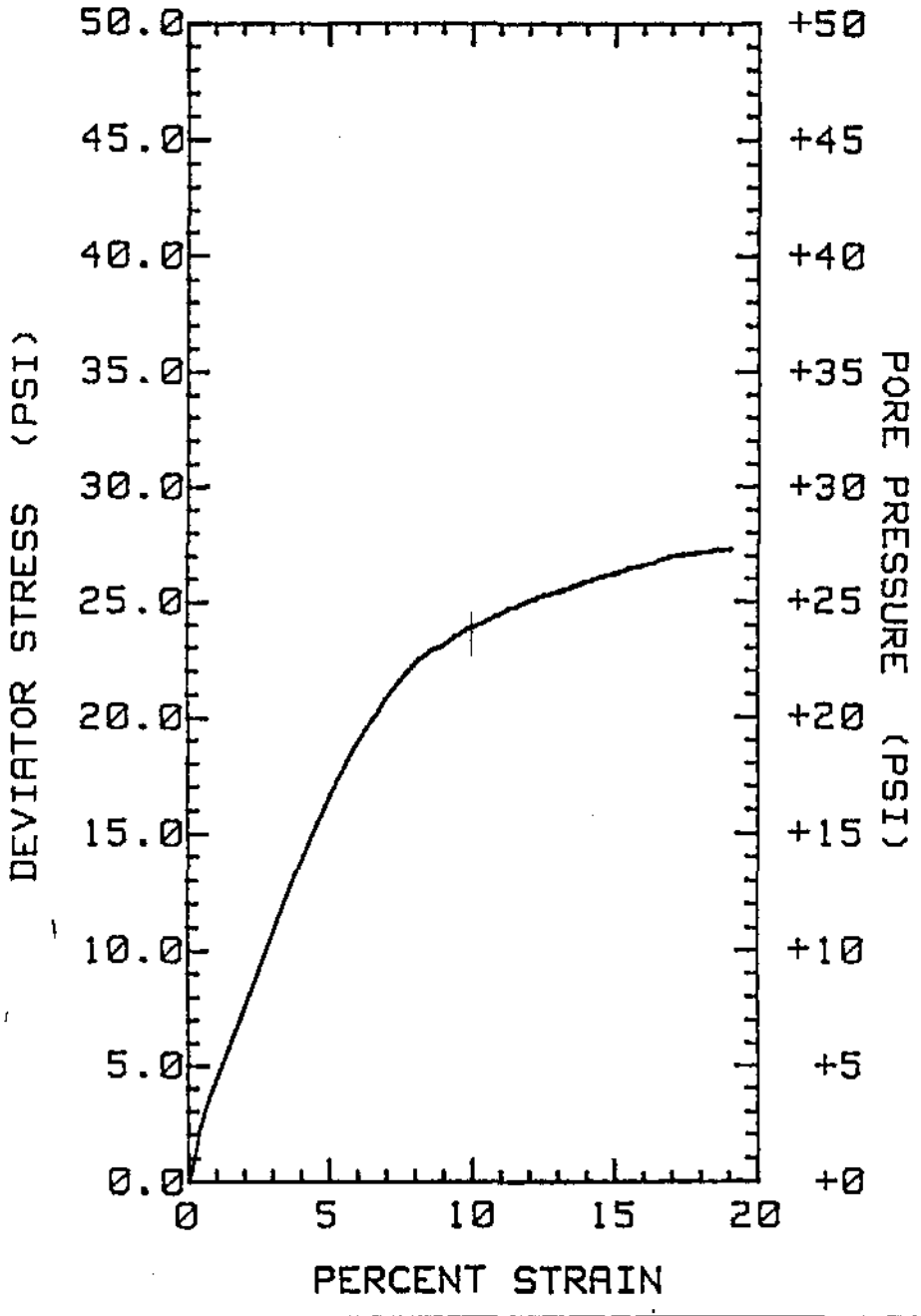
LAB # T97038; σ_3 = 7.0 psi; γ_d = 82.5 pcf



ALASKA TESTLAB

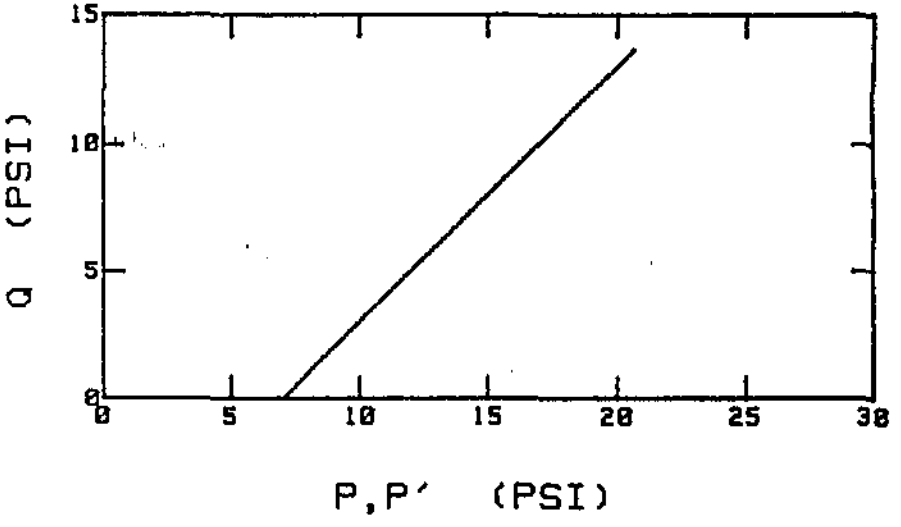
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-1 DEPTH : 3.0'
SAMPLE #
INITIAL DRY DENSITY: 74.1 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97019
DATE: 3 Apr 1996 15:05:33



ALASKA TESTLAB

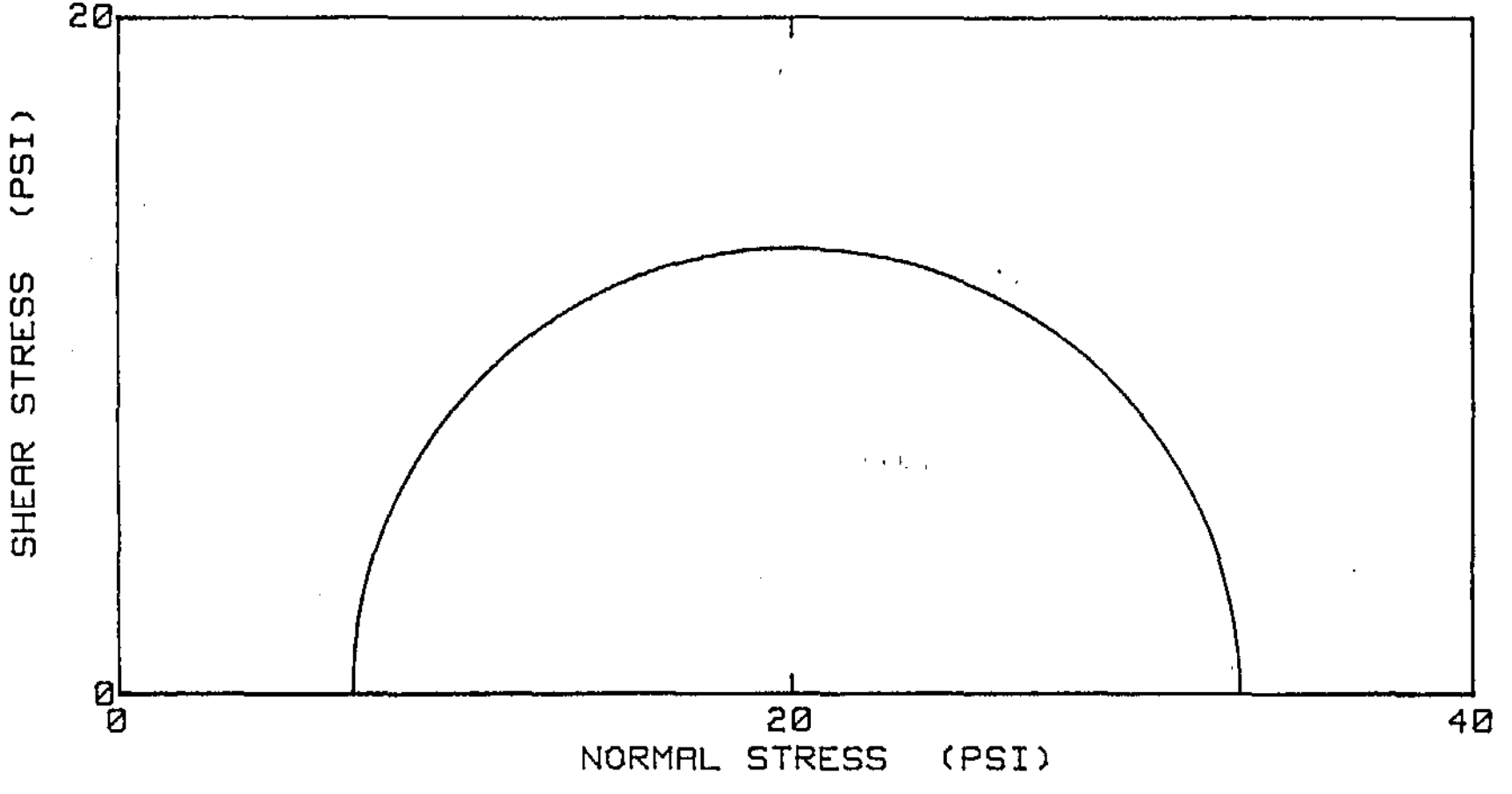
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-1
SAMPLE #
DEPTH: 3.0'

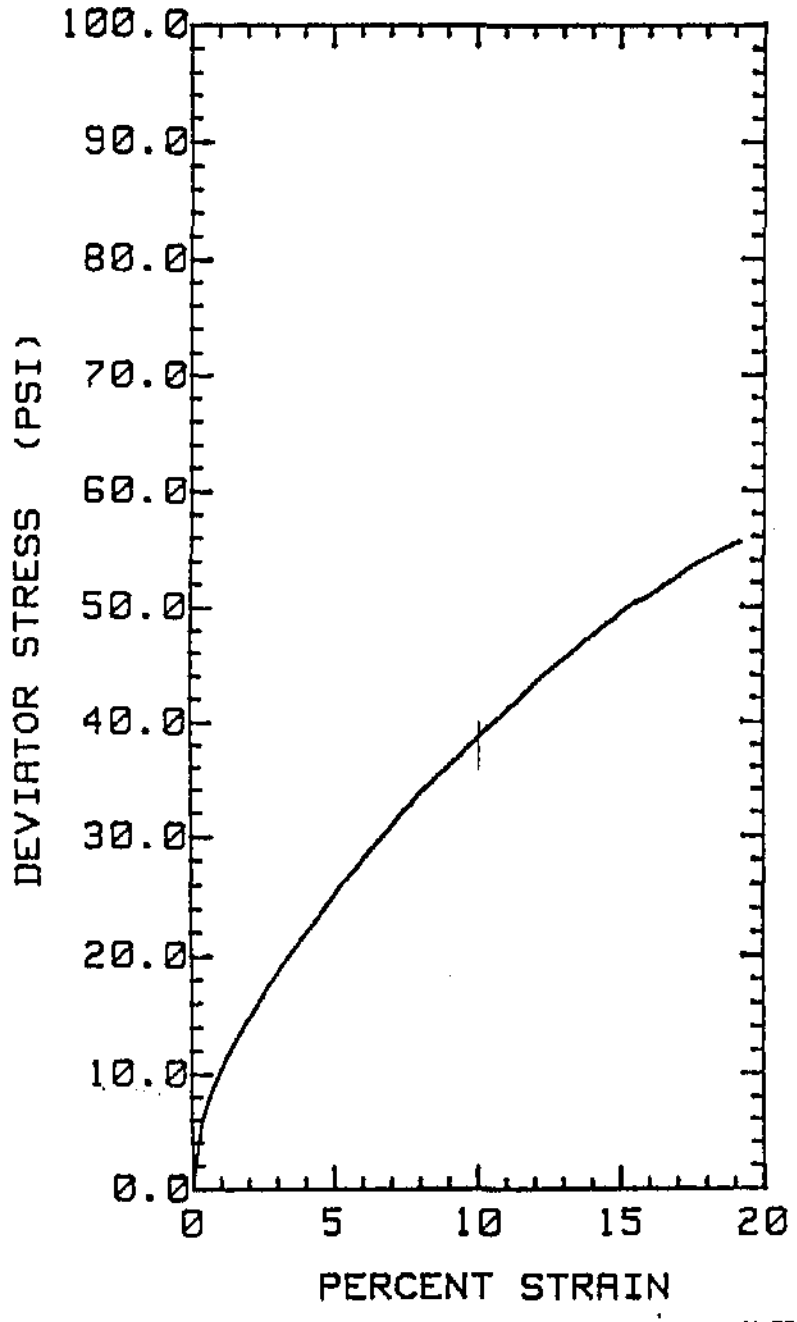
DATE : 3 Apr 1996 15:05:33

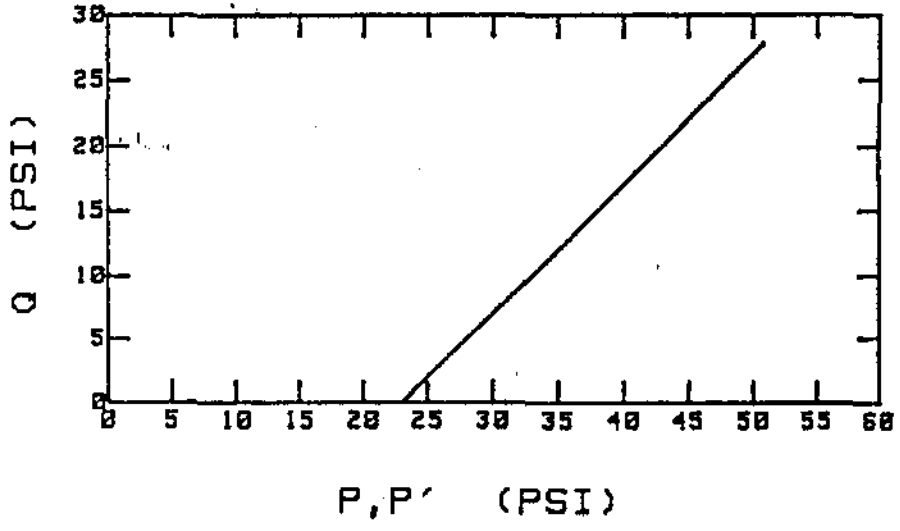
LAB # T97019; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 74.1 pcf



ALASKA TESTLAB	*Mohr Diagram - UU Tests*	WO # A27153 FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-1 DEPTH : 3.8
SAMPLE #
INITIAL DRY DENSITY: 82.5 pcf
EFFECTIVE CONFINING PRESSURE: 23.0 psi
FINAL MOISTURE CONTENT: 44.5 percent
LABORATORY # T97020
DATE: 4 Apr 1996 17:01:37





ALASKA TESTLAB

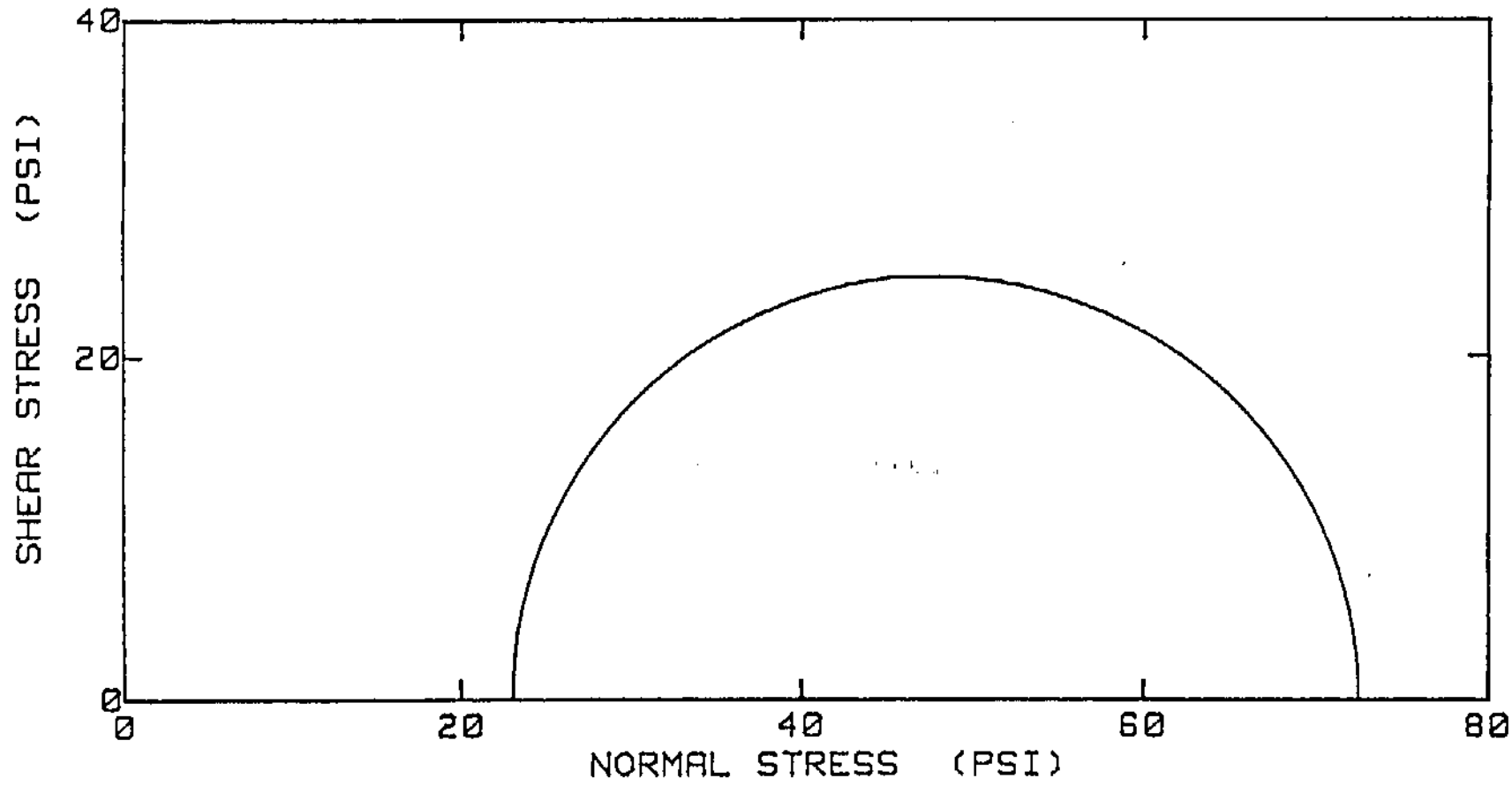
Consolidated Drained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-1
SAMPLE #
DEPTH: 3.0

DATE : 4 Apr 1996 17:01:37

LAB # T97020; σ_3 = 23.0 psi; γ_d = 62.5 pcf



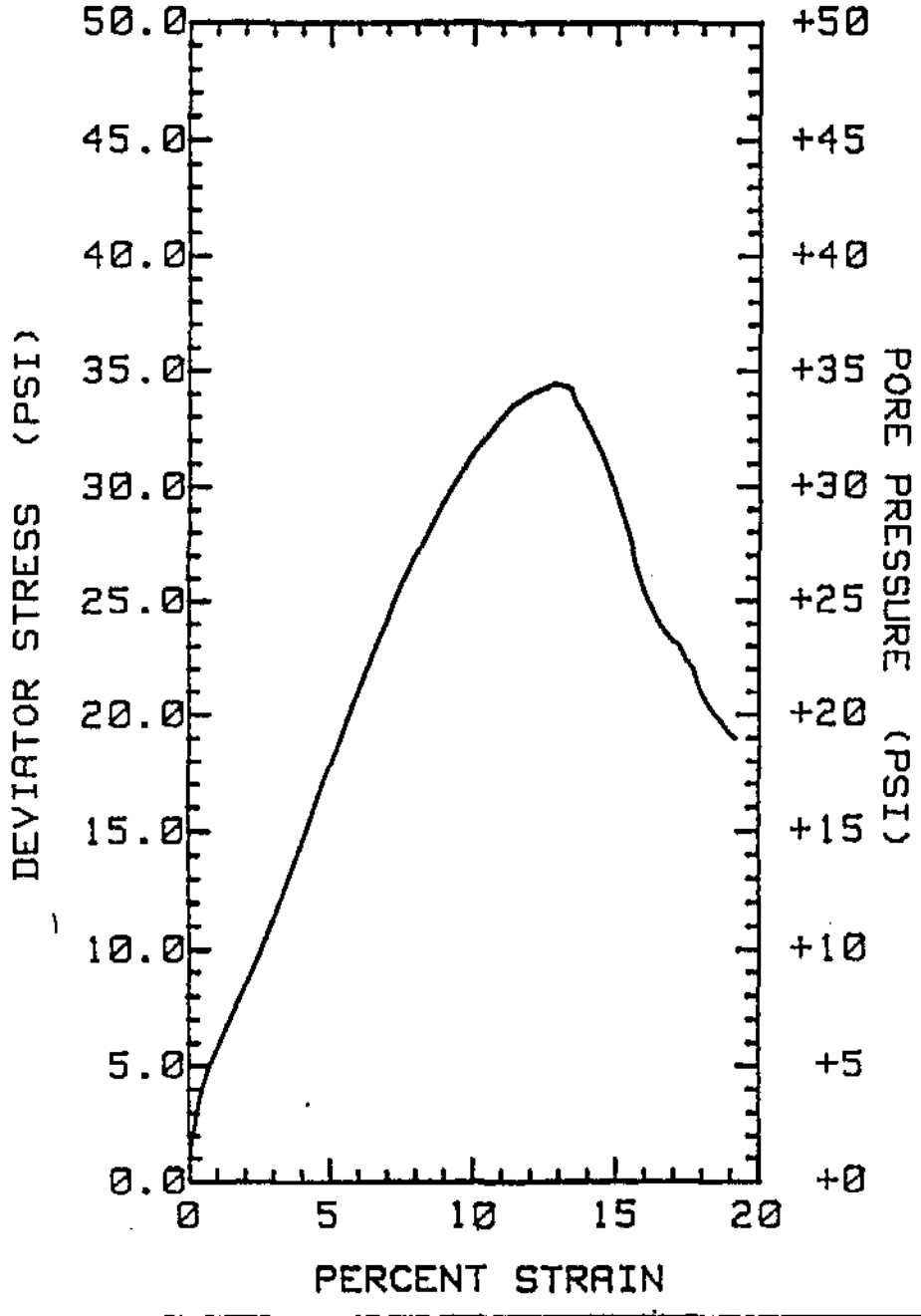
ALASKA TESTLAB

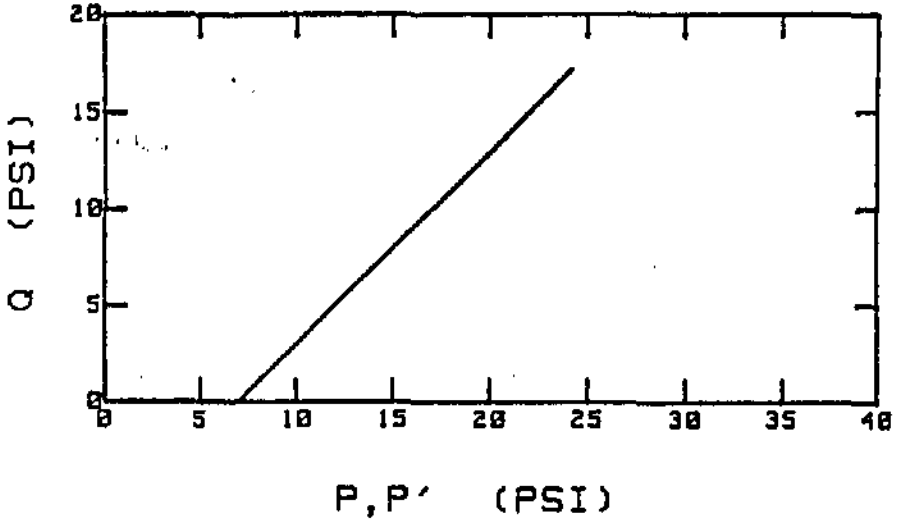
Mohr Diagram - CD Tests

WO # A27153
FIGURE

PROJECT : LIBBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-1 DEPTH : 5.5'
SAMPLE #
INITIAL DRY DENSITY: 92.9 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # CT97021
DATE: 4 Apr 1996 12:13:42





ALASKA TESTLAB

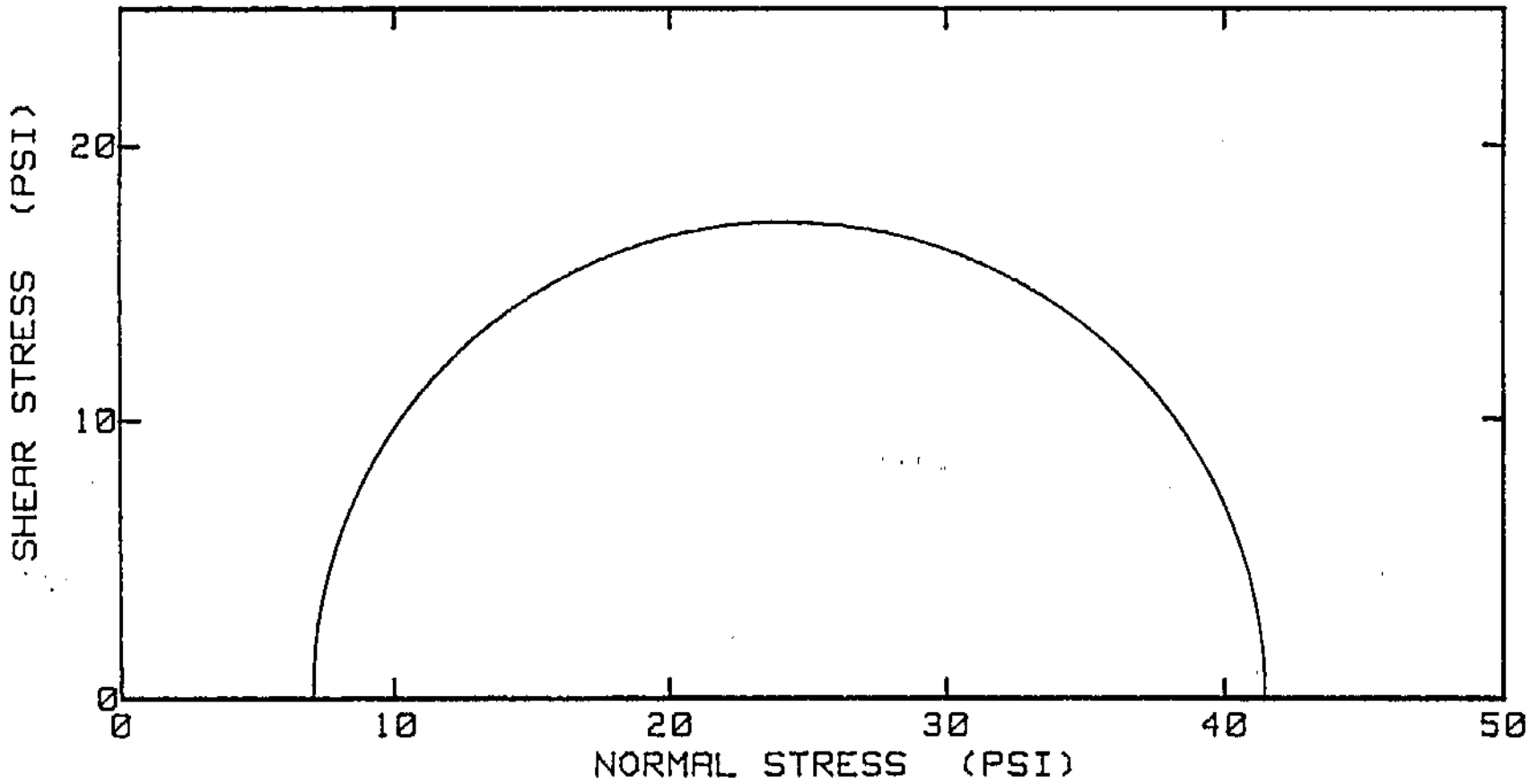
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-1
SAMPLE #
DEPTH: 5.5'

DATE : 4 Apr 1996 12:13:42

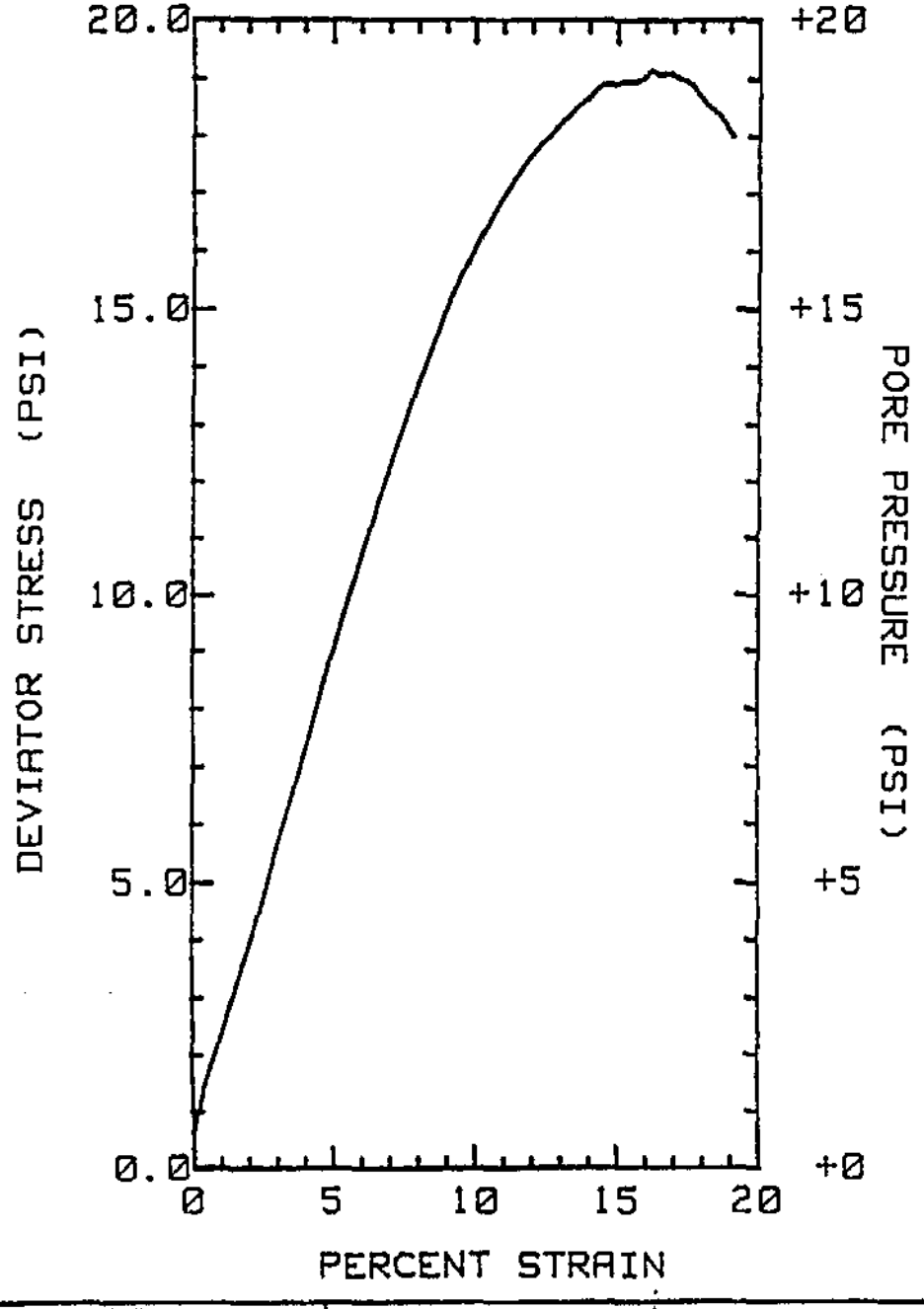
LAB # CT97021; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 92.9 pcf



ALASKA TESTLAB

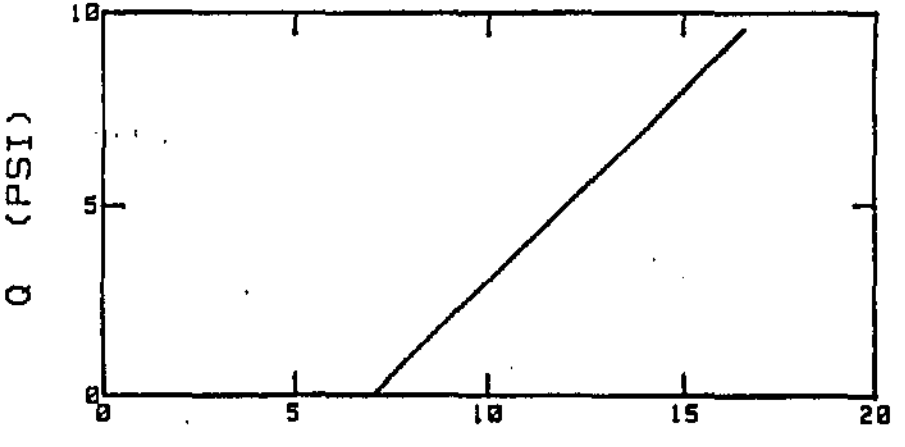
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-1 DEPTH : 8.5'
SAMPLE #
INITIAL DRY DENSITY: 99.3 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97040
DATE: 16 Apr 1996 14:47:14



ALASKA TESTLAB

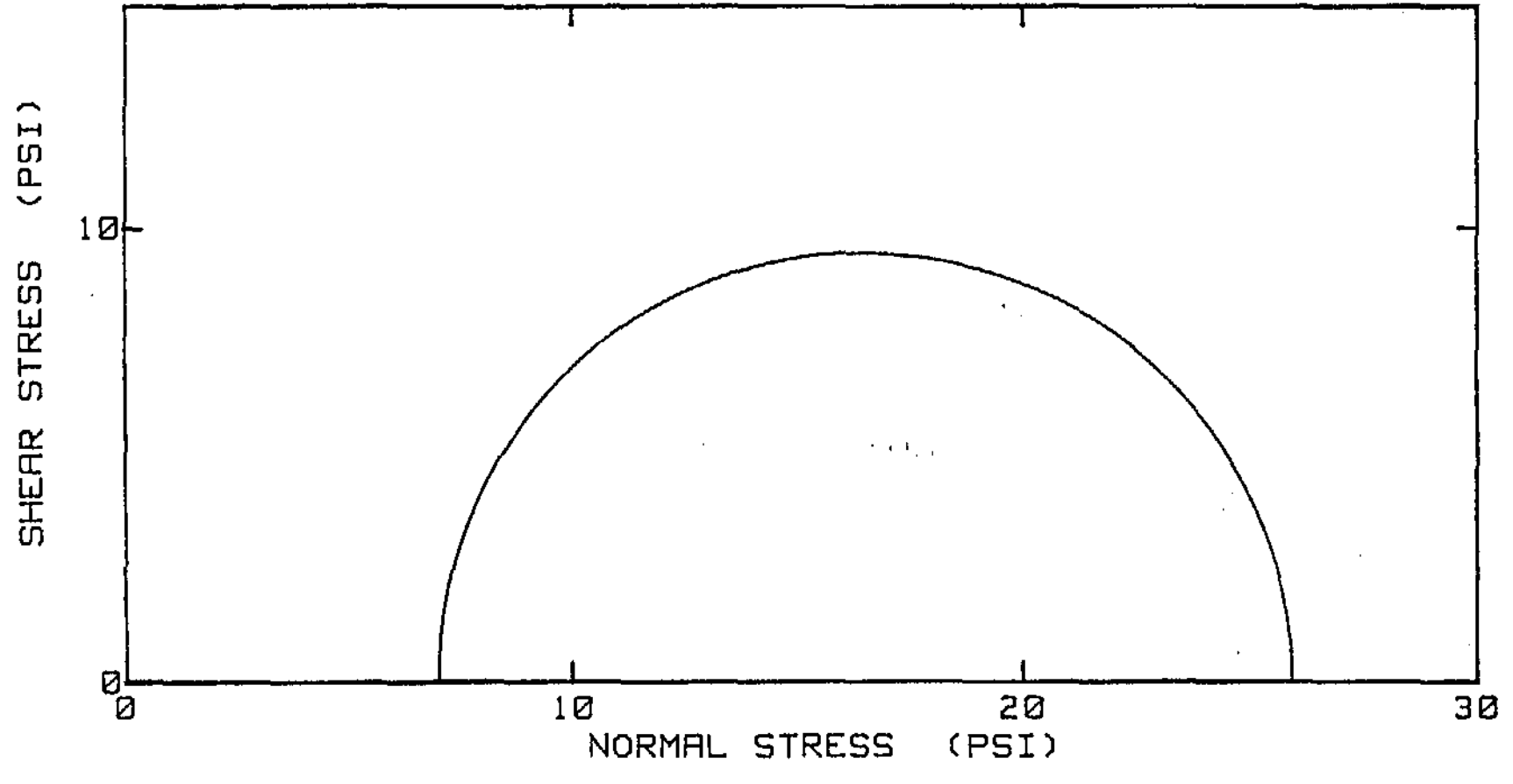
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-1
SAMPLE #
DEPTH: 8.5'

DATE : 16 Apr 1996 14:47:14

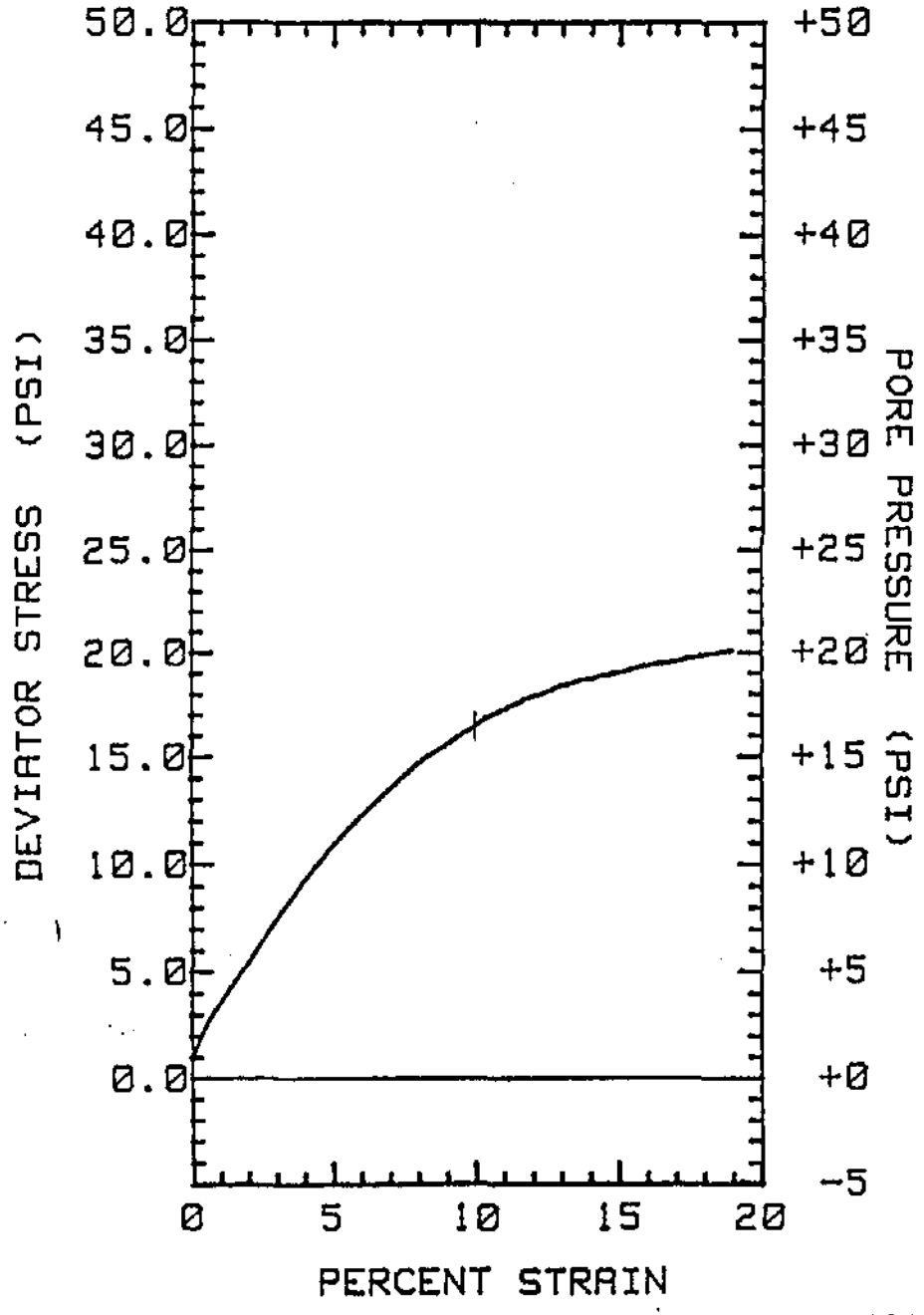
LAB # T97040; σ_3 = 7.0 psi; γ_d = 99.3 pcf



ALASKA TESTLAB

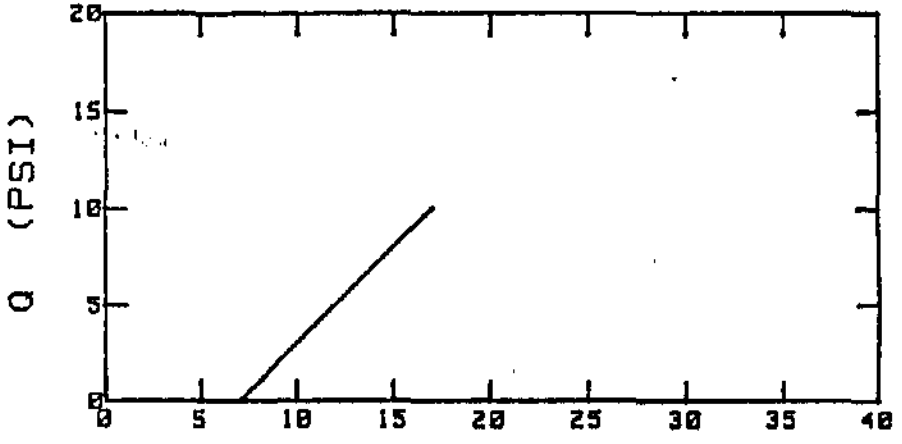
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-1 DEPTH : 11.0
SAMPLE #
INITIAL DRY DENSITY: 88.4 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

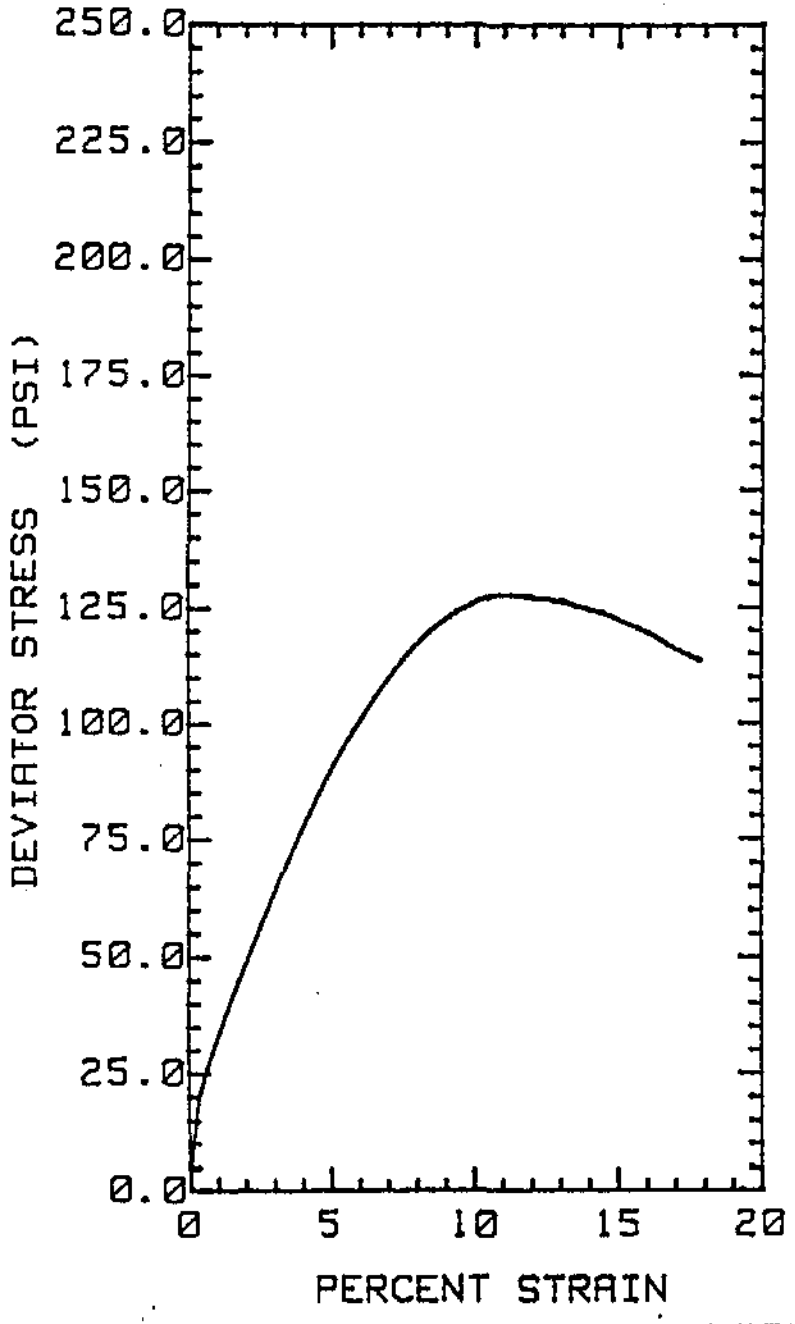
LABORATORY # T97043
DATE: 18 Apr 1996 11:23:58



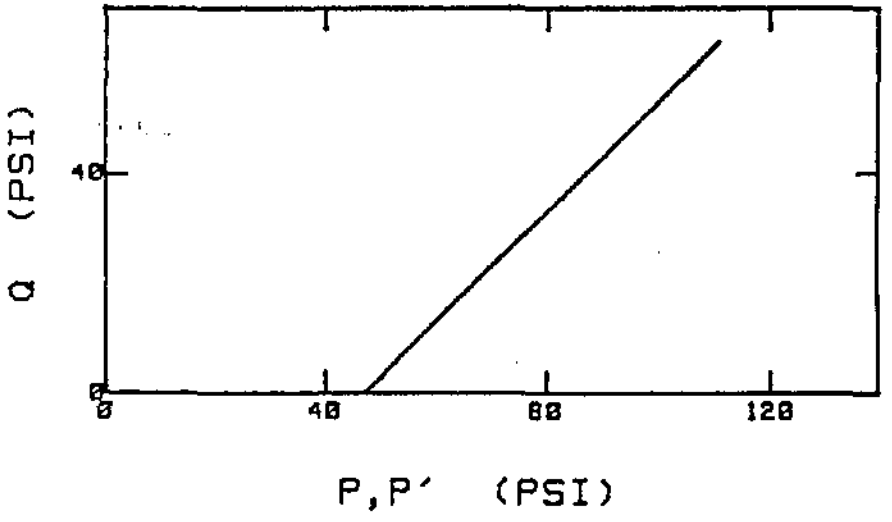
ALASKA TESTLAB

Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-2 DEPTH : 7.0'
SAMPLE #
INITIAL DRY DENSITY: 103.9 pcf
EFFECTIVE CONFINING PRESSURE: 47.0 psi
FINAL MOISTURE CONTENT: 15.6 percent
LABORATORY # T97028
DATE: 10 Apr 1996 20:28:09



ALASKA TESTLAB

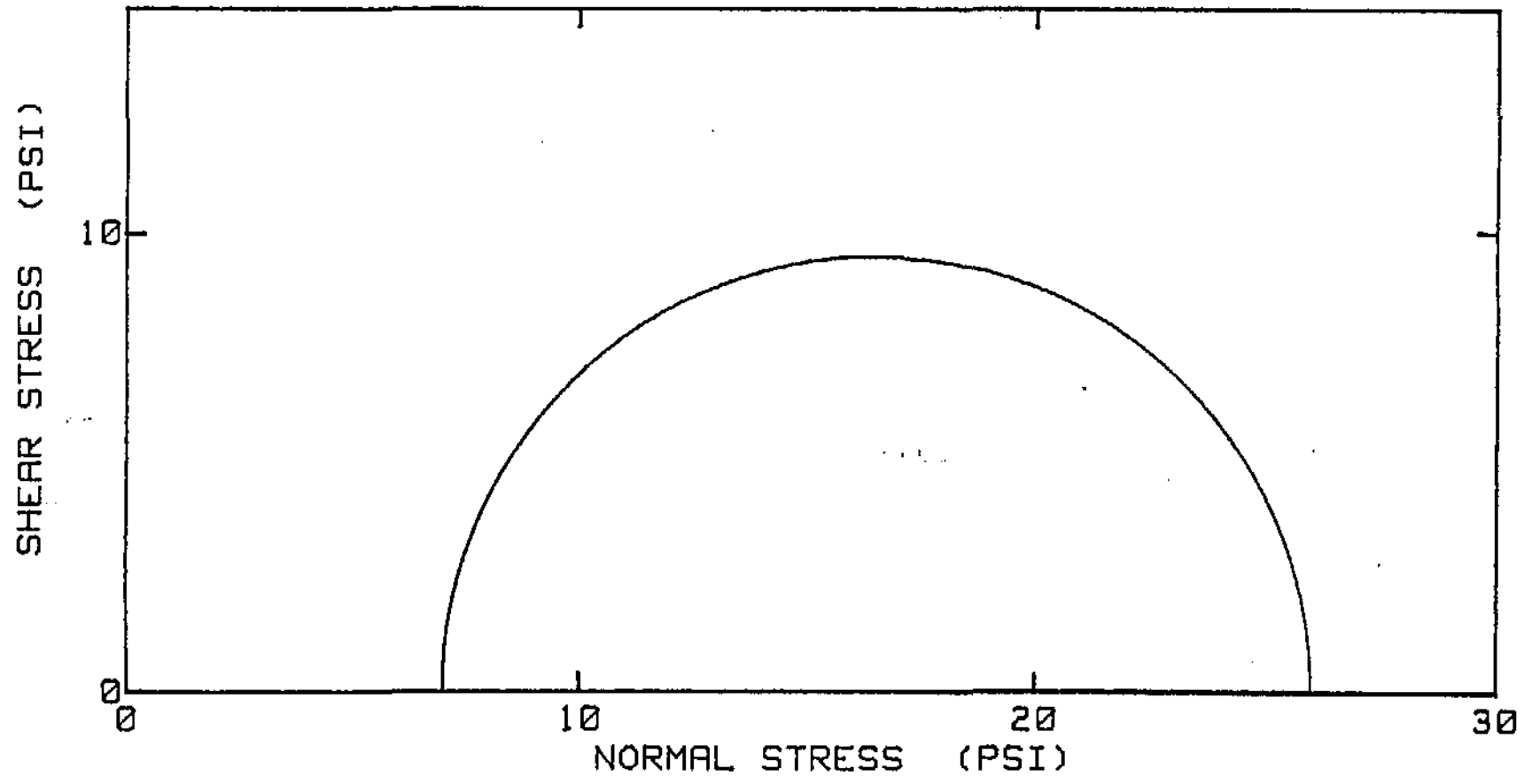
Consolidated Drained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-1
SAMPLE #
DEPTH: 11.0

DATE : 18 Apr 1996 11:23:58

LAB # T97043 ; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 88.4 pcf



ALASKA TESTLAB

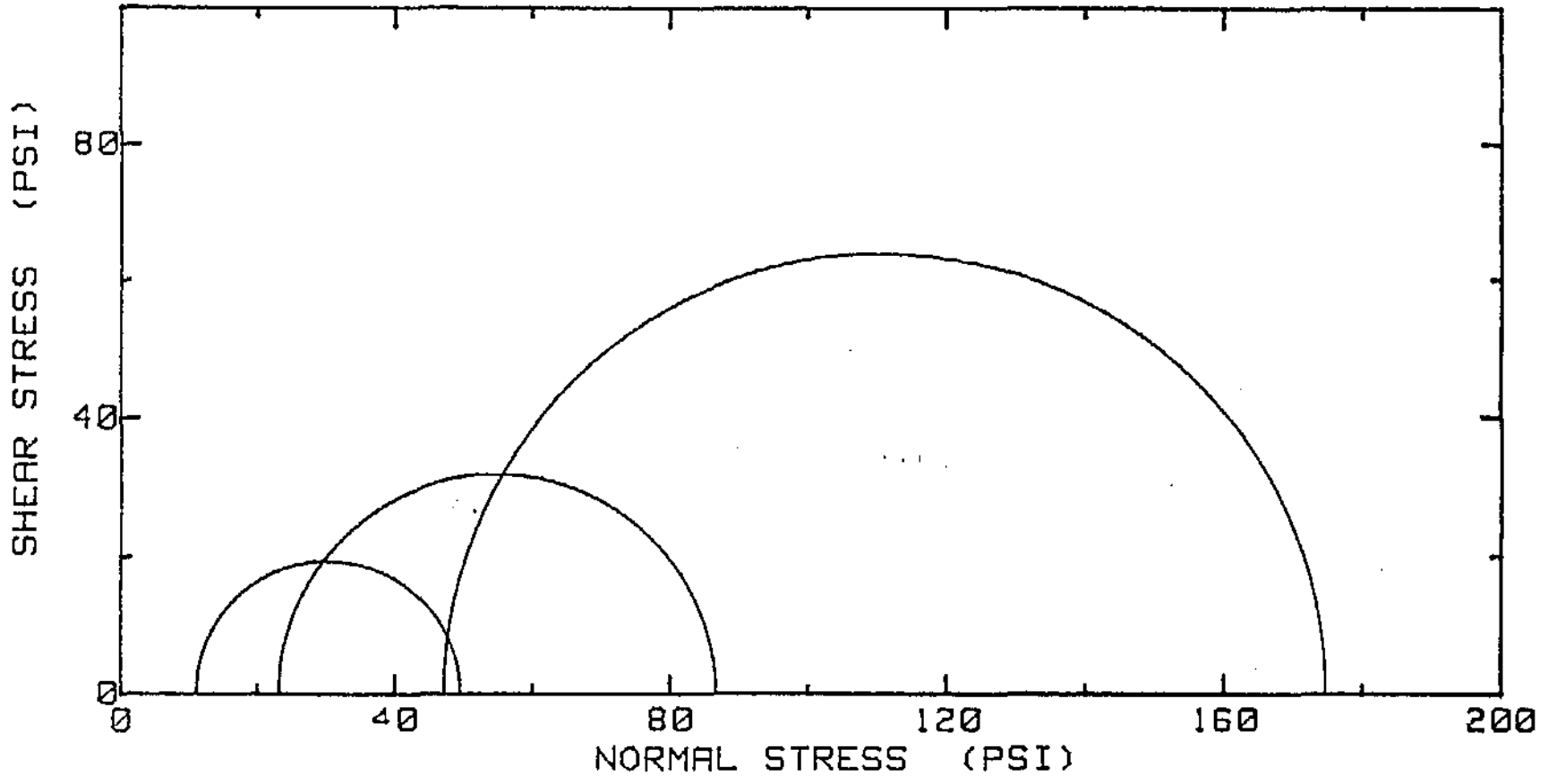
Mohr Diagram - UU Tests

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-2
SAMPLE #
DEPTH: 7.0'

DATE : 10 Apr 1996 20:28:09

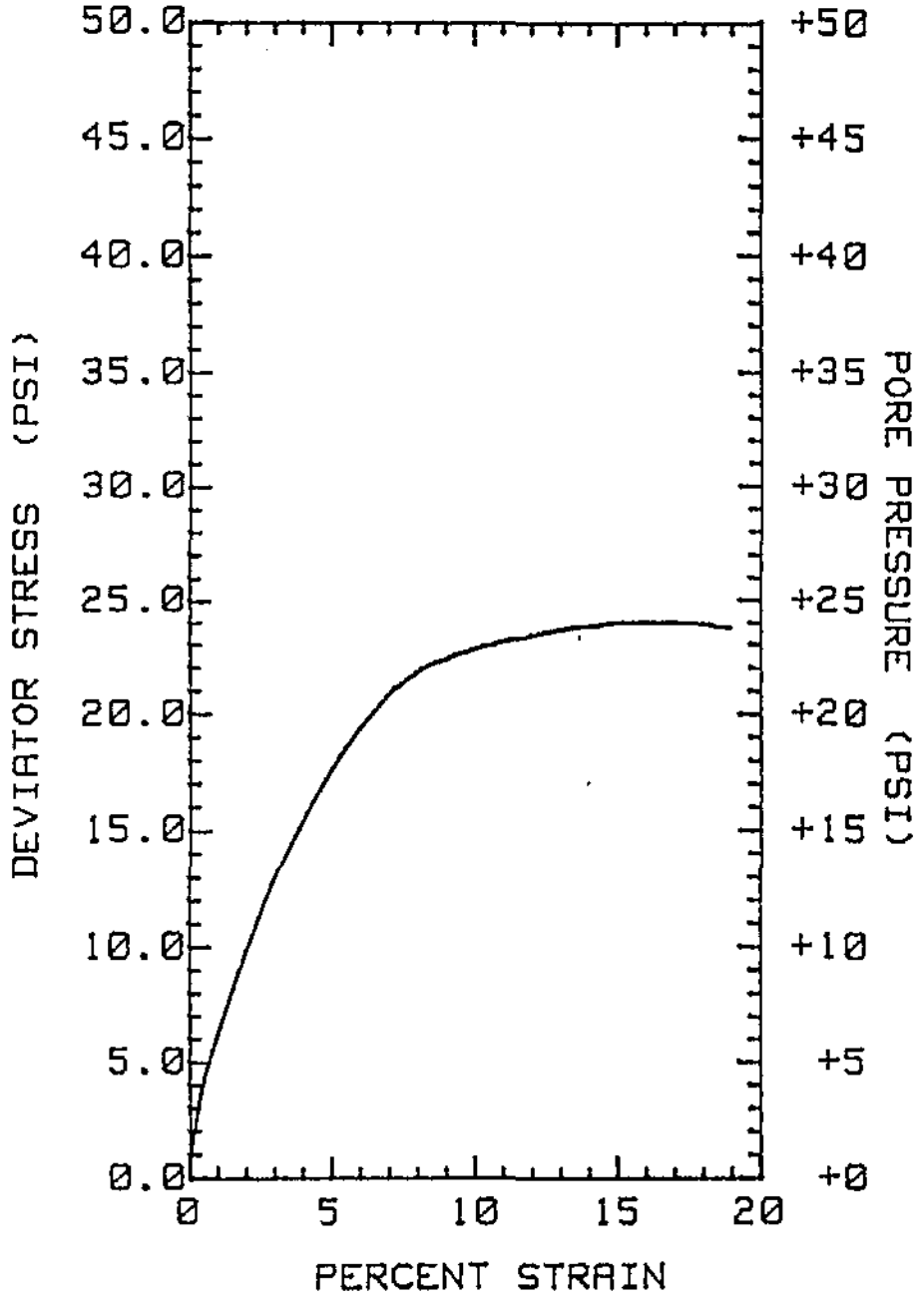
LAB # T97028; σ_3 = 47.0 psi; γ_d = 103.9 pcf
LAB # T97047; σ_3 = 23.0 psi; γ_d = 94.5 pcf
LAB # T97029; σ_3 = 11.0 psi; γ_d = 90.2 pcf



ALASKA TESTLAB

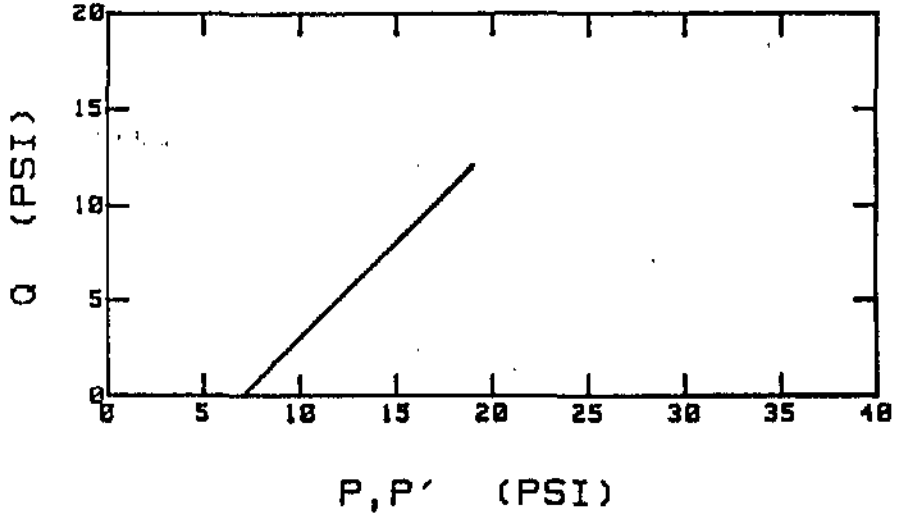
Mohr Diagram - CD Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-2 DEPTH : 14.5'
SAMPLE #
INITIAL DRY DENSITY: 98.3 pcf
TOTAL CONFINING PRESSURE : 7.8 psi

LABORATORY # T97044
DATE: 18 Apr 1996 12:09:46



ALASKA TESTLAB

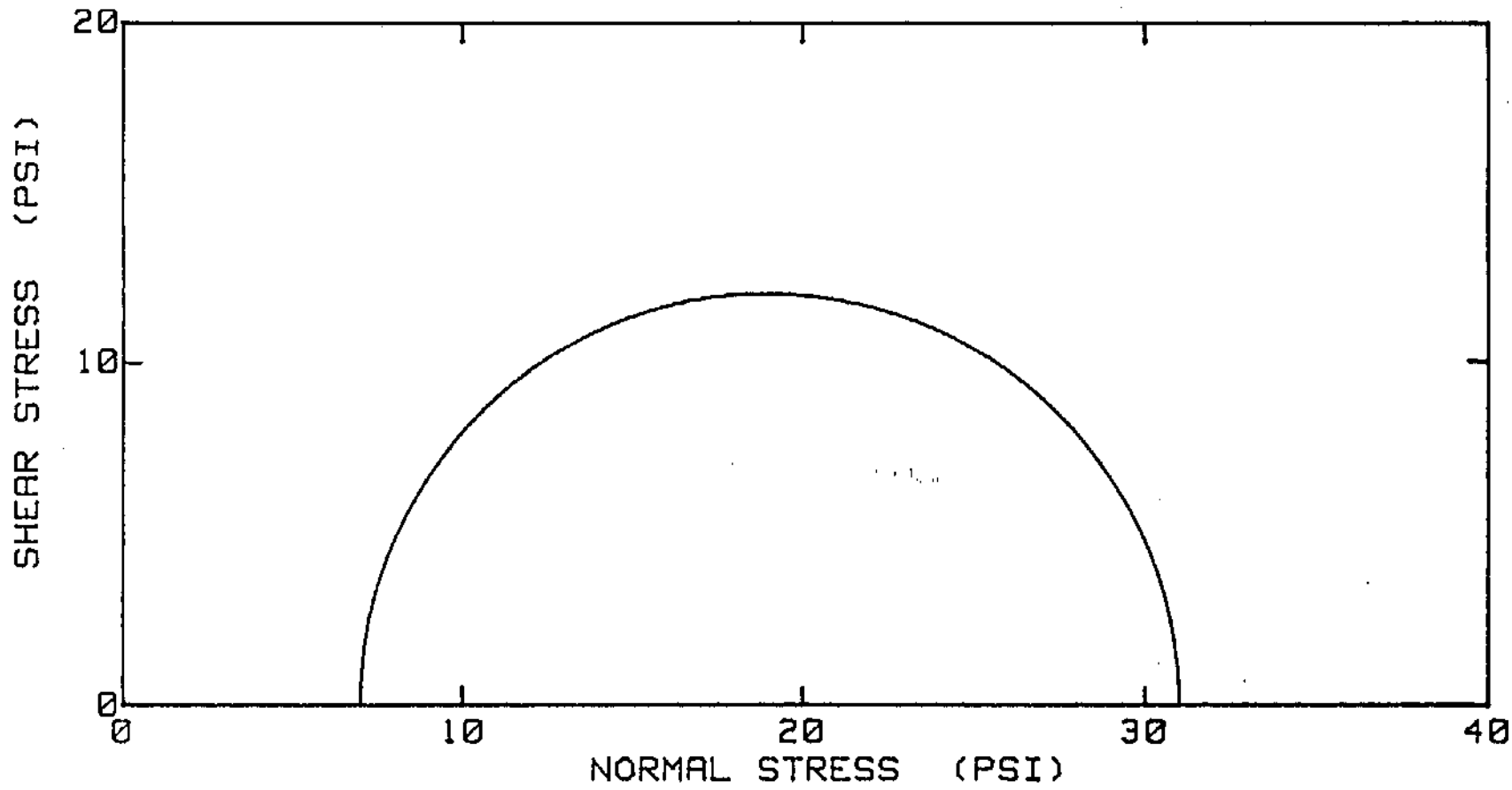
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
W.O. # A27153
BORING # I-2
SAMPLE #
DEPTH: 14.5'

DATE : 18 Apr 1996 12:09:46

LAB # T97044; σ_3 = 7.0 psi; γ_d = 90.3 pcf

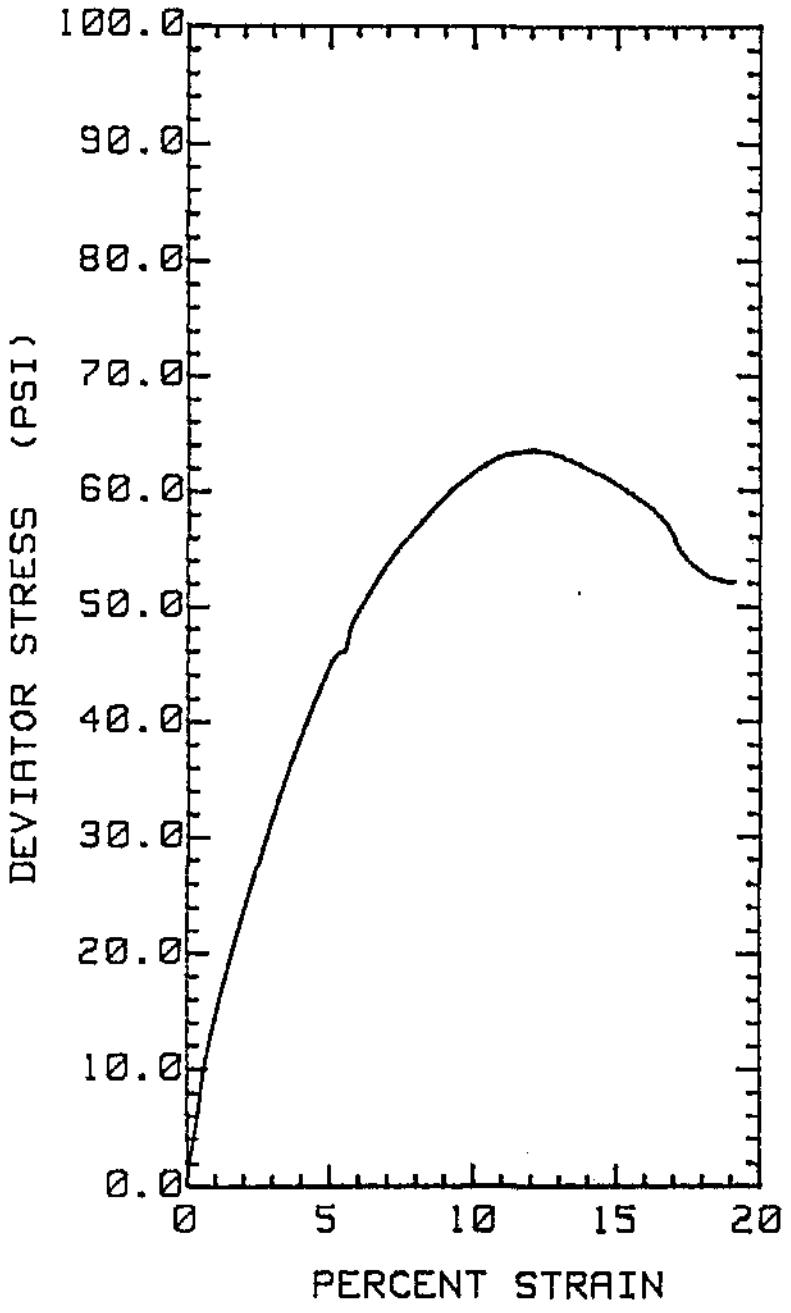


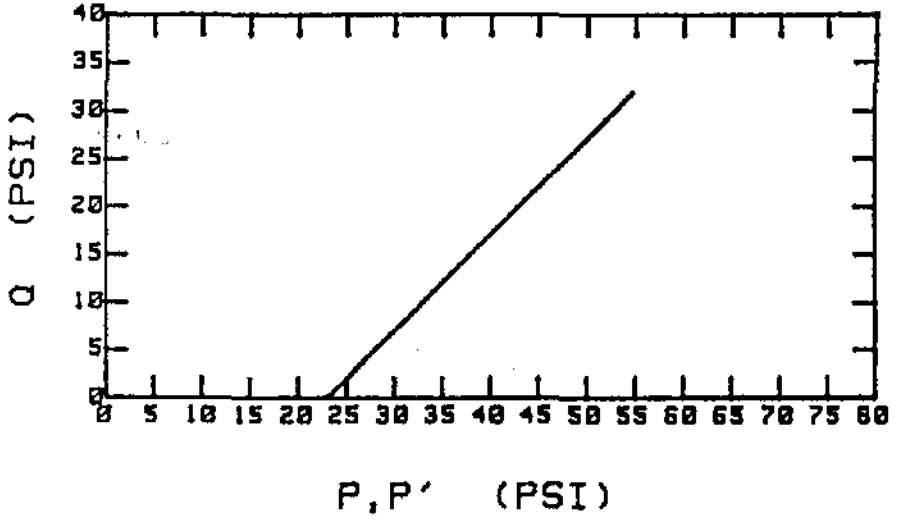
ALASKA TESTLAB

Mohr Diagram - UU Tests

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-3 DEPTH : 2.5'
SAMPLE #
INITIAL DRY DENSITY: 94.5 pcf
EFFECTIVE CONFINING PRESSURE: 23.0 psi
FINAL MOISTURE CONTENT: 18.0 percent
LABORATORY # T97047
DATE: 25 Apr 1996 16:17:31

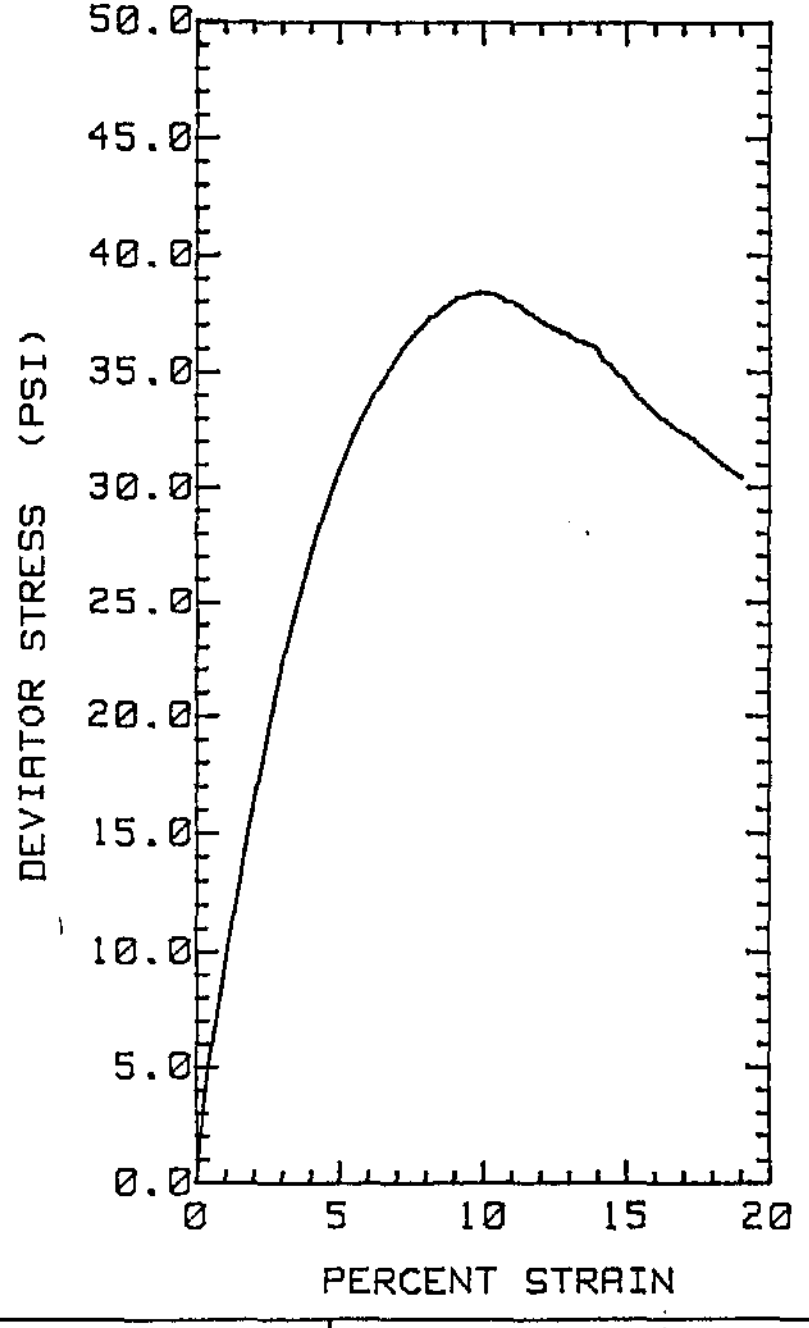




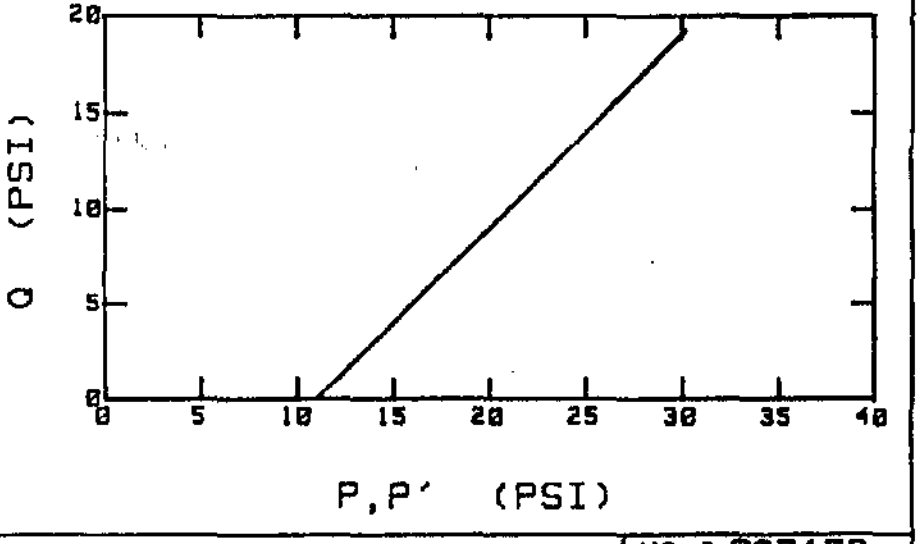
ALASKA TESTLAB

Consolidated Drained Triaxial Compression

WO # A27153
FIGURE



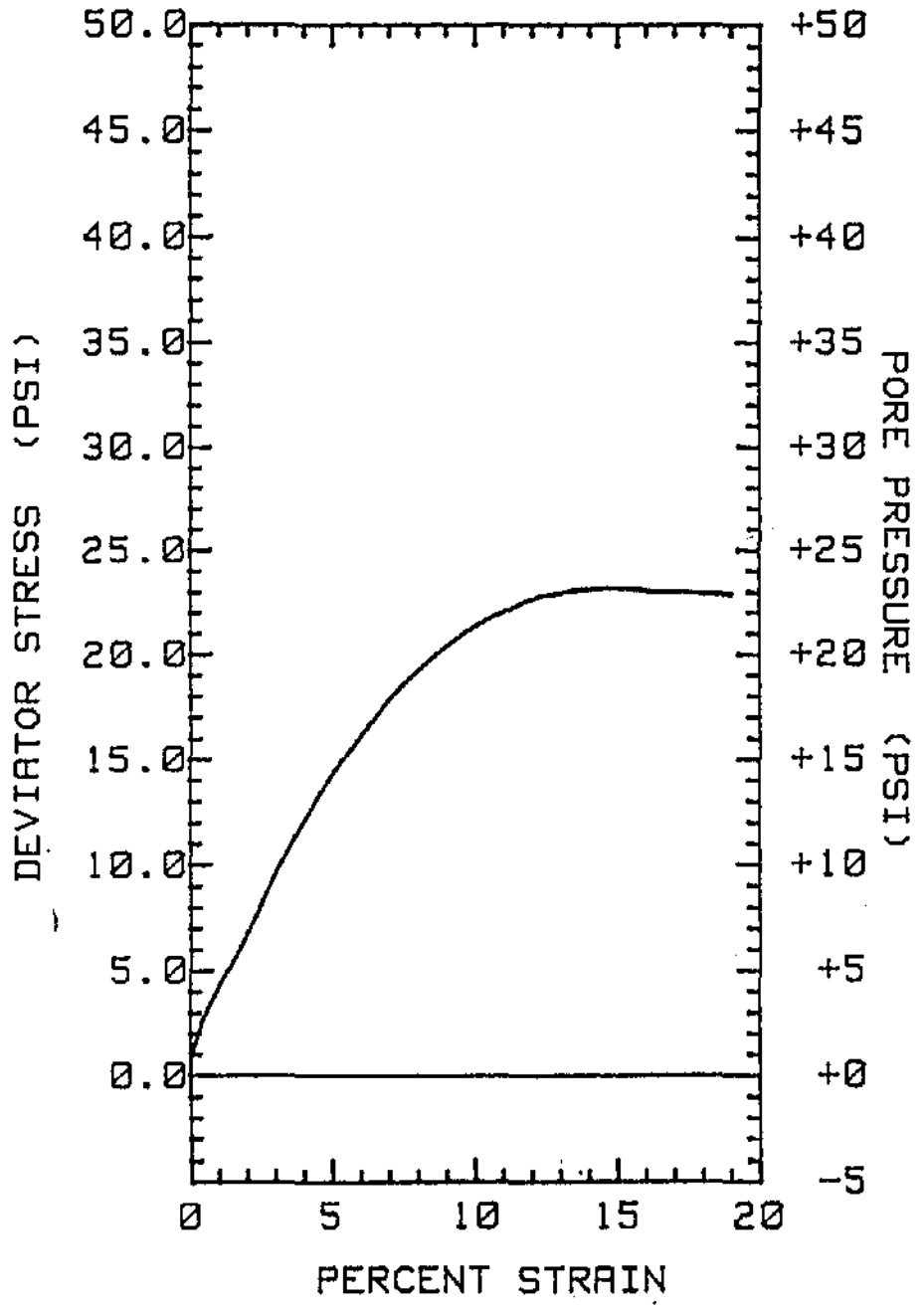
PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-3 DEPTH : 7.5'
SAMPLE #
INITIAL DRY DENSITY: 98.2 pcf
EFFECTIVE CONFINING PRESSURE: 11.0 psi
FINAL MOISTURE CONTENT: 32.7 percent
LABORATORY # T97029
DATE: 11 Apr 1996 16:27:02



ALASKA TESTLAB

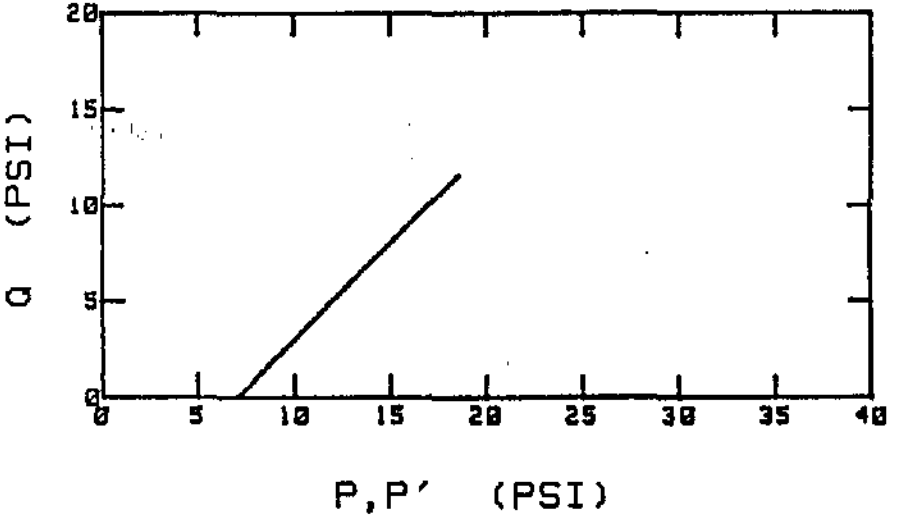
Consolidated Drained Triaxial Compression

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-3 DEPTH : 5.0'
SAMPLE #
INITIAL DRY DENSITY: 91.0 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97046
DATE: 18 Apr 1996 14:52:44



ALASKA TESTLAB

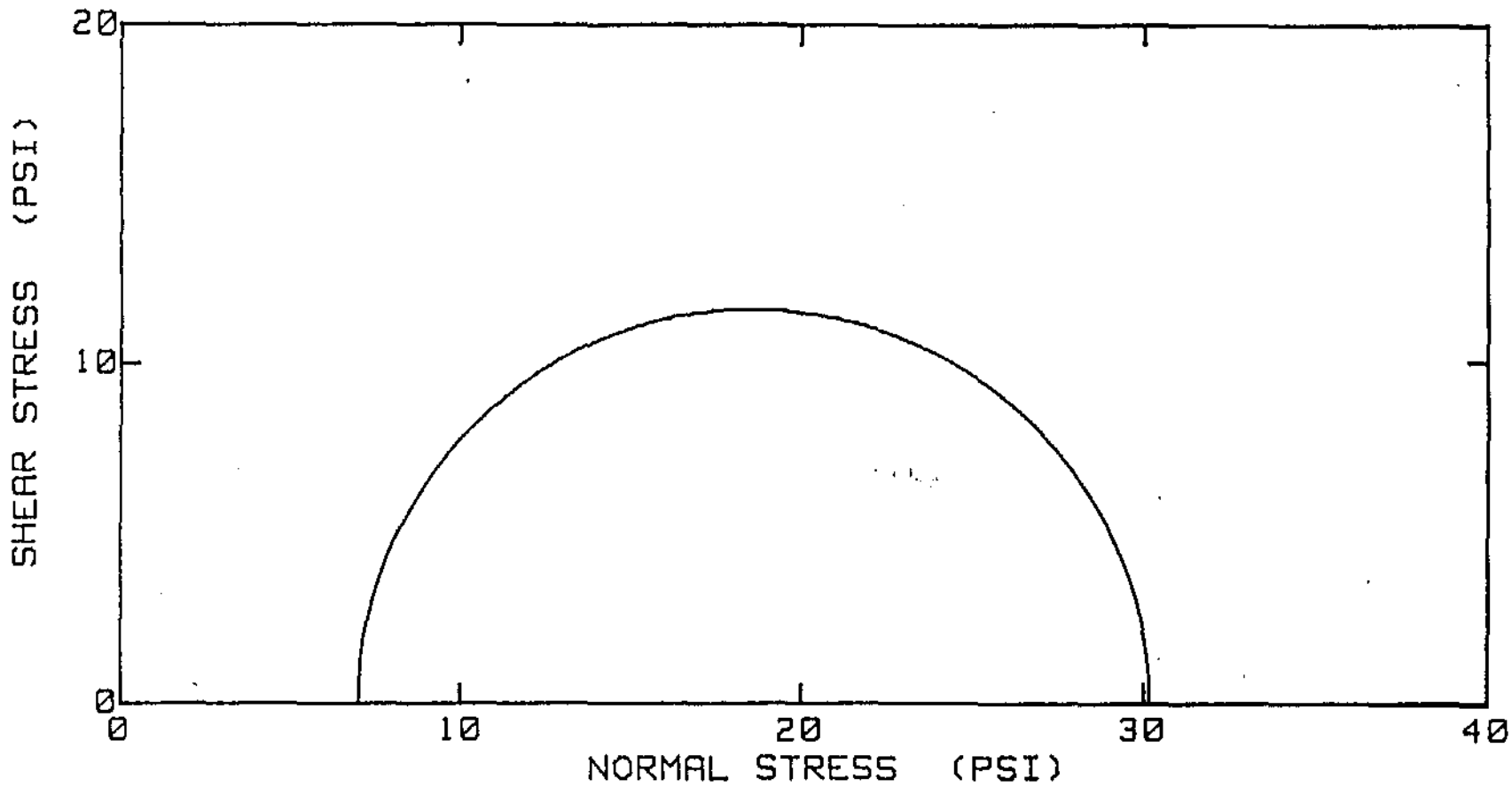
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-3
SAMPLE #
DEPTH: 5.0'

DATE : 18 Apr 1996 14:52:44

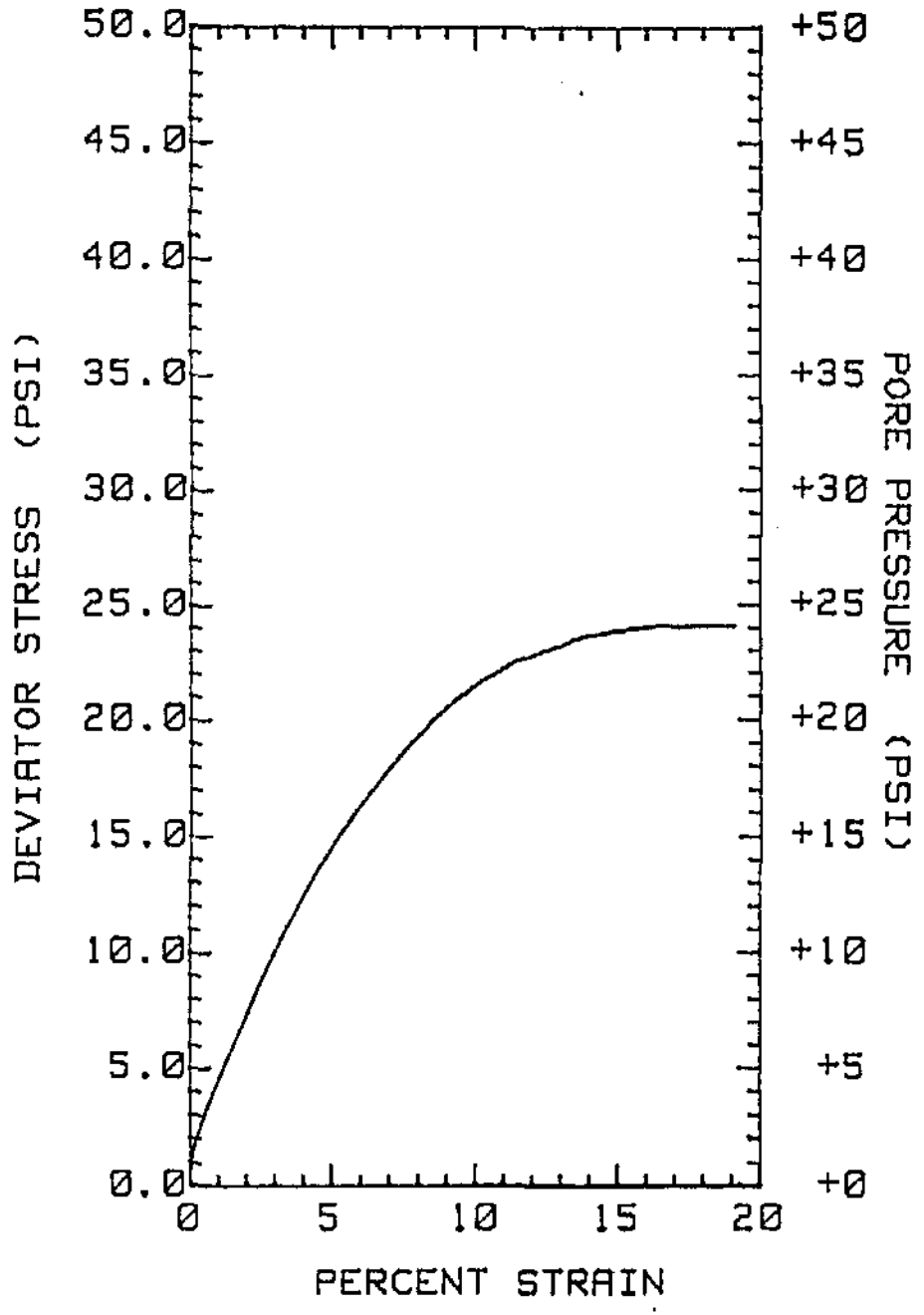
LAB # T97046; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 91.0 pcf



ALASKA TESTLAB

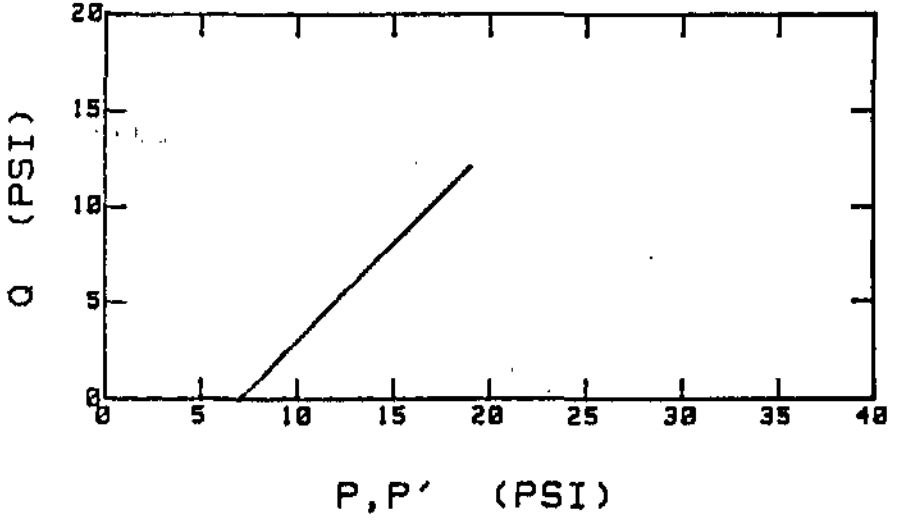
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-3 DEPTH : 7.5'
SAMPLE #
INITIAL DRY DENSITY: 89.3 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97025
DATE: 9 Apr 1996 11:42:39

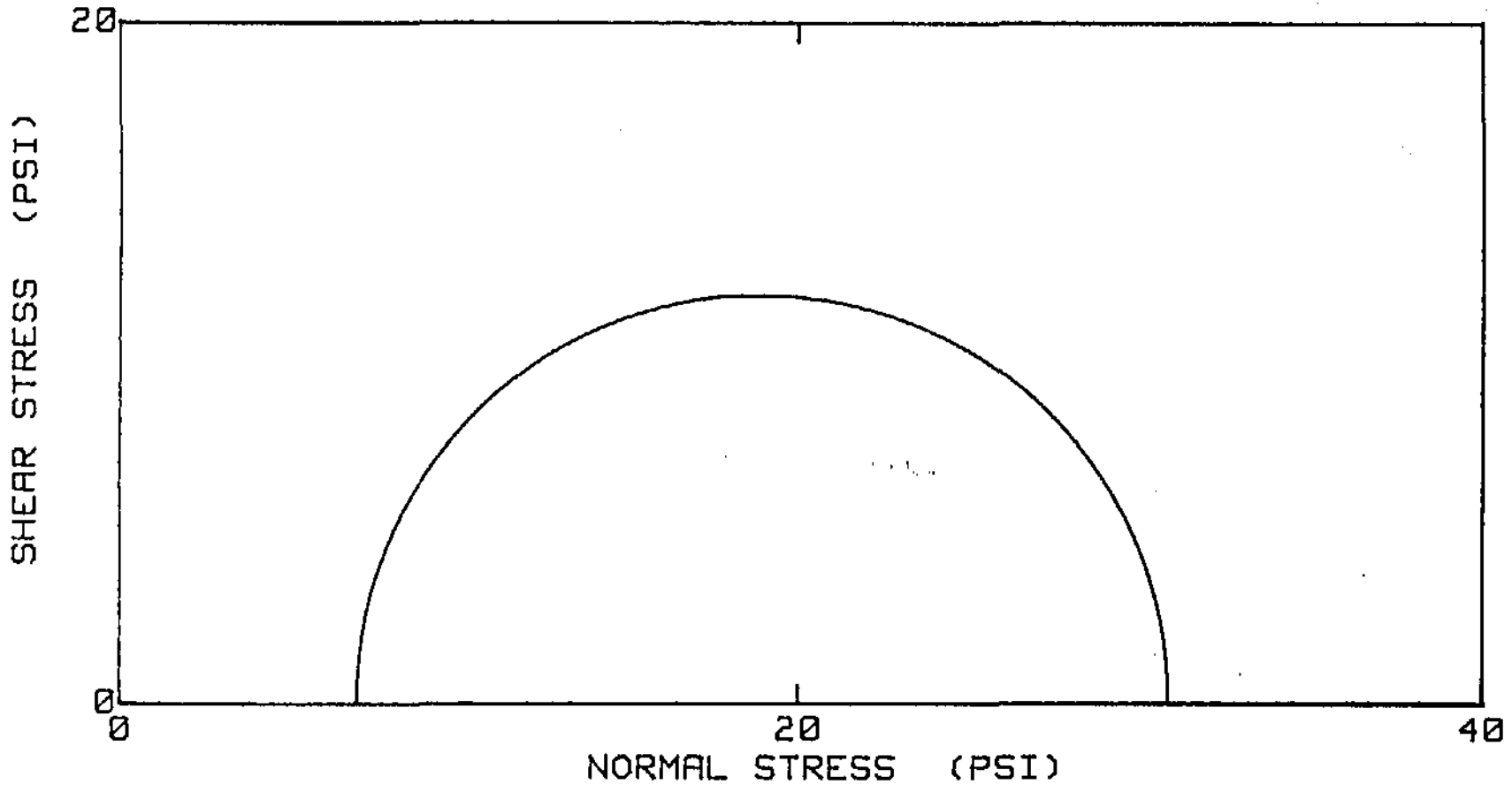


ALASKA TESTLAB | *Unconsolidated Undrained Triaxial Compression* | WO # A27153 FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-3
SAMPLE #
DEPTH: 7.5'

DATE : 9 Apr 1996 11:42:39

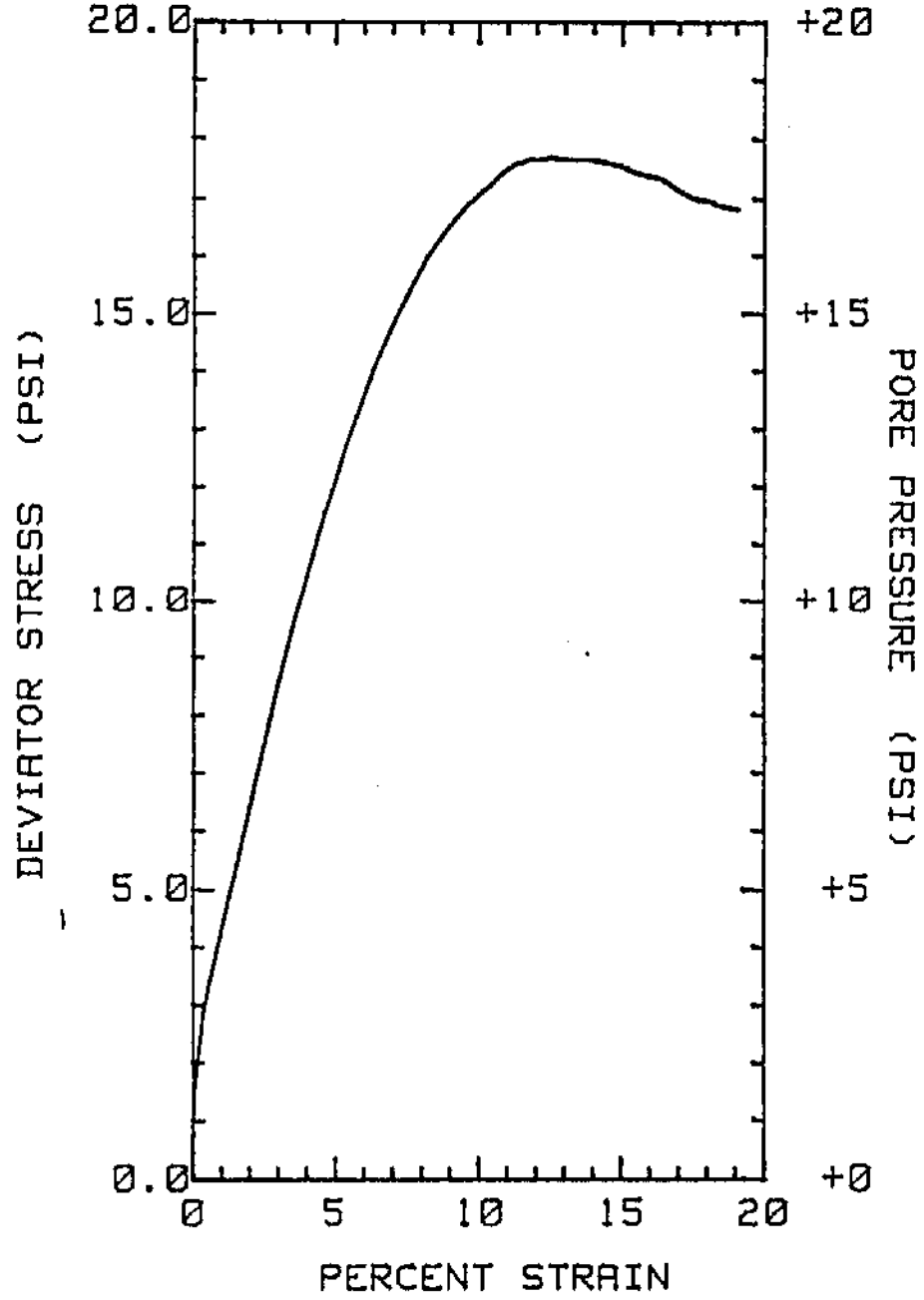
LAB # T97025; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 89.3 pcf



ALASKA TESTLAB

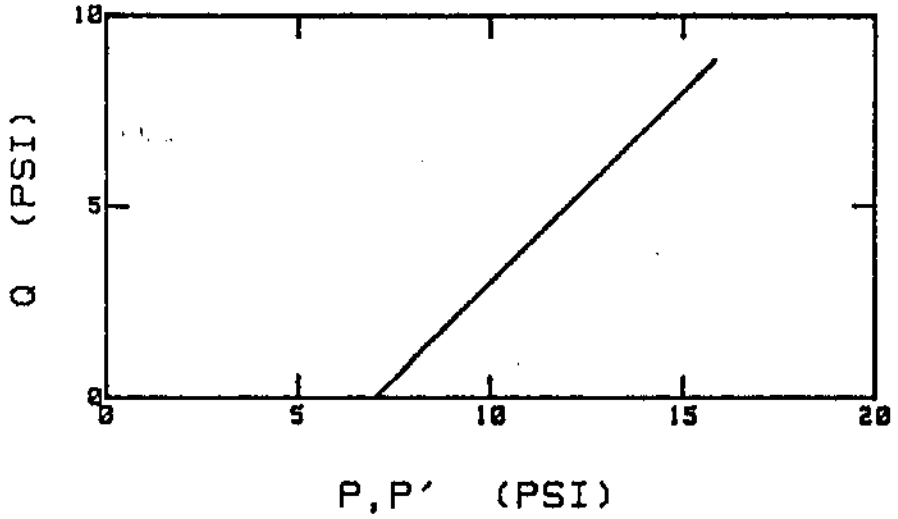
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-3 DEPTH : 12.5'
SAMPLE #
INITIAL DRY DENSITY: 85.7 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97030
DATE: 11 Apr 1996 07:40:55



ALASKA TESTLAB

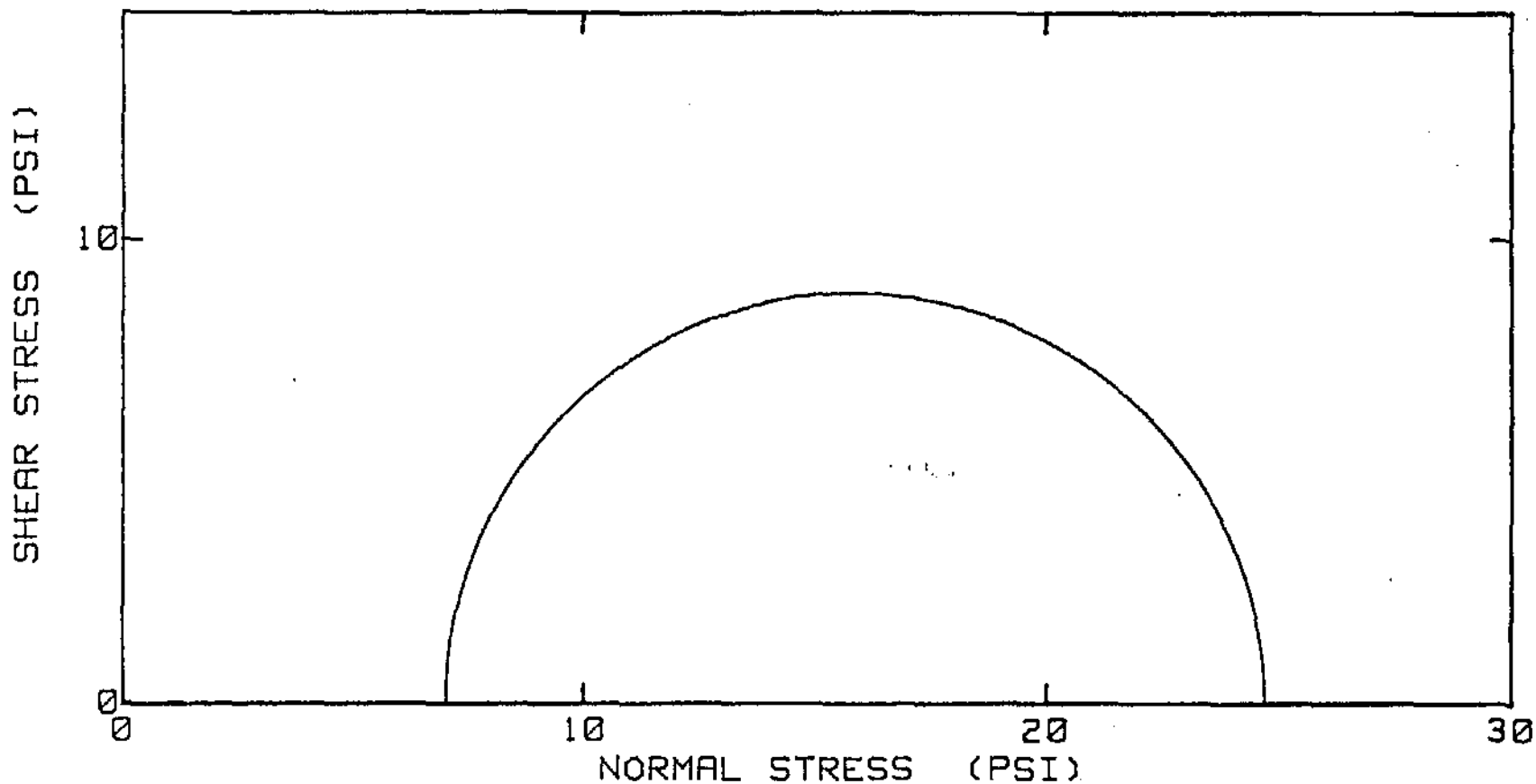
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

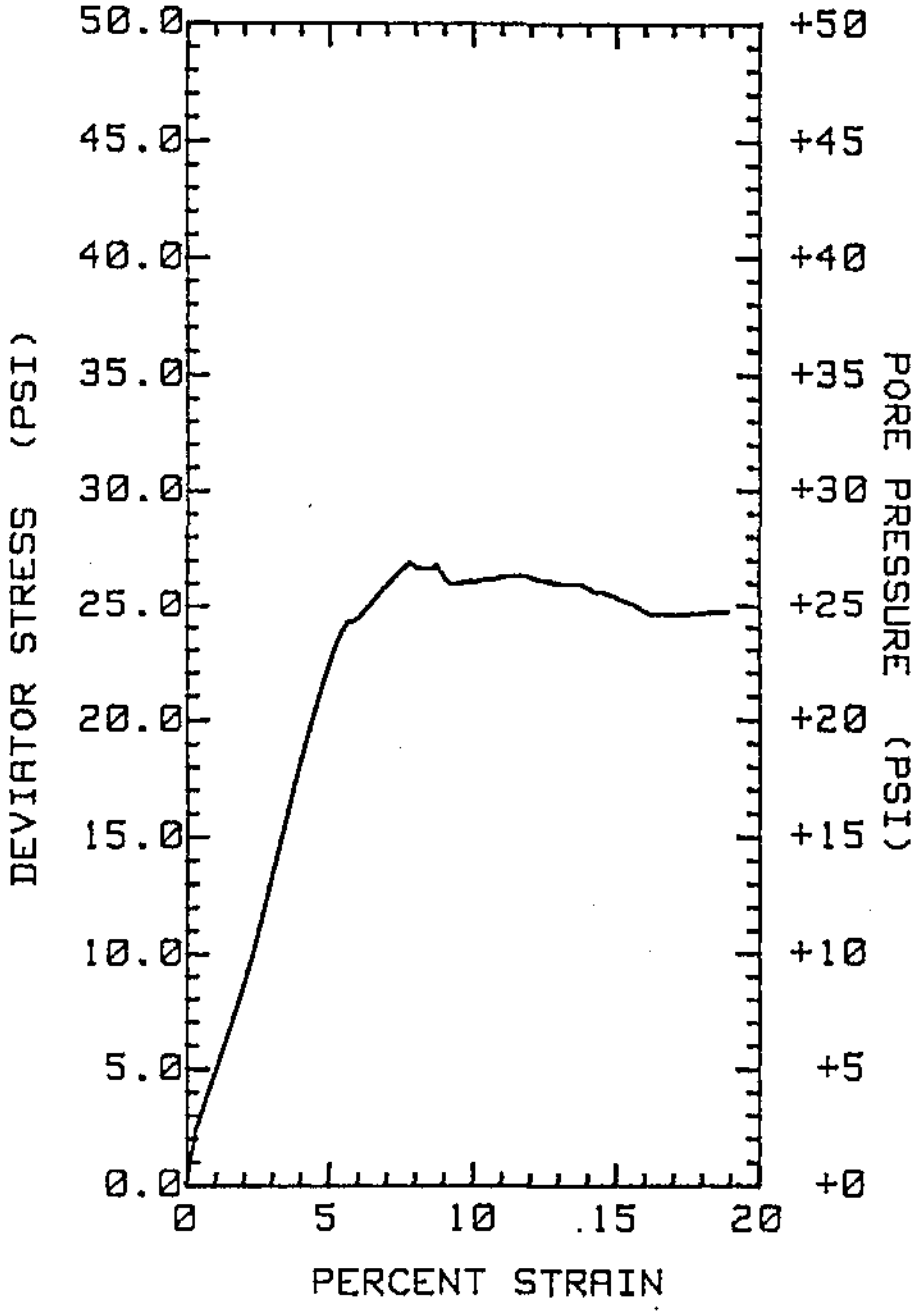
PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-3
SAMPLE #
DEPTH: 12.5'

DATE : 11 Apr 1996 07:48:55

LAB # T97030; σ_3 = 7.0 psi; γ_d = 85.7 pcf

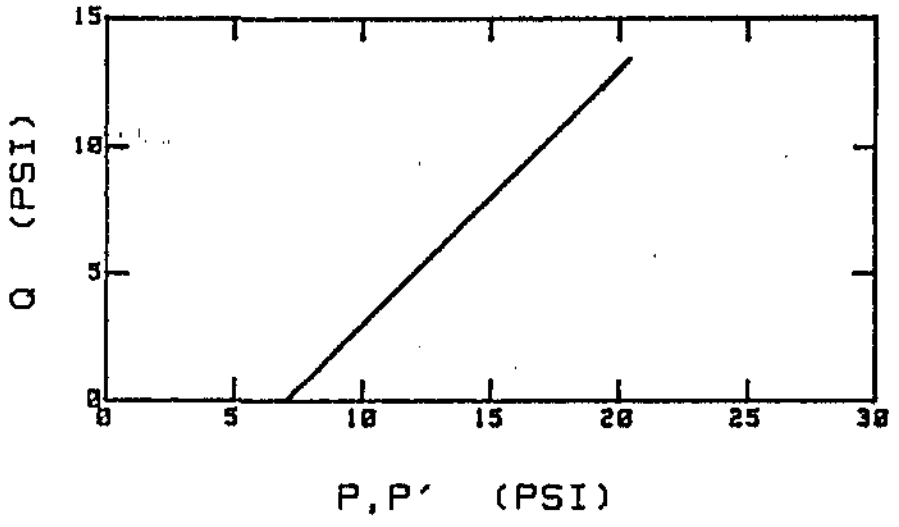


ALASKA TESTLAB	*Mohr Diagram - UU Tests*	WO # A27153 FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-3 DEPTH : 28.0'
SAMPLE #
INITIAL DRY DENSITY: 94.2 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97031
DATE: 11 Apr 1996 09:32:11



ALASKA TESTLAB

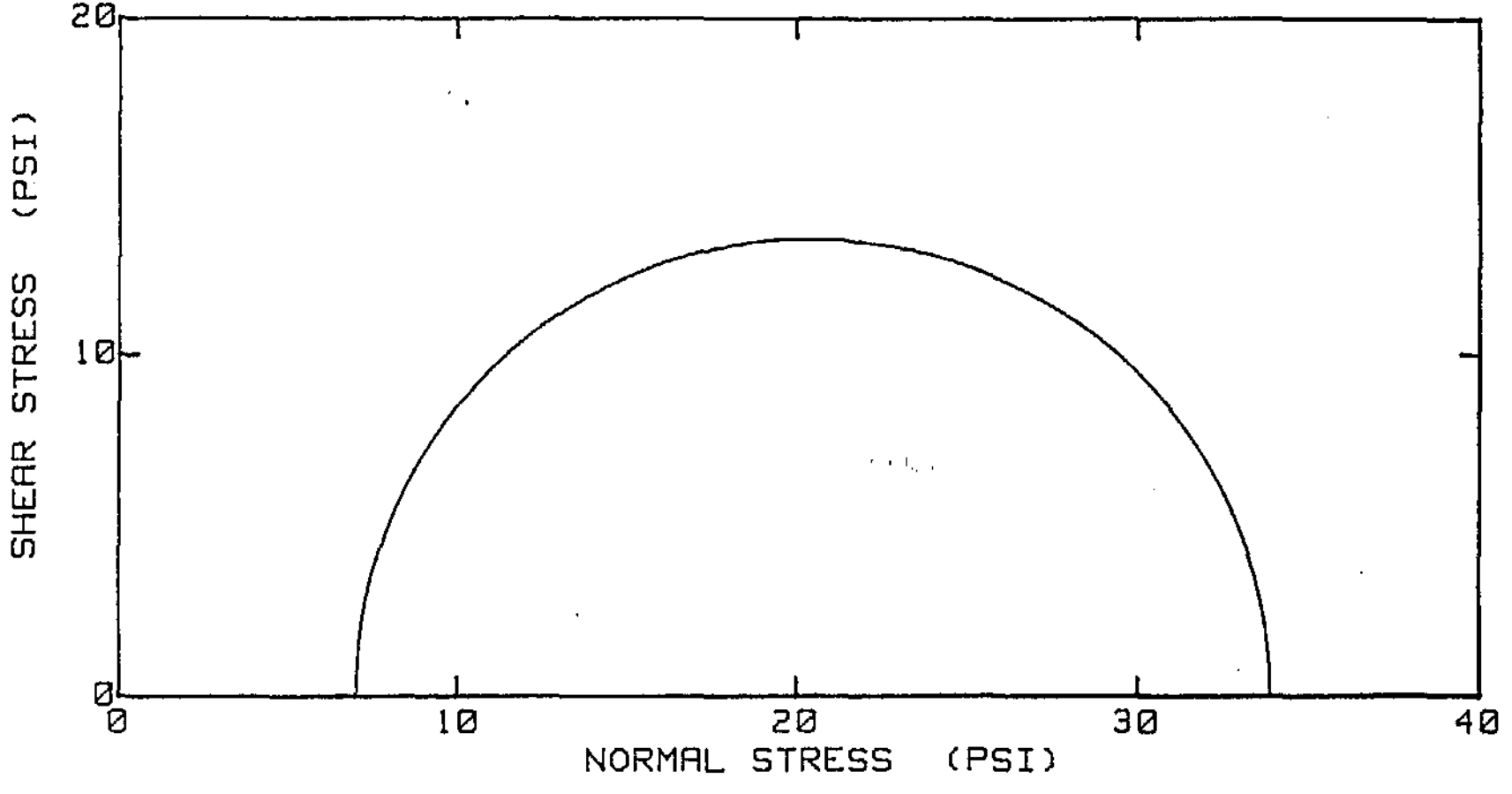
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-3
SAMPLE #
DEPTH: 20.0'

DATE : 11 Apr 1996 09:32:11

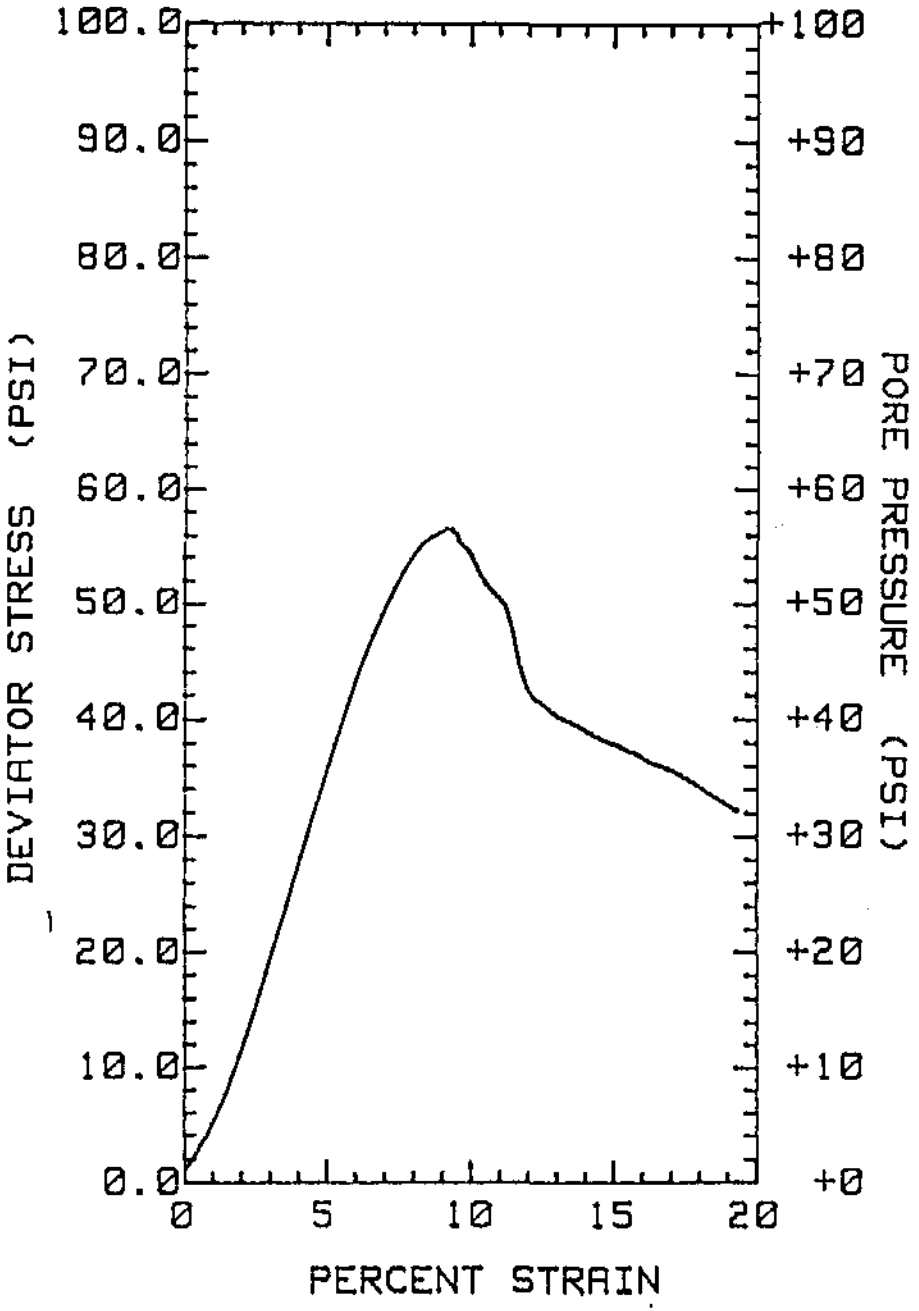
LAB # T97031; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 94.2 pcf



ALASKA TESTLAB

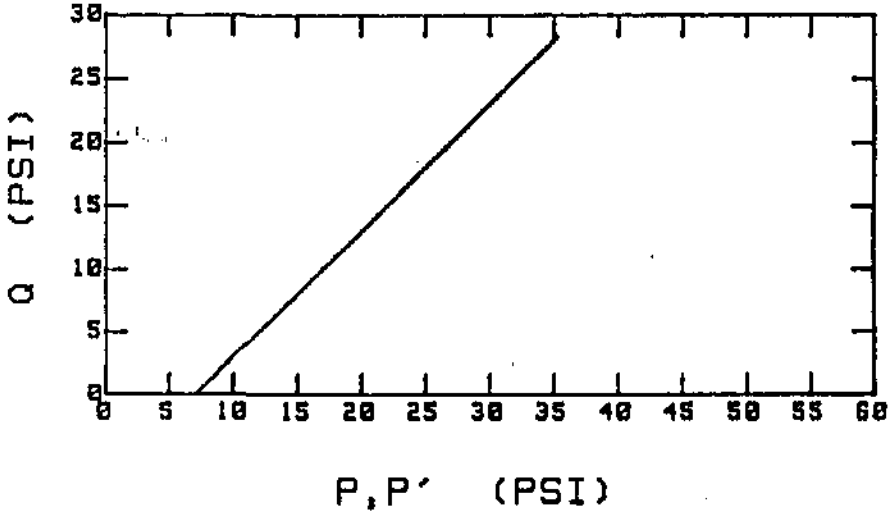
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-4 DEPTH : 2.0'
SAMPLE #
INITIAL DRY DENSITY: 92.2 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97024
DATE: 9 Apr 1996 09:39:32



ALASKA TESTLAB

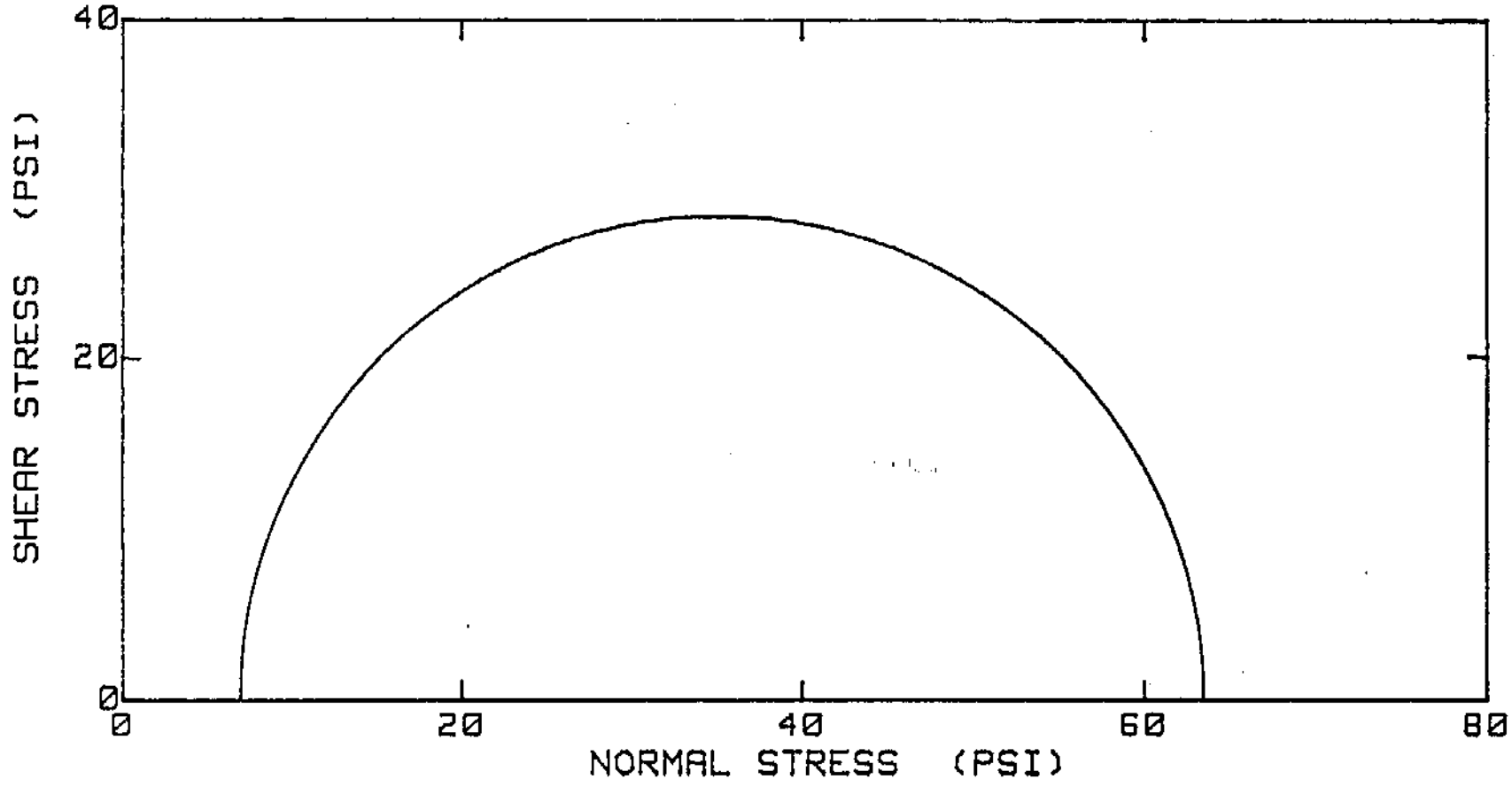
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-4
SAMPLE #
DEPTH: 2.0'

DATE : 9 Apr 1996 09:39:32

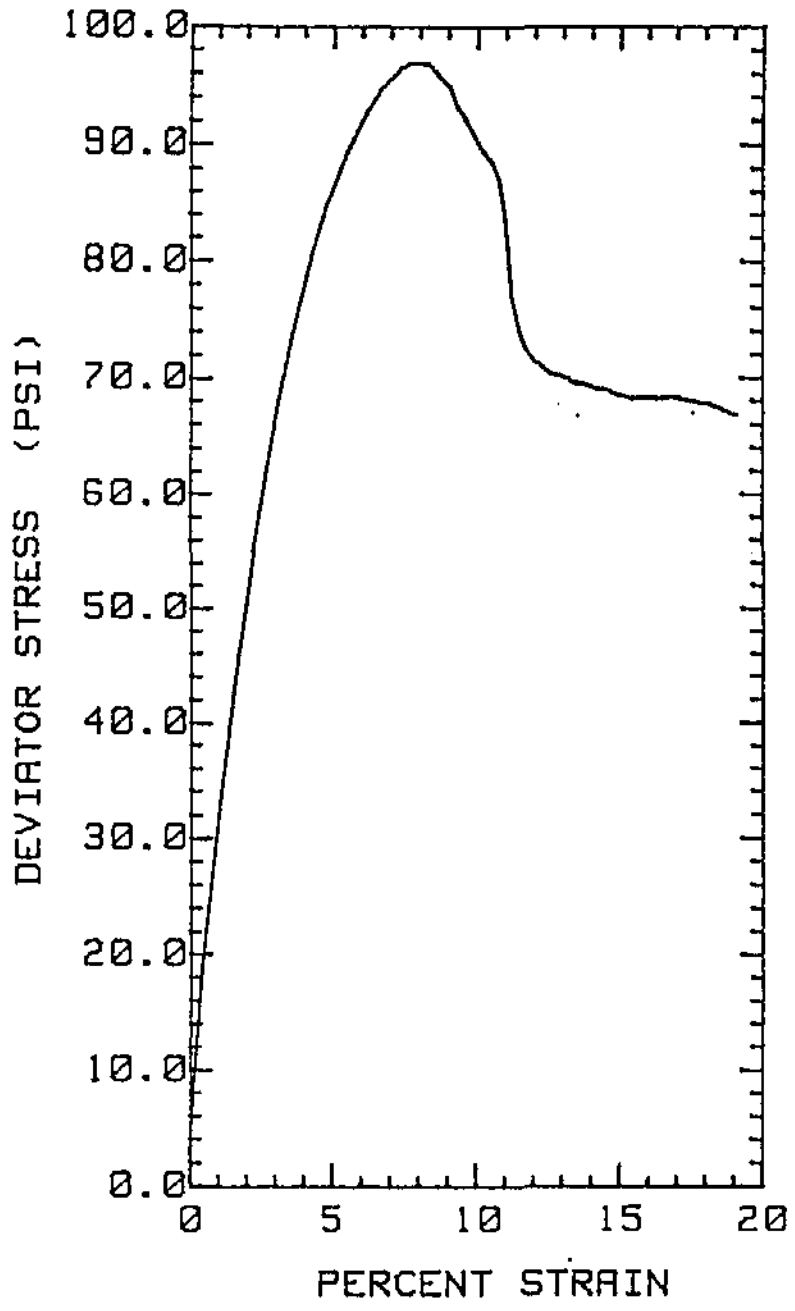
LAB # T97024; σ_3 = 7.0 psi; γ_d = 92.2 pcf



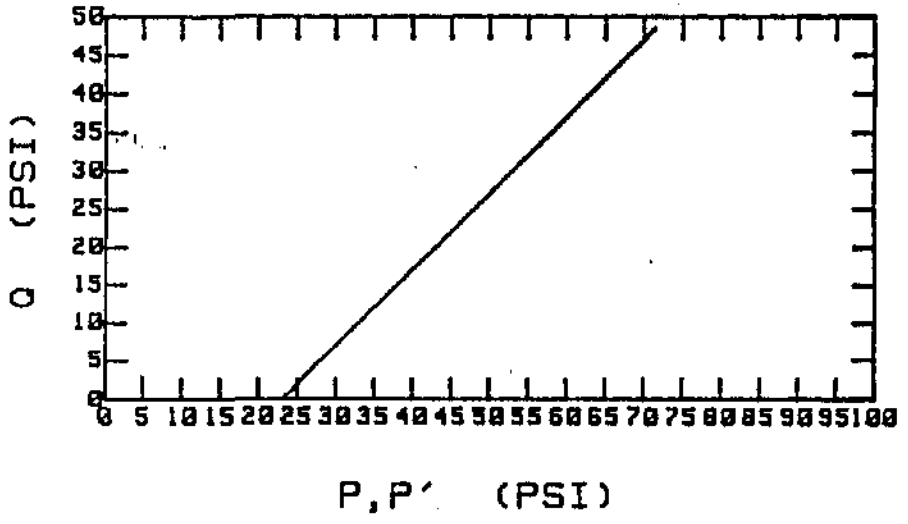
ALASKA TESTLAB

Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-4 DEPTH : 2.0'
SAMPLE #
INITIAL DRY DENSITY: 99.4 pcf
EFFECTIVE CONFINING PRESSURE: 23.0 psi
FINAL MOISTURE CONTENT: 26.5 percent
LABORATORY # T97026
DATE: 9 Apr 1996 15:21:53



ALASKA TESTLAB

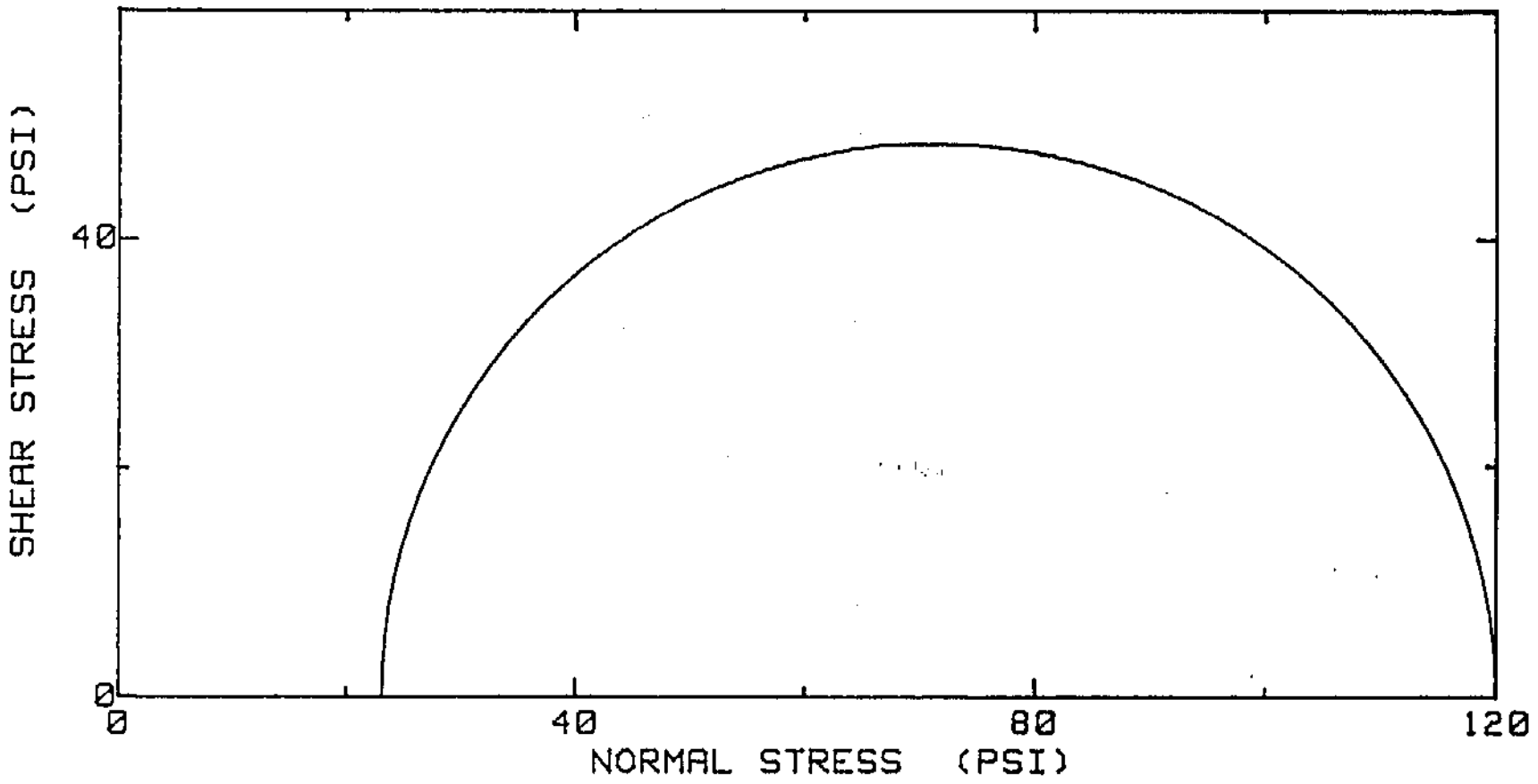
Consolidated Drained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-4
SAMPLE #
DEPTH: 2.0'

DATE : 9 Apr 1996 15:21:53

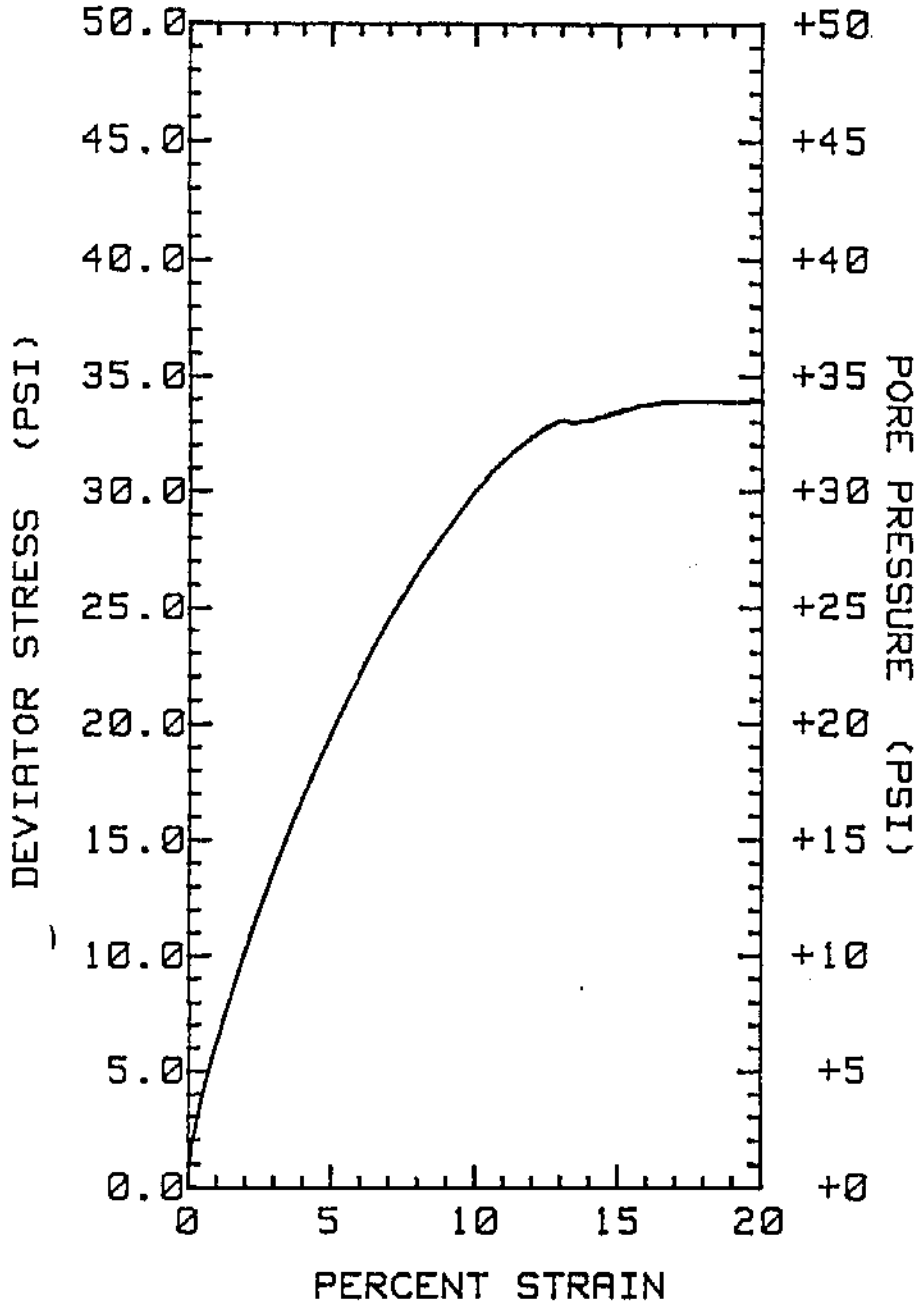
LAB # T97026; σ_3 = 23.0 psi; γ_d = 99.4 pcf



ALASKA TESTLAB

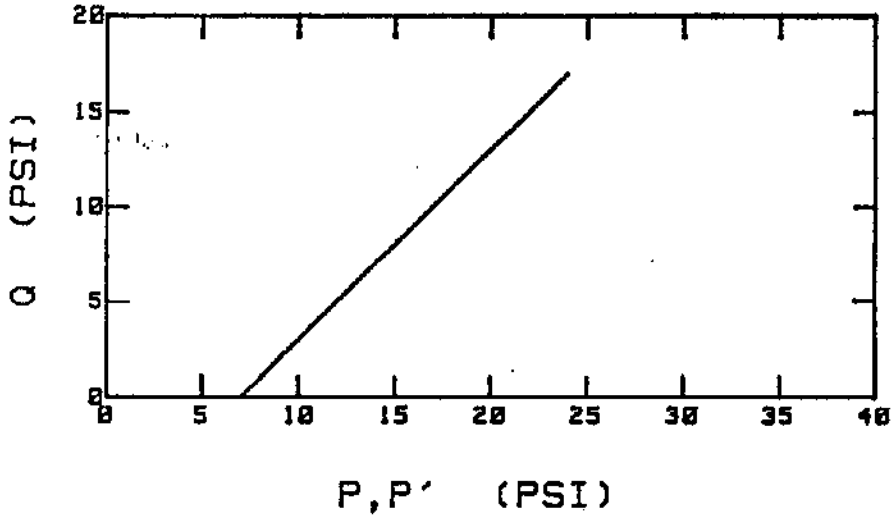
Mohr Diagram - CD Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DUANE MILLER
WO # A27153
BORING # I-4 DEPTH : 7.0'
SAMPLE #
INITIAL DRY DENSITY: 96.8 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

LABORATORY # T97027
DATE: 9 Apr 1996 13:53:36



ALASKA TESTLAB

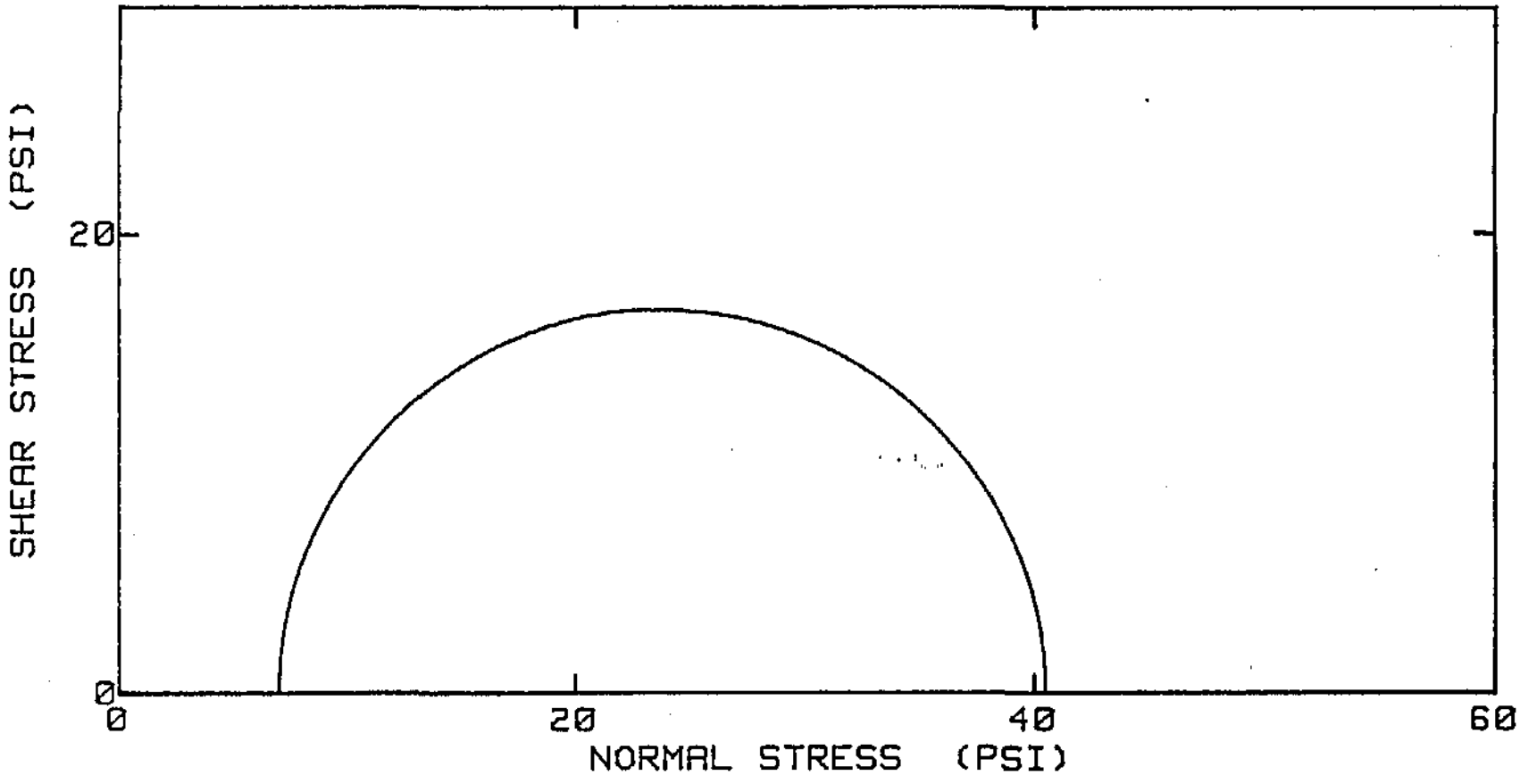
Unconsolidated Undrained Triaxial Compression

WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-4
SAMPLE #
DEPTH: 7.0'

DATE : 9 Apr 1996 13:53:36

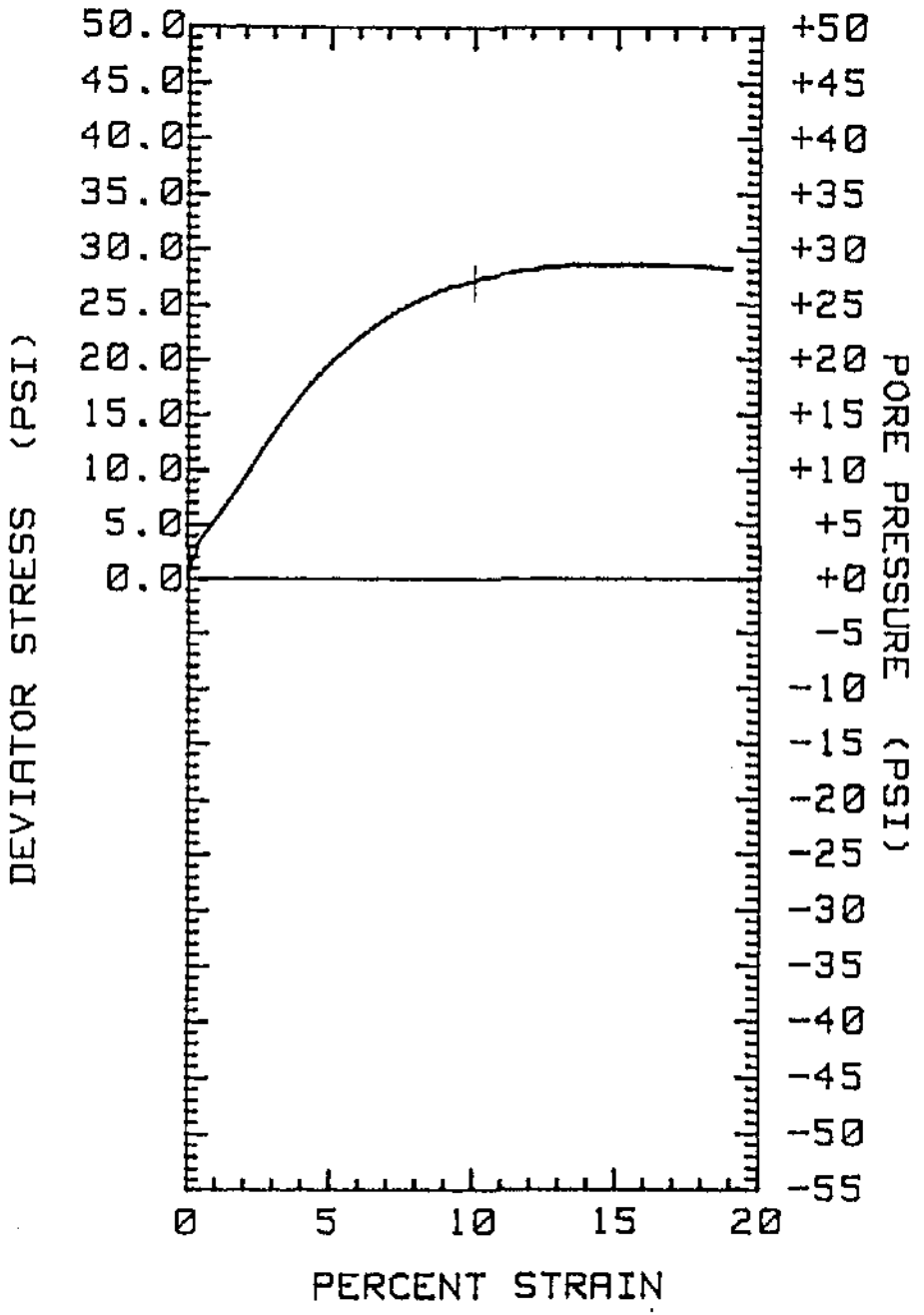
LAB # T97027; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 96.8 pcf



ALASKA TESTLAB

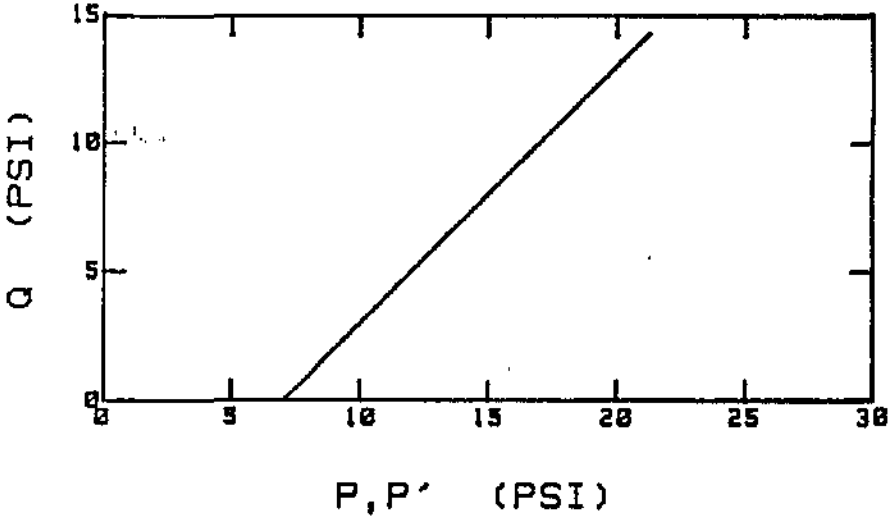
Mohr Diagram - UU Tests

WO # A27153
FIGURE



PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # I-4 DEPTH : 12.8'
SAMPLE #
INITIAL DRY DENSITY: 89.9 pcf
TOTAL CONFINING PRESSURE : 7.0 psi

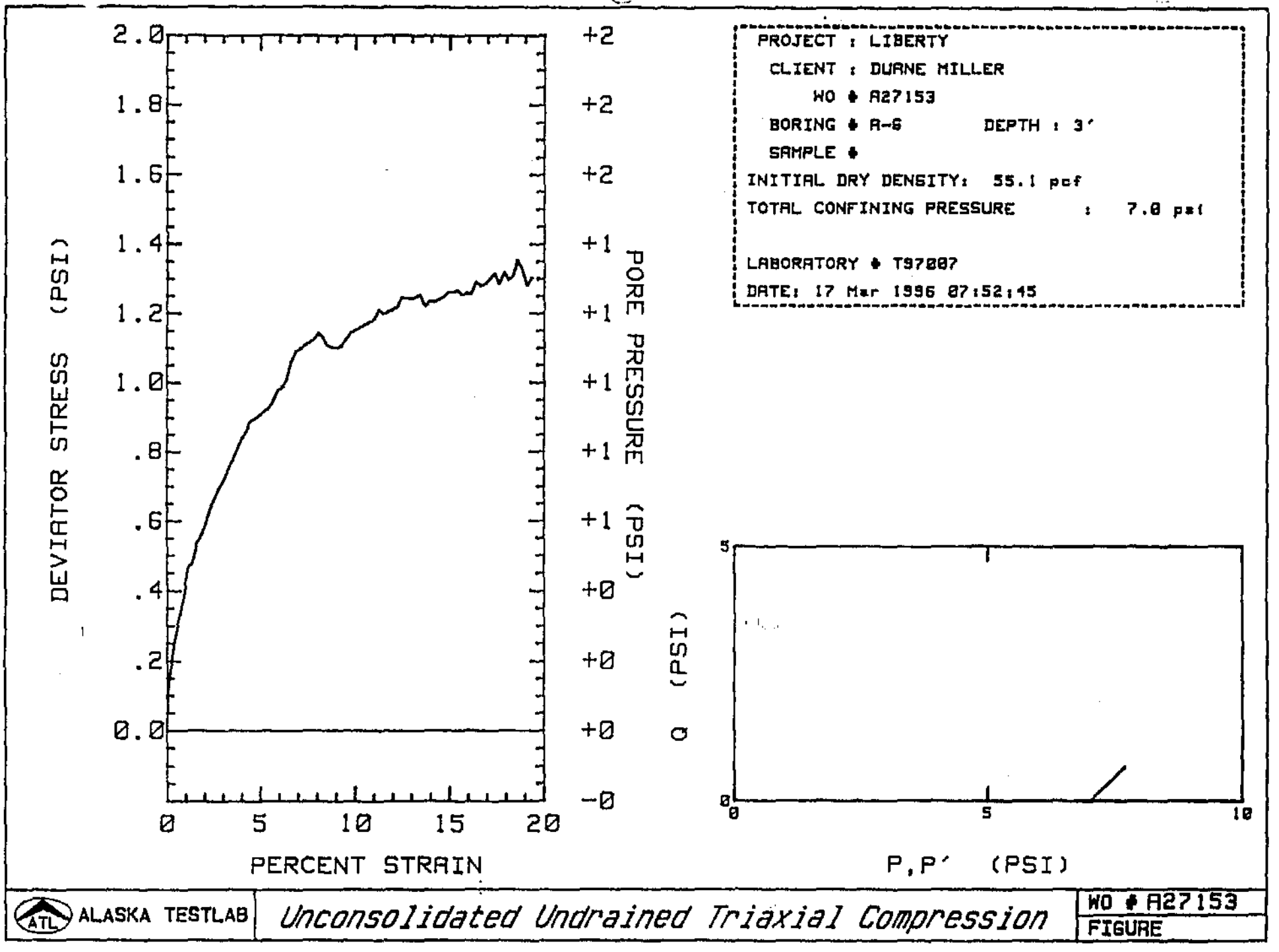
LABORATORY # T97045
DATE: 18 Apr 1996 14:14:19



ALASKA TESTLAB

Unconsolidated Undrained Triaxial Compression

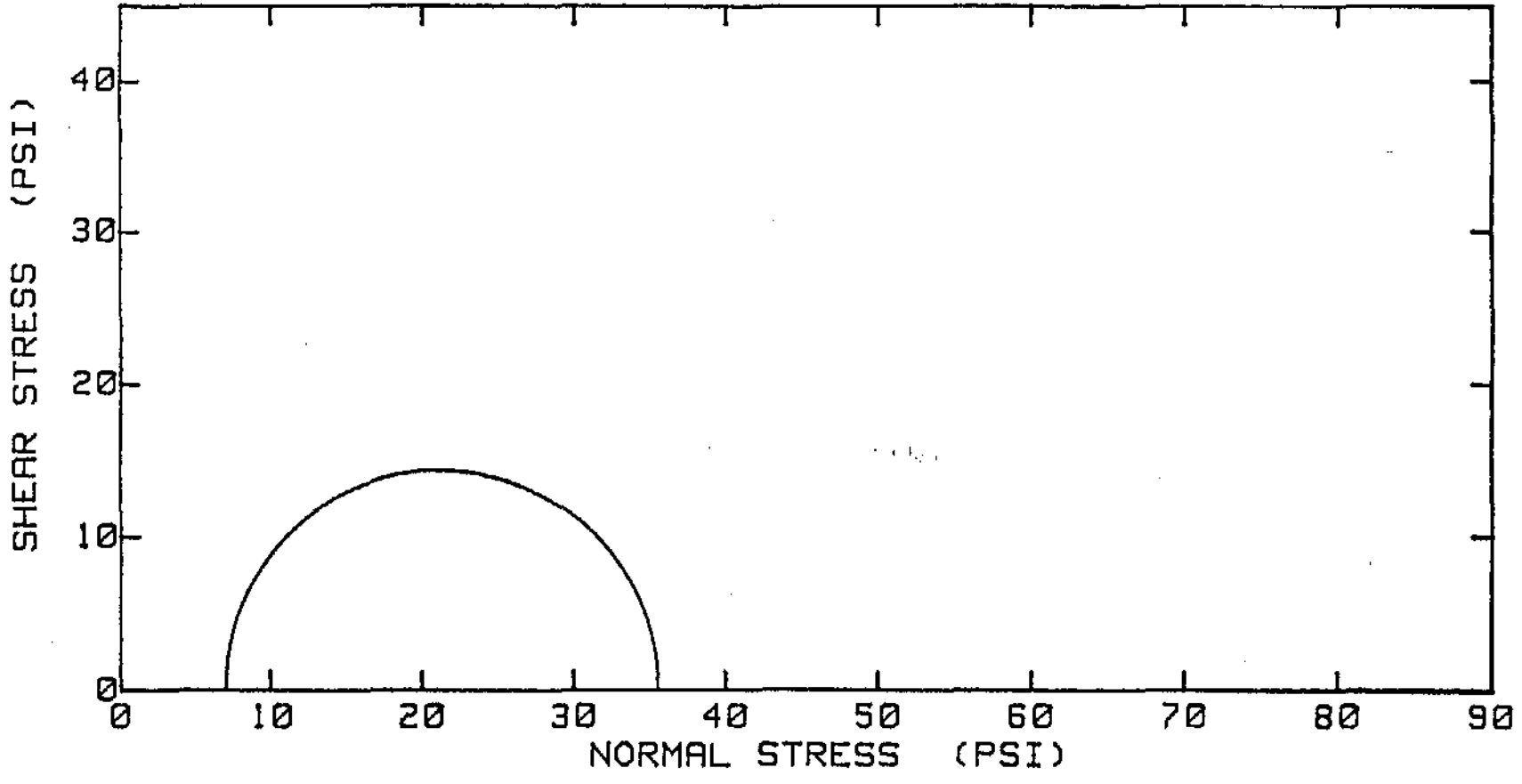
WO # A27153
FIGURE


PROJECT : LIBERTY
CLIENT : DURNE MILLER
WO # A27153
BORING # A-6 DEPTH : 3'
SAMPLE #
INITIAL DRY DENSITY: 55.1 pcf
TOTAL CONFINING PRESSURE : 7.0 psi
LABORATORY # T97007
DATE: 17 Mar 1996 07:52:45
DEVIATOR STRESS (PSI)
PORE PRESSURE (PSI)
PERCENT STRAIN
Q (PSI)
P,P' (PSI)
ALASKA TESTLAB
Unconsolidated Undrained Triaxial Compression
WO # A27153
FIGURE

PROJECT : LIBERTY
CLIENT : DUANE MILLER
W.O. # A27153
BORING # I-4
SAMPLE #
DEPTH: 12.0'

DATE : 18 Apr 1996 14:14:19

LAB # T97045; $\bar{\sigma}_3$ = 7.0 psi; γ_d = 89.9 pcf



ALASKA TESTLAB

Mohr Diagram - UU Tests

WO # A27153
FIGURE

APPENDIX D

STRENGTH TESTING

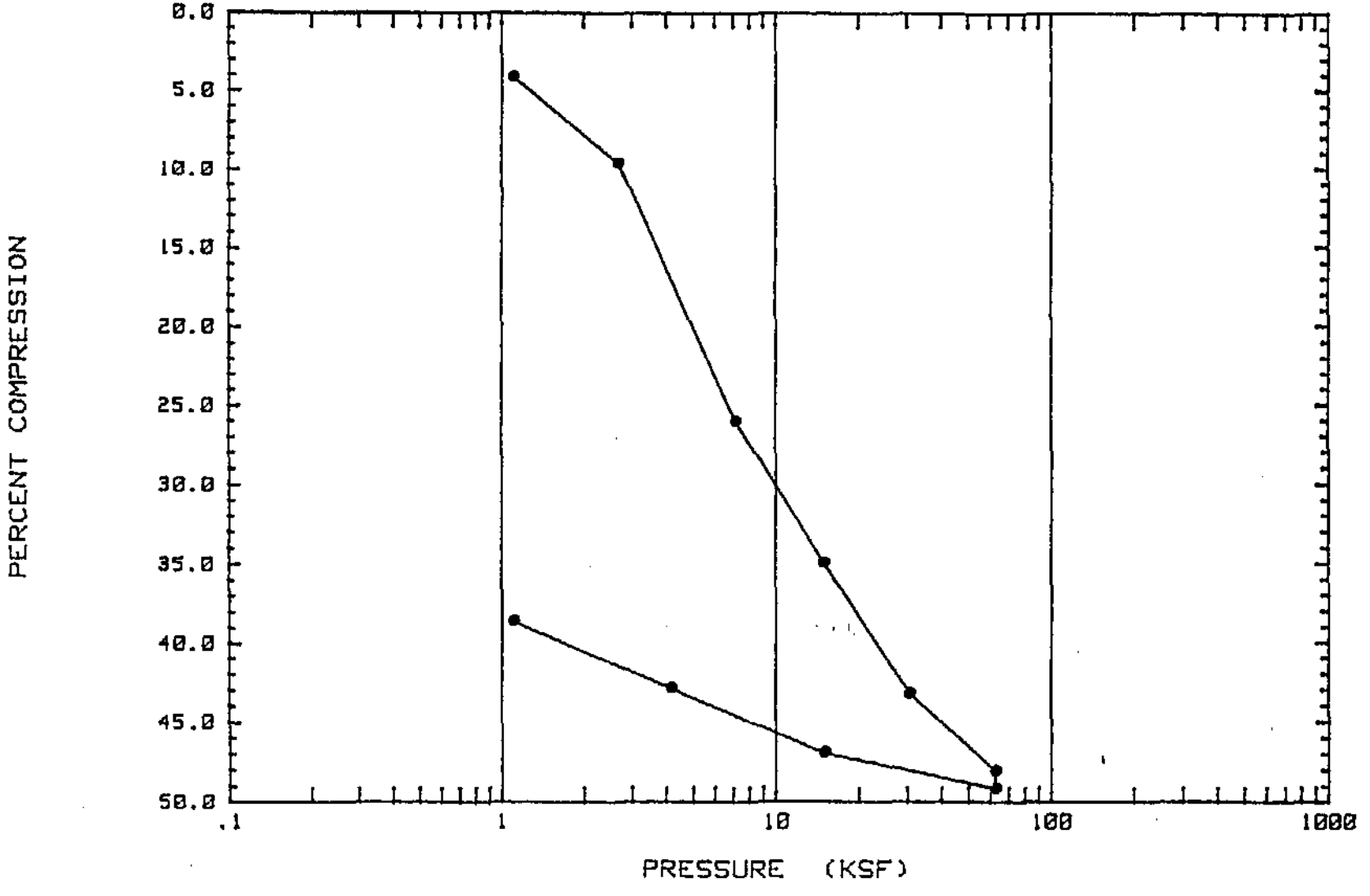
Consolidation

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 3.0'

CLIENT : DURNE MILLER

LABORATORY # C97034



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153

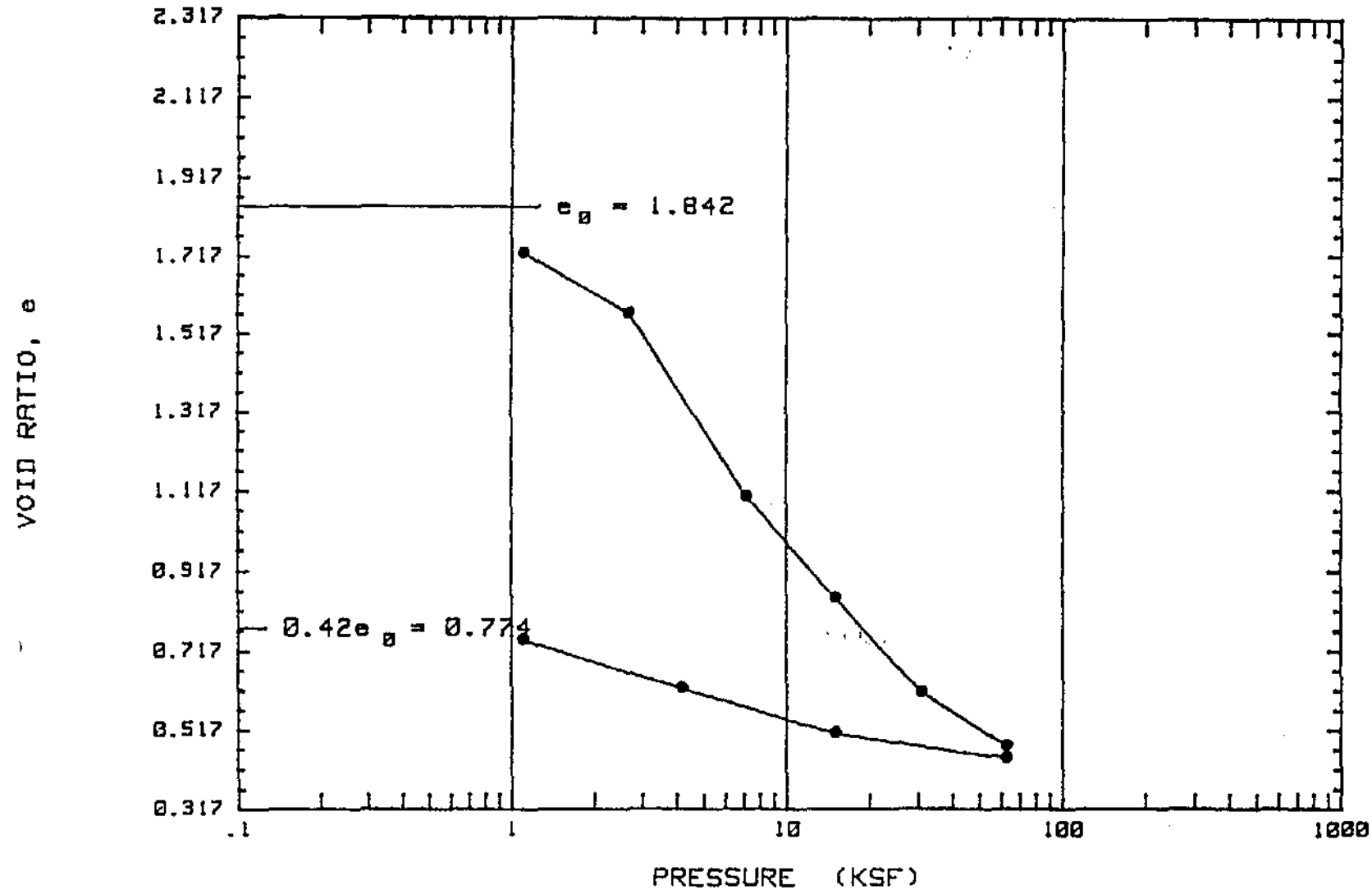
FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 3.0'

CLIENT : DUANE MILLER

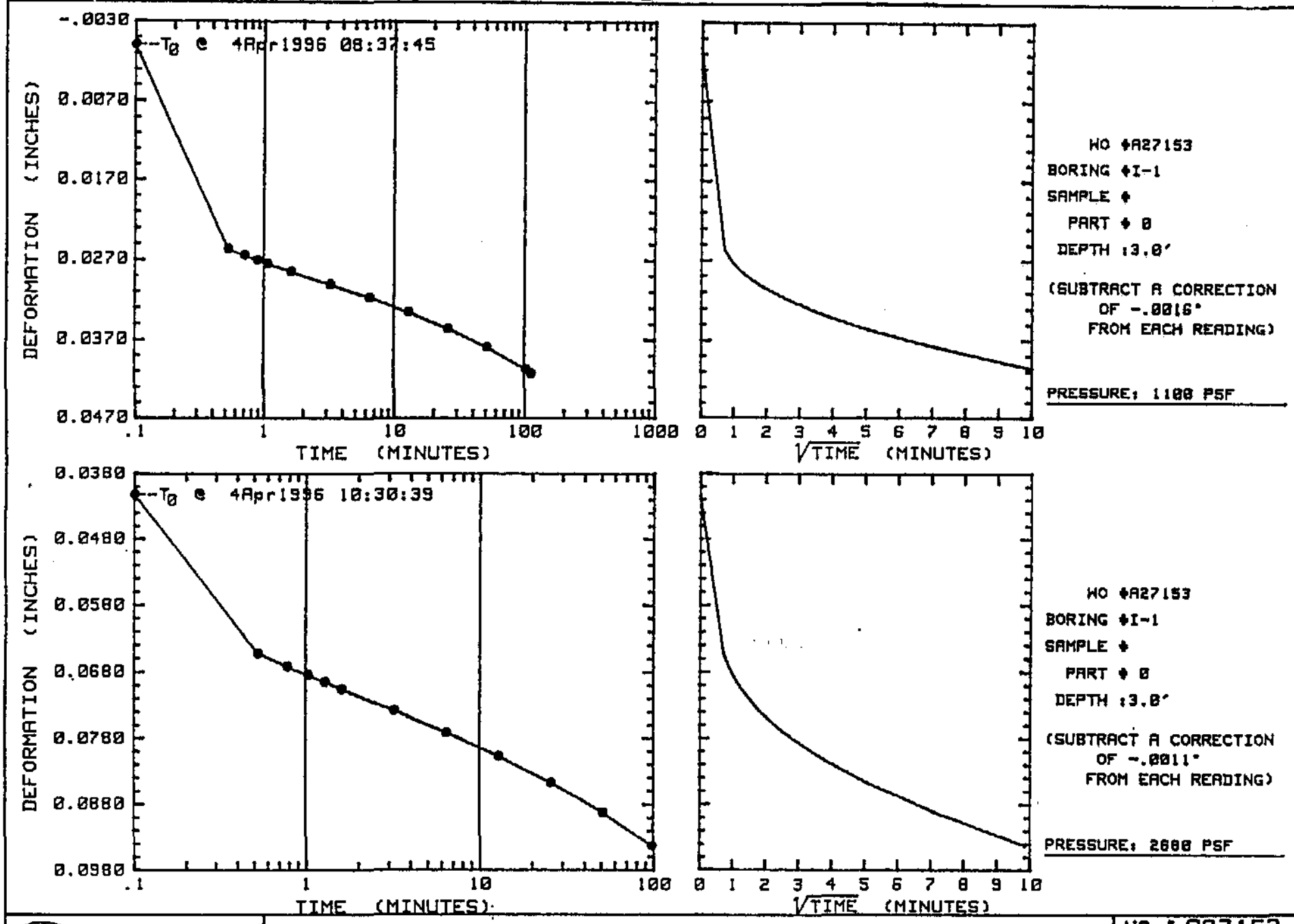
LABORATORY # C97034



ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE

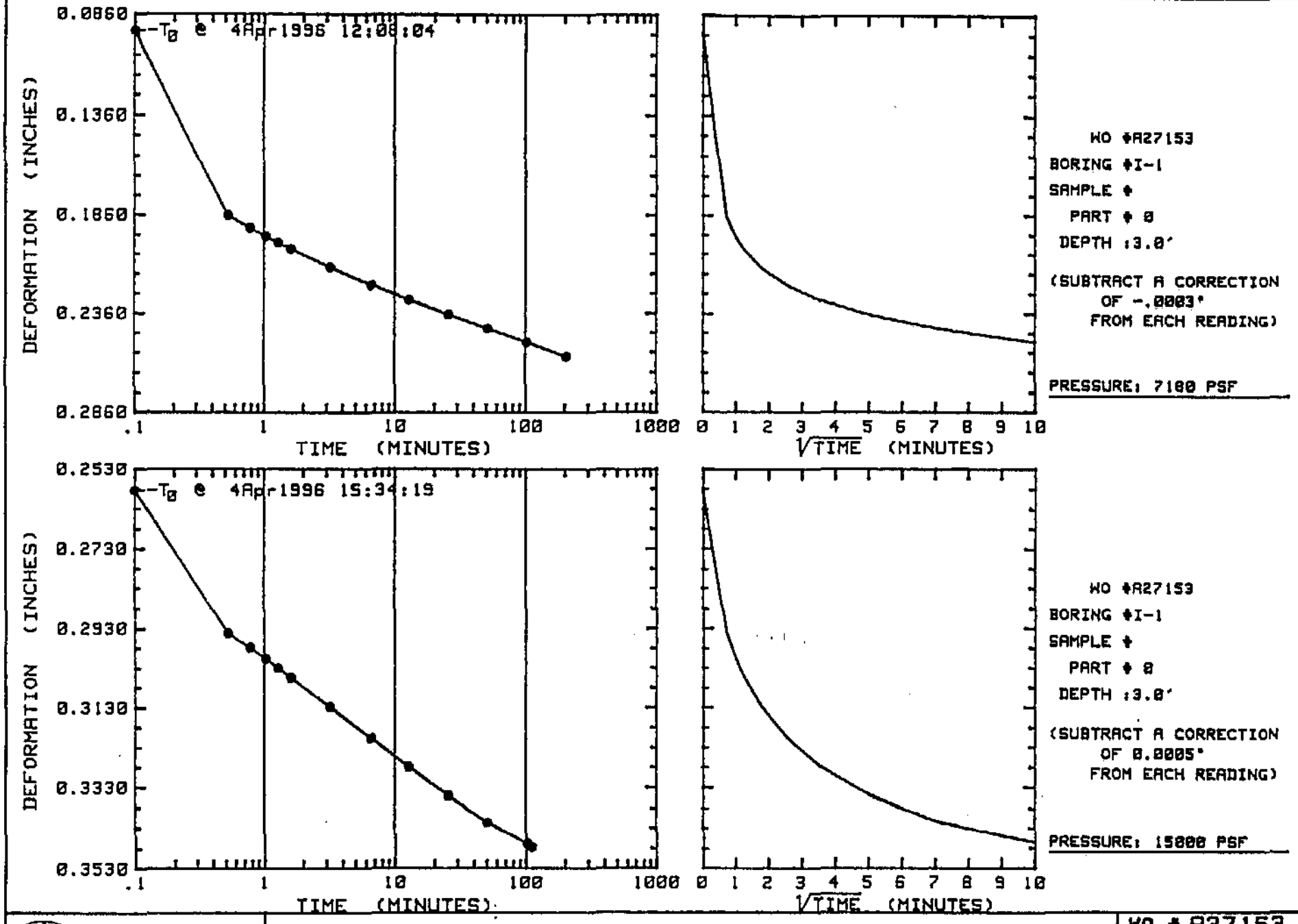


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

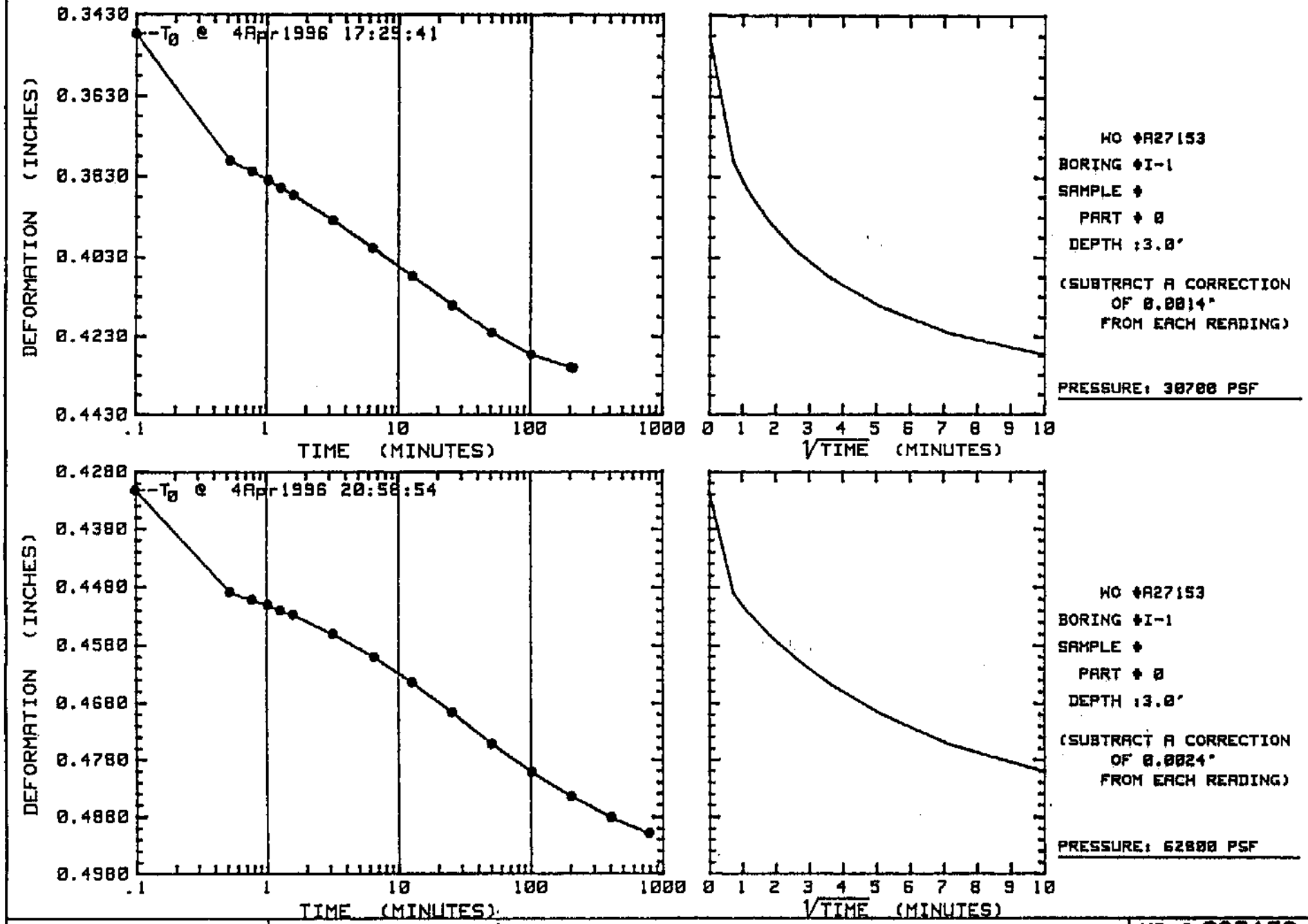


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

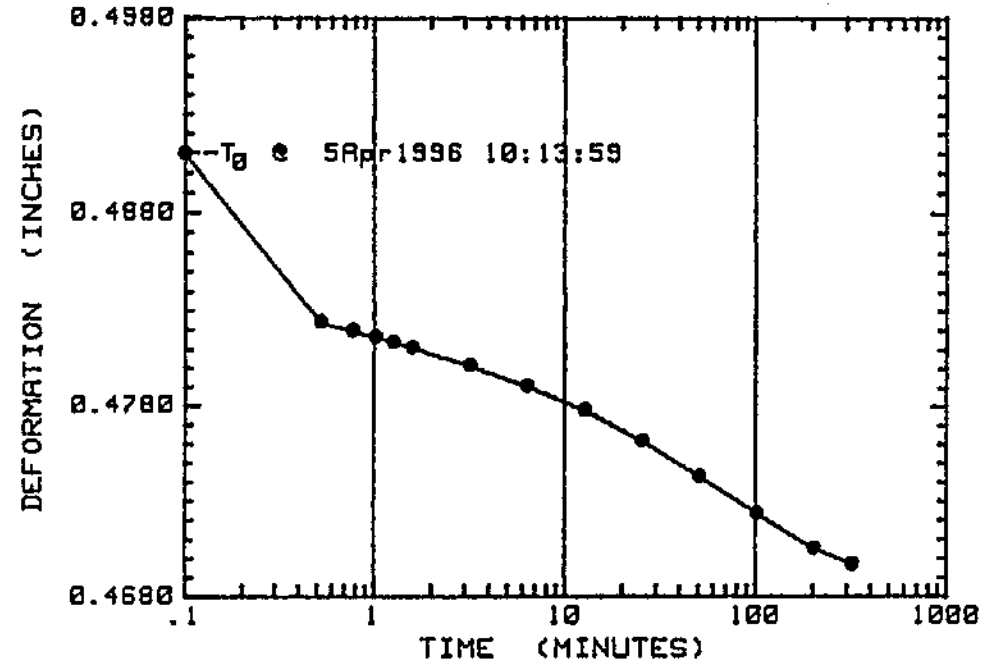
FIGURE

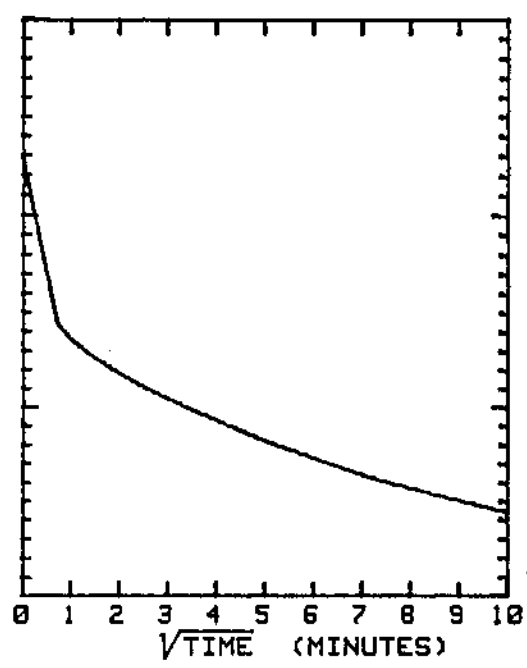


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

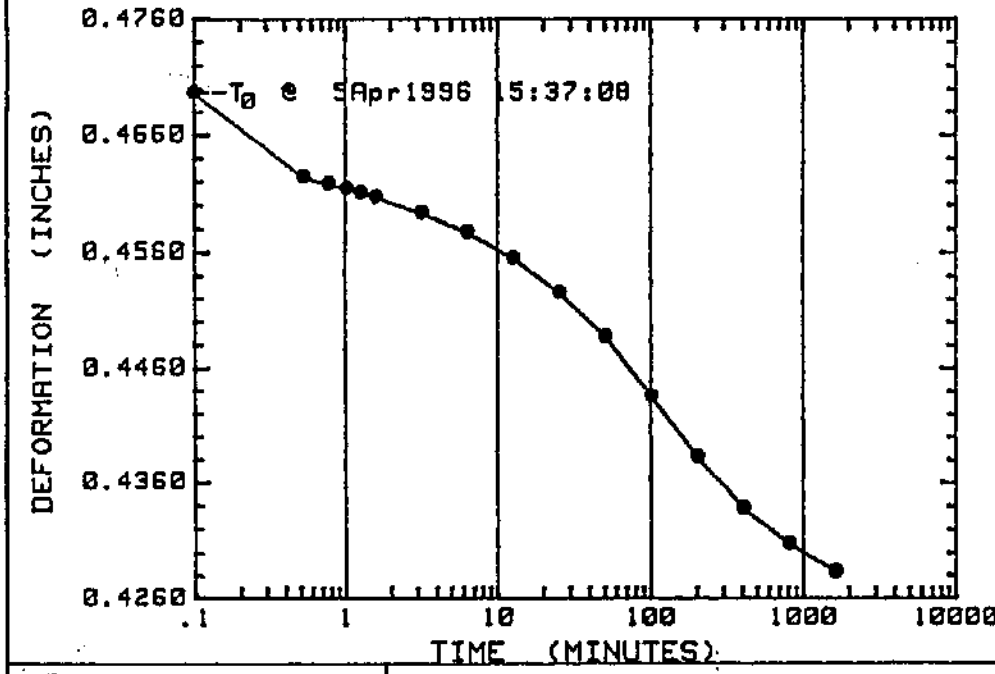


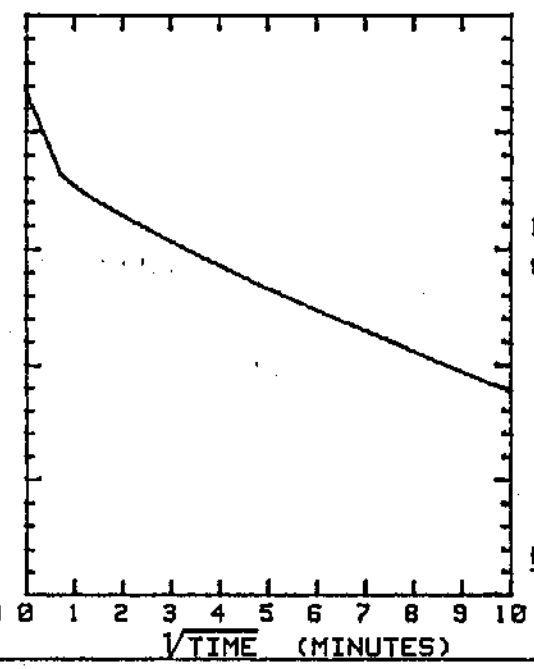


WO #A27153
BORING #I-1
SAMPLE #
PART # 0
DEPTH :3.0'

(SUBTRACT A CORRECTION OF 0.0009" FROM EACH READING)

PRESSURE: 15000 PSF





WO #A27153
BORING #I-1
SAMPLE #
PART # 0
DEPTH :3.0'

(SUBTRACT A CORRECTION OF -.0002" FROM EACH READING)

PRESSURE: 4160 PSF

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

APPENDIX D

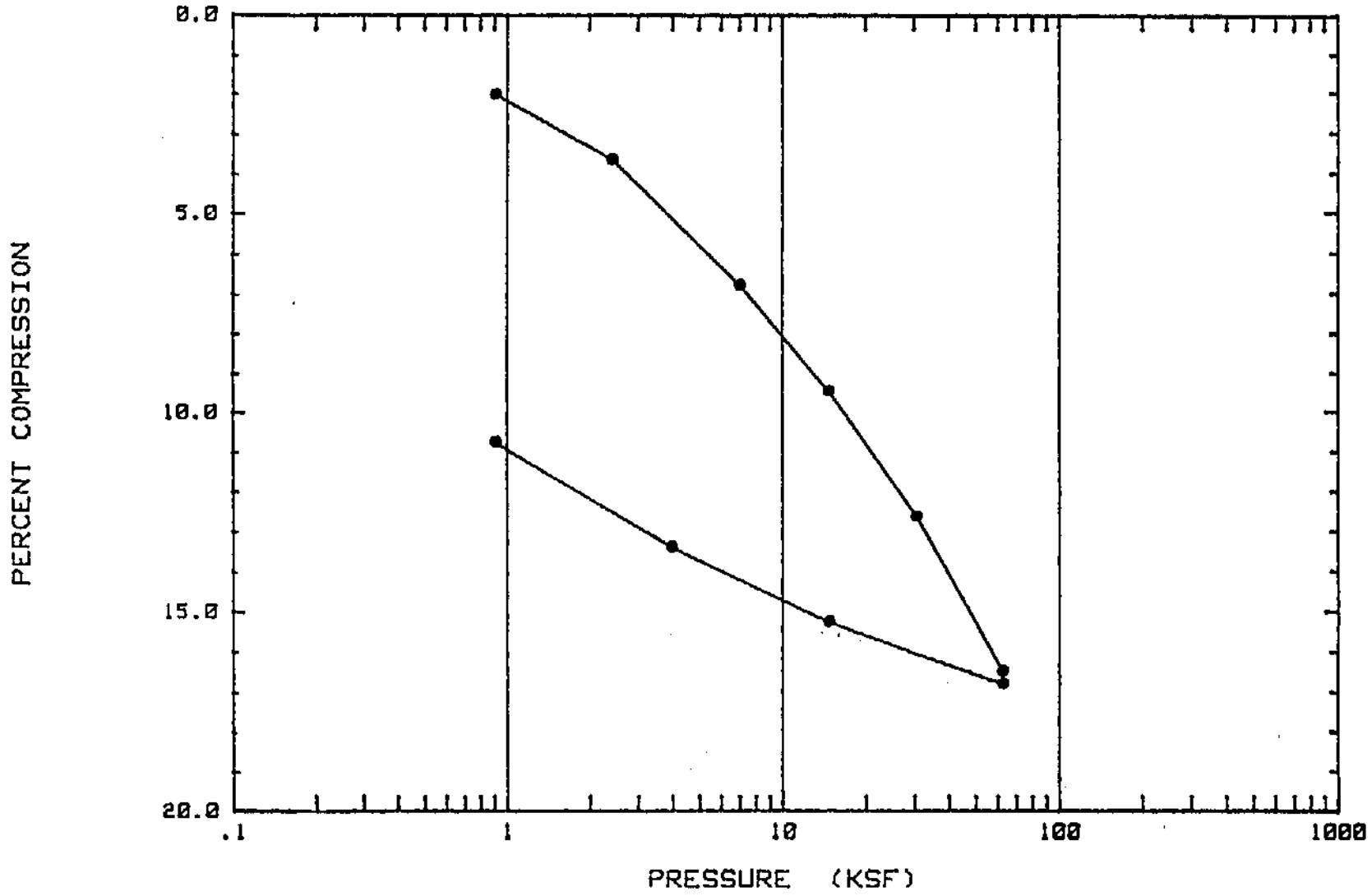
CONSOLIDATION TEST DATA

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 5.5'

CLIENT : DUANE MILLER

LABORATORY # C97035



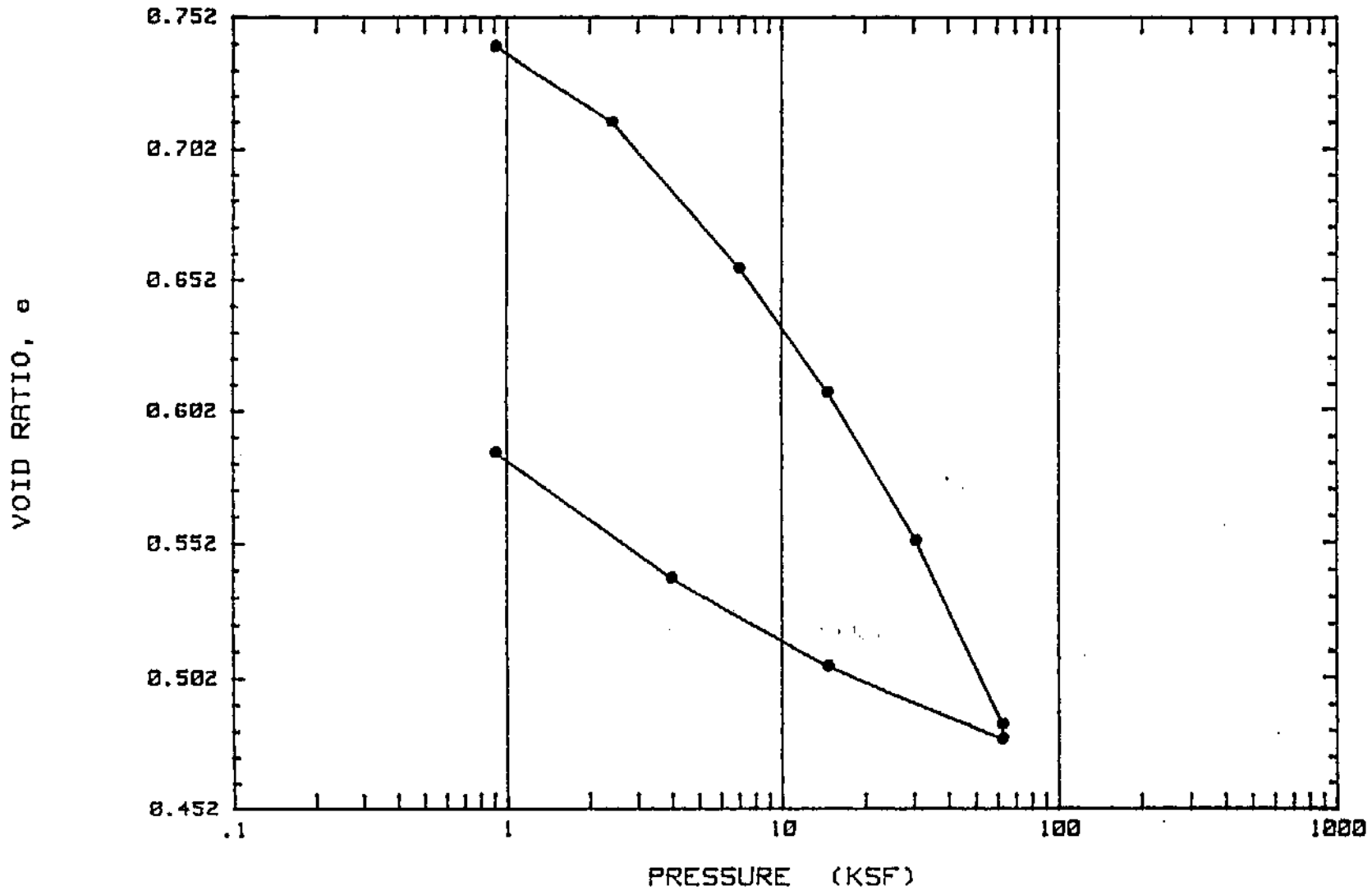
ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #
DEPTH: 5.5'

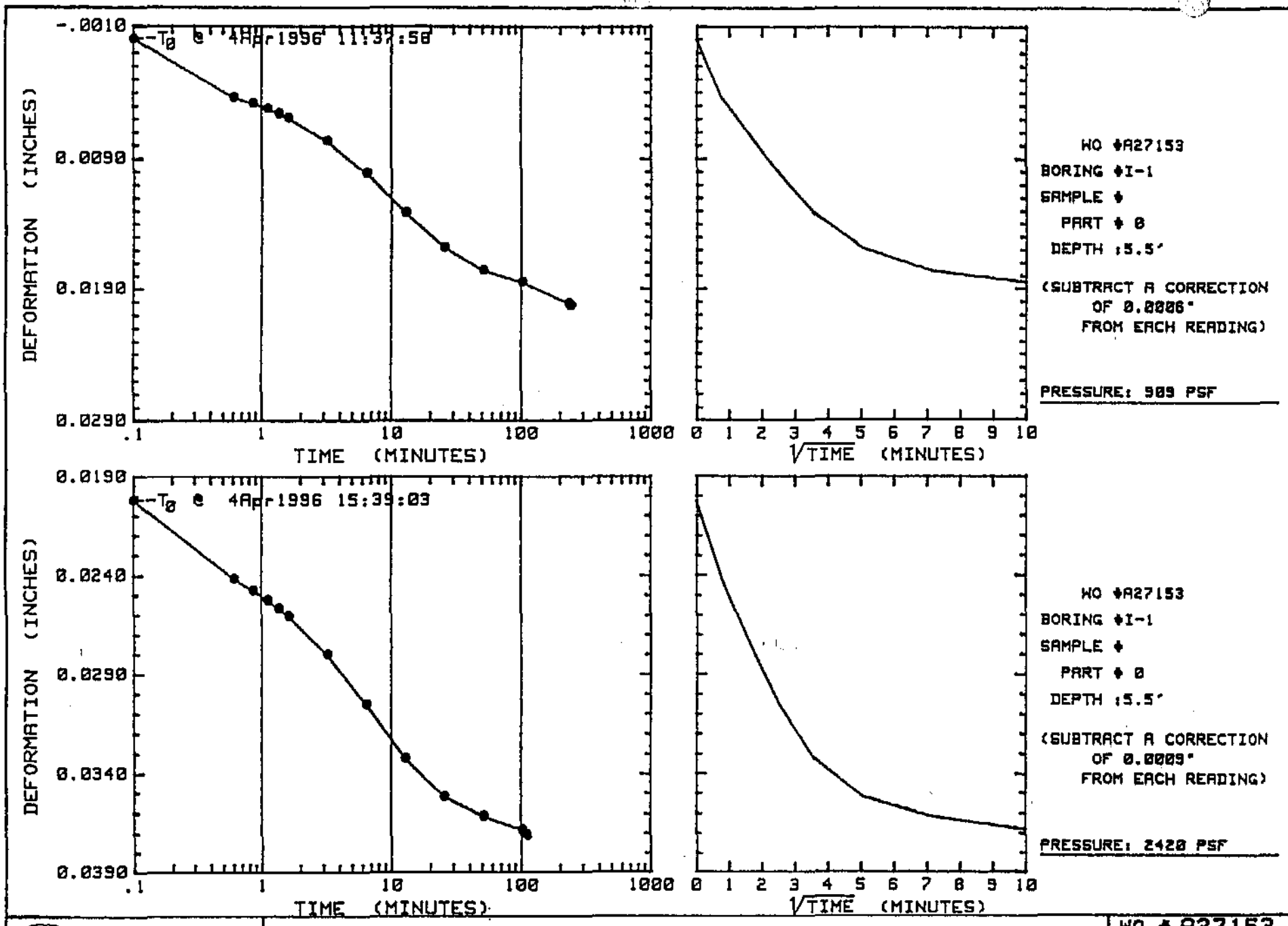
CLIENT : DURNE MILLER
e = 0.777
LABORATORY # C97035



ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE

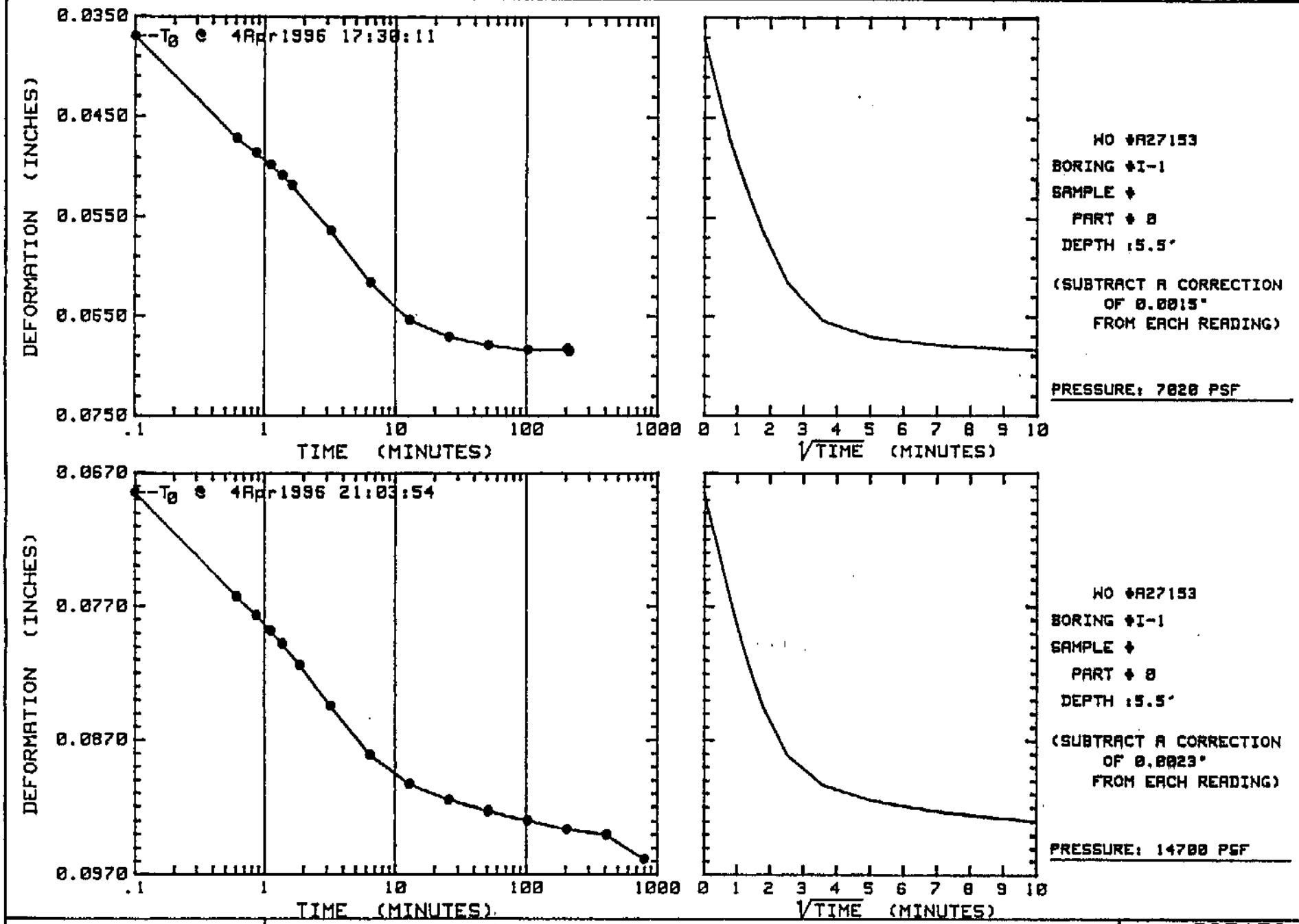


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

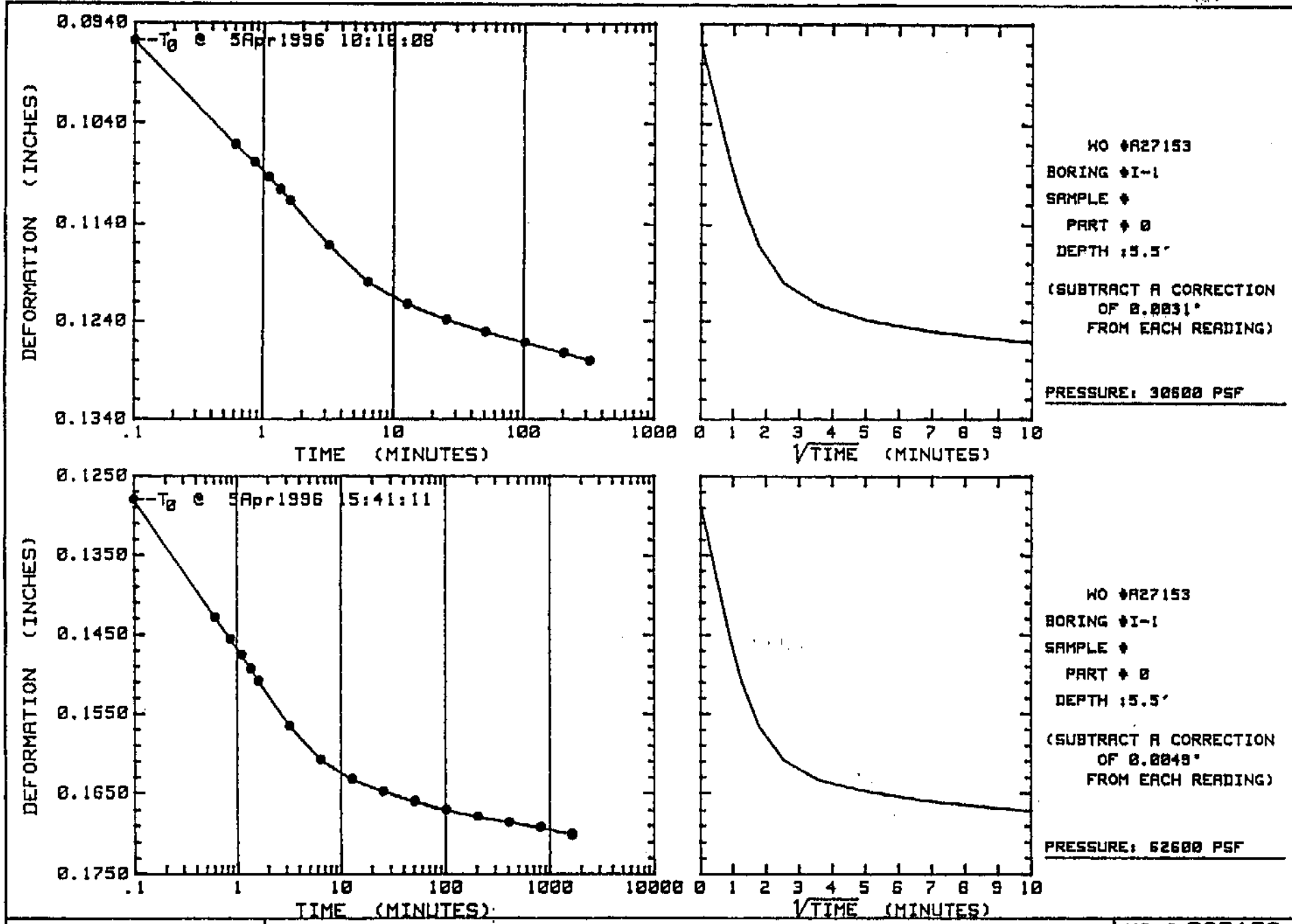


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

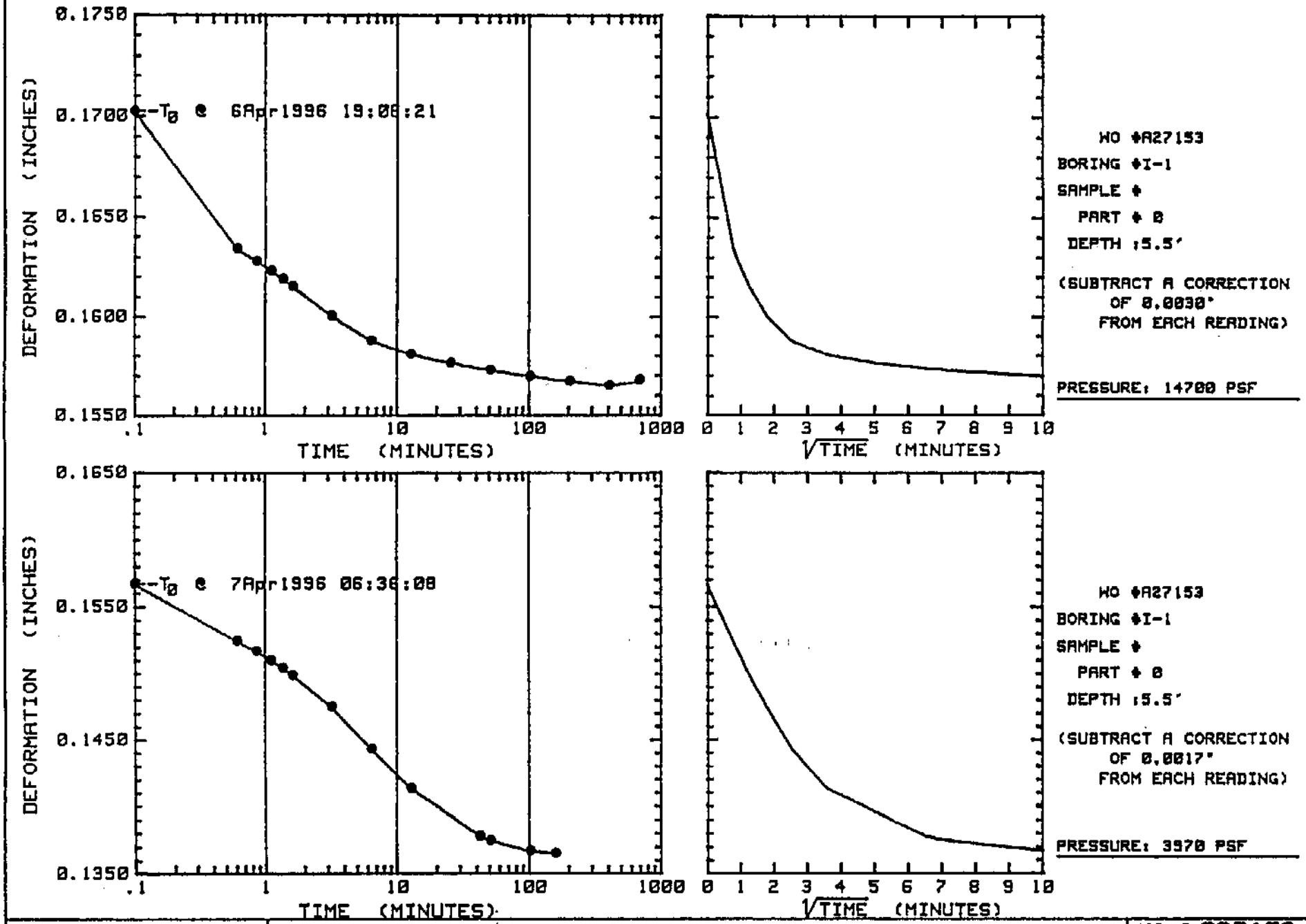


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

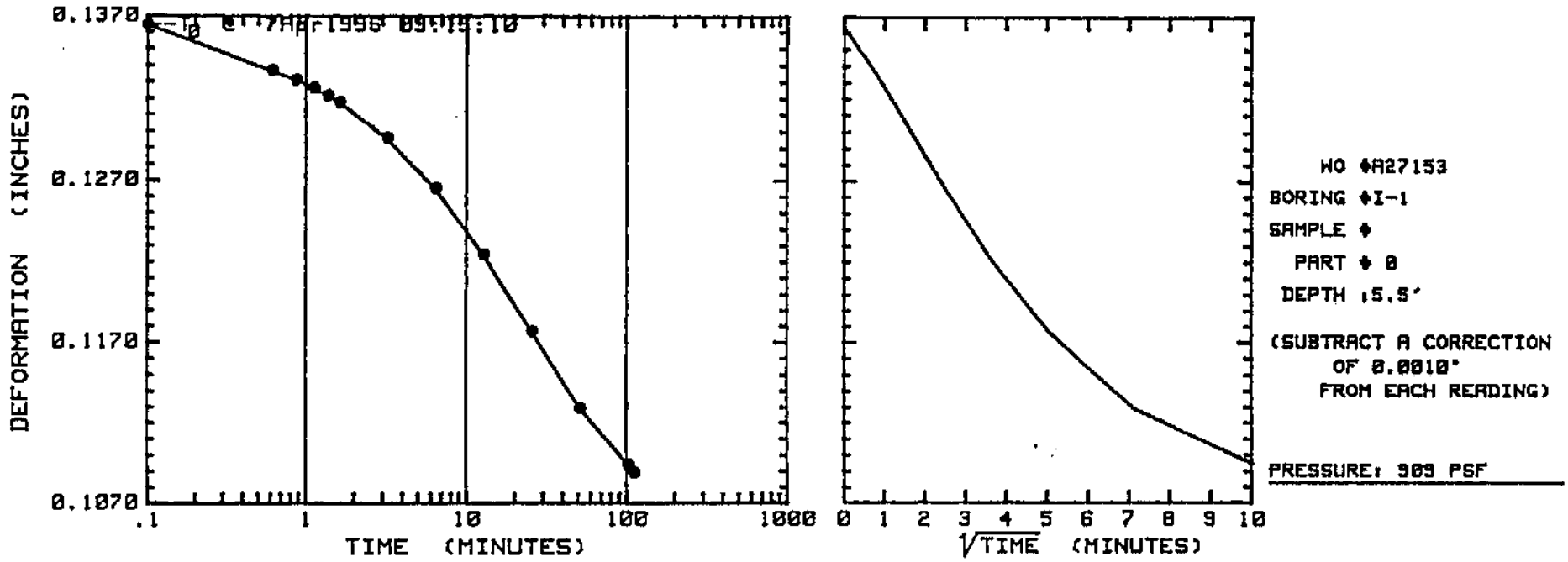


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE



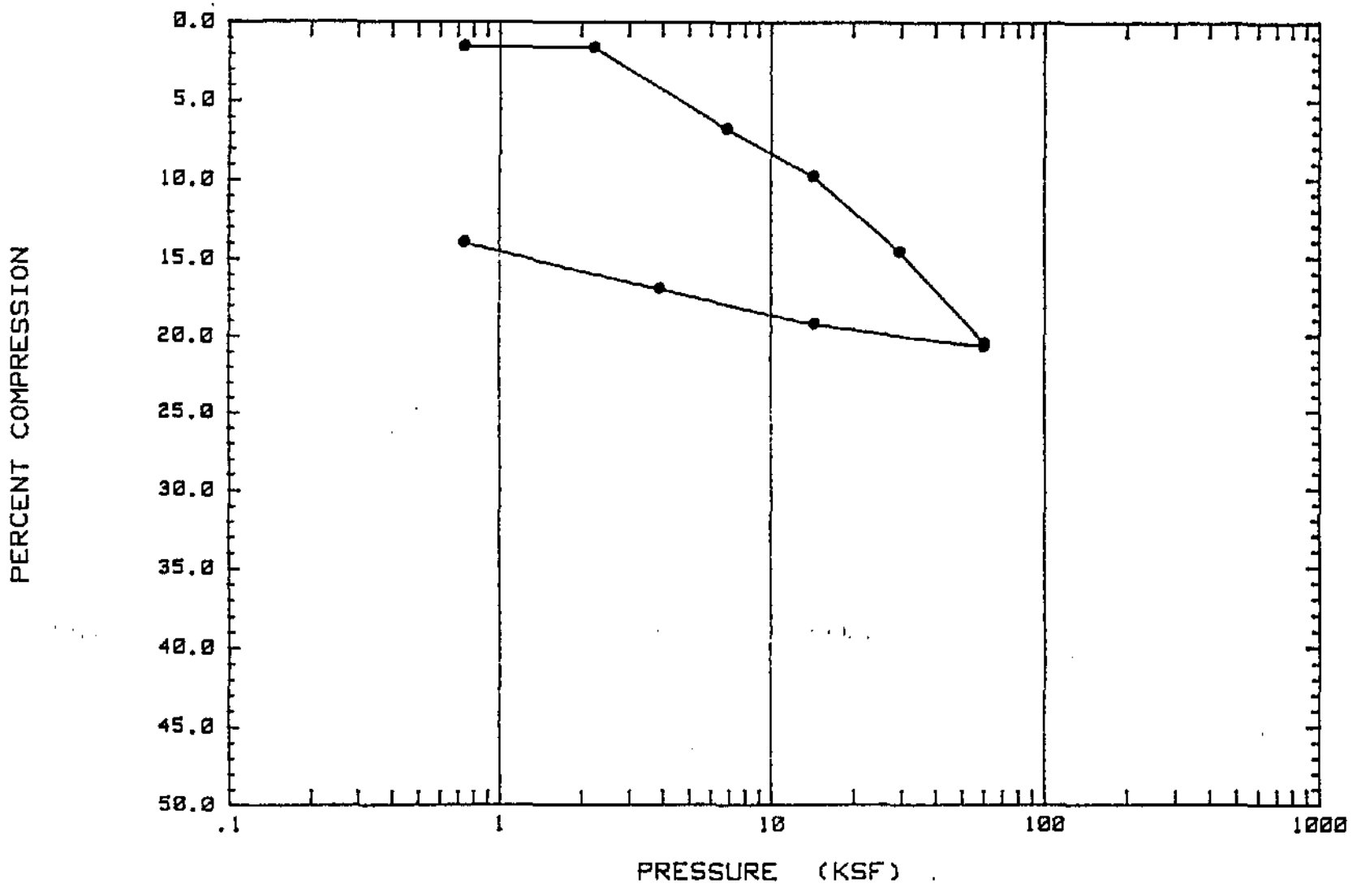
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 15.5

CLIENT : DUANE MILLER

LABORATORY # C97048



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

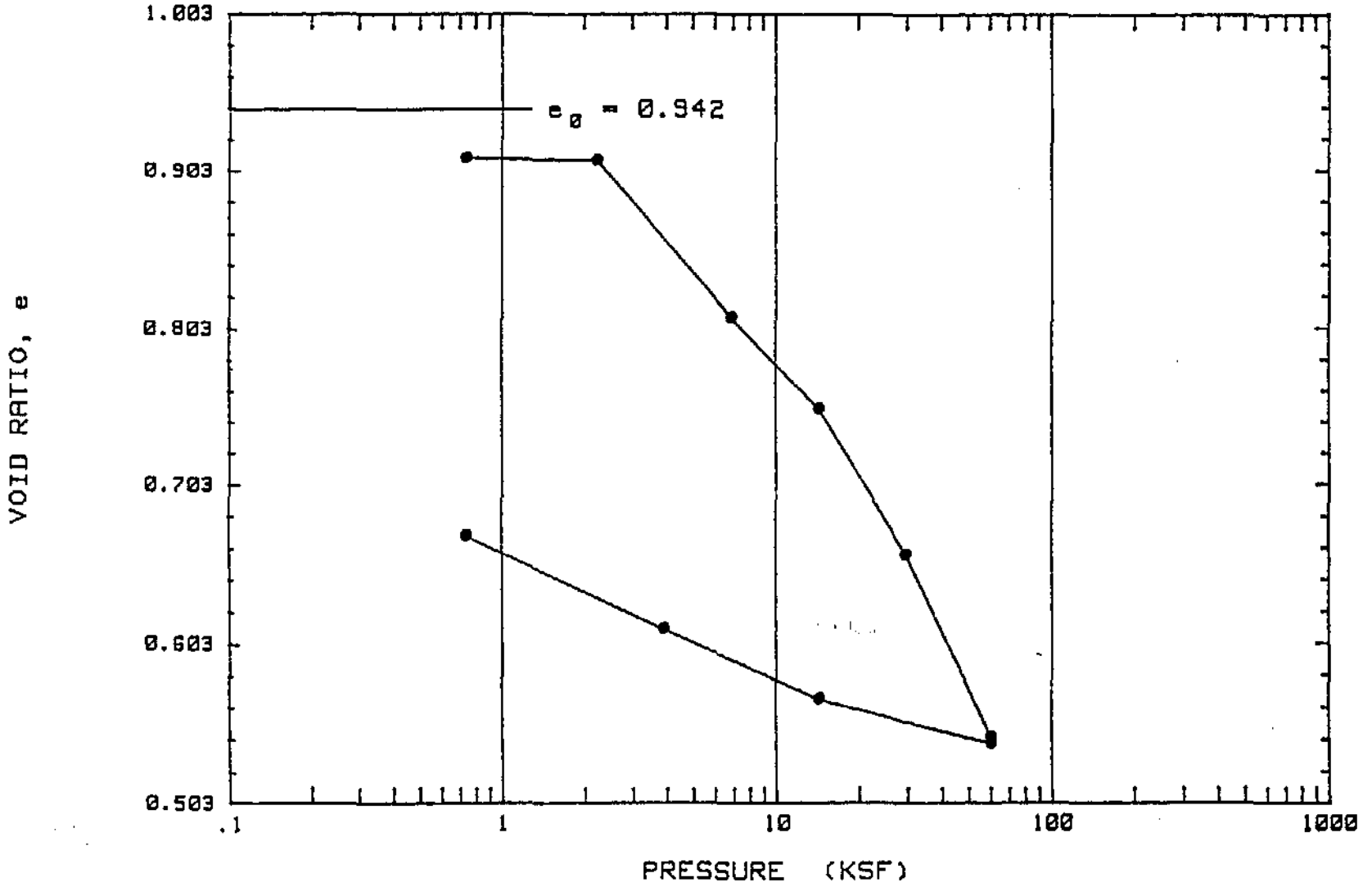
WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 15.5

CLIENT : DUANE MILLER

LABORATORY # C97048



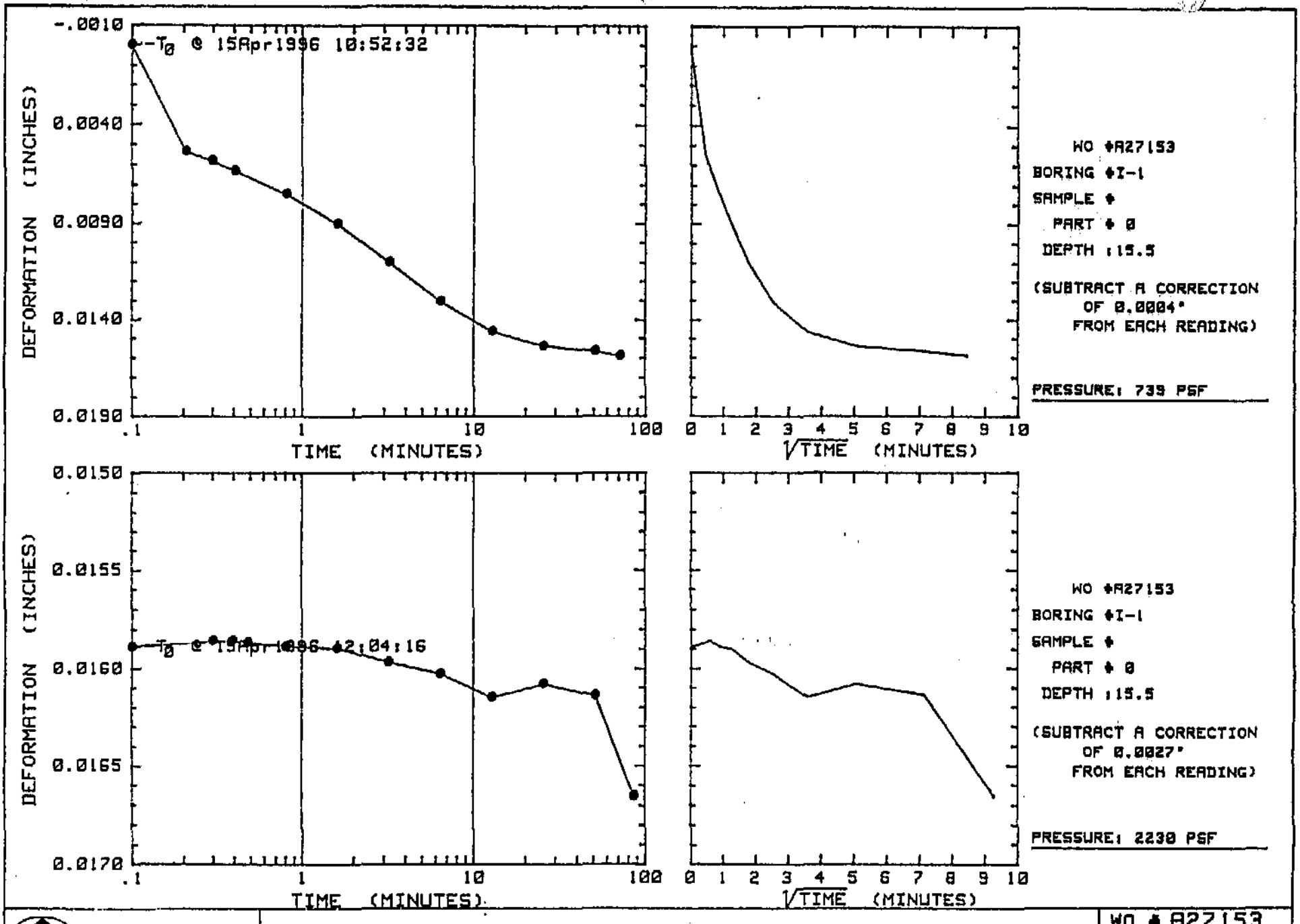
ALASKA TESTLAB

— 0.42 — 0.396

Compression Curve (e vs. Log P)

WO # A27153

FIGURE

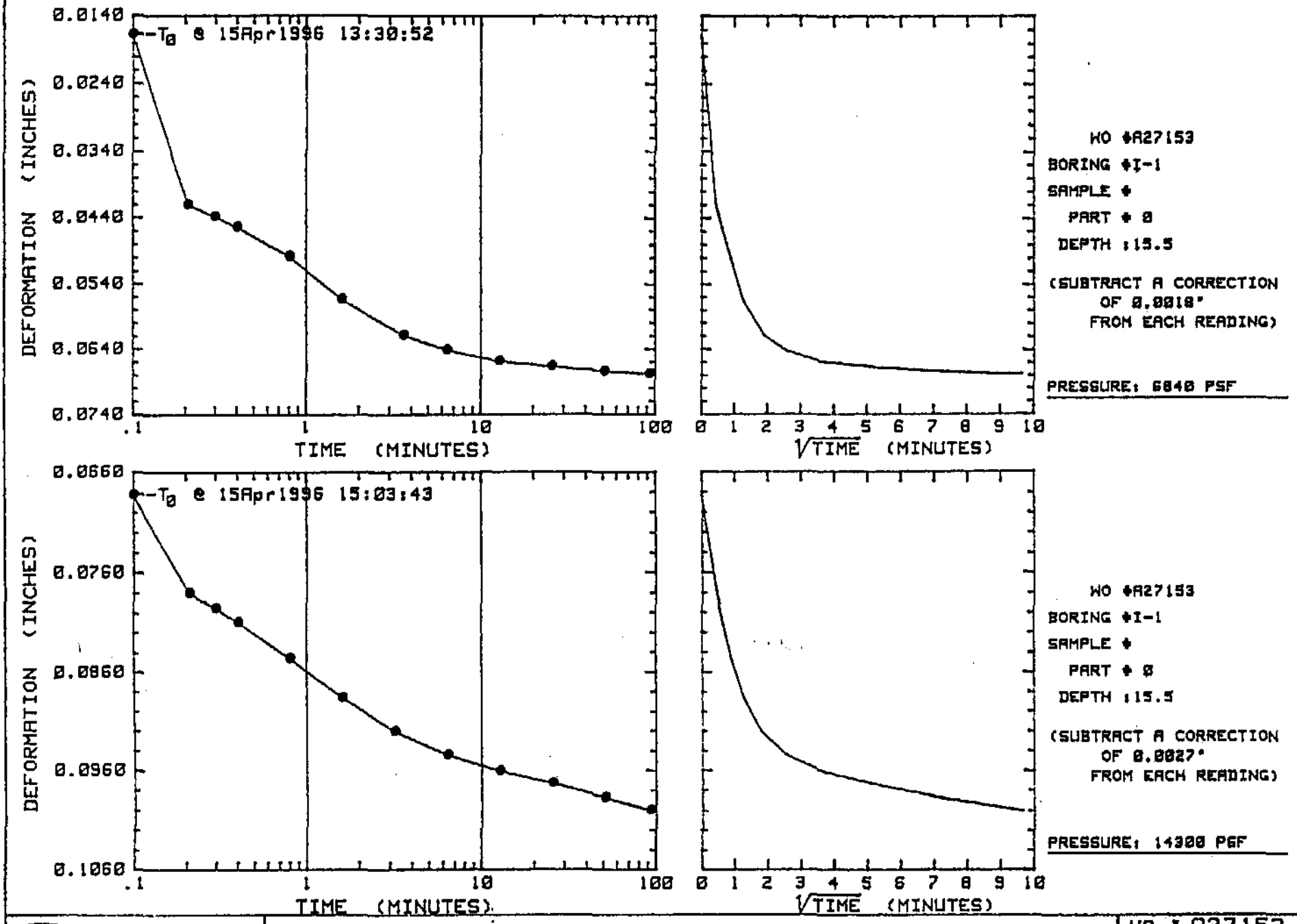


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

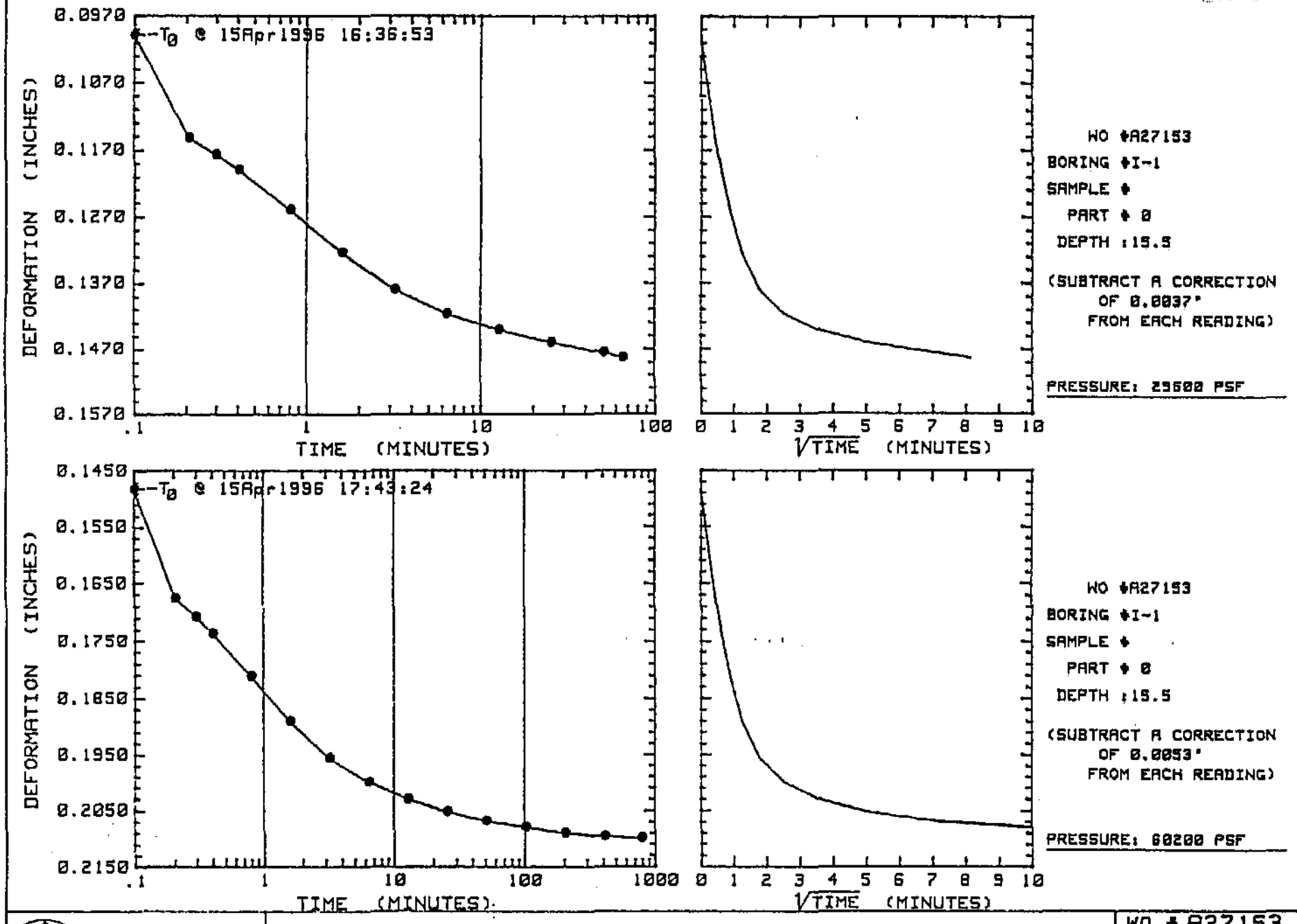
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

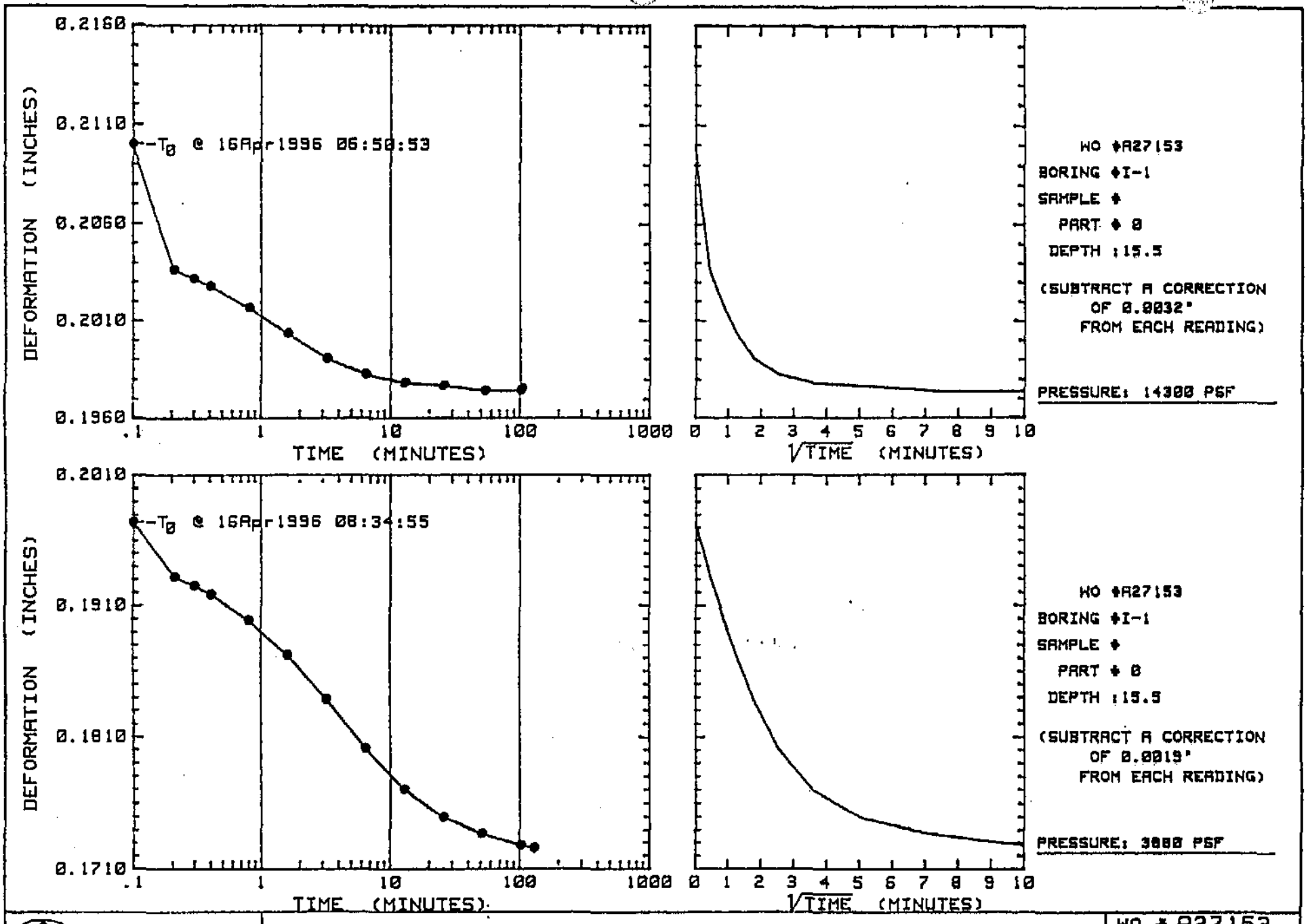


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

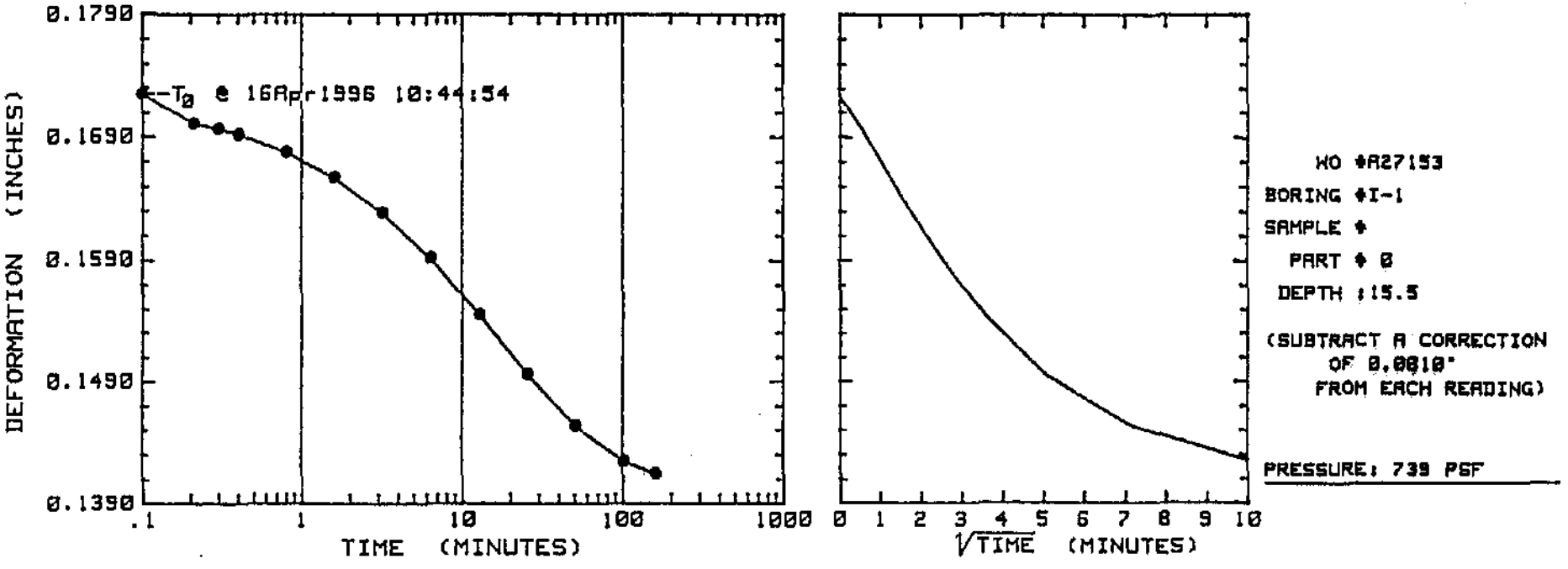


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE



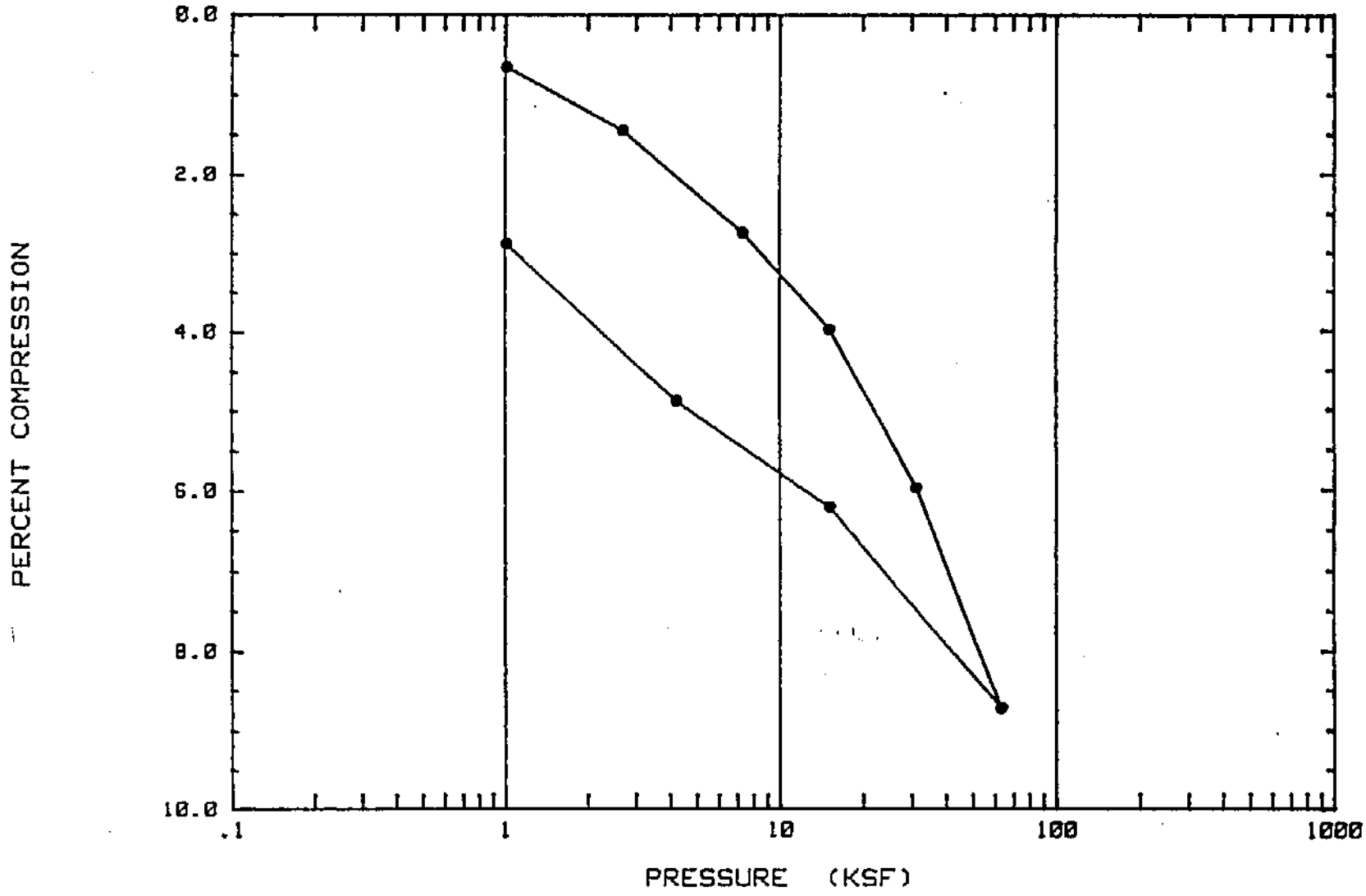
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE

PROJECT : LIBERTY
BORING # I-2
SAMPLE #

DEPTH: 9.7

CLIENT : DUANE MILLER

LABORATORY # C97049



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153

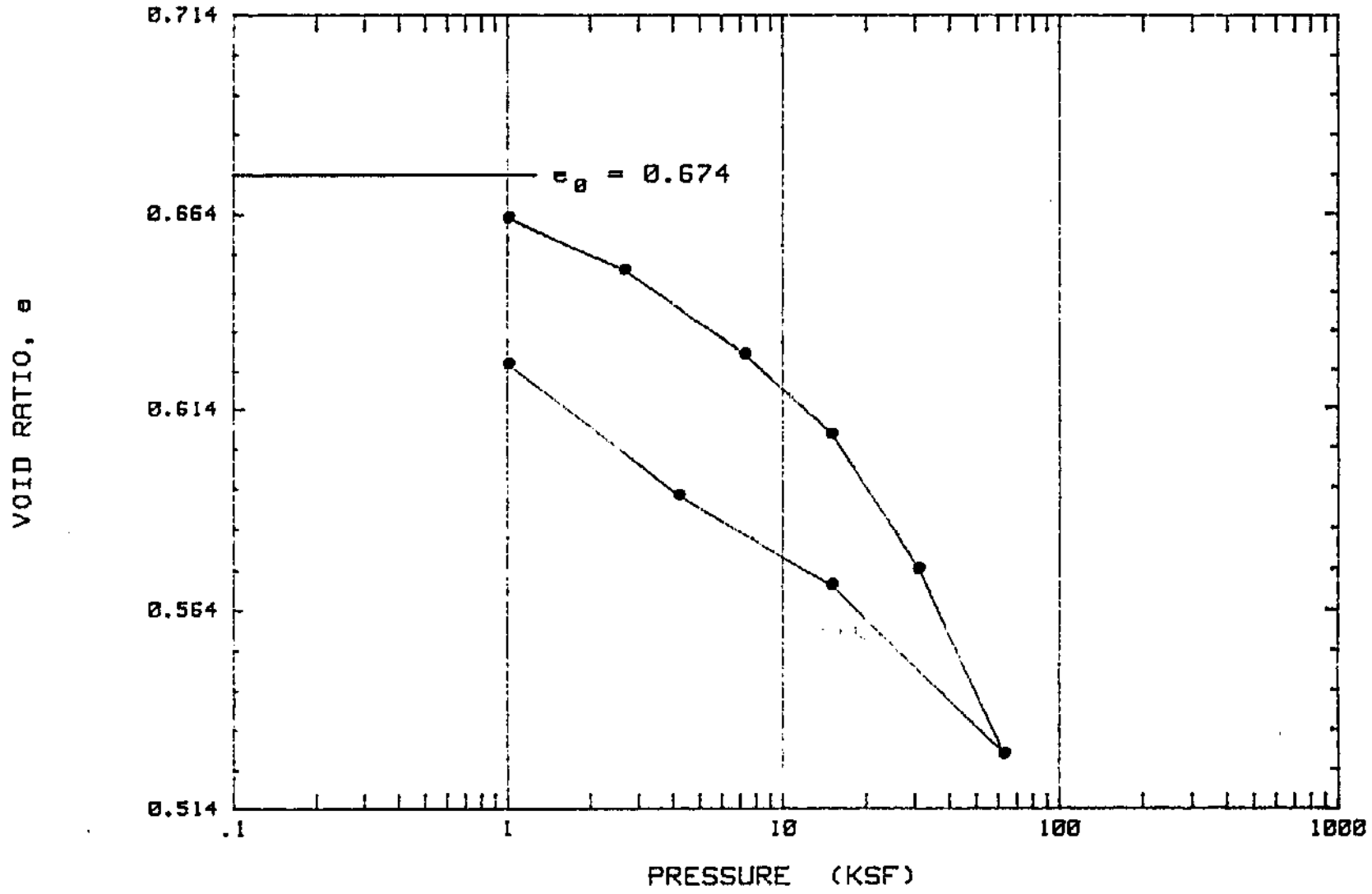
FIGURE

PROJECT : LIBERTY
BORING # I-2
SAMPLE #

DEPTH: 9.7

CLIENT : DUANE MILLER

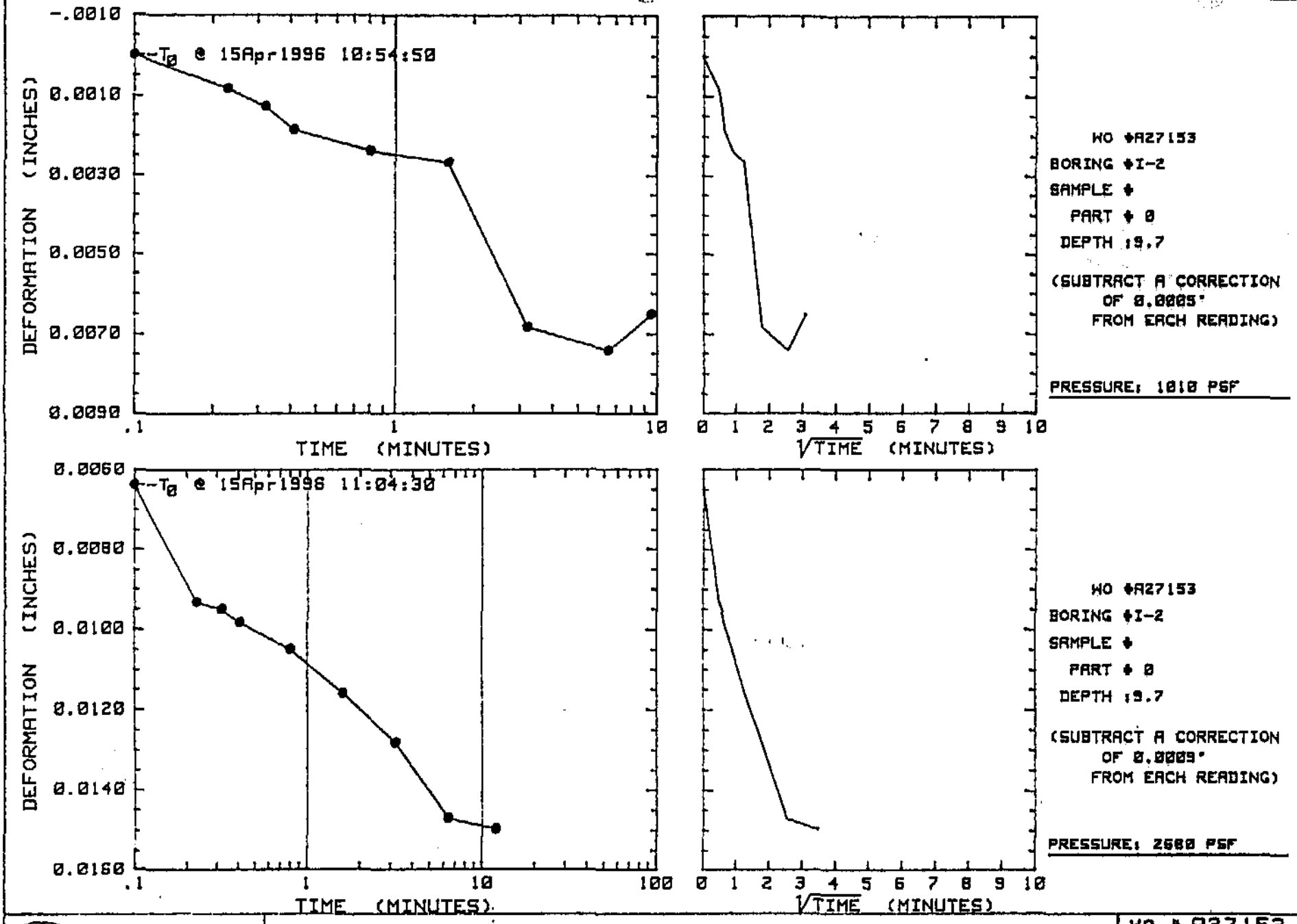
LABORATORY # C97049



ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE

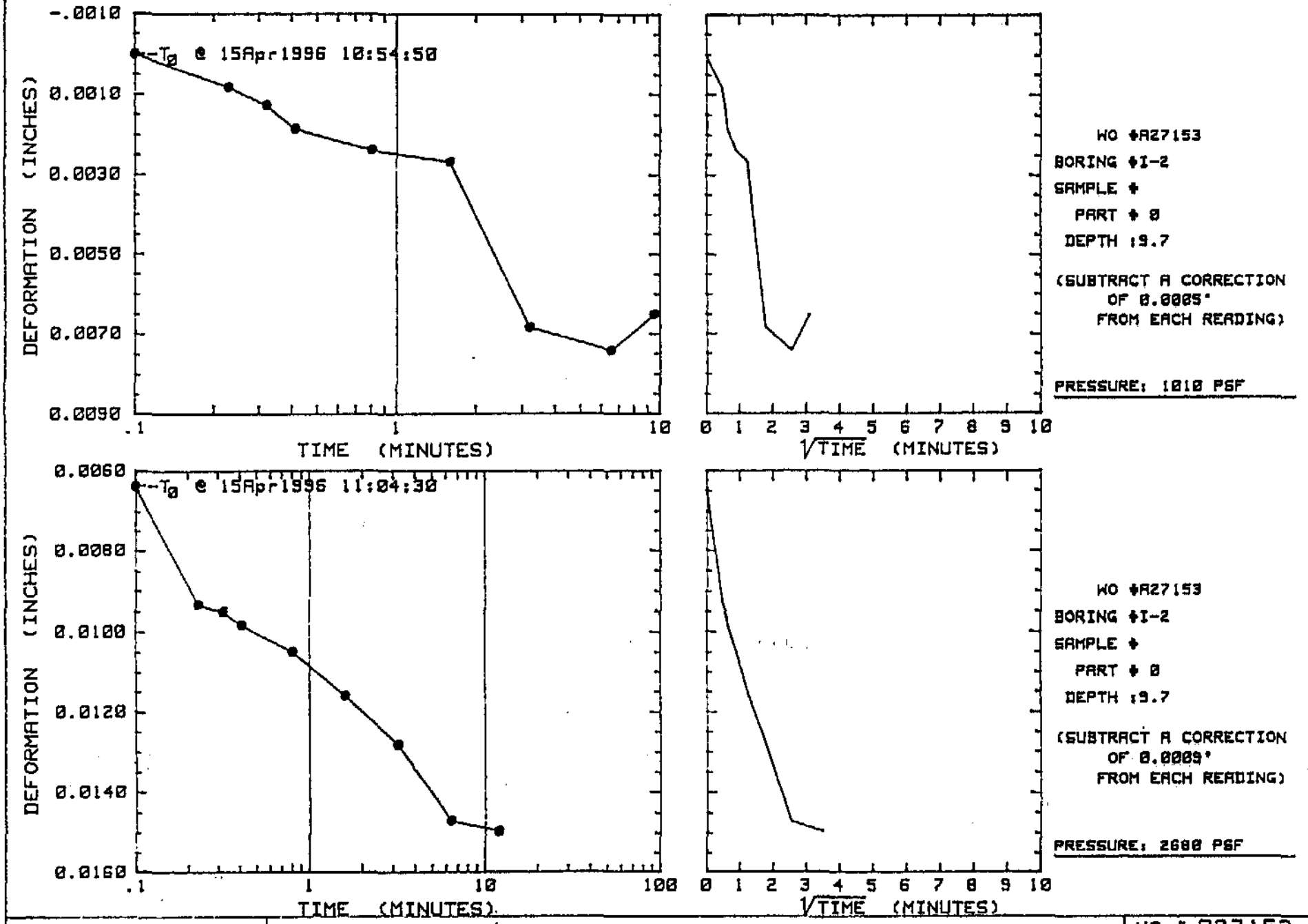


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

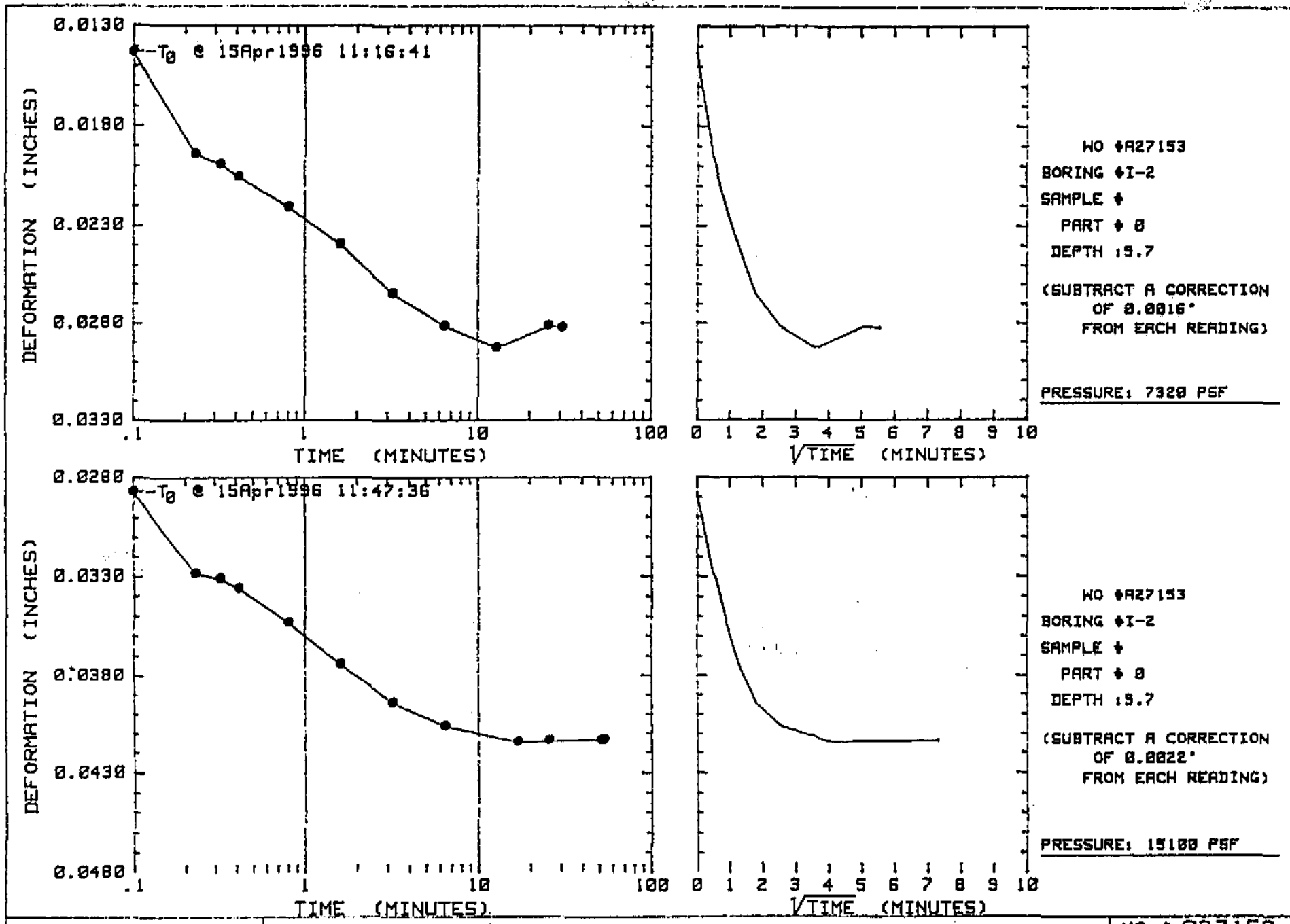
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

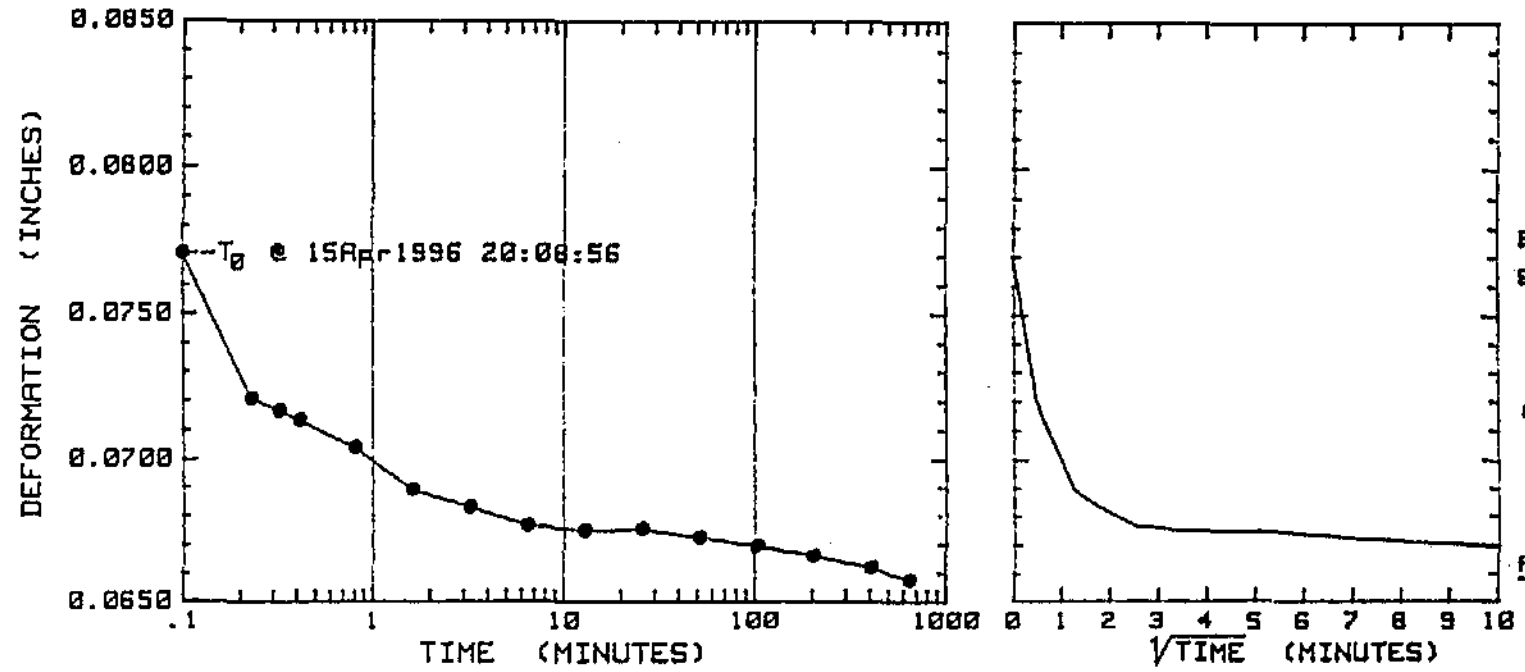


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

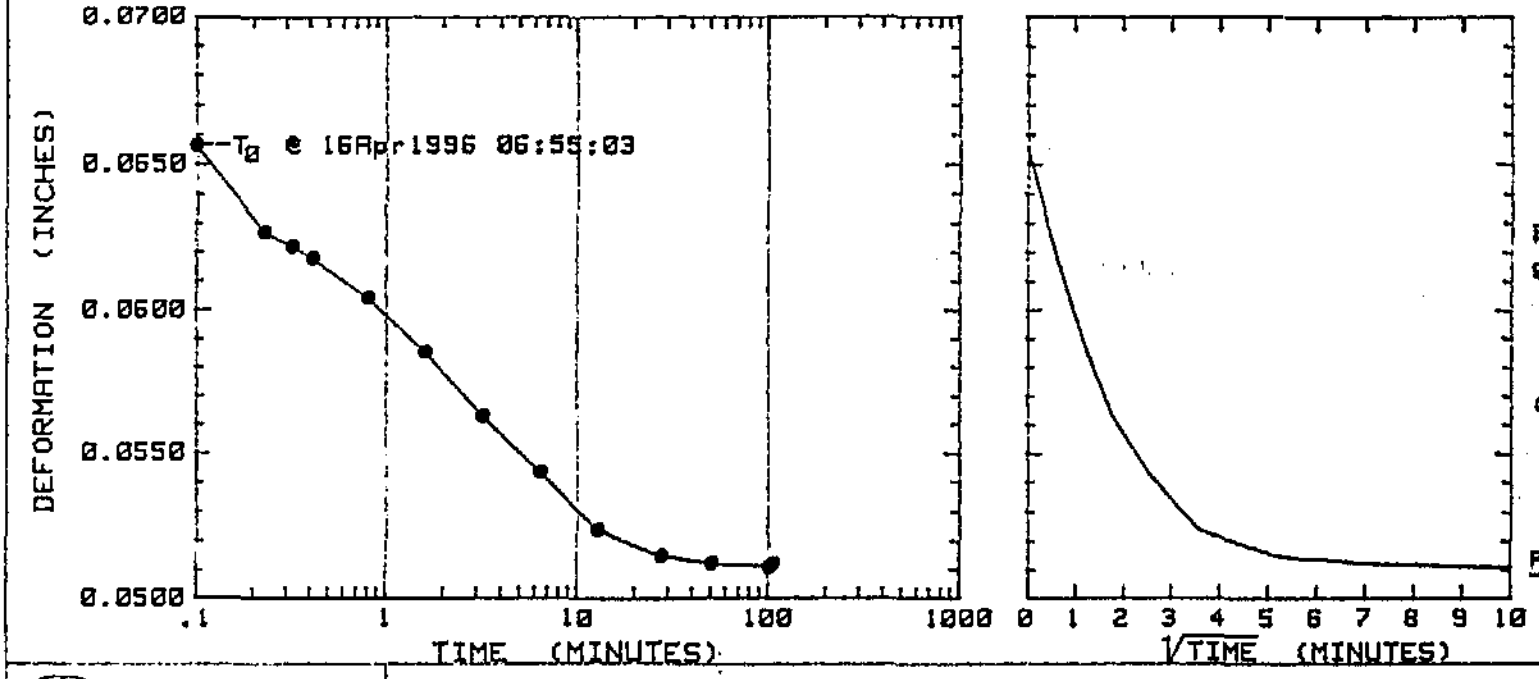
FIGURE



WO #A27153
BORING #I-2
SAMPLE #
PART # 0
DEPTH :9.7

(SUBTRACT A CORRECTION OF 0.0024" FROM EACH READING)

PRESSURE: 15100 PSF



WO #A27153
BORING #I-2
SAMPLE #
PART # 0
DEPTH :9.7

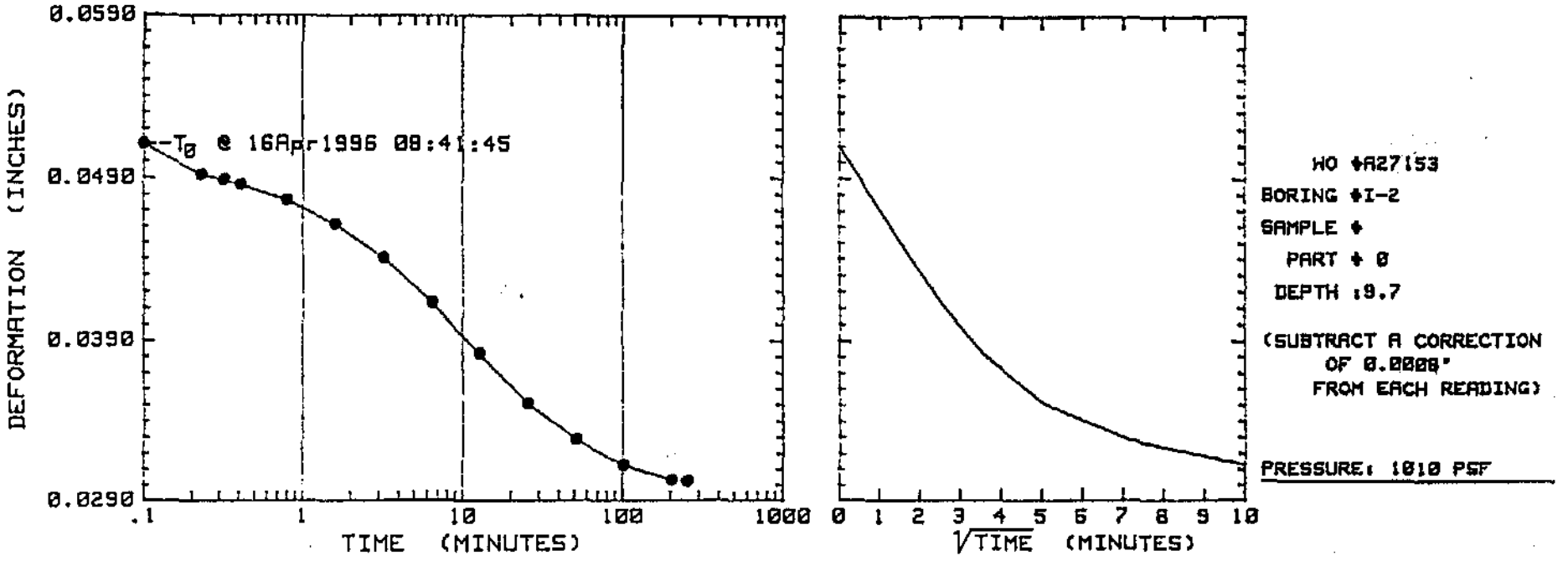
(SUBTRACT A CORRECTION OF 0.0014" FROM EACH READING)

PRESSURE: 4210 PSF

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

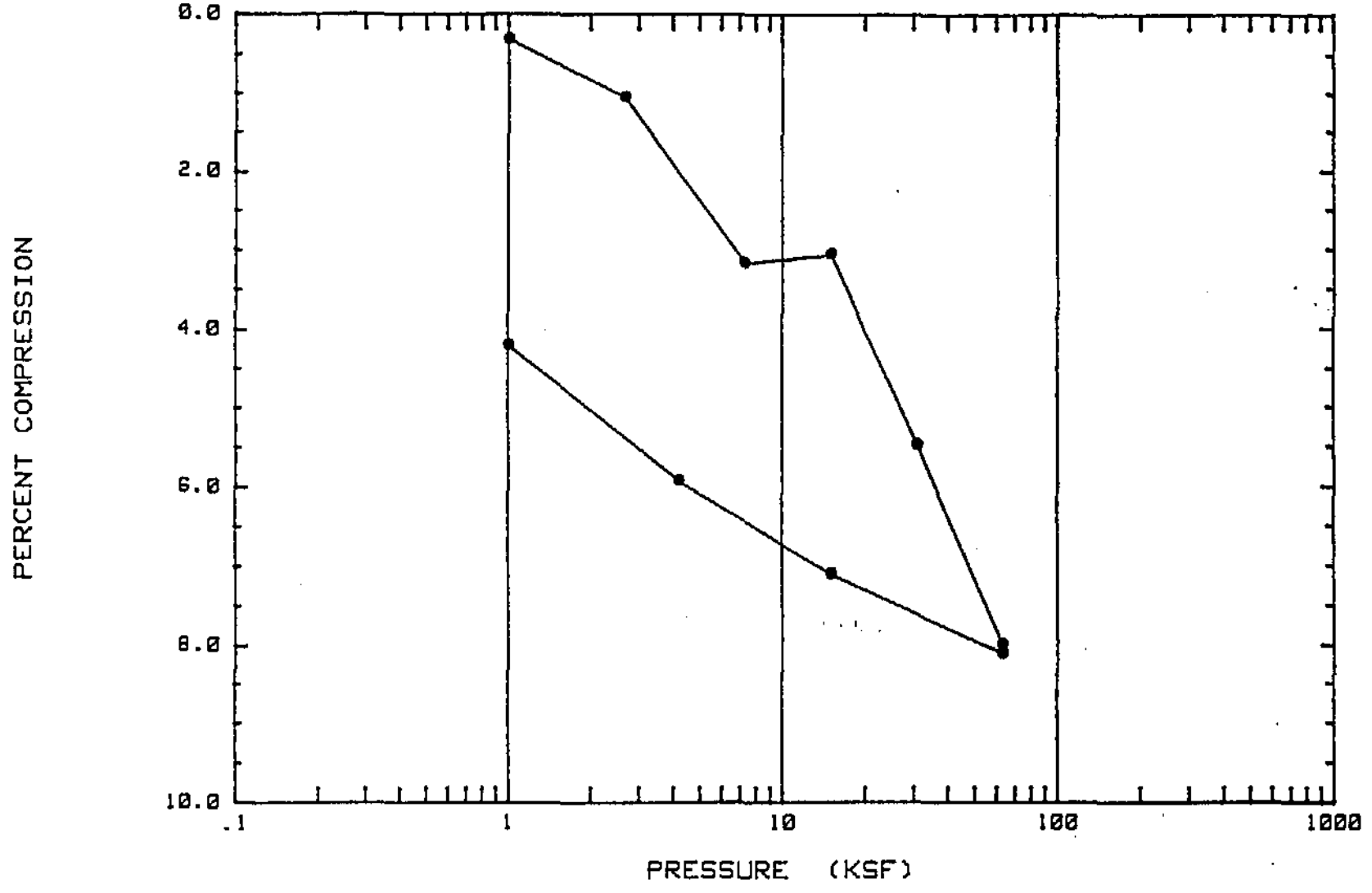
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 2.5'

CLIENT : DUANE MILLER

LABORATORY # C97052



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

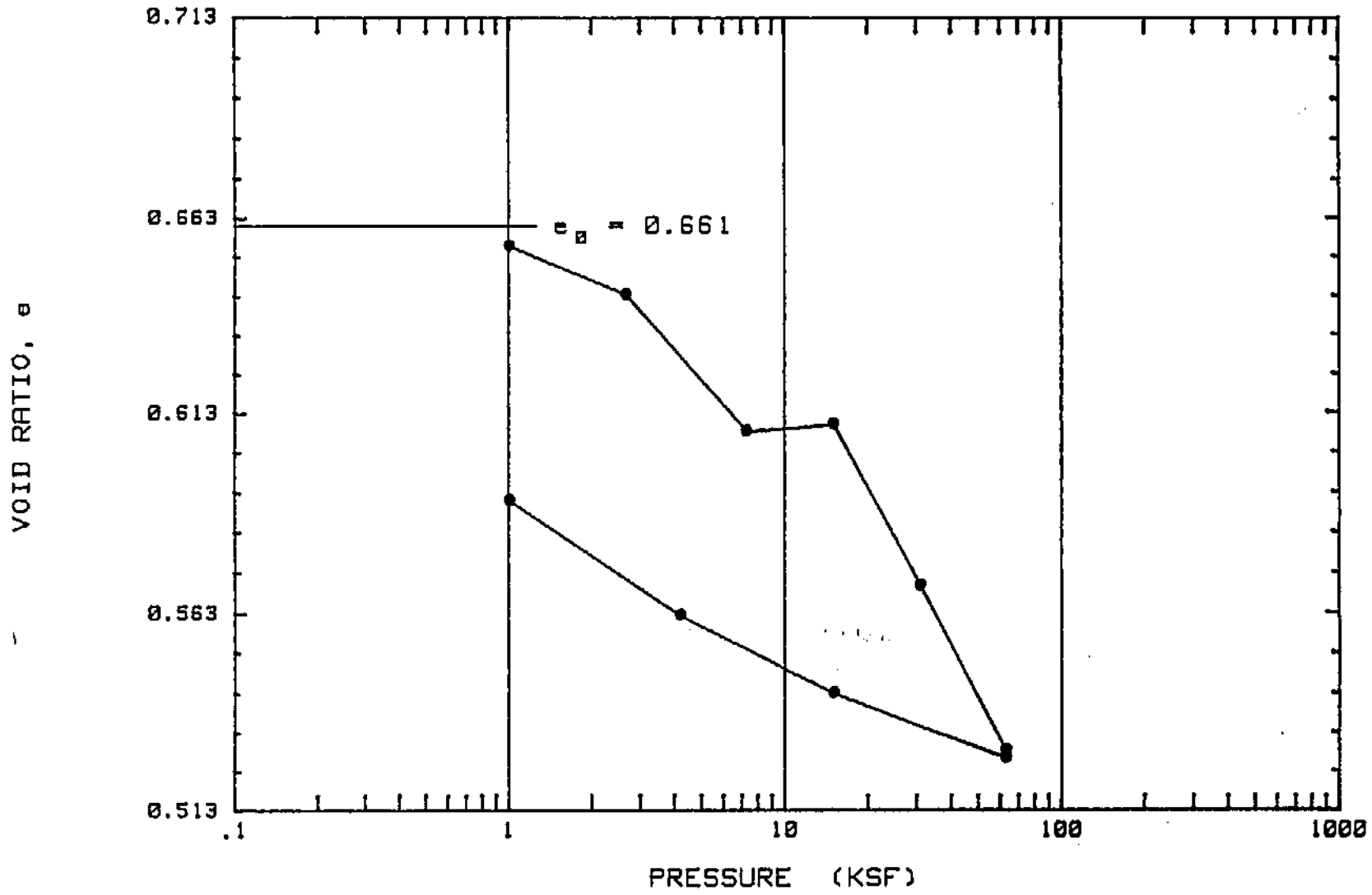
WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 2.5'

CLIENT : DUANE MILLER

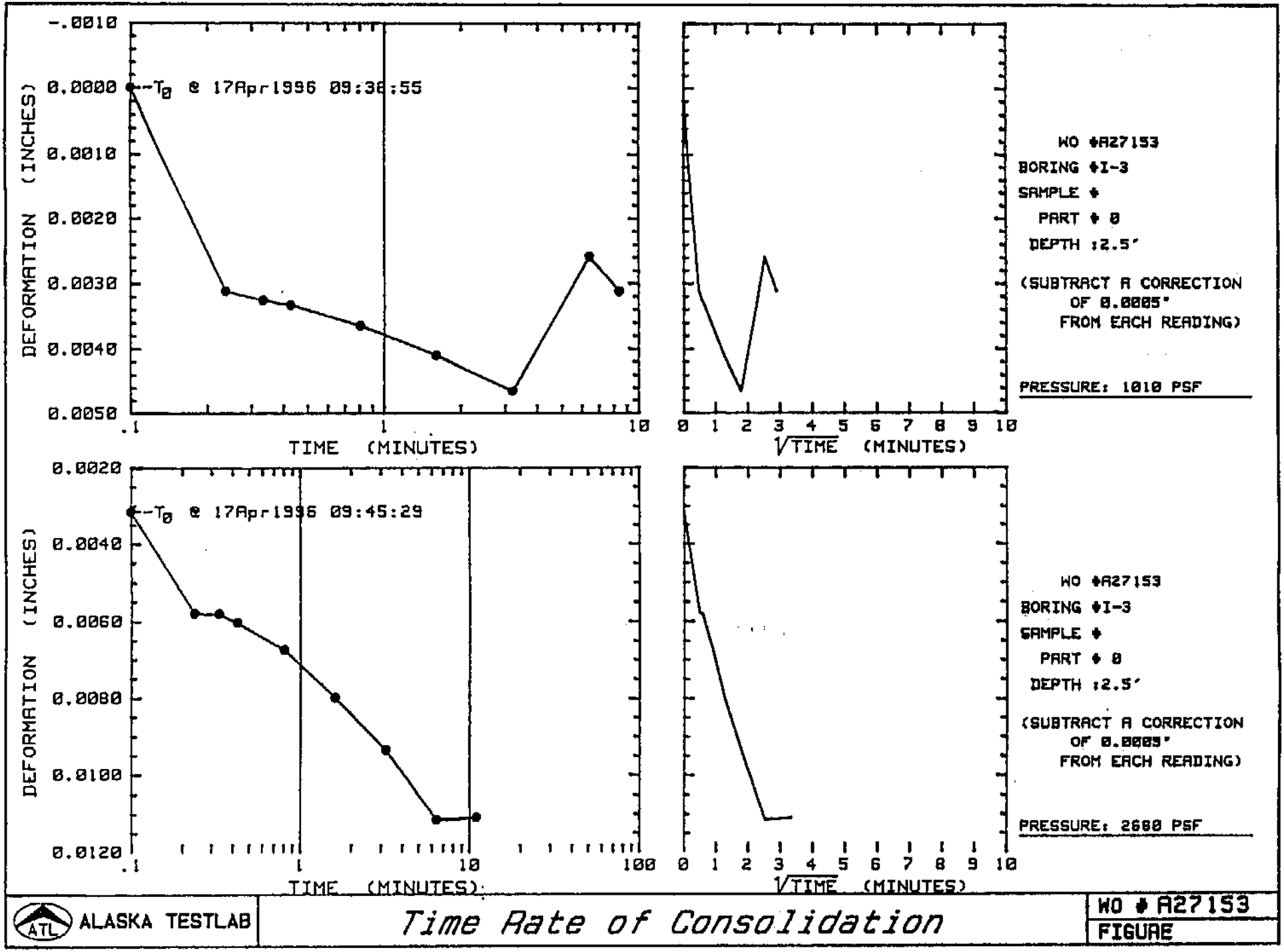
LABORATORY # C97052

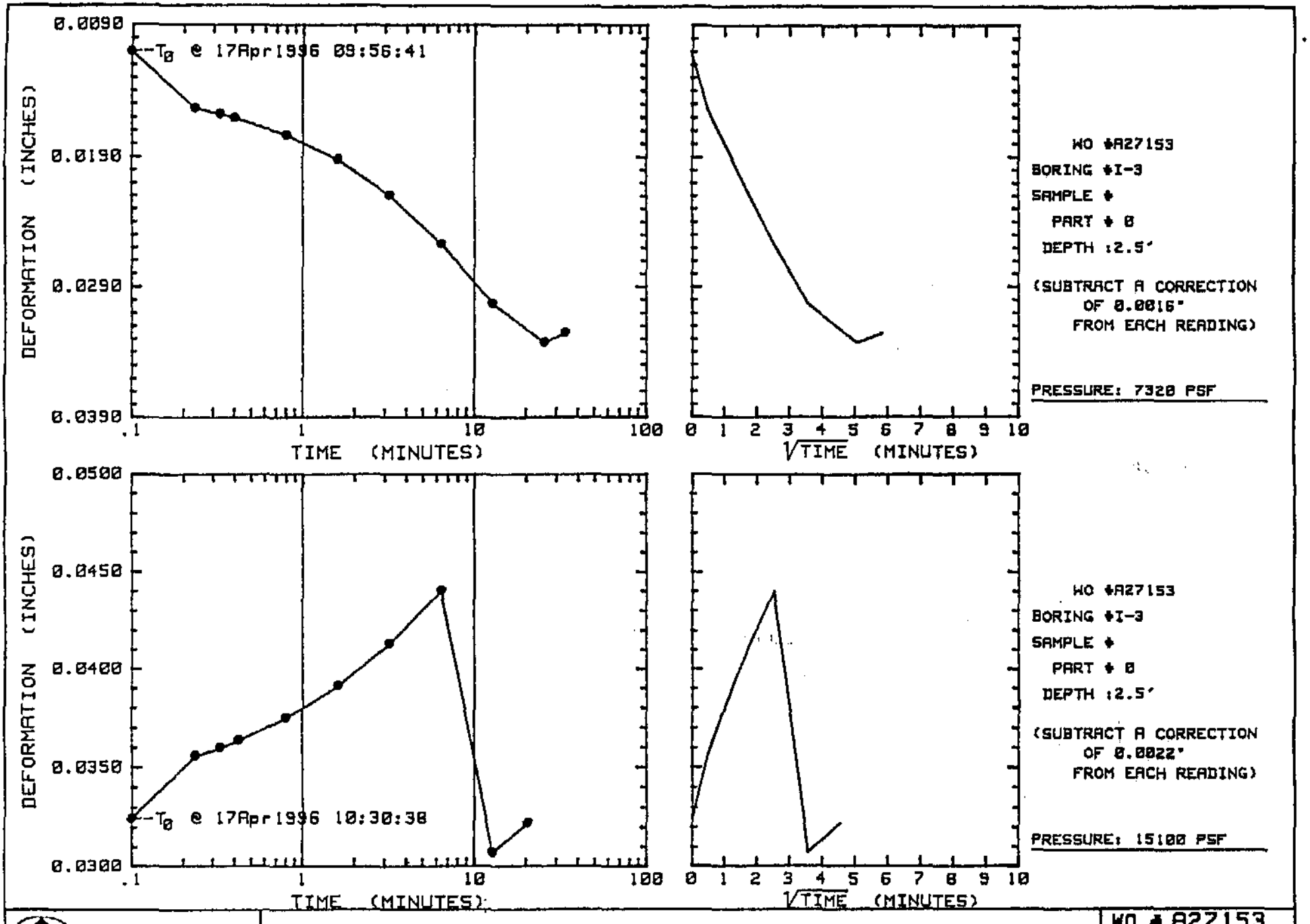


ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE


-.0010
0.0000
0.0010
0.0020
0.0030
0.0040
0.0050
DEFORMATION (INCHES)
T_0 @ 17Apr1996 09:38:55
.1
1
10
TIME (MINUTES)
0 1 2 3 4 5 6 7 8 9 10
√TIME (MINUTES)
WO #A27153
BORING #I-3
SAMPLE #
PART # 0
DEPTH :2.5'
(SUBTRACT A CORRECTION OF 0.0005" FROM EACH READING)
PRESSURE: 1010 PSF
0.0020
0.0040
0.0060
0.0080
0.0100
0.0120
DEFORMATION (INCHES)
T_0 @ 17Apr1996 09:45:29
.1
1
10
100
TIME (MINUTES)
0 1 2 3 4 5 6 7 8 9 10
√TIME (MINUTES)
WO #A27153
BORING #I-3
SAMPLE #
PART # 0
DEPTH :2.5'
(SUBTRACT A CORRECTION OF 0.0009" FROM EACH READING)
PRESSURE: 2680 PSF
ATL
ALASKA TESTLAB
Time Rate of Consolidation
WO # A27153
FIGURE

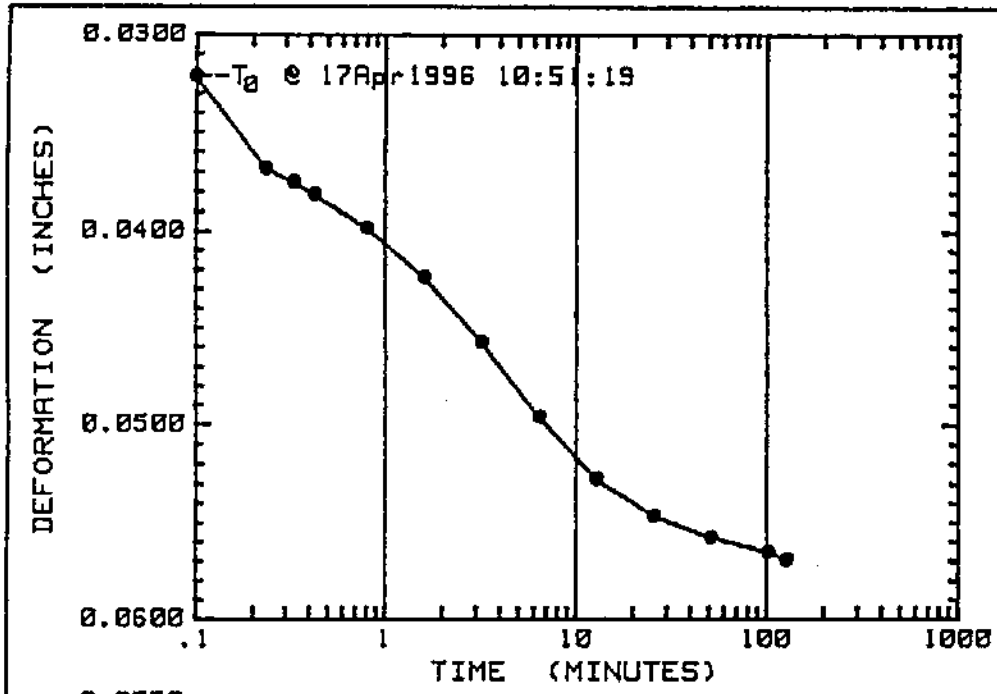


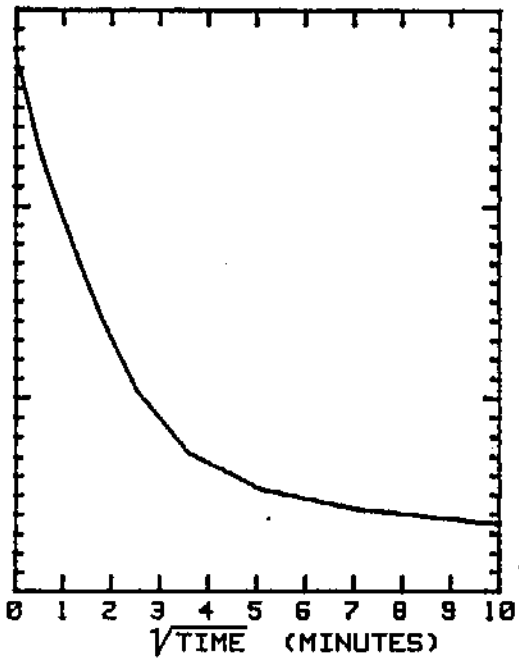
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

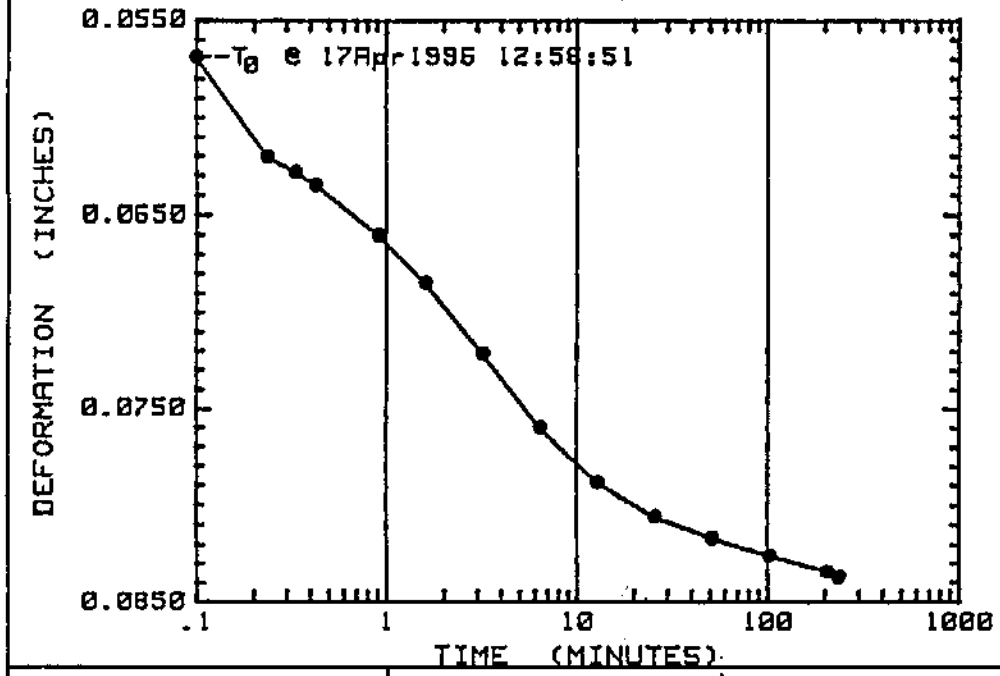


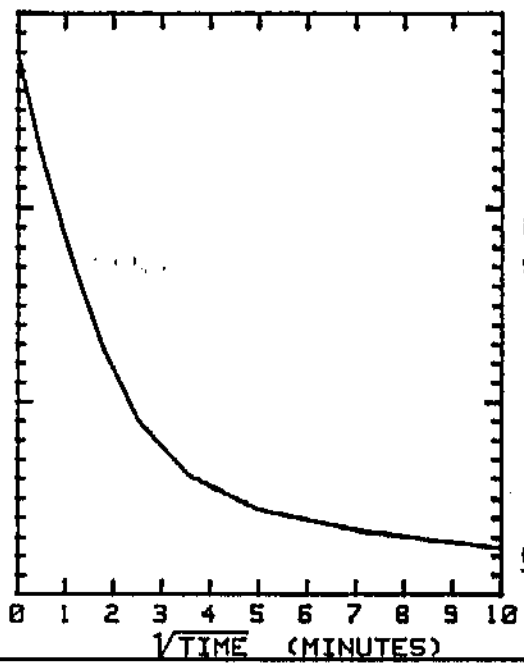


WO #A27153
BORING #I-3
SAMPLE #
PART # 0
DEPTH :2.5'

(SUBTRACT A CORRECTION OF 0.0029" FROM EACH READING)

PRESSURE: 31100 PSF





WO #A27153
BORING #I-3
SAMPLE #
PART # 0
DEPTH :2.5'

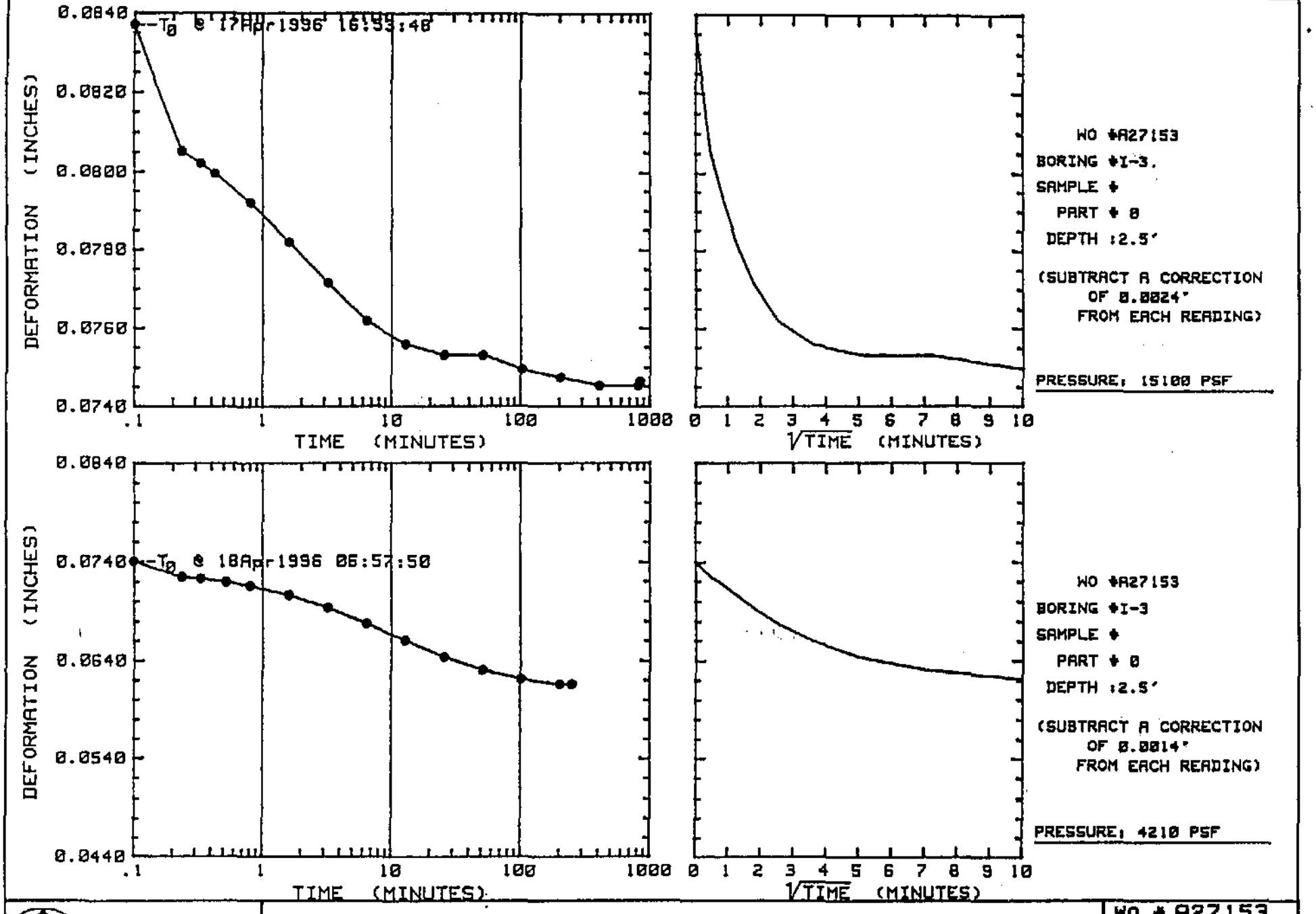
(SUBTRACT A CORRECTION OF 0.0038" FROM EACH READING)

PRESSURE: 63300 PSF

ALASKA TESTLAB

Time Rate of Consolidation

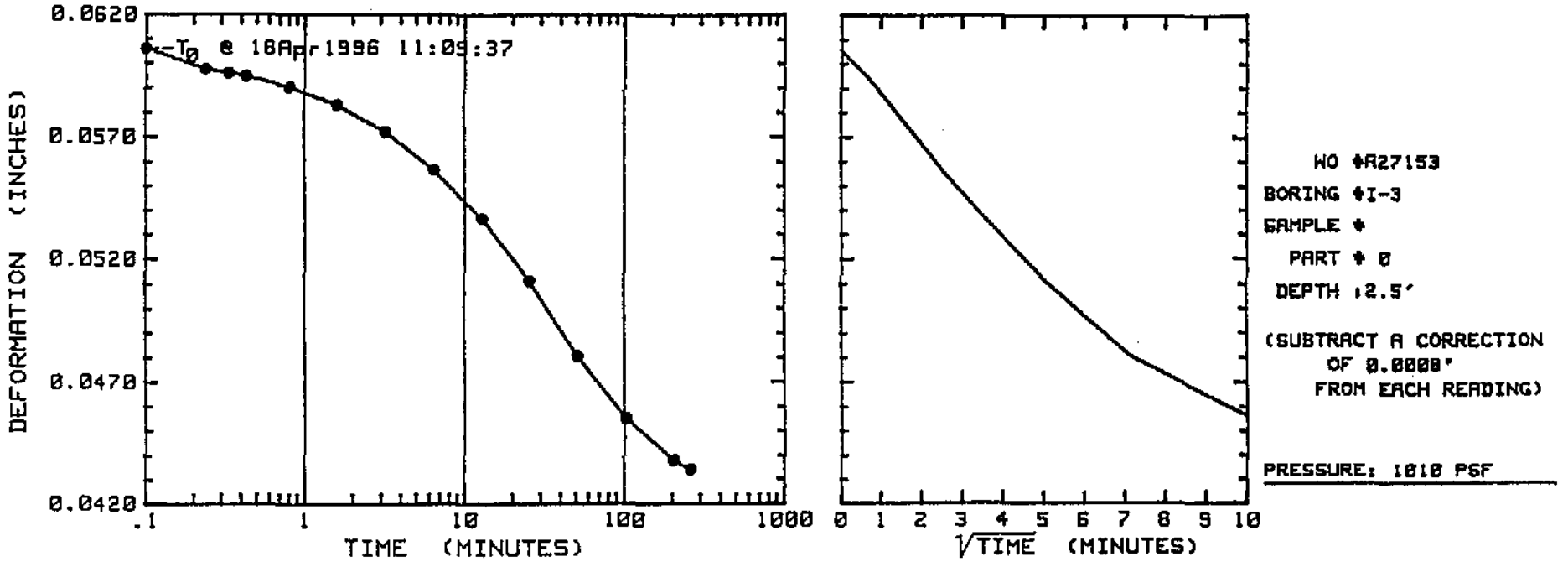
WO # A27153
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



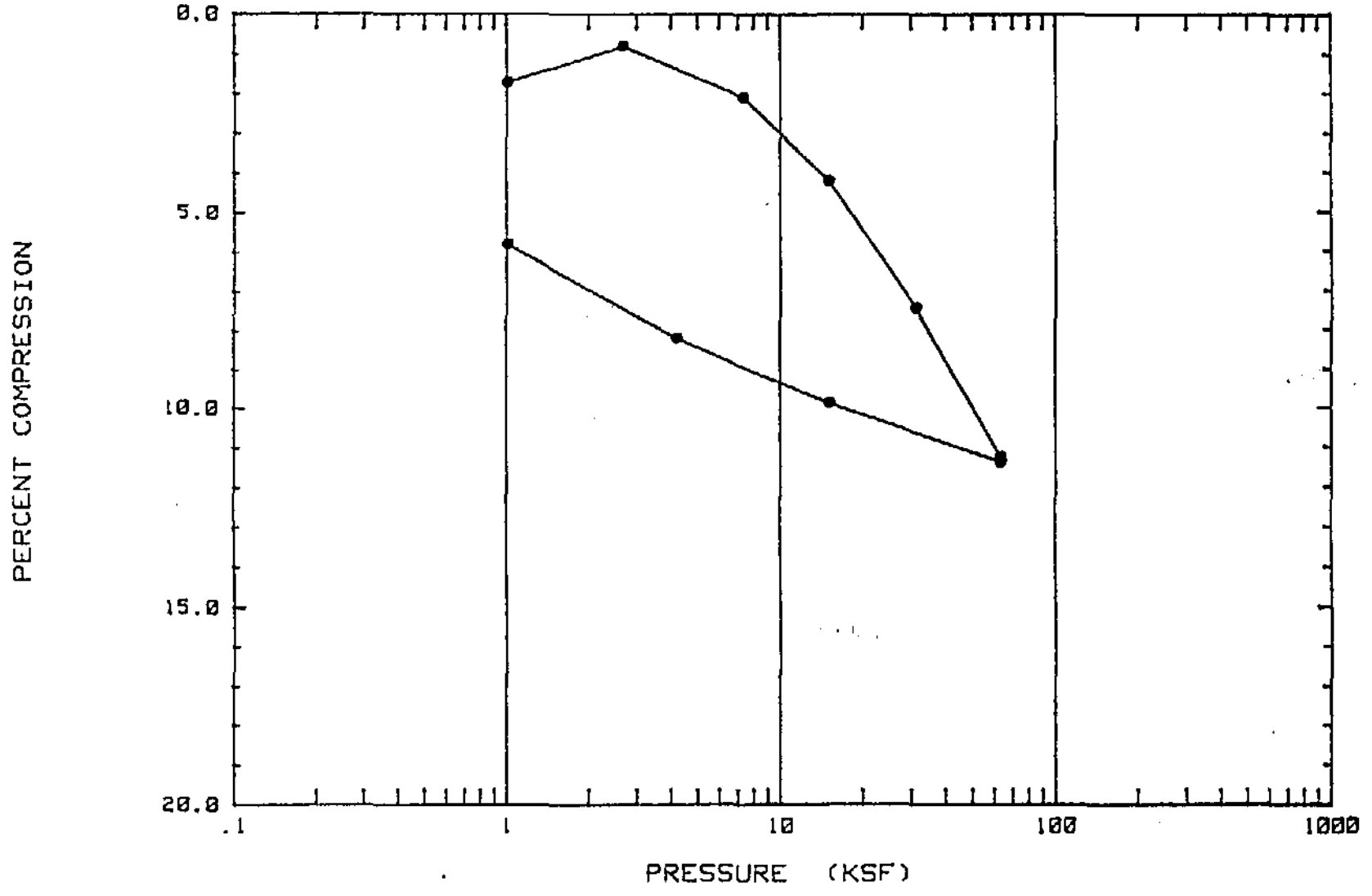
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 7.5'

CLIENT : DUANE MILLER

LABORATORY # C97039



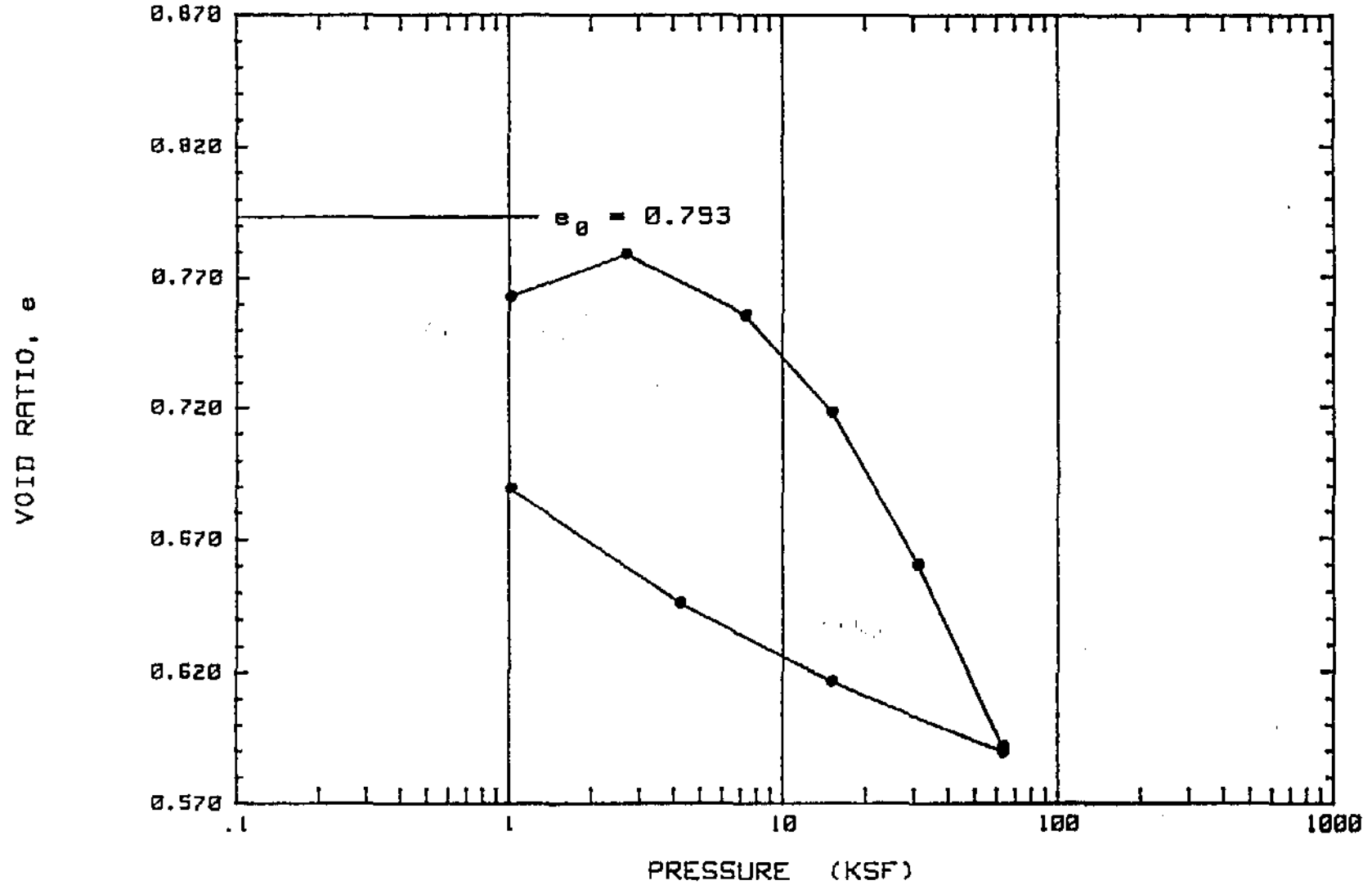
ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #
DEPTH: 7.5'

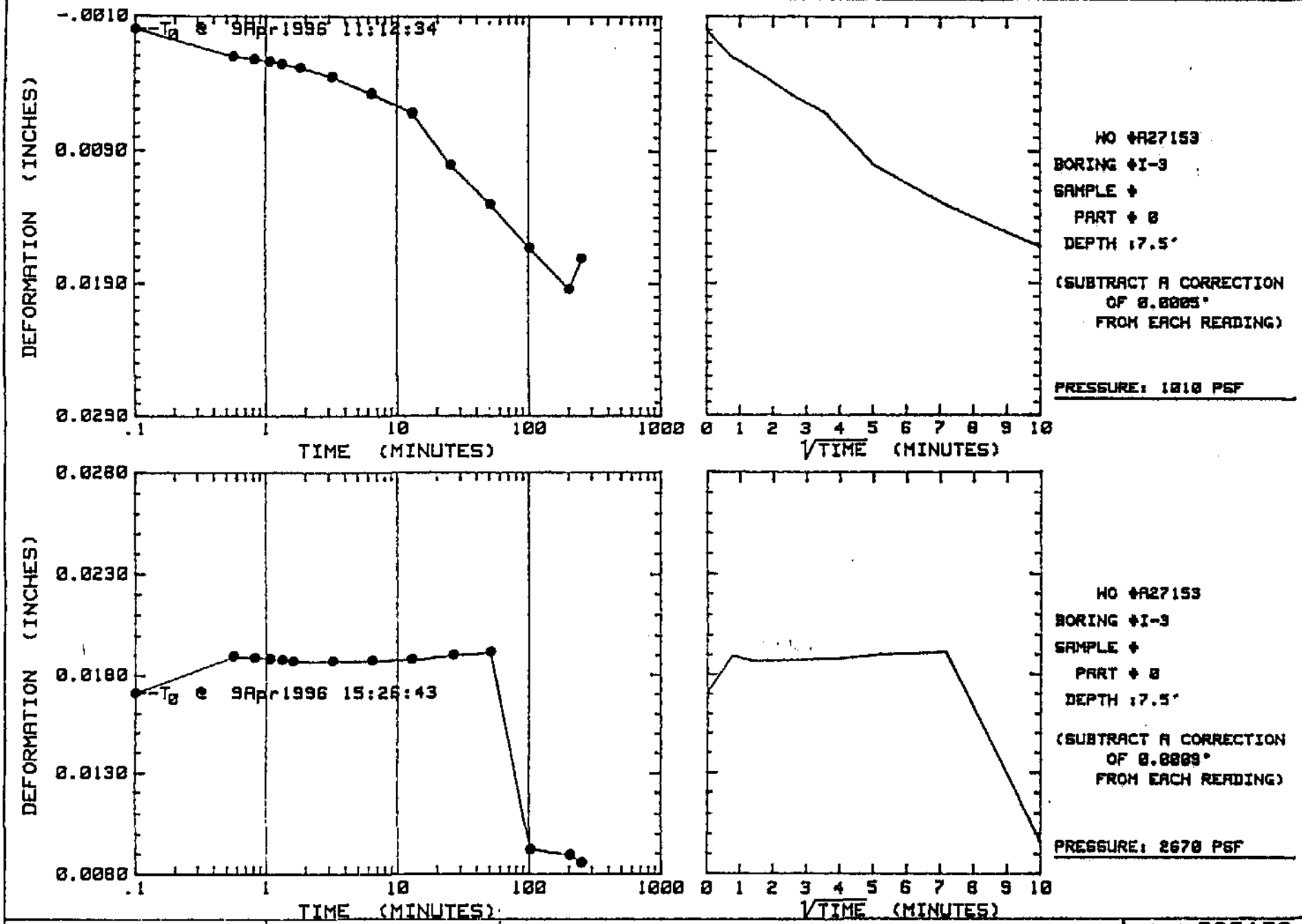
CLIENT : DUANE MILLER
LABORATORY # C97039



ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE

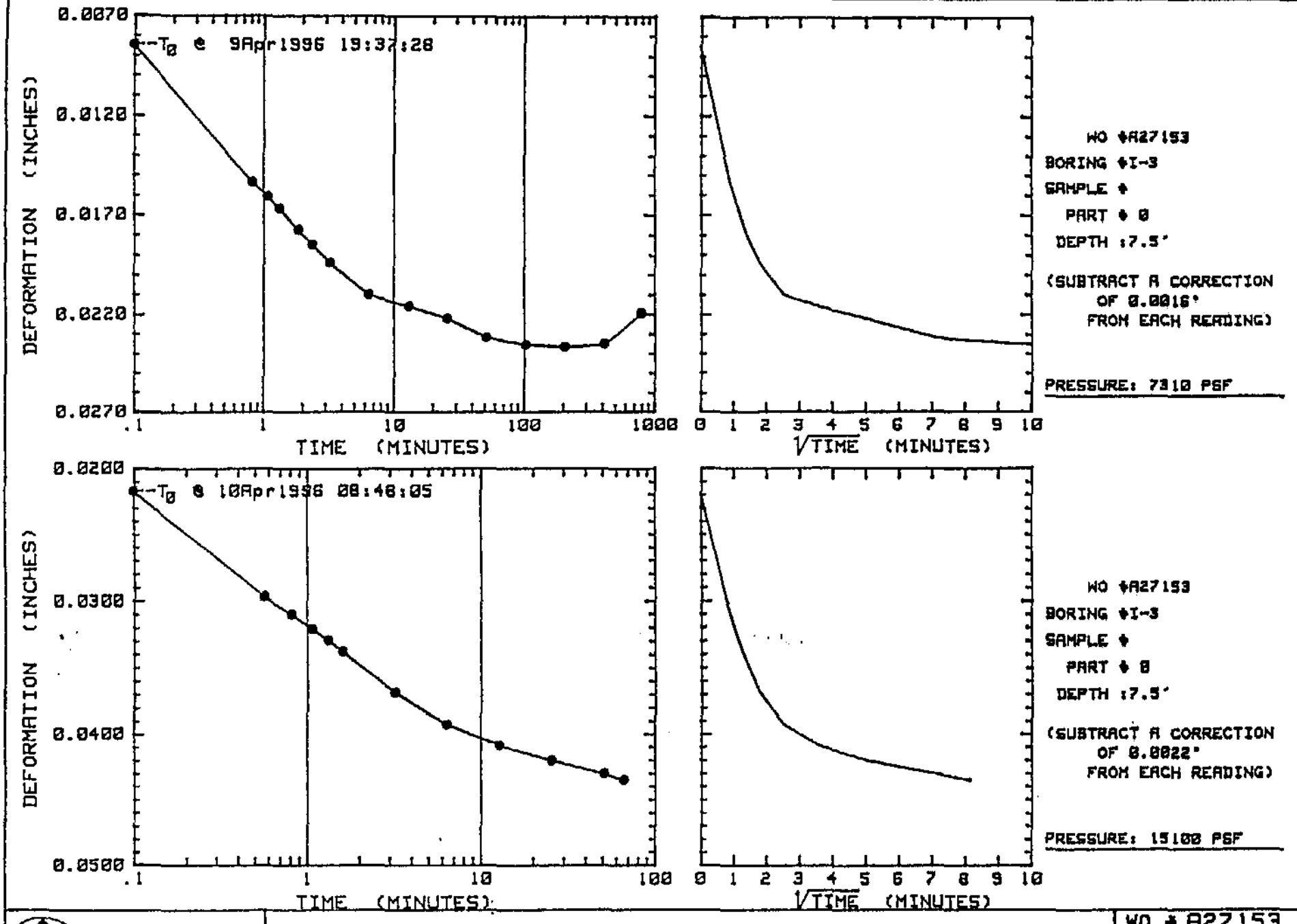


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

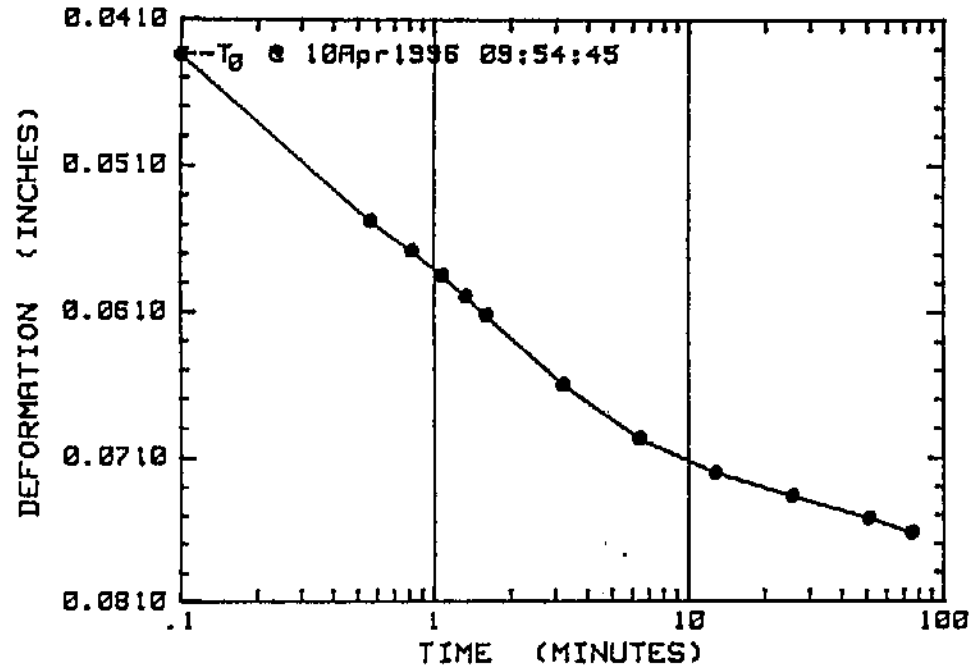
FIGURE

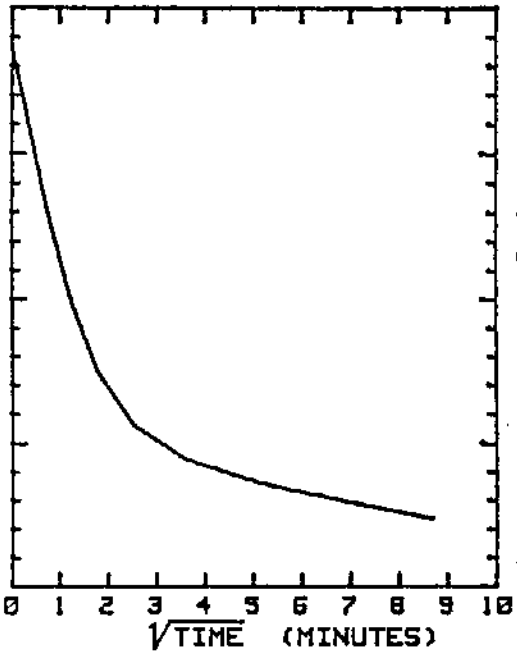


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

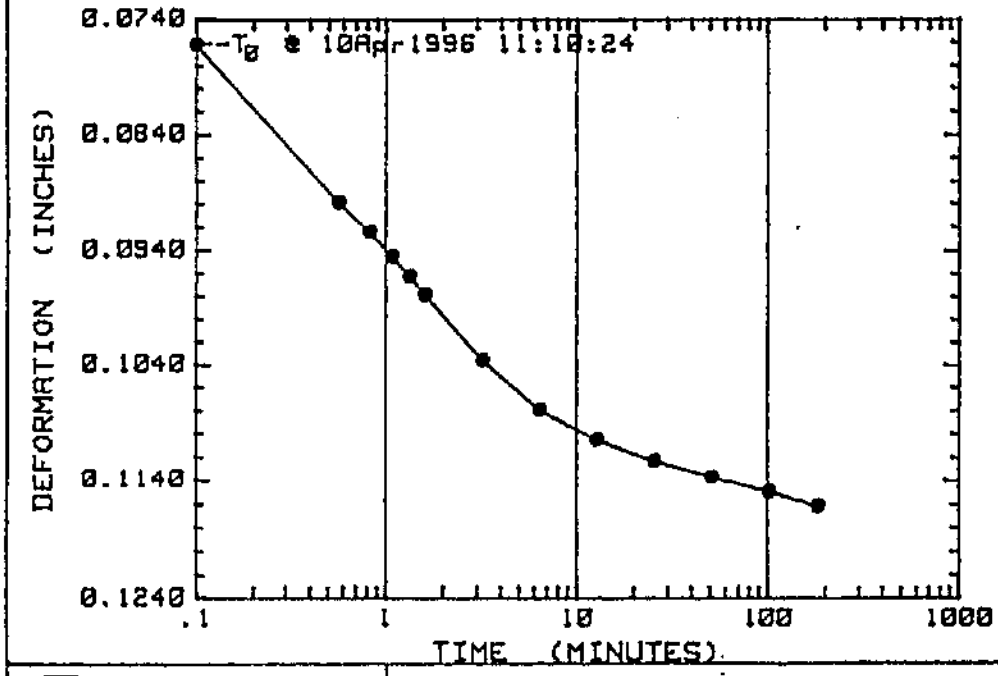


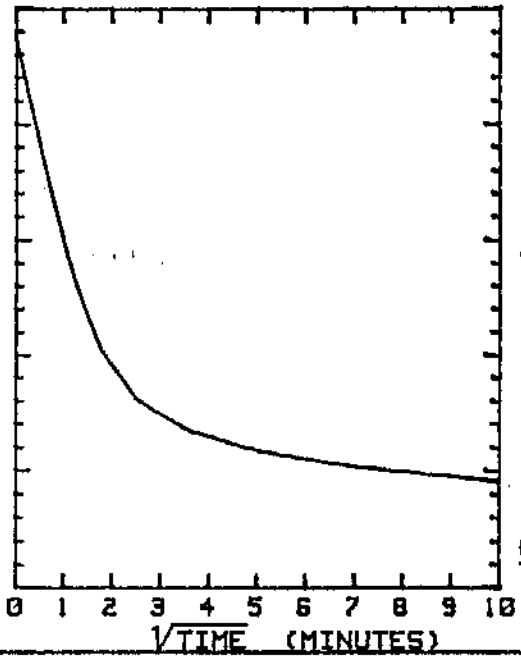


WO #A27153
BORING #I-3
SAMPLE #
PART # 8
DEPTH :7.5'

(SUBTRACT A CORRECTION OF 0.0029" FROM EACH READING)

PRESSURE: 31100 PSF





WO #A27153
BORING #I-3
SAMPLE #
PART # 8
DEPTH :7.5'

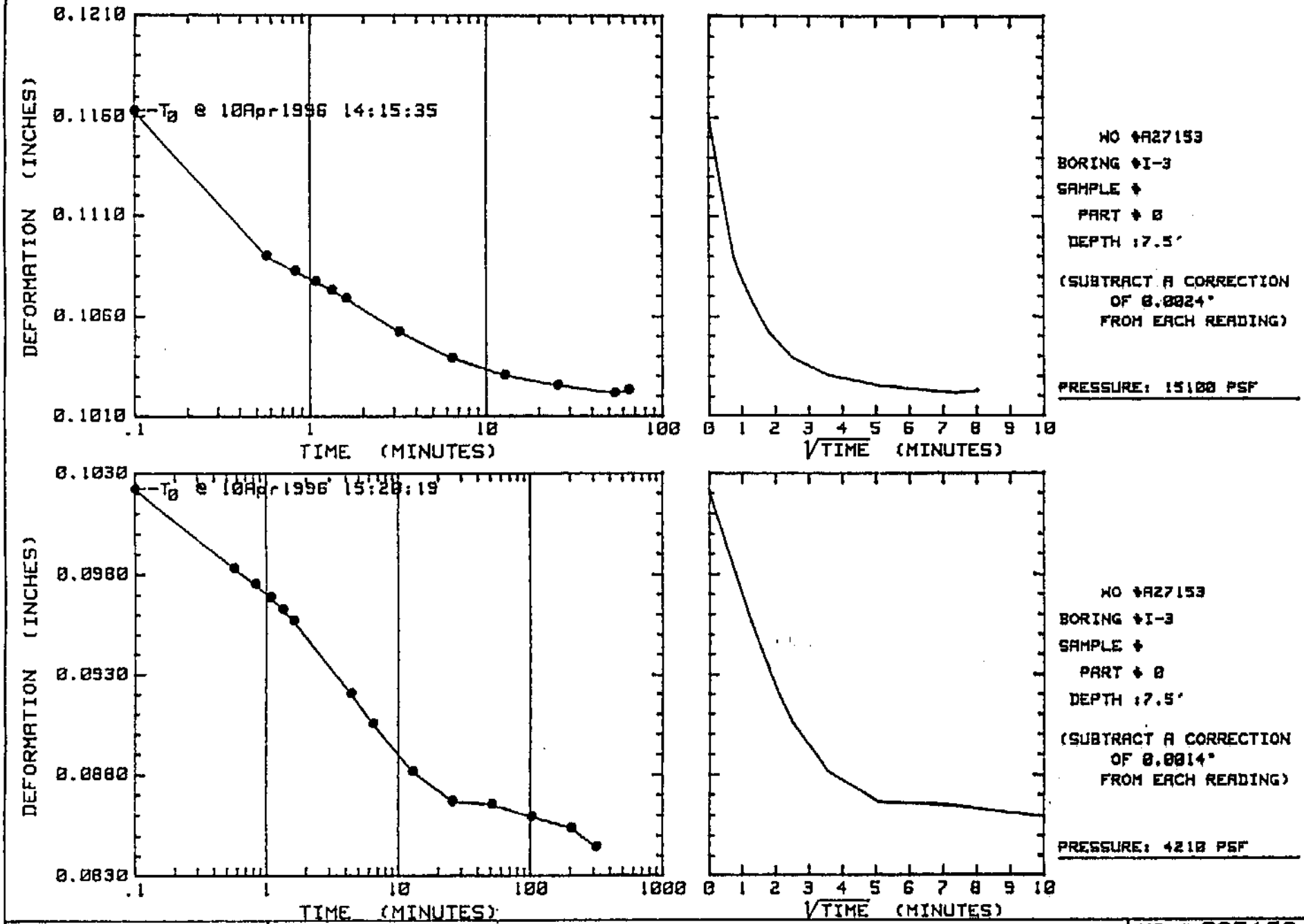
(SUBTRACT A CORRECTION OF 0.0038" FROM EACH READING)

PRESSURE: 63200 PSF

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

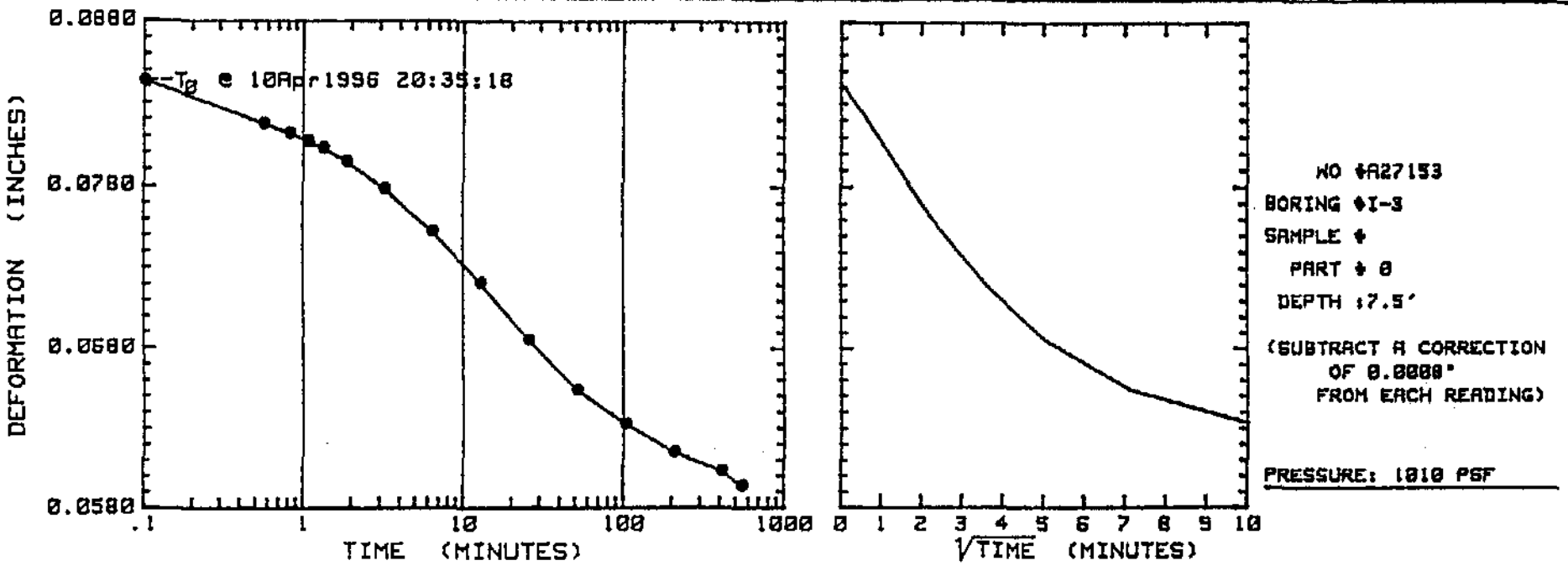


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE



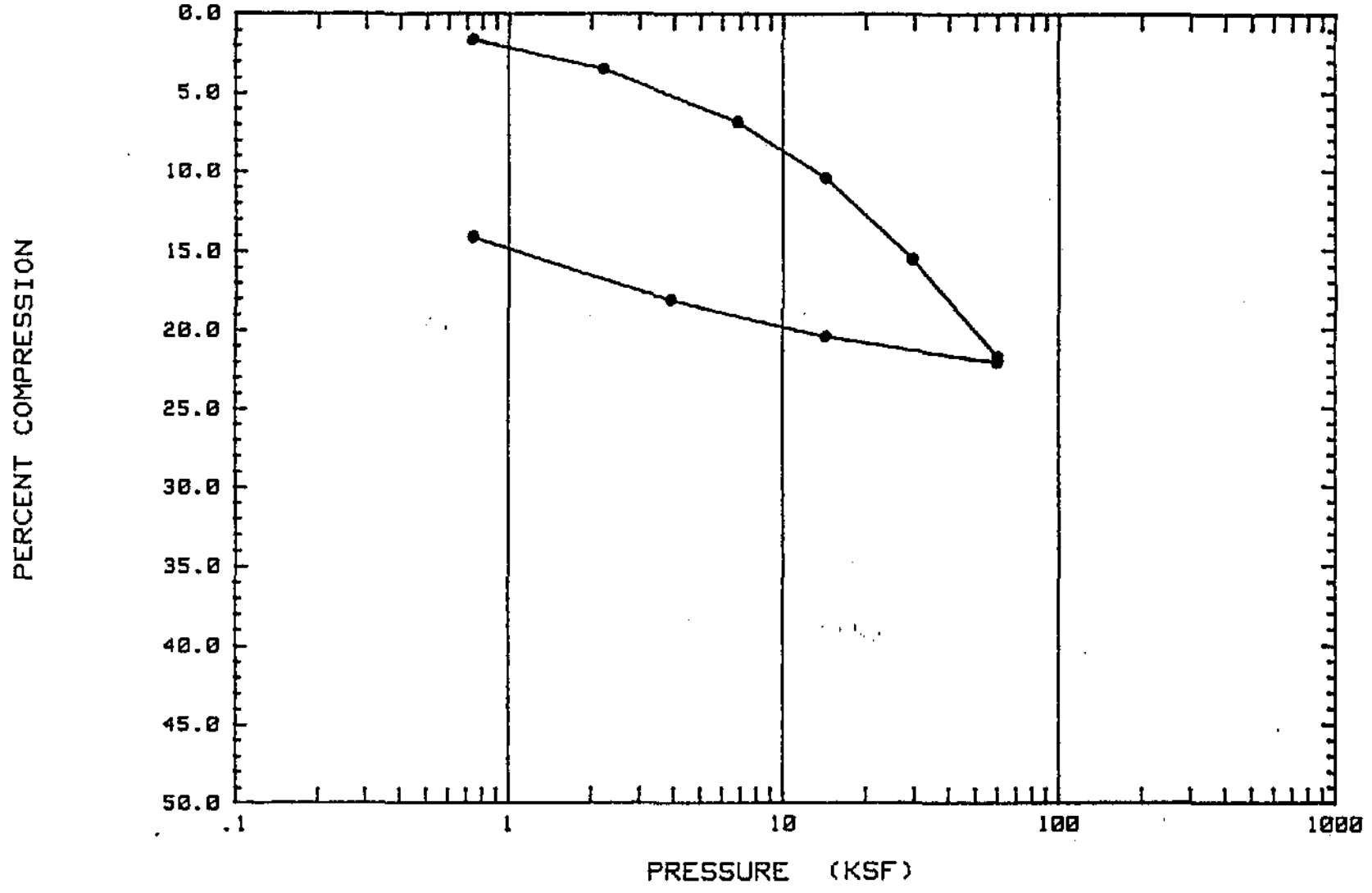
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 12.5'

CLIENT : DUANE MILLER

LABORATORY # C97042



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

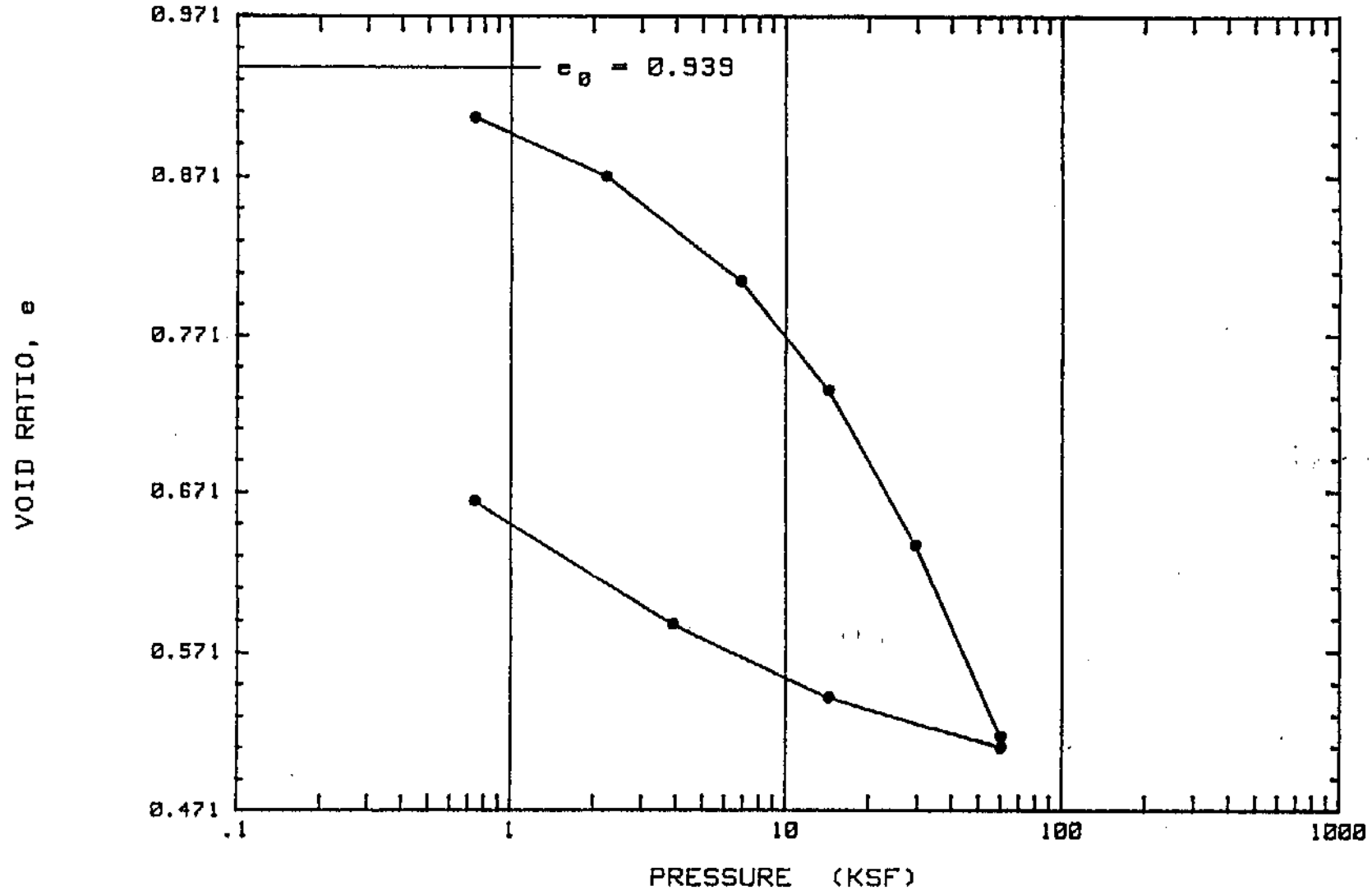
WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 12.5'

CLIENT : DUANE MILLER

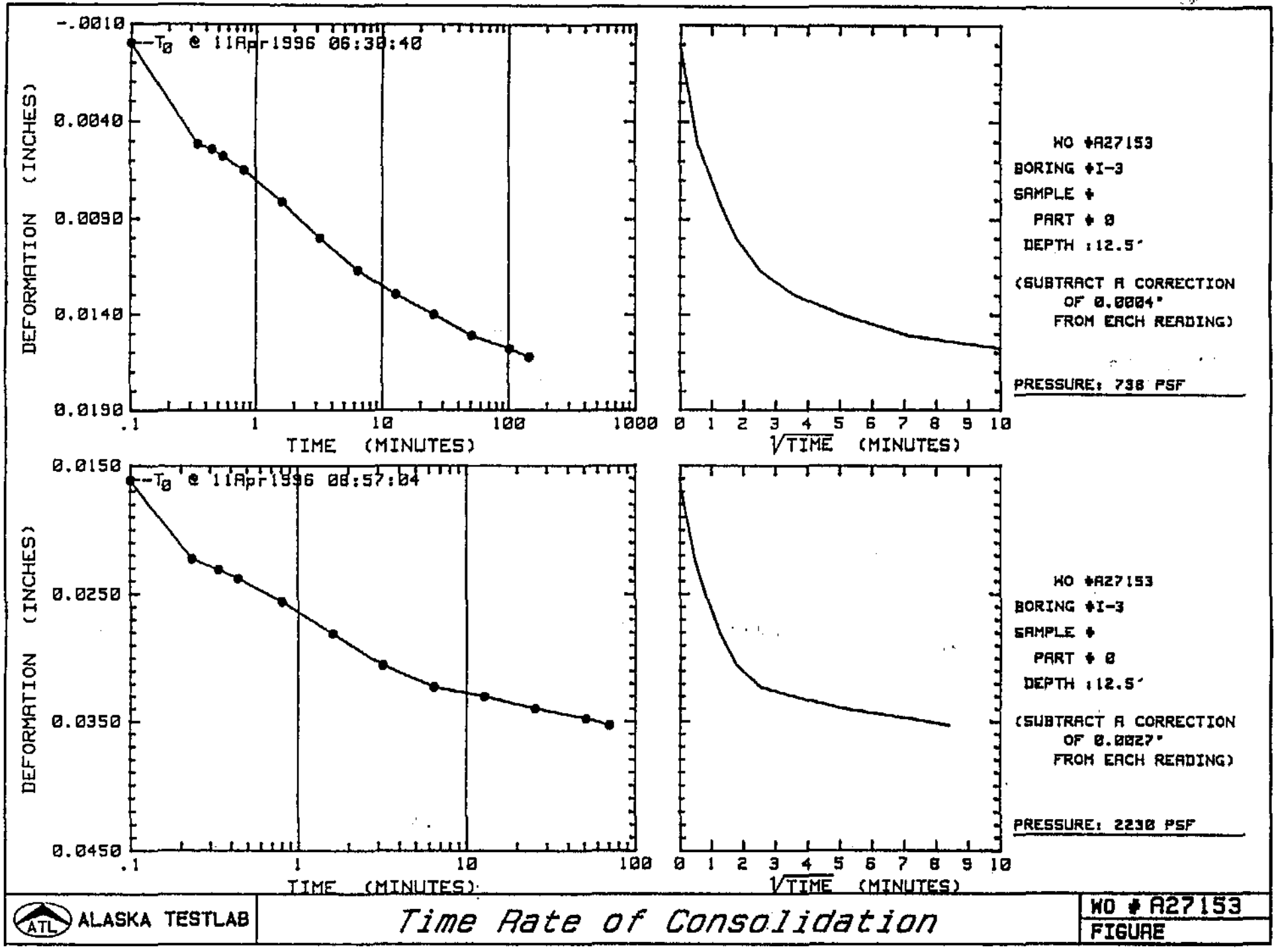
LABORATORY # CS7042



ALASKA TESTLAB

Compression Curve (e vs. Log P)

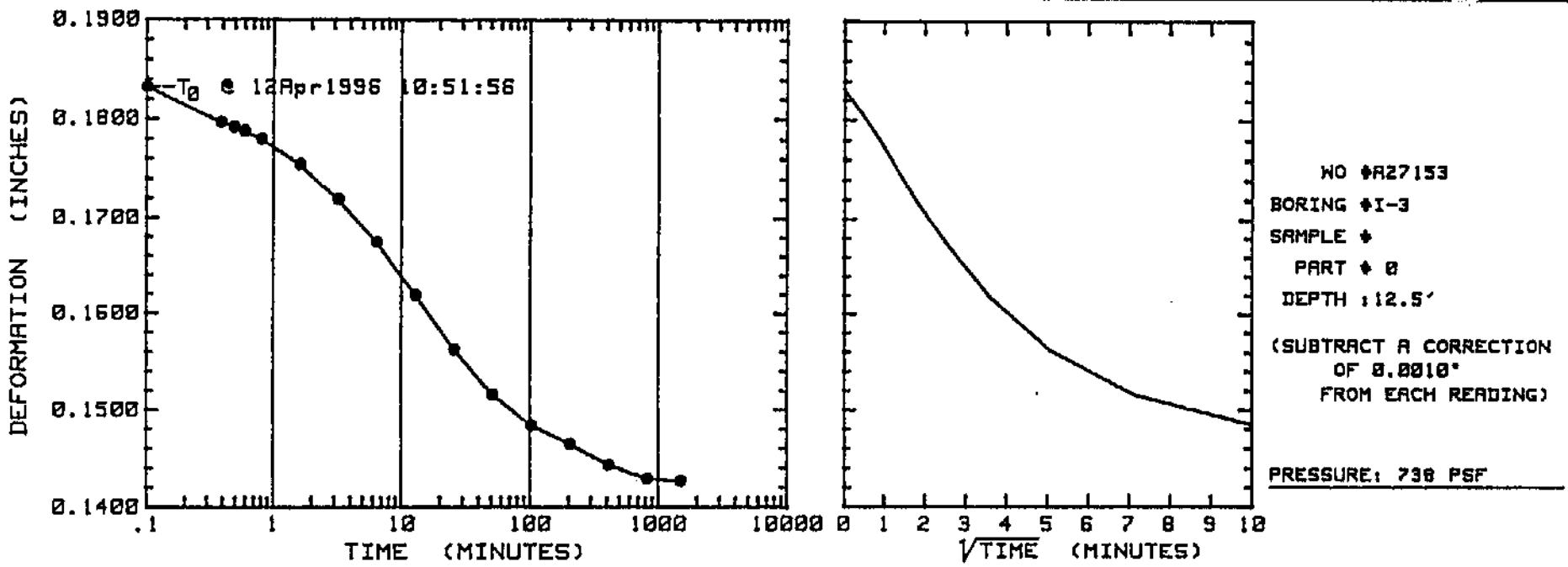
WO # A27153
FIGURE



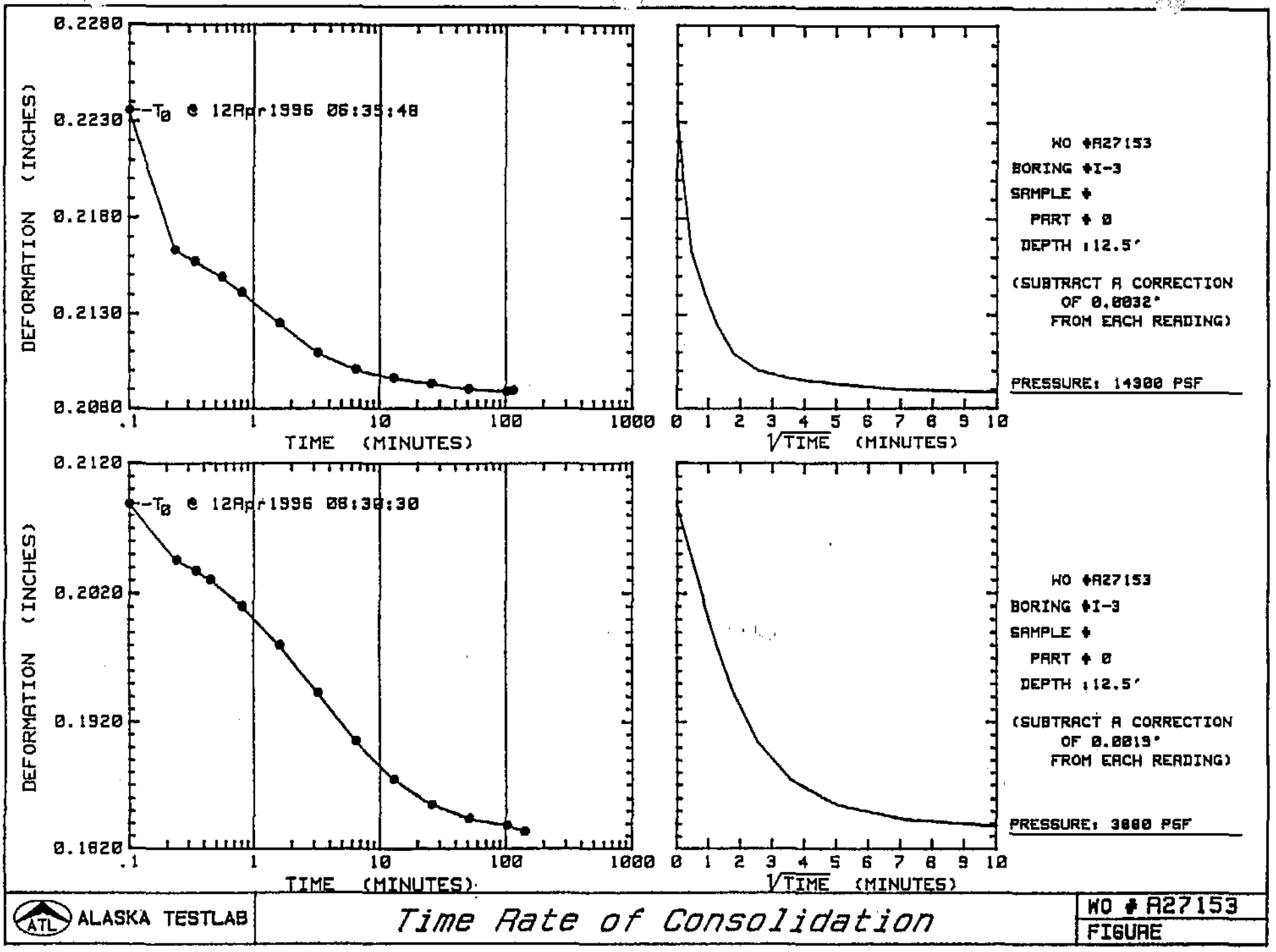
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE

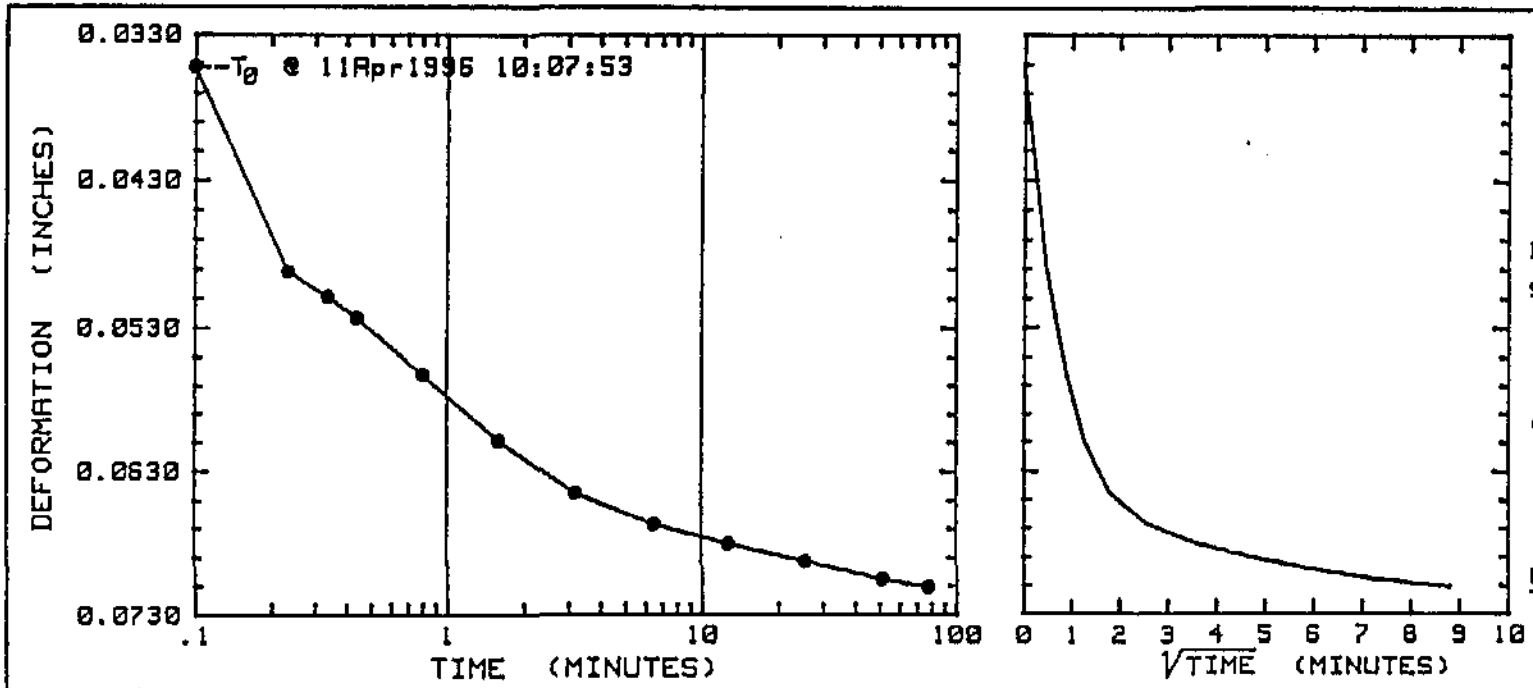


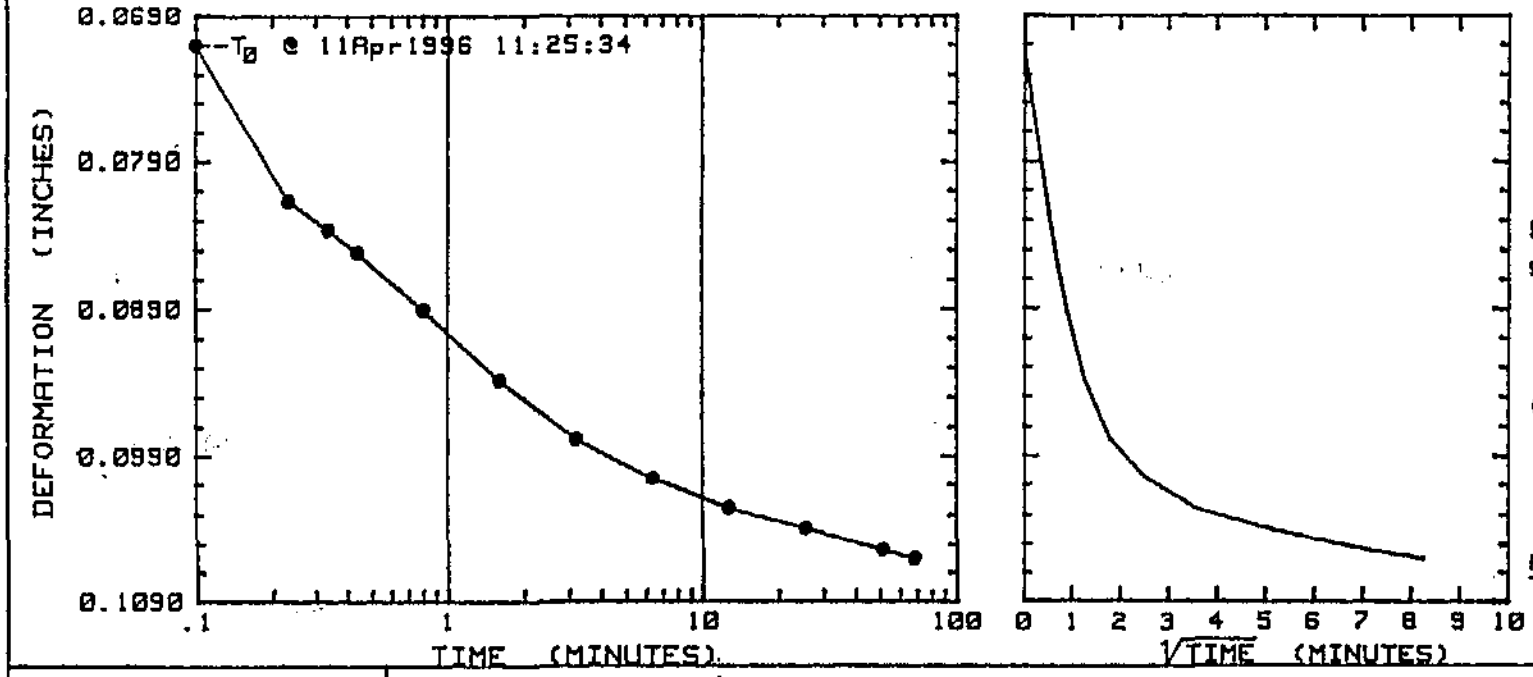
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

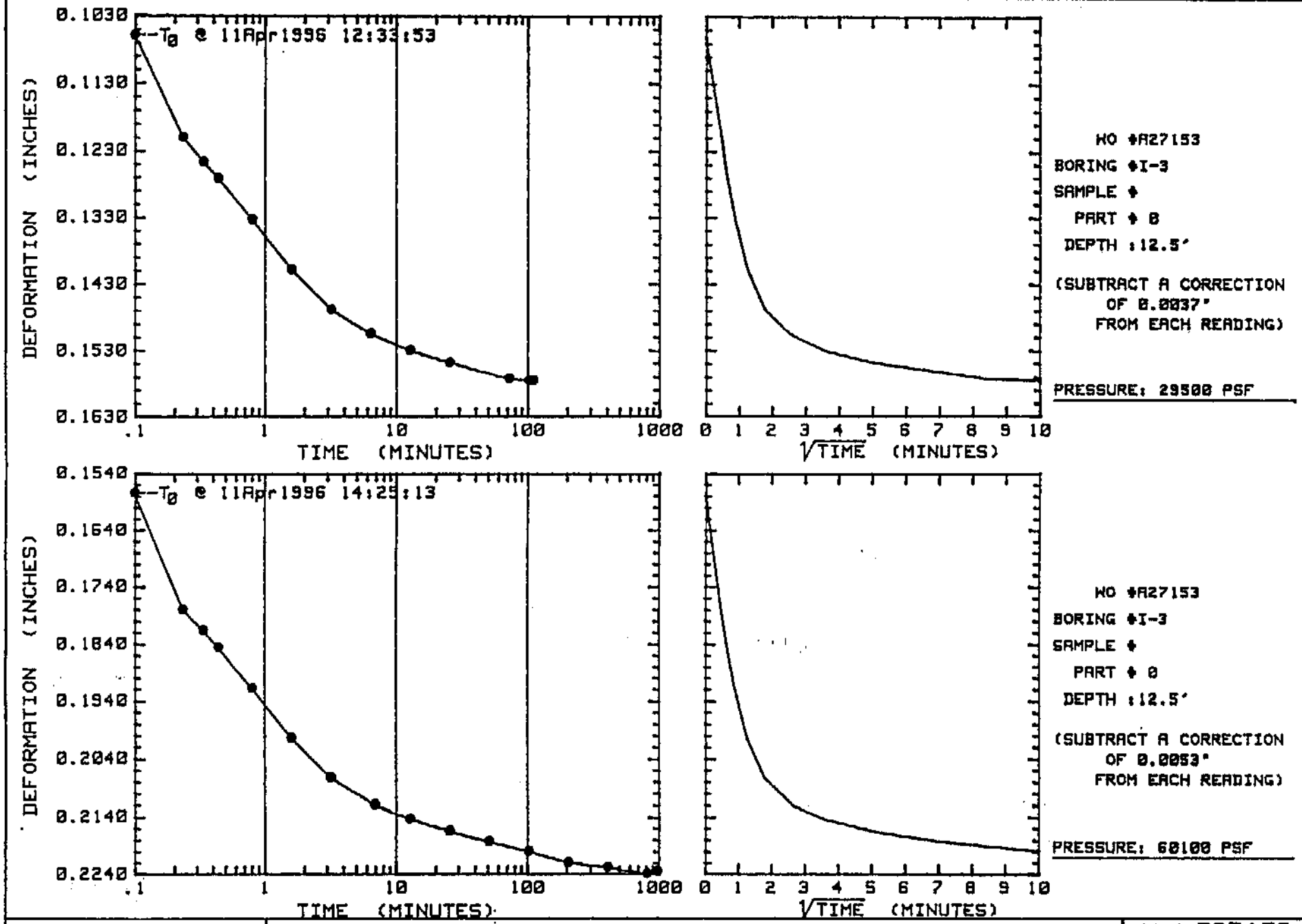




ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

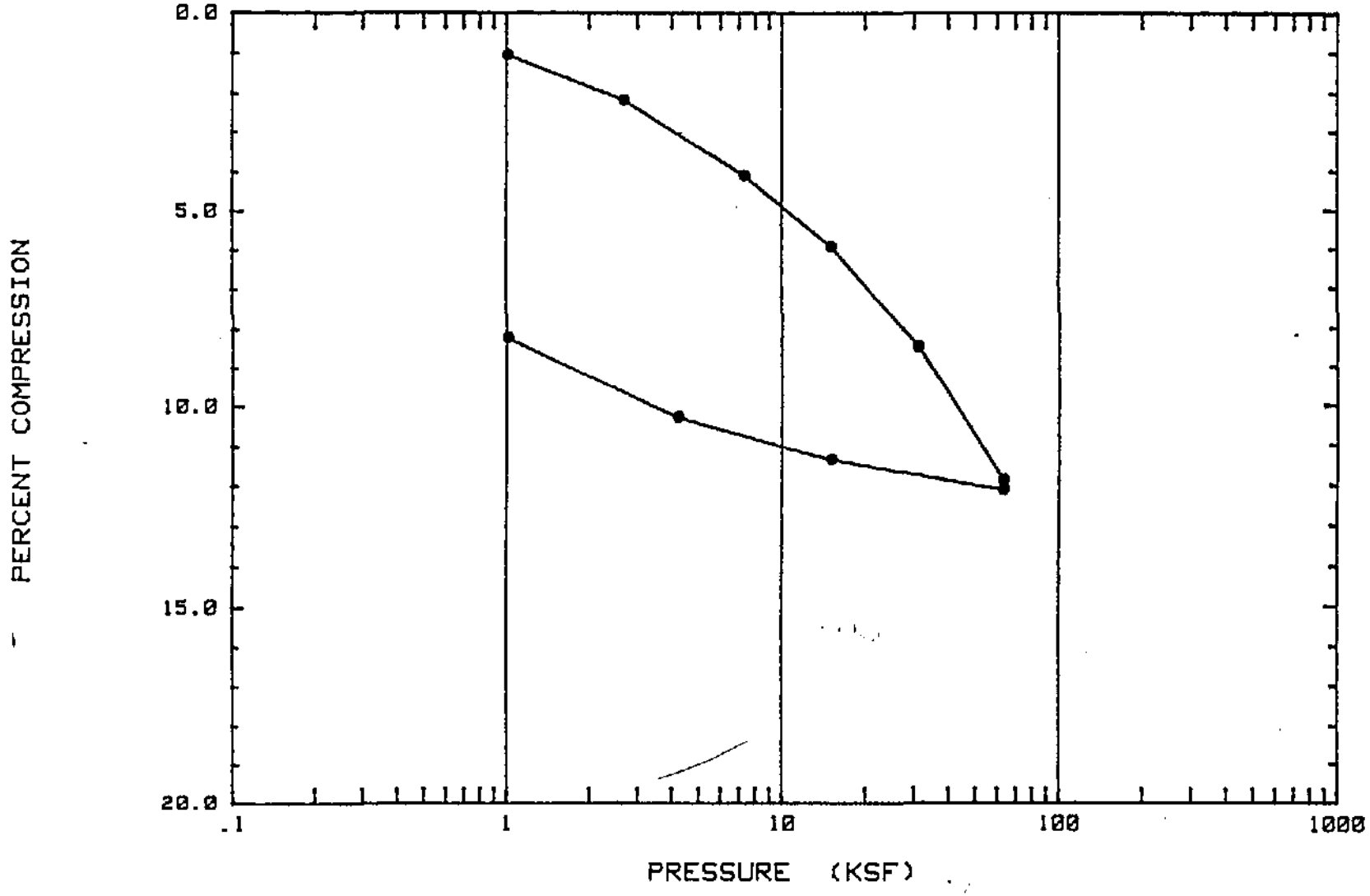
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 20.0'

CLIENT : DUANE MILLER

LABORATORY # C97043



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

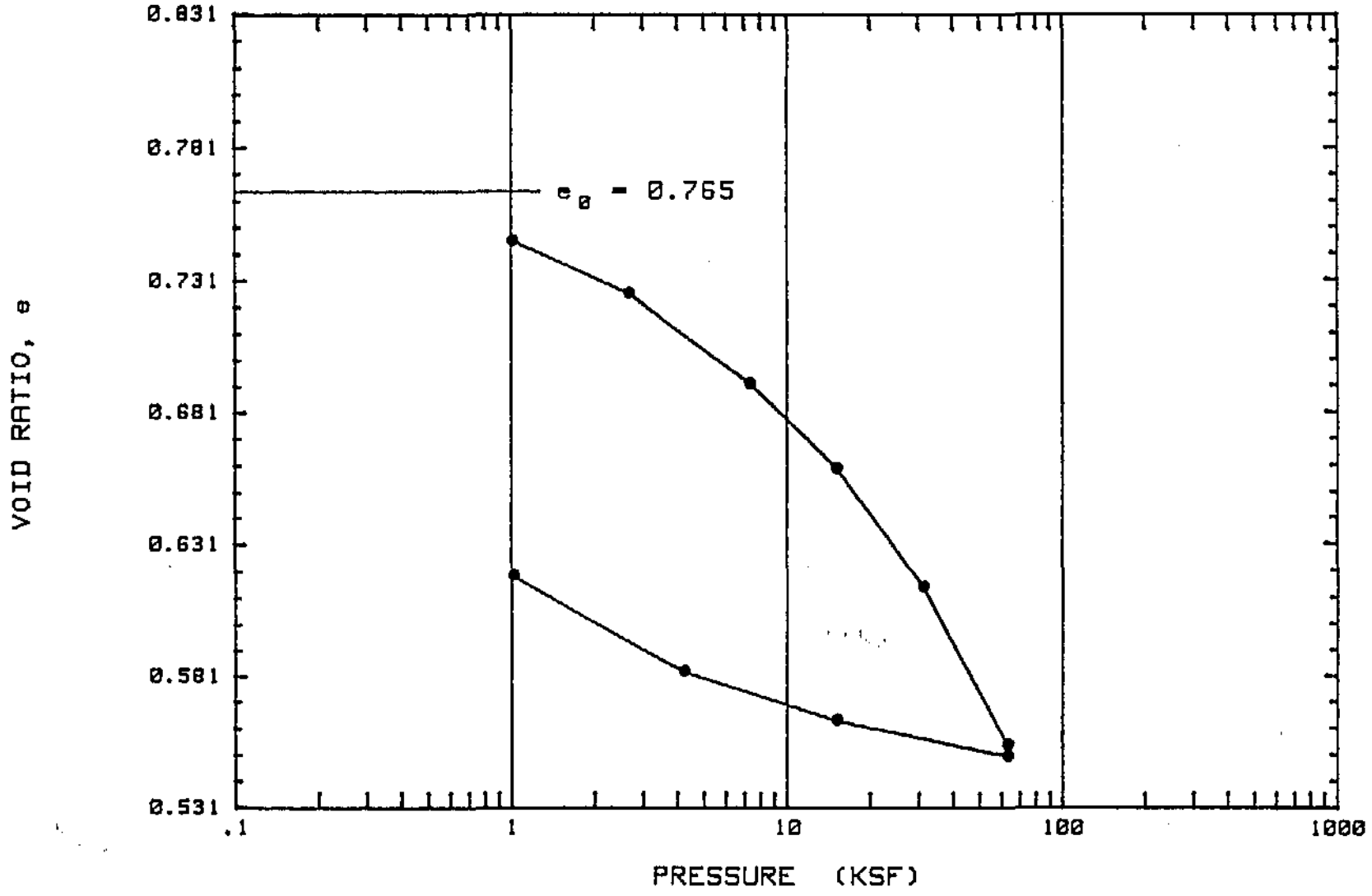
WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-3
SAMPLE #

DEPTH: 20.0'

CLIENT : DUANE MILLER

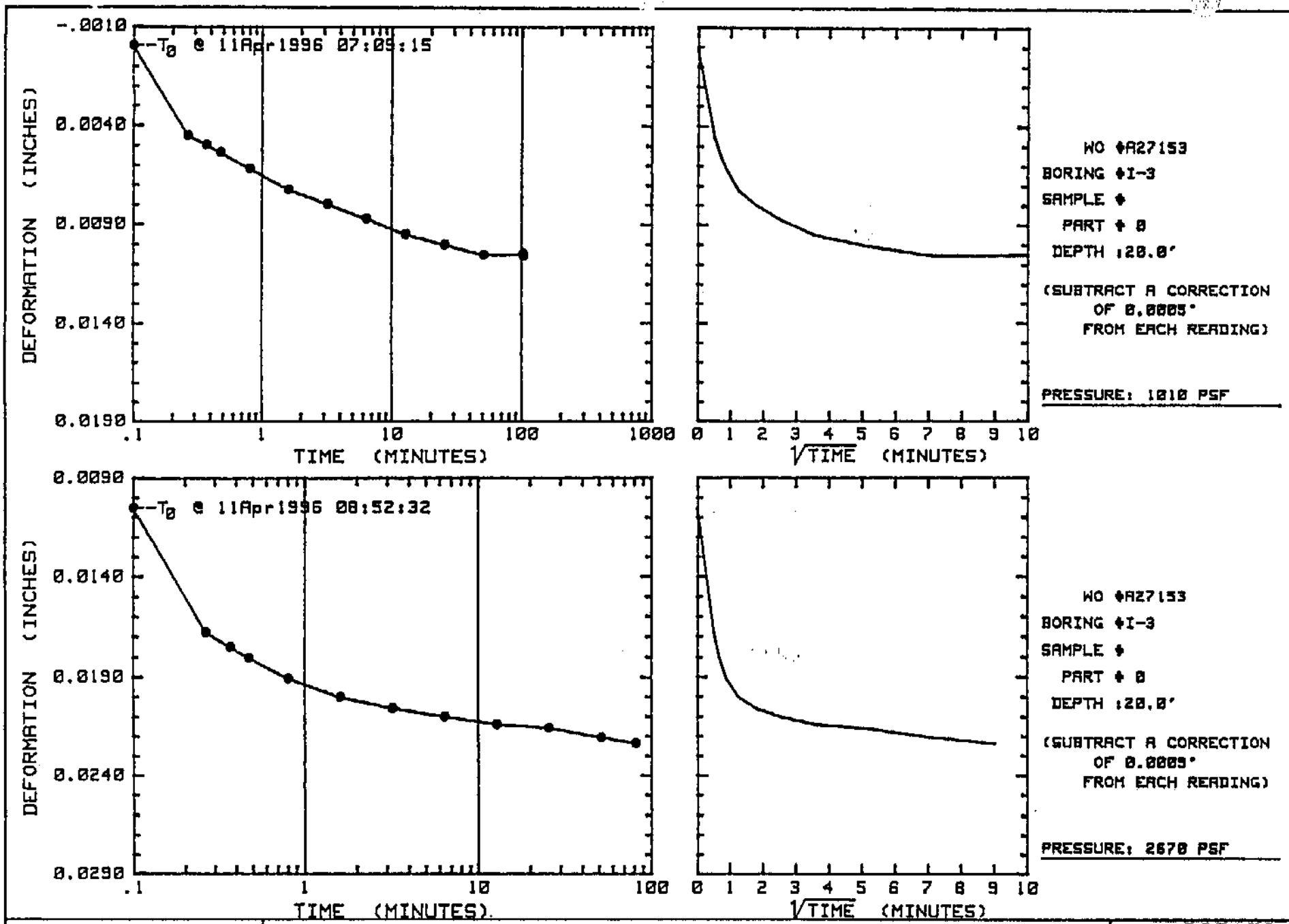
LABORATORY # C97043



ALASKA TESTLAB

Compression Curve (e vs. Log P)

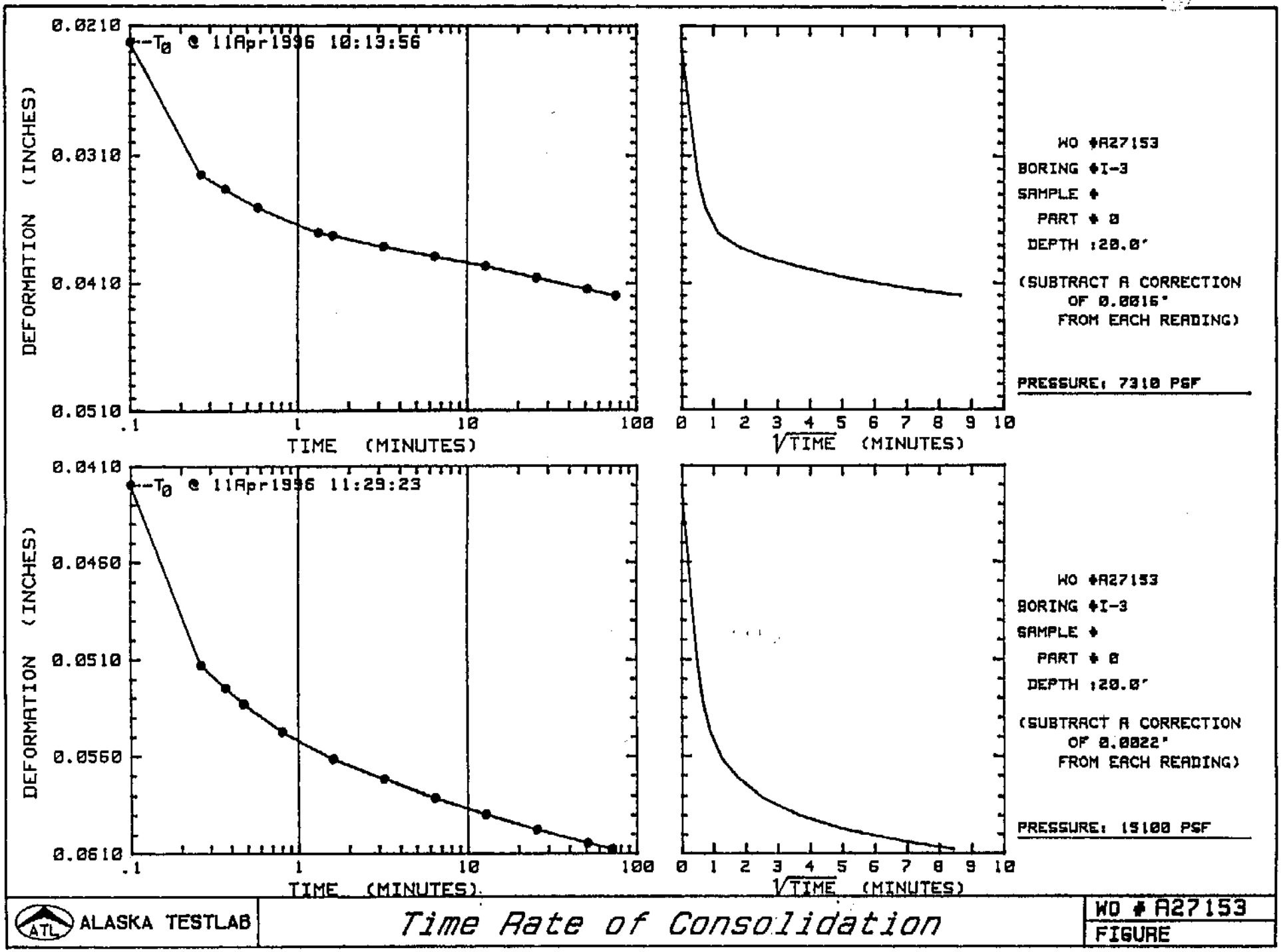
WO # A27153
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

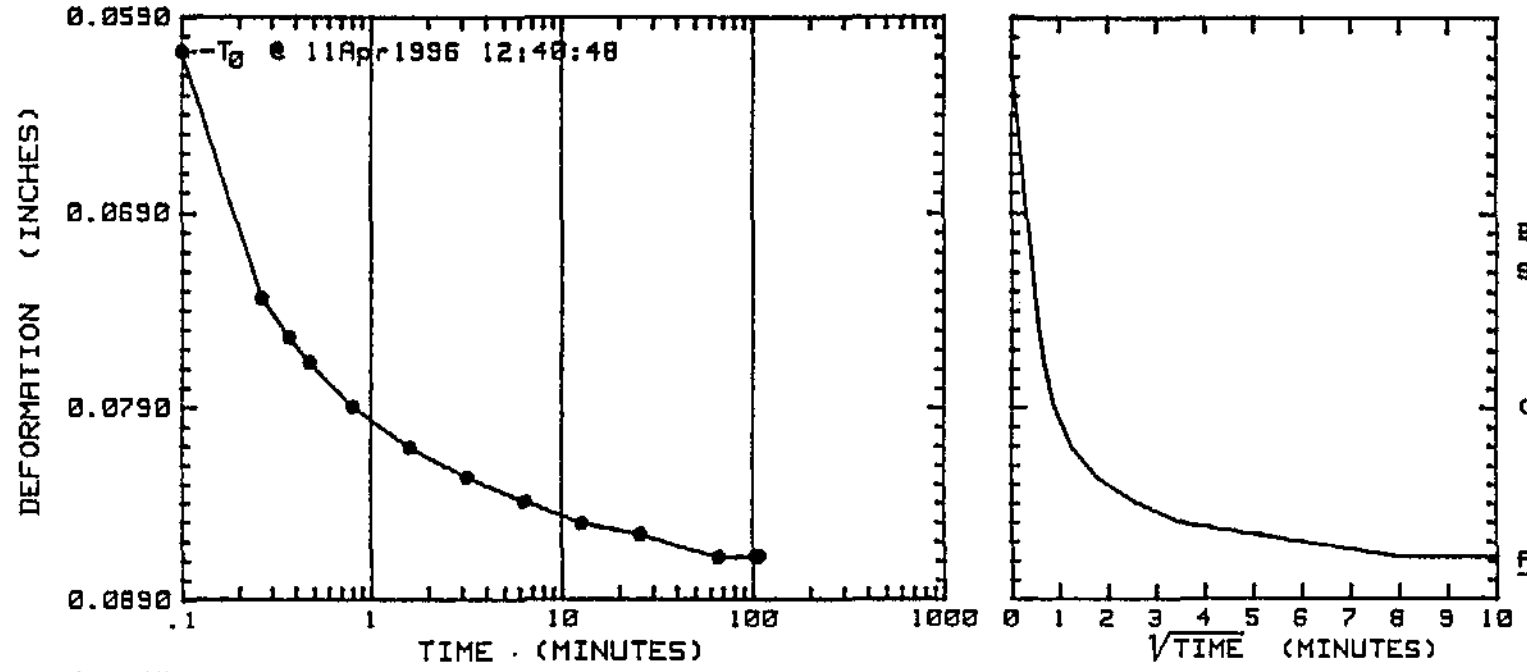


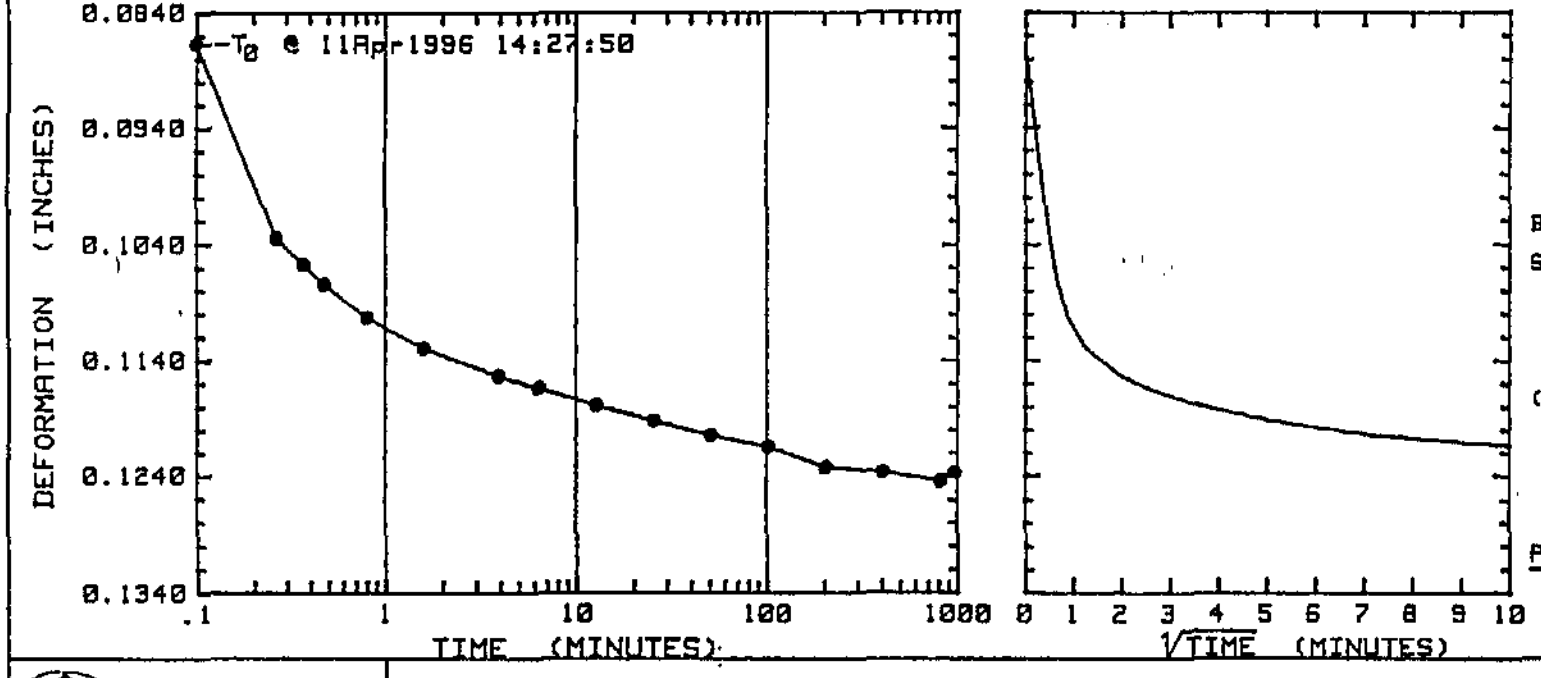
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

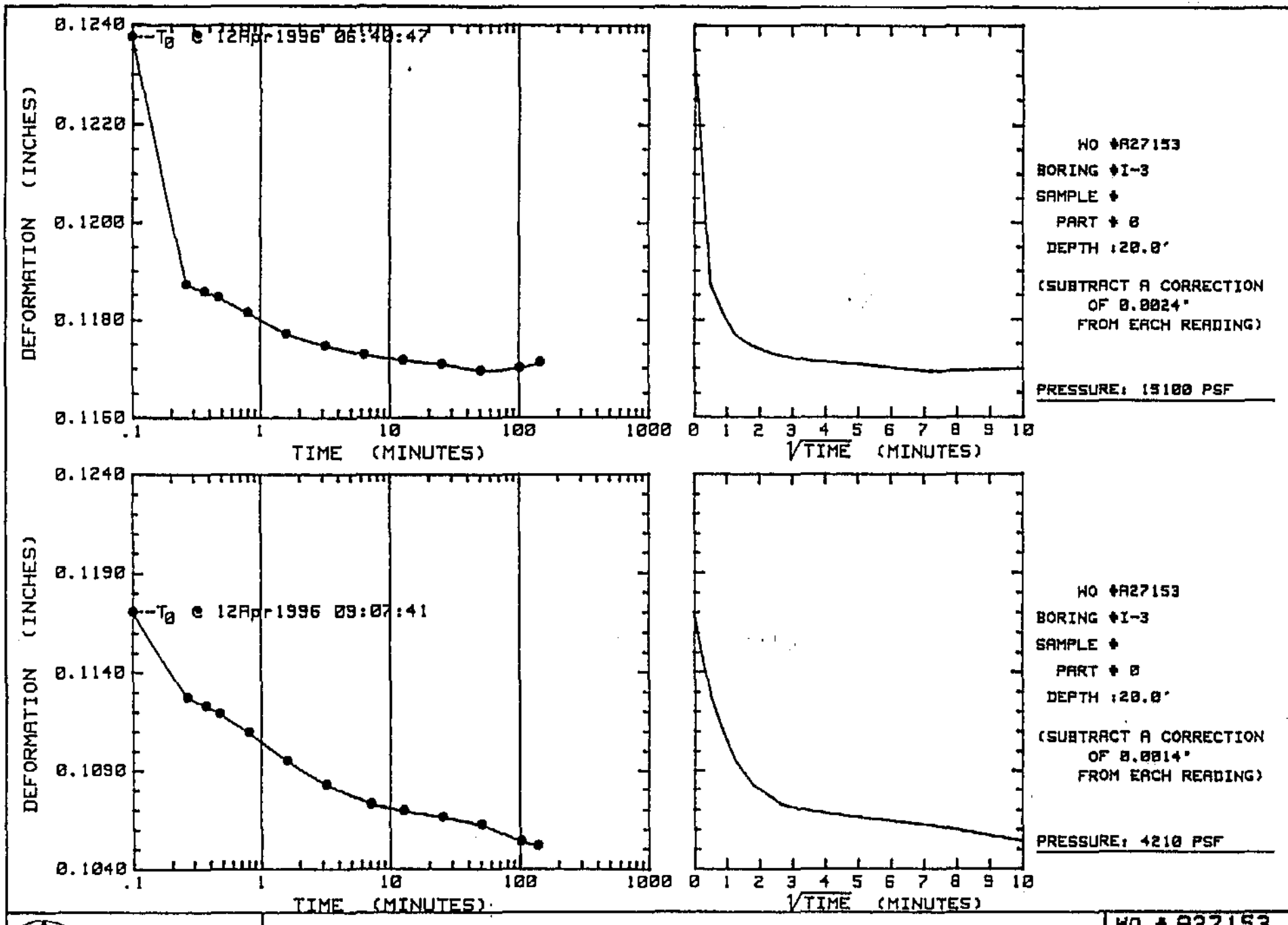




ALASKA TESTLAB

Time Rate of Consolidation

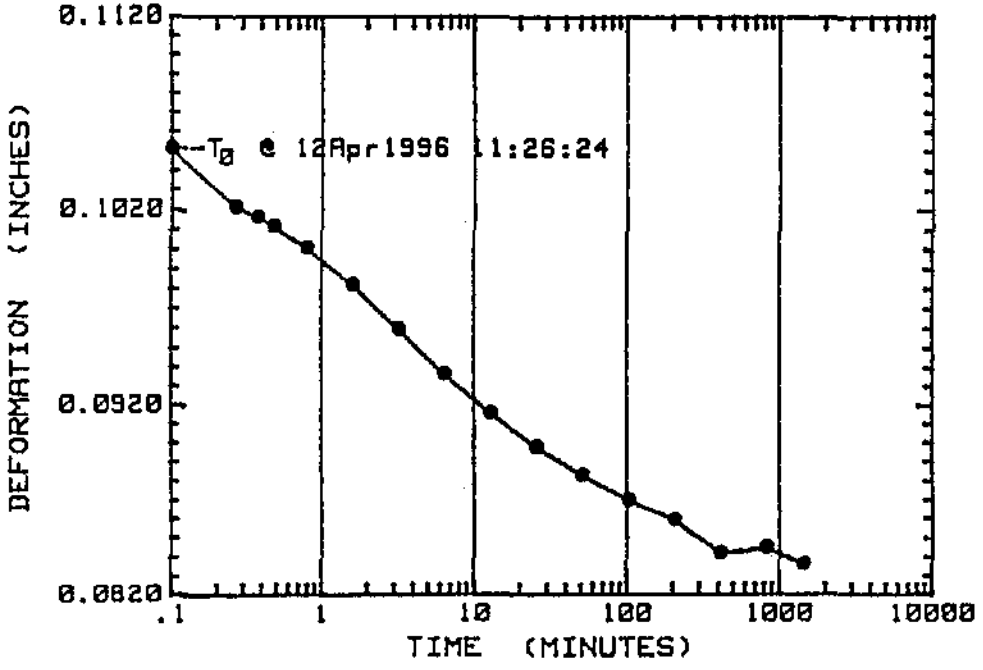
WO # A27153
FIGURE

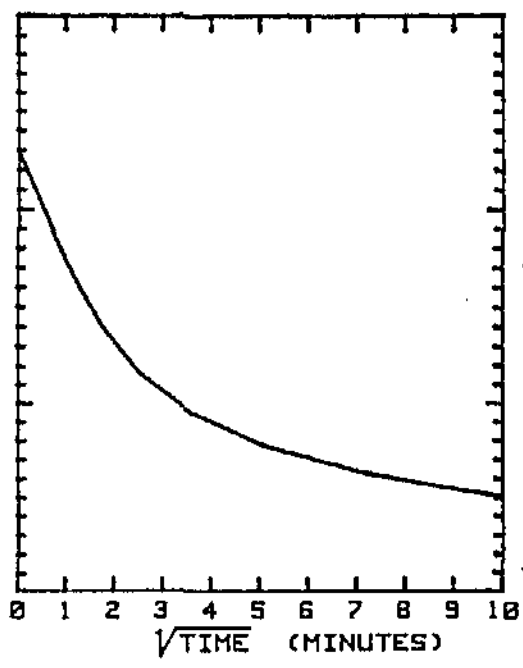


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE





WO #A27153
BORING #I-3
SAMPLE #
PART # 0
DEPTH :20.0'

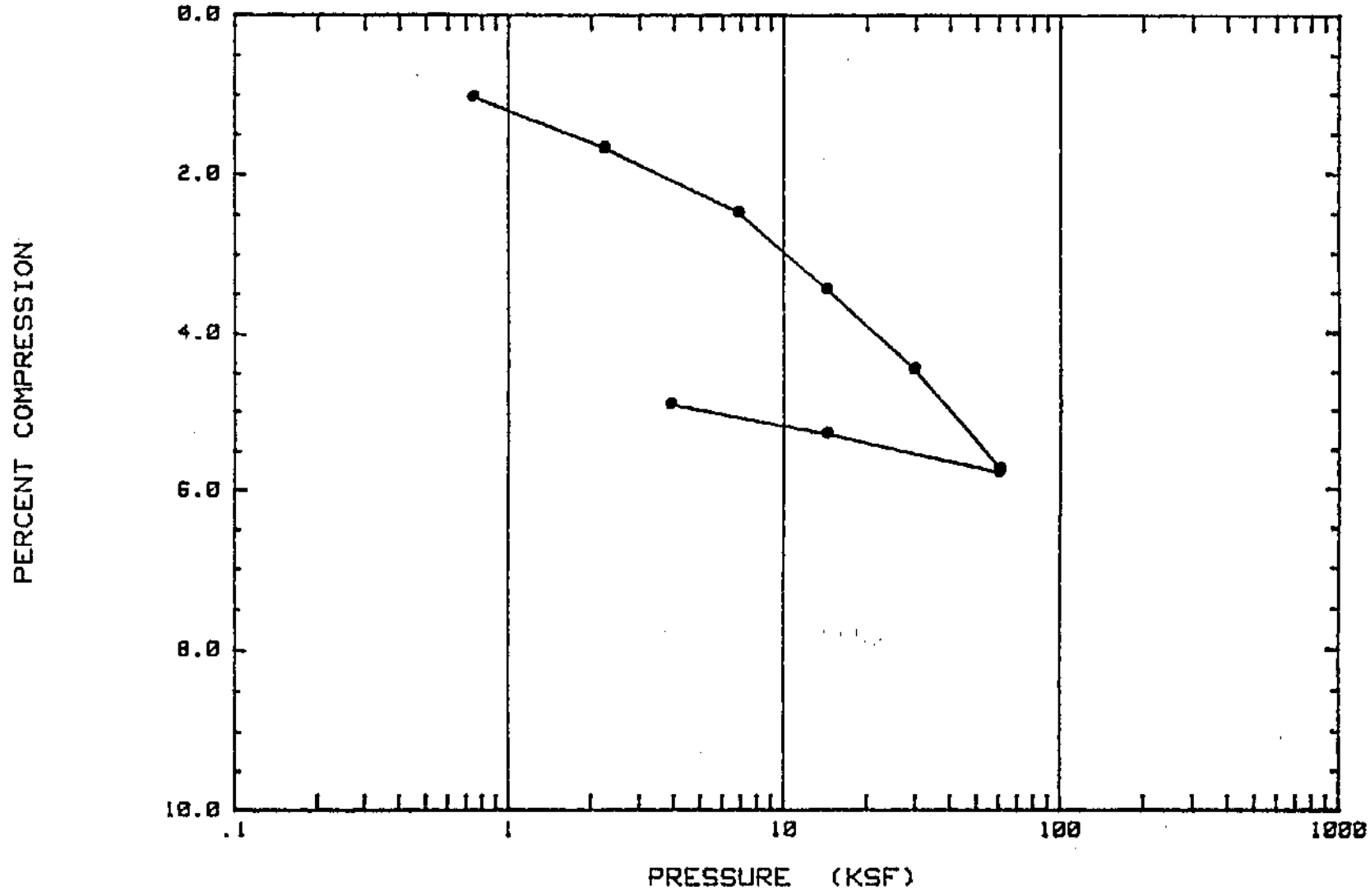
(SUBTRACT A CORRECTION
OF 0.0008"
FROM EACH READING)

PRESSURE: 1010 PSF

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE

PROJECT : LIBERTY
BORING # I-4
SAMPLE #
DEPTH: 2.0'

CLIENT : DURNE MILLER
LABORATORY # C97038



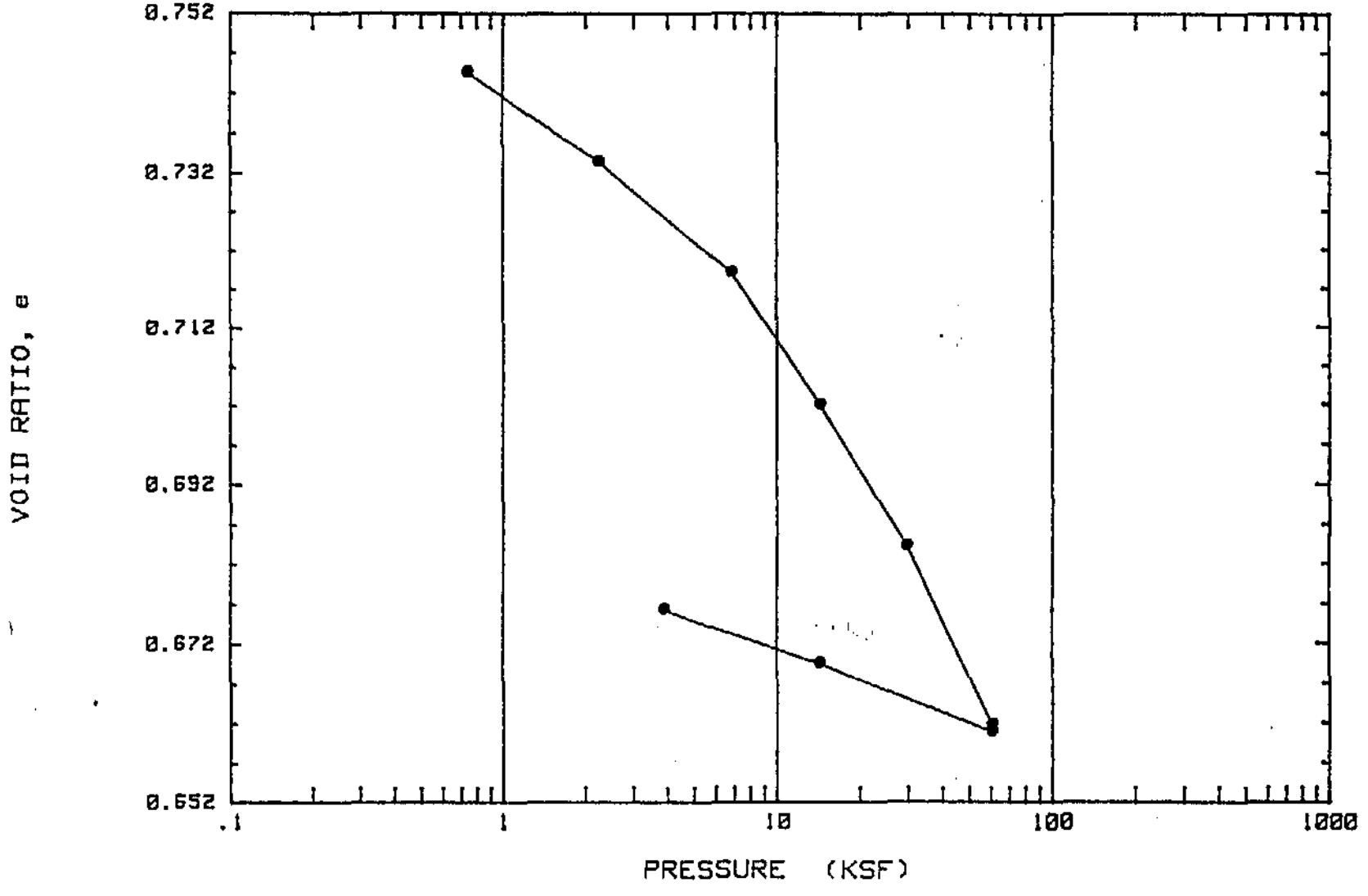
ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-4
SAMPLE #
DEPTH: 2.0'

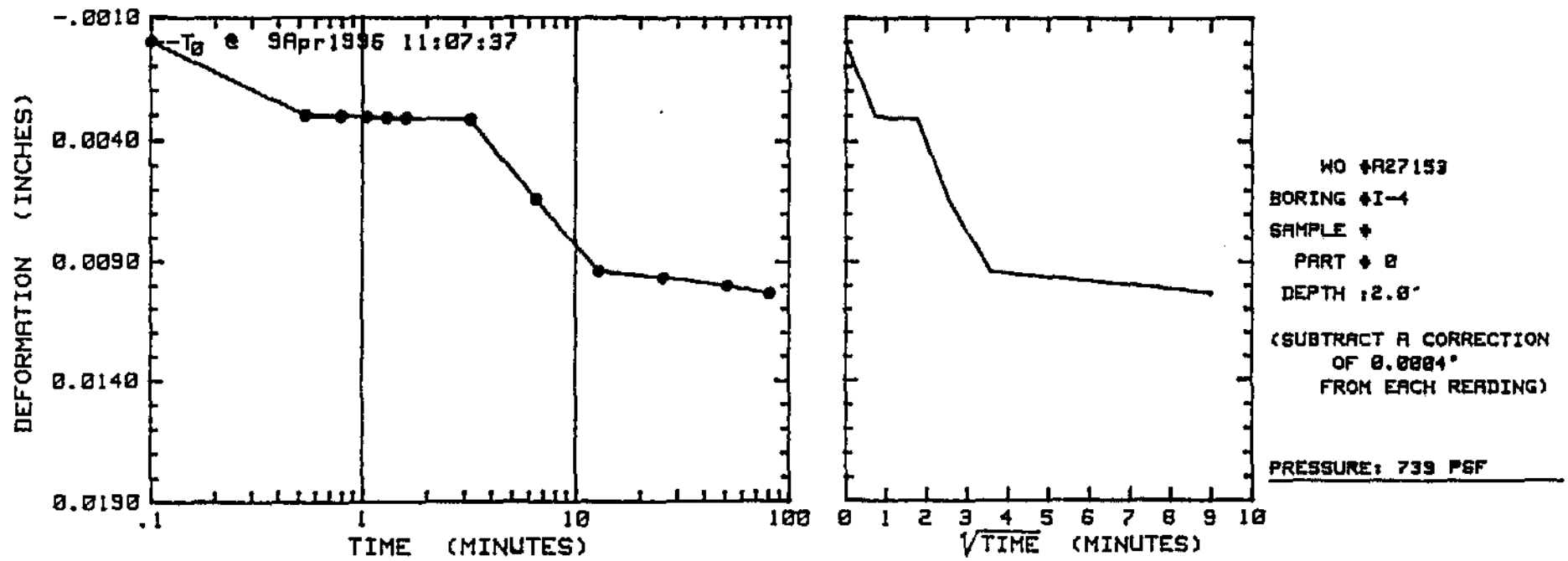
CLIENT : DUANE MILLER
e_o = 0.763
LABORATORY # C97038



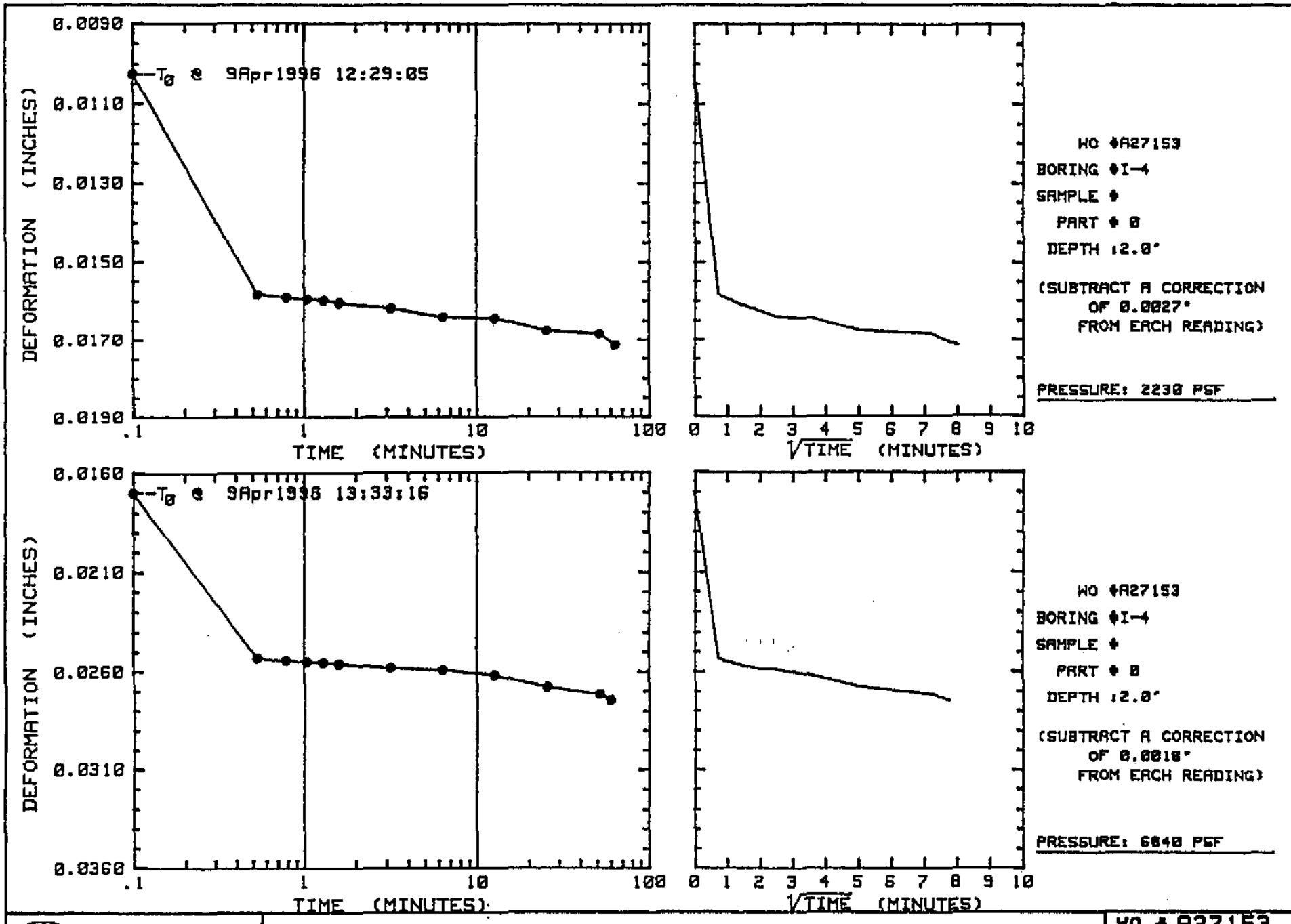
ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE



ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

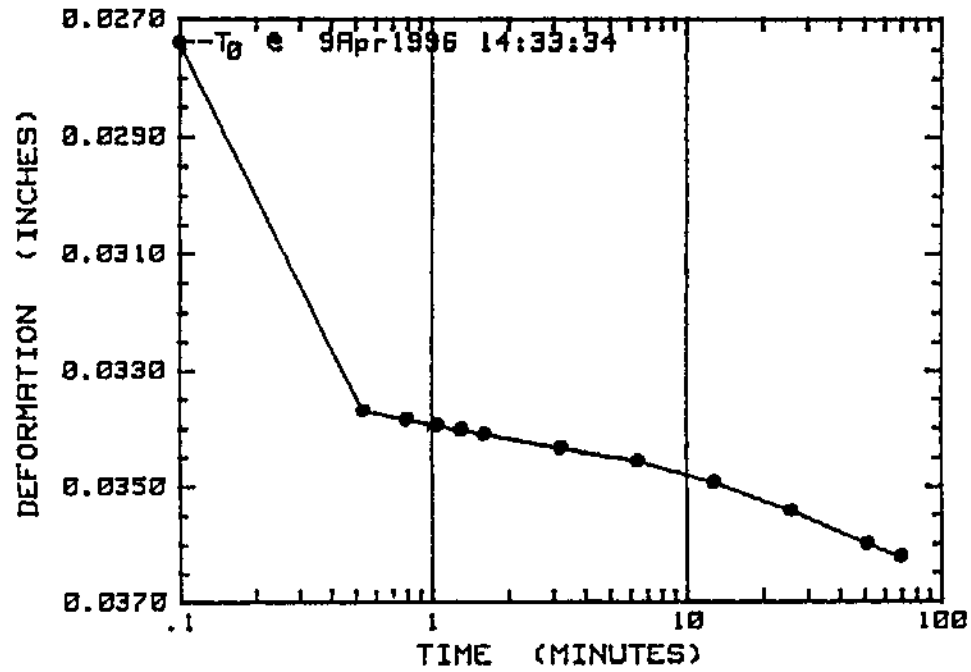


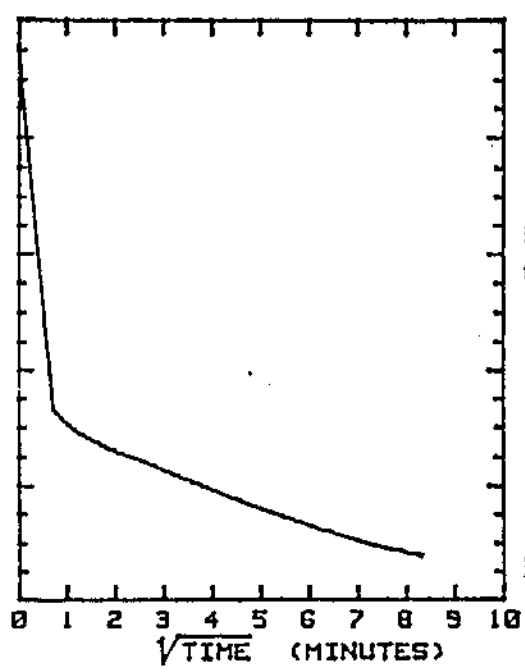
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

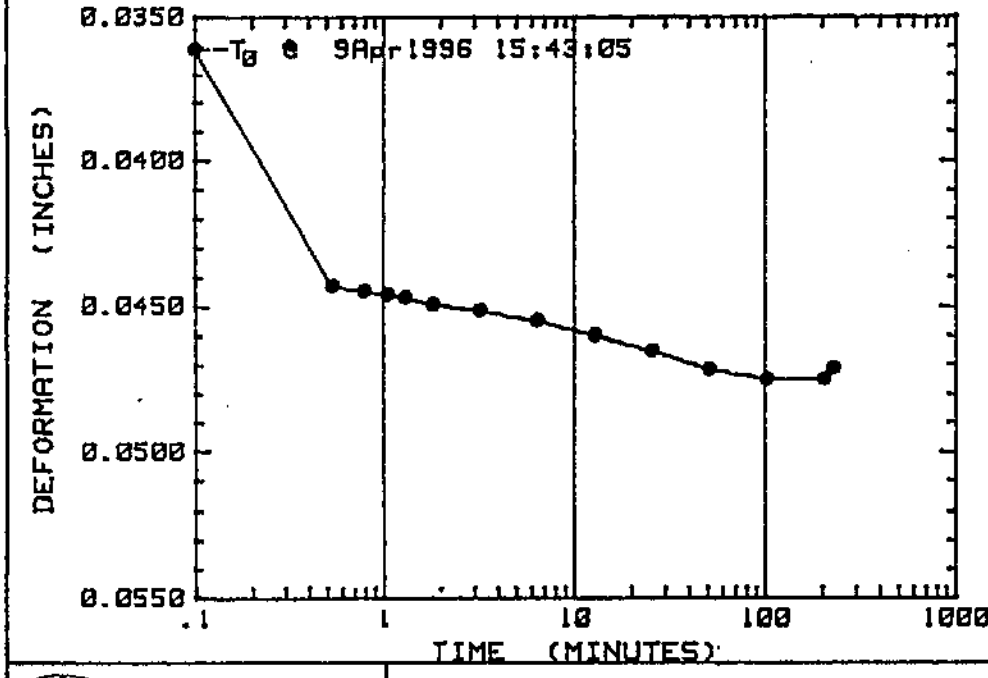


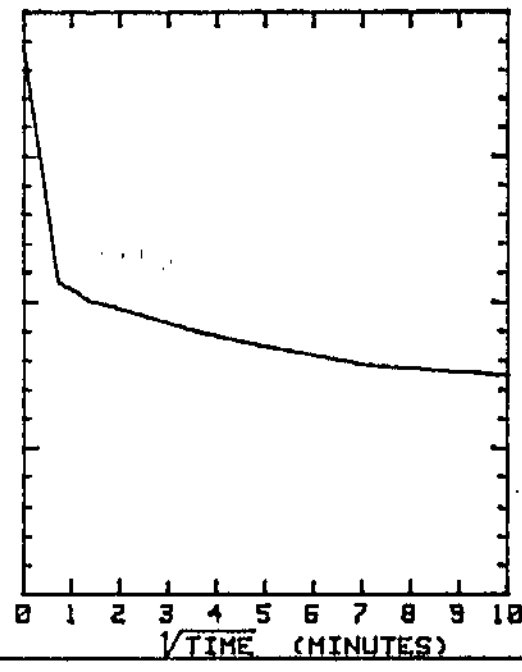


WO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH :2.0'

(SUBTRACT A CORRECTION OF 0.0027" FROM EACH READING)

PRESSURE: 14300 PSF





WO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH :2.0'

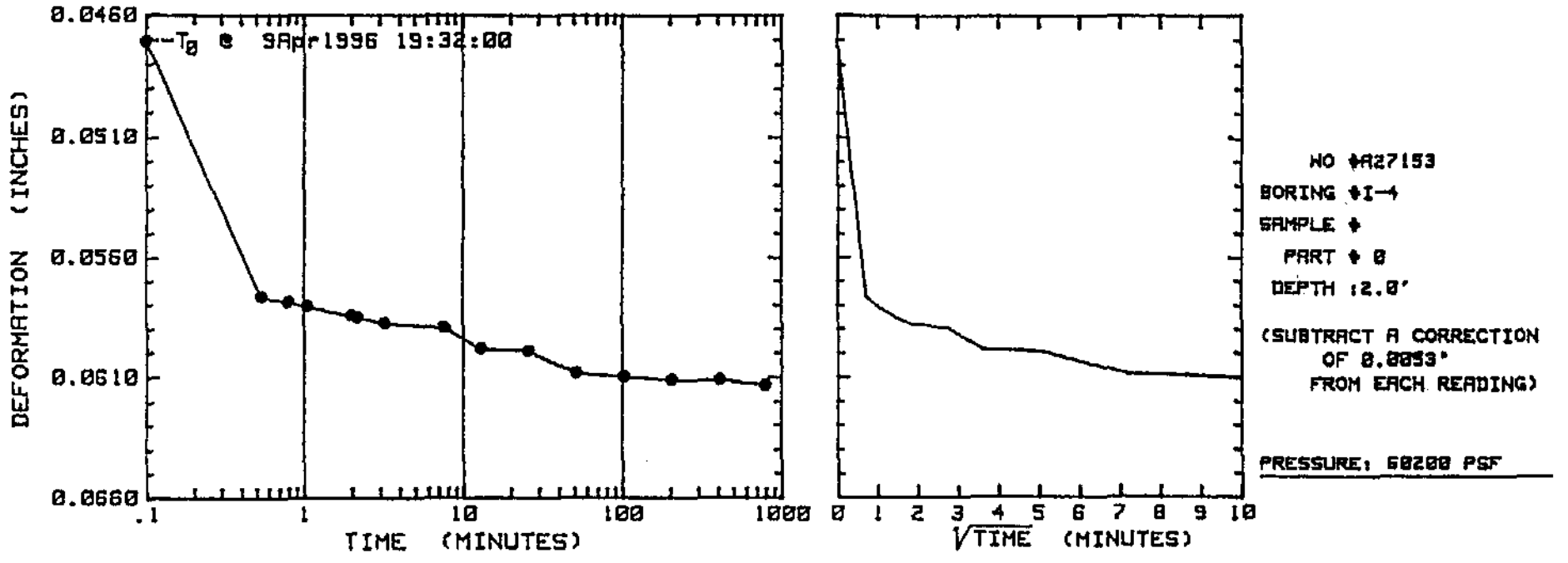
(SUBTRACT A CORRECTION OF 0.0037" FROM EACH READING)

PRESSURE: 29600 PSF

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



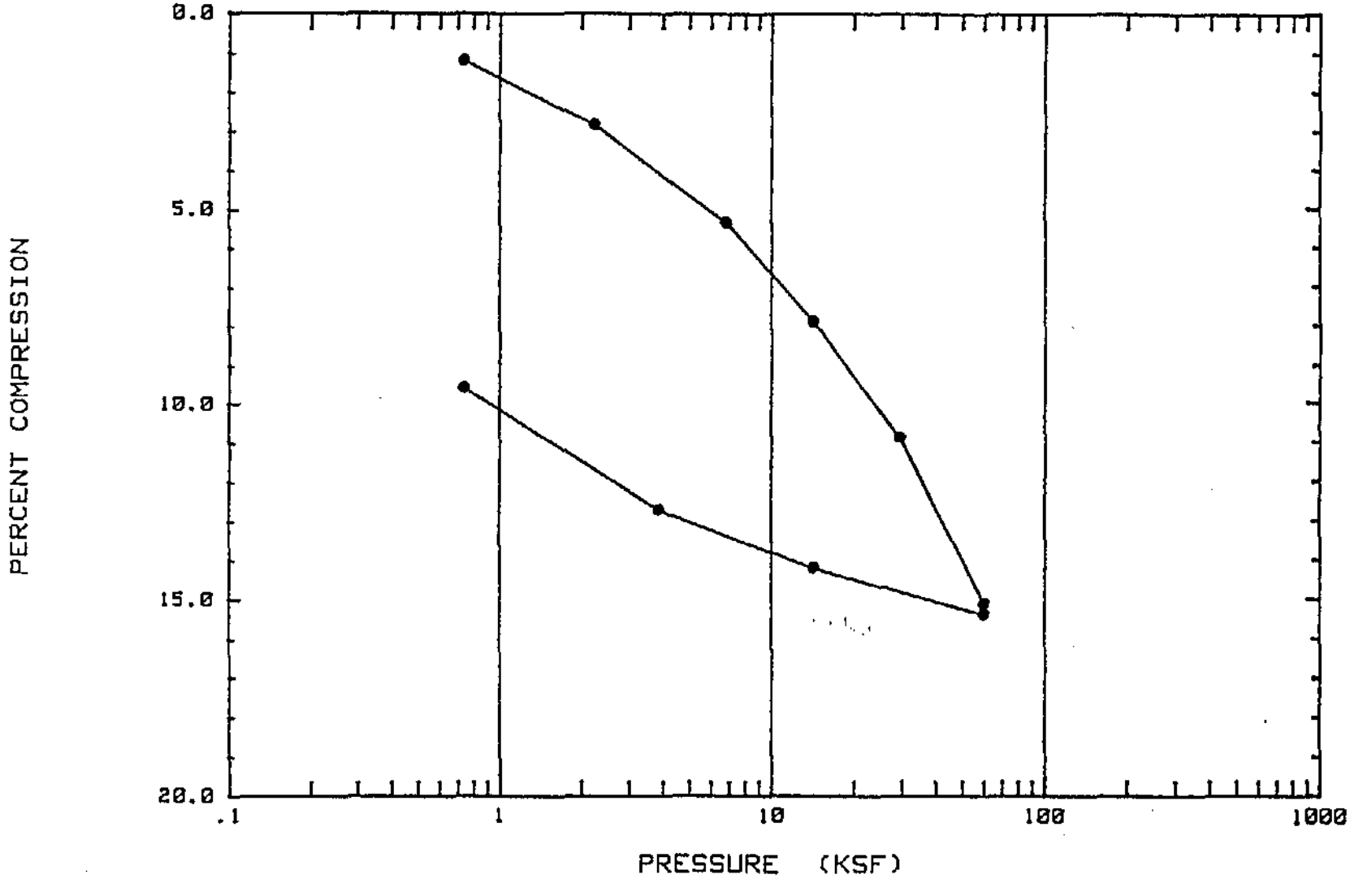
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

PROJECT : LIBERTY
BORING # I-4
SAMPLE #

DEPTH: 22 '

CLIENT : DURNE MILLER

LABORATORY # C97053



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153
FIGURE

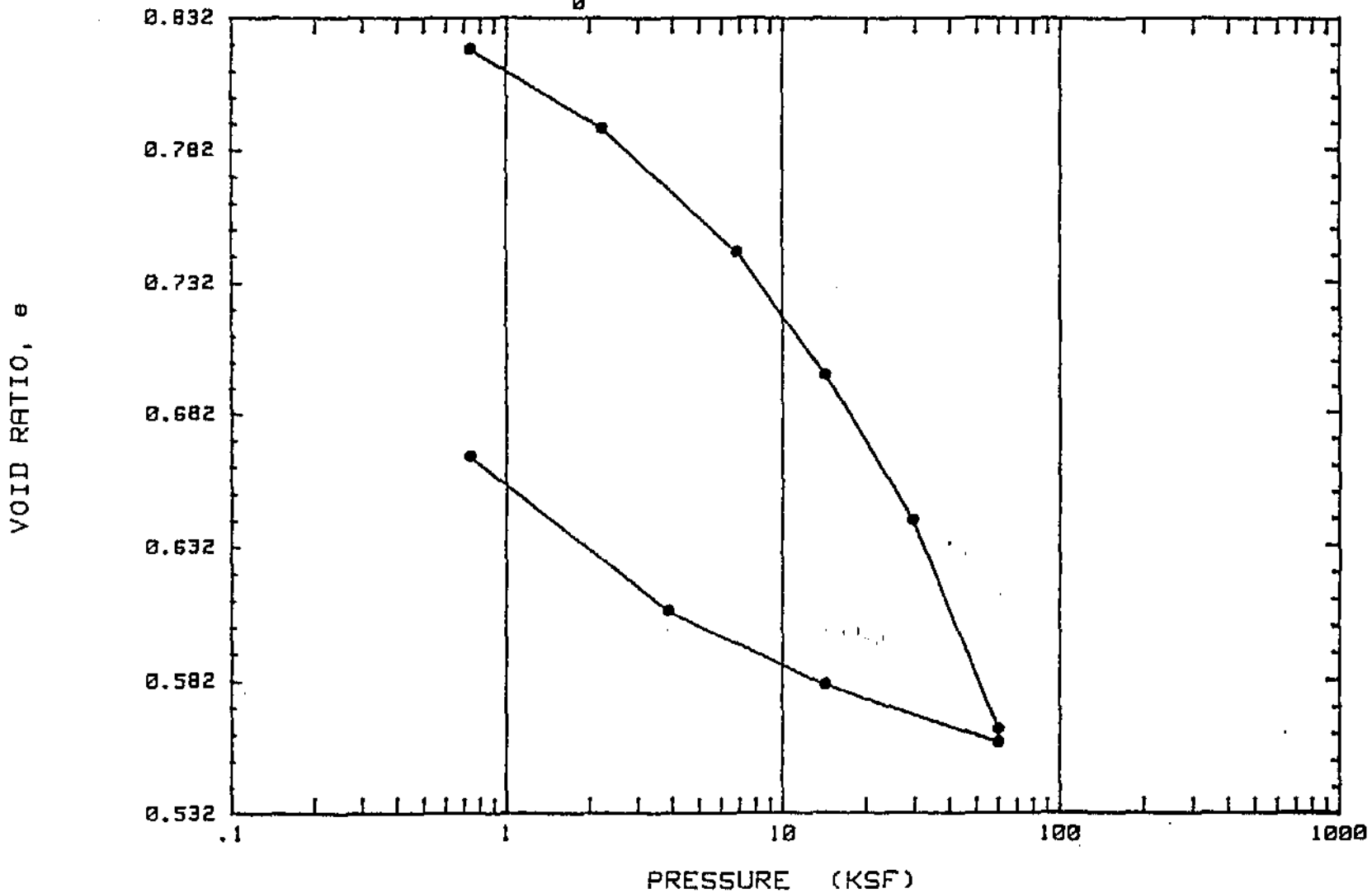
PROJECT : LIBERTY
BORING # I-4
SAMPLE #

CLIENT : DUANE MILLER

DEPTH: 82'

LABORATORY # C97053

e_0 = 0.842

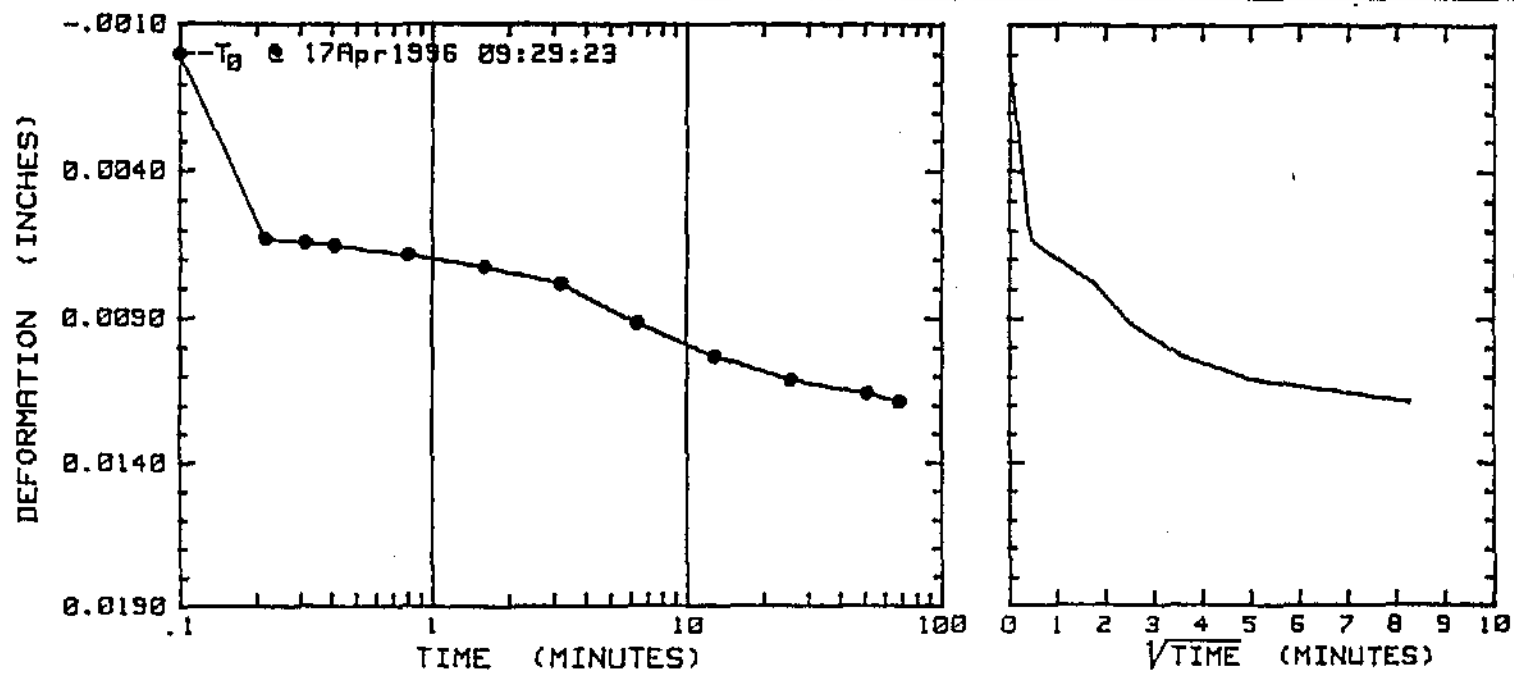


ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153

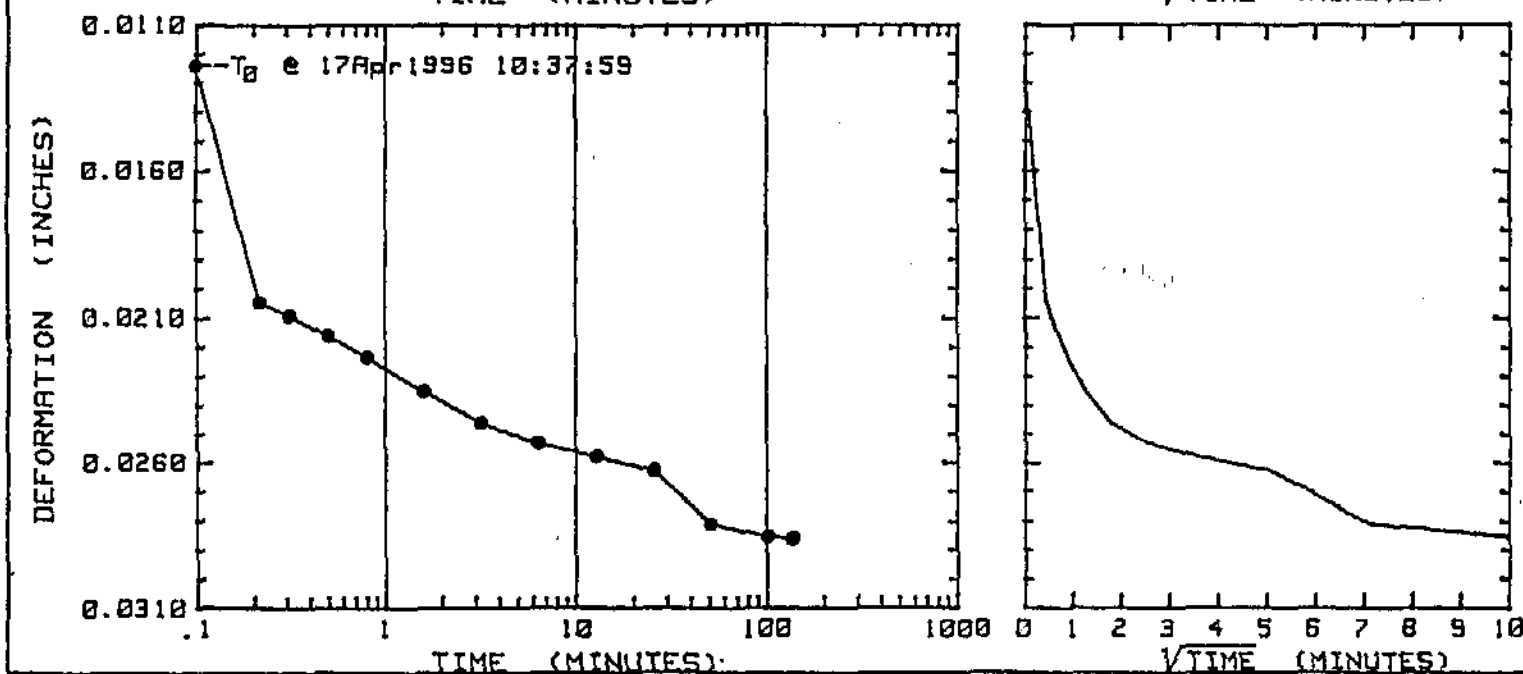
FIGURE



WO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH : 22'

(SUBTRACT A CORRECTION OF 0.0004" FROM EACH READING)

PRESSURE: 739 PSF

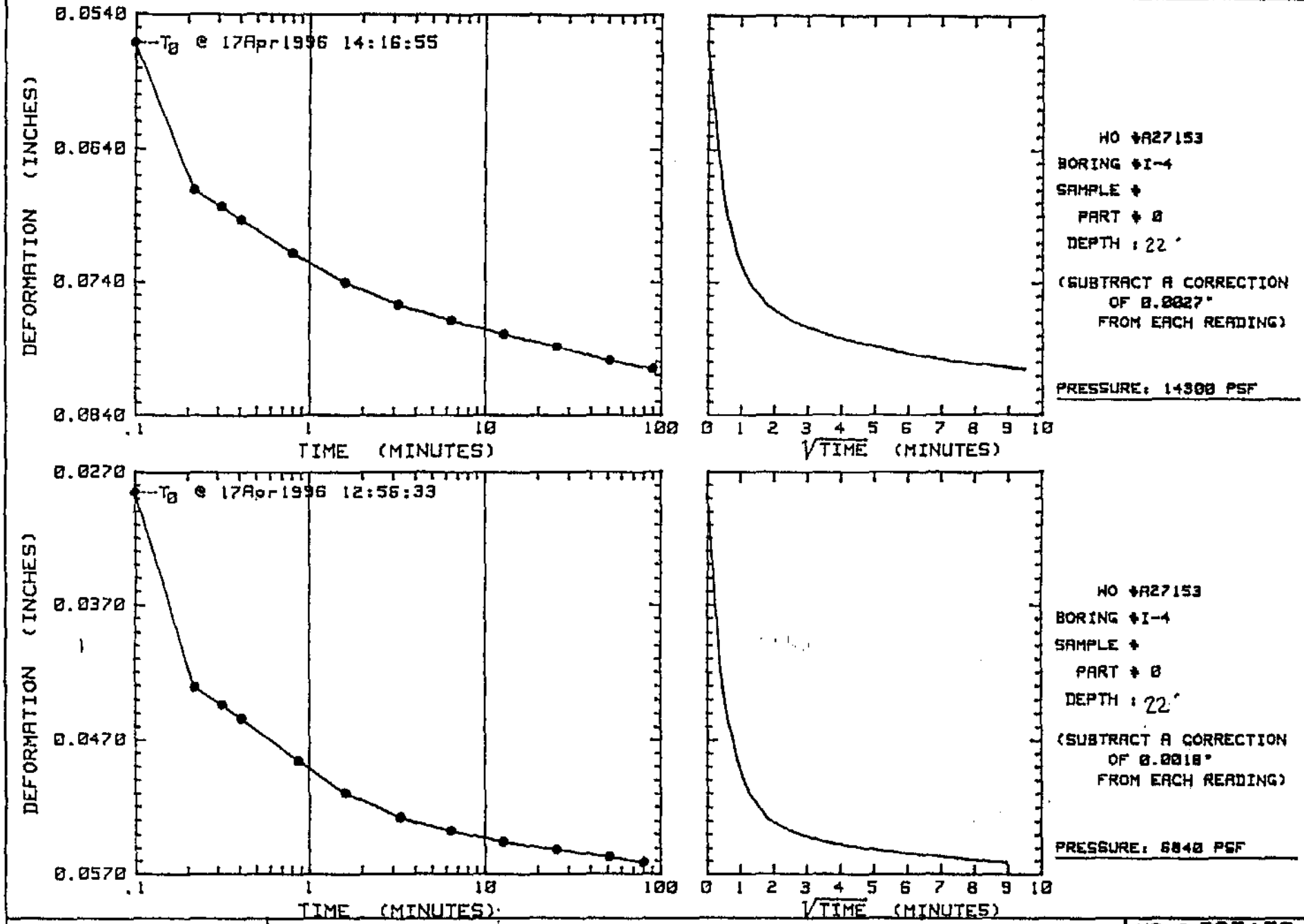


WO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH : 22'

(SUBTRACT A CORRECTION OF 0.0027" FROM EACH READING)

PRESSURE: 2230 PSF

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE

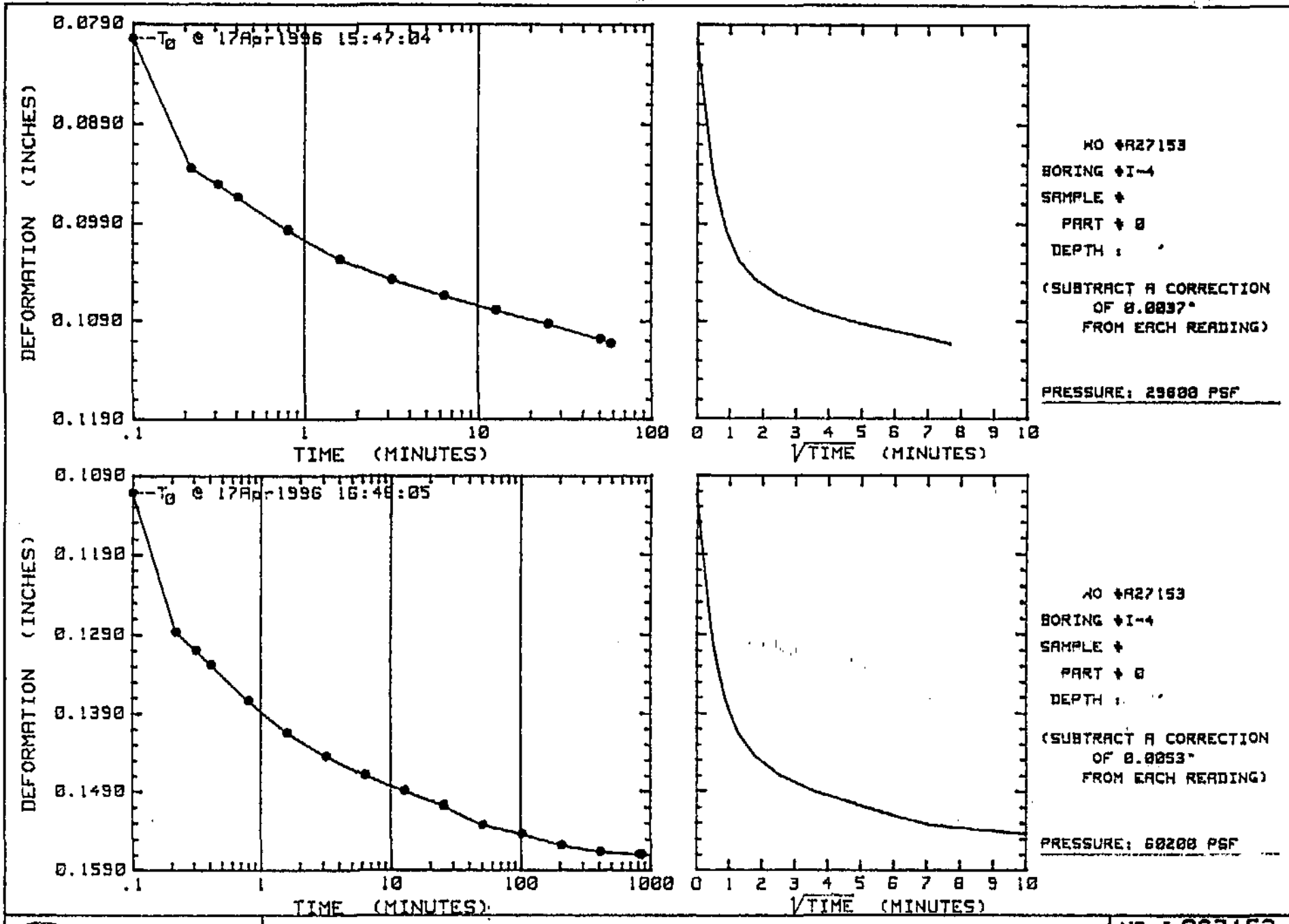


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

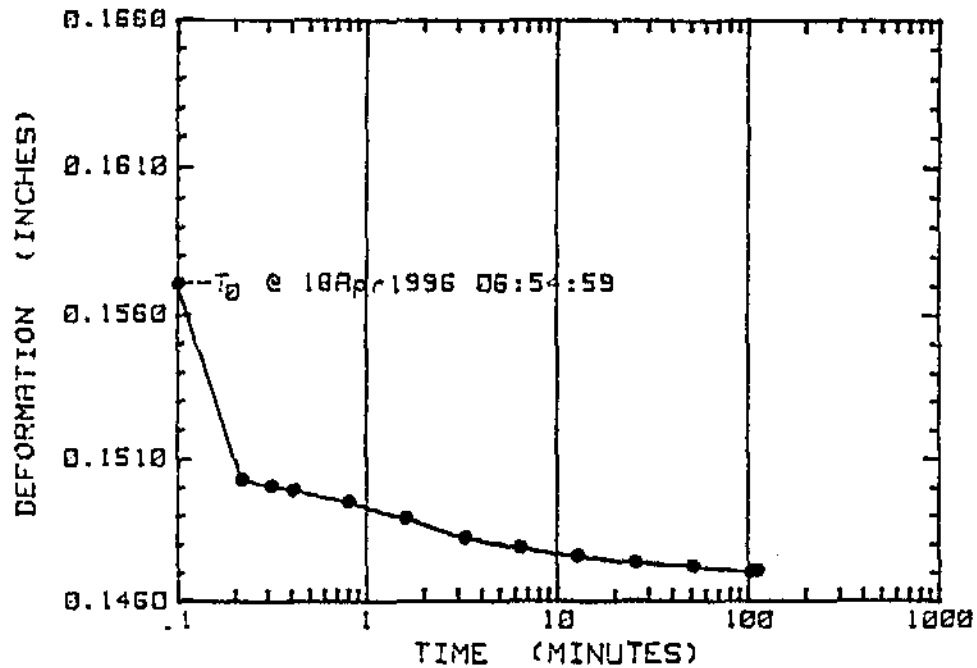
FIGURE

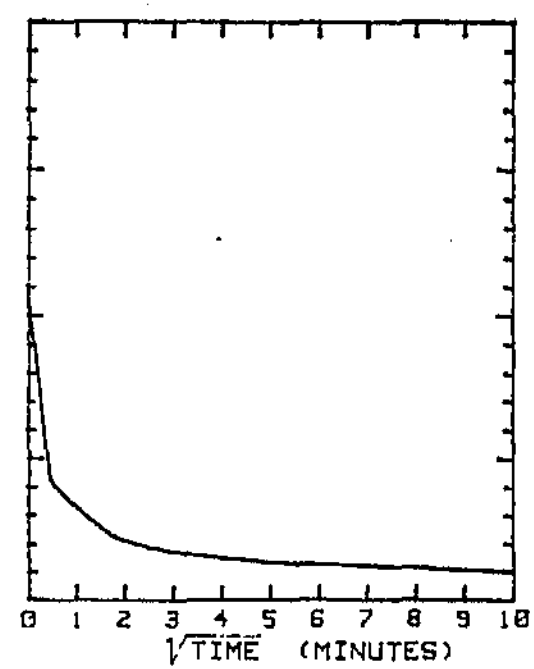


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

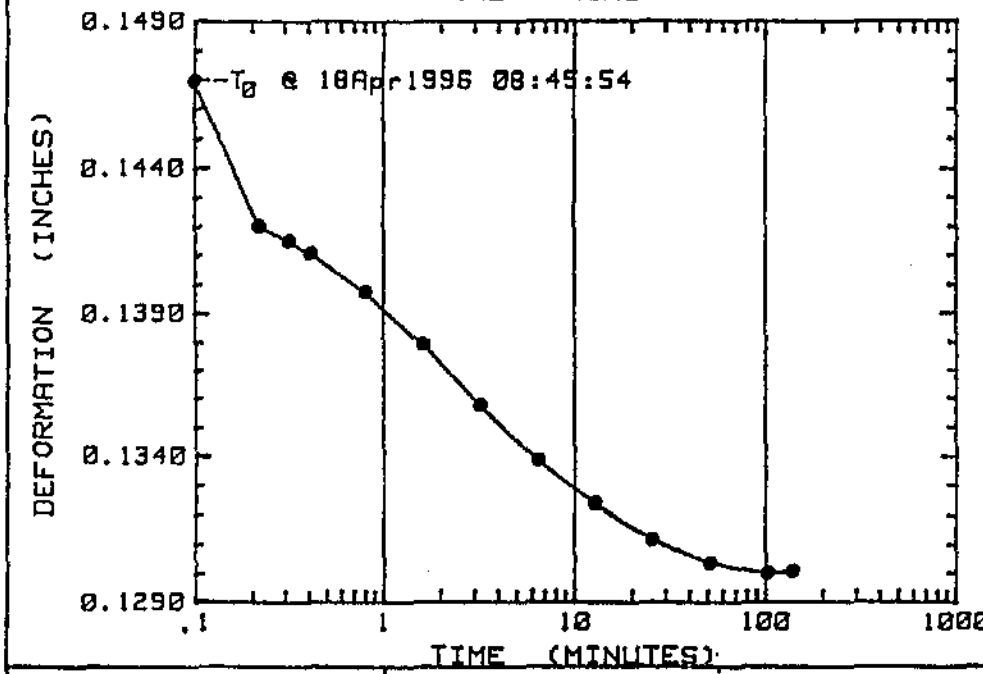


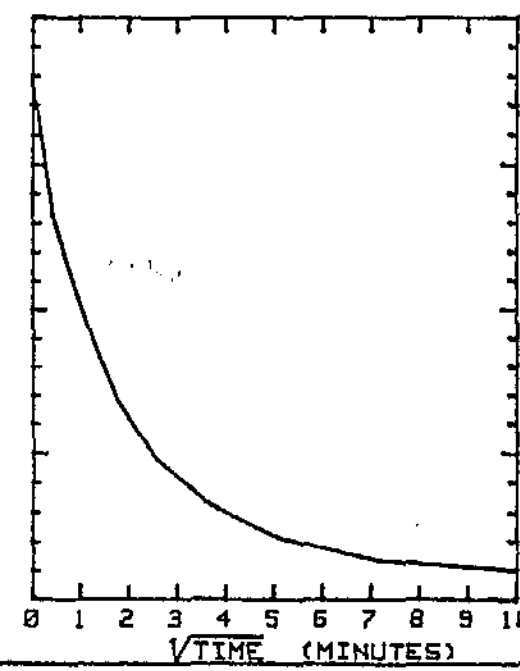


AO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH :22'

(SUBTRACT A CORRECTION OF 0.0032" FROM EACH READING)

PRESSURE: 14300 PSF





WO #A27153
BORING #I-4
SAMPLE #
PART # 0
DEPTH :22'

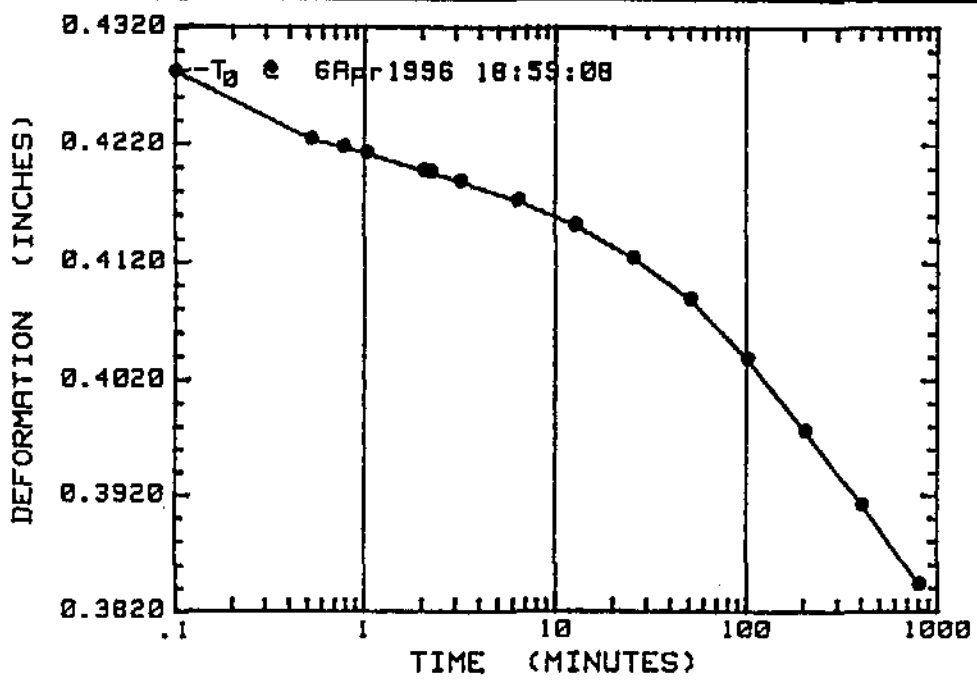
(SUBTRACT A CORRECTION OF 0.0019" FROM EACH READING)

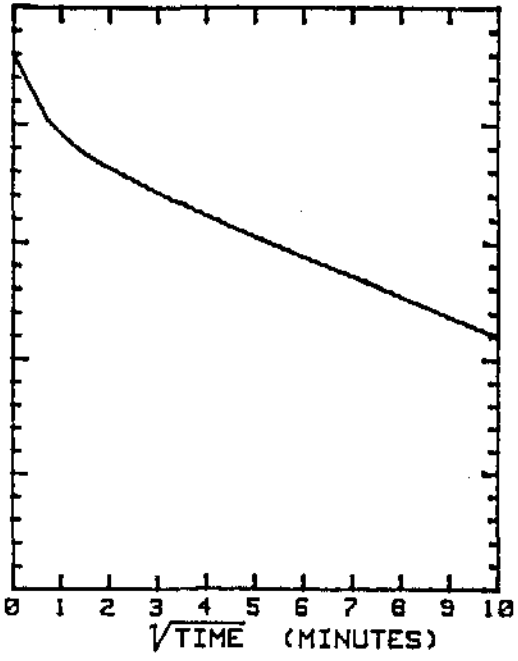
PRESSURE: 3000 PSF

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE





WO #A27153
BORING #I-1
SAMPLE #
PART # 0
DEPTH :3.0'

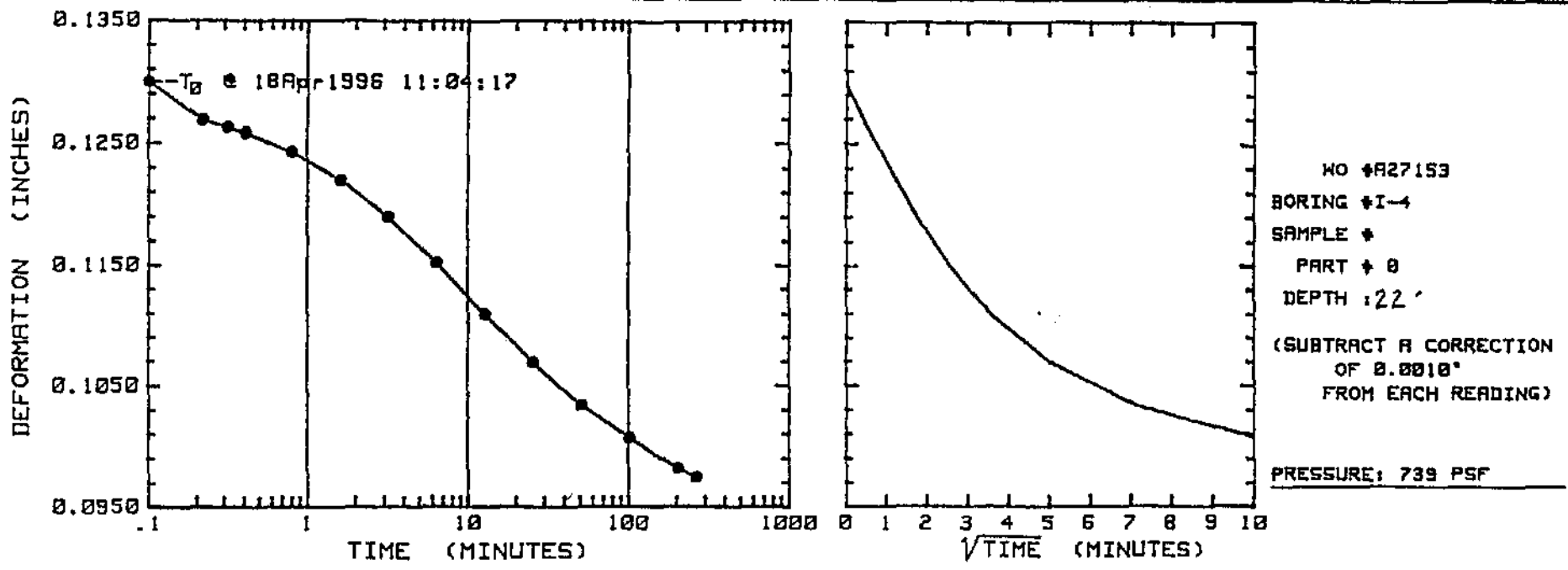
(SUBTRACT A CORRECTION OF -.0003" FROM EACH READING)

PRESSURE: 1100 PSF

ALASKA TESTLAB

Time Rate of Consolidation

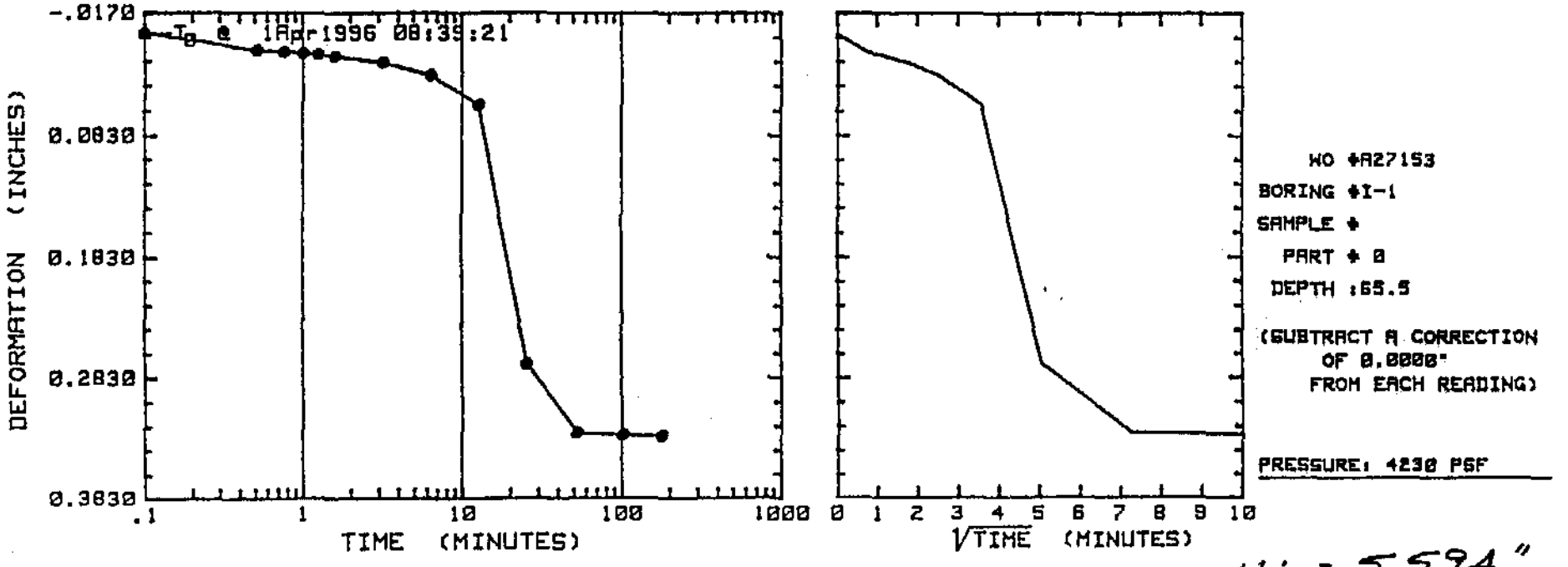
WO # A27153
FIGURE



ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

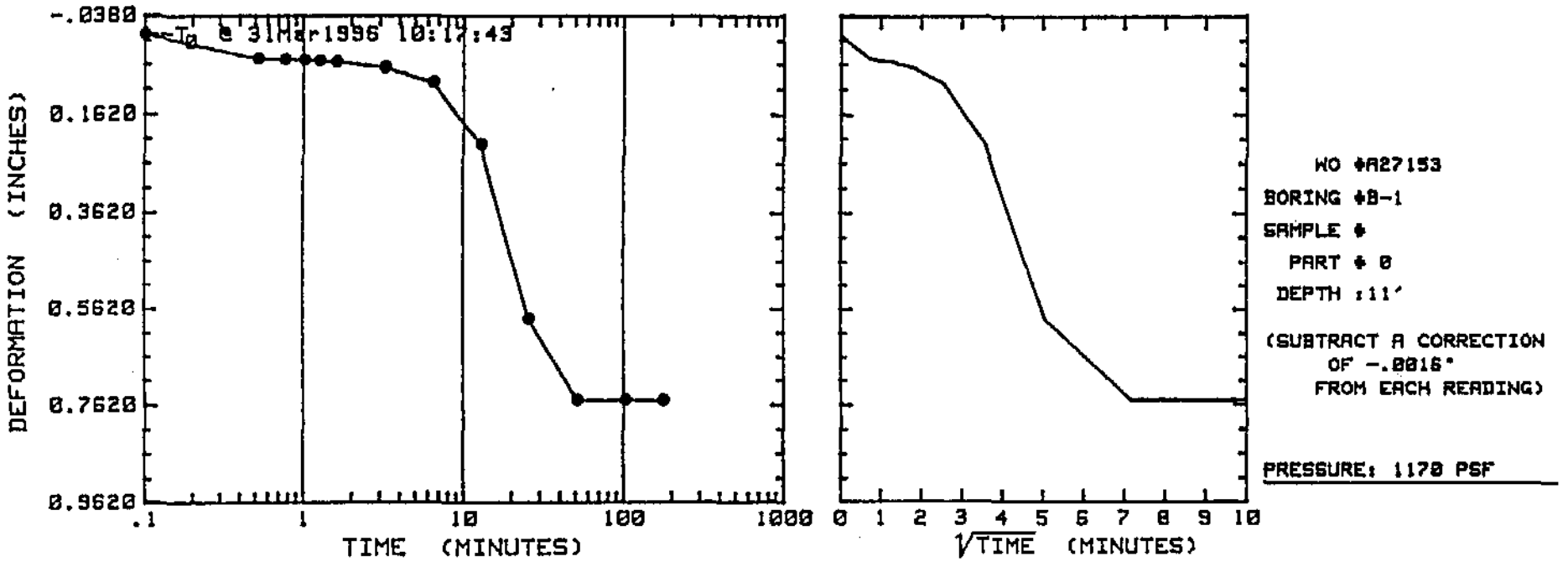
APPENDIX E

THAW STRAIN TESTS



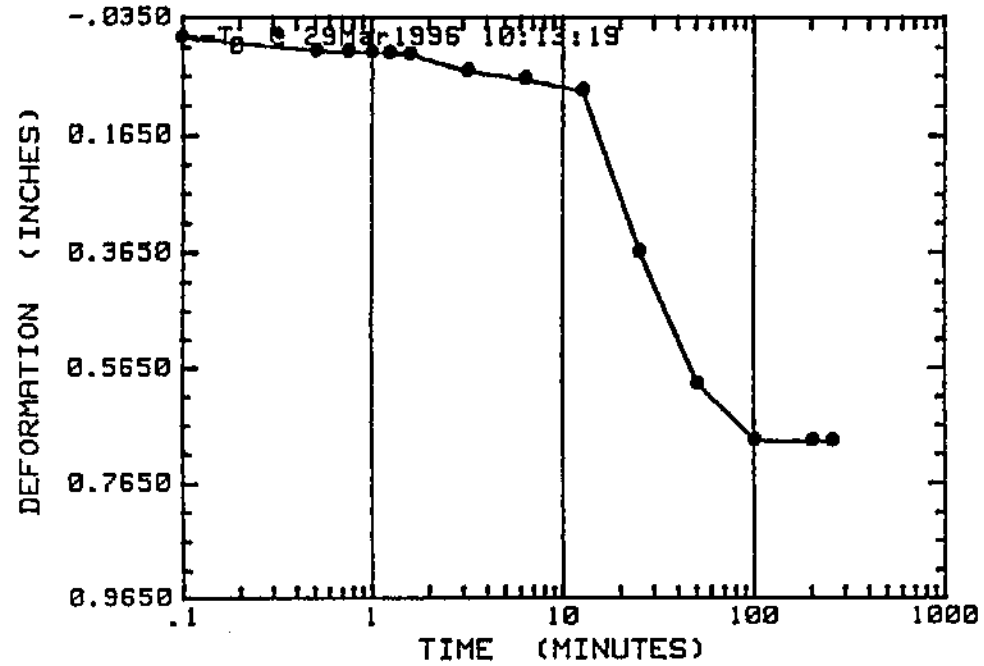
$H_i = 5.594"$

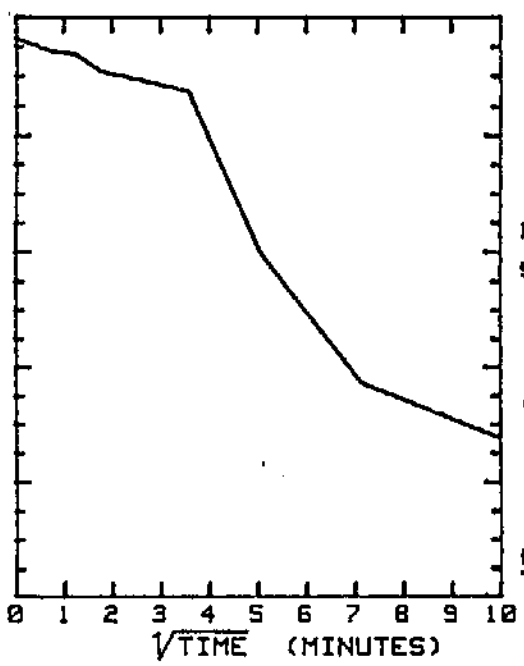
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE



$H_i = 5.28''$

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE





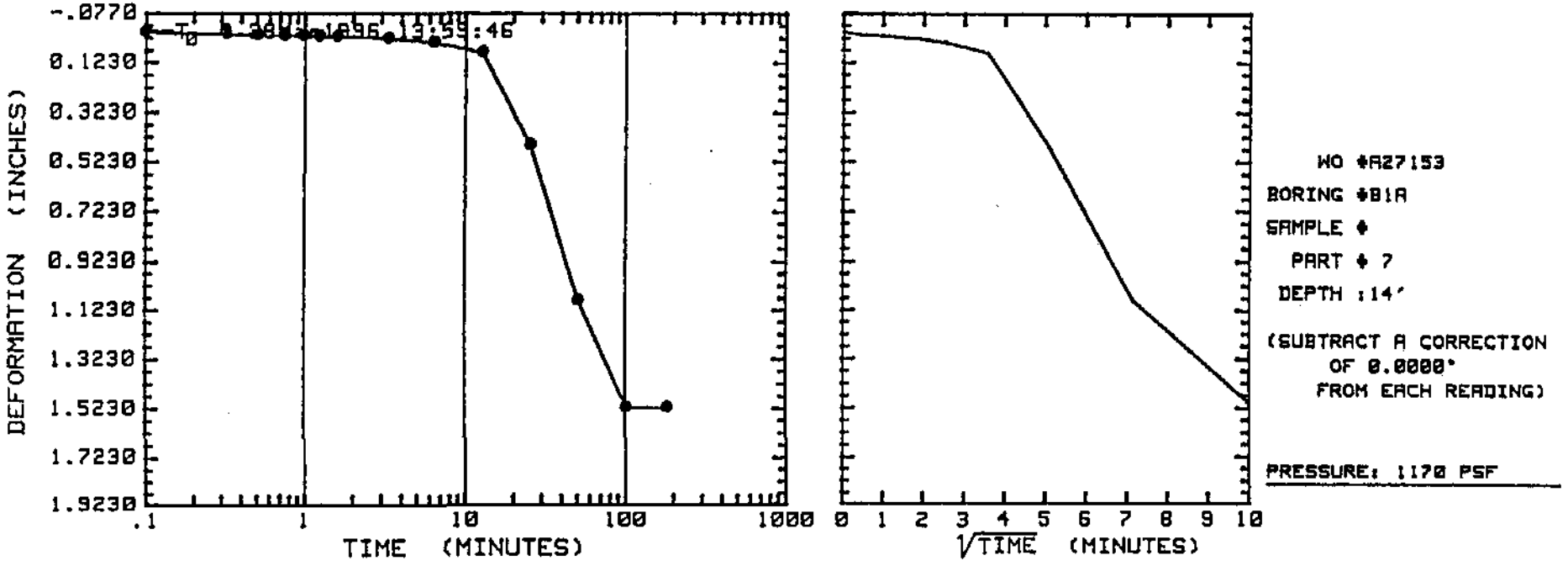
WO #A27153
BORING #B1
SAMPLE #
PART # 0
DEPTH :14.5

(SUBTRACT A CORRECTION
OF 0.0000"
FROM EACH READING)

PRESSURE: 1120 PSF

$H_i = 6.082"$

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE

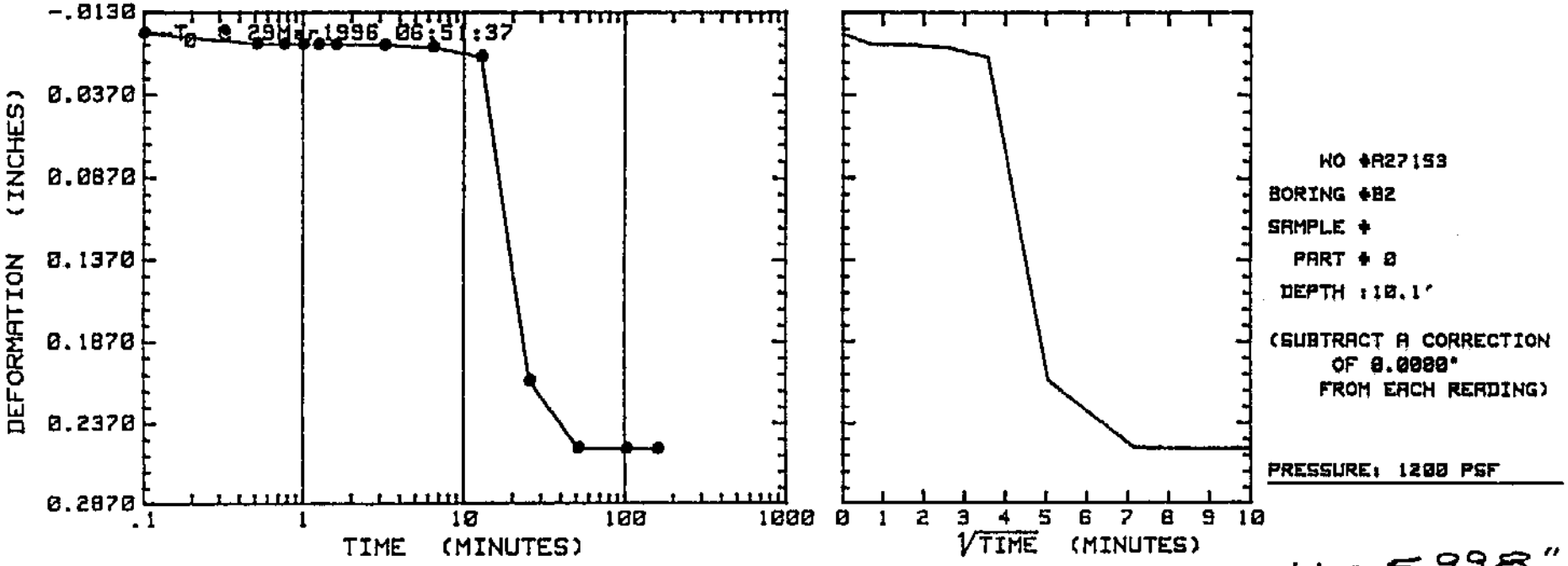


$H_i = 5.978"$

ALASKA TESTLAB

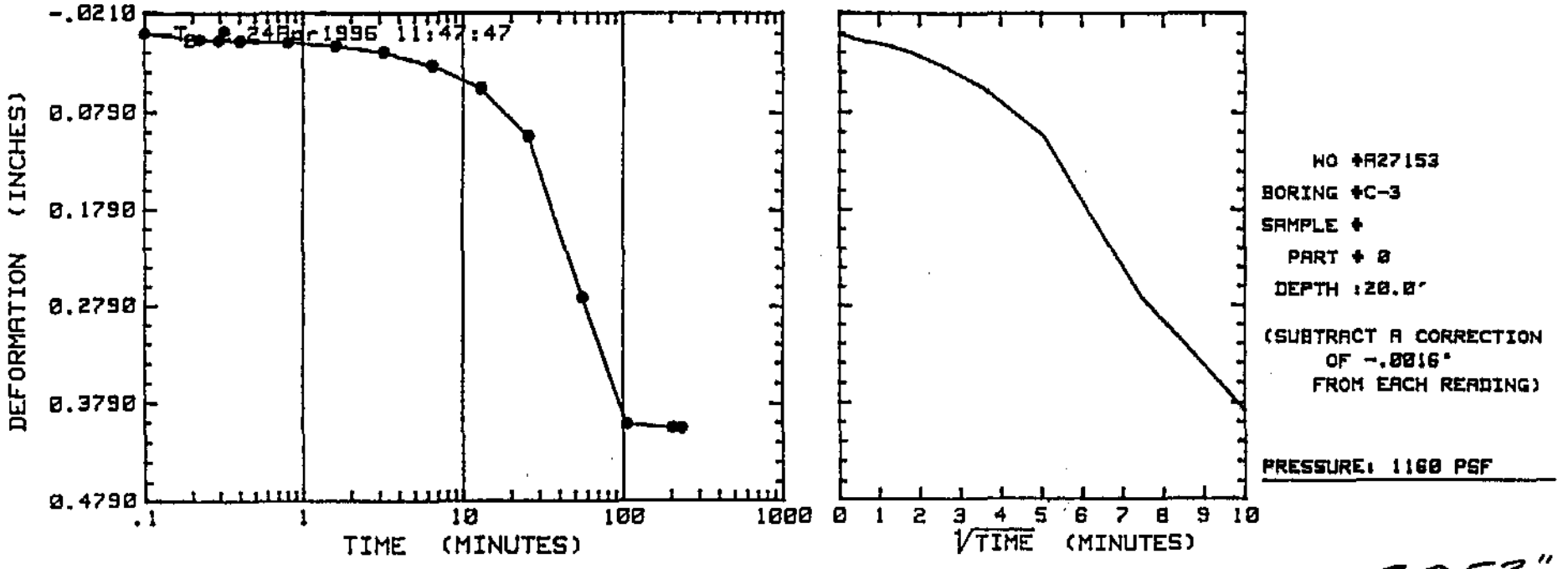
Time Rate of Consolidation

WO # A27153
FIGURE



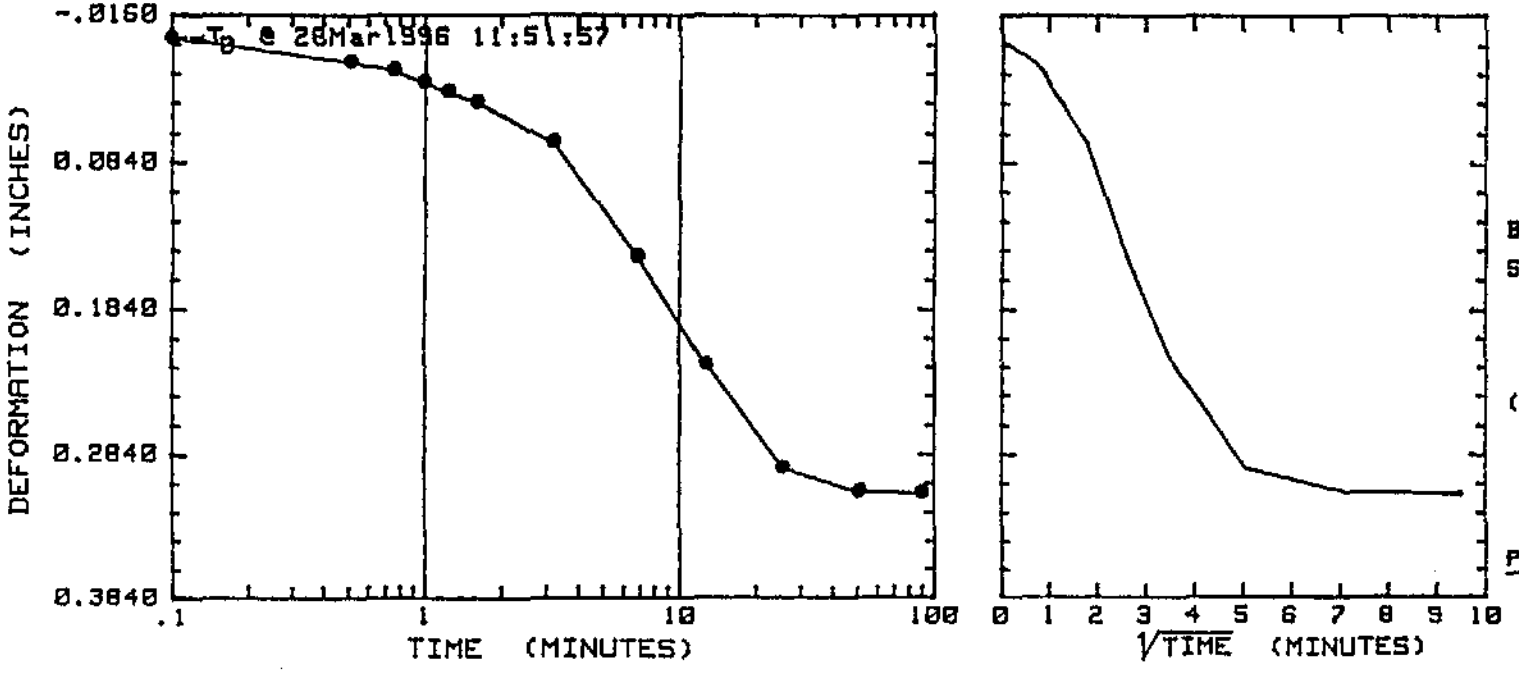
$H_i = 5.998"$

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153 FIGURE



$H_i = 3.053"$

ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE



WO #A27153
BORING #C3
SAMPLE #
PART # 7
DEPTH :28.5'

(SUBTRACT A CORRECTION OF -.0016" FROM EACH READING)

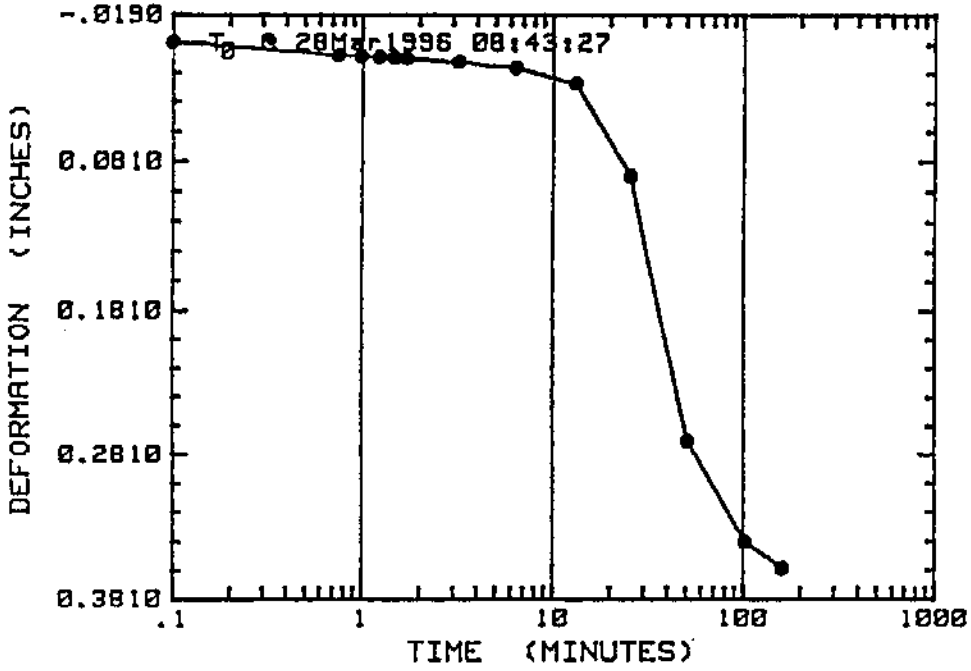
PRESSURE: 1170 PSF

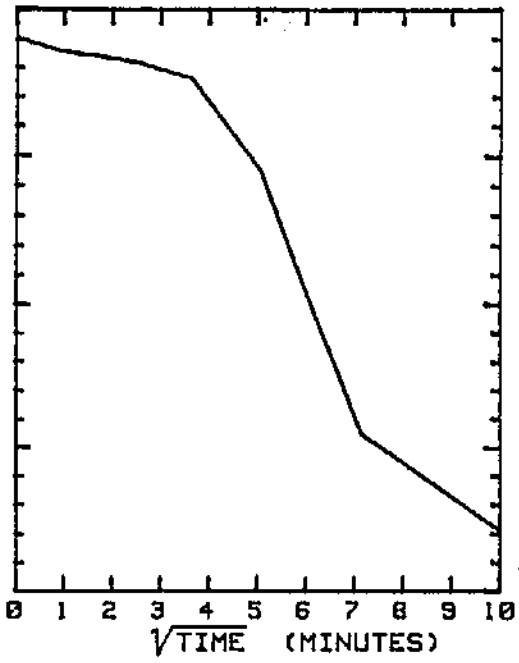
H_i = 2.029"

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE





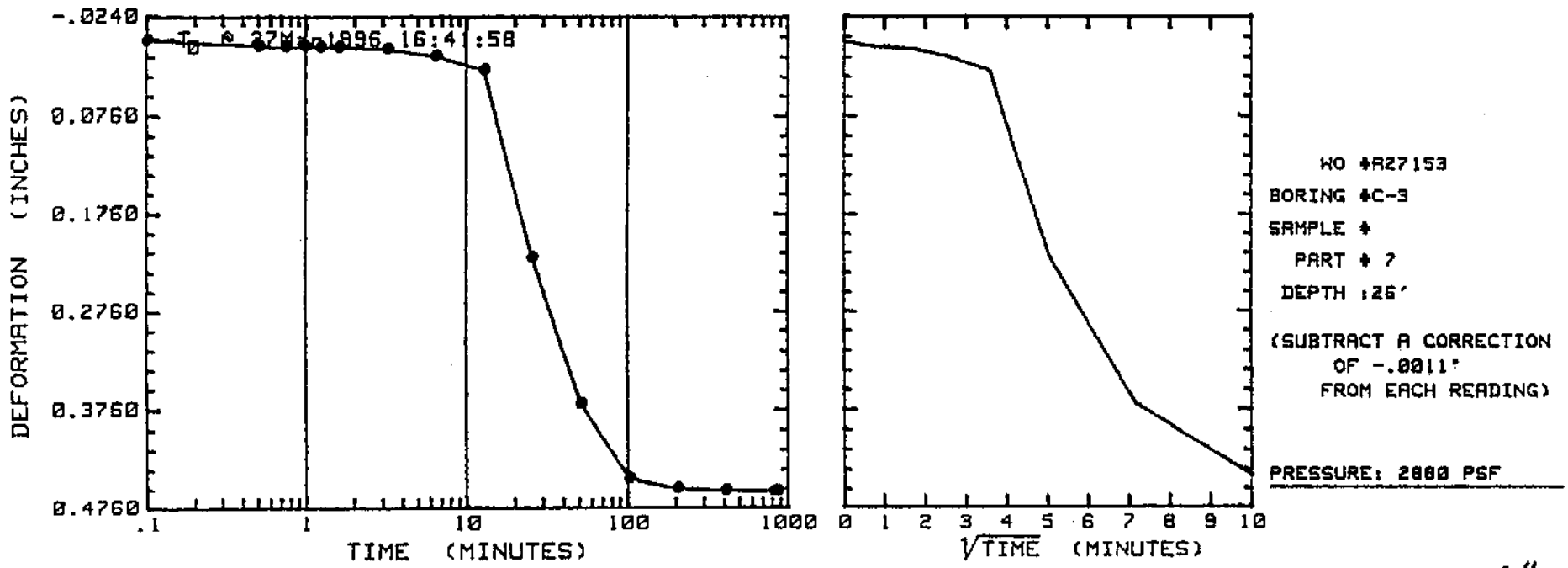
WO #A27153
BORING #C3
SAMPLE #
PART # 7
DEPTH :25.5

(SUBTRACT A CORRECTION
OF 0.0000"
FROM EACH READING)

PRESSURE: 2040 PSF

$H_i = 5.983"$

ALASKA TESTLAB	Time Rate of Consolidation	WO # A27153
		FIGURE

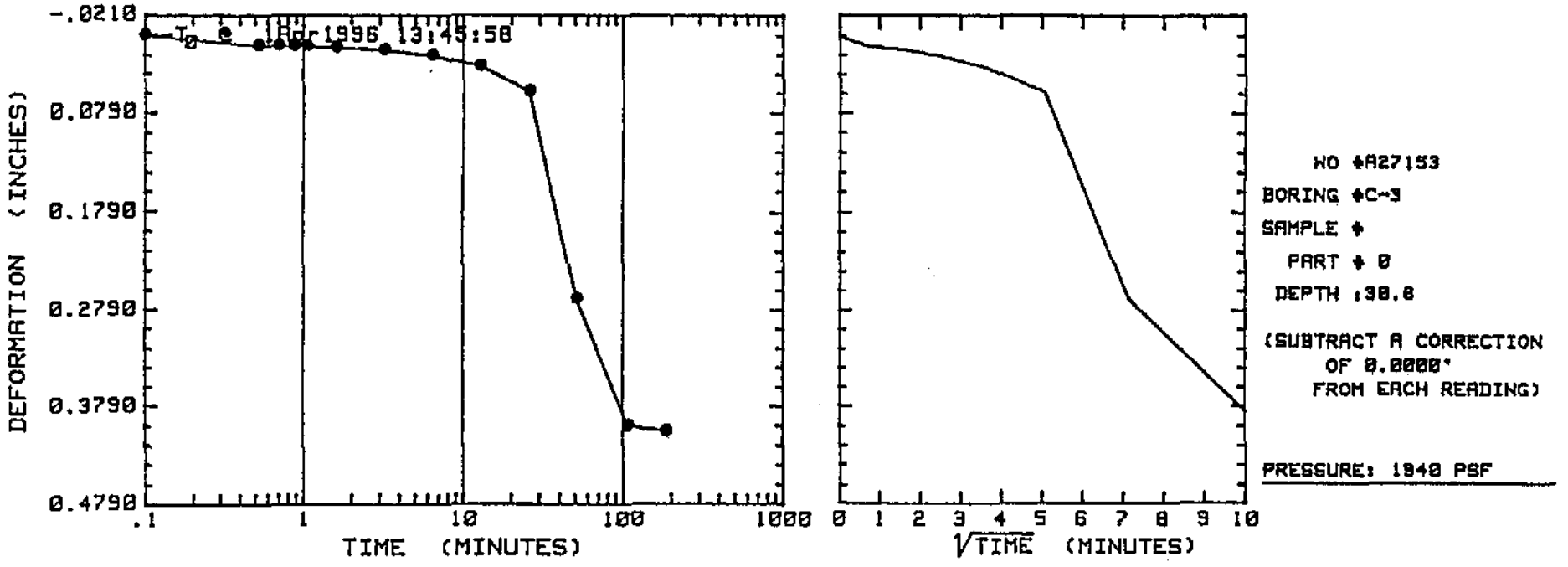


$H_i = 5.974"$

ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE



H_i = 5.970"

ALASKA TESTLAB

Time Rate of Consolidation

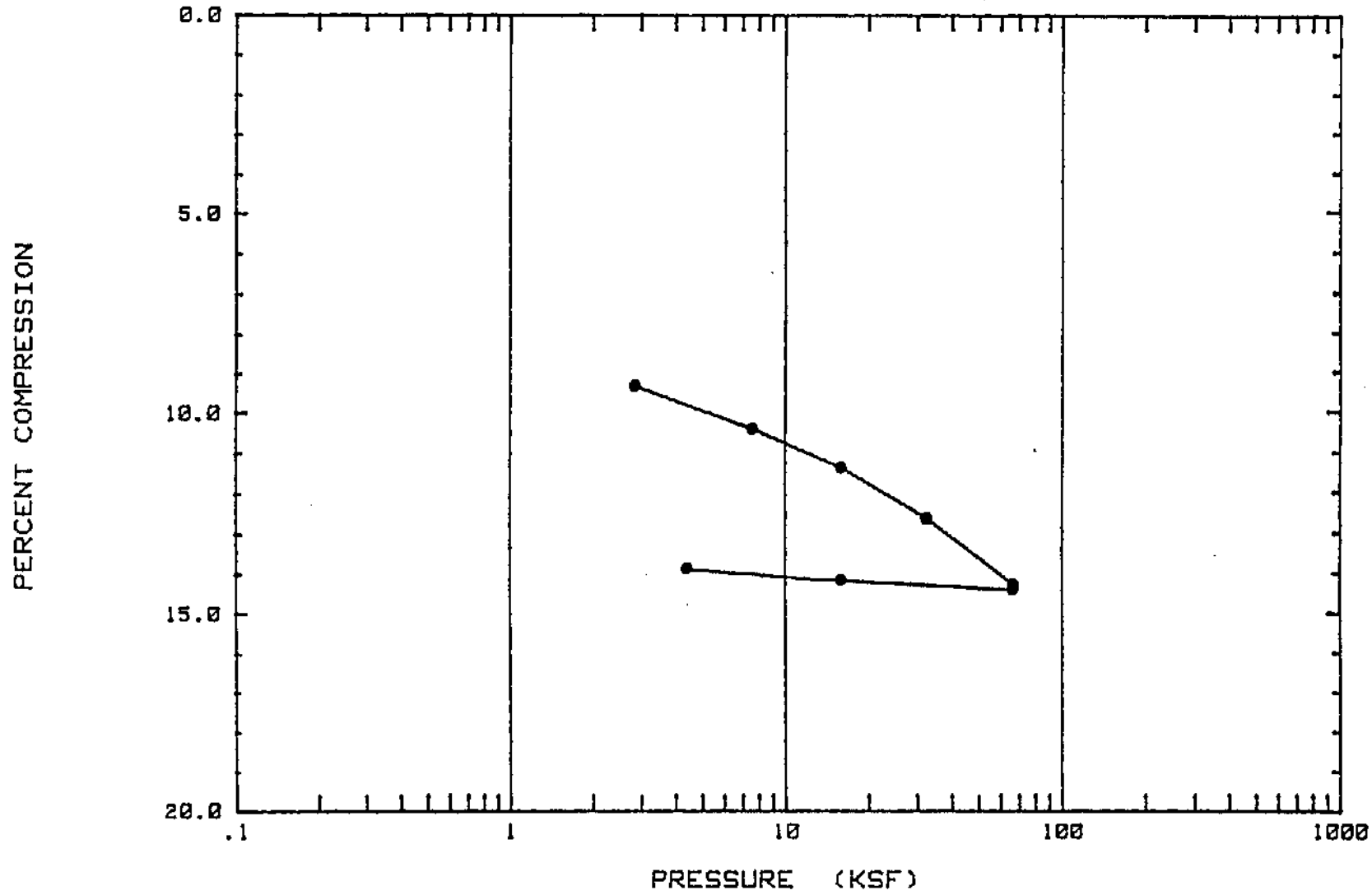
WO # A27153
FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 45.5

CLIENT : DUANE MILLER

LABORATORY # C97031



ALASKA TESTLAB

Compression Curve (%Comp. vs. Log P)

WO # A27153

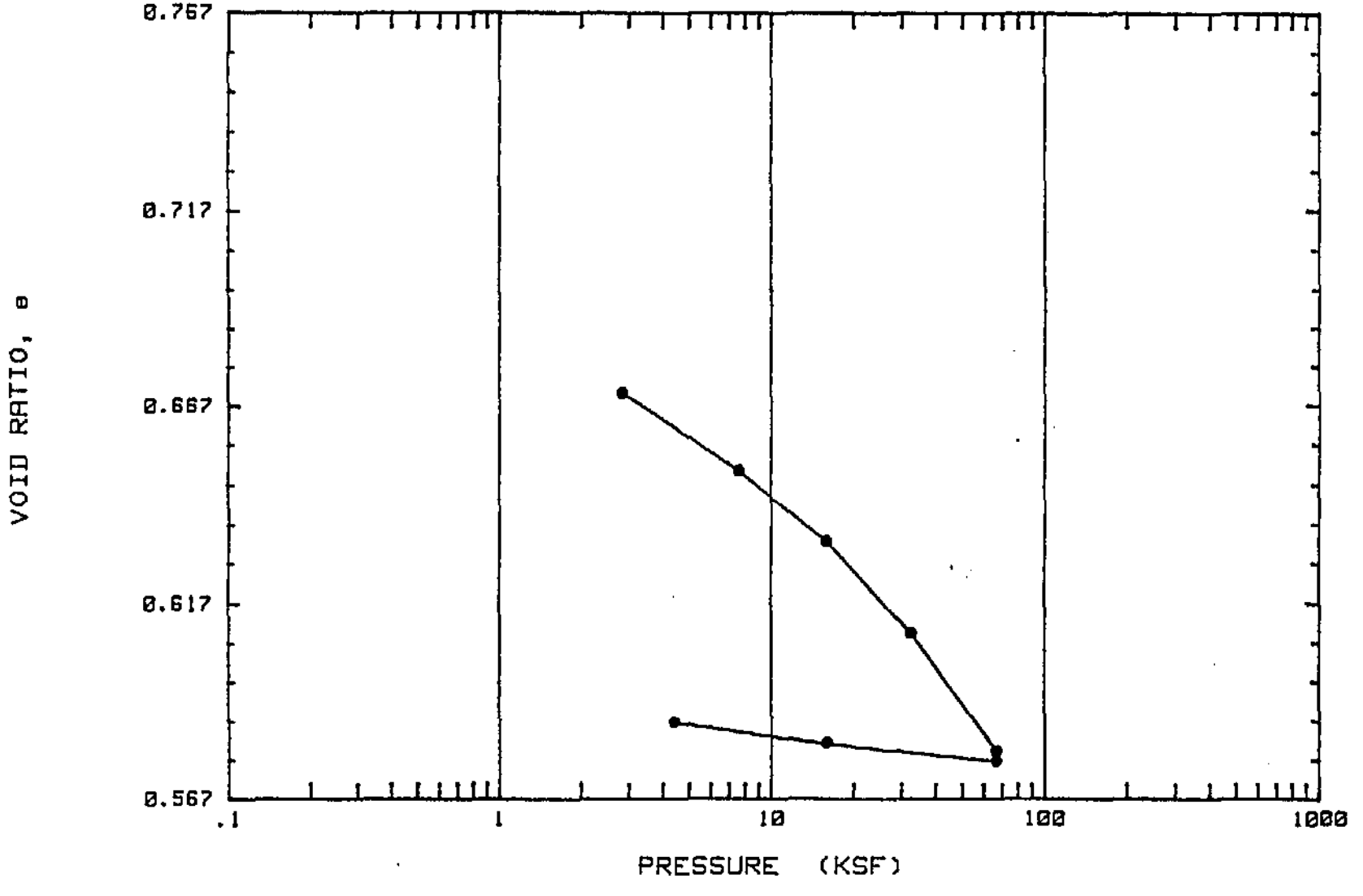
FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 45.5

CLIENT : DUANE MILLER

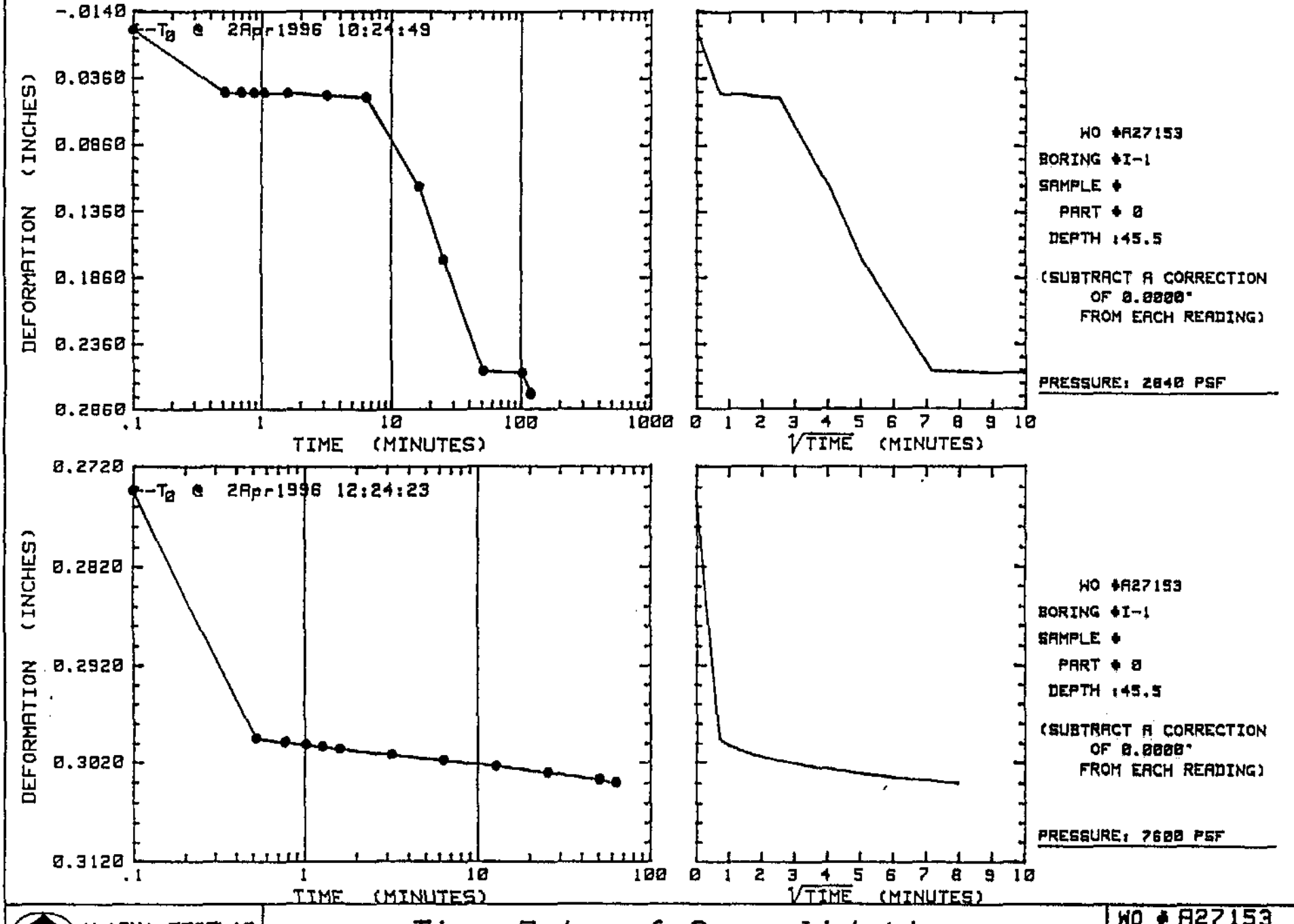
LABORATORY # C97031



ALASKA TESTLAB

Compression Curve (e vs. Log P)

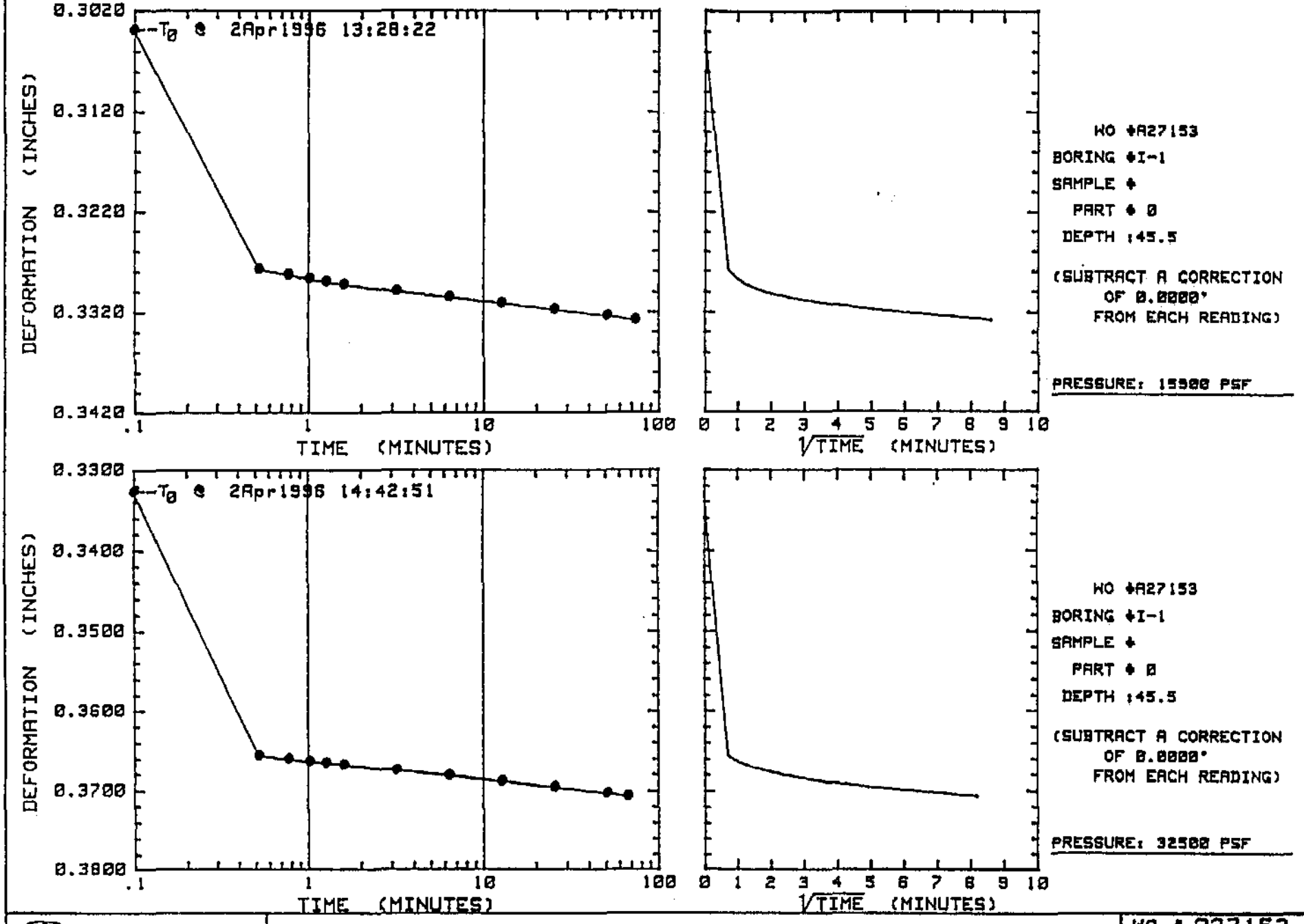
WO # A27153
FIGURE



ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153
FIGURE

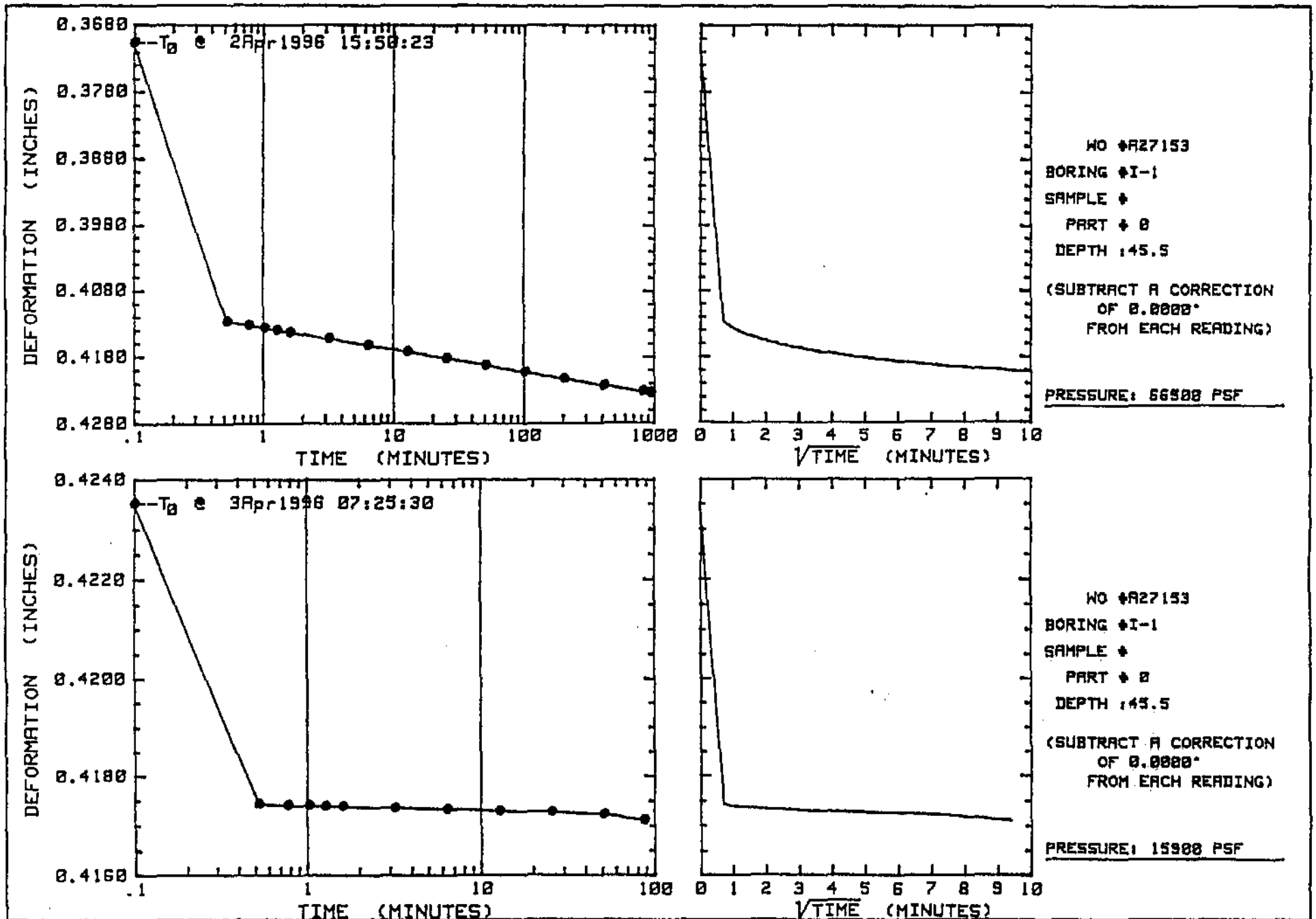


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

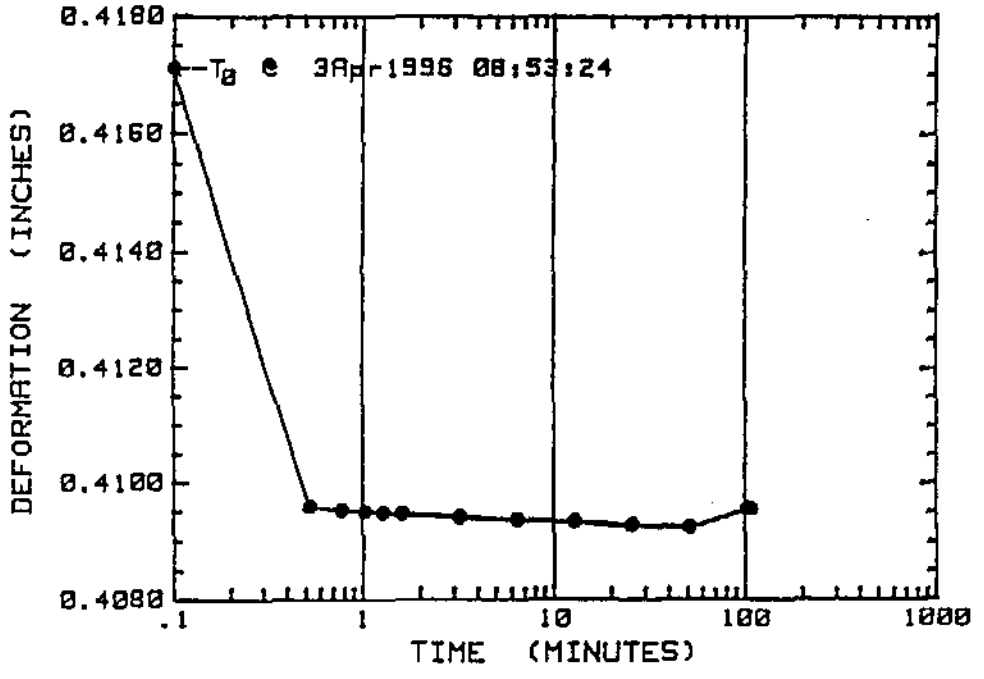


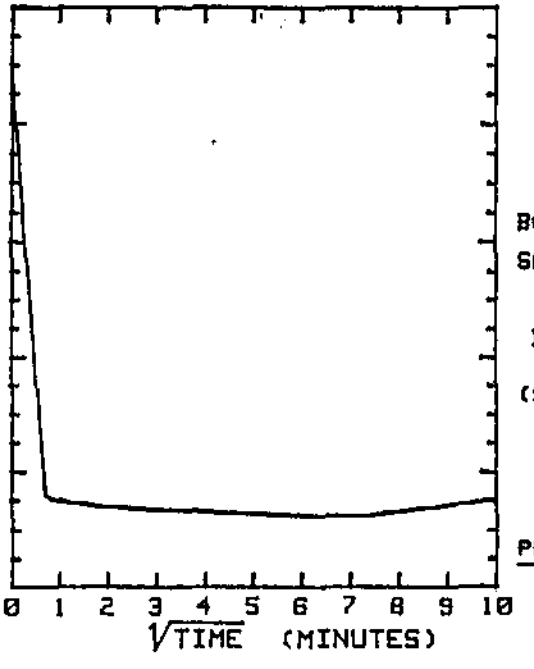
ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE





WO #A27153
BORING #I-1
SAMPLE #
PART # 0
DEPTH :45.5

(SUBTRACT A CORRECTION
OF 0.0000"
FROM EACH READING)

PRESSURE: 4400 PSF

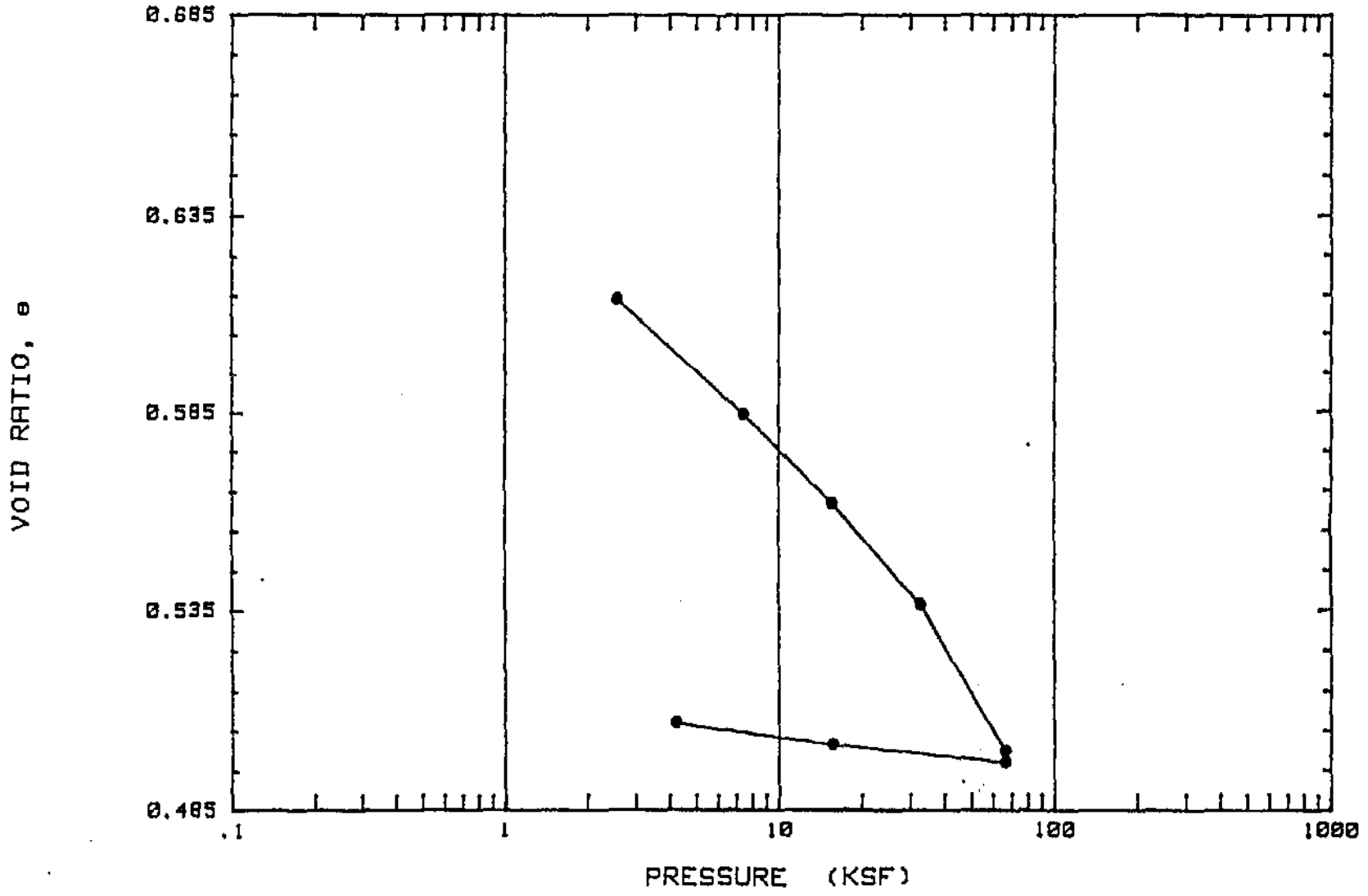
ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

PROJECT : LIBERTY
BORING # I-1
SAMPLE #

DEPTH: 46.0

CLIENT : DURNE MILLER

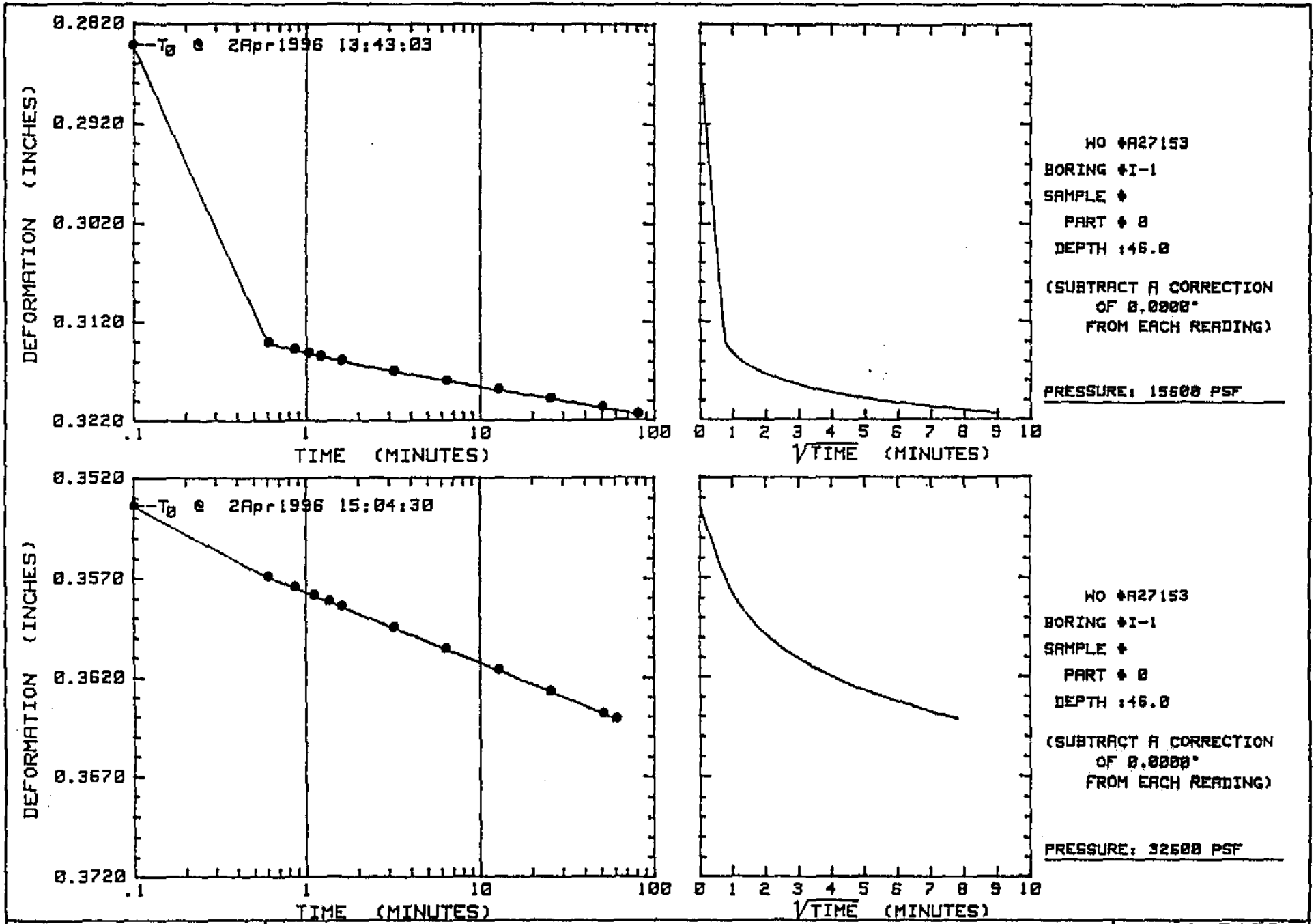
LABORATORY # C97032



ALASKA TESTLAB

Compression Curve (e vs. Log P)

WO # A27153
FIGURE

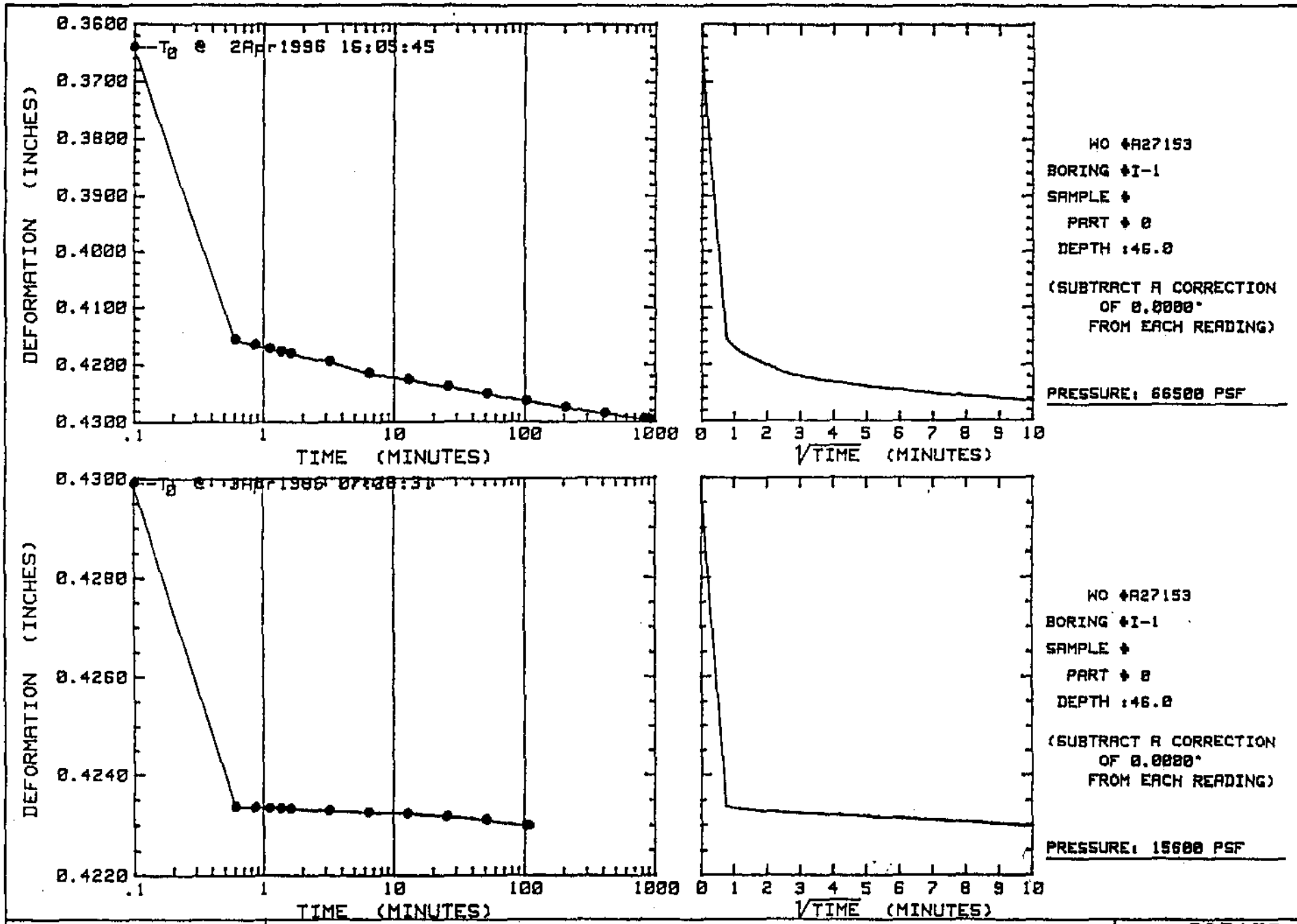


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE

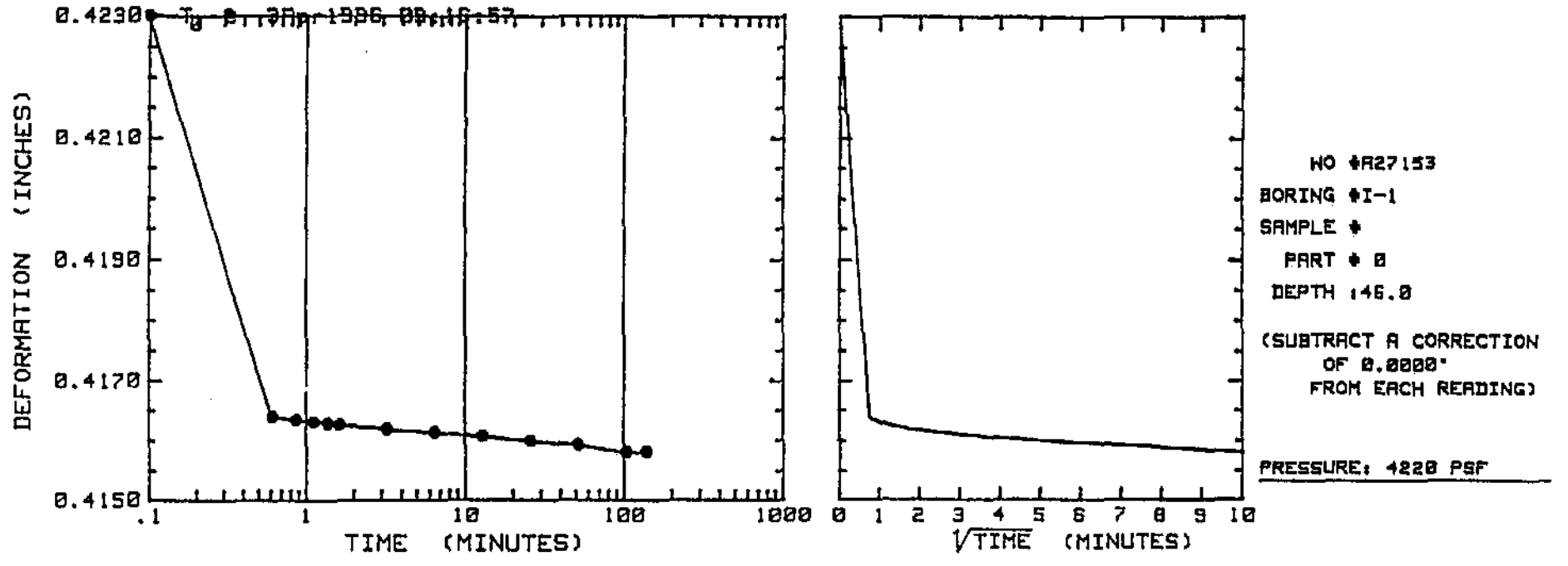


ALASKA TESTLAB

Time Rate of Consolidation

WO # A27153

FIGURE



ALASKA TESTLAB	*Time Rate of Consolidation*	WO # A27153
		FIGURE

APPENDIX F

GROUND TEMPERATURES

Project => **Liberty**
Job No. => **4119.22**

Reduction for YSI 44034 thermistor

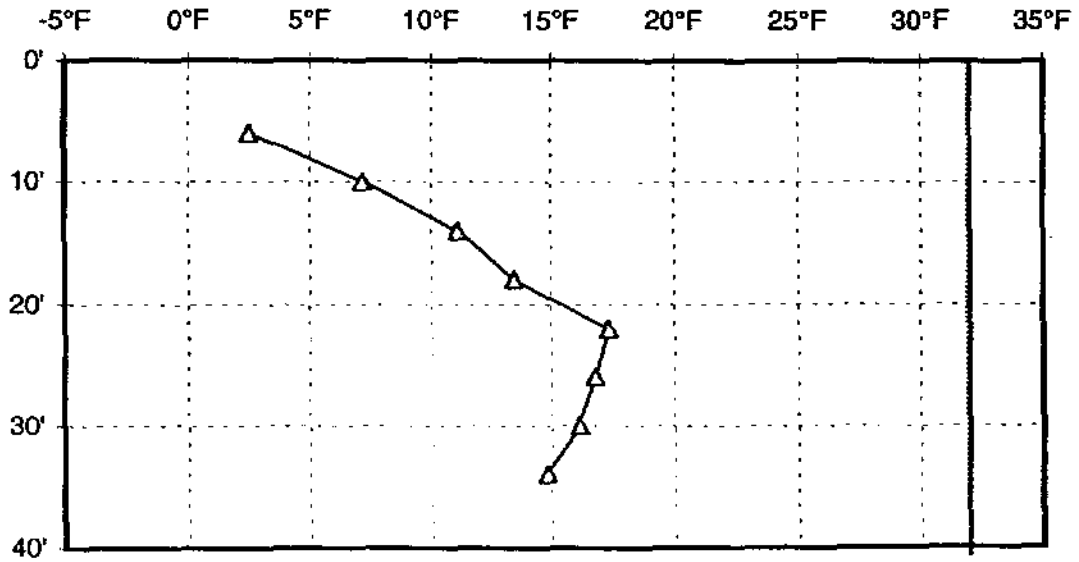
A = 0.00128
B = 0.00024
C = 9.3E-08

Boring => **A-1** Date of reading = **3/19/97** By = W. Phillips & K. Phillips

Stickup (depth of #1) => **18**

Therm #	Space (feet)	5001 Ice point	Shallow Depth K ohms	Feet	Temp
1	0	0.23°F		-18.0'	
2	4	0.36°F		-14.0'	
3	8	0.16°F	79.700	-10.0'	-19.1°F
4	12	0.11°F	78.600	-6.0'	-18.7°F
5	16	0.13°F	74.800	-2.0'	-17.2°F
6	20	0.09°F	74.400	2.0'	-17.0°F
7	24	-0.08°F	39.500	6.0'	2.5°F
8	28	0.08°F	33.980	10.0'	7.2°F
9	32	0.17°F	30.050	14.0'	11.1°F
10	36	-0.05°F	28.140	18.0'	13.5°F
11	40	0.14°F	24.910	22.0'	17.3°F
12	44	0.12°F	25.320	26.0'	16.8°F
13	48	0.15°F	25.800	30.0'	16.1°F
14	52	0.43°F	26.610	34.0'	14.8°F
15	0	0.00°F			
16	0	0.00°F			

Measured Temperatures



Project => **Liberty**
Job No. => **4119.22**

Reduction for YSI 44034 thermistc

A = 0.00128
B = 0.00024
C = 9.3E-08

Boring => **A-2** Date of reading = **3/19/97** By = M. Hendee & K. Phillips

Stickup (depth of #1) => **18**

Therm #	Space (feet)	5002 Ice point	Shallow Depth K ohms	Feet	Temp
1	0	0.12°F	68.500	-18.0'	
2	4	0.09°F	65.700	-14.0'	
3	8	0.36°F	77.300	-10.0'	
4	12	0.14°F	77.300	-6.0'	
5	16	0.05°F	68.300	-2.0'	-14.5°F
6	20	0.32°F	65.500	2.0'	-13.5°F
7	24	0.25°F	36.400	6.0'	4.8°F
8	28	0.23°F	24.300	10.0'	18.1°F
9	32	0.08°F	21.050	14.0'	23.1°F
10	36	0.08°F	19.830	18.0'	25.1°F
11	40	0.23°F	19.660	22.0'	25.3°F
12	44	0.13°F	19.470	26.0'	25.7°F
13	48	0.23°F	19.850	30.0'	25.0°F
14	52	-0.01°F	20.270	34.0'	24.5°F
15	0	0.00°F			
16	0	0.00°F			

Measured Temperatures