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NAVAL FACILITIES ENGINEERING SERVICE CENTER
Port Hueneme, California 93043-4370

Site Specific Report
SSR-2205-ENV

SITE CHARACTERIZATION AND ANALYSIS PENETROMETER SYSTEM

SITE CHARACTERIZATION
AT NAVAL SUBMARINE BASE
NEW LONDON, CONNECTICUT

FUEL FARM

by

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August 1996

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FINAL REPORT

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FUEL FARM

EXECUTIVE SUMMARY

An investigation was conducted from 24 July 1995 to 15 August 1995 at Naval Submarine Base (NSB) New London, Fuel Farm. Thirty SCAPS pushes were completed and three soil samples were collected for analysis. The objective of the SCAPS investigation was to complete pushes in areas were future investigation work was planned. The pushes were to screen for polycyclic aromatic hydrocarbon (PAH) contamination in the vicinity of underground fuel storage tanks at the NSB New London Fuel Farm. The investigation began by performing at least three pushes near each UST. The plan was to then determine the extent of contamination if encountered. SCAPS did not identify contamination from any of the USTs. Contamination emanating from the nearby Naval Exchange (NEX) gas station was identified.

The near surface geology as interpreted through the SCAPS investigation consists primarily of silty sand to sandy silt and clayey silt to silty clay.

As shown in Figure 4, the PAH contamination identified is associated with the NEX gas station.

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This report documents the Site Characterization and Analysis Penetrometer System (SCAPS) investigation of the Fuel Farm at Naval Submarine Base (NSB) New London. The investigation consisted of pushing a penetrometer probe (known as a "push") into the subsurface at locations in and around the site to determine the vertical and lateral extent of hydrocarbon contamination and soil lithology. SCAPS performed the investigation from 24 July 1995 to 15 August 1995. Thirty SCAPS pushes were completed and three soil samples were collected for analysis.

1. INTRODUCTION

1.1 Objectives

The objective of the SCAPS investigation was to complete pushes in areas where future investigation work is planned. The pushes were to screen for polycyclic aromatic hydrocarbon (PAH) contamination in the vicinity of underground fuel storage tanks at the NSB New London Fuel Farm.

1.2 Site Location

NSBNL is located in southeastern Connecticut, approximately midway between the cities of Boston and New York as shown in Figure 1. It is situated along the east bank of the Thames River, just north of the town of Groton. Long Island Sound and the Atlantic Ocean are six miles south of the base. As shown in Figure 2, the fuel farm is located at the southern end of the base and covers an area of approximately 37 acres (NEESA, 1983).

1.3 Site History

The NSBNL Fuel Farm was once an underground fuel storage facility consisting of nine concrete underground storage tanks (USTs). Each UST had a capacity of 750,000 gallons. Fuel product was delivered to a pier via barge and transported through a pipeline network to the USTs. The fuel product was then transferred via pipeline to the power plant or to submarines as needed. All the USTs have been demolished and closed in place with the exception of OT-5, which is scheduled for closure. The site is now occupied by six baseball fields and a number of parking areas. (Halliburton, 1995).

1.4 Site Geology

The near surface geology as interpreted through the SCAPS investigation consists primarily of silty sand to sandy silty and silty clay to clayey silt. See Appendix F - Raw Data for interpreted soil classification results.

Groundwater in the area of the fuel farm ranges from 2 to 6 feet below ground surface. Groundwater in the western portion of the fuel farm appears to flow from the north, east, and south toward a trough in the water table, while in the eastern portion of the fuel farm (near OT-7) the groundwater appears to flow northeast toward USTs OT-4 and OT-5. Regionally,

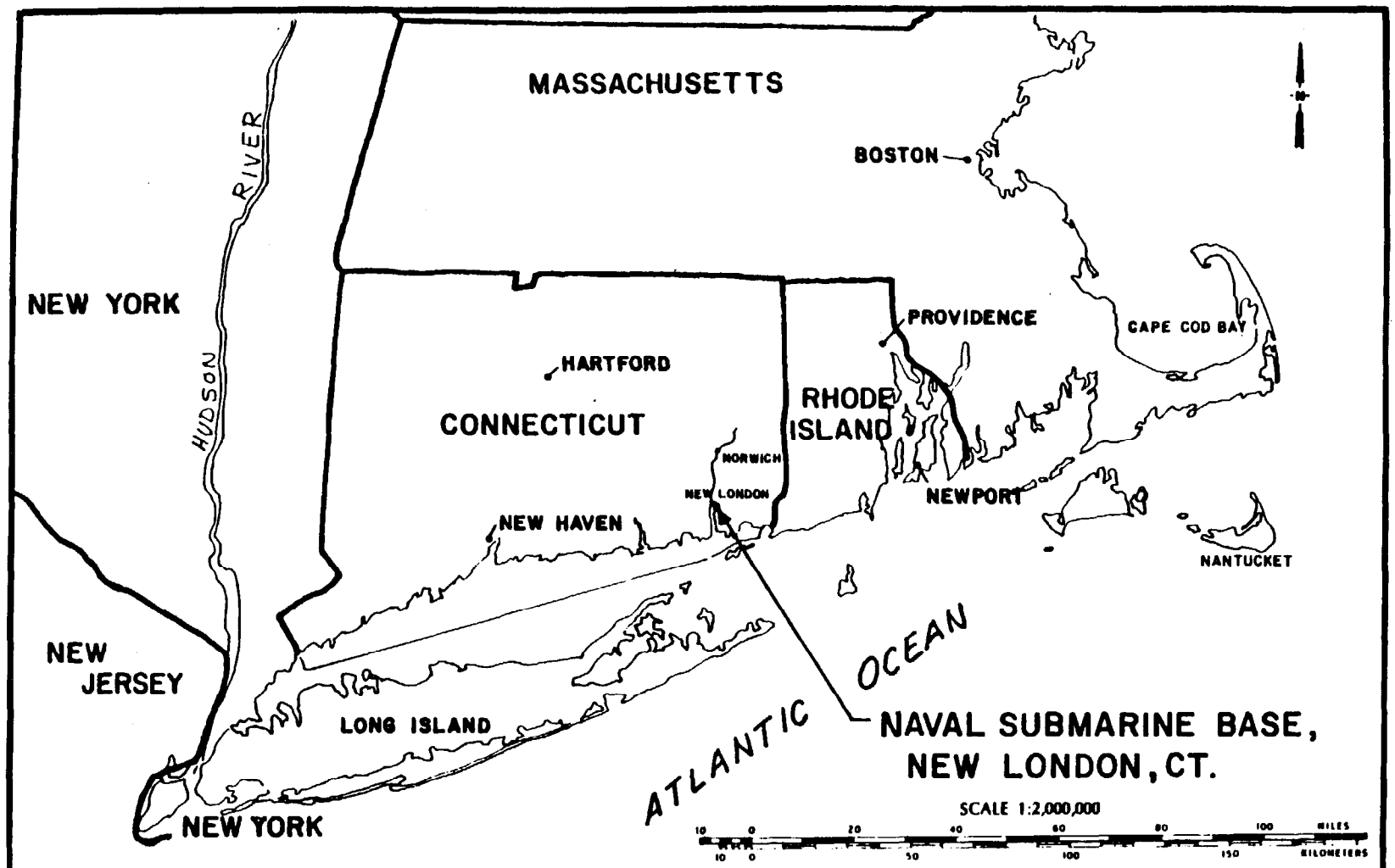


FIGURE 1

LOCATION MAP

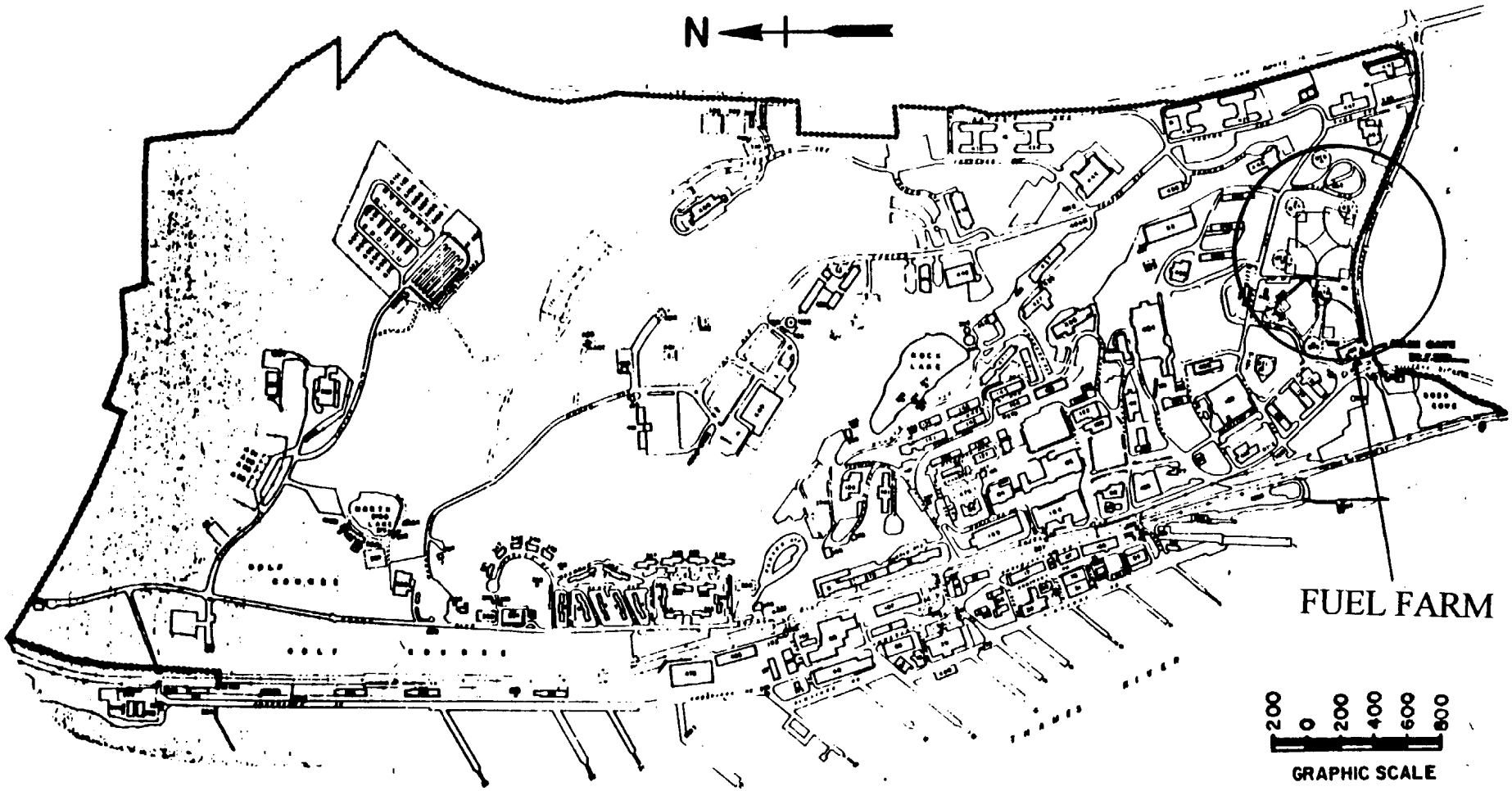


FIGURE 2

SUBMARINE BASE LAYOUT

groundwater follows topography and flows in a westward direction, discharging into the Thames River (Halliburton, 1995).

1.5 Investigation Procedure

The investigation began by performing at least three pushes near each UST. The plan was to then determine the extent of contamination if encountered.

Appendix A contains the Methods used during the investigation.

2. INTERPRETATIONS

2.1 Interpreting Laser Induced Fluorescence Data.

SCAPS is a field screening technique that detects petroleum hydrocarbons using the technique of laser induced fluorescence (LIF). SCAPS measures the presence of petroleum hydrocarbons by detecting polynuclear aromatic hydrocarbons (PAHs). PAHs are virtually found in all petroleum fuel mixtures. The PAHs fluorescence under ultra violet excitation, so that the amount of fluorescence is related to the amount of PAHs. A detailed system description is included in Appendix B.

The sensitivity of SCAPS varies with the portion of PAHs in the petroleum fuel. The present SCAPS system is most sensitive to PAHs with three or more rings like those found in heavy fuels such as diesel fuel and heating oils. The system has a reduced sensitivity to lighter fuels such as avgas, JP-5, and JP-4 which contain a smaller portion of three or more ringed PAHs.

The Laser Induced Fluorescence (LIF) system is quantitative in a known soil matrix with a known contaminant. However, when operated in the field the LIF system is semi-quantitative due to typical variations in the local soil matrix contaminant type.

SCAPS results are intended to be used to gain a better understanding of contaminant distribution while reducing the number of investigation iterations at a site. Experience has shown that the measured fluorescence intensity is a good gross indicator of the location and amount of petroleum in the soil at a site, and that the SCAPS measurements are most effective when used in conjunction with a reduced number of soil samples that provide a quantitative measurement of the amount of contamination. The SCAPS results are not intended to define the extent of contamination for regulatory purposes.

Interpretation of the LIF response is completed by performing statistical analysis of the data collected to determine the Fluorescence Threshold (FT). The statistical analysis is included in Appendix C. A responding fluorescent intensity below the FT represents the normal population of responses that is expected from a complex soil system. A responding fluorescent intensity above the FT represents a different population of responses that can be shown to represent petroleum hydrocarbon contamination. This is shown during each investigation by collecting

soil samples from ten percent of the push locations and sending the samples to contracted laboratories for total petroleum hydrocarbon analysis.

2.2 Interpolation of Laser Induced Fluorescence Data

The Groundwater Modeling System version 2.0 is used to interpolate the LIF responses to give a visual summary of SCAPS results. Interpolations are performed by bounding all data by a grid. The distance between each grid node is selected to represent the average distance between push locations. The interpolation is made by using the Inverse Distance Weighted method which uses Gradient Hyperplane Nodal Functions to determine a scalar value at the nearest grid node. Appendix C contains all assumptions used to generate the interpolation.

2.3 LIF System Output

A push profile is generated after the LIF system collects the data. All the profiles are included in Appendix D. A profile consists of six columns of information. The first three columns are cone penetrometer data that is discussed in section 2.3. The last two columns of information are LIF system results. The first of the last two columns represents the Peak Wavelength in nanometers of the responding signal. This is used real time to indicate:

- consistency with previous results
- consistency of the response with depth
- consistency with known contaminant responses from previous investigations

The second of the last two columns represents the peak Raw Fluorescent intensity of the responding signal. This is used real time to indicate:

- the magnitude of the responding signal with respect to the calibration samples
- the depth and thickness of the positive response

Responses at or near the ground surface are considered false positives since they could represent plant materials.

2.4 Cone Penetrometer Data.

As mentioned in the previous section, the push profile consists of six columns of information. The first three columns are cone penetrometer data results. The first of the three columns represents the cone pressure in tons per square foot (tsf). The cone pressure measurement, q_c, is recorded with a Wheatstone bridge strain gauge in terms of the voltage and converted to bearing pressure expressed as tons/ft^2 (tsf). Results may be used in geotechnical design or along with sleeve friction to determine soil classification. The cone resistance is a measure of the grain-to-

grain skeleton strength for sands and silts. Further advancement of the probe is stopped if this measurement exceeds 1000 tsf at any time during the push.

The second of the first three columns represents the sleeve friction in tons per square foot (tsf). The sleeve friction resistance, f_g, is the resistance of the soil as it slides past the friction sleeve. Further advancement of the probe is stopped if this measurement exceeds 8 tsf at any time during the push.

The third column represents the soil classification as a number between 1 and 12. This is determined from the ratio of cone pressure and sleeve friction. Appendix D contains the chart that is used to convert the number to a soil classification type.

Techniques for using the soil strength measurements (cone pressure and sleeve friction) made with the cone penetrometer to determine soil type have been well-documented (Olsen and Farr, 1986). The classification scheme used by the SCAPS was devised by Robertson and Campanella (1989) to identify the types of soils encountered by cone penetrometer probes. For a detailed description of the output interpretation see Roberston and Campanella (1989), "Guidelines for Geotechnical Design Using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Hogentogler & Co., Inc., Columbia, MD.

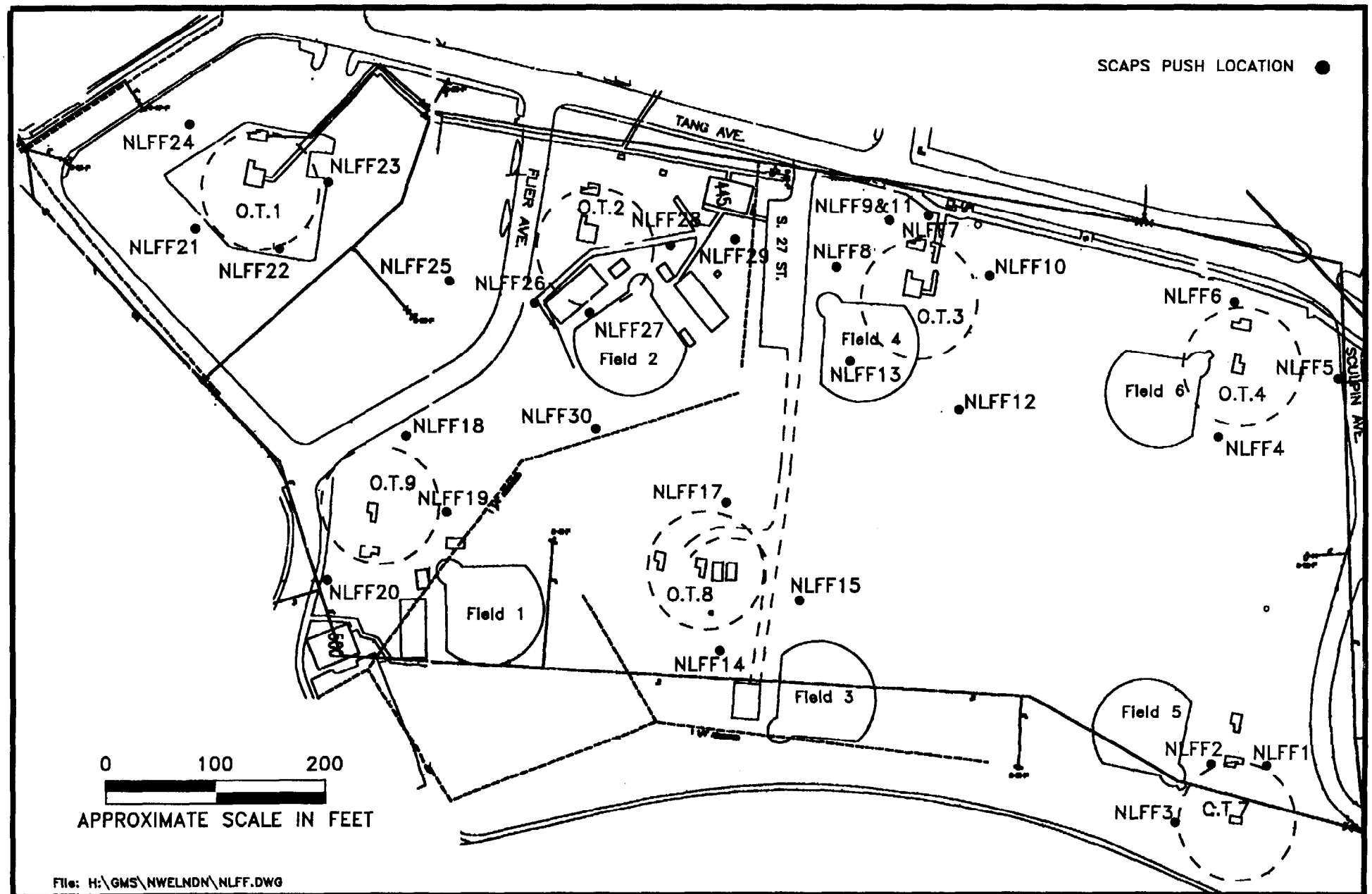
SCAPS standard electrical cone penetrometer instrumentation consists of strain gauges measuring cone pressure and sleeve friction in accordance with American Society of Testing and Materials (ASTM) Standard D3441. The probe does not fully conform to ASTM standard because the diameter changes less than one foot above the friction sleeve.

3. RESULTS

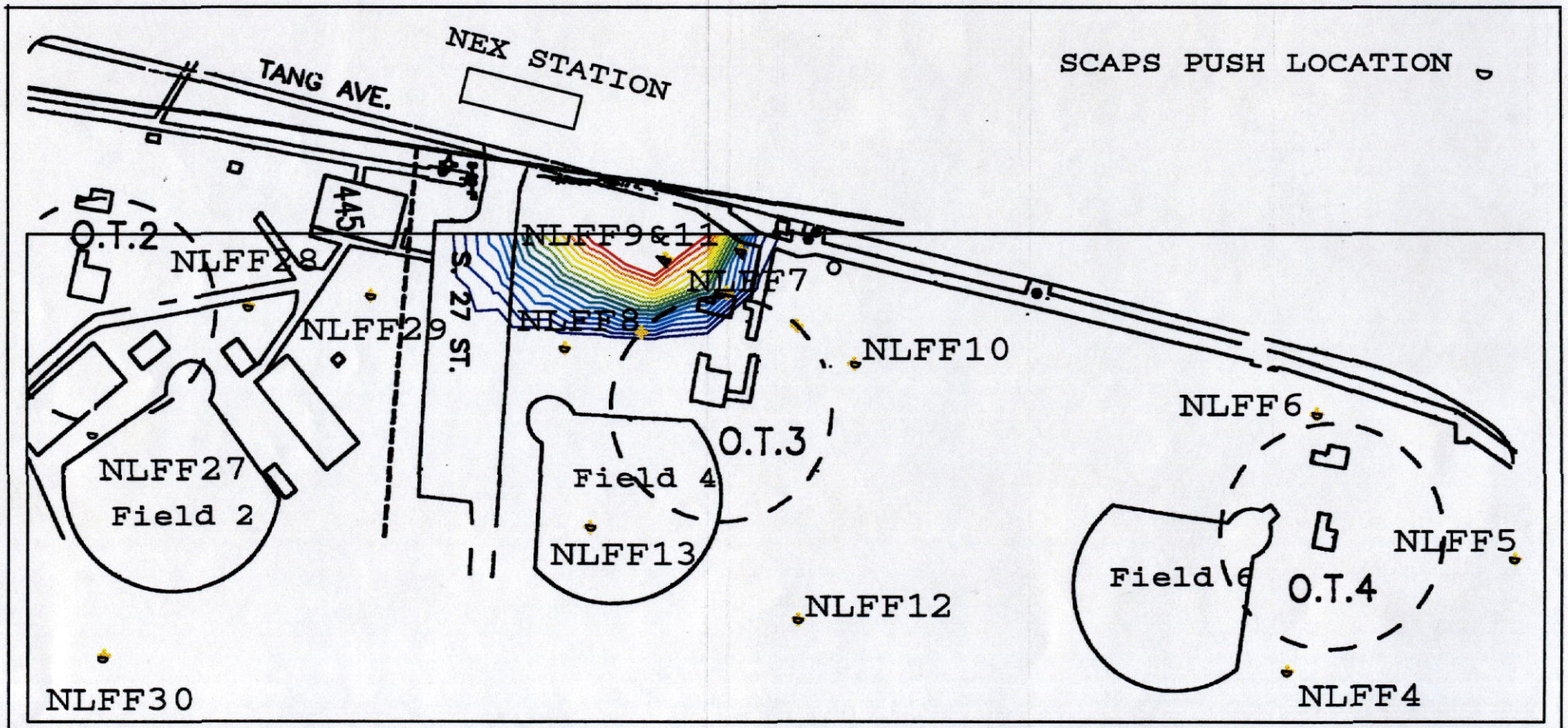
Figure 3 shows the push locations completed at the Fuel Farm. Figure 4 is an interpolation of the interpreted results. The raw SCAPS results are in Appendix E.

As shown in Figure 4, the majority of the PAH contamination is down-gradient of the existing NEX gas station. The red contours indicate the highest fluorescent intensity followed by yellow, green, and blue. SCAPS did not identify PAH contamination in the push holes near the USTs, except at OT-3. The contamination identified at OT-3 is suspected to be from the nearby NEX gas station.

The soil samples collected from push holes NLFF11, NLFF17, and NLFF29 confirm the SCAPS findings. Based on the Fluorescent Threshold of 6973 counts as determined in Appendix C, the corresponding (part per million) Total Recoverable Petroleum Hydrocarbon equivalent is approximately 20 ppm.



FUEL FARM	Figure 3 – SCAPS PUSH LOCATIONS	SCAPS INVESTIGATION NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNETICUT



FUEL FARM	**Figure 4 - SCAPS Intensity Results at approximately 6.5 feet bgs**	SCAPS INVESTIGATION NAVAL SUBMARINE BASE NEW LONDON GROTON, CONNETICUT

Note: The red contours indicate the highest fluorescent intensity followed by yellow, green, and blue.

0097501Y

REFERENCES

Halliburton NUS Corporation, 1995: "Work Plan for Tank Farm Investigation for Naval Submarine Base New London, Groton, Connecticut."

Olsen and Farr, 1986: "Site Characterization Using the Cone Penetrometer Test." Proceedings of the ASCE Conference on the Use of In-Situ Testing in Geotechnical Engineering. American Society of Civil Engineers, New York, N.Y.

NEESA 13-025, 1983: "Initial Assessment Study of Naval Submarine Base New London, Connecticut". Naval Energy and Environmental Support Activity.

APPENDIX A - METHODS

A.1 Permits.

A permit to excavate was issued by the Public Works Office at the Subase. The permit is included at the of this Appendix. No permits were required to complete or abandon push holes.

A.2 Push Hole Clearance.

Ground Penetrating Radar (GSSI Sir System 2) and a magnetic induction pipeline locator were used to check each push location for the presence of buried objects or utilities. The hole clearance records are included at the end of this Appendix.

A.3 Surveying.

Push locations were determined by triangulation of bearings from stationary monuments. The surveying records are included at the end of this Appendix. The push hole coordinate was determined after each push hole was located on the Existing Diesel Oil drawing. The push hole coordinates are included at the end of this Appendix.

A.4 Grouting.

A grout tube is attached to the tip of the SCAPS probe. Following the data collection activities for each push, the attached grout pump is used to force grout to fill the hole as the probe is withdrawn. The grouting process consists of initially pumping approximately one gallon of water down the grout tube to force a sacrificial tip off the end of the SCAPS probe. Once the tip is removed a grout mixture of 15 lbs of Portland Cement, 1 lb Bentonite and 4 gallons of water per 10 feet of push hole is pumped at a rate equal to the SCAPS probe withdrawal rate. A constant pressure is maintained on the grout tube as the probe is withdrawn. Grout flow is monitored to identify any blockage of the tubing.

A.5 Decontamination.

All sampling and data collection devices coming in contact with potentially contaminated materials were decontaminated in accordance with ASTM 5088, Practice for Decontamination of Field Equipment Used at Non-radioactive Waste Sites.

Upon completion of push operations for penetration and fluoroscopic tests, the push rod and probe are cleaned as they are withdrawn using pressurized hot water. The hot water (140 degree Fahrenheit) is flushed through a cleaning collar at 150 psi (connected to a hot water storage system which contains all wash fluids) located beneath the truck.

A.6 Investigative Derived Waste.

All decontamination water was collected into 55-gallon drums for analysis and proper disposal. Two 55-gallon drums of Investigative derived waste (IDW) water were generated during the investigation. The drums were left on a pallet near the Public Works Building 125. Northern Division, Naval Facilities Engineering Command has the responsibility for the analysis and disposal of the two IDW drums.

IDW was generated during operation of the CPT system. Types of waste produced include: 1) wash water from rod decontamination operations, 2) solidified grout, and 3) wash water from grouting equipment cleanup. IDW was placed in 55-gallon drums, labeled, and stored on pallets at the site.

The decontamination wastewater was expected to contain traces of petroleum hydrocarbons and suspended solids. Although the wash water is not expected to meet hazardous classification as defined in RCRA, the material was containerized, labeled, and stored at the SCAPS staging area.

The solidified grout consists of hydrated cement with a small amount of non-hazardous admixture (bentonite and Sikament). Grouting cleanup wash water consists of potable water with small amounts of cement particles and cement sludge. The wash water was disposed of on-site in accordance with the California Stormwater Best Management Practice Handbook.

A.7 Collection and Analysis of Samples.

Three soil samples were collected during the investigation. The soil samples were collected from holes within twelve inches of the SCAPS push hole, and at depths that correspond to LIF results. A MOSTAP soil sampler was used to collect each soil sample.

The soil samples were analyzed by a PWC Jacksonville contracted. The chain-of-custody records and analysis are given at the end of this Appendix. The sample depths and corresponding SCAPS results are given in Appendix F.

Permits

9562

SOPA(ADMIN) NLON
INST 6280.2

REQUEST FOR PERMIT TO EXCAVATE

Date: 7/28/95

From: US Navy - Jacksonville Public Works
To: Public Works Engineering Division

Subj: REQUEST FOR EXCAVATION PERMIT PURSUANT TO _____

1. Purpose of Excavation: SCAPS environmental investigation

2. Time and Date of Excavation: 7-28/8-15 1995

3. Description of Excavation (attach sketch/plan):
core penetrometer - 1½" DIA probe pushed 20-30 feet into the ground

Location - old fuel oil tank site (baseball fields)

4. Other Pertinent Information: Sub Base POC - Bob Brown #5191

[signature] Project Engineer
cellular - (904) 571-9087 Signature, title and phone extension

---

Date: 7/28/95

From: Public Works Division
To: U.S. Navy Jacksonville Public Works

1. [✓] Approved.

2. [ ] Approved, subject to the following changes: _____

3. [ ] Disapproved, due to the following reason(s): _____

4. Comments and other action required: _____

Mark W. Schutz x4483
Signature, title and phone extension

Copy to:
850
860

SBNI PWD 6280/2 (3-86)

Tab A to
Chapter 2

9562

Push Hole Clearance Records

SCAPS GPR SURVEY

* HOLES 1 – 43 HAVE BEEN SAVED TO BERNOULLI DISK PRIOR TO 8-8-95

SITE GPR SURVEY INFORMATION:

SCAPS file Hole #	GPR File #'s	GPR Pull (N-S/E-W)	Remarks
NLF-[illegible]	[illegible]	[illegible]	[illegible] OK
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	N-S	
[illegible]	[illegible]	E-W	
[illegible]	[illegible]	[illegible]	
[illegible]	356	W-E	
[illegible]	454	S-N	[illegible] tank is visible
[illegible]	455	E-W	
[illegible]	453	N-S	
[illegible]	452	E-W	tank is visible
[illegible]	472	N-S	[illegible]
[illegible]	471	E-W	[illegible] OK [illegible]
[illegible]	(470-411) ?		[illegible]
[illegible]	"		[illegible]
08	"		[illegible]
09	"		OK
09	[illegible]	S-N	OK
09	1013	[illegible]	[illegible]
10	[illegible]	?	
10			
10	510	W-E	OK; tank visible
10	511	N-S	OK
10*	512	W-E	actual junk spot, 1½' W of target
10*	513	N-S	OK " " "

SCAPS GPR SURVEY

SITE GPR SURVEY INFORMATION:

SCAPS file Hole #	GPR File #'s	GPR Pull (N-S/E-W)	Remarks
#11	468	N-S	RE PUSH NEAR HOLE #9
#11	469	W-E	THIS HOLE HAD SUSPECTED PROBE PRODUCT. NEW LASER PROBE TEST.
#12	470	N-S	IRREGULAR TO 3.3M, CLEAR BEYOND
#12	471		IRREGULAR TO 3.3M SUSPECT COBBLE FILL
#12	472	SE-NW	IRREGULAR SURFACE TO 2.2M.
#13	473	N-S	SHADOWS N. OF MARK
#13	474	E-W	SHADOWS PRIOR TOO, ON PAST MARK * MOVING MARK.
#5		N-S	RELOCATED APPROX 5' SW OF ORIGINAL MARK
		E-W	
#13	475	N-S	
#13	476	E-W	
#14	477	N-S	SHADOW PRIOR TO MARK, POSSIBLE TANK
#14	478	E-W	SHADOW - POSSIBLE ERROR PULL by RADAR LITTER ON CONS.
#14	479	E-W	REPEAT, APPEARS CLEAR
#15	480	N-S	ROUGH TO 2.3M, HOMOGENEOUS 3.3 & DEEPER.
#15	481	E-W	CLEAR
#16	482	N-S	ROUGH UPPER SURFACE APPEARANCE
#16	483	W-E	DIDN'T RECORD
#16	484	E-W	ROUGH UPPER SURFACE APPEARANCE

SCAPS GPR SURVEY

SITE GPR SURVEY INFORMATION:

SCAPS file Hole #	GPR File #'s	GPR Pull (N-S/E-W)	Remarks
#16	485	E-W	PULL PAST ORIGINAL JOB, LOOKING FOR
#16	486	E-W	CLEARER AREA
#16	487	S-N	CLEAR AREA
#17	488	N-S	SIGNATURE OF SOMETHING BELOW 2.2M, EDGE MARK
#17	489	E-W	APPEARS CLEAR
#18	490	E-W	OBSTRUCTIONS, CLEAR ON MARK
#18	491	S-N	SHADOW ON MARK, MOVED MARK 2' N
#19	492	W-E	POSSIBLE SHADOWS, ~~OTHER~~ FOUNDATION TANK 9
#19	493	W-E	REPOH I.D. TANK EDGE, LOCATED CLEAR HOLE
#19	494	N-S	CLEAR ON MARK
#20	495	N-S	LONG POH TO LOCATE TANK EDGE LOCATED. POSSIBLE EDGE OF TANK FOUND CLEAR MARK
#20	496	E-W	SURFACE TO 2.2M ROUGH CLEAR HOLE
#21	497	N-S	CLEAR
#21	498	E-W	CLEAR
~~#22~~ HOLE	~~499~~	~~N-S~~	~~CLEAR~~
~~#22~~	~~500~~	~~SE-NW~~	~~SHADOW, POSSIBLE CAVE, DEFORMATION IN SURFACE~~
#22	501	N-S	OBSTRUCTION ON MARK
#22	502	W-E	APPEAR TO BE CLEAR
#22	503	N-S	ROUGH FILL TO DEPTH 6M

SCAPS GPR SURVEY

SITE GPR SURVEY INFORMATION:

SCAPS file Hole #	GPR File #'s	GPR Pull (N-S/E-W)	Remarks
#23	504	N-S	CLEAR HOLES, MARKED UTILITIES
#23	505	E-W	CLEAR
#24	506	N-S	SHADOW UNDER MARK MOVED 3'SE
#24	507	E-W	SHADOW UNDER MARK 3'SE
25	508	N-S	Single hit at proposed location
25	509	E-W	Signal over entire profile
25	510	N-S	Clear
25	511	E-W	Between two hits.
#26	512	E-W	Bad / moved to new location
26	513	E-W	APPARENT HIT ON MARK > MOVED 3' NE
26	514	S-N	HIT ON MARK
26	515	S-N	DISTURBANCE PRIOR TO MARK ISD STEEL IS GRAVEL
26	516	E-W	DIST (MOVING APPROX 100' N)
26	517	S-N	Fill / in tank, move to West
26	518	E-W	Fill / in tank, move to West
26	519	S-N	clean
26	520	W-E	Clean
27	521	E-W	clean / Located in clean area
27	522	N-S	Clean

SCAPS GPR SURVEY

SITE GPR SURVEY INFORMATION:

SCAPS file Hole #	GPR File #'s	GPR Pull (N-S/E-W)	Remarks
#28	525	S-N	SHADOW POSSIBLY LOCATED ELECTRIC POWER
#23	523	?	CLEARED HOLE #23 AFTER FISH
#23	524	?	WENT TO RETRIEAV.
#28	526	E-W	LOCATING POWER (ELECTRIC)
#28	527	W-E	LOCATING POWER
#28	528		NO GOOD / PASI FILE
#28	529	W-E	LOCATING ELE ADJUSTED GAINS
#28	530	S-N	CLEAR, NO MARK
29	531	E-W	Unable to locate pipeline
29	532	E-W	"
29	533	E-W	"
29	534	S-N	"
30	535	E-W	Locate Drainage Box
30	536	S-N	"
30	537	S-N	Clear.

APPENDIX A - METHODS

Surveying Records

SCAPS
FIELD SURVEY FORM

DATE: 8-11-95
PROJECT#: NEW LONDON SUB BASE

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	Fire Hydrant (Eller AVE) Between OT1 & OT2	N/A 3-29-1F
(BM #2)	Fire Hydrant @ Tank Ave " OT1 & McDonald	N/A 3-27-F
(BM #3)	Fire Hydrant Next to Bldg 137	N/A 3-25-1F
(BM #4)		
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 3 (BM #1, BM #2, etc) bearing to BENCH MARK #1 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From BENCH MARK #3 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	5 #21	6 #22	3 #23	4 #24	2 #25	1 #26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)	304°	335°	325°	285.5°	353.5°	358°				
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19,

DATE: 7-30-95
PROJECT#: NEW LONDON SUB BASE FUELTANK

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	ELECTRIC VAULT (78E) CONC.	78E
(BM #2)	FIRE PLUG BTWN FIELDS 3 & 5	N/A, 3-31-F
(BM #3)	TRANSFORMER SWITCH STEIN 3&6	
(BM #4)		
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # BM #2 (BM #1, BM #2, etc) bearing to BM #1 (BM #, Building, Tower, Mag. North, etc) in relative degrees 0 (Mag. North - N/A)

Survey From BM #2 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)	094.0	093.5	113.0	035.0	043.0	028.0	355.0	344.5	351.0	001.0
DISTANCE (Feet)	N/A									

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)	351°	355.2°	342.3°	297.8°	314°	Refuge	317.8°	303°	298.5°	
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)							321.2	330.8		
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 7-30-95
PROJECT#: NEW LONDON SUB BASE FUEL FARM

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	ELECTRIC VAULT (78 E) CONC.	78 E
(BM #2)	FIRE PLUG, BTWN FIELDS 3 & 5	N/A 3-31-F
(BM #3)	TRANSFORMER SWETH ST. BTWN 5 & 6	
(BM #4)		
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # BM#1 (BM #1, BM #2, etc) bearing to BM#2 (BM #, Building, Tower, Mag. North, etc) in relative degrees 0 (Mag. North - N/A)

Survey From BM#1 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)	336.5	341.0	346.0	316.0	298.0	292.0	105.0	080.0	098.0	352.0
DISTANCE (Feet)	N/A									

8-11-95

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)	98°	11°	50°	38°	32°	Refusal	49°	75°	67°	66°
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)							* CANT SEE	91.6°		
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 7-30-95 F1-E,0 8/1/95 F1-#38
PROJECT#: NLFF

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	ELECTRIC VAULT (78 E) CONC.	78 E
(BM #2)	FIRE PLUG BTWN FIELDS 3 & 5	N/A 3-31-5
(BM #3)	TRANSFORMER SWITCH ST. BTWN 5 & 6	
(BM #4)		
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # BM #3 (BM #1, BM #2, etc) bearing to BM #1 (BM #, Building, Tower, Mag. North, etc) in relative degrees 0 (Mag. North - N/A)

Survey From BM #3 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)	216.0	231.0	236.5	022.0	061.0	033.5	356.0	345.0	352.5	357.5
DISTANCE (Feet)	N/A									

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)	352.5°	339°	337°	301.2°	306.5°	REFUSAL	317°	317.8°	312.5°	309
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)							330°	33[illegible]		
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 8-11-95
PROJECT#: New London Sub Base

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks	
(BM #1)	Fire Hydrant at Flier Ave Betw. OT1 & OT2	N/A	3-28-F
(BM #2)	Fire Hydrant @ TANG Ave Between OT1 & McDonald's	N/A	3-29-F
(BM #3)	Fire Hydrant next to Bldg 139		3-25-F
(BM #4)			
(BM#5)			

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 1 (BM #1, BM #2, etc) bearing to Bench Mark #2 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From Bench Mark 1 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	5 #21	6 #22	3 #23	4 #24	2 #25	1 #26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)	244°	319	20°	3°	99°	136°				
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 8-11-95
PROJECT#: NEW LONDON SUB BASE

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks	
(BM #1)	Fire Hydrant @ Elier AVE. Between OT1 & OT2	N/A	3-23-15
(BM #2)	Fire Hydrant @ Tank Ave Between OT1 & McDonald's	N/A	3-24-15
(BM #3)	Fire Hydrant @ Bldg 137	N/A	3-25-15
(BM #4)			
(BM#5)			

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 2 (BM #1, BM #2, etc) bearing to Benchmark #1 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From Benchmark #2 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)	29.5°	8.7°	344.7°	341°	352°	344°				
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 13 AUG 95
PROJECT#: NEW LONDON SUB BASE

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks	
(BM #1)	Fire Hydrant Between OT1 & OT2 Lot	N/A	3-28-F
(BM #2)	Fire Hydrant ON Tang Ave Across from Commissary Store	N/A	3-29-F
(BM #3)	ELECTRIC VAULT 78E (CONC)	78E	73E
(BM #4)			
(BM#5)			

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 1 (BM #1, BM #2, etc) bearing to Bench Mark 2 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From BENCH MARK 1 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)									69°	113.7°
DISTANCE (Feet)										

SCAPS
FIELD SURVEY FORM

DATE: 13 Aug 95
PROJECT#: NEW LONDON SUB BASE

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	Fire hydrant Between OT1 & OT2 IN Parking Lot	N/A 3-28-E
(BM #2)	Fire hydrant on Tank Ave Across Fm Commissary	N/A 3-28-E
(BM #3)	ELECTRIC VAULT 78E (CONC)	78E
(BM #4)		
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 2 (BM #1, BM #2, etc) bearing to Bench Mark 1 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From BENCH MARK 2 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)									292°	38-E
DISTANCE (Feet)										

NA

SCAPS
FIELD SURVEY FORM

DATE: 13 Aug 95
PROJECT#: NEW LONDON Sup BASE

BENCHMARKS:

	Description of Benchmarks	I. D. on Benchmarks
(BM #1)	Fire Hydrant BETWEEN DT1 & DT2 in Parking Lot	N/A 7-28-F
(BM #2)	Fire Hydrant on Tank Aque Across fm Commissary	N/A 3-99-F
(BM #3)	Electric Vault 78E CONC	78E
(BM #4)	Fire Hydrant BETWEEN Fields 3 & 5 Next to Track	N/A
(BM#5)		

*Description of Benchmarks - Monitoring Wells, Survey stakes, Telephone Poles etc..
*Identifiaction of benchmarks - Markings, symbols, etc..

Special Notes regarding Benchmarks & Survey:

SURVEY:

Benchmark Orientation

Benchmark # 3 (BM #1, BM #2, etc) bearing to Benchmark 1 (BM #, Building, Tower, Mag. North, etc) in relative degrees Ø (Mag. North - N/A)

Survey From Benchmark 3 to Project Push Location #'s:

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
BEARING (Relative, actual for Mag.)										
DISTANCE (Feet)										

	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
BEARING (Relative, actual for Mag.)									[illegible]	67°
DISTANCE (Feet)										

Newlandon — 2/21/96 by Ted Carter

	Easting	Northing
1	782[illegible]	2[illegible]
2	782[illegible]	2[illegible]
3	782[illegible]	203865.7
4	782[illegible]	2[illegible]
5	782[illegible]	203273.98
6	782934.[illegible]	203[illegible]3.05
7	782[illegible]	203421.23
8	782[illegible]	203374.6
9	782[illegible]	2[illegible]
10	782[illegible]	203[illegible]
11	same as 9	same as 9
12	782683.[illegible]	203[illegible]44.[illegible]
13	782532.87	203299.06
14	782467.[illegible]5	203025.41
15	782536.[illegible]2	203[illegible]
16	Re[illegible]	
17	782468.67	203158.39
18	782[illegible]	2[illegible]
19	782211.05	203154.98
20	782161.26	203099.27
21	781982.[illegible]5	203409.66
22	782058.82	203371.78
23	782103.36	203451.35
24	781[illegible]44	203505.7[illegible]
25	782[illegible]13.86	203362.33
26	782[illegible]	203342.35
27	782341.85	203333.58
28	782417.66	203394.58
29	782476.14	203394.[illegible]
30	782347.85	203227.70

Chain of Custody and Sample Analysis Records

CHAIN OF CUSTODY RECORD

NAVY PUBLIC WORKS CENTER JACKSONVILLE
ATTN: CODE 330 (ENVIRONMENTAL LABORATORY)
JACKSONVILLE, FL 32212-0030

PROJECT # _____ CONTRACT #: _____

D.O.# _____ CALL# _____ COLLECTED BY: Jeff Naro

LABORATORY: _____ PHONE: _____

ADDRESS: _____ FAX: _____

SAMPLE ID #	DATE	TIME	COMP	GRAB	WELL	SAMPLE LOCATION	SAMP.COMP	PH	TEMP	#CONT	REMARKS / TESTS REQUIRED	CONTAINER TYPE / PRESERVAT: 40ml VOC -
NLFF-17B	8/12/95	1310		X		NEW LONDON Fuel Farm	Solid	N/A	N/A	3	418.1	3
NLFF-11B	8/12/95	1240		X		NEW LONDON Fuel FARM	Solid			3	418.1	3
NLFF-29B	8/12/95	1014		X		NEW LONDON FUEL FARM	Solid			3	418.1	3

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
[signature]	8-15-95	13:29	[signature]
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY LAB BY:

REMARKS:

PWCENVLAB FORM-12 DTD 11-22-93

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Navy Public Works Center
Project: 50484 / Call # 00012
Sample Matrix: Soil

Service Request: J950694
Date Collected: 8/12/95
Date Received: 9/7/95
Date Extracted: 9/8/95
Date Analyzed: 9/8/95

Total Recoverable Petroleum Hydrocarbons
EPA Method 9073
Units: mg/Kg (ppm)

Sample Name	Lab Code	MRL	Result
508-0048	J950694-1	10	13
508-0049	J950694-2	10	6,500
508-0050	J950694-3	10	27
Method Blank	J950908-MB	10	U

U Not detected at or above the MRL.

Approved By: Tom D. Kissinger Date: 9/12/95

APPENDIX B - SYSTEM DESCRIPTION

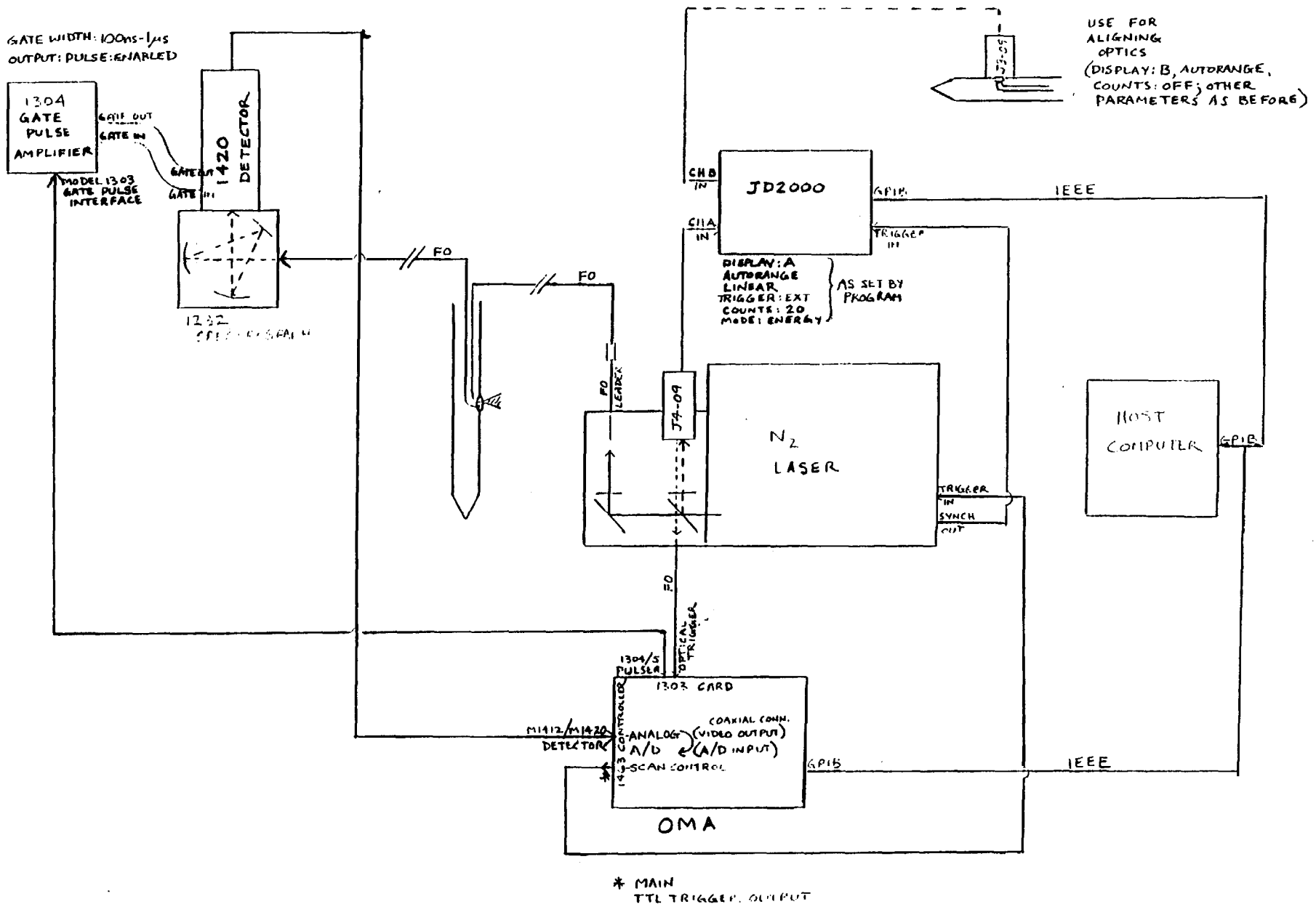
B.1. LIF System Description.

The LIF system is capable of measuring the occurrence of polynuclear aromatic hydrocarbons of 3 or more rings.

A schematic diagram of the fiber optic fluorometer system is shown in Figure B-1. The system was adapted from a design originally developed for in-situ fluorescence measurements in sea water (Lieberman, 1991; Inmand, 1990; Lieberman, 1989). The penetrometer sensor system uses two 365 micron diameter UV/visible transmitting (high OH silica clad silica) optical fibers. One fiber is used to carry excitation radiation down through the penetrometer rod and a second fiber collects the fluorescence generated in the soil sample and carries it back to the detector system at the surface. The standard fiber length is 100 meters which permits collection of fluorescence data to the maximum push depth (50 meters) using a standard 20 ton penetrometer rig. Excitation and emission fibers are isolated from the soil at the probe tip by a 6.35 millimeter diameter sapphire window mounted flush with the outside of the probe approximately 60 centimeters from the tip.

Excitation radiation is provided by a pulsed nitrogen laser (Model PL2300, Photon Technology, Inc.) that operates at 337 nanometers with a pulse width of 0.8 nanoseconds and a pulse energy of 1.4 millijoules. The beam is coupled into the excitation fiber using a 2 inch focal length quartz lens. The primary output of the laser is at 337 nanometers; however, there are secondary fluorescence lines in the region from 380 to 459 nanometers. In order to minimize the contribution of these lines to the measured fluorescence backgrounds, a mirror which selectively reflects only 337 nanometers is used to redirect the laser line before coupling it into the excitation fiber. Optical triggering of the detector eliminates problems associated with laser jitter.

A photodiode array detector system is used to quantify the fluorescence emission spectrum brought back to the surface over the receiving fiber. The detector system consists of a Model 1420 Intensified Photodiode Array Detector (EG&G PARC) coupled to a quarter-meter spectrograph which houses a 300 line/millimeter diffraction grating. The 1024 element array (700 elements are intensified) consists of 25 micron wide diodes centered at 25 micron increments. For the 300 line/millimeter grating, the dispersion of the spectrograph translates to a spectral resolution of 0.45 nanometers per pixel at the array surface when a 25 micron input slit is used. Readout of an emission spectra requires approximately 16 milliseconds. Because the detector can be readout quickly it is possible to add spectra from multiple laser shots in order to improve the signal to noise ration of the measurement. At present, 20 laser shots are used per sample interval.



* MAIN TTL TRIGGER OUTPUT

APPENDIX B - SYSTEM DESCRIPTION

Control and readout of the detector is performed by a Model 1460 optical multichannel analyzer (OMA) (EG&G PARC). Measurements are initiated by an electronic signal from the OMA that fires the laser. The laser pulse then triggers an optical detector which sends an electronic signal to a fast pulsed (Model 1304, EG&G PARC). The pulsed implements an appropriate delay (approximately 350 nanoseconds for a 50 meter fiber and 750 nanoseconds for a 100 meter fiber), and gates the detectors "on" for a period of 100 nanoseconds. Time-gating of the detector is set so that the detector is gated "on" to coincide with the arrival of the fluorescence signal at the detector. Because most fluorophores of interest have fluorescent lifetimes in the range of 5 to 100 nanoseconds, time-gating the detector maximizes signal-to-noise by minimizing contributions to the signal from background light and detector noise.

The resulting fluorescent intensity is a measure of the response to the input energy. The greater the number, the greater the amount of responding energy. The relationship is linear in that with increasing amounts of PAHs, the responding energy increases. The response is relative to the type of PAH so that the relationship is can't be exactly determined. This makes SCAPS a semi-quantitative analysis technique. If the relationship could be determined it would be quantitative.

A 486-based microprocessor host computer is used to automate the overall measurement process. The host computer controls the OMA system and stores fluorescence emission data received from the OMA, collects data from strain gauges, estimates soil type from strain gauge data and monitors depths from transducers on the hydraulic ram. A typical fluorescence emission spectrum from the LIF-POL sensor is shown in Figure 3. As the probe is pushed into the soil the data acquisition software generates real-time depth plots of maximum fluorescence intensity, wavelength of maximum intensity, point resistance, sleeve friction and soil characteristics as interpreted from the strain gauge data. Under normal operating conditions, a fluorescence emission spectrum is collected approximately every 2 seconds. For the standard push rate of 2 centimeters/sec this corresponds to a vertical resolution between measurements of 2-4 centimeters. The entire fluorescence emission spectrum is stored on a fixed disk to facilitate post-processing of the data.

B.2. Quality Control & Calibration Standards.

Two different types of standards are used during field operations. A quality control standard based on a solution of quinine sulfate is used to ensure the system is functioning correctly. This standard also allows the data to be normalized if the probe is changed in the middle of field operations. A set of calibration standards is prepared to evaluate the sensitivity of the sensor to the soil type at the site and the fuel type expected to be encountered. This set of standards is used to establish the noise in the measurement as well as the sensitivity of the sensor to the soil/fuel combination.

APPENDIX B - SYSTEM DESCRIPTION

The quality control standard, designed to evaluate the system performance and internal noise, consists of dilute sulfuric acid mixed with 10 parts per million (ppm), by weight, quinine sulfate. Quinine sulfate has a high quantum efficiency so that it fluoresces quite strongly, is chemically stable, easily reproducible, and exhibits minimal photodegradation.

A single measurement of the quinine sulfate standard averages 20 fluorescence spectra (analogous to the in-situ push averaging), and the measurement is repeated three times directly before and after a push. The short term system stability is defined as the standard deviation of the three measurements. Typical results show an average standard deviation of 1-2 percent of the fluorescent intensity.

The quinine sulfate data is also used to normalize data taken using different probes. Figure B-2 shows the quinine sulfate data collected pre-push at NAS Cecil Field. The quinine sulfate data was used to normalize the data for all of the pushes for a consistent data set throughout the site.

In addition to the quinine sulfate quality control standard, series of spiked soil standards are prepared using soil gathered from the site. The sensitivity of the sensor will depend on the type of hydrocarbons encountered. For instance, diesel fuel (which is composed mostly of heavy polynuclear aromatic hydrocarbons (PAHs)) tends to fluoresce strongly when excited by a nitrogen laser, so that a small amount of fuel can give a large fluorescence signal. On the other hand, some jet fuels (e.g. JP-5) are composed of a greater fraction of lighter PAHs, which are not efficiently excited by the nitrogen laser, so that a larger amount of jet fuel is needed to give the same fluorescence signal as diesel fuel. Hence the sensor is less sensitive to this type of fuel.

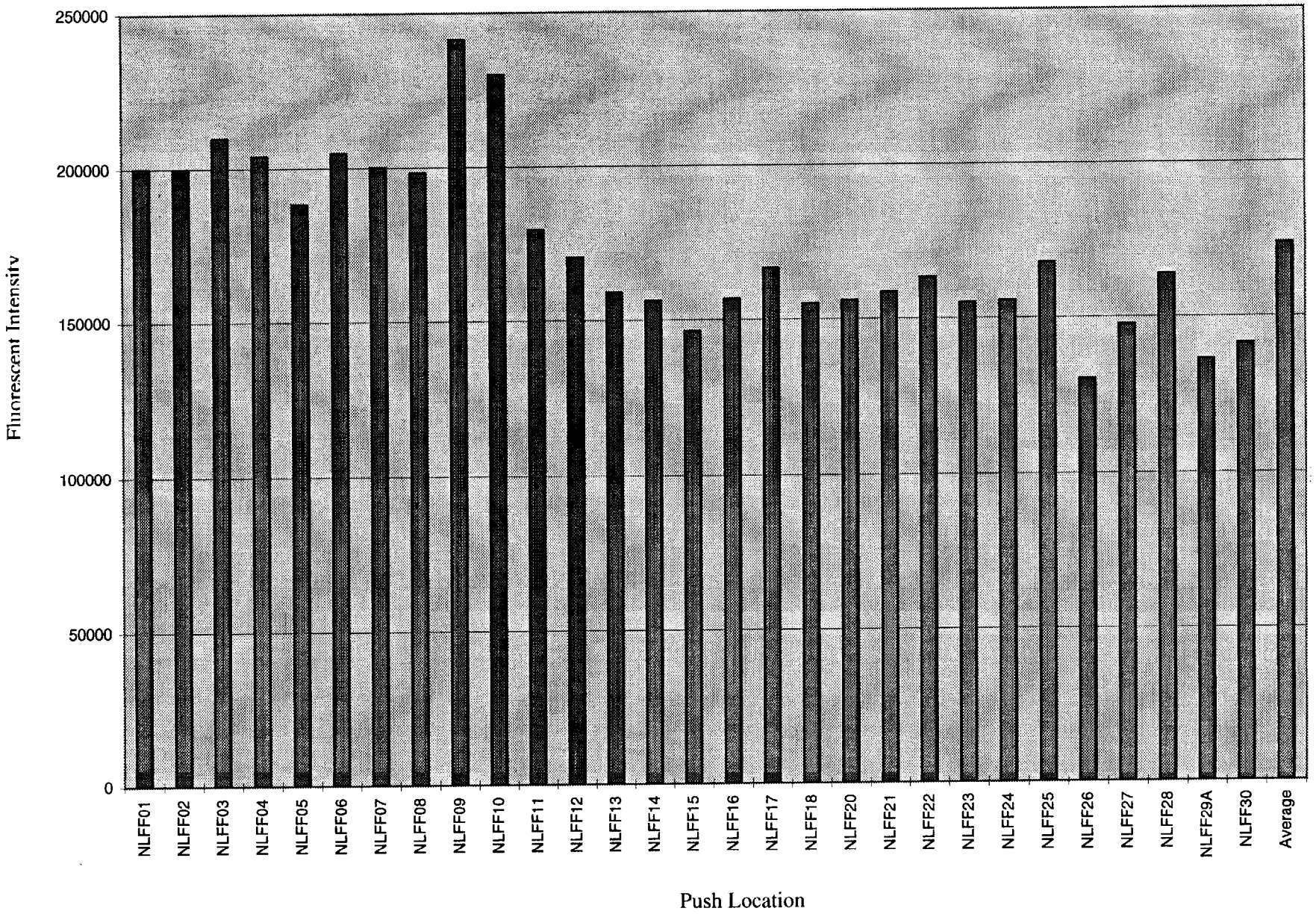
The fuel chosen as the standard for NSB New London was diesel fuel marine (DFM). One of the difficulties in establishing the target fuel is that often many different fuels were used during the history of the site, so the contaminant represents a combination of fuels In addition, the contaminant has aged and weathered from long term exposure at the site. This is the same problem that many other quantifying analytical methods also encounter, and for this reason, SCAPS LIF-POL sensor is intended to be a screening tool to establish the presence of contamination, rather than a quantitative method for measuring the amount of contamination.

To prepare the standards, a sample of soil was collected from NSB New London. The soil was gathered from near surface, at a depth of 6-12 inches, to reduce hydrocarbon contamination from aerosols and other airborne particulant, and was grossly sifted to remove sticks and other large debris. A series of soil samples were prepared by spiking the soil with the following concentrations (by weight) of DFM: 0 ppm (assumed), 197 ppm, 603 ppm, 1021 ppm, 1554 ppm, 2022 ppm, 2589 ppm, and 24386 ppm. The spiked samples were placed on a shaker table for 24 hours to uniformly distribute the fuel.

The fluorescence spectra from the spiked samples were measured at the start of each day of field operations. As with the quinine sulfate, 20 shots are averaged to provide a single

measurement. The standard deviation of the calibration standards reflects both the internal noise as well as the variations due to non-homogeneous soil, and can be compared to that of the internal standard (quinine sulfate) to assess the non-homogeneity of the soil at the site. The calibration data for the NSB New London DFM standards are included in Appendix D. This data is used to calculate the sensitivity of response of the fuel to the local soil, as well as the baseline and standard deviations that are needed to determine the detection threshold at the site.

NSB New London
Pre-Push Quinen Sulfate System Response



APPENDIX C - DETECTION THRESHOLD DETERMINATION

C.1. Detection Threshold

The ability of the LIF sensor to measure small amounts of contaminant will be limited by:

- Its variable sensitivity to the hydrocarbons present in the soil
- The ambient fluorescence of the soil
- Fluctuations in the output energy of the nitrogen laser
- Variations in the detector temperature
- Changes in optical alignment

In practice, setting the detection threshold is a two part process. The first part consists of establishing a fluorescence threshold. This is the value of fluorescent intensity that must be exceeded to indicate the presence of contamination. The second part is to relate this fluorescence threshold to a correlation of petroleum concentrations to establish the detection threshold in milligrams/kilograms (ppm).

The correlation of petroleum concentrations is determined by preparing standards consisting of soil with known concentrations of contaminant. This procedure is carried out using only the lower concentration calibration standards. For NSB New London the following values were used in calculating the detection threshold: 0 ppm (assumed), 197 ppm, 603 ppm, 1021 ppm, 1554 ppm, 2022 ppm, 2589 ppm, and 24386 ppm. Experiments have shown that for the full range of calibration standards (up to 25,000 ppm), the calibration data is not well fit by a linear regression. This is not surprising because of the complicated interaction between the fuel and soil type. By restricting the data set to the low concentration samples, the data is well fit using the linear regression and this approach gives much more confidence in the sensitivity near the detection threshold.

The fluorescence intensity for each calibration sample is measured in triplicate daily at the start of operations. The three measurements are averaged to provide a single measured intensity for each concentration. The data is regressed to establish a slope and intercept. The intercept is given by the intensity of the unspiked calibration standard (0 ppm). The slope is found from the least squares fit using this intercept.

Intercept: $b = y_0$ = intensity measured on 0 ppm calibration sample

Slope: $M = \Sigma(y_i - y_0)x_i / \Sigma(x_i^2)$

The variance in the regression is given by:

$$V = \Sigma(mx_i + b - y_i)^2 / (n-1)$$

where V is the biased estimator of the residual mean square of the fit and the data, and the standard deviation of the fit is:

$\sigma = \text{Sqrt}(V)$

For the calibration soils, x is given by the concentration (C) of the target fuel, while y is the measured fluorescence intensity (I) of the sample. The sensitivity and background are defined as follows:

sensitivity = slope of fitted data = m

background = intercept of fitted data = b

The noise is defined as:

noise = standard deviation of the fit = σ

The noise is defined as 1.00 times the standard deviation in order to establish a conservative fluorescence threshold. (The fluorescence threshold is given as the sum of the background and the noise values). Using the standard assumption of a normal "student's T" distribution statistics, and the number of points used in these fits (typically 8), this corresponds to an 80% confidence limit. This was chosen because the sensor is used as a field screening tool, and it was considered important to reduce the possibility for false negatives.

The quantities needed to calculate the fluorescence threshold and the detection threshold are now known. These are determined from:

Fluorescence threshold = background + noise = $b + \sigma$

Detection threshold = noise / sensitivity = σ / m

The fluorescence threshold is the quantitative limit that the fluorescence intensity must exceed in order to qualify as a "detect". If the fluorescence intensity is less that the fluorescence threshold, the sensor indicates "none-detected".

The detection threshold is the amount of contaminant that corresponds to the fluorescence threshold. This is the practical detection level in ppm, as determine from the calibration standards for a given site, and is found by taking the fluorescence threshold and working back to the concentration needed to produce this intensity. The detection threshold is used to compare the ppm of petroleum present in the sample as determined by Total Recoverable Petroleum Hydrocarbon (TRPH, EPA Method 8015-Modified) and Total Petroleum Hydrocarbon (TPH, EPA Method 418.1) with the fluorescence measurements for the validation phase of the site characterization. TPH and TRPH values above the

detection threshold value are considered "detects", while those less than the detection threshold are not detectable by the SCAPS sensor.

This method for setting the fluorescence threshold and detection threshold is based on a standard analytical chemical approach for quantifying the response of a detector. It is also easily reproducible, and the results follow directly from applying a well defined series of data reduction techniques that can be documented and repeated at any site.

This approach does have limitations. The background level is determined by a single soil sample, chosen near the surface at one location from the site. It is possible that the soil sample is contaminated, so that the background represents not only the natural fluorescence but a contribution from the contaminant. Even if it is not contaminated, the background from this single sample may not be representative of the whole site. The following additional interpretation approaches have been developed because of this single soil sample limitation.

C.2. Fluorescent Threshold

C.2.1 Histogram

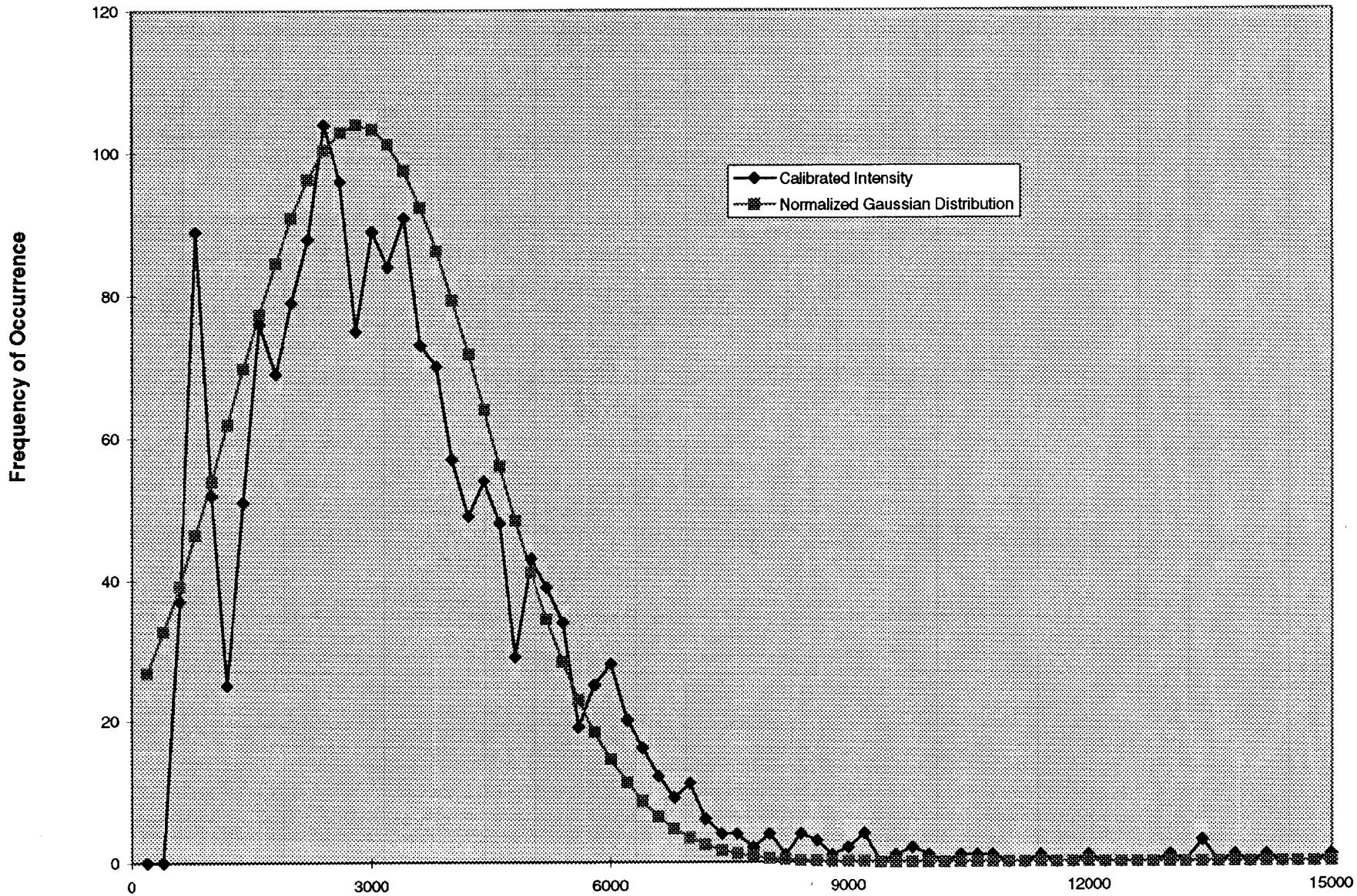
It can be shown that LIF responses from the uncontaminated soil system are normally (Gaussian) distributed. It can be shown that LIF responses from the contaminated soil system are not normally distributed. This may be due to a variety of reasons including but not limited to:

- the limited vertical duration of the contaminant when compared to the uncontaminated soil system
- the relatively recent release of contamination on the geologic time scale

The underlying principle is that these are two different populations. The value of Fluorescence that marks the separation of the two populations is referred to as the Fluorescent Threshold (FT). Once the FT is determined, the LIF results can be interpreted to define the contaminated population.

The procedure consists of Ranking all the Fluorescent Intensity results generated during an investigation from least to highest without regard to depth or push location. Next, determine the frequency of occurrence within each 200 count range. With this frequency of occurrence information, construct a histogram as shown in Chart 1.

New London Fuel Farm



F.T. = 6973 counts
Pop. = 0 -12,000 counts

On this histogram plot a normal distribution using the formula:

$f(x) = 1/\mathrm{sqrt}(2\sigma^2\pi)*(\exp(-(x-\mu)^2/2*\sigma^2)$

Limit the calculation of the mean and standard deviation to the population that appears to be not-contaminated. Then generate the normal distribution normalized to the most frequently occurring Fluorescent Intensity. At this point it should be obvious that a portion of the Fluorescent Intensity data lie along the normal distribution curve with the larger values representing the contaminated population. Perform a students t-test comparison to find the best fit of the normal distribution and the Fluorescent Intensity data set. Calculate the standard deviation and mean values based on the values that best fit the probability curve. The point at which the Fluorescent Intensity data no longer fits the normal curve should be obvious by inspection or by calculating the 95% upper confidence limit value:

$UC = \mu + t*\sigma$ With $t = 1.96$ (students t value for n = infinity)

C.2.2 Quantile

Another method to determine the underlying distribution of data is the Quantile approach. This breaks the data set up by percentage of population so that 50% of the population lies below and above the mean value. Through the quantile method the FT can be determined by inspection.

The procedure involves ranking the data from every push without regard to depth or location from lowest to highest. For each value calculate the quantile:

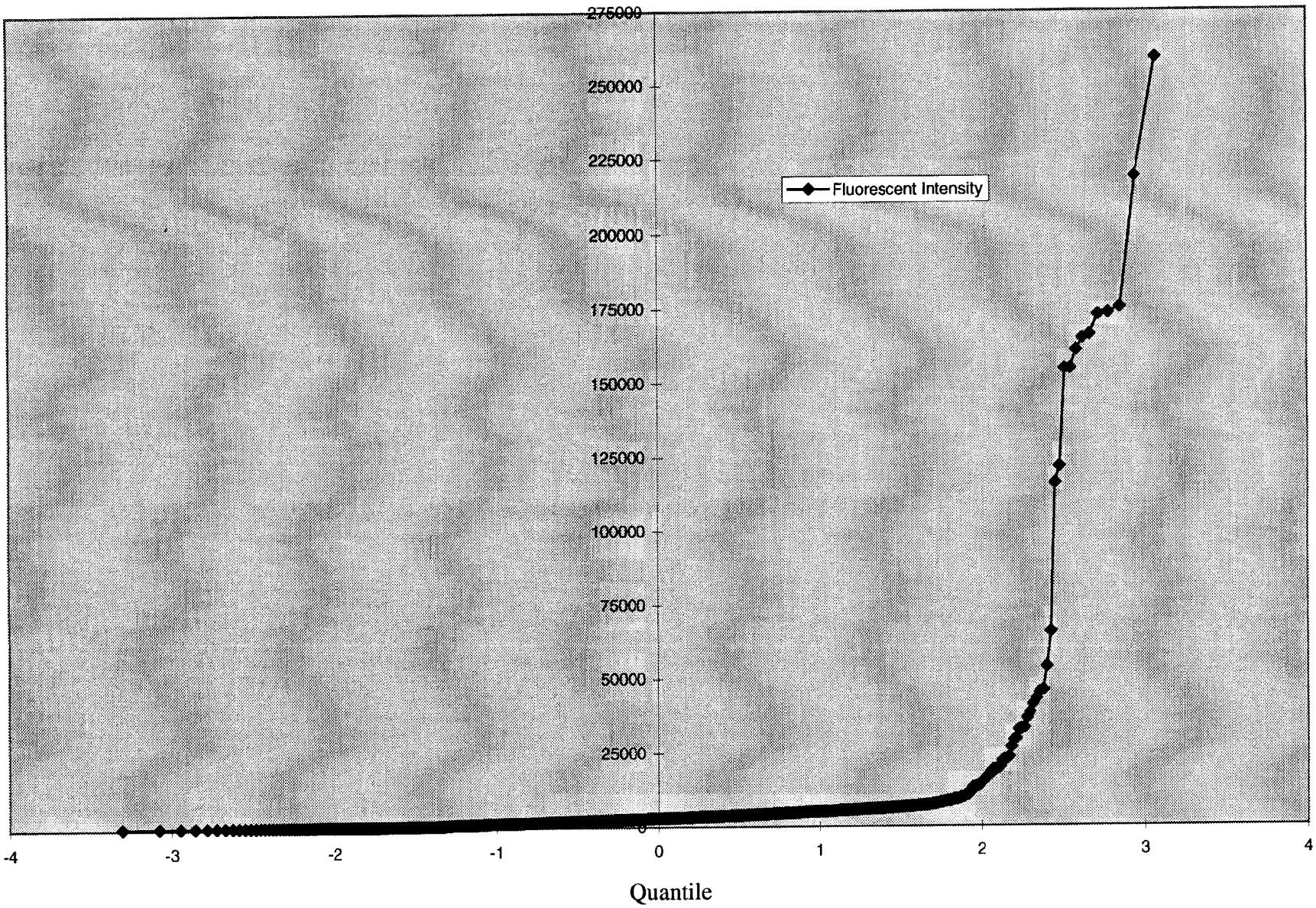
use: $f_i = (i-3/8)/(n+1/4)$

to calculate: $Q(f_i) = 4.91\ [f_i^{0.14} - (1 - f_i)^{0.14}]$

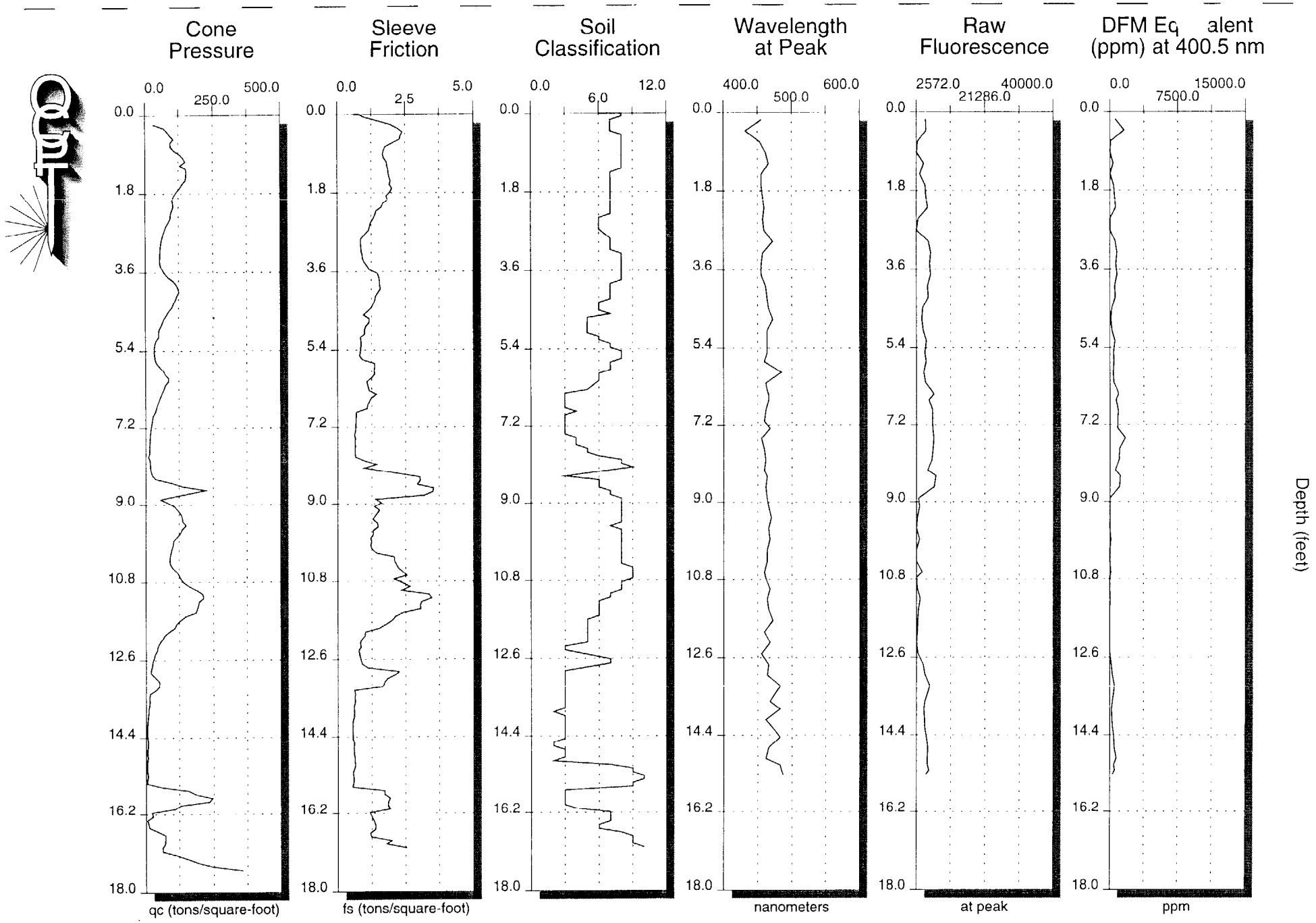
Plot $Q(f_i)$ verses the intensity for each corresponding rank as shown in Chart 2. Linearity indicates that the sample data are consistent with a normal reference distribution. Different linear regions of differing slopes known as clusters will be obvious. Each cluster represents a different population. There is one population of relatively low intensity values that represents one cluster and a population of high intensity values that represents the contaminated population. It may be possible to identify saturated conditions by observing a further cluster at higher intensity values.

This method is a powerful interpretation tool that is best used in conjunction with the following reference: "Statistical Design and Analysis of Experiments, With Applications to Engineering and Science" by Mason, Robert., et all., John Wiley and Sons, Inc., 1989.

NSB New London Quantile Distribution



APPENDIX D - STRIP CHARTS



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Date: 07-28-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF01.PSH
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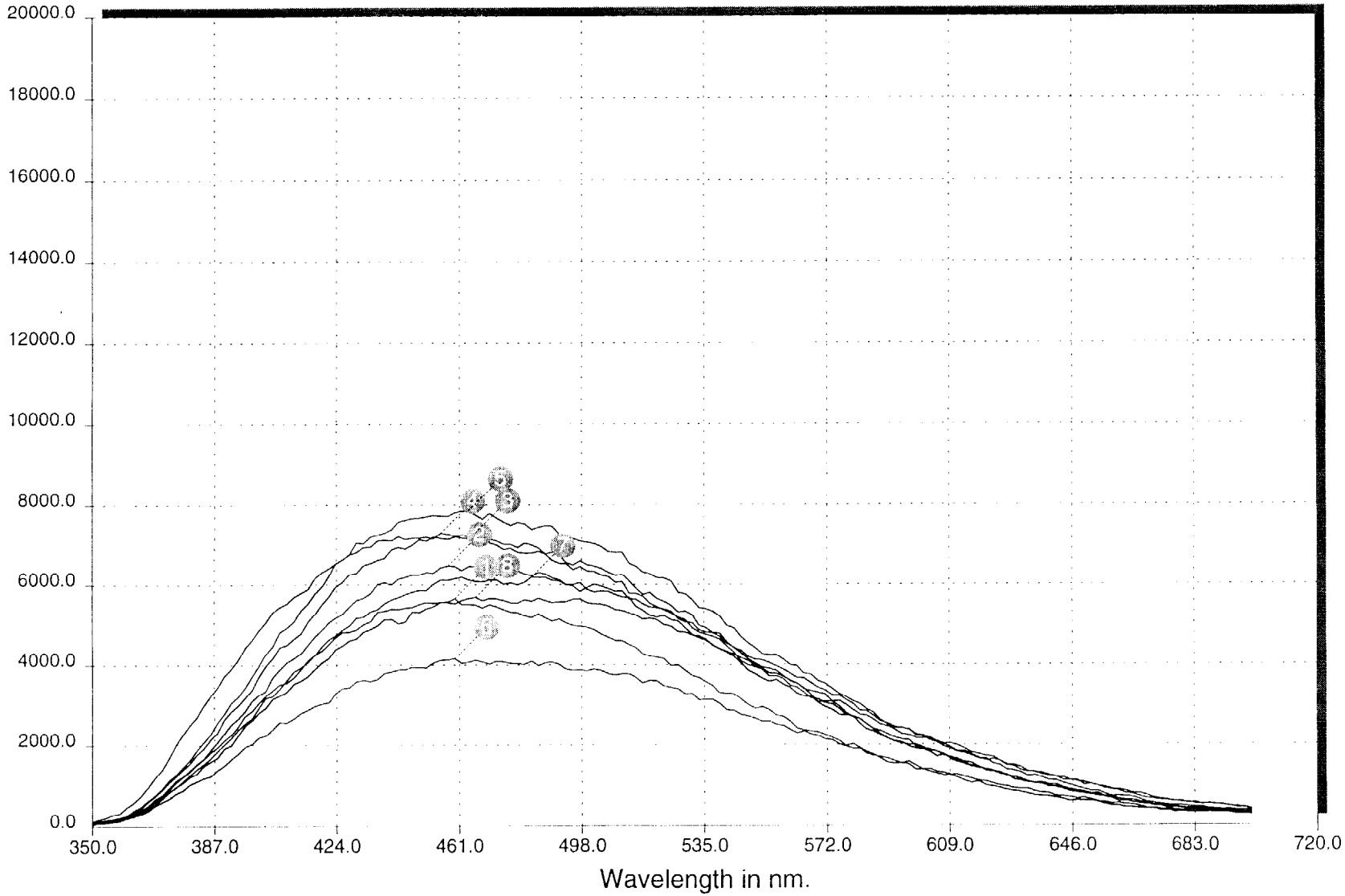
Calibration: C:\BASIC71\DATA\JUL28DFM.CAL

Spectral Plot(s)



1: 2.2 ft.; 5654 @ 459.6 nm	5: 8.4 ft.; 7854 @ 463.8 nm
2: 3.2 ft.; 6475 @ 457.5 nm	6: 10.6 ft.; 4157 @ 459.6 nm
3: 6.5 ft.; 7312 @ 465.9 nm	7: 13.3 ft.; 6191 @ 482.8 nm
4: 7.5 ft.; 7302 @ 455.4 nm	8: 14.7 ft.; 5686 @ 465.9 nm

Time: 21:26:50
Date: 07-28-1995
Version: 1.0

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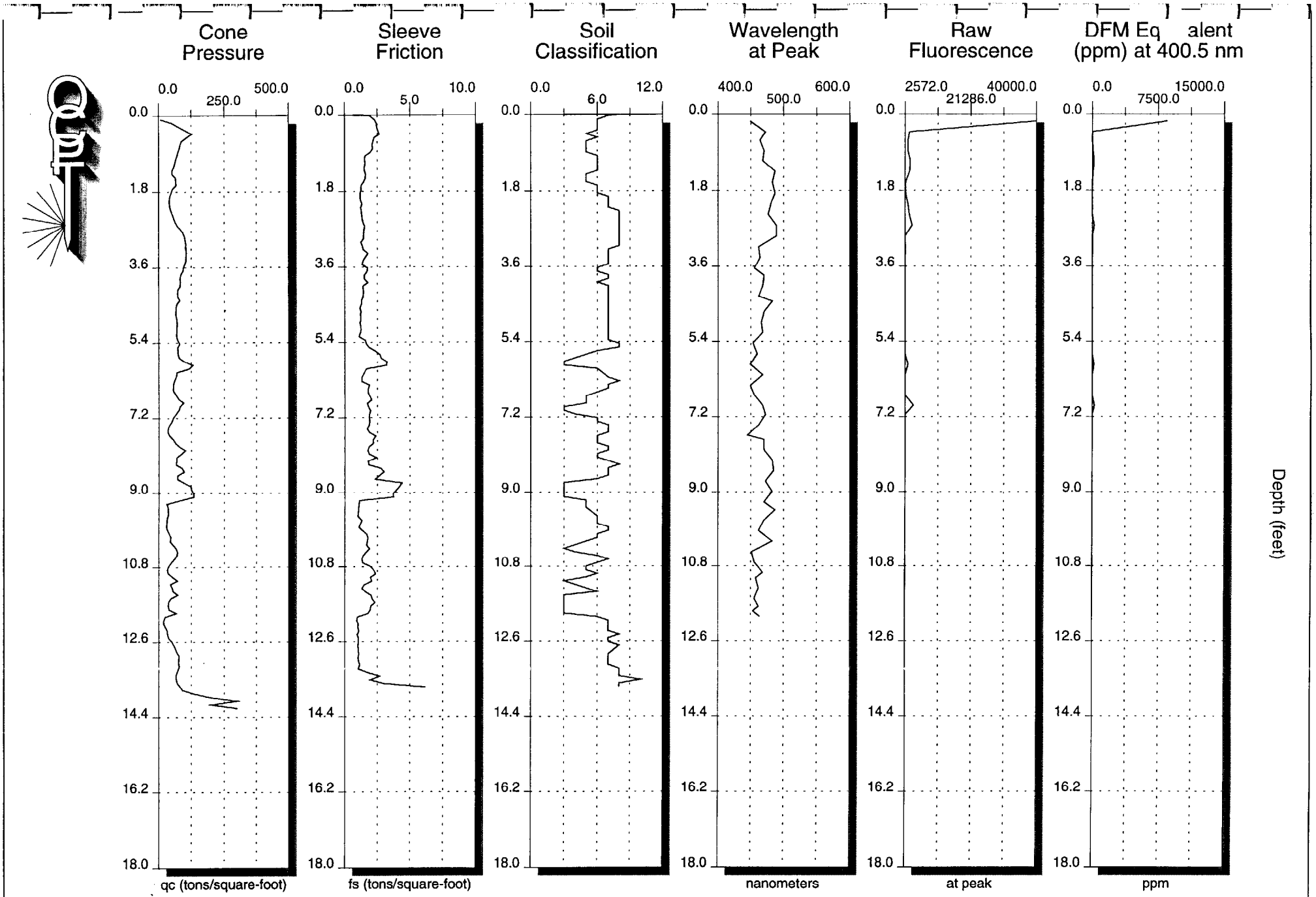

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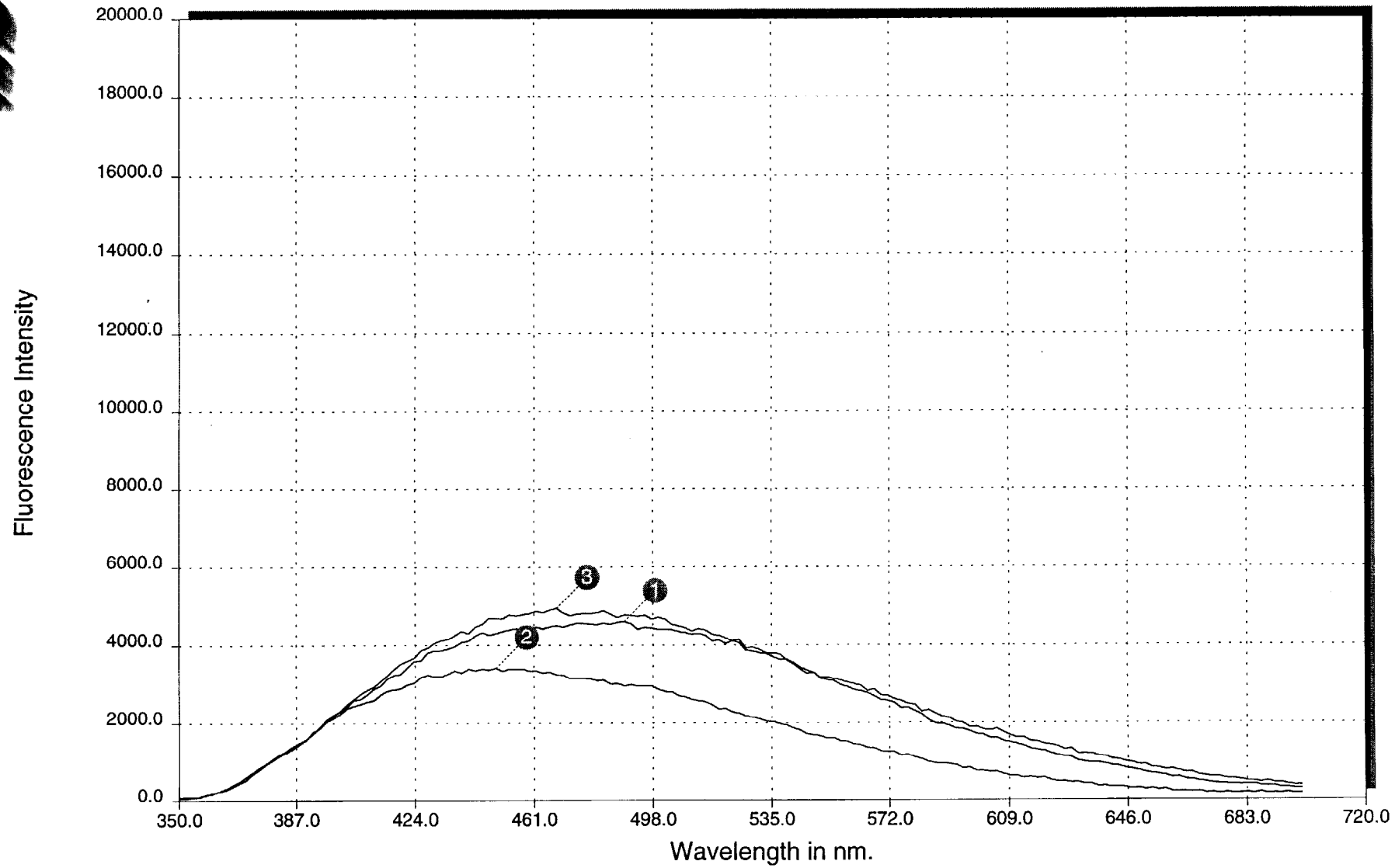
Spectral Plot(s)



1: 2.6 ft.; 4598 @ 489.1 nm
2: 5.9 ft.; 3415 @ 449.0 nm
3: 6.9 ft.; 4939 @ 468.0 nm

Time: 23:05:37
Date: 07-28-1995
Version: 1.0

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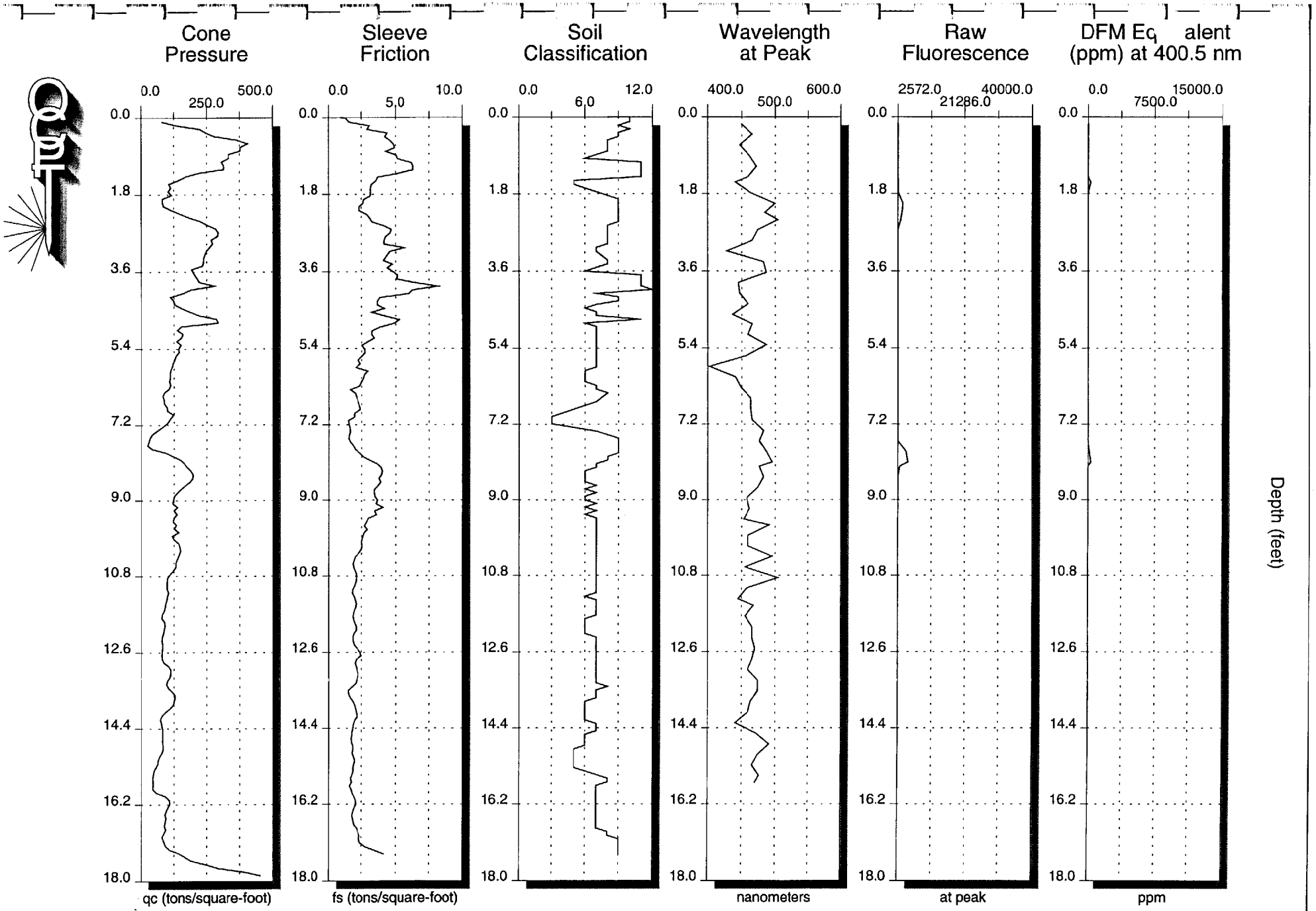

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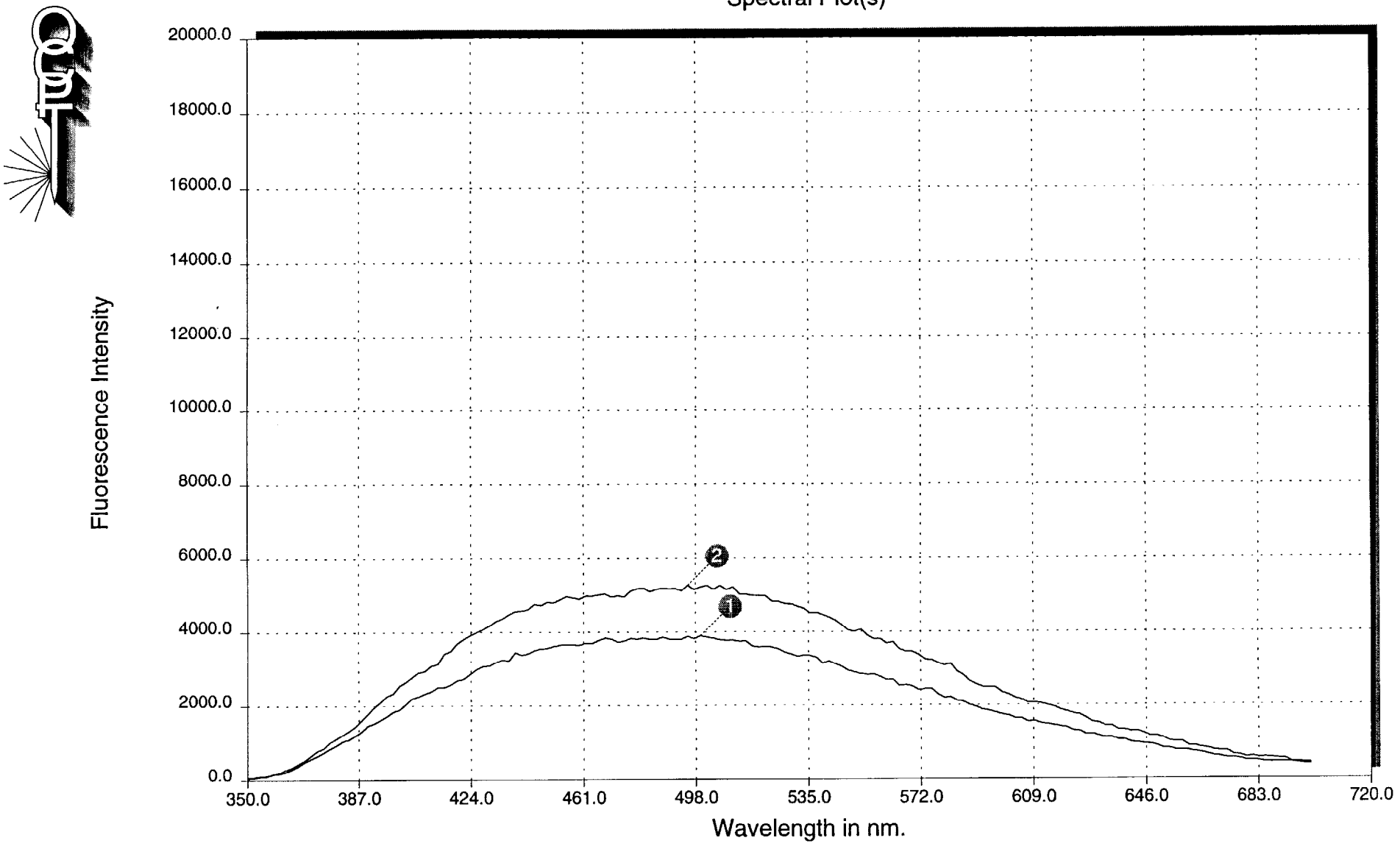
Spectral Plot(s)



1: 2.0 ft.; 3898 @ 499.7 nm

2: 8.1 ft.; 5265 @ 495.4 nm

Time: 23:39:35

Date: 07-28-1995

Version: 1.0

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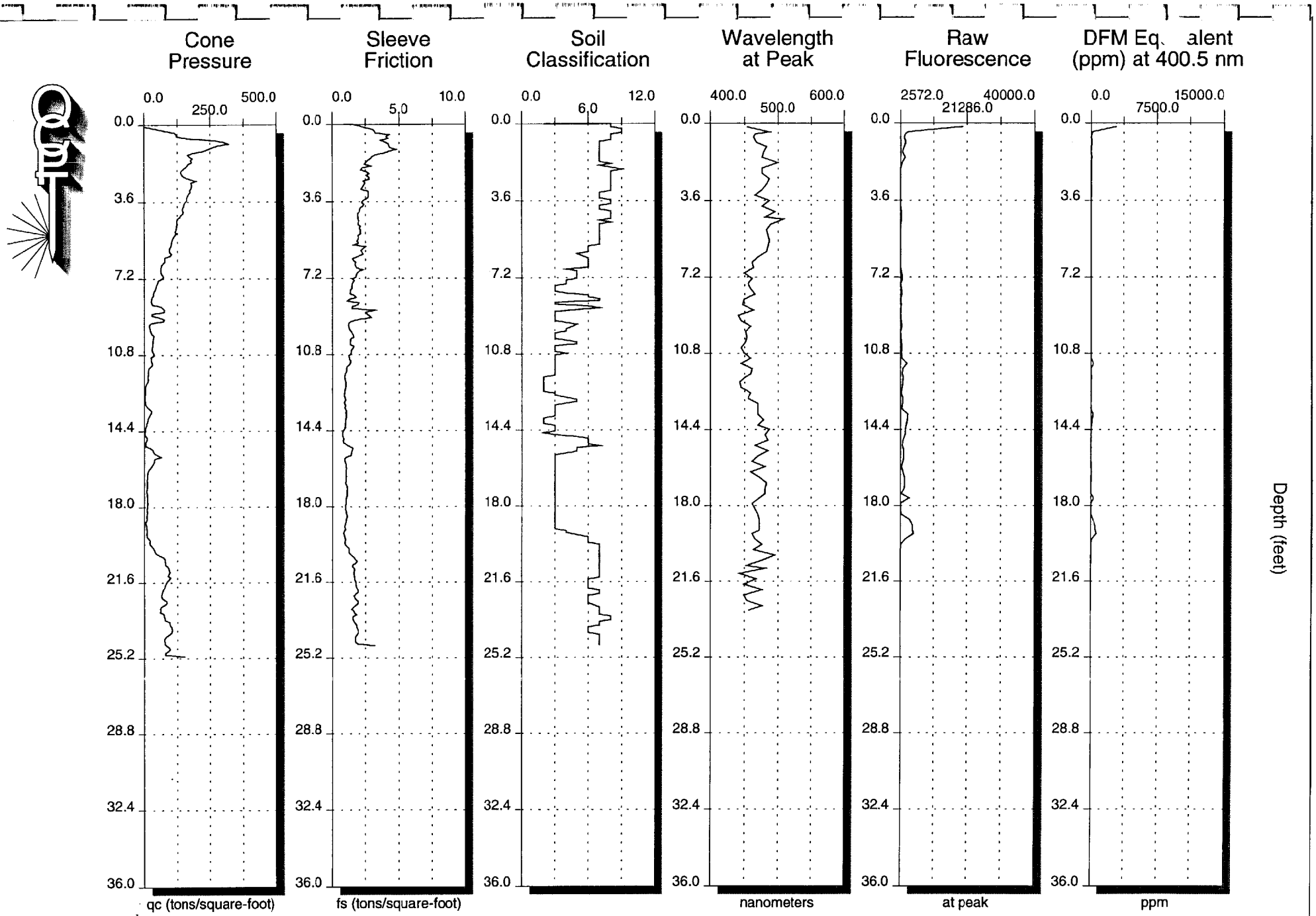
Calibration: C:\BASIC71\DATA\JUL28DFM.CAL



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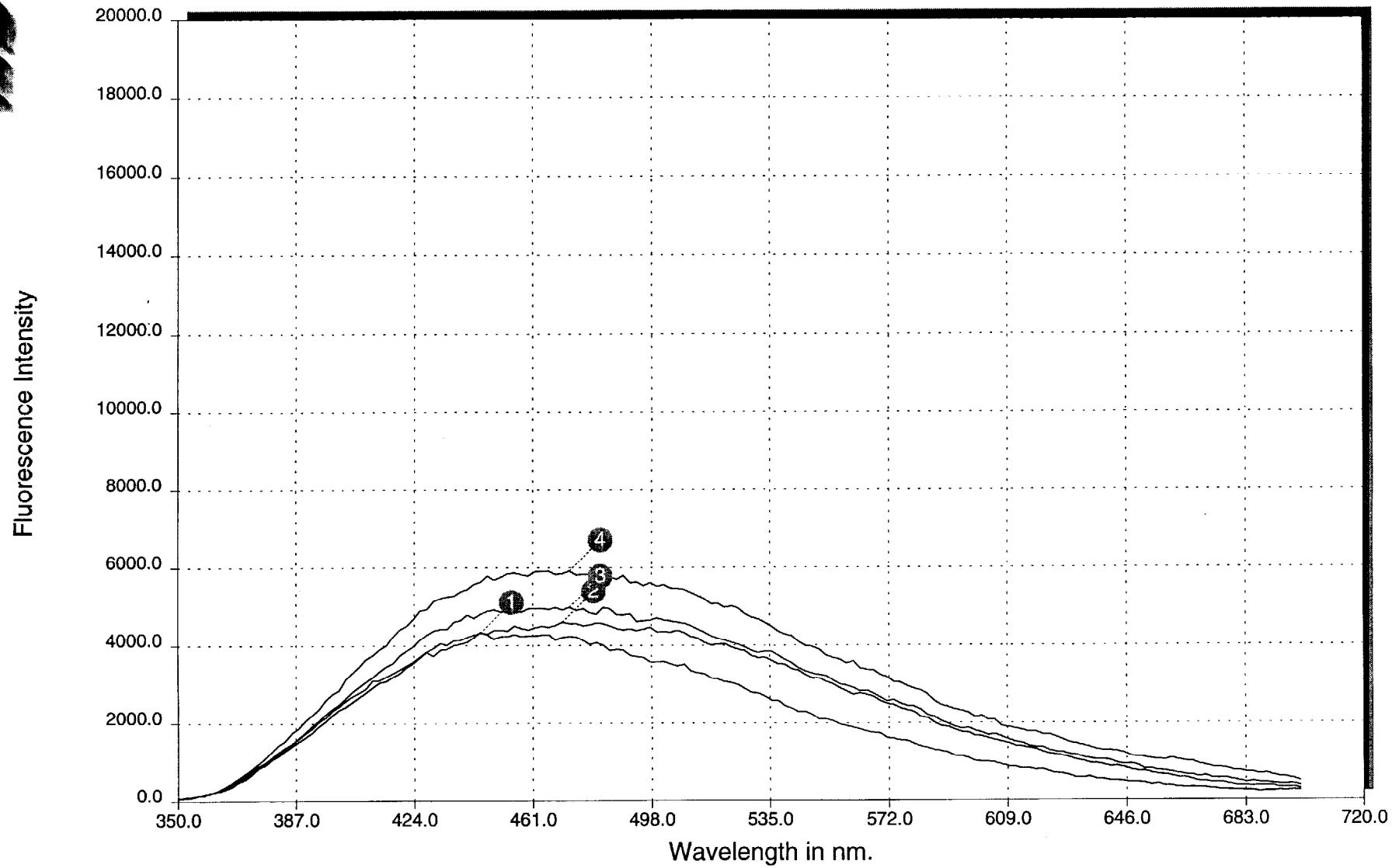
Spectral Plot(s)



1: 11.3 ft.; 4317 @ 444.8 nm
2: 13.7 ft.; 4601 @ 470.1 nm
3: 17.6 ft.; 4982 @ 472.2 nm
4: 19.2 ft.; 5912 @ 472.2 nm

Time: 00:18:22
Date: 07-29-1995
Version: 1.0

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Probe: C:\BASIC71\DATA\PROBE02B.PRB
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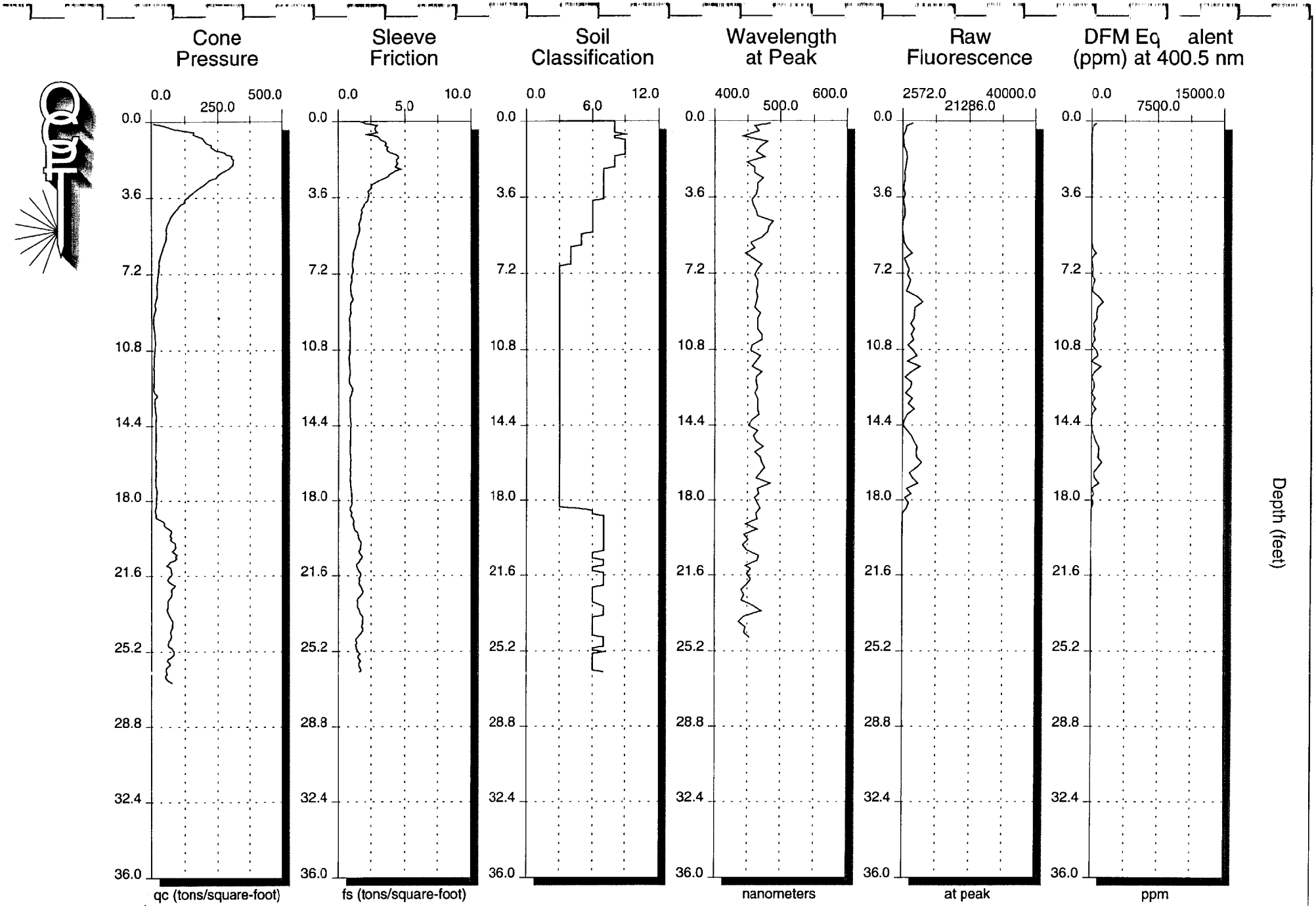

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Date: 07-29-1995
Version: 1.0

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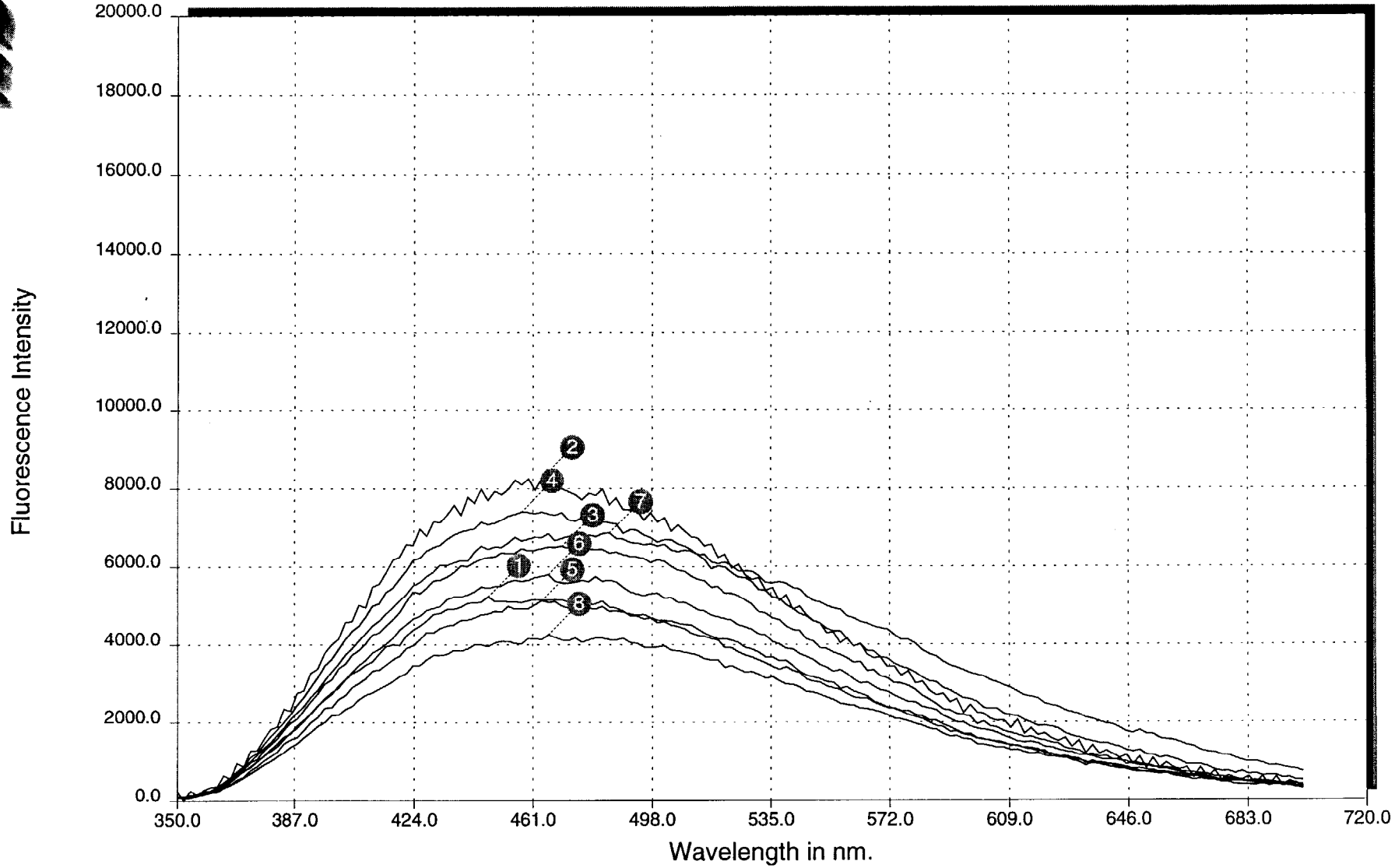
Calibration: C:\BASIC71\DATA\JUL28DFM.CAL

Spectral Plot(s)



1: 6.2 ft.; 5233 @ 446.9 nm	5: 12.4 ft.; 5128 @ 463.8 nm
2: 8.5 ft.; 8255 @ 463.8 nm	6: 13.6 ft.; 5796 @ 465.9 nm
3: 11.1 ft.; 6523 @ 470.1 nm	7: 17.2 ft.; 6865 @ 484.9 nm
4: 11.6 ft.; 7404 @ 457.5 nm	8: 18.1 ft.; 4256 @ 465.9 nm

Time: 00;58:26
Date: 07-29-1995
Version: 1.0

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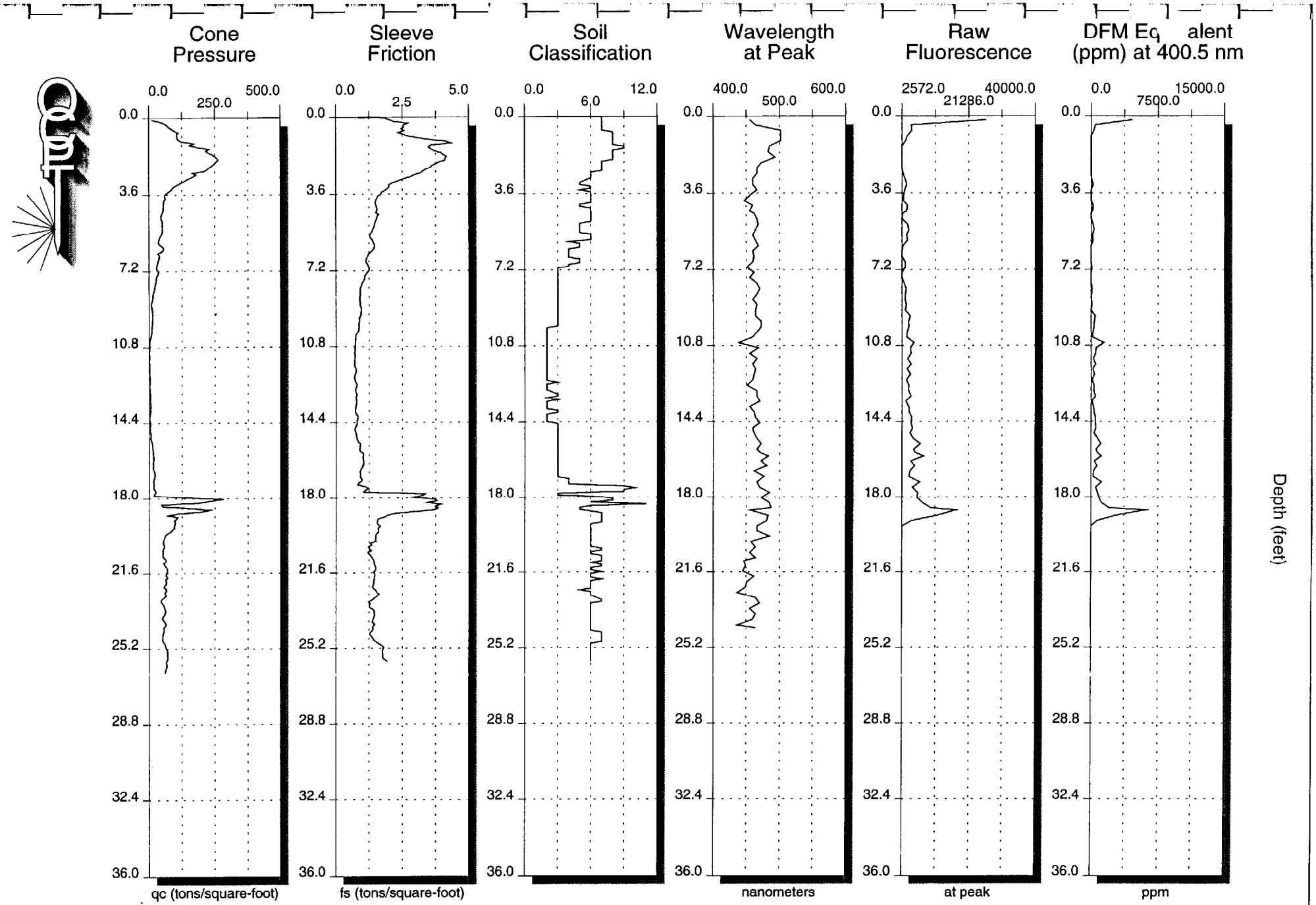

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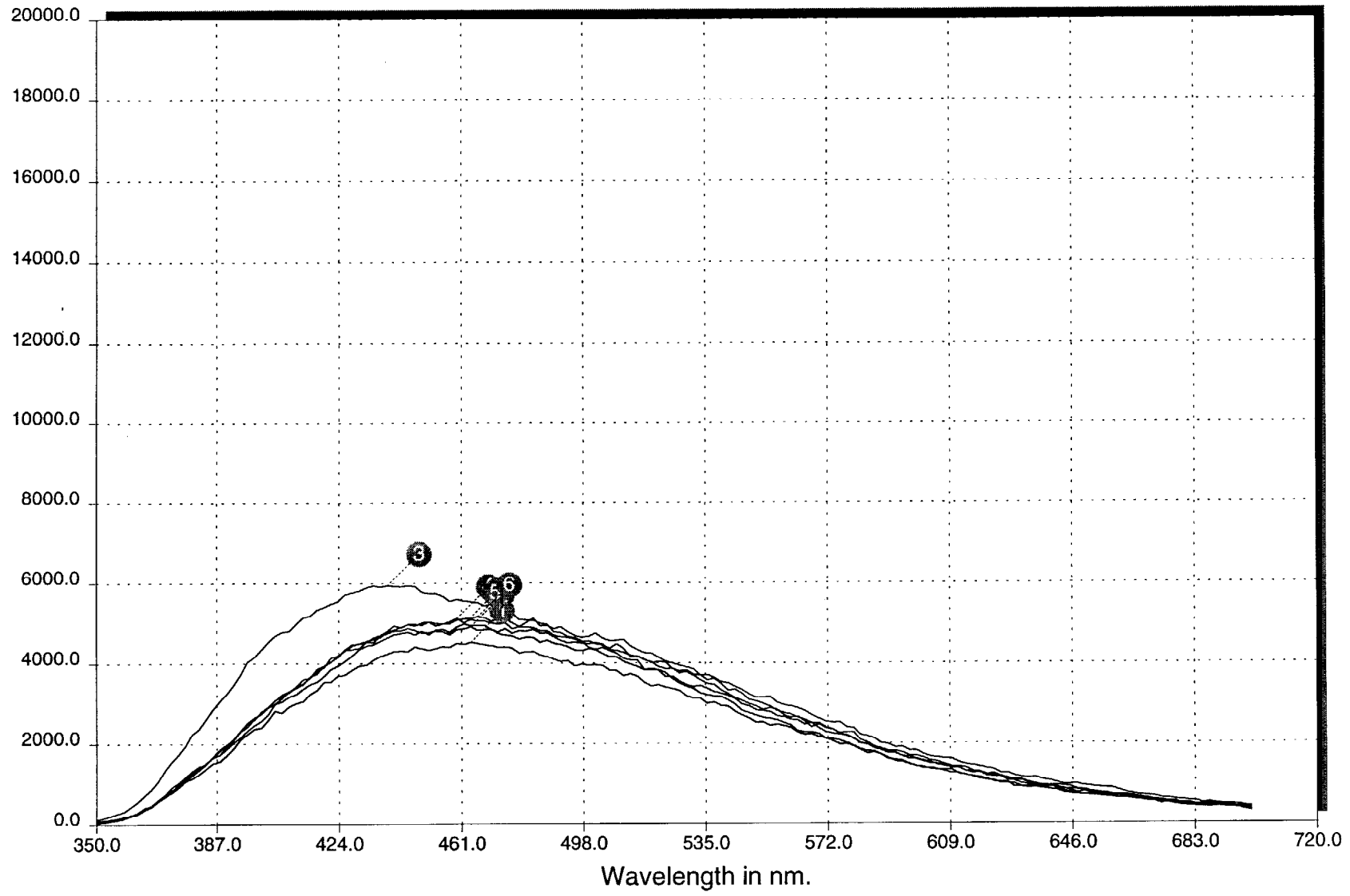
Spectral Plot(s)



1: 5.3 ft.; 4519 @ 463.8 nm
2: 9.4 ft.; 4904 @ 463.8 nm
3: 10.7 ft.; 5935 @ 438.5 nm
4: 11.7 ft.; 5116 @ 459.6 nm
5: 12.2 ft.; 4970 @ 461.7 nm
6: 13.2 ft.; 5159 @ 465.9 nm

Time: 01:35:55
Date: 07-29-1995
Version: 1.0

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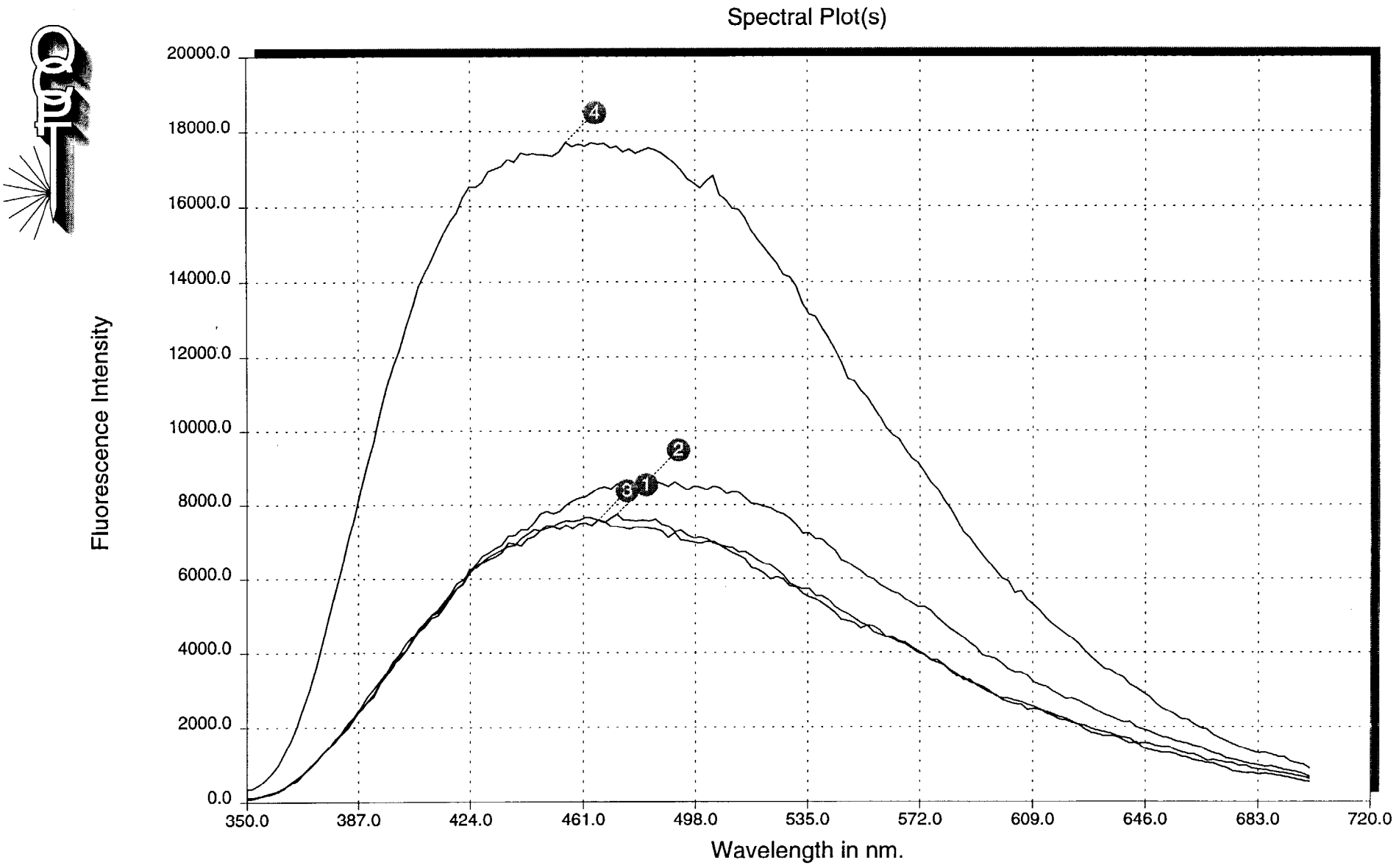

1: 15.5 ft.; 7741 @ 472.2 nm
2: 16.1 ft.; 8689 @ 482.8 nm
3: 17.3 ft.; 7584 @ 465.9 nm
4: 18.6 ft.; 17702 @ 455.4 nm

Time: 01:35:55
Date: 07-29-1995
Version: 1.0

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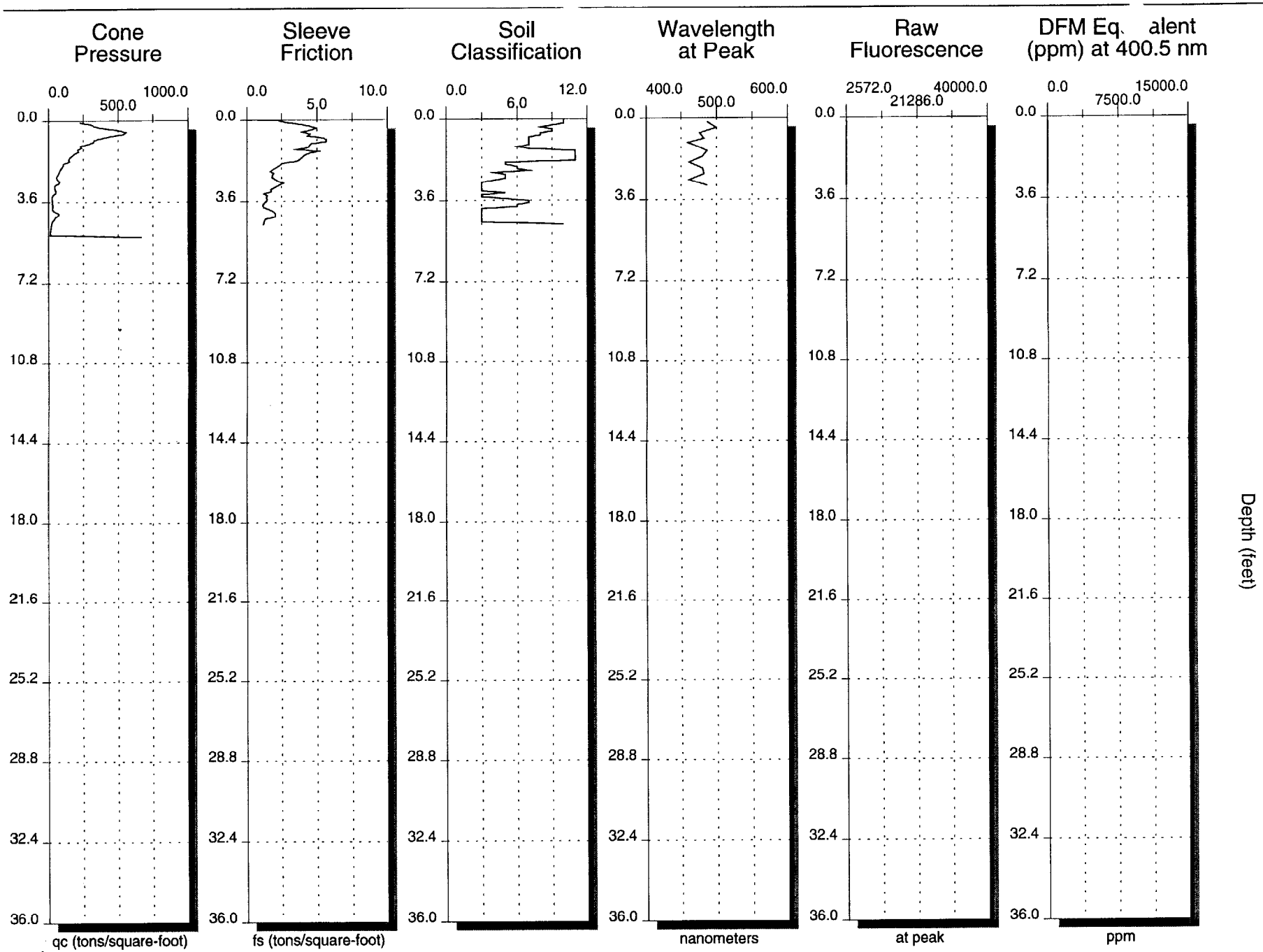

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Version: 1.0

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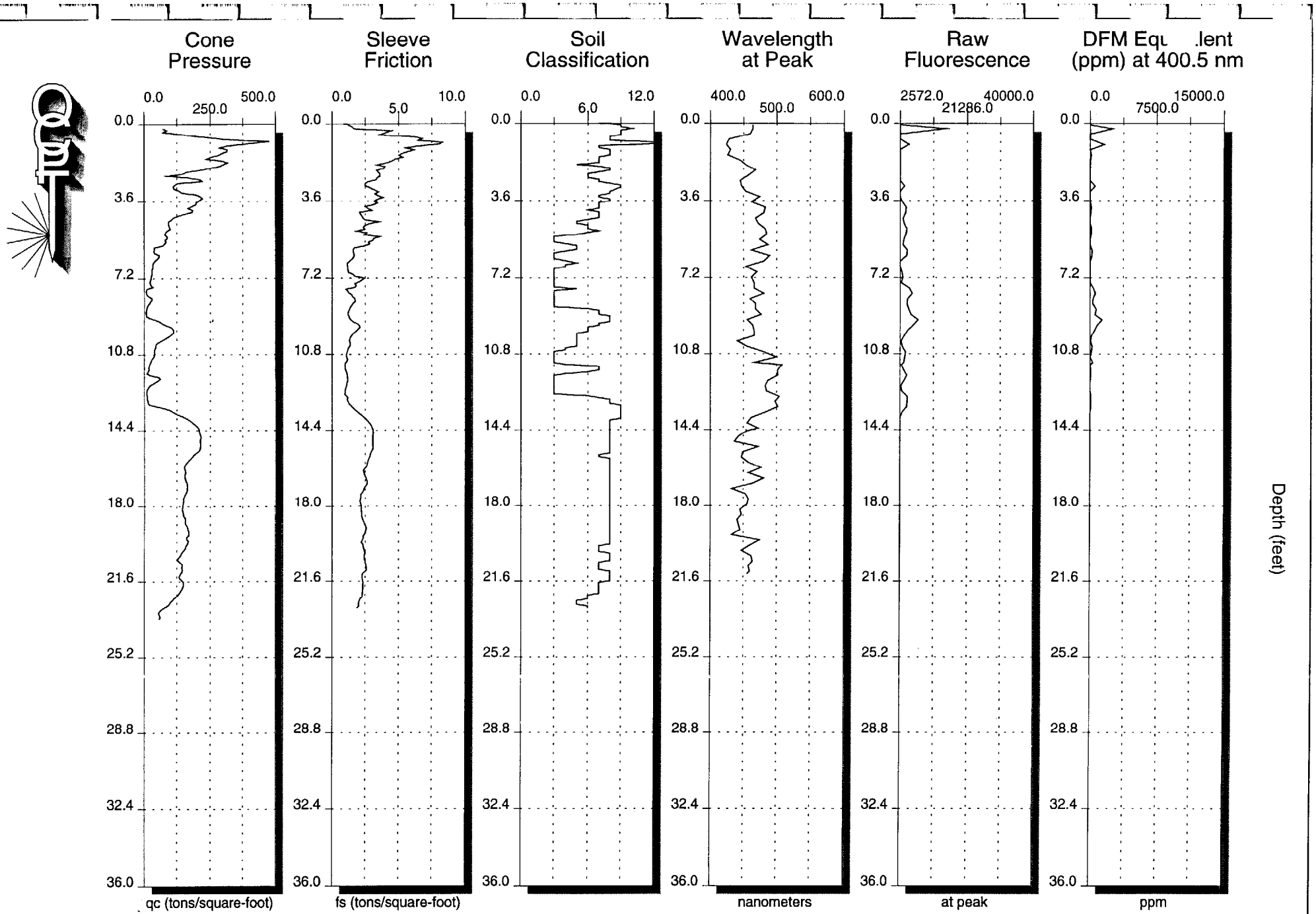

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Date: 07-29-1995
Version: 1.0

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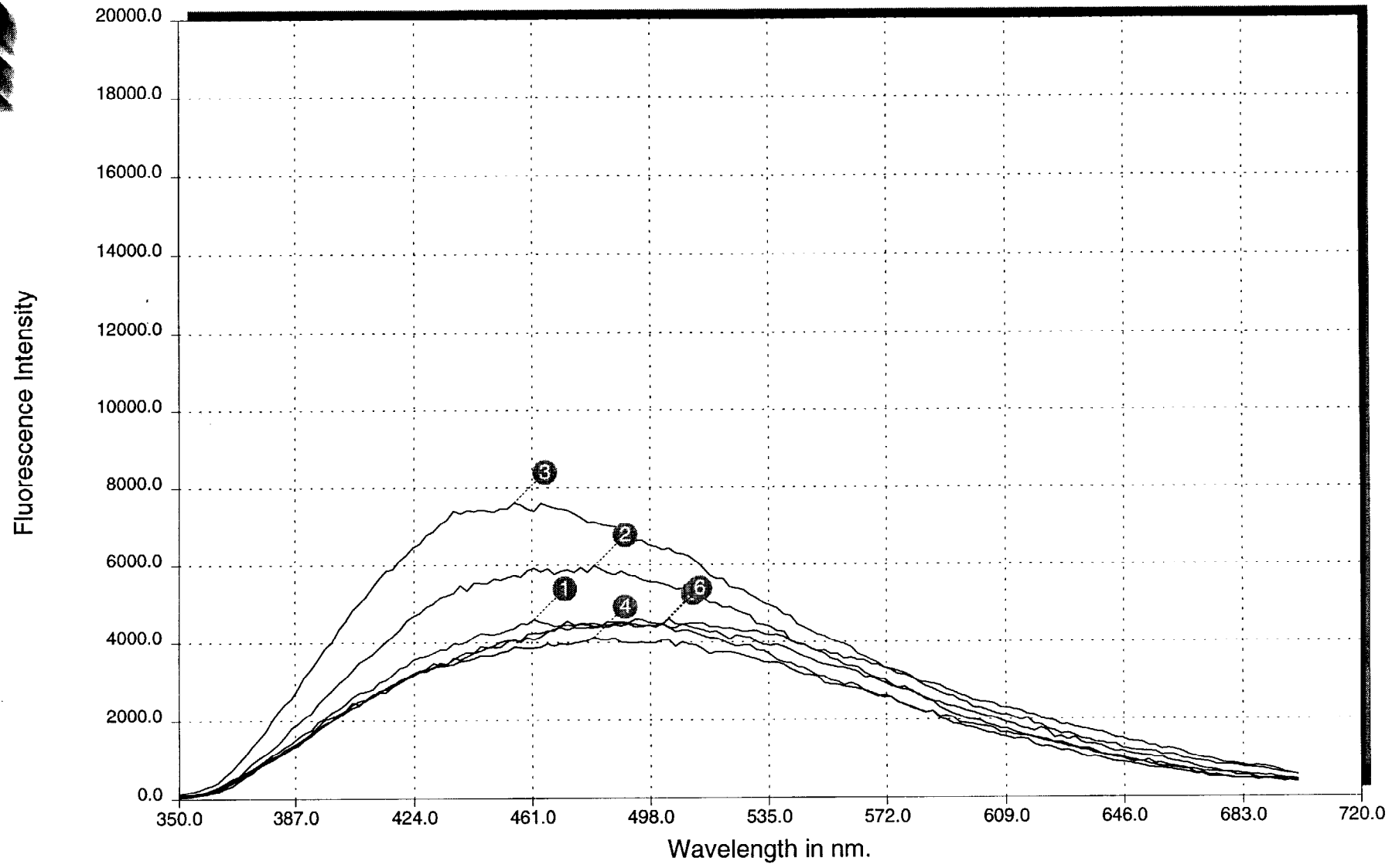
Calibration: C:\BASIC71\DATA\JUL28DFM.CAL

Spectral Plot(s)



1: 5.9 ft.; 4592 @ 461.7 nm
2: 7.9 ft.; 5975 @ 480.7 nm
3: 9.2 ft.; 7608 @ 455.4 nm
4: 10.7 ft.; 4129 @ 480.7 nm
5: 11.8 ft.; 4473 @ 501.8 nm
6: 12.8 ft.; 4606 @ 503.9 nm

Time: 17:54:01
Date: 07-29-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF08.PSH
Probe: C:\BASIC71\DATA\PROBE02B.PRB
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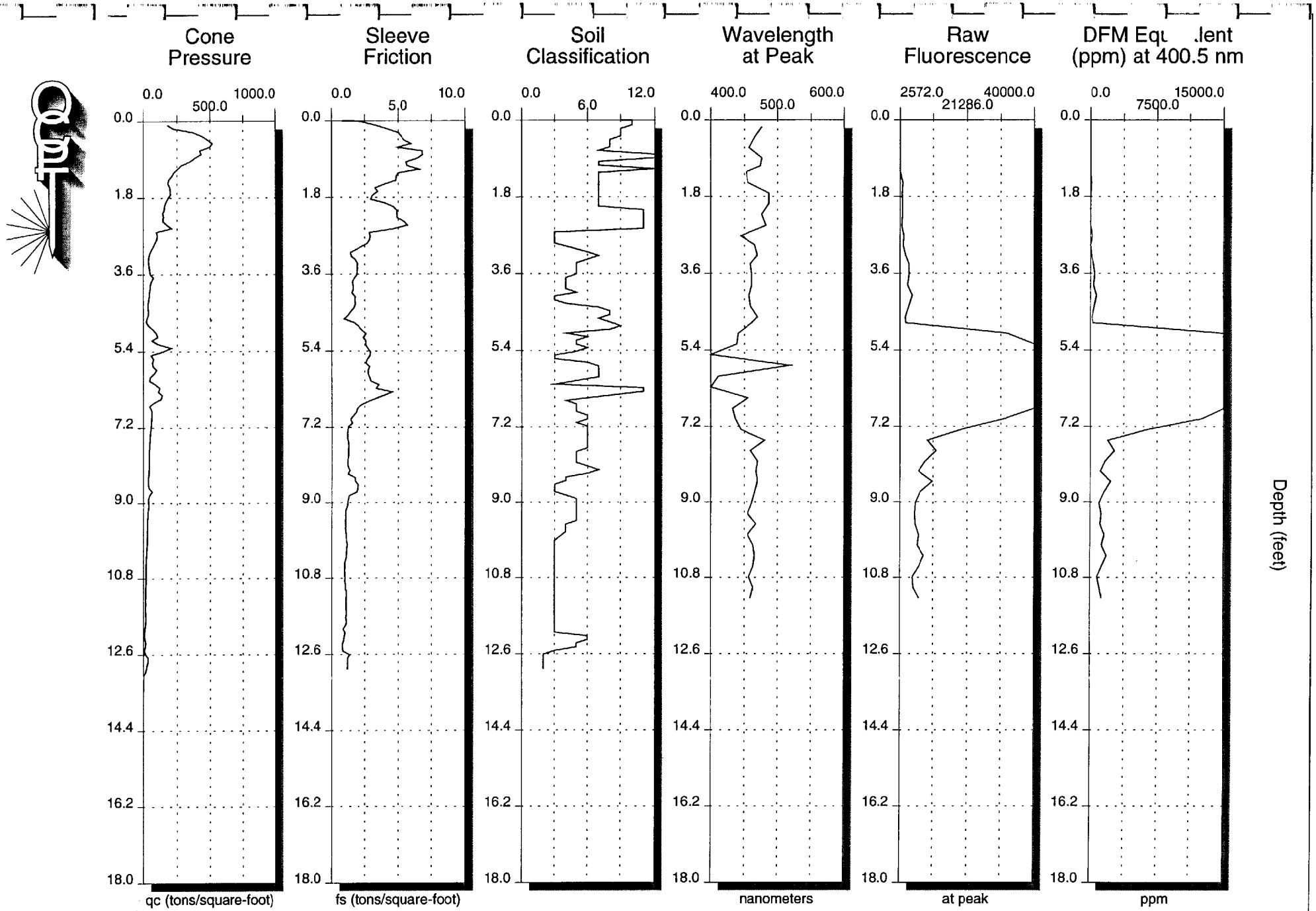

Time: 19:17:08
Date: 07-29-1995
Version: 1.0

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Probe: C:\BASIC71\DATA\PROBE02B.PRB
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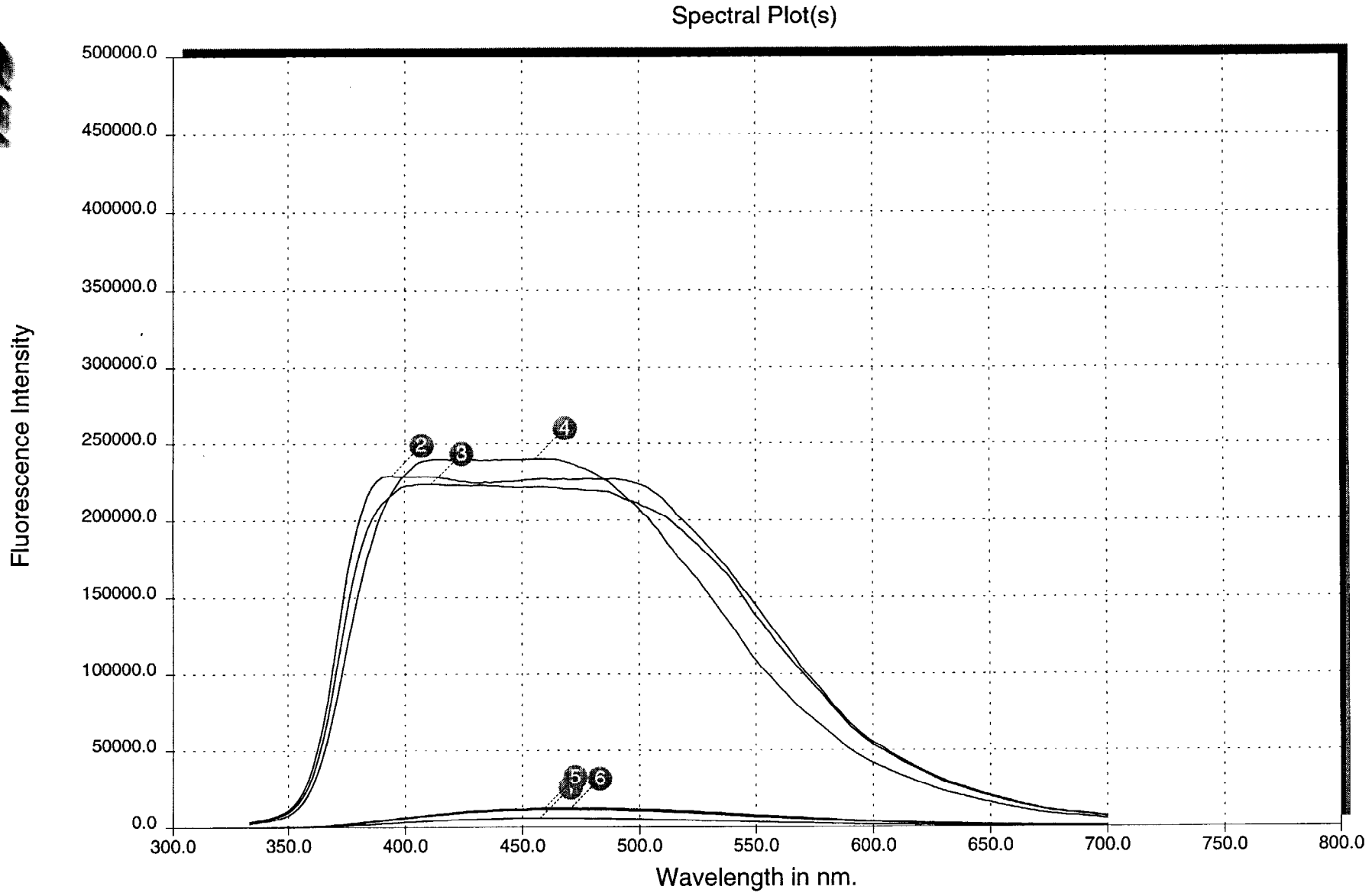

1: 4.1 ft.; 6001 @ 457.5 nm
2: 5.5 ft.; 229160 @ 394.2 nm
3: 6.0 ft.; 223673 @ 411.0 nm
4: 6.5 ft.; 240080 @ 455.4 nm
5: 7.8 ft.; 12728 @ 459.6 nm
6: 8.5 ft.; 11699 @ 470.1 nm

Time: 19:17:08
Date: 07-29-1995
Version: 1.0

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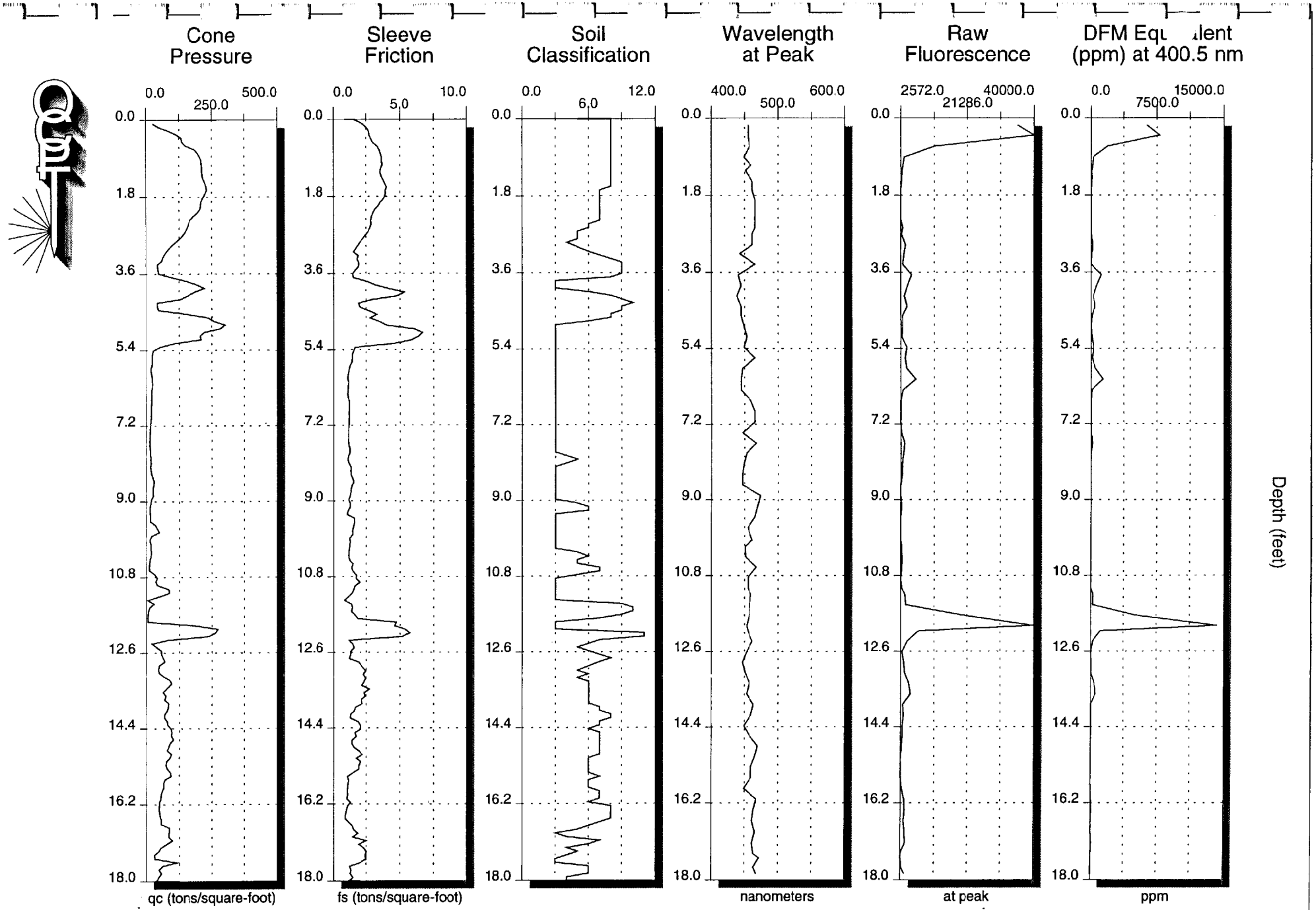

Time: 20:02:43
Date: 07-29-1995
Version: 1.0

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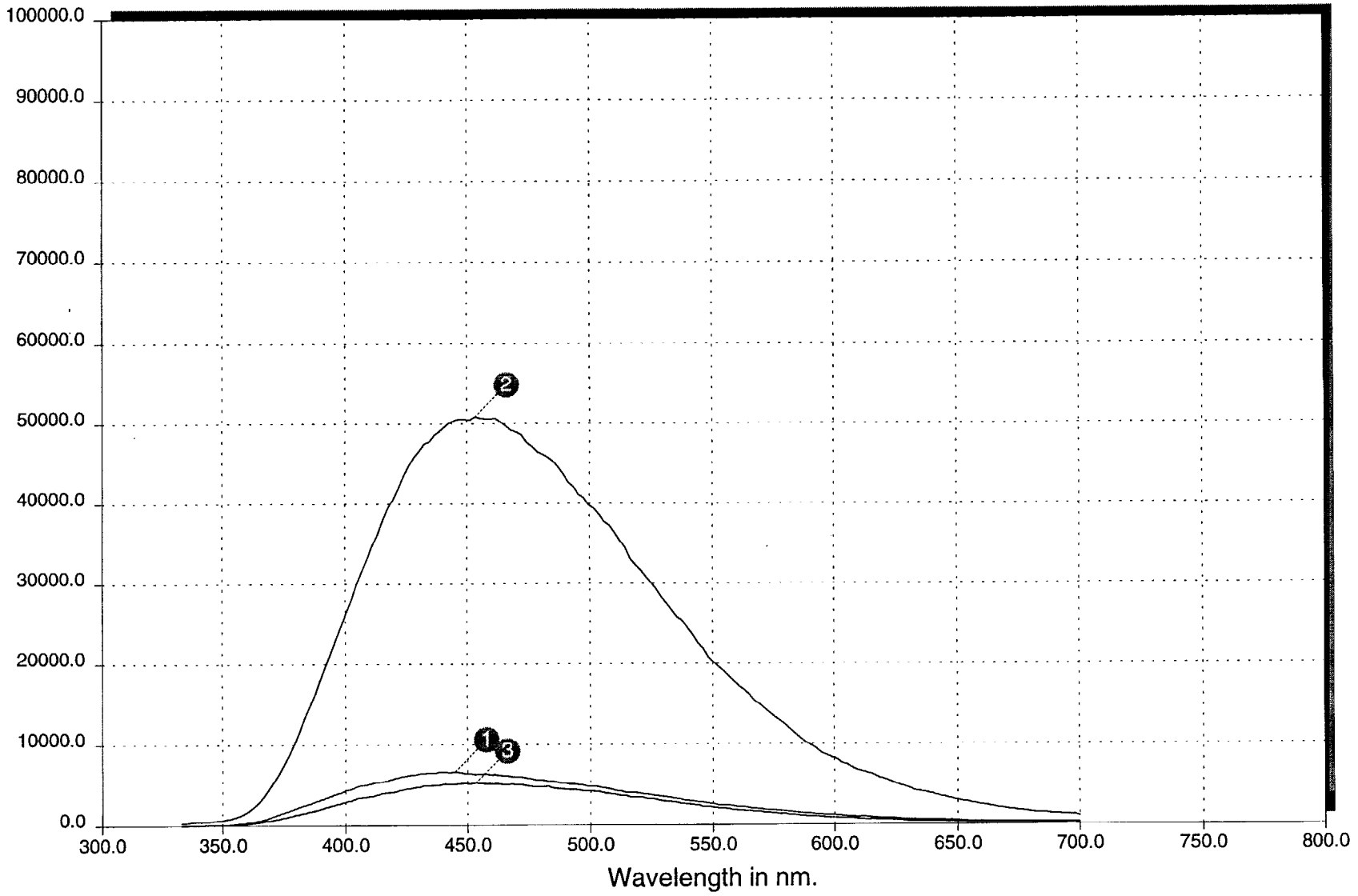
Spectral Plot(s)



1: 6.1 ft.; 6656 @ 444.8 nm

2: 12.0 ft.; 50847 @ 453.2 nm

3: 13.6 ft.; 5259 @ 453.2 nm

Time: 20:02:43

Date: 07-29-1995

Version: 1.0

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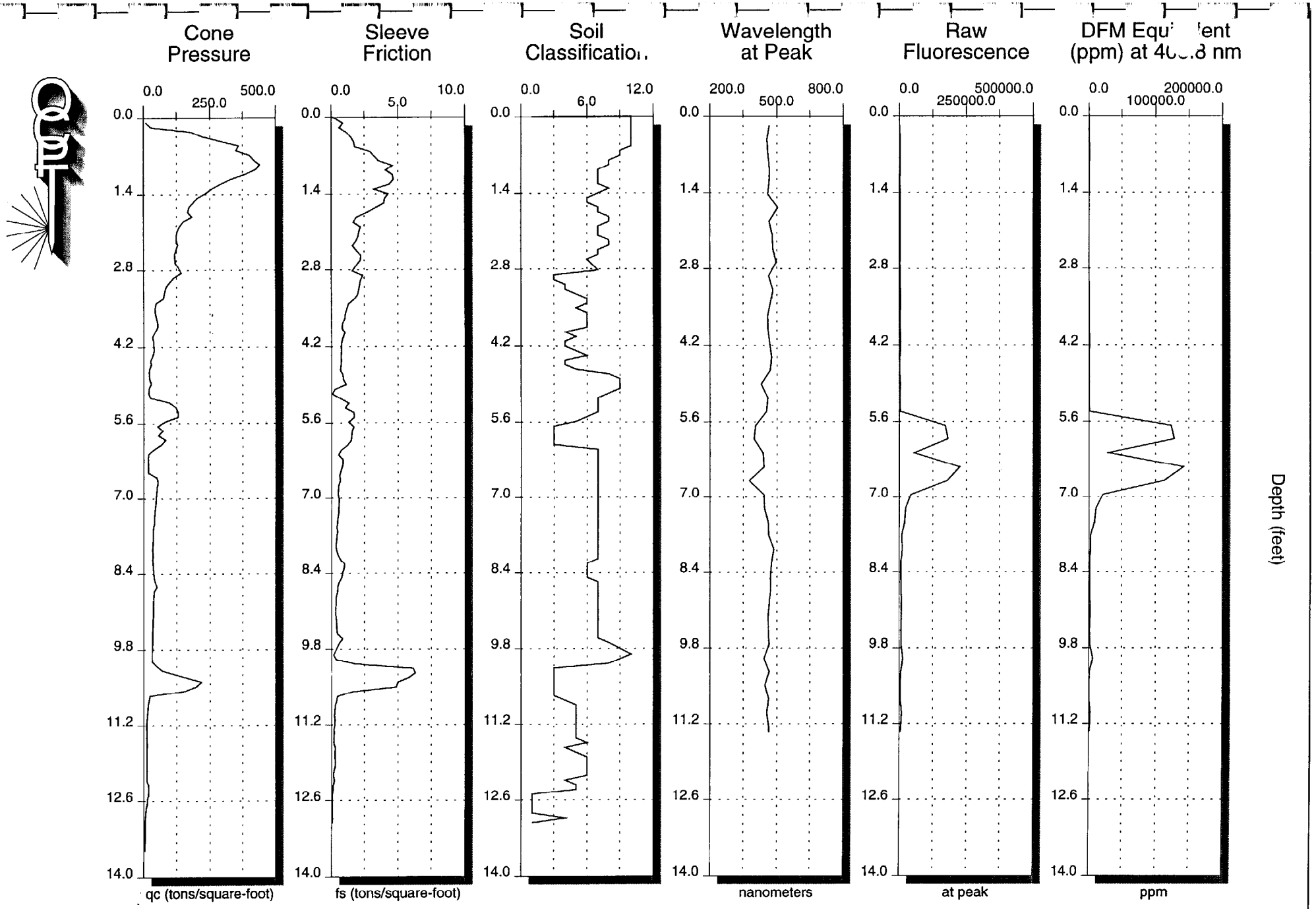

Time: 13:19:09
Date: 08-08-1995
Version:-1.0

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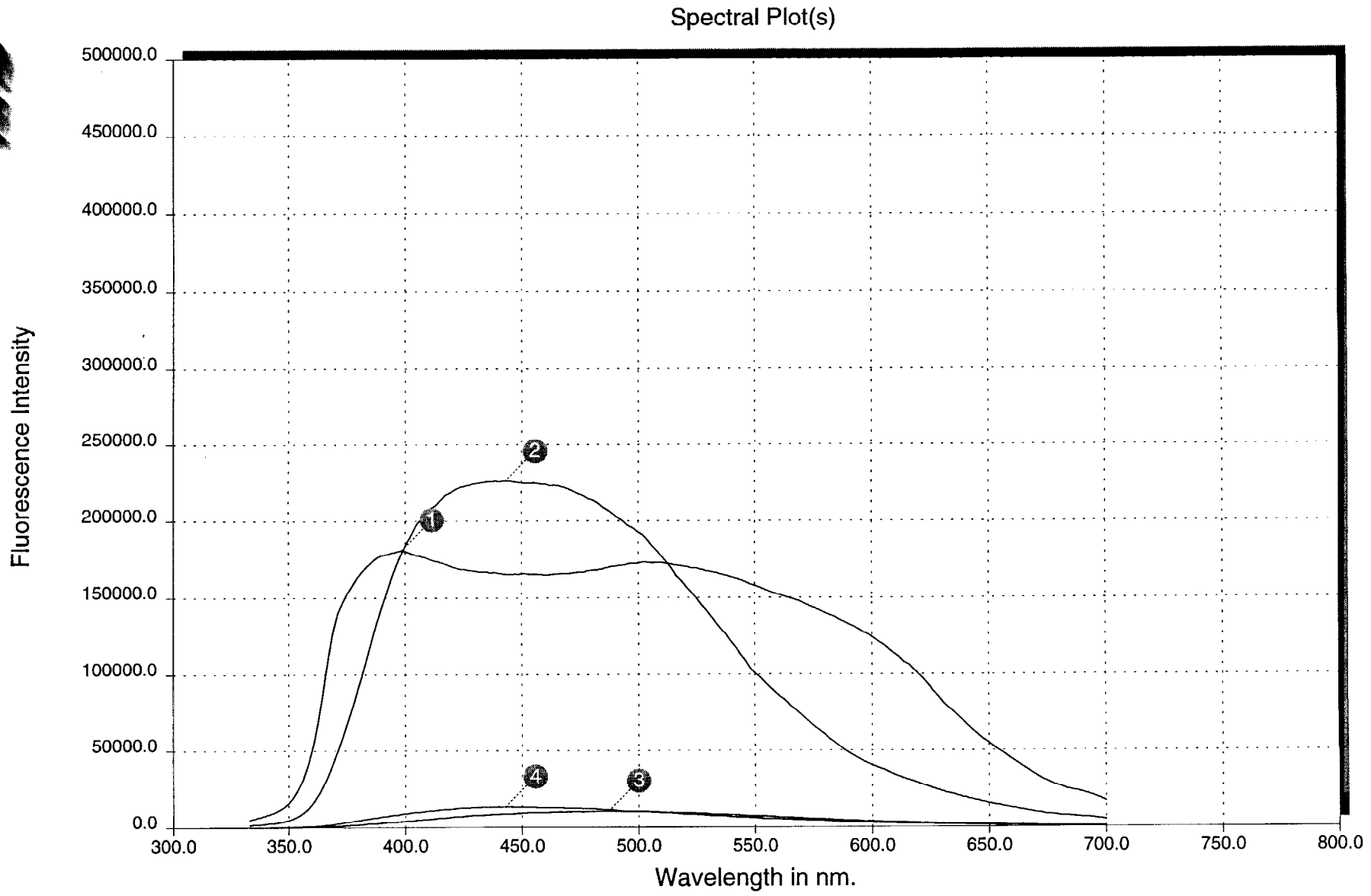

1: 5.9 ft.; 180880 @ 398.4 nm
2: 6.4 ft.; 226003 @ 442.7 nm
3: 8.0 ft.; 10556 @ 487.0 nm
4: 10.0 ft.; 13387 @ 442.7 nm

Time: 13:19:09
Date: 08-08-1995
Version: 1.0

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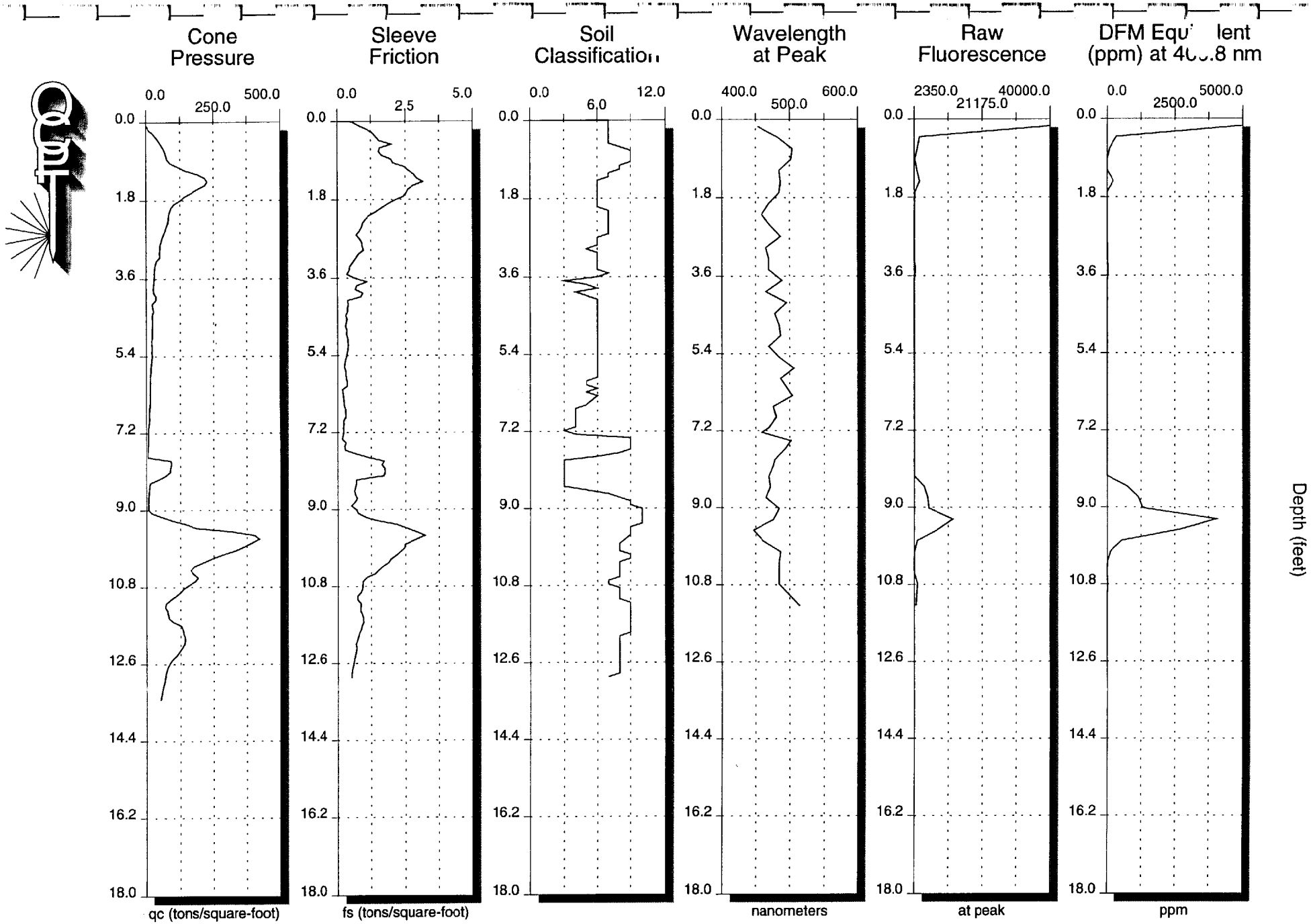

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Version: 1.0

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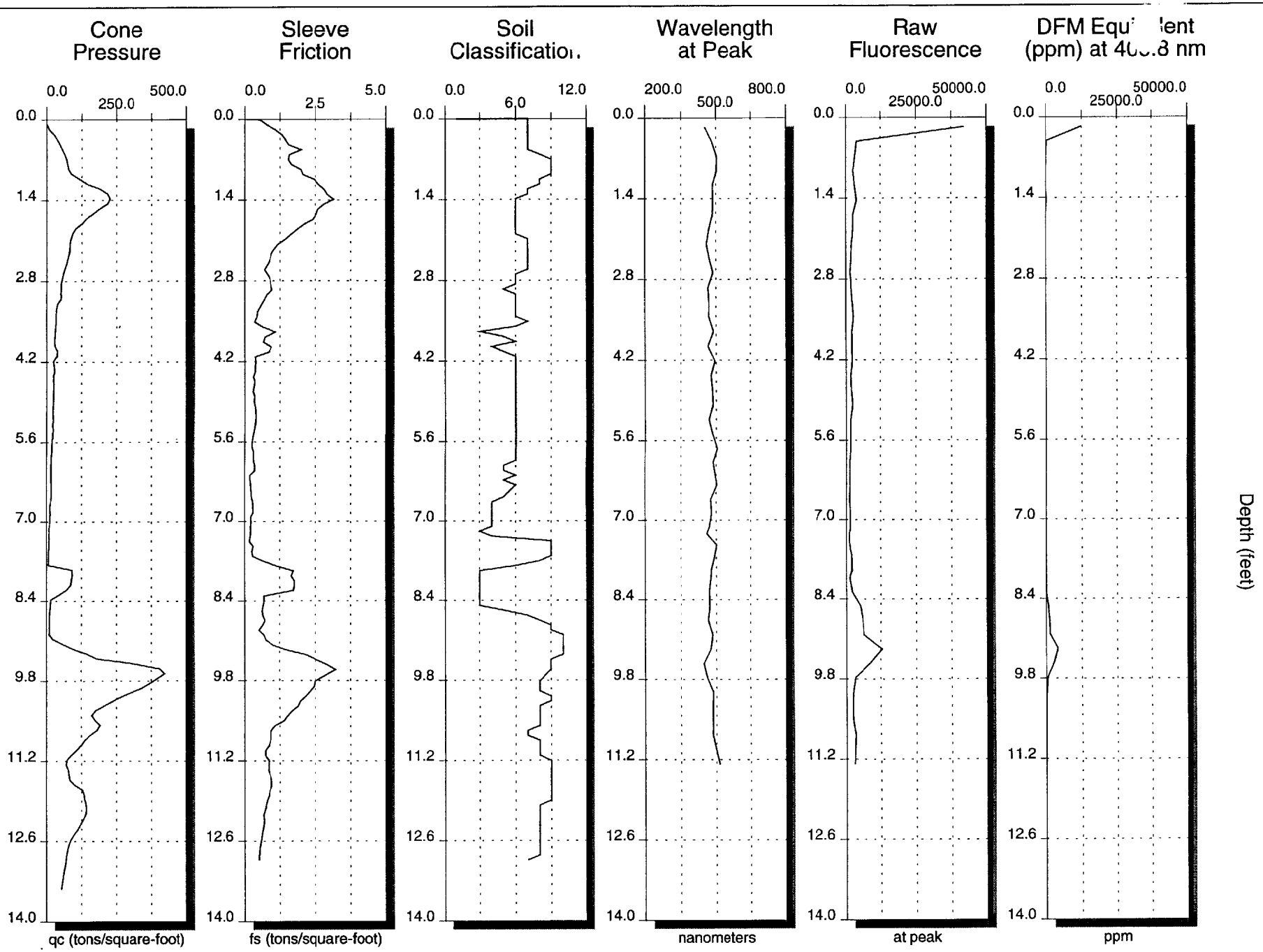

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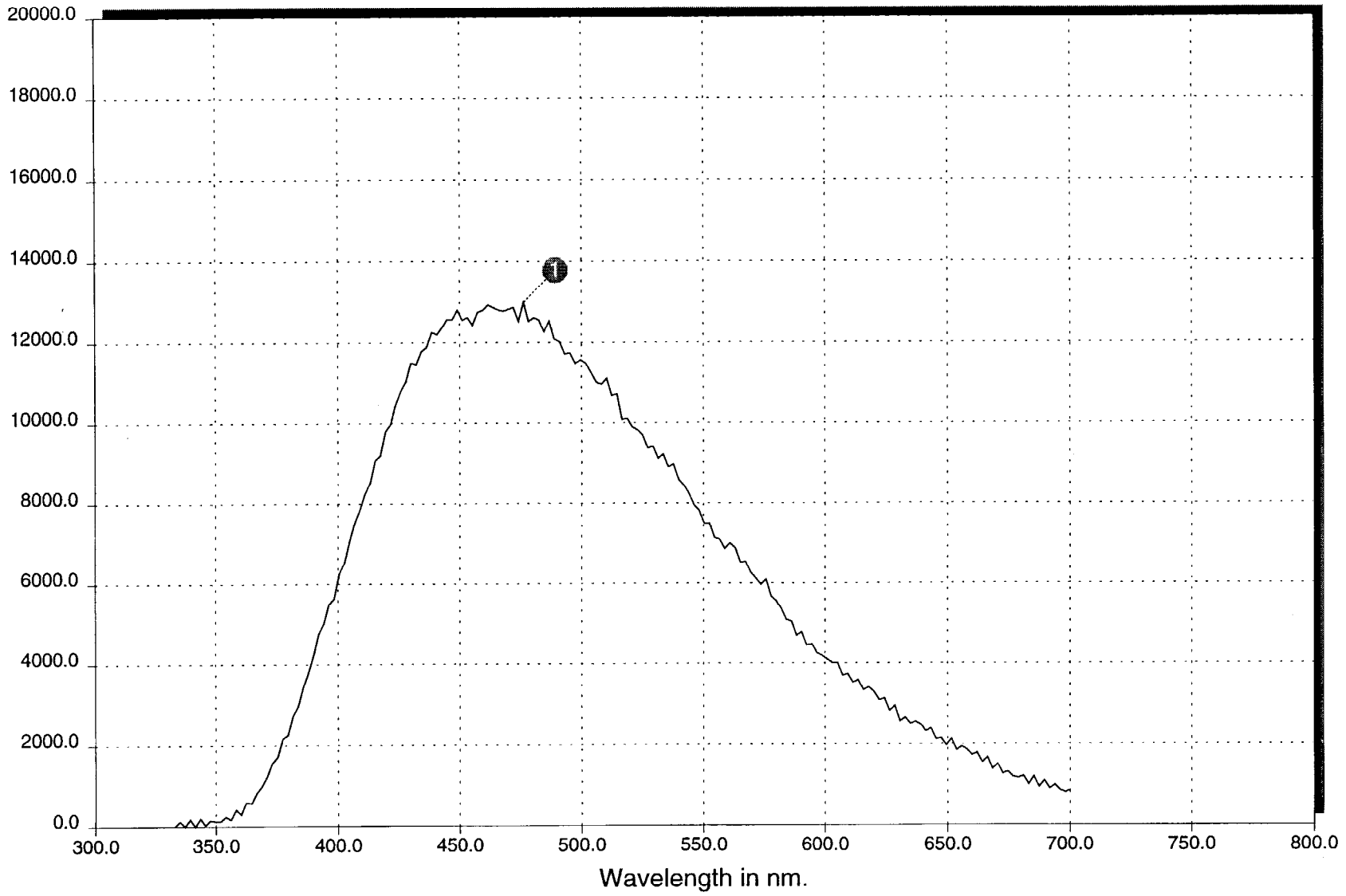
Spectral Plot(s)



1: 9.3 ft.; 12989 @ 476.5 nm

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Date: 08-08-1995

Version: 1.0

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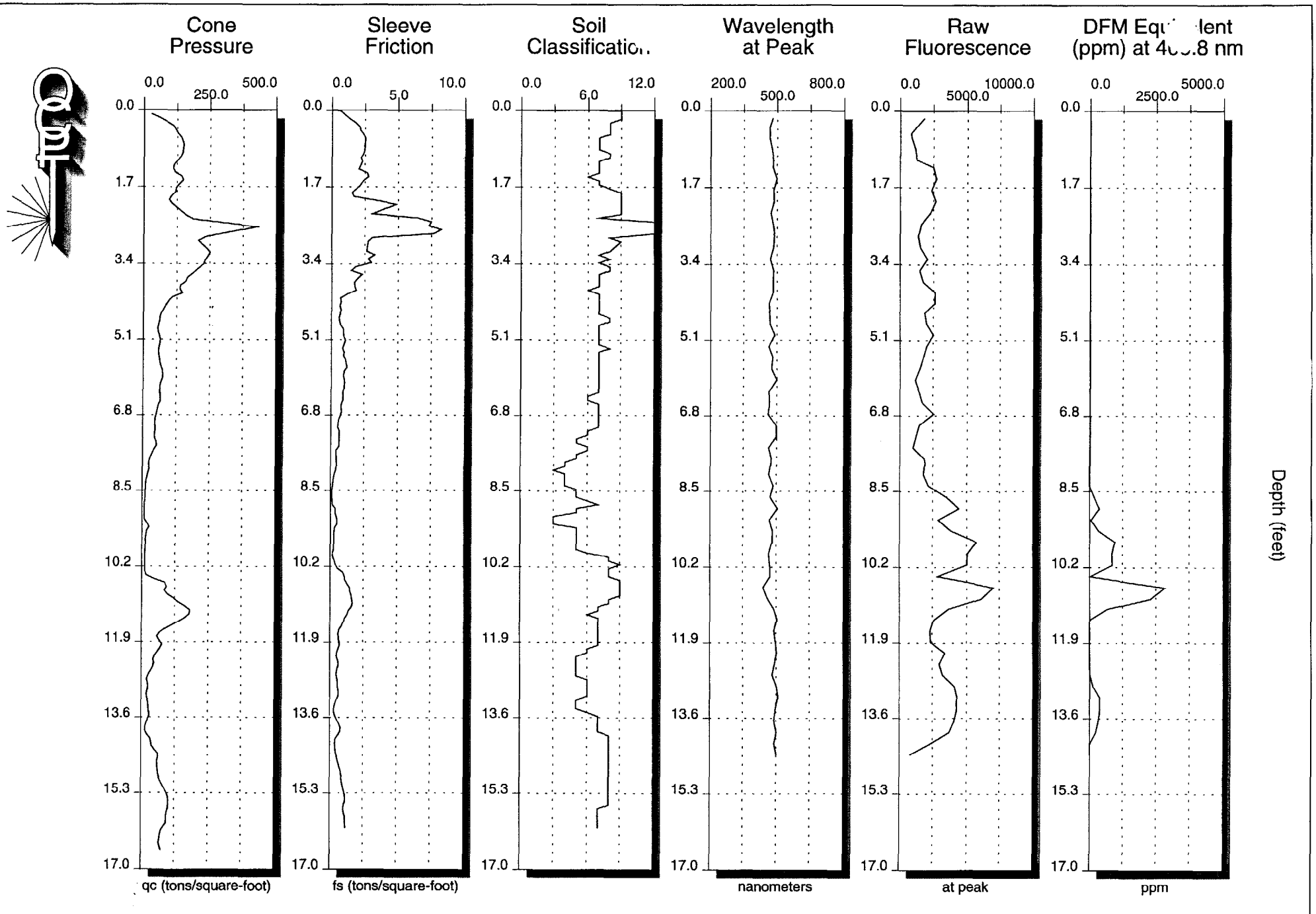

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Version: 1.0

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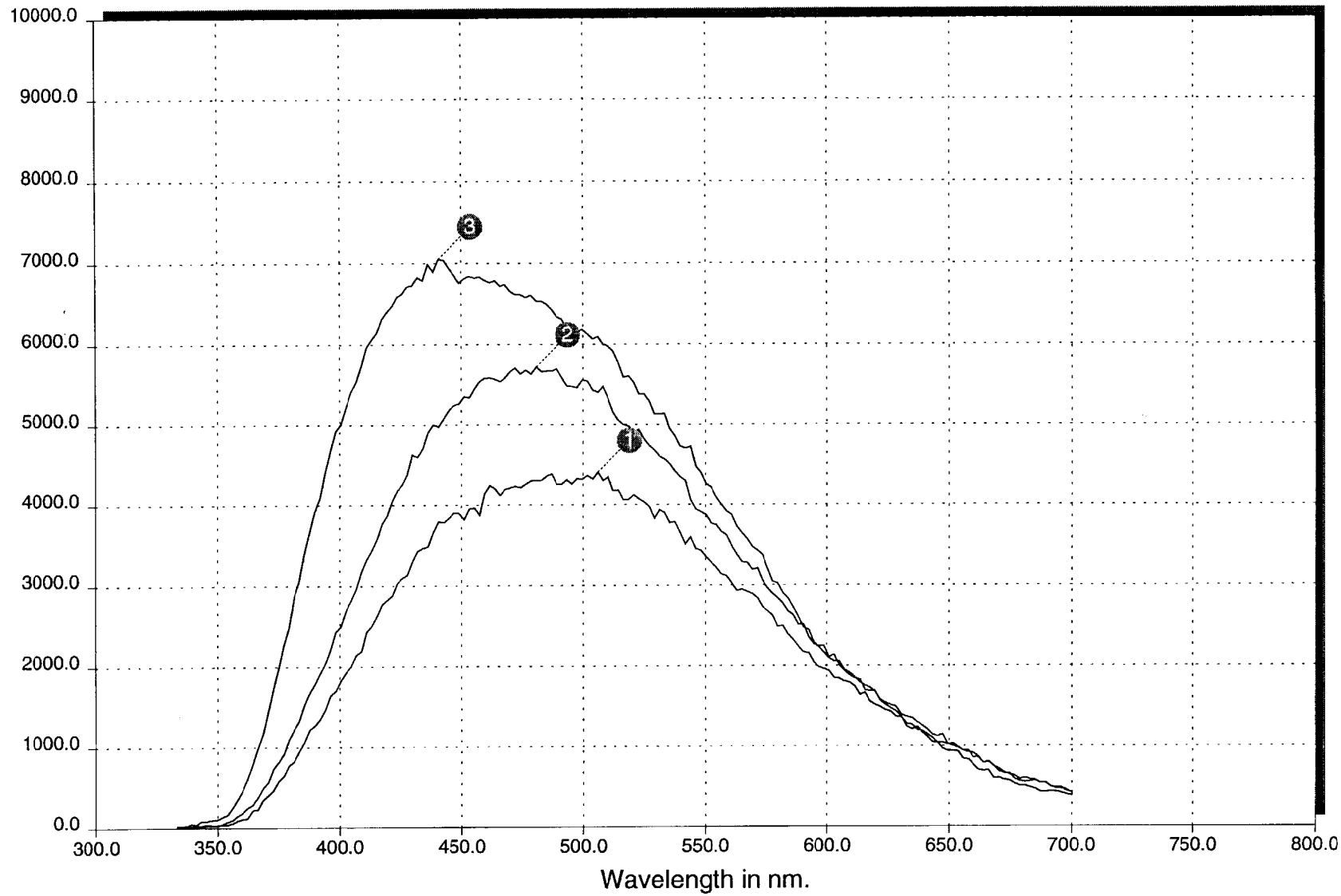
Spectral Plot(s)



1: 8.9 ft.; 4406 @ 506.0 nm

2: 9.6 ft.; 5718 @ 480.7 nm

3: 10.7 ft.; 7051 @ 440.6 nm

Time: 14:49:59

Date: 08-08-1995

Version: 1.0

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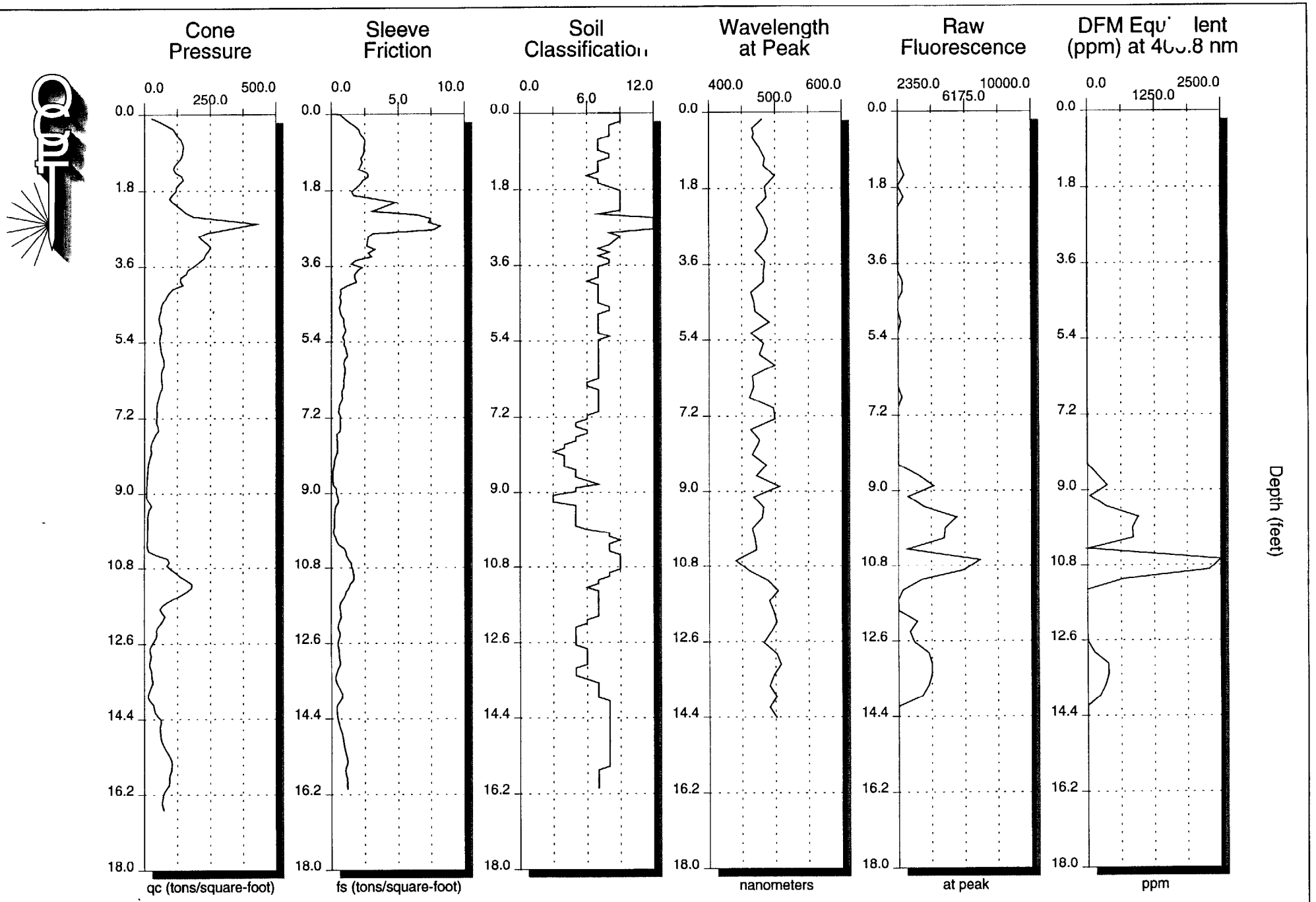

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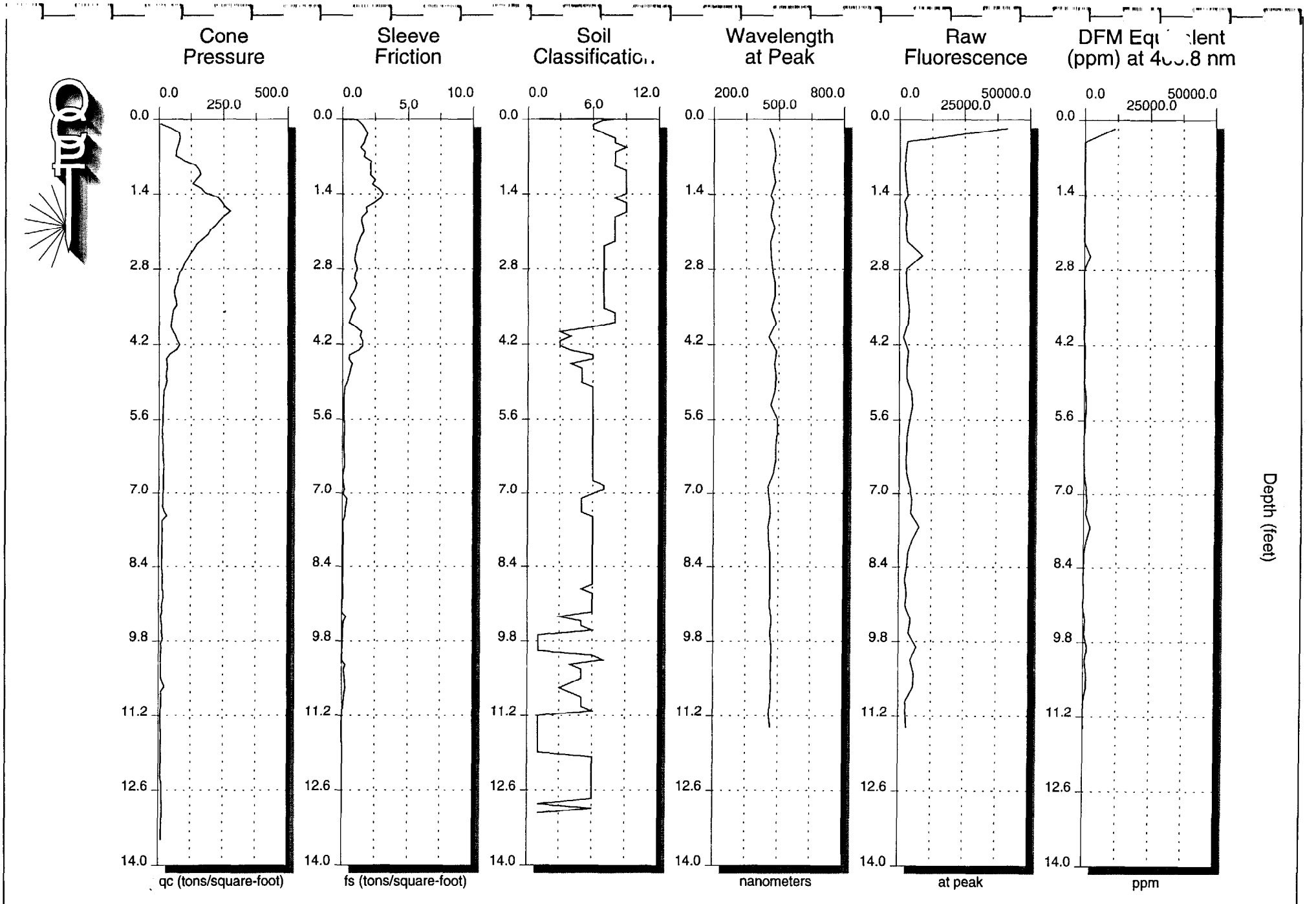

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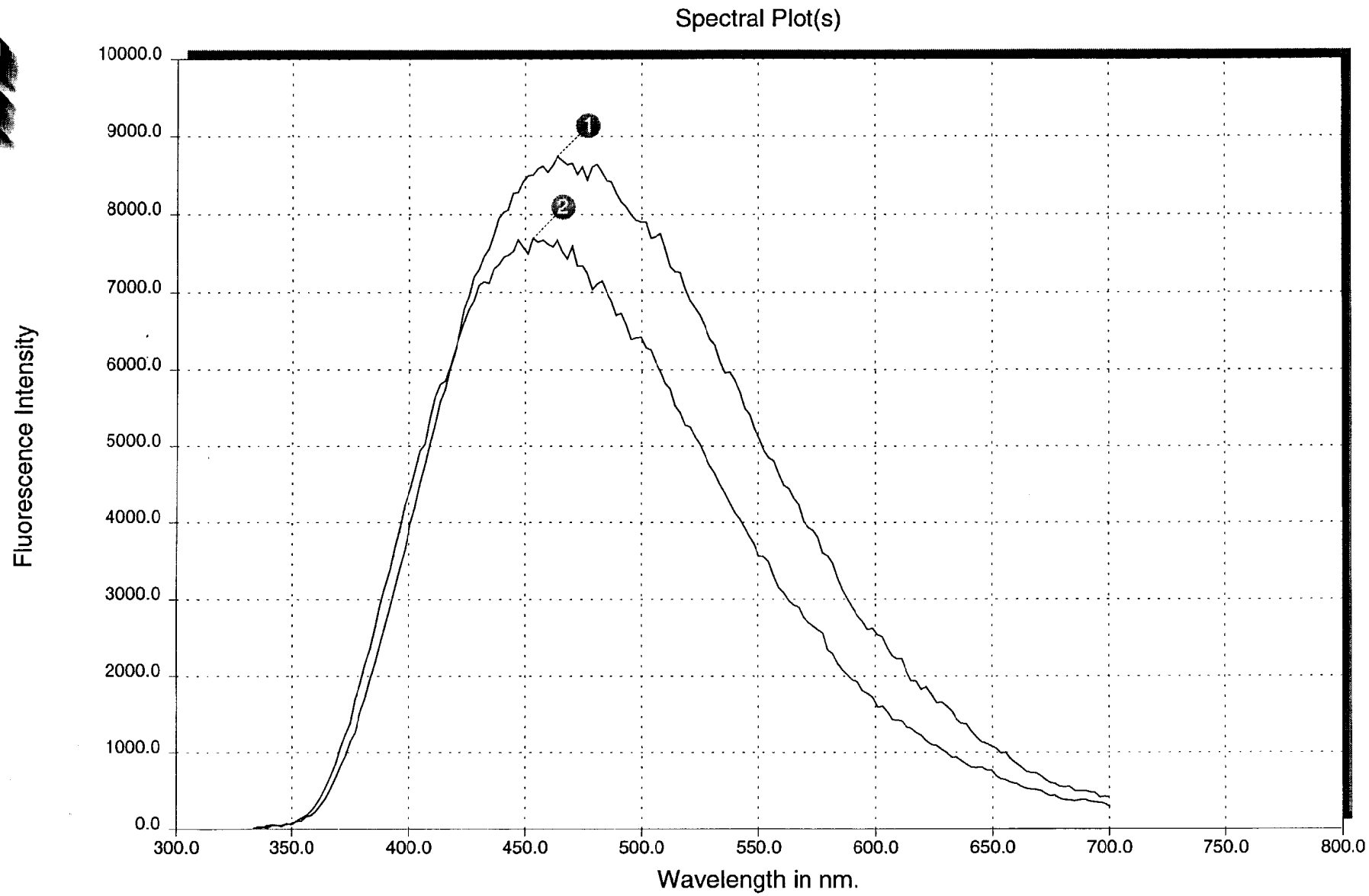
Version: 1.0

Push: C:\BASIC71\DATA\NLFF14.PSH
Probe: C:\BASIC71\DATA\PROBE05A.PRB
Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



1: 2.5 ft.; 8740 @ 463.8 nm

2: 7.6 ft.; 7696 @ 453.2 nm

Time: 15:31:35

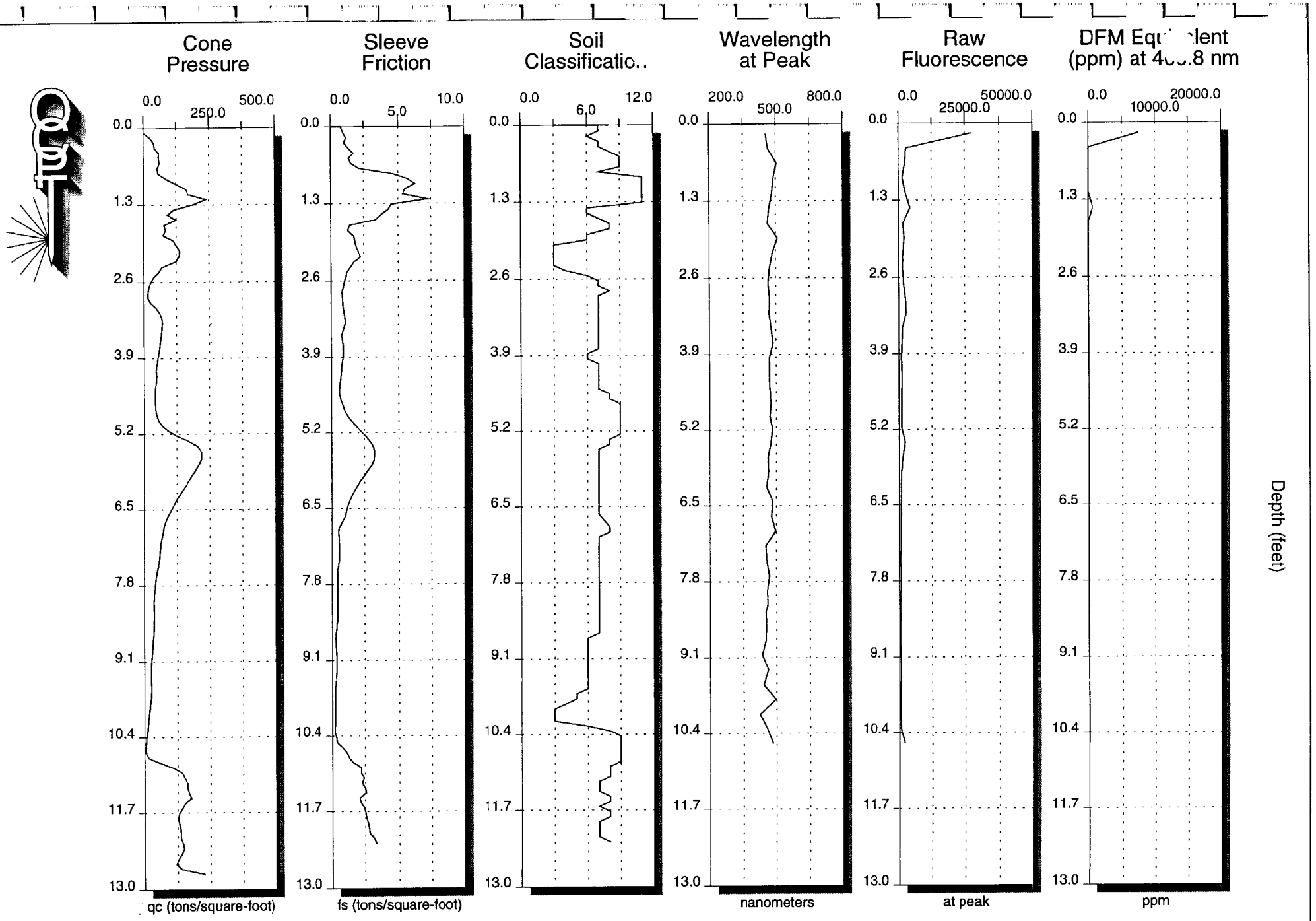
Date: 08-08-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF14.PSH

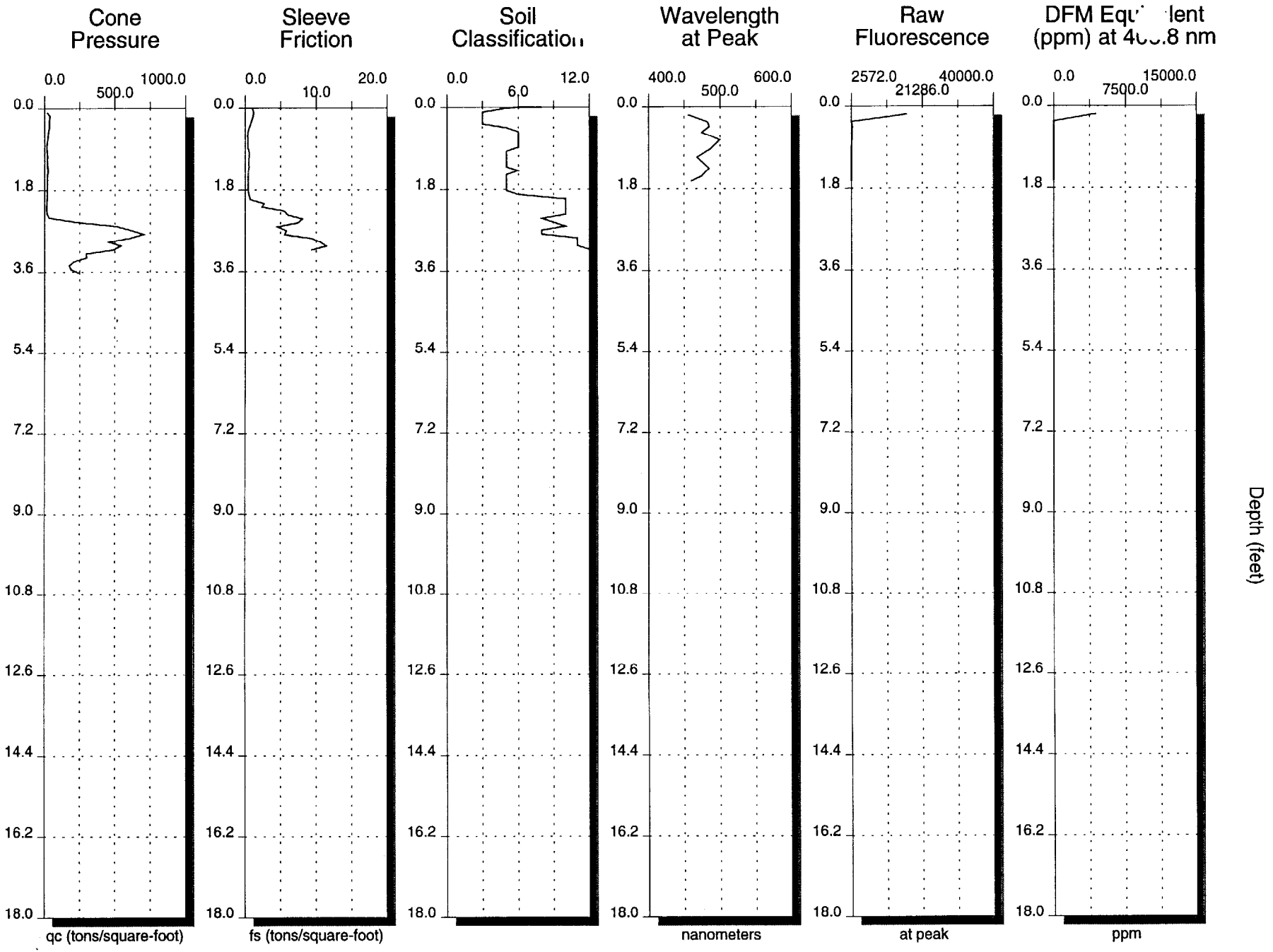
Probe: C:\BASIC71\DATA\PROBE05A.PRB

Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



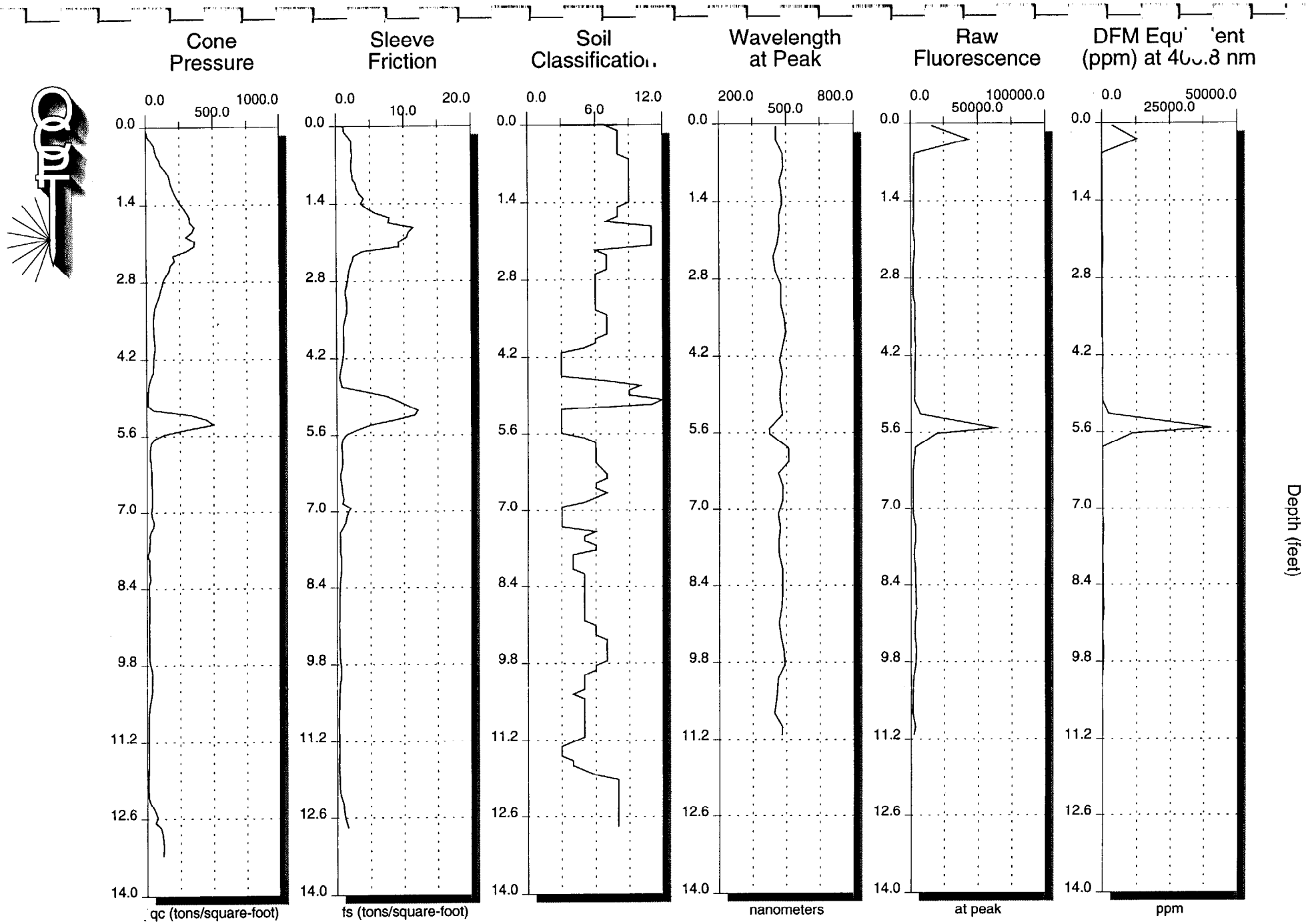
Time: 16:14:51
Date: 08-08-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF15.PSH
Probe: C:\BASIC71\DATA\PROBE05A.PRB
Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



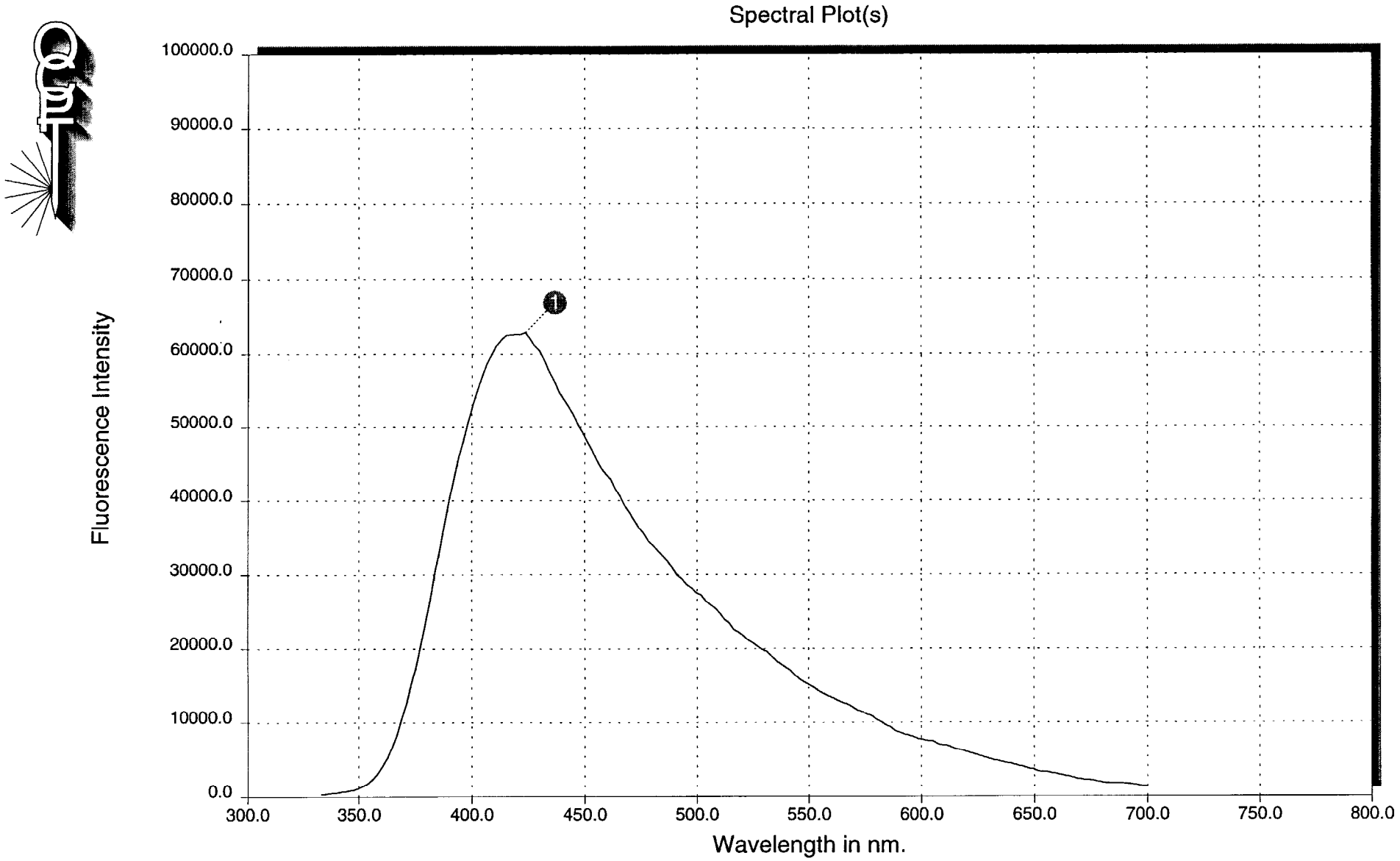
Time: 16:44:13
Date: 08-08-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF16.PSH
Probe: C:\BASIC71\DATA\PROBE05A.PRB
Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



Time: 17:24:05
Date: 08-08-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF17.PSH
Probe: C:\BASIC71\DATA\PROBE05A.PRB
Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



1: 5.5 ft.; 62933 @ 423.7 nm

Time: 17:24:05

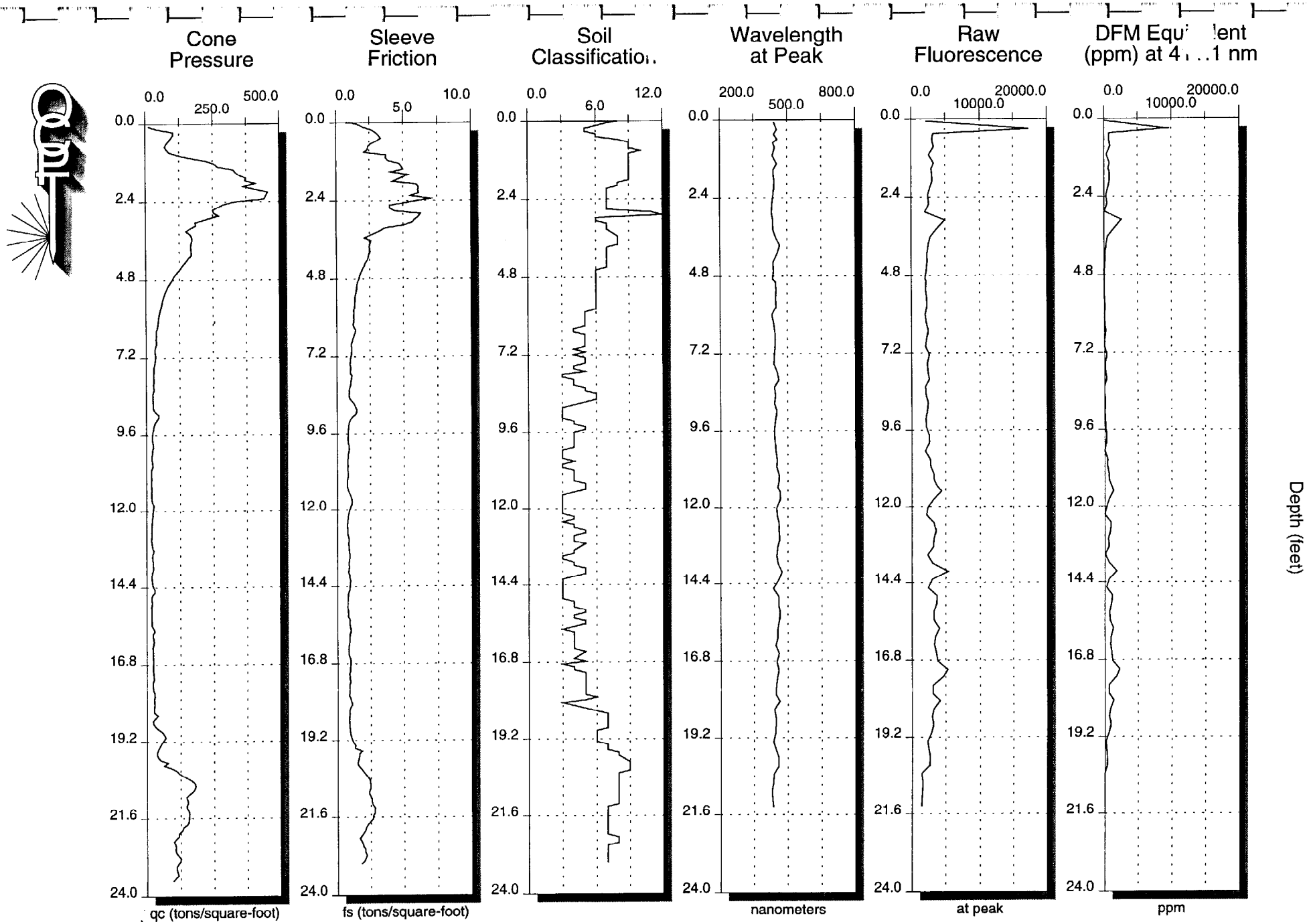
Date: 08-08-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF17.PSH

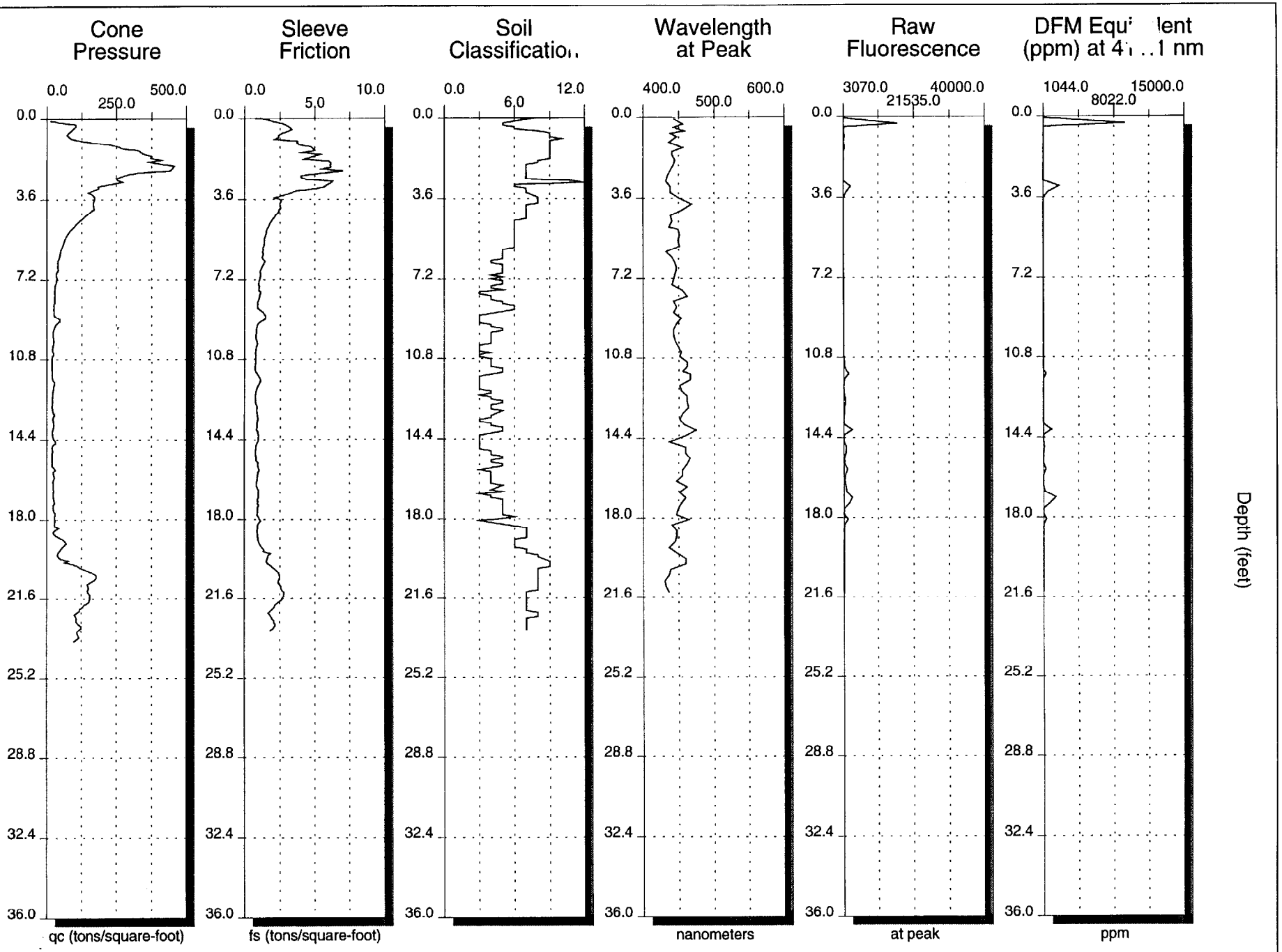
Probe: C:\BASIC71\DATA\PROBE05A.PRB

Calibration: C:\BASIC71\DATA\AUG8DFM.CAL



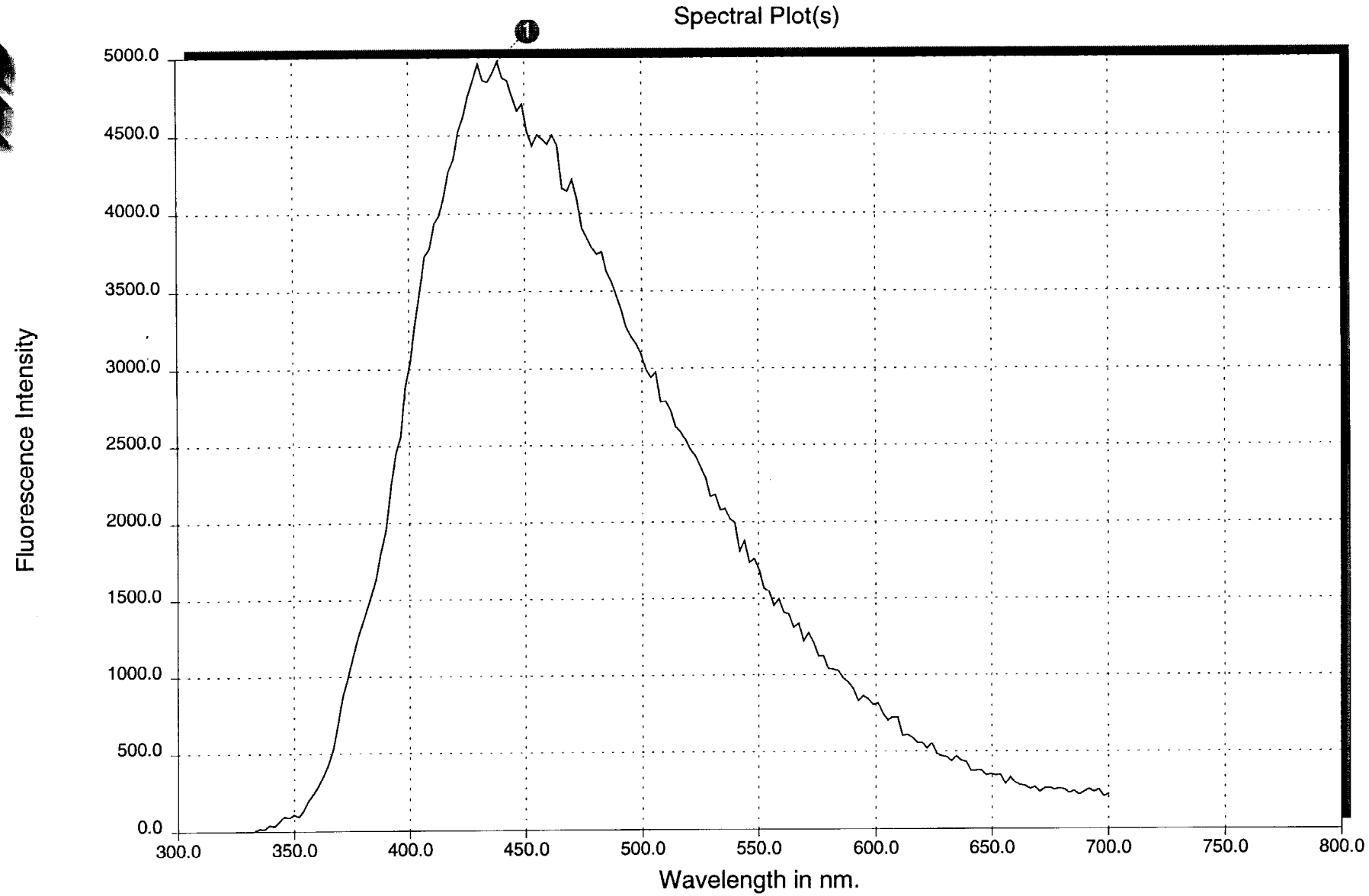
Time: 09:17:53
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF18.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 09:17:53
Date: 08-10-1995
Version: 1.0

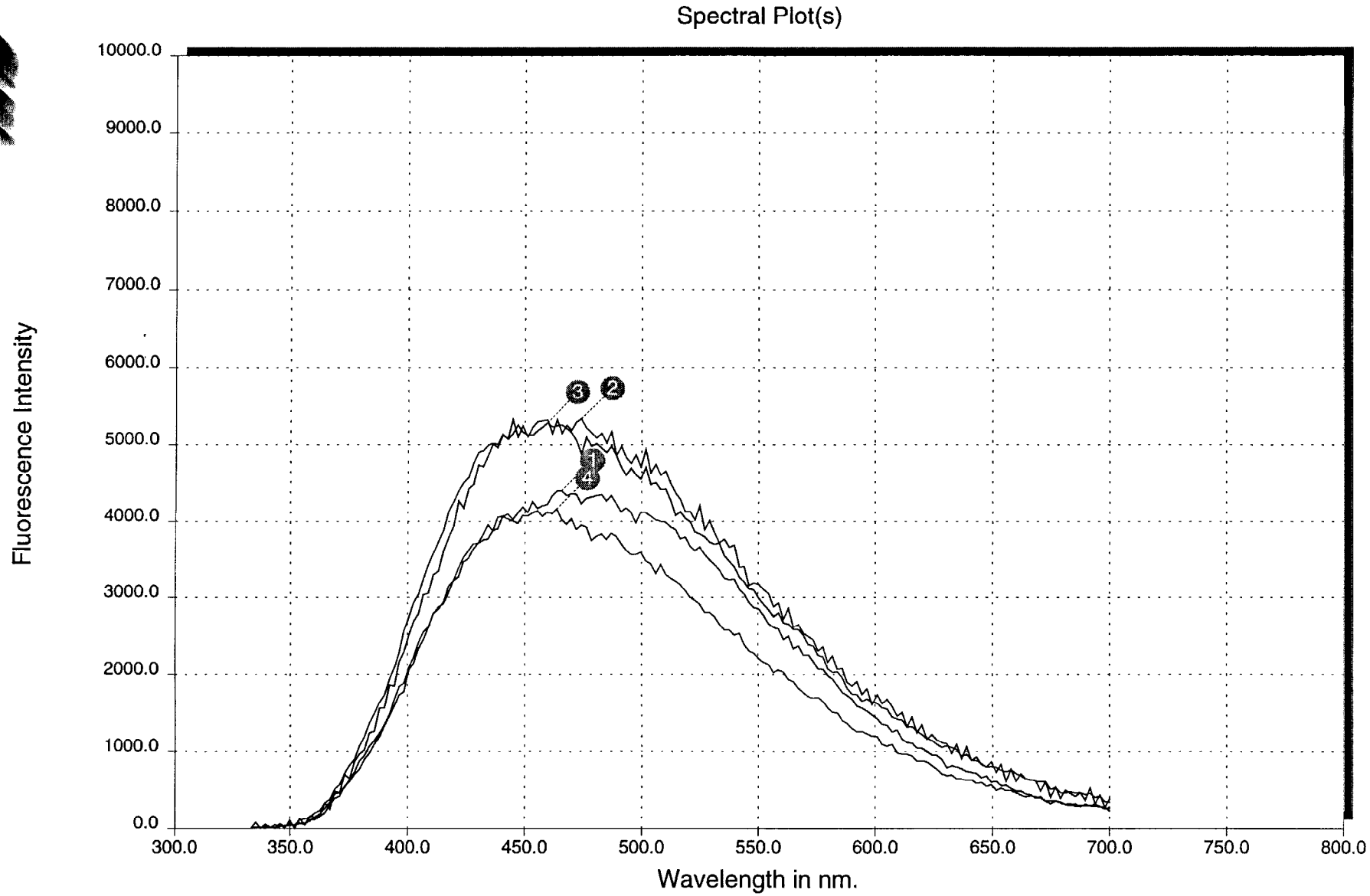
Push: C:\BASIC71\DATA\NLFF18.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 3.1 ft.; 4974 @ 438.5 nm

Time: 09:17:53
Date: 08-10-1995
Version: 1.0

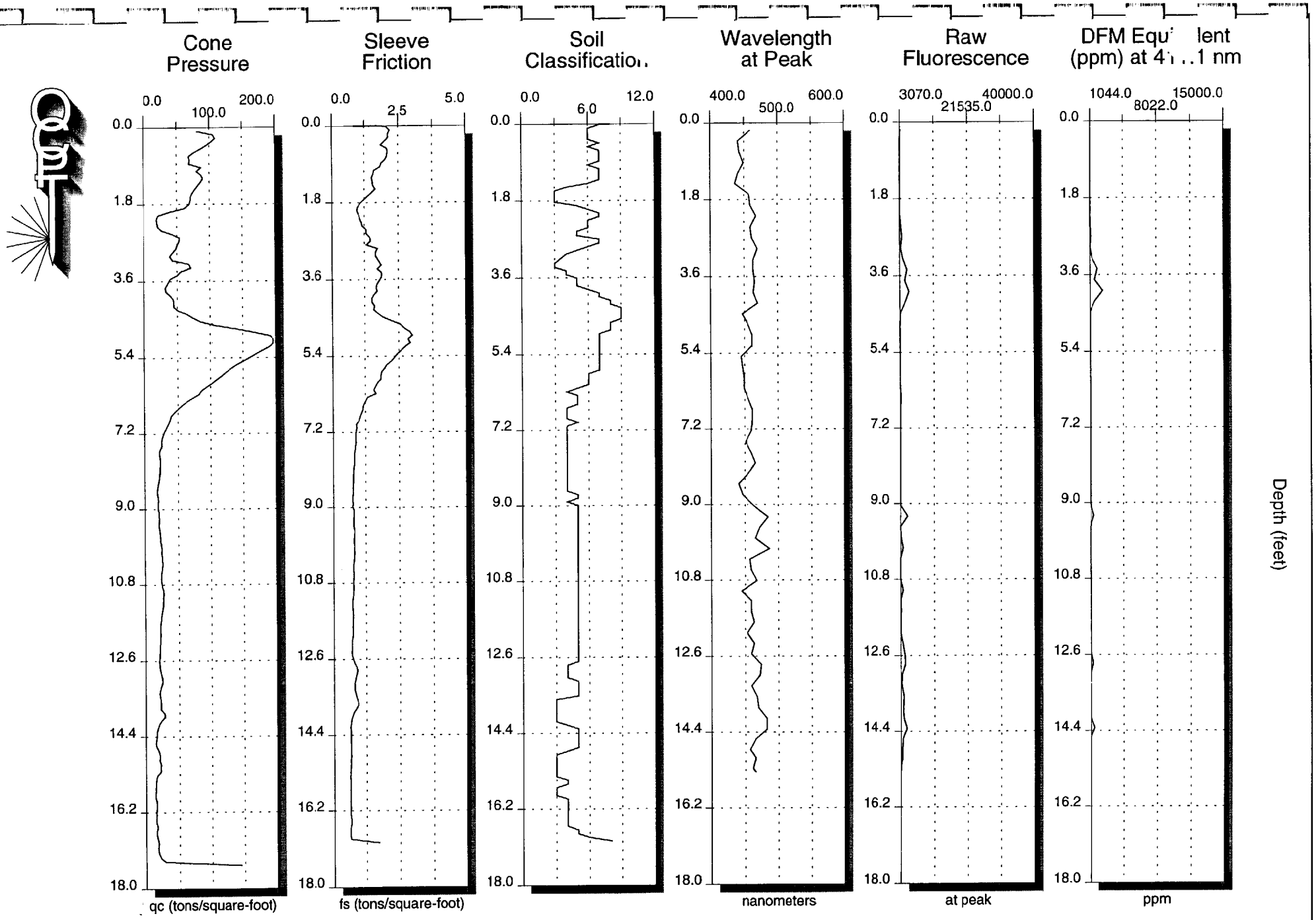
Main: C:\BASIC71\DATA\NLFF18.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 11.5 ft.; 4397 @ 465.9 nm
2: 14.0 ft.; 5337 @ 474.3 nm
3: 17.1 ft.; 5287 @ 459.6 nm
4: 18.1 ft.; 4162 @ 463.8 nm

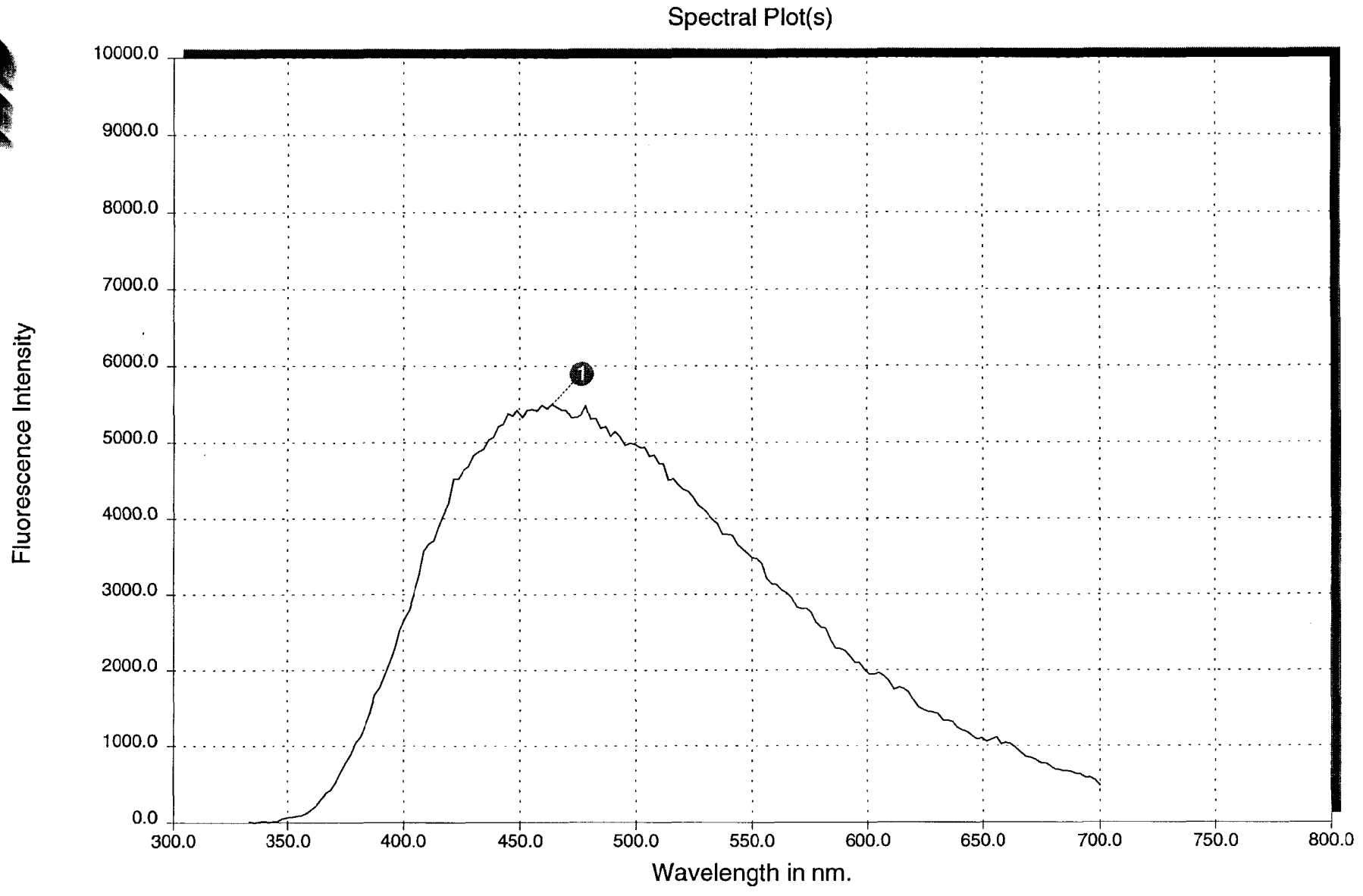
Time: 09:17:53
Date: 08-10-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF18.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 10:41:45
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF19.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 4.0 ft.; 5498 @ 463.8 nm

Time: 10;41:45

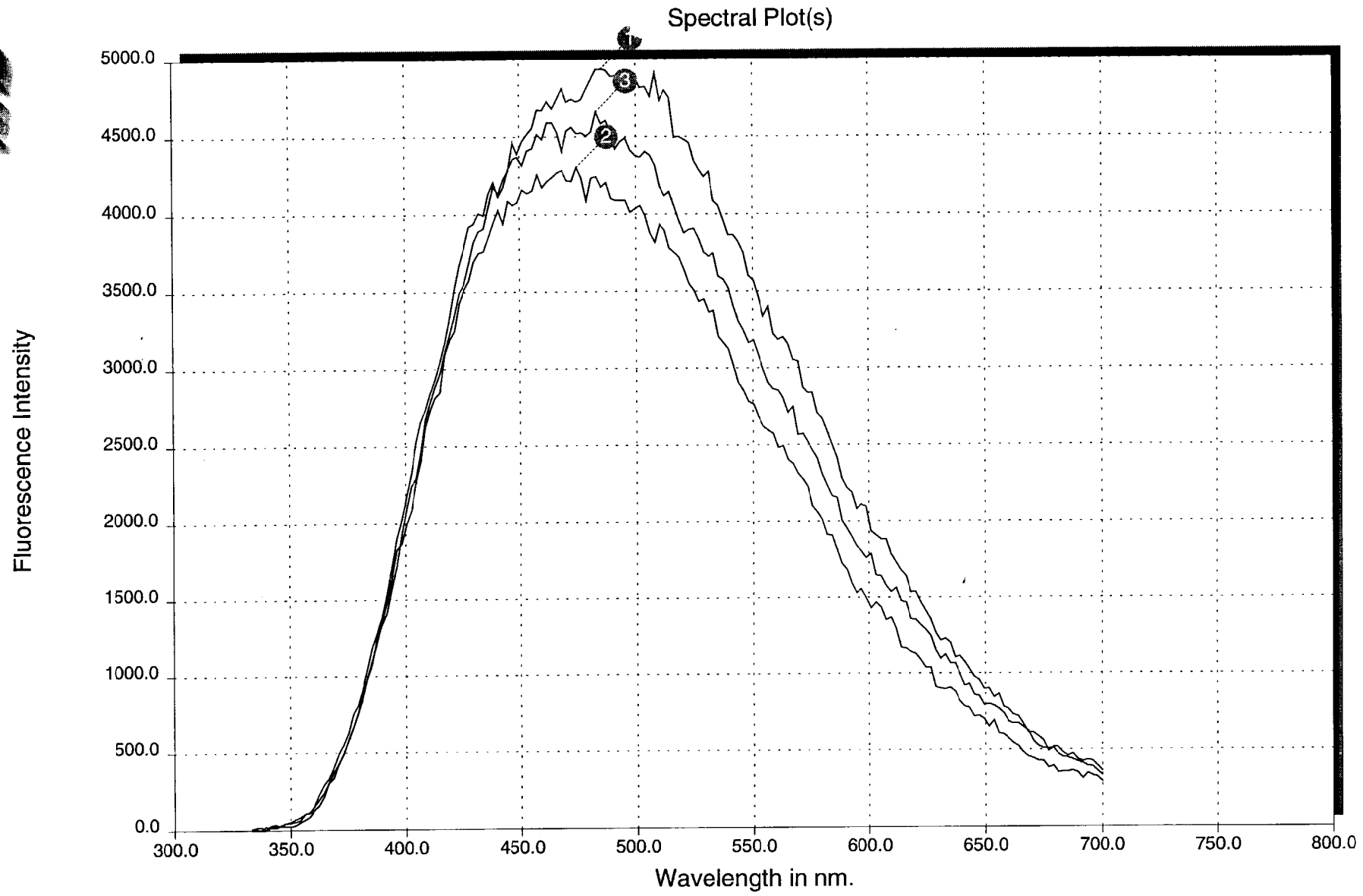
Date: 08-10-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF19.PSH

Probe: C:\BASIC71\DATA\PROBE12B.PRB

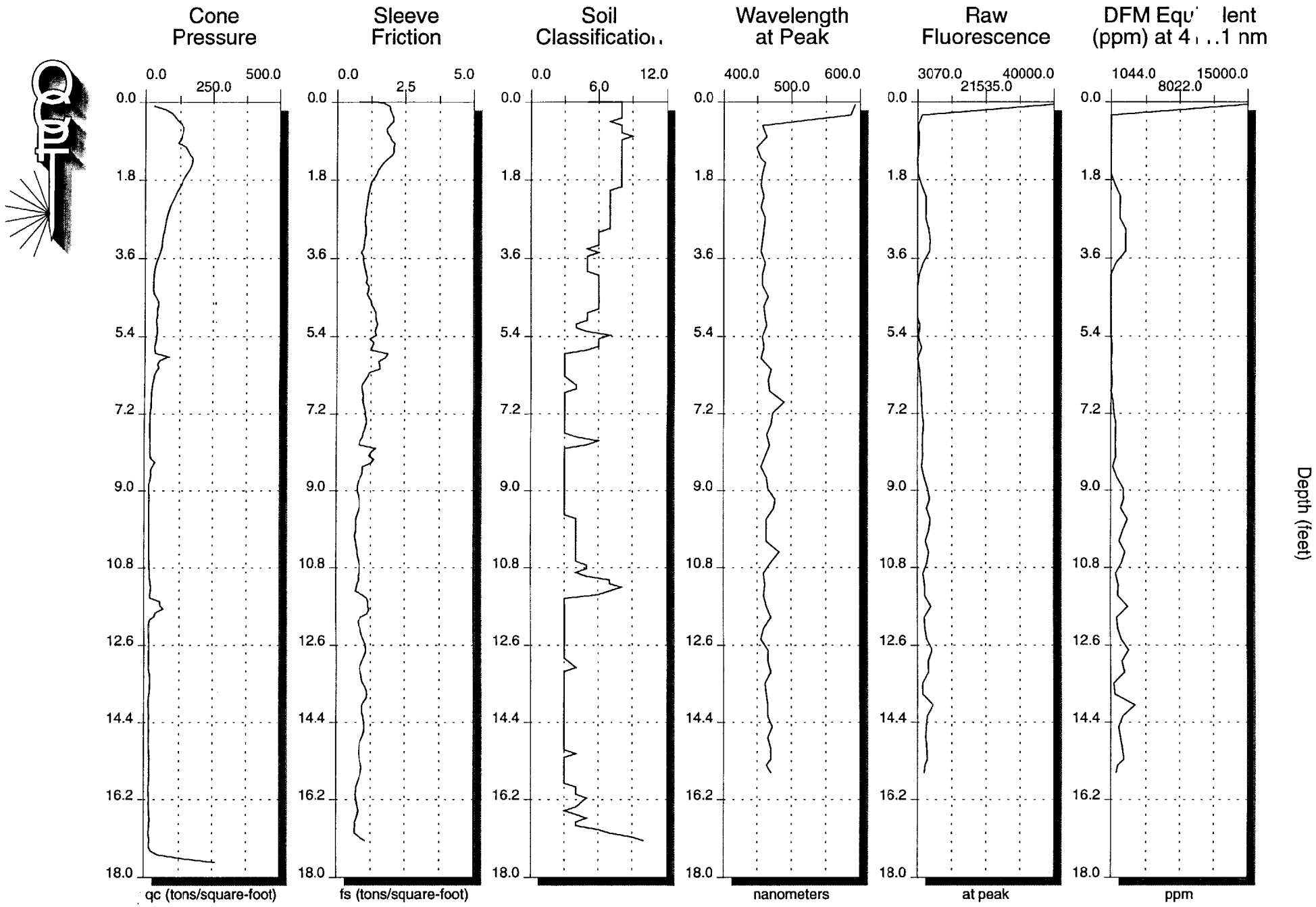
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 9.3 ft.; 4935 @ 484.9 nm
2: 12.8 ft.; 4301 @ 474.3 nm
3: 14.3 ft.; 4660 @ 482.8 nm

Time: 10:41:45
Date: 08-10-1995
Version: 1.0

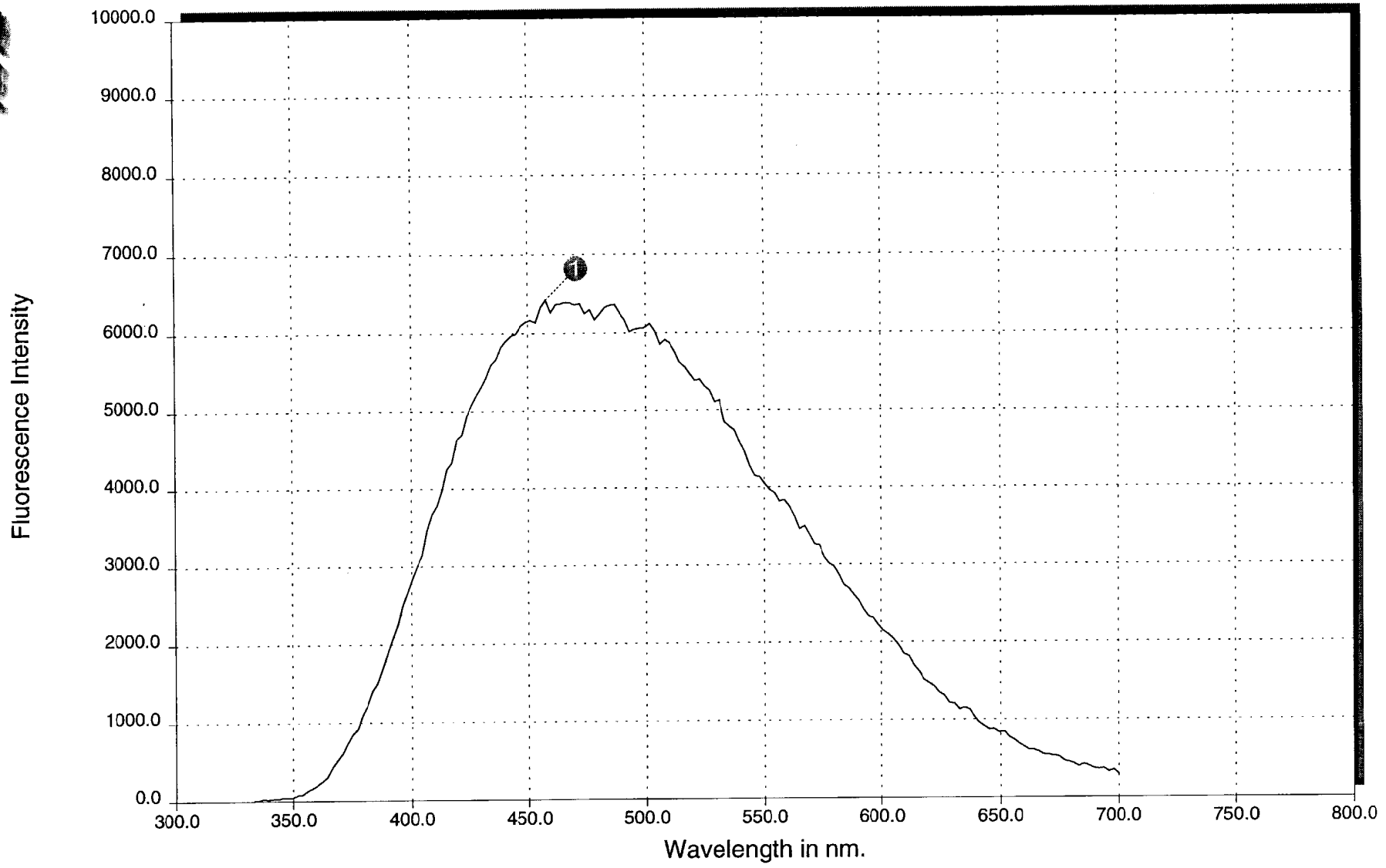
Main: C:\BASIC71\DATA\NLFF19.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 11:19:15
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF20.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL

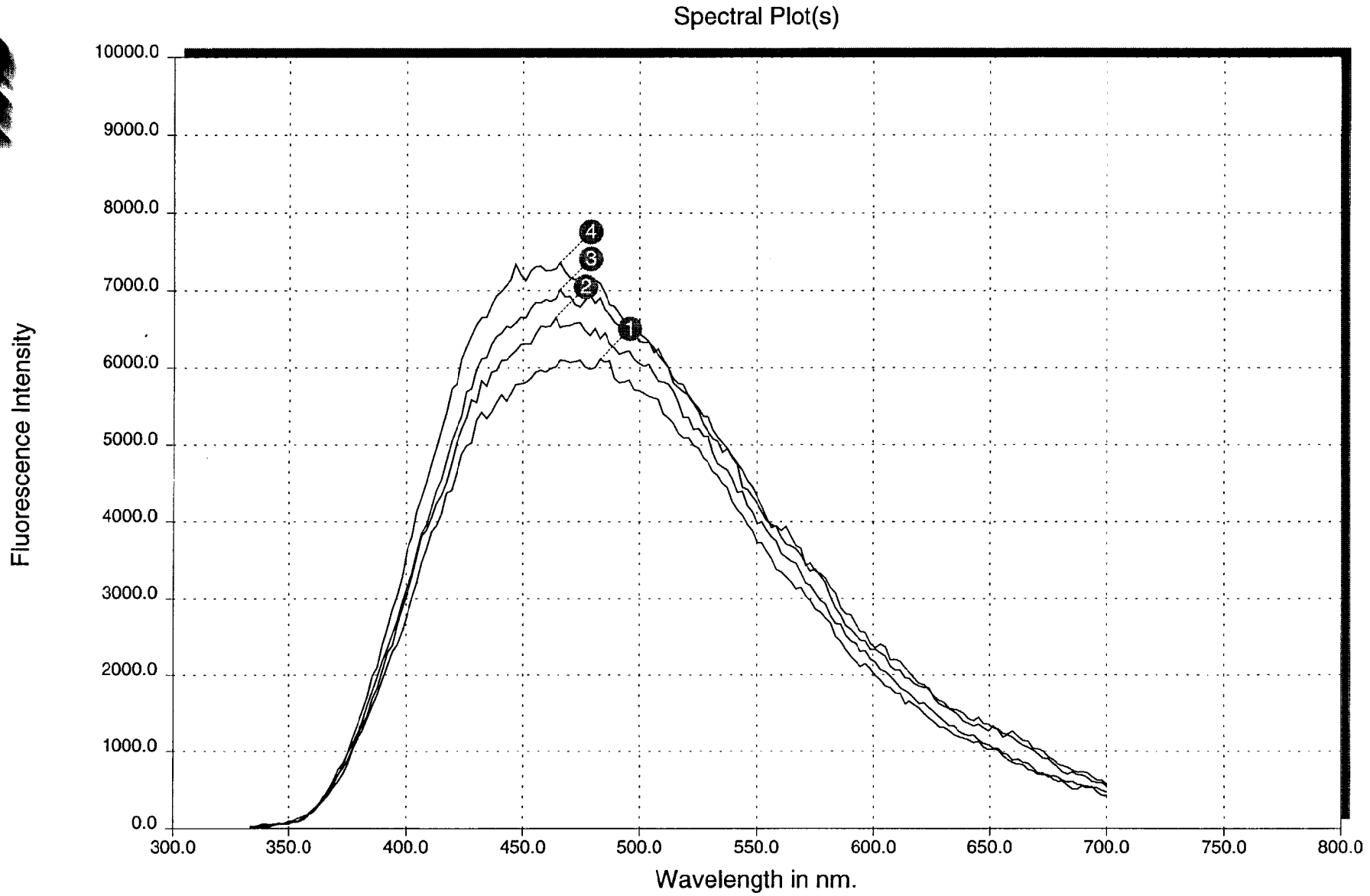
Spectral Plot(s)



1: 3.2 ft.; 6423 @ 457.5 nm

Time: 11:19:15
Date: 08-10-1995
Version: 1.0

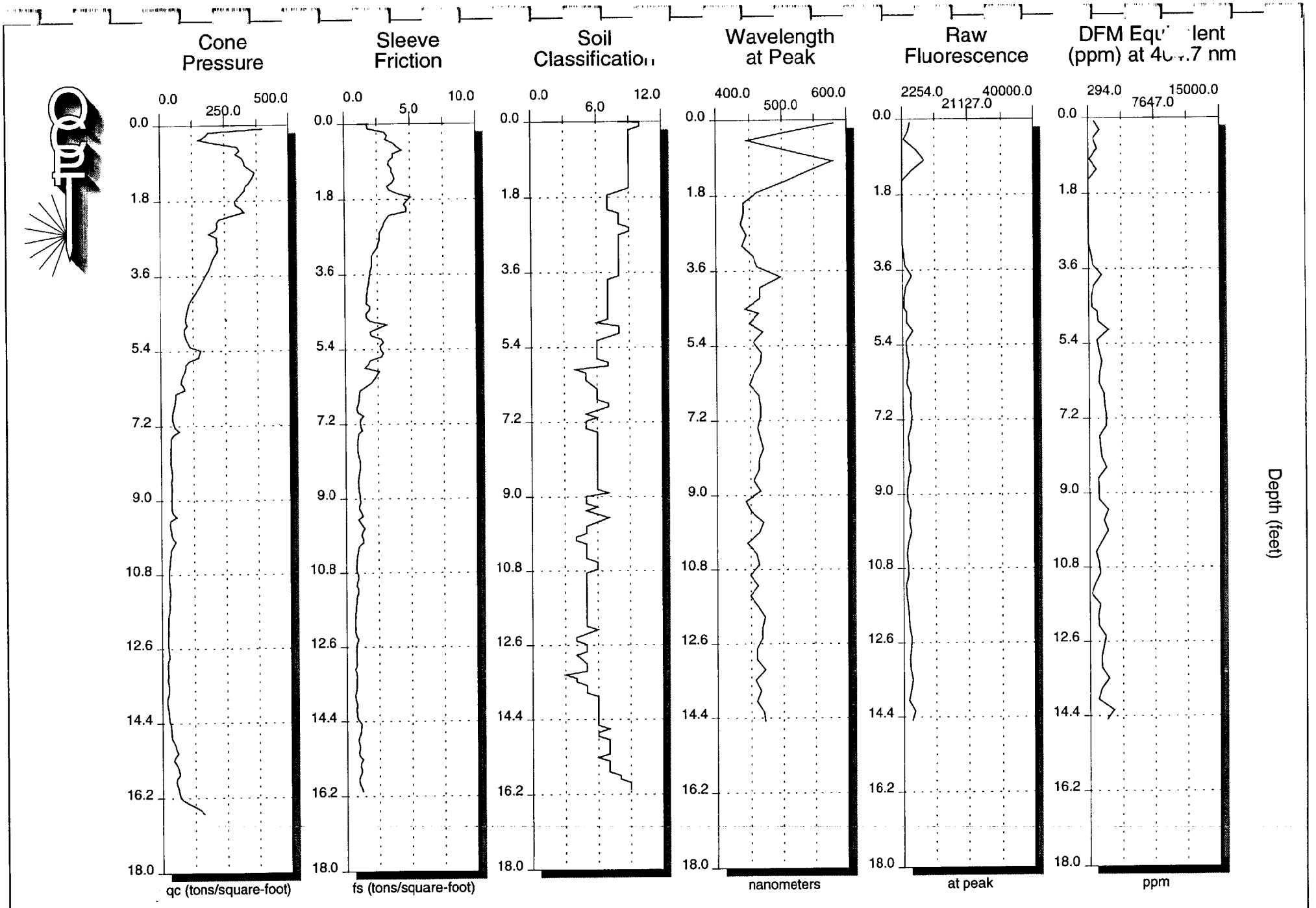
Main: C:\BASIC71\DATA\NLFF20.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 10.4 ft.; 6108 @ 482.8 nm
2: 11.7 ft.; 6649 @ 463.8 nm
3: 12.7 ft.; 7011 @ 465.9 nm
4: 14.0 ft.; 7359 @ 465.9 nm

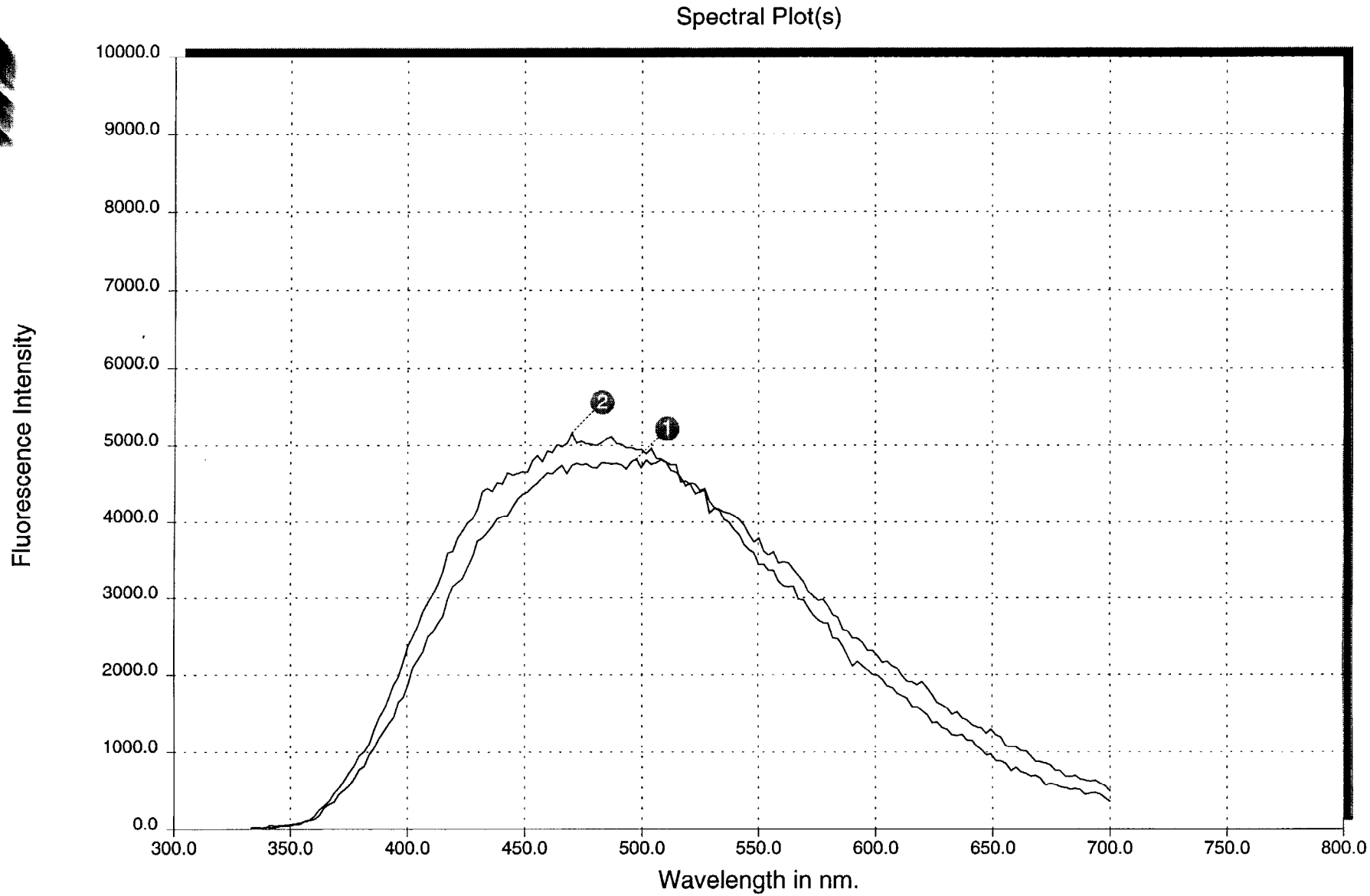
Time: 11:19:15
Date: 08-10-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF20.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 18:00:25
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF21.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL



1: 3.7 ft.; 4824 @ 497.6 nm

2: 5.1 ft.; 5163 @ 470.1 nm

Time: 18:00:25

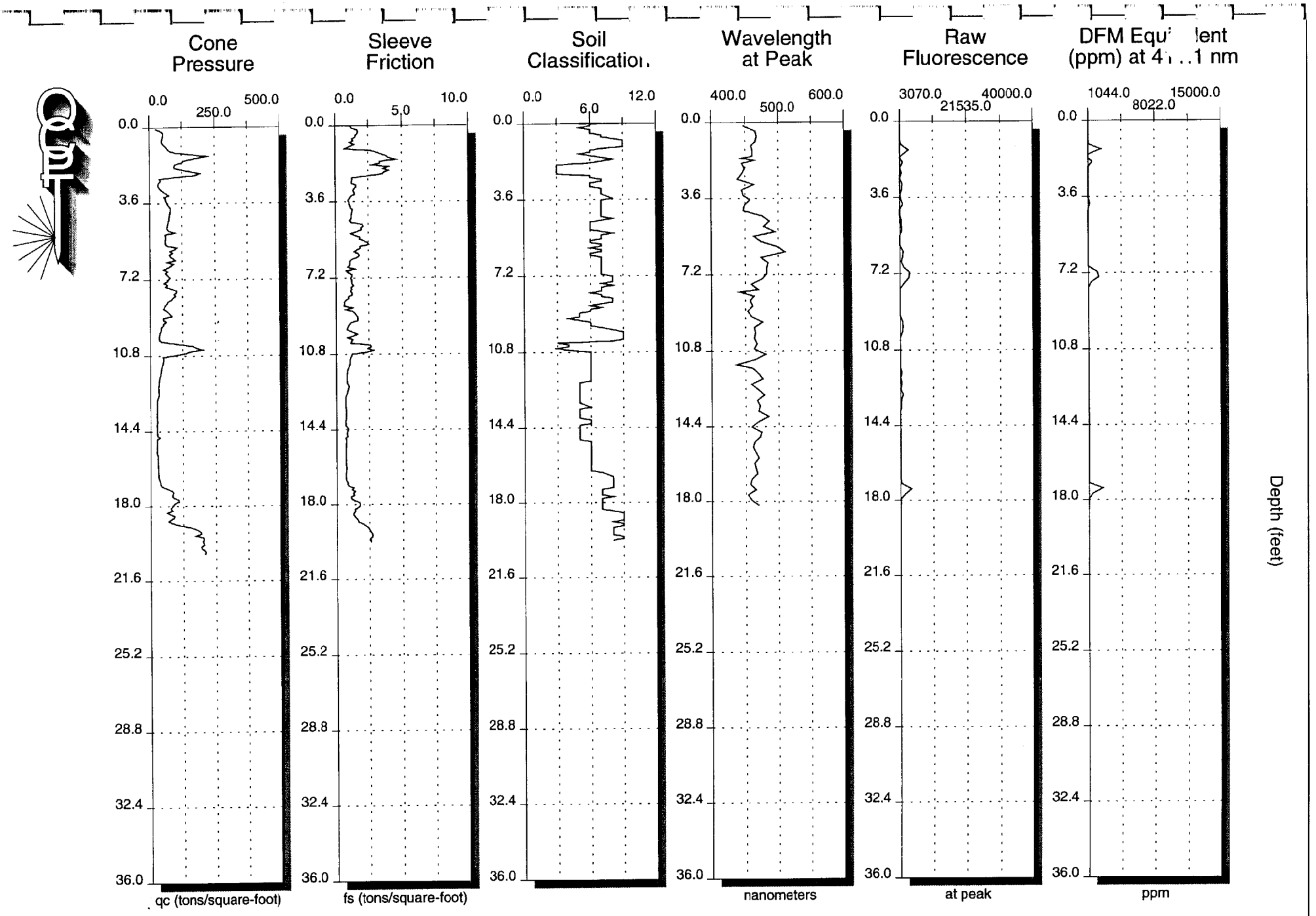
Date: 08-10-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF21.PSH

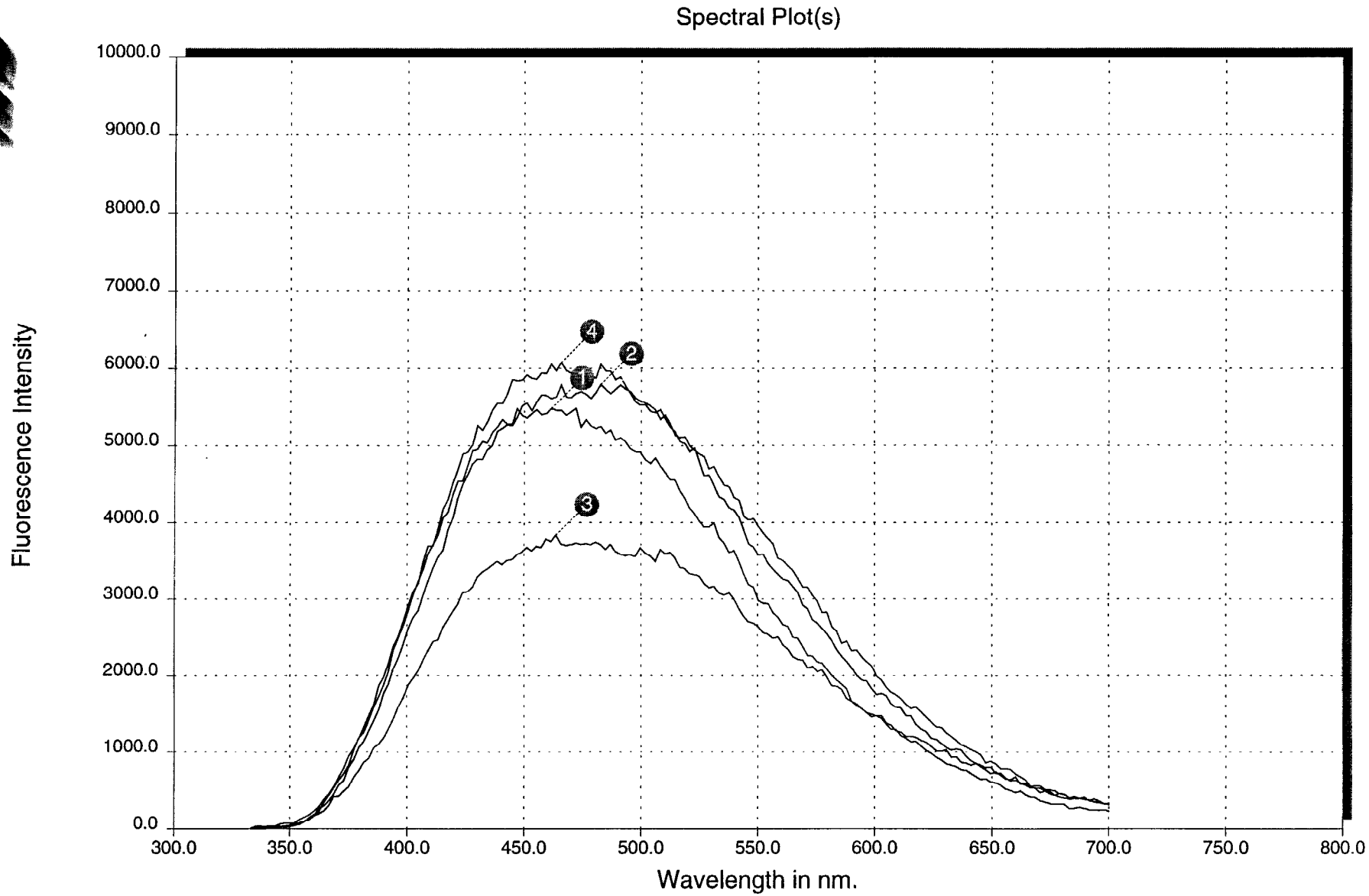
Probe: C:\BASIC71\DATA\PROBE12B.PRB

Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 16:33:55
Date: 08-10-1995
Version: 1.0

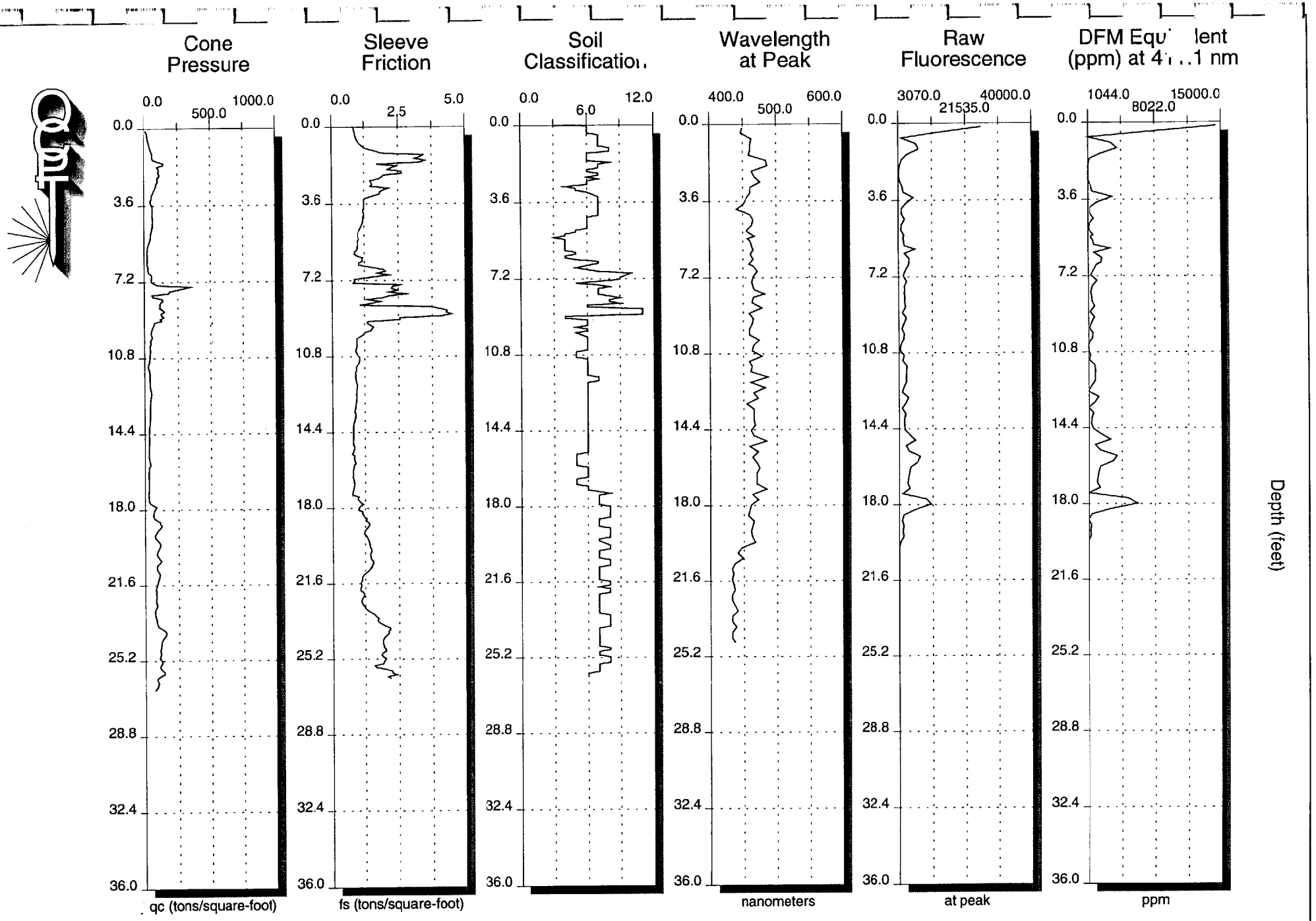
Push: C:\BASIC71\DATA\NLFF22.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 1.4 ft.; 5478 @ 461.7 nm
2: 7.1 ft.; 5791 @ 482.8 nm
3: 9.7 ft.; 3837 @ 463.8 nm
4: 17.4 ft.; 6077 @ 465.9 nm

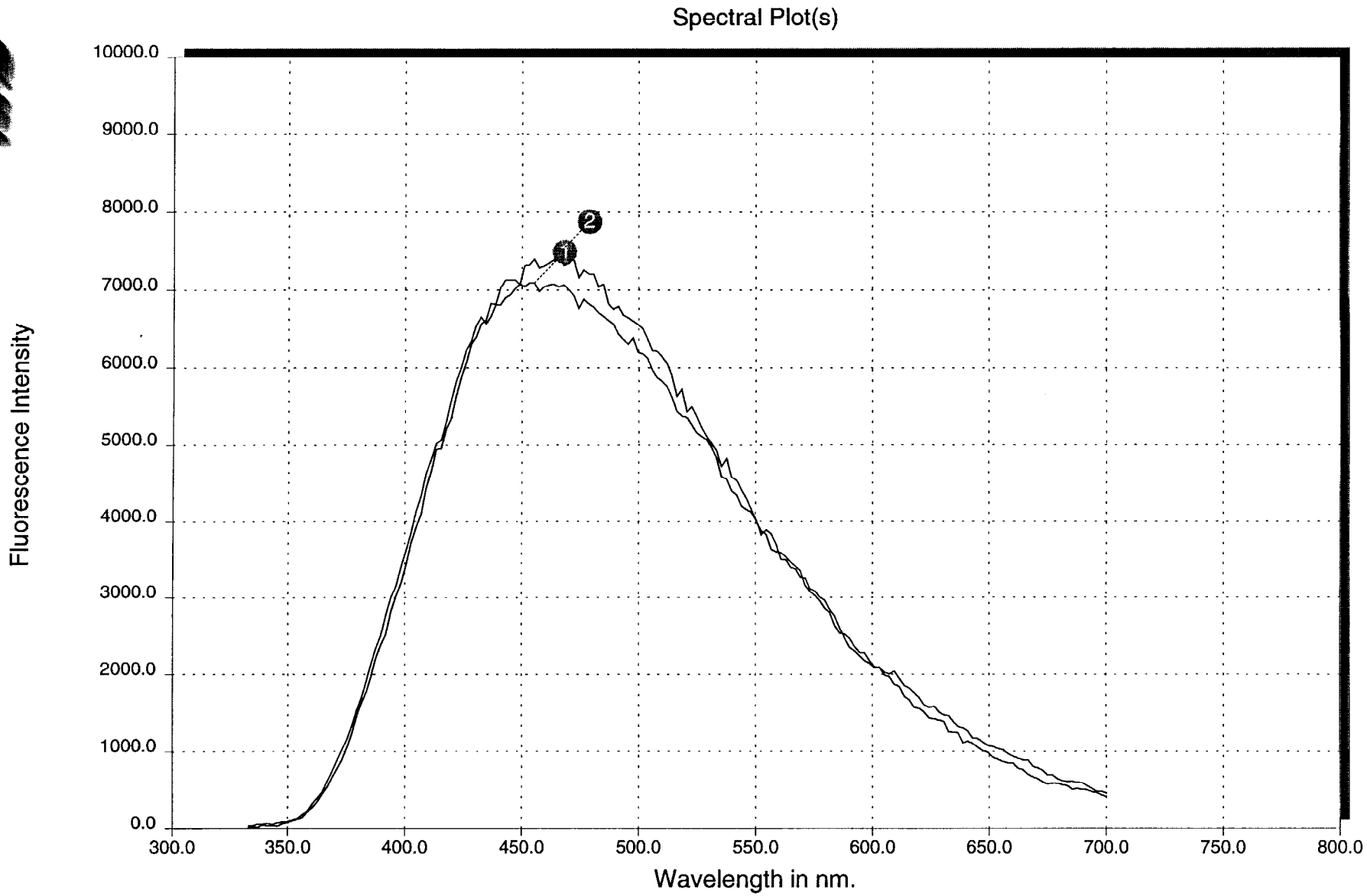
Time: 16:33:55
Date: 08-10-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF22.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 12:00:03
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF23.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 3.5 ft.; 7095 @ 455.4 nm

2: 5.9 ft.; 7481 @ 465.9 nm

Time: 12:00:03

Date: 08-10-1995

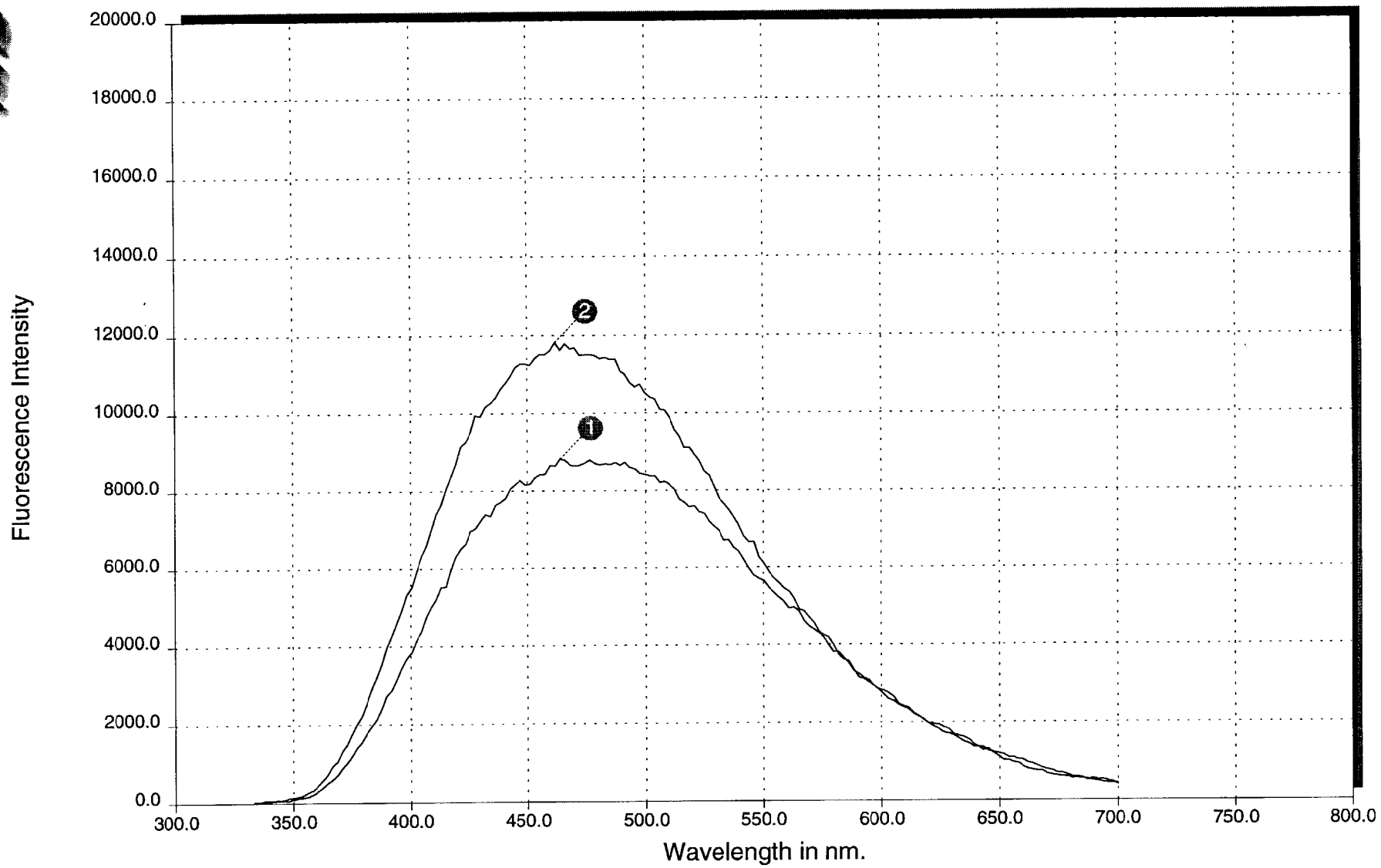
Version: 1.0

Main: C:\BASIC71\DATA\NLFF23.PSH

Probe: C:\BASIC71\DATA\PROBE12B.PRB

Calibration: C:\BASIC71\DATA\AUG10DFM.CAL

Spectral Plot(s)



1: 15.7 ft.; 8824 @ 463.8 nm

2: 18.0 ft.; 11818 @ 461.7 nm

Time: 12:00:03

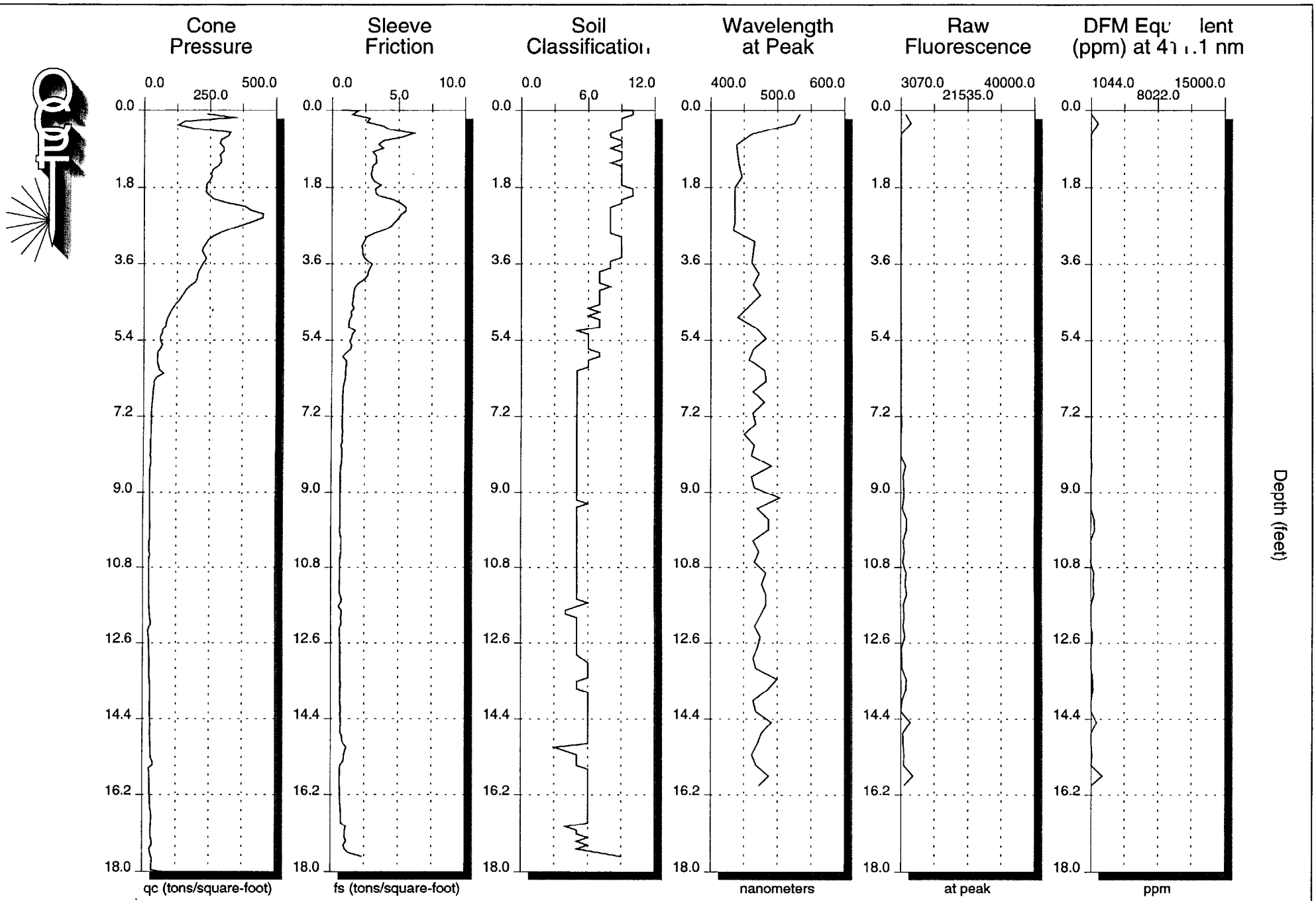
Date: 08-10-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF23.PSH

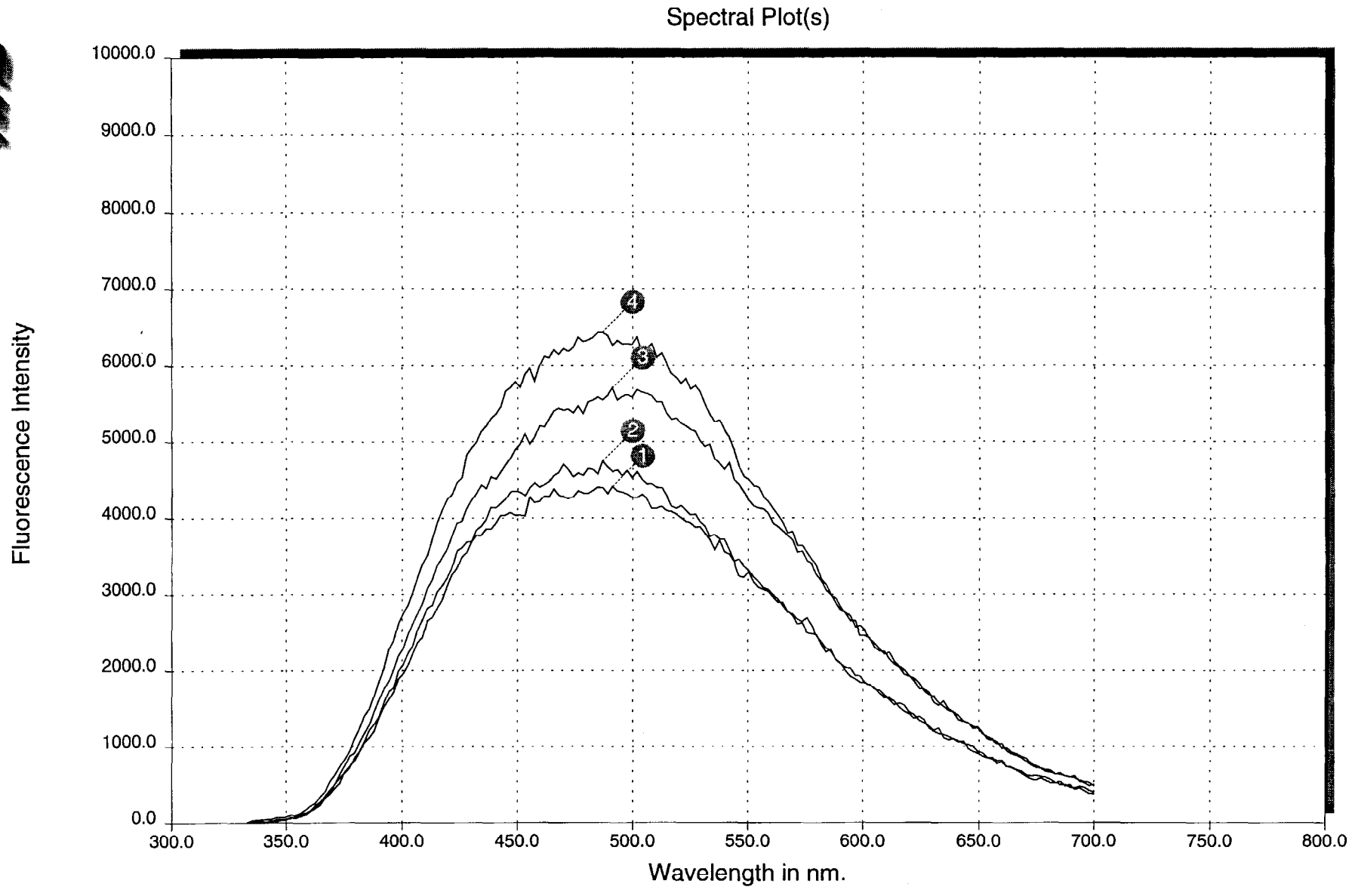
Probe: C:\BASIC71\DATA\PROBE12B.PRB

Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 17:19:05
Date: 08-10-1995
Version: 1.0

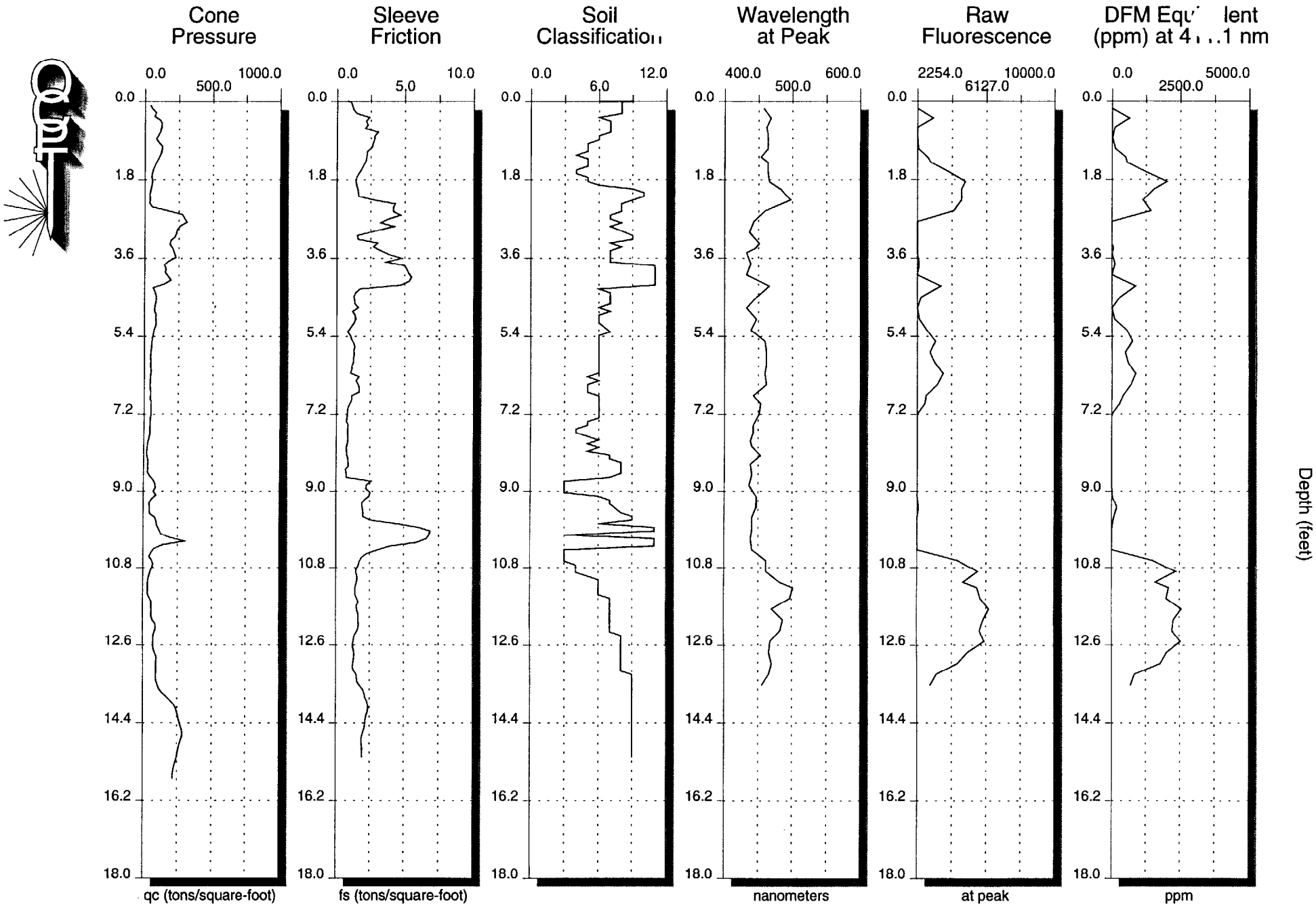
Push: C:\BASIC71\DATA\NLFF24.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 8.4 ft.; 4414 @ 491.2 nm
2: 9.6 ft.; 4742 @ 487.0 nm
3: 14.5 ft.; 5704 @ 491.2 nm
4: 15.7 ft.; 6431 @ 487.0 nm

Time: 17;19:05
Date: 08-10-1995
Version: 1.0

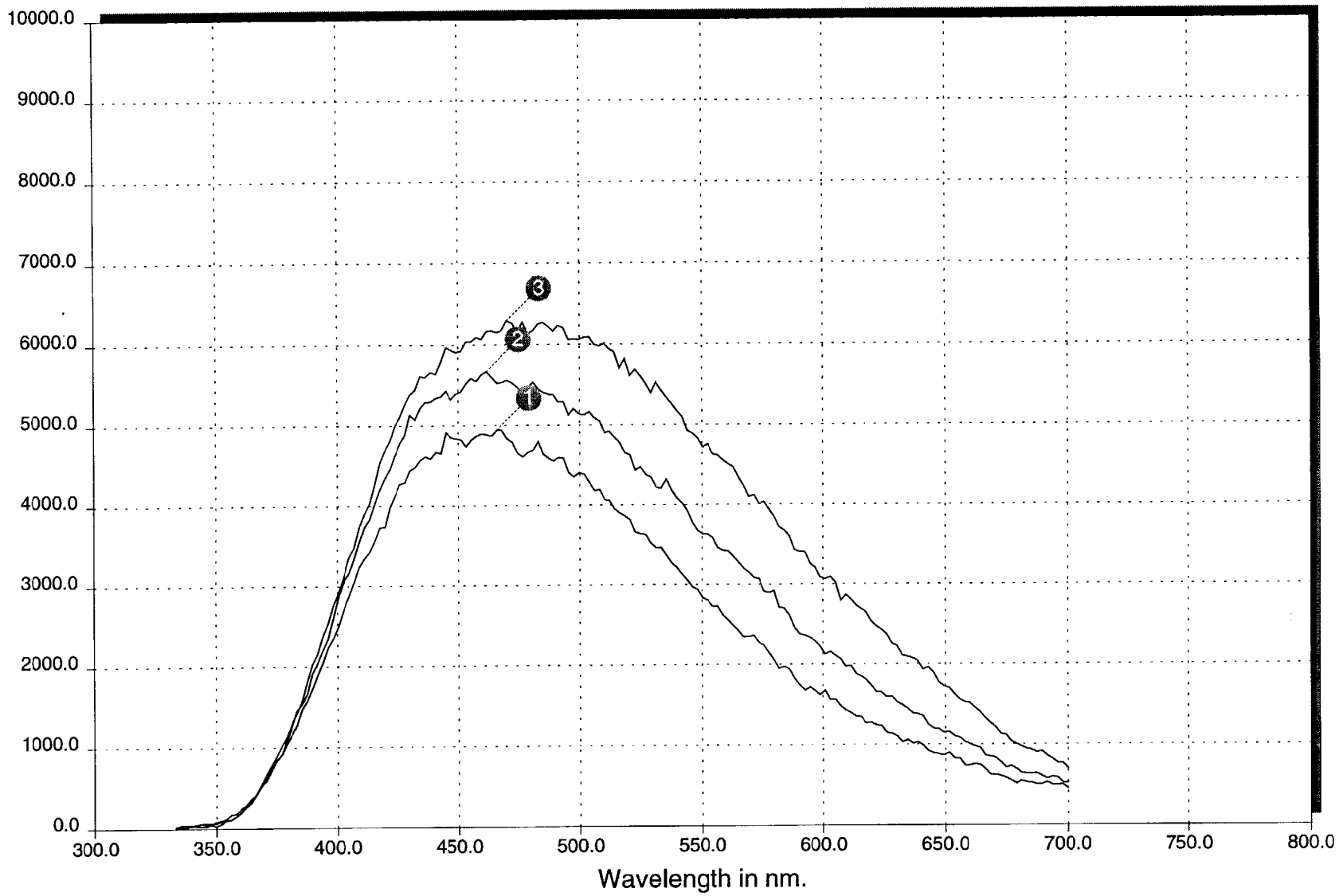
Main: C:\BASIC71\DATA\NLFF24.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 15:37:51
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF25.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL

Spectral Plot(s)



1: 1.8 ft.; 4942 @ 465.9 nm

2: 10.9 ft.; 5667 @ 461.7 nm

3: 11.8 ft.; 6293 @ 470.1 nm

Time: 15:37:51

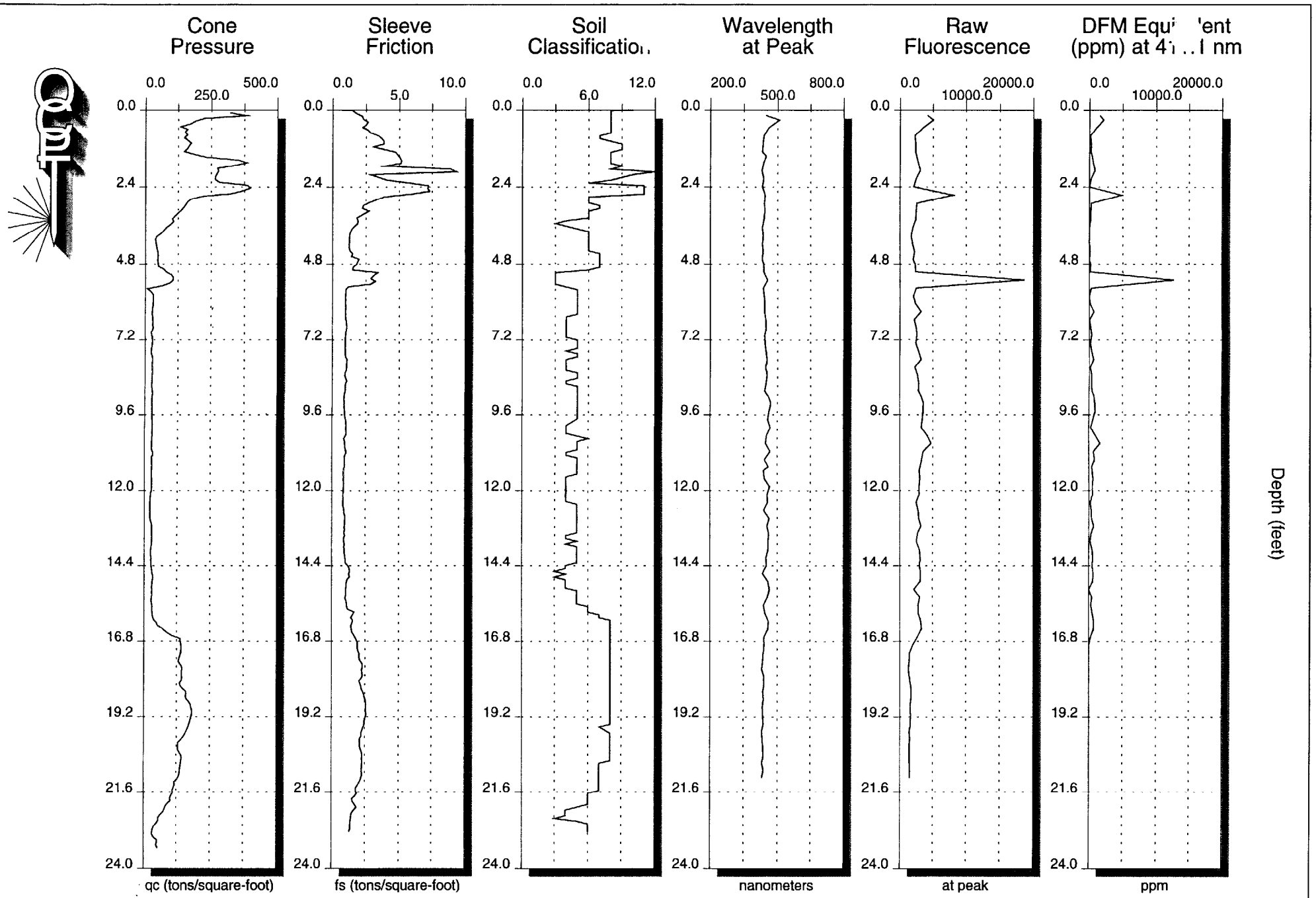
Date: 08-10-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF25.PSH

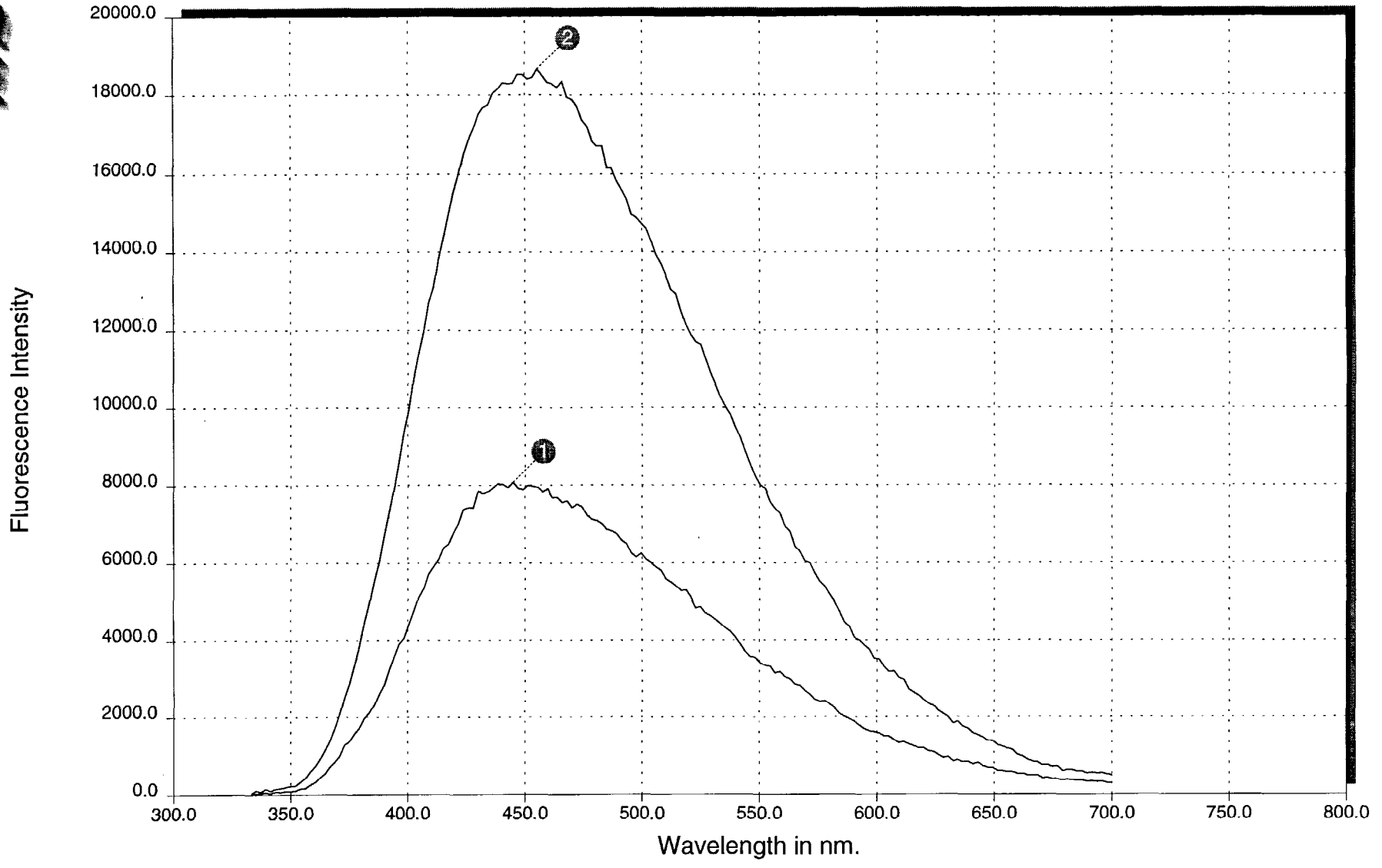
Probe: C:\BASIC71\DATA\PROBE12B.PRB

Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 08:07:22
Date: 08-10-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF26B.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



1: 2.6 ft.; 8070 @ 444.8 nm

2: 5.3 ft.; 18658 @ 455.4 nm

Time: 08;07:22

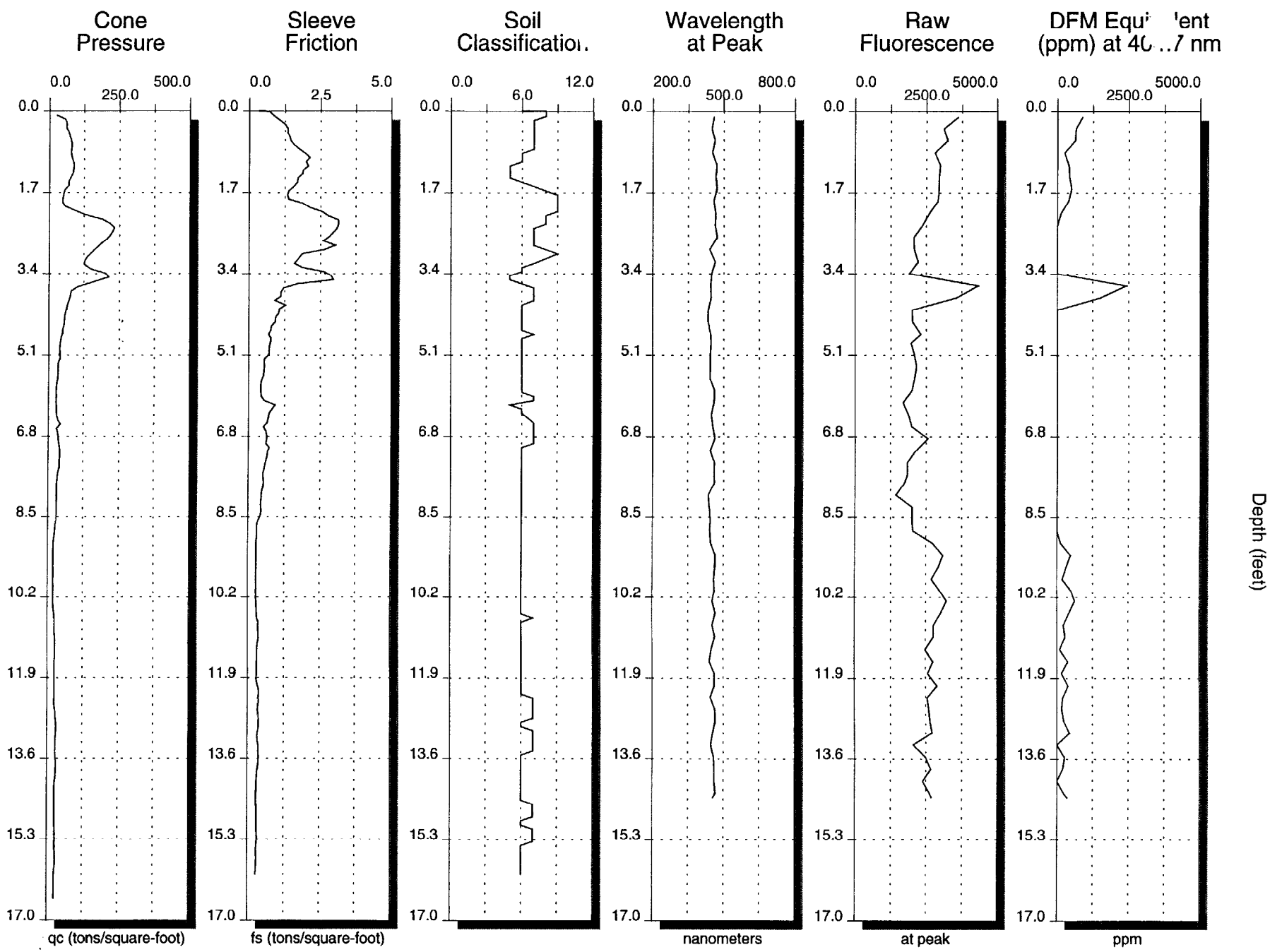
Date: 08-10-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF26B.PSH

Probe: C:\BASIC71\DATA\PROBE12B.PRB

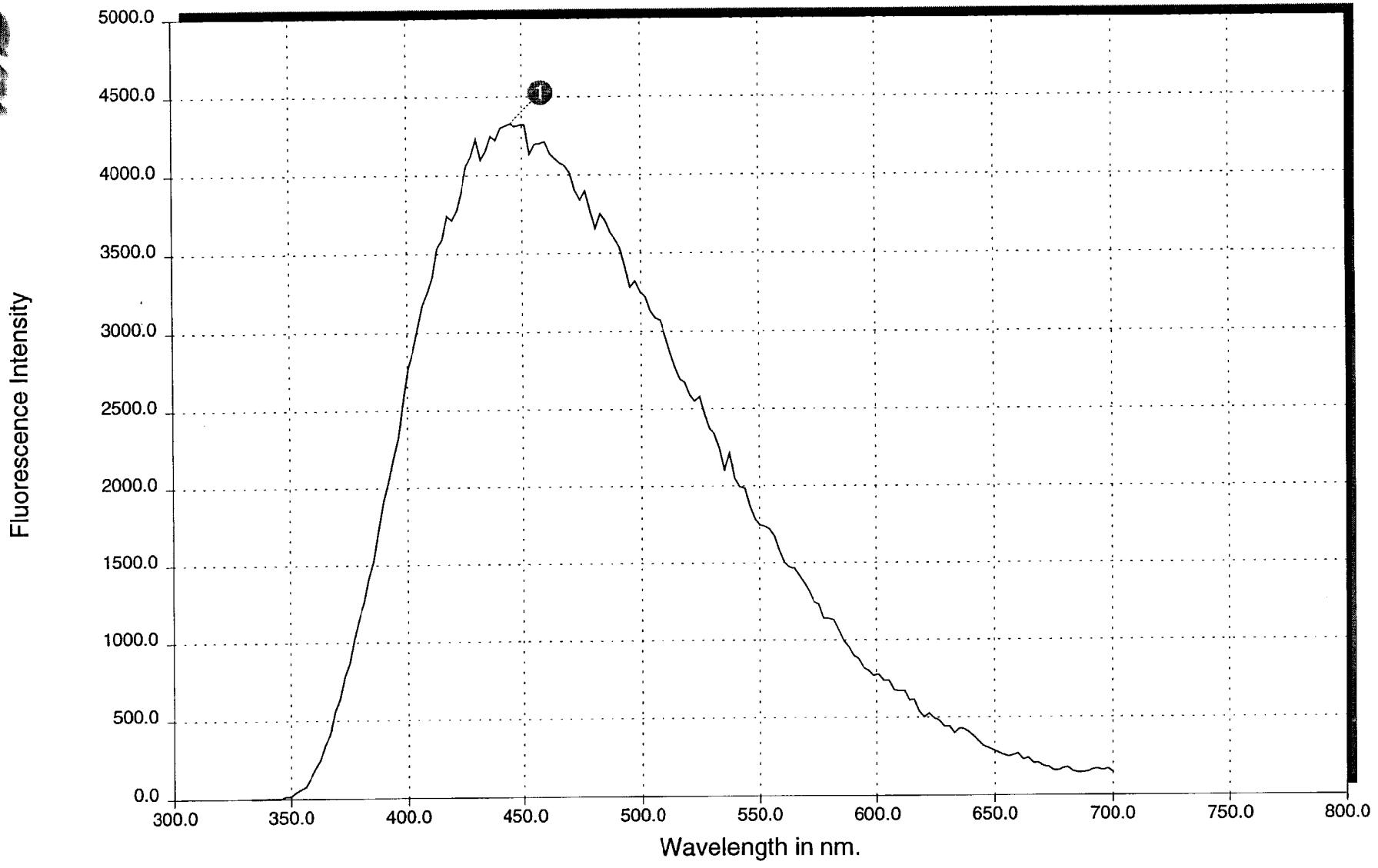
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL



Time: 08:33:28
Date: 08-11-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF27.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL

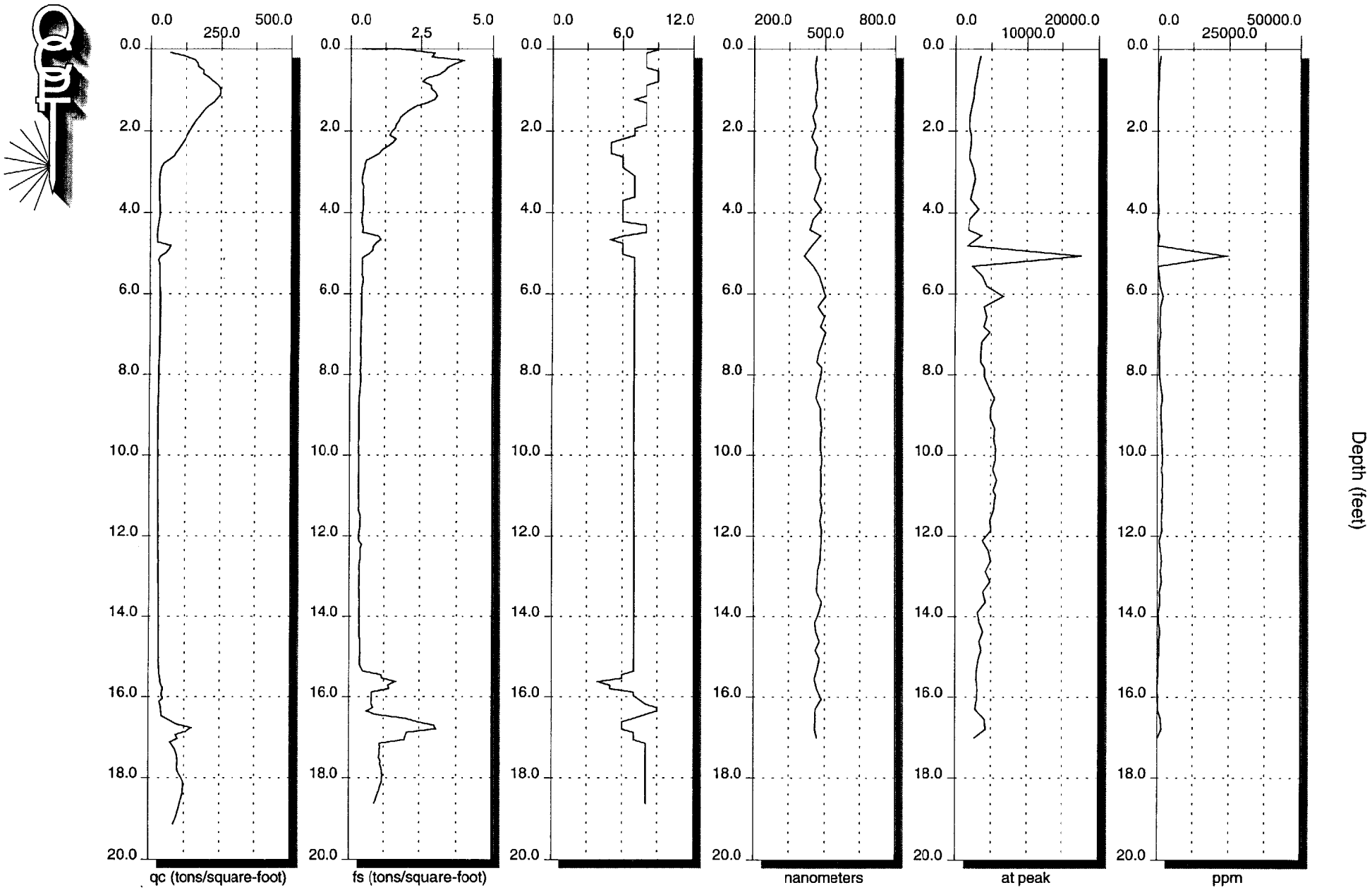
Spectral Plot(s)



1: 3.6 ft.; 4327 @ 444.8 nm

Time: 08:33:28
Date: 08-11-1995
Version: 1.0

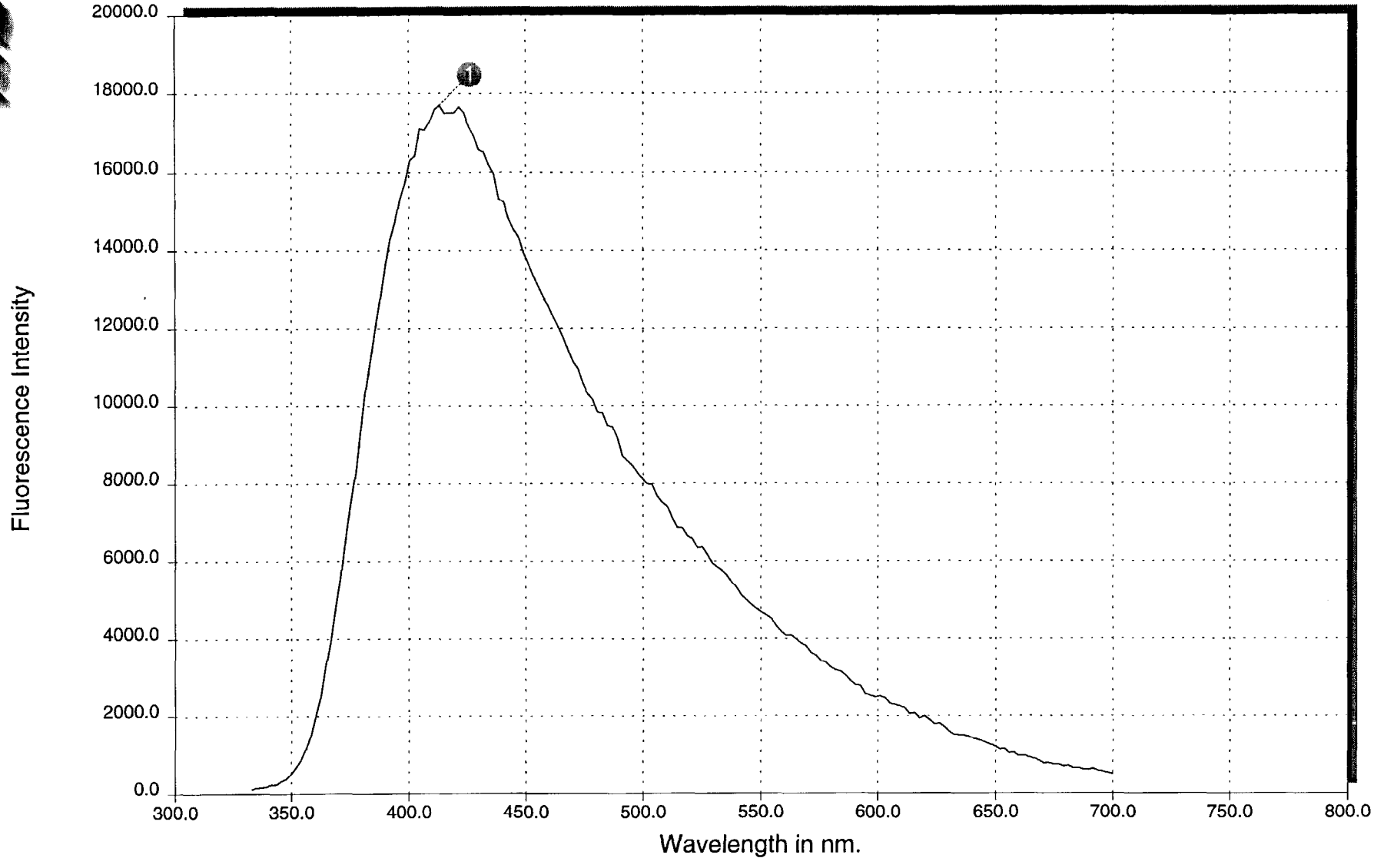
Main: C:\BASIC71\DATA\NLFF27.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL



Time: 09:17:51
Date: 08-11-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF28.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL

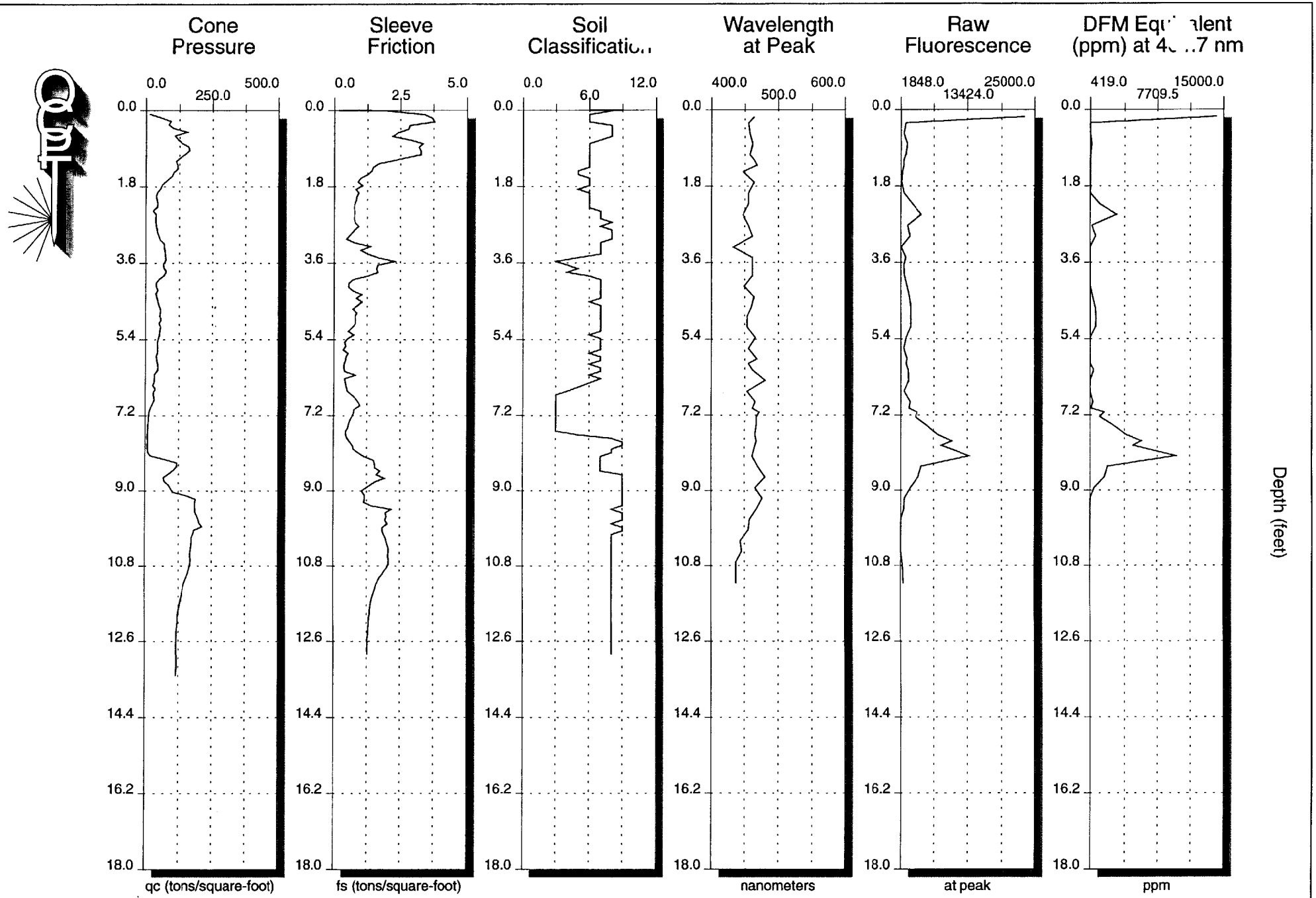
Spectral Plot(s)



1: 5.1 ft.; 17693 @ 413.2 nm

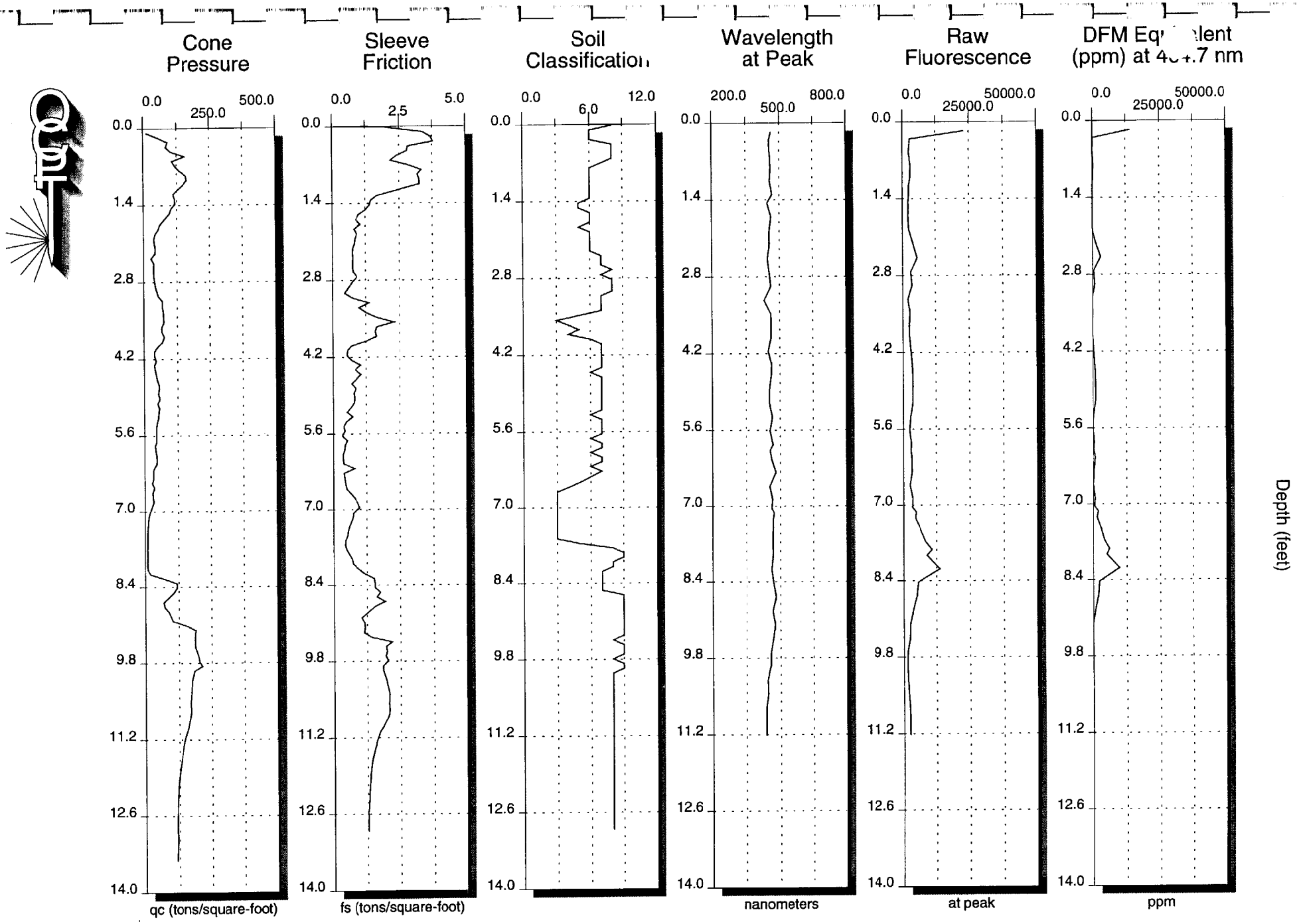
Time: 09:17:51
Date: 08-11-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF28.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL



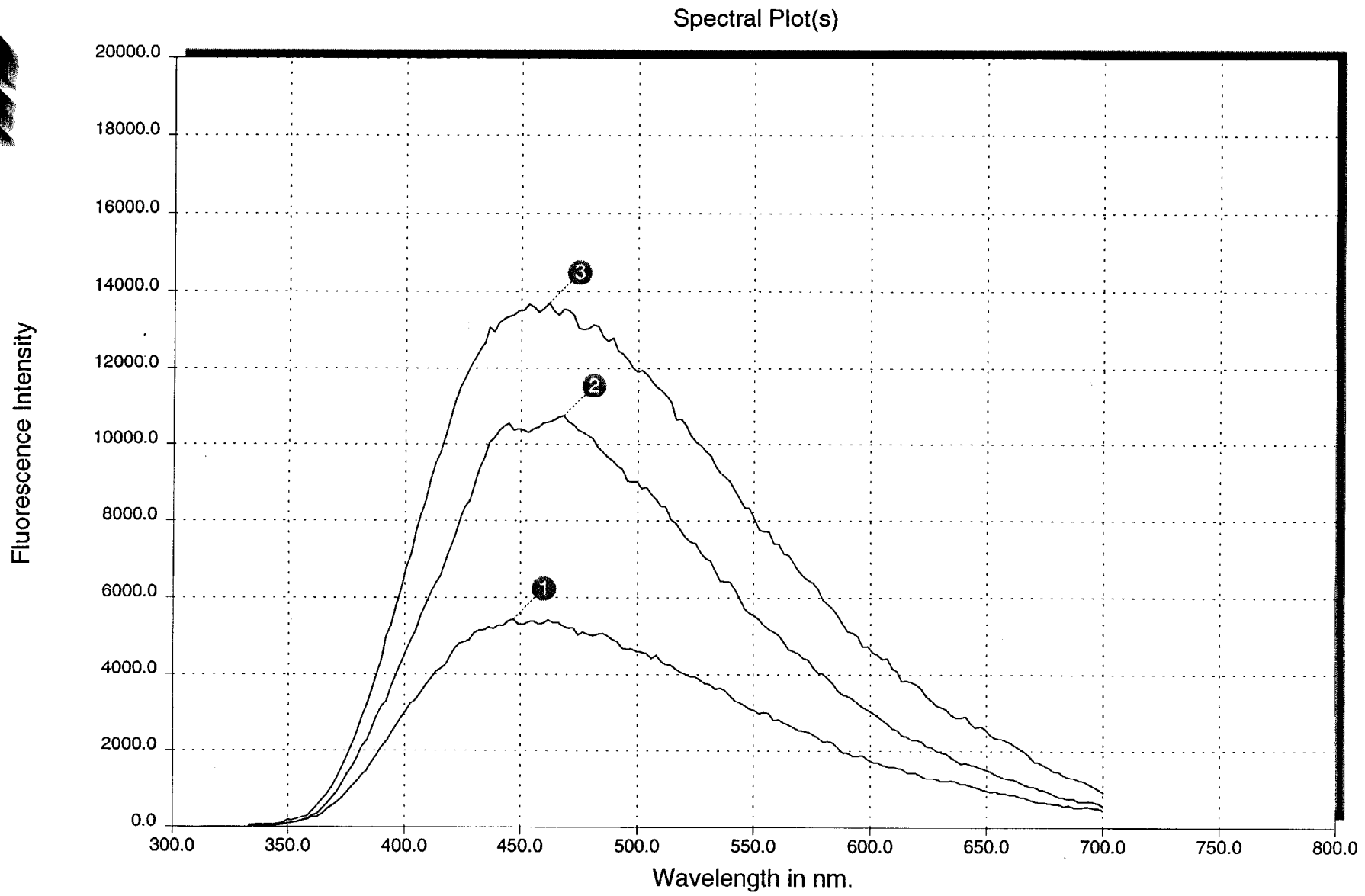
Time: 09:00:38
Date: 08-12-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF29A.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG12DFM.CAL



Time: 09:00:38
Date: 08-12-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF29A.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG12DFM.CAL



1: 2.5 ft.; 5444 @ 446.9 nm

2: 7.8 ft.; 10743 @ 468.0 nm

3: 8.2 ft.; 13701 @ 461.7 nm

Time: 09:00:38

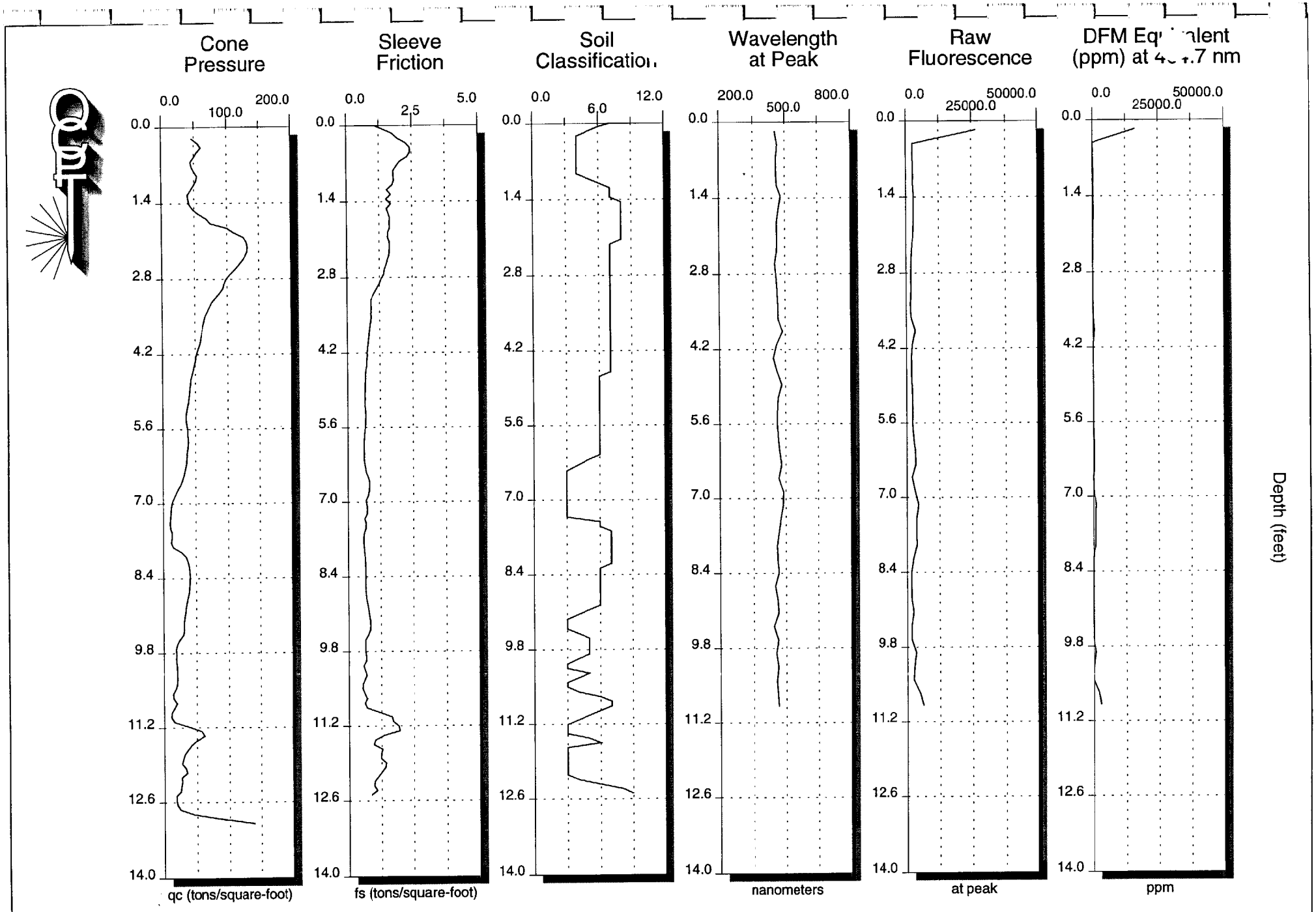
Date: 08-12-1995

Version: 1.0

Main: C:\BASIC71\DATA\NLFF29A.PSH

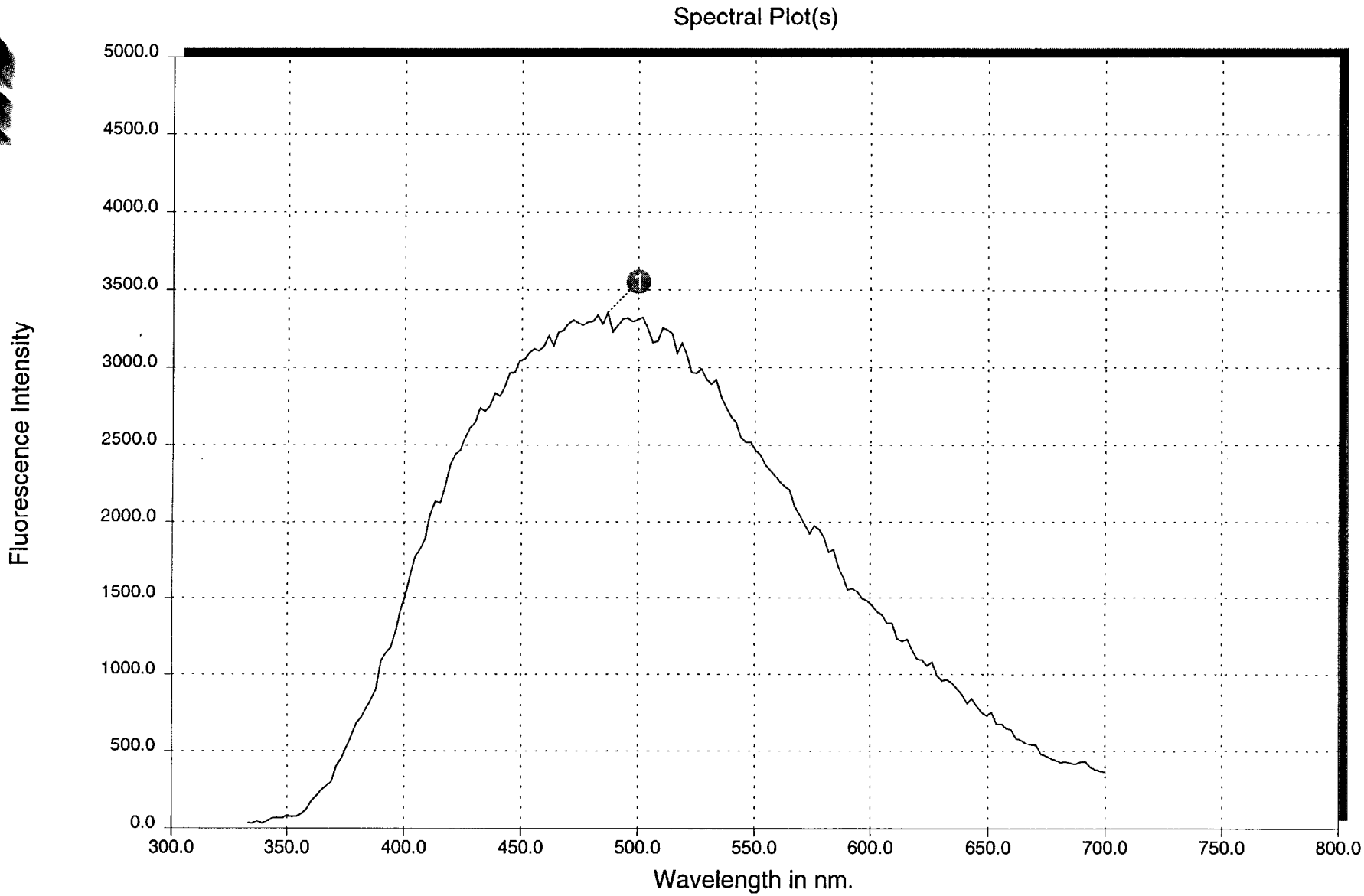
Probe: C:\BASIC71\DATA\PROBE12B.PRB

Calibration: C:\BASIC71\DATA\AUG12DFM.CAL



Time: 08:02:20
Date: 08-12-1995
Version: 1.0

Push: C:\BASIC71\DATA\NLFF30.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG12DFM.CAL

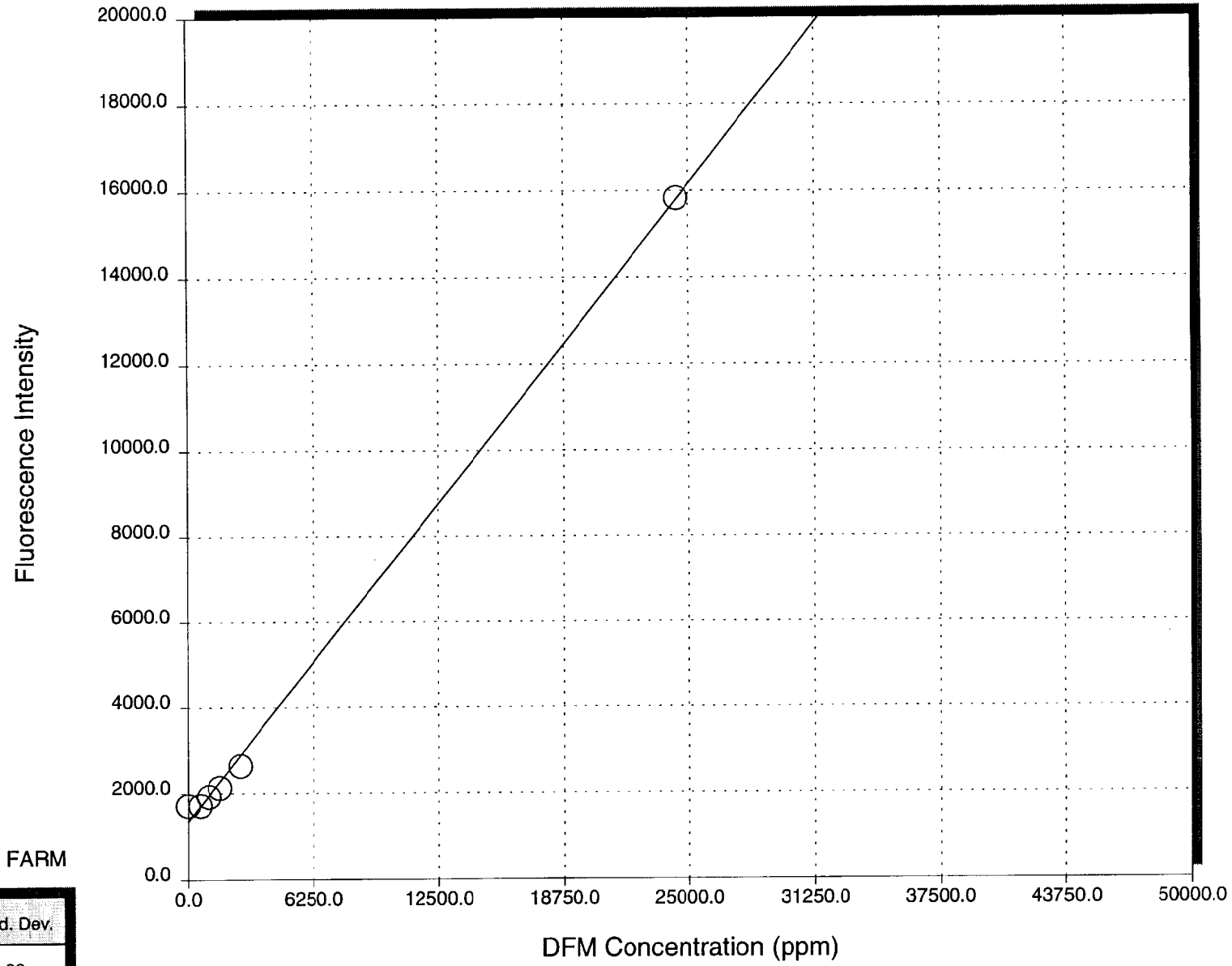


1: 3.9 ft.; 3357 @ 487.0 nm

Time: 08:02:20
Date: 08-12-1995
Version: 1.0

Main: C:\BASIC71\DATA\NLFF30.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG12DFM.CAL

Concentration Calibration



OMA Parameters

No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 250 ns

NEW LONDON SUB BASE FUEL FARM

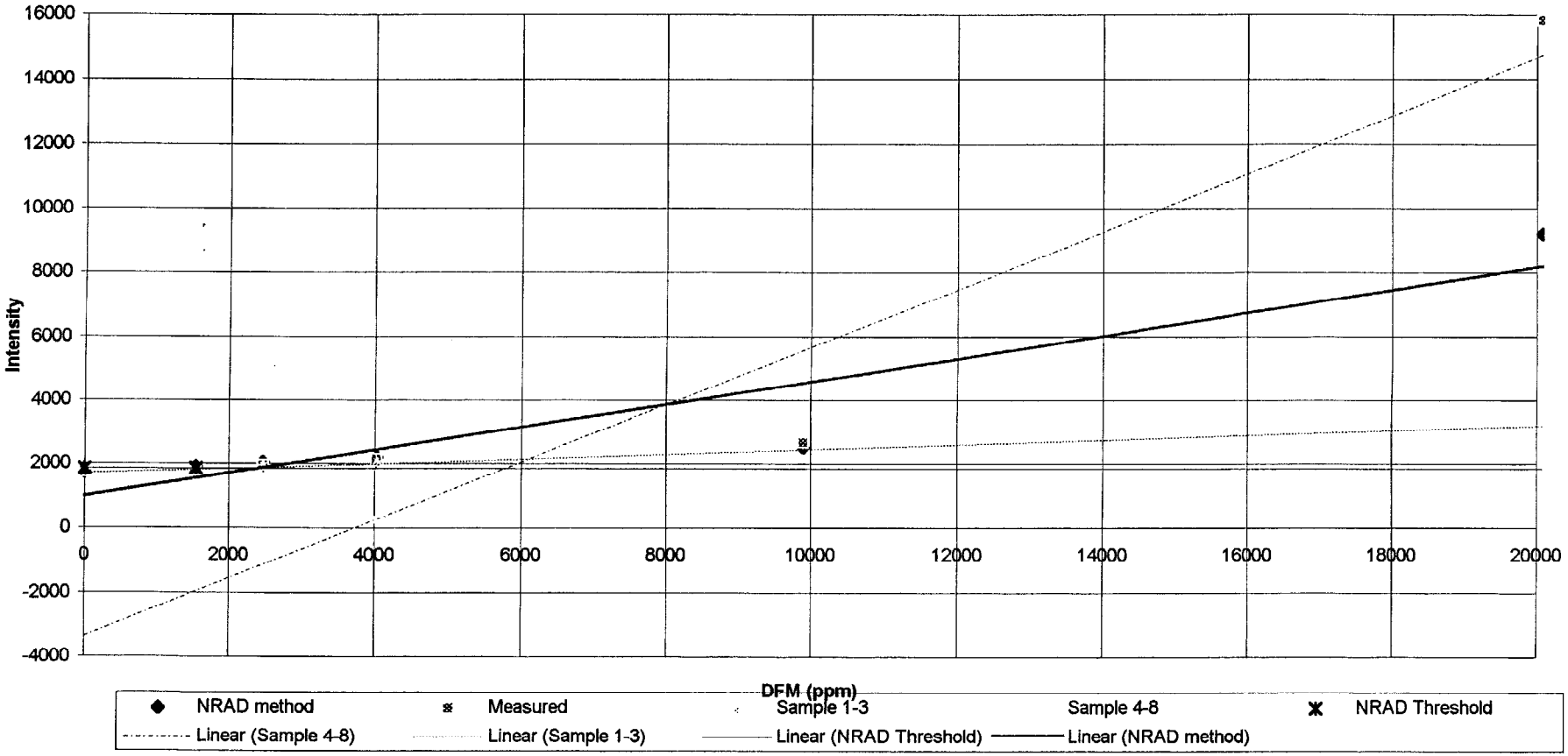
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	1719	0.93
2	603	1718	2.57
3	1021	1924	2.15
4	1554	2130	4.75
5	2589	2638	1.79
6	24386	15828	4.27

Time: 07:29:15
Date: 08-12-1995
Version: 1.0

Slope: 0.592
Intercept: 1349.92
r^2: 0.998629

Push: C:\BASIC71\DATA\NLFF28.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG12DFM.CAL

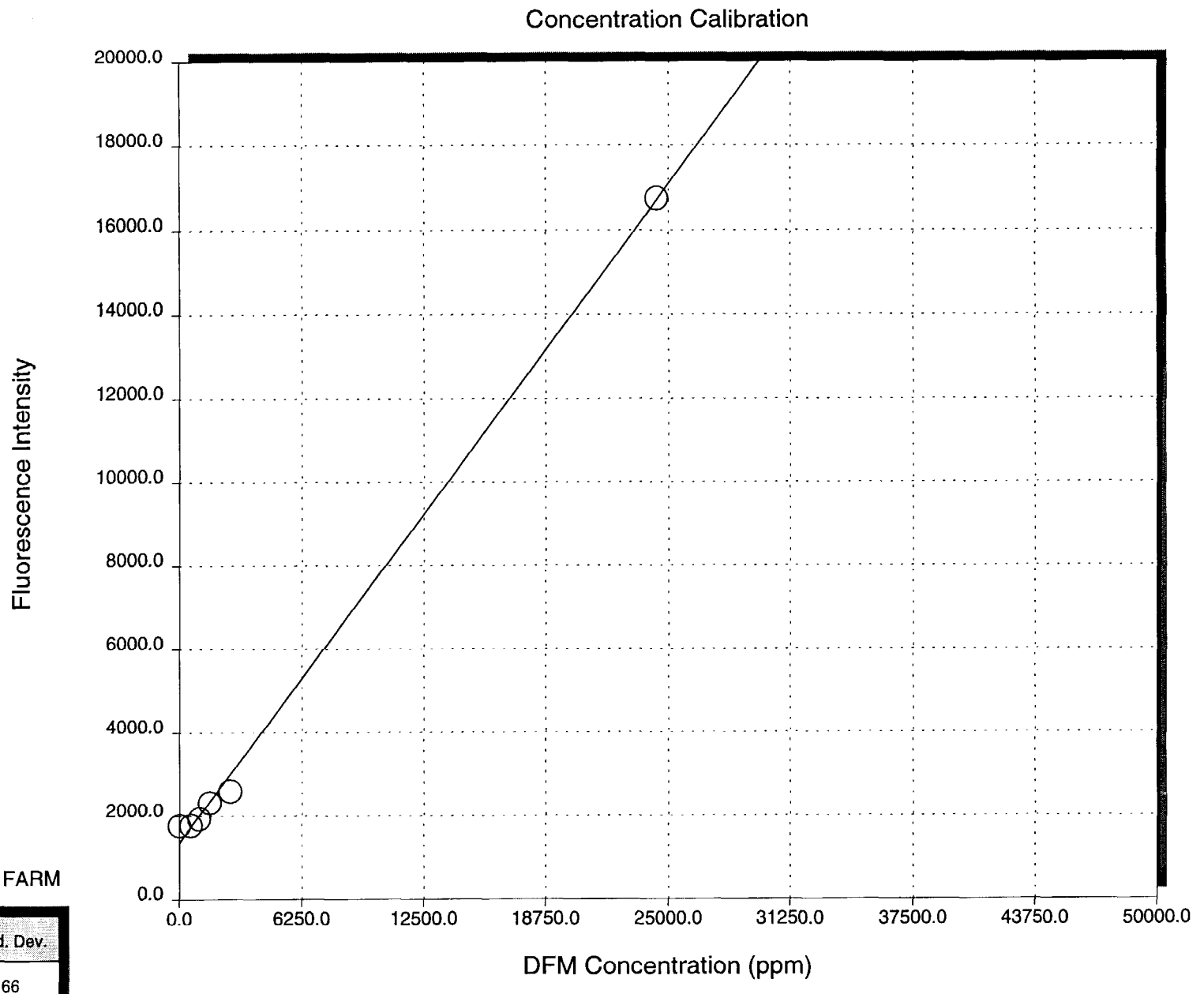
SUB BASE NEW LONDON



Fluorescent Threshold 1848 (counts)
Detection Threshold 419
(ppm)

8-12-95

OMA Parameters
No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 365 ns



NEW LONDON SUB BASE FUEL FARM

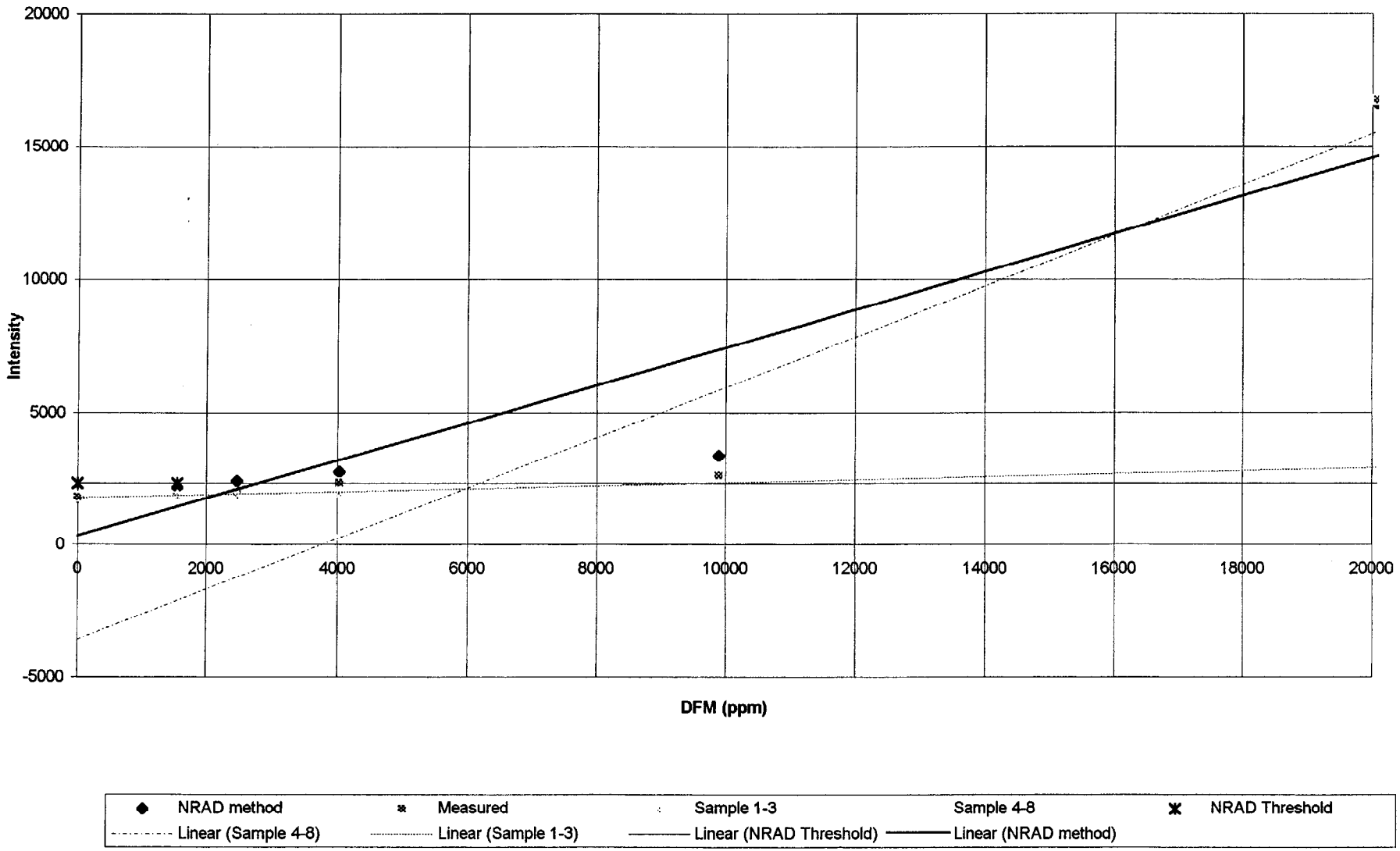
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	1779	1.66
2	603	1778	2.26
3	1021	1935	3.44
4	1554	2319	3.61
5	2589	2598	4.31
6	24386	16747	6.89

Time: 07:20:09
Date: 09-07-1995
Version: 1.0

Slope: 0.629
Intercept: 1365.61
r^2: 0.998128

Push: C:\BASIC71\DATA\TK4207.PSH
Probe: C:\BASIC71\DATA\PROBE14D.PRB
Calibration: C:\BASIC71\DATA\AUG11DFM.CAL

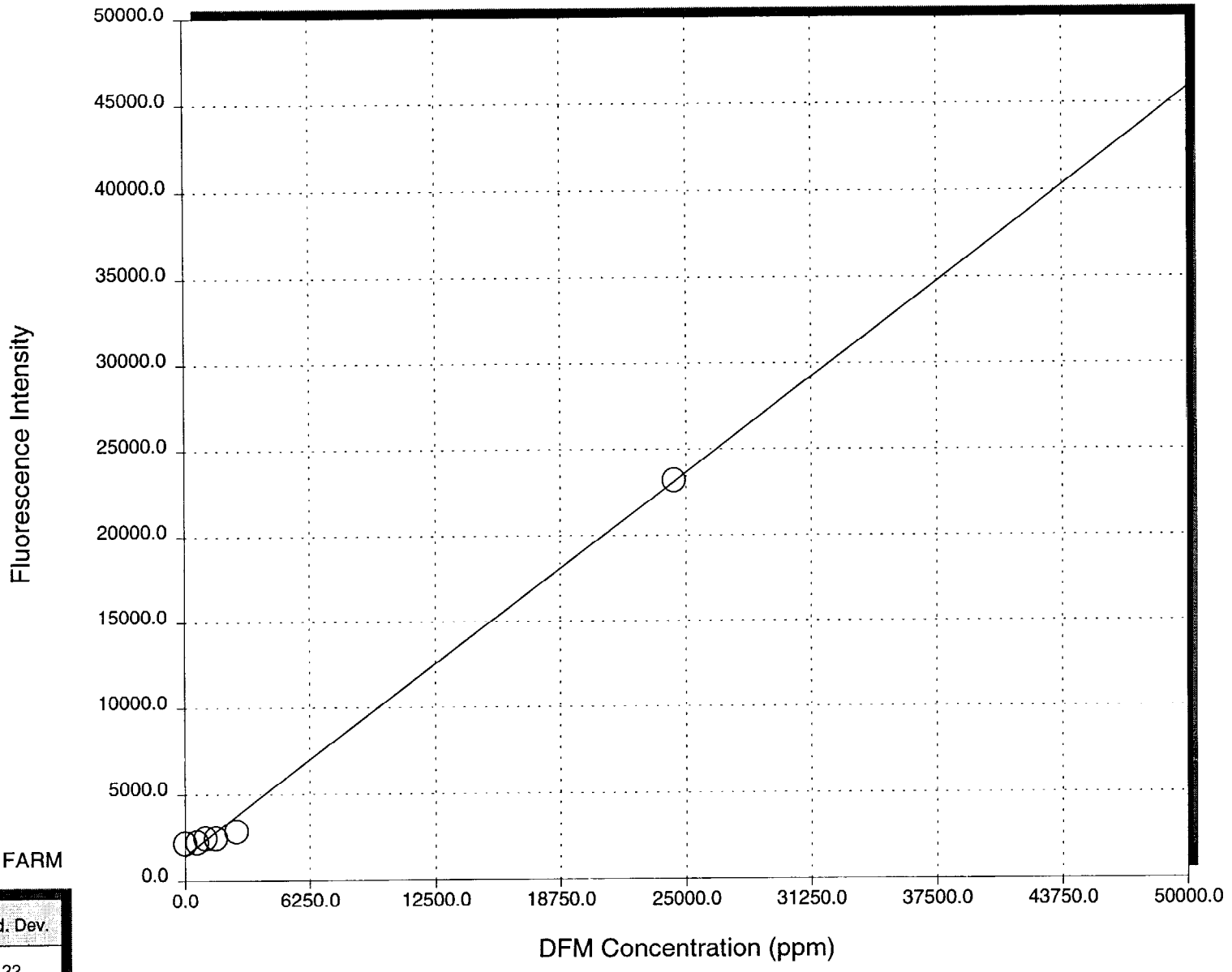
SUB BASE NEW LONDON



Fluorescent Threshold 2304 (counts)
Detection Threshold 864
(ppm)

8-11-95

Concentration Calibration



OMA Parameters

No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 250 ns

NEW LONDON SUB BASE FUEL FARM

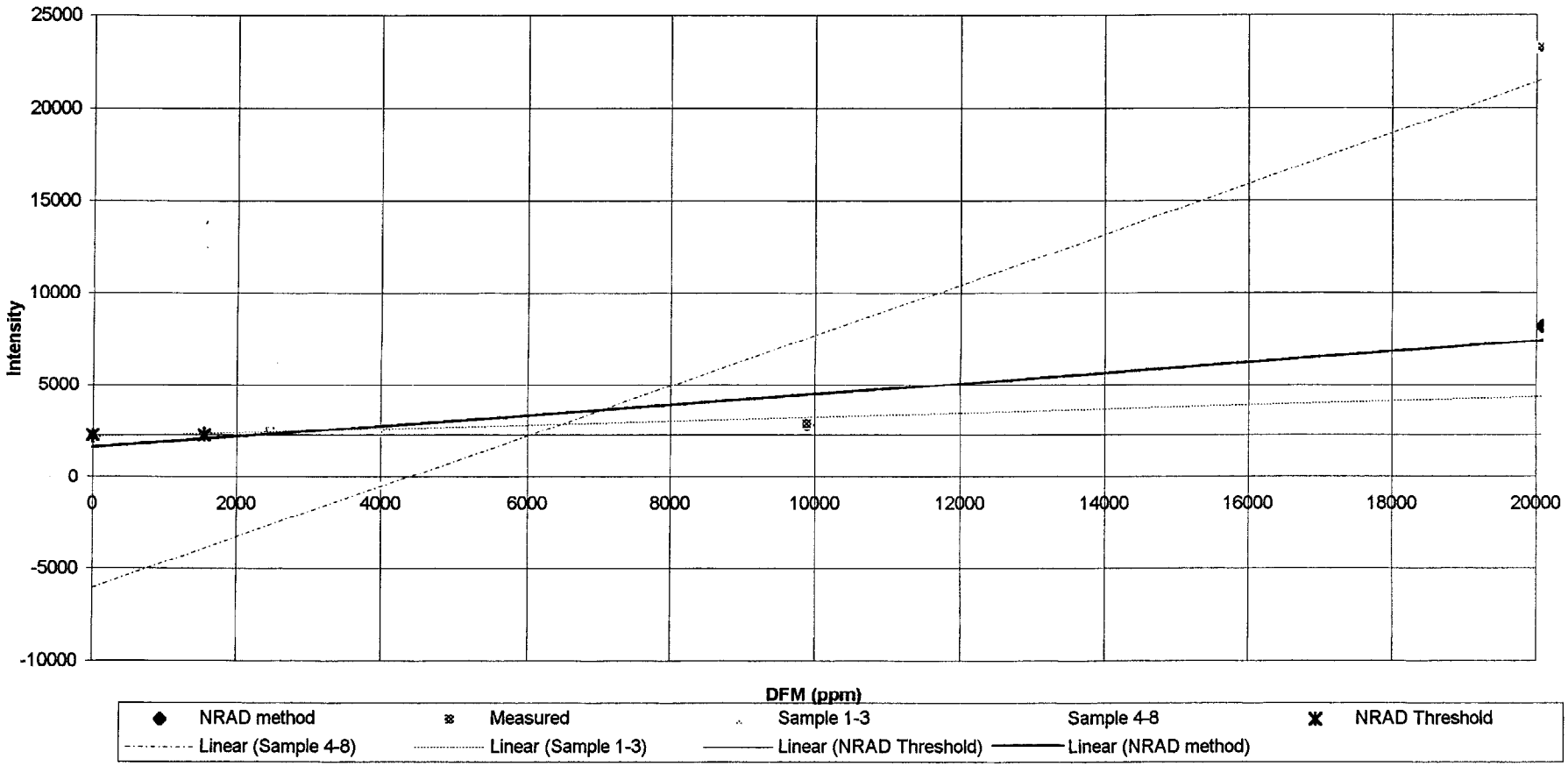
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	2182	3.22
2	603	2244	2.4
3	1021	2472	1.71
4	1554	2472	1.03
5	2589	2877	3.73
6	24386	23202	1.85

Time: 07:37:37
Date: 08-10-1995
Version: 1.0

Slope: 0.888
Intercept: 1445.9
r^2: 0.995785

Push: C:\BASIC71\DATA\NLFF26B.PSH
Probe: C:\BASIC71\DATA\PROBE12B.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL

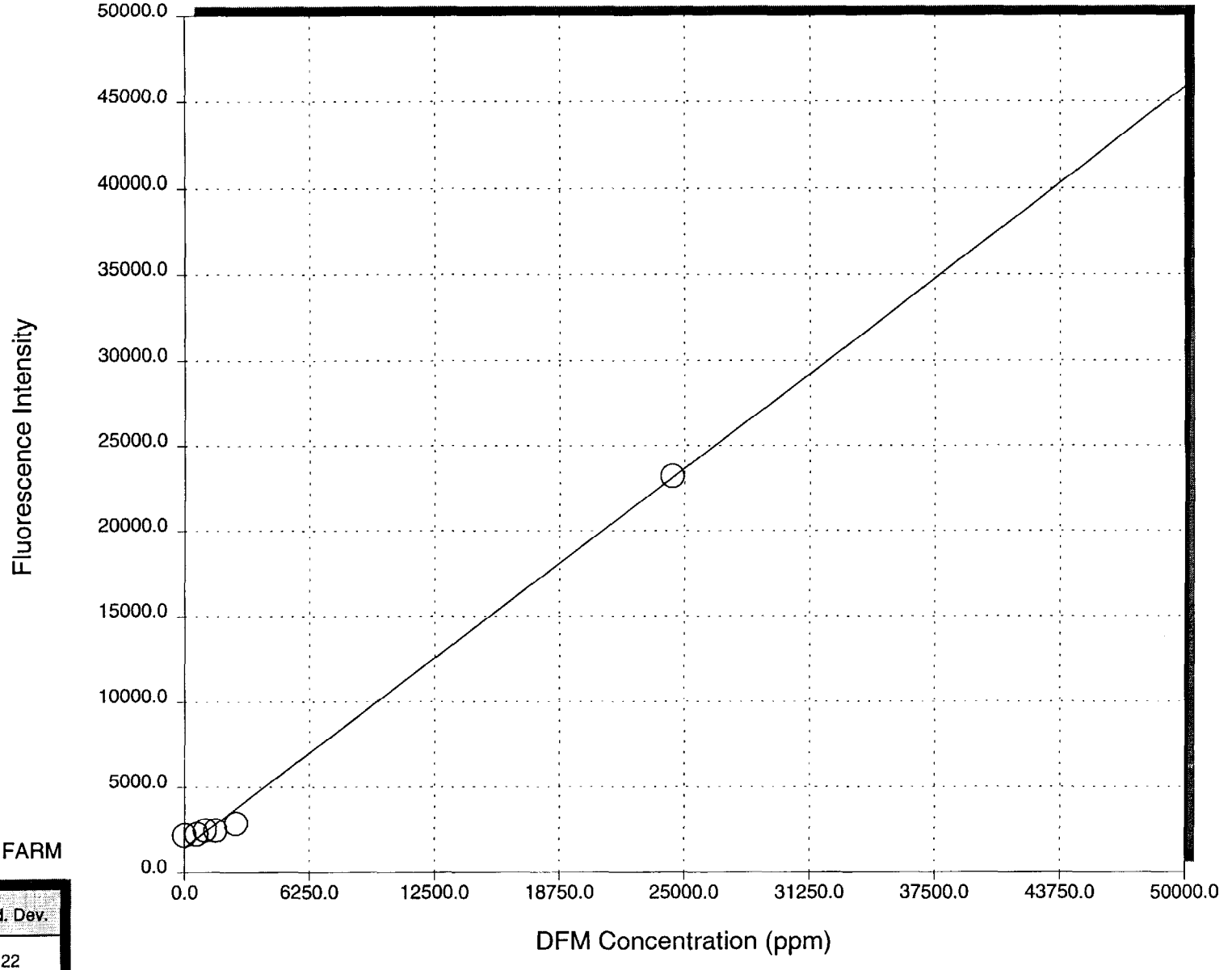
SUB BASE NEW LONDON



Fluorescent Threshold 2254 (counts)
Detection Threshold 294
(ppm)

8-10-95

Concentration Calibration



OMA Parameters

No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 365 ns

NEW LONDON SUB BASE FUEL FARM

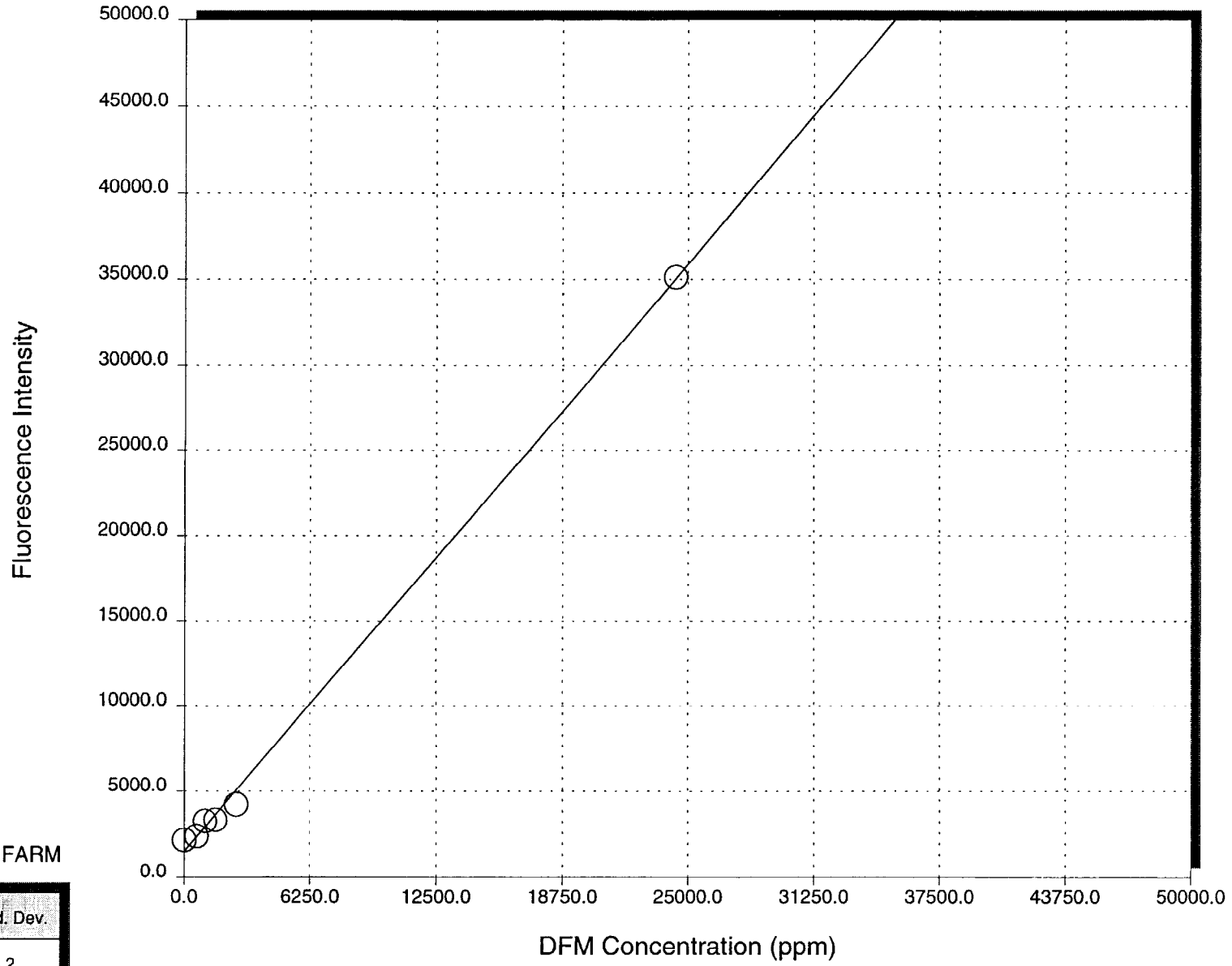
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	2182	3.22
2	603	2244	2.4
3	1021	2472	1.71
4	1554	2472	1.03
5	2589	2877	3.73
6	24386	23202	1.85

Time: 07:20:09
Date: 09-07-1995
Version: 1.0

Slope: 0.888
Intercept: 1445.9
r^2: 0.995785

Push: C:\BASIC71\DATA\TK4207.PSH
Probe: C:\BASIC71\DATA\PROBE14D.PRB
Calibration: C:\BASIC71\DATA\AUG10DFM.CAL

Concentration Calibration



OMA Parameters

No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 340 ns

NEW LONDON SUB BASE FUEL FARM

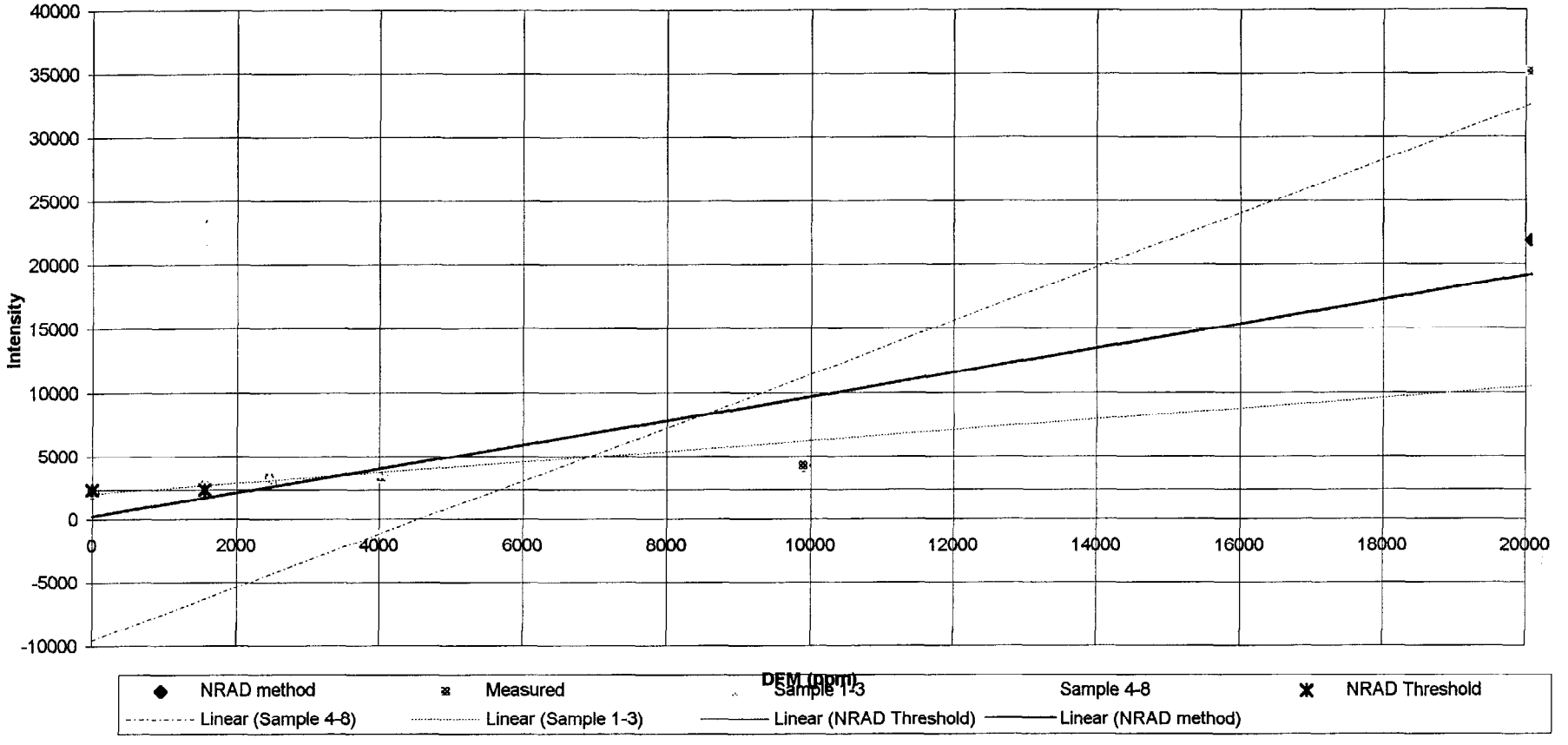
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	2153	3.2
2	603	2383	3.06
3	1021	3267	7.21
4	1554	3334	5.54
5	2589	4232	1.82
6	24386	35128	3.97

Time: 10:28:27
Date: 08-08-1995
Version: 1.0

Slope: 1.375
Intercept: 1506.36
r^2: 0.998431

Push: C:\BASIC71\DATA\NLFF11.PSH
Probe: C:\BASIC71\DATA\PROBE02B.PRB
Calibration: C:\BASIC71\DATA\AUG8DFM.CAL

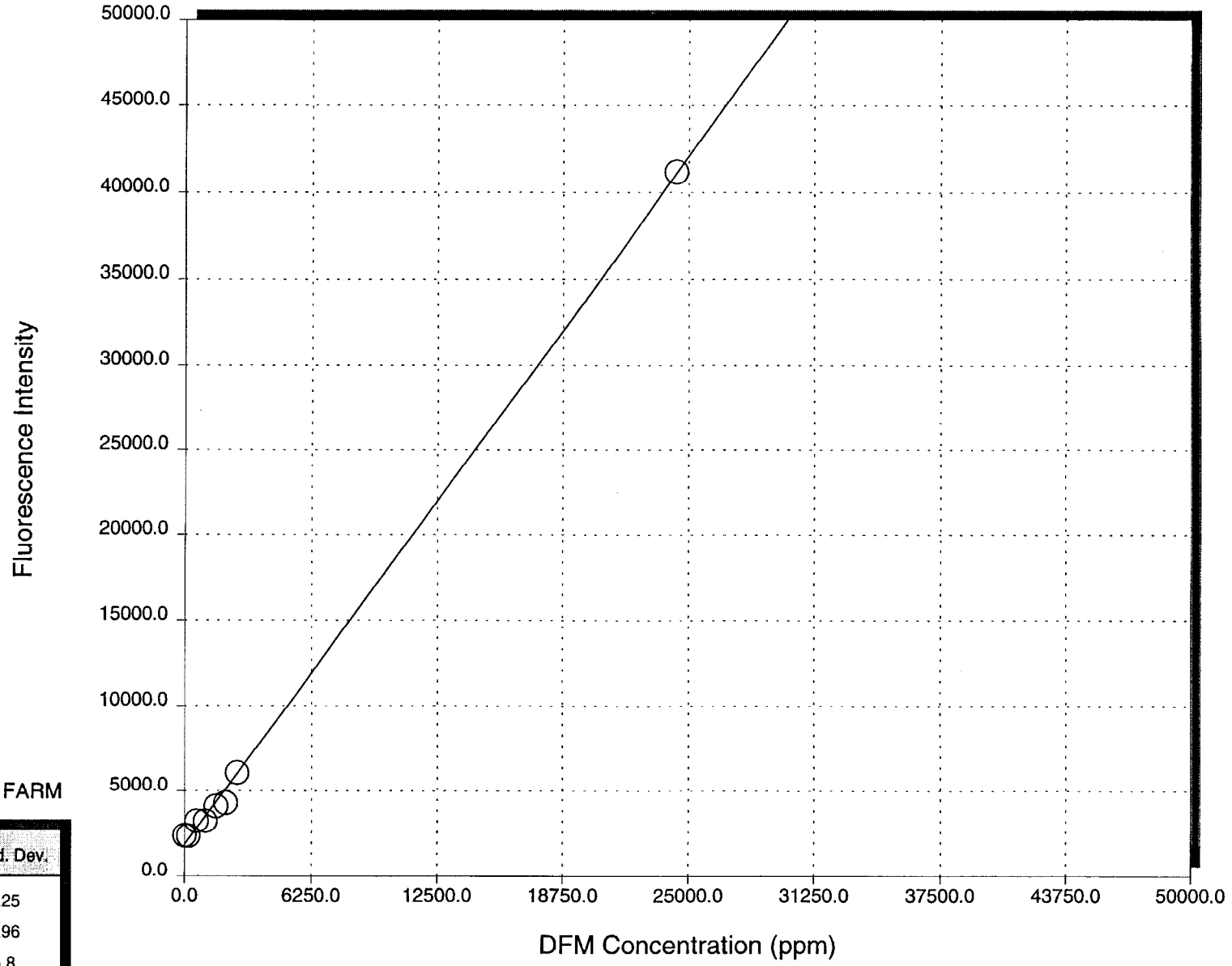
SUB BASE NEW LONDON



Fluorescent Threshold 2350 (counts)
Detection Threshold 244
(ppm)

8-8-95

Concentration Calibration



OMA Parameters

No. of shots: 20
Pixels per Group: 4
Starting Pixel: 162
Read Pixels: 700
Delay Time: 110 ns

NEW LONDON SUB BASE FUEL FARM

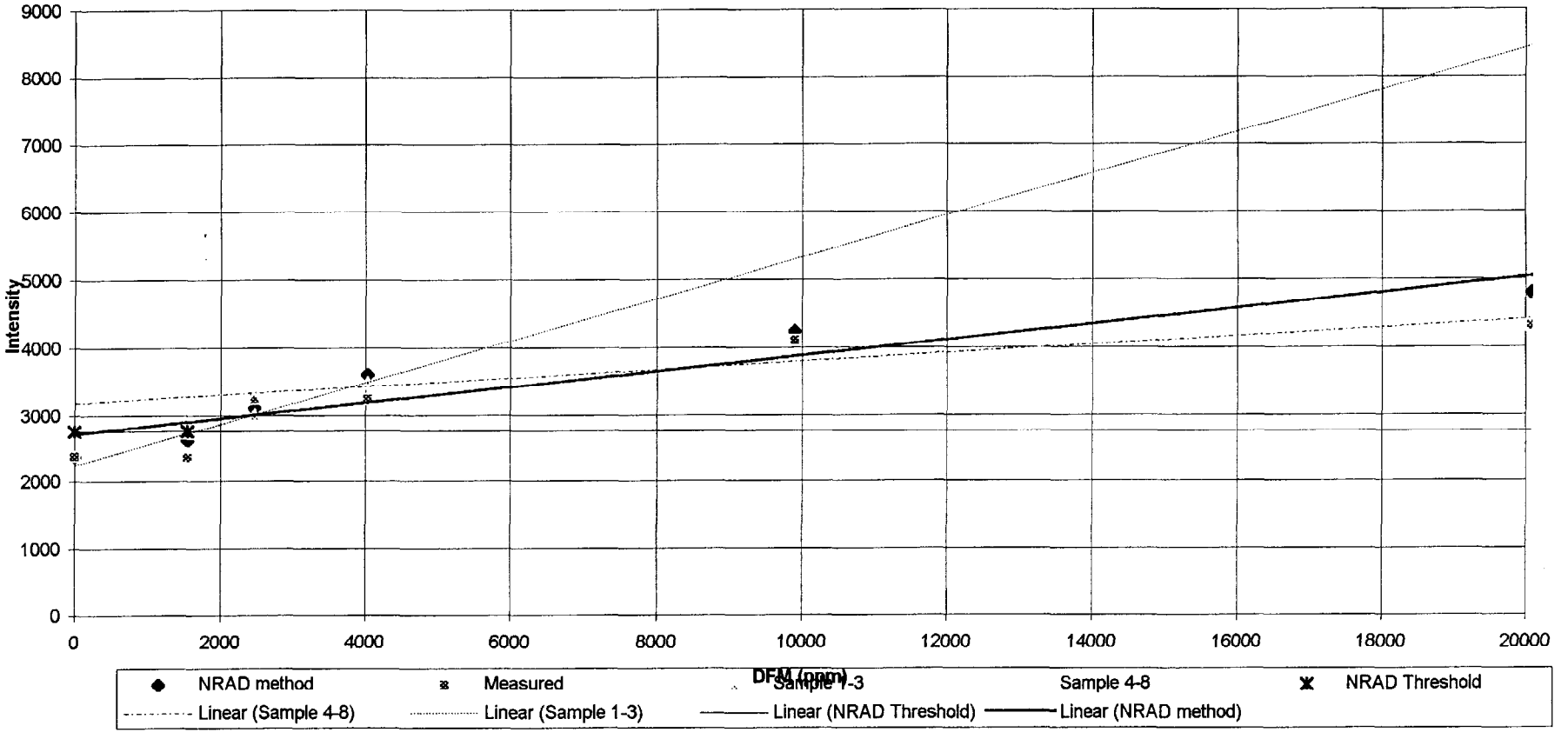
Pt.	Conc. (ppm)	Intensity	% Std. Dev.
1	0	2381	4.25
2	197	2351	5.96
3	603	3239	5.8
4	1021	3231	0.52
5	1554	4099	0.87
6	2022	4303	5.0
7	2589	6070	3.05
8	24386	41170	2.14

Time: 10:07:10
Date: 07-28-1995
Version: 1.0

Slope: 1.61
Intercept: 1841.74
r^2: 0.998974

Push: C:\BASIC71\DATA\CHRFF3.PSH
Probe: C:\BASIC71\DATA\PROBE02B.PRB
Calibration: C:\BASIC71\DATA\JUL28DFM.CAL

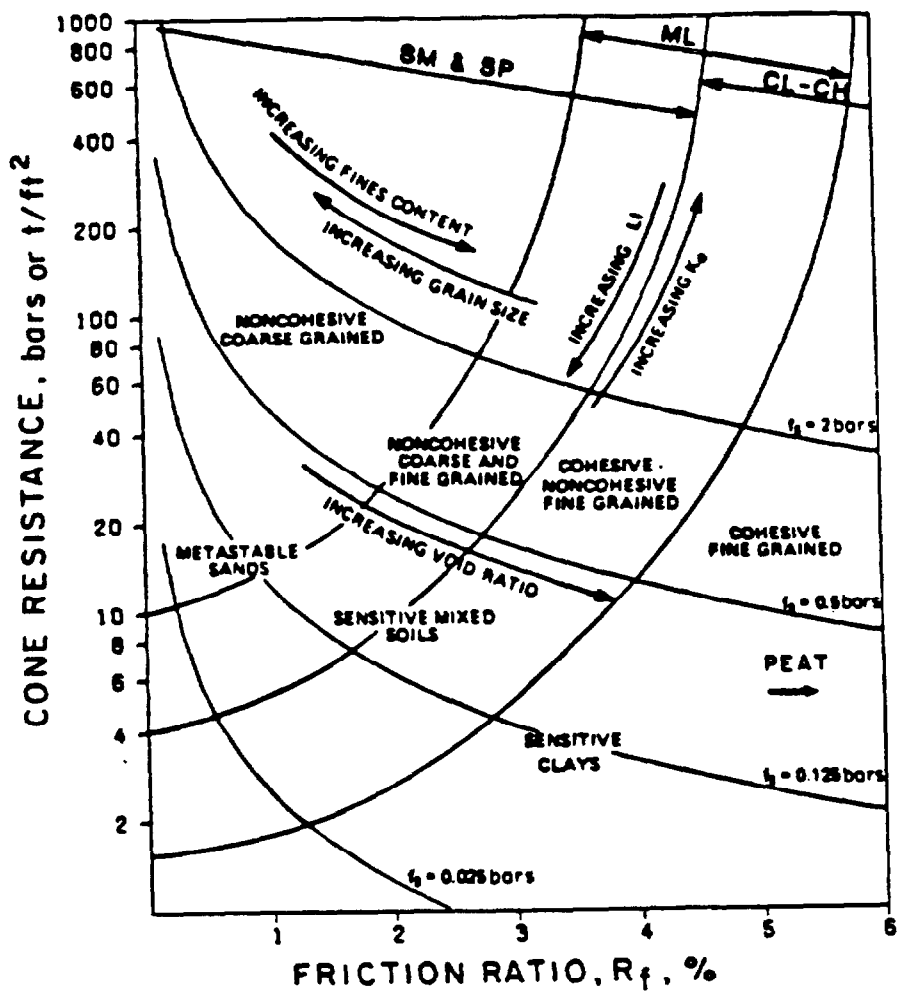
SUB BASE NEW LONDON



Fluorescent Threshold 2756 (counts)
Detection Threshold 314
(ppm)

7-28-95

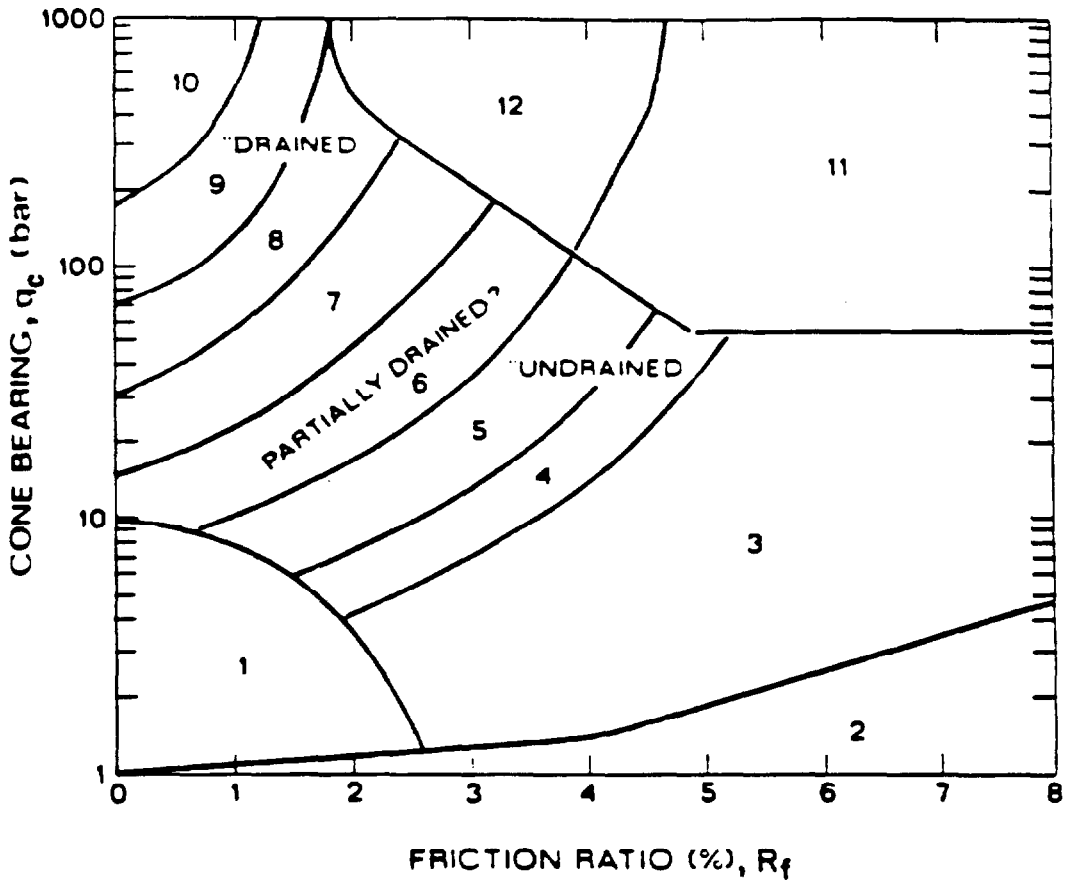
APPENDIX E - SOIL CONVERSION CHART



1 bar = 100 kPa ≈ 1 kg/cm²

Figure E.1 - Soil Classification Chart for Standard Electronic Friction Cone (Adapted from Douglas and Olsen, 1981)

APPENDIX E - SOIL CONVERSION CHART



Zone	q_c/N	Soil Behaviour Type
1)	2	sensitive fine grained
2)	1	organic material
3)	1	clay
4)	1.5	silty clay to clay
5)	2	clayey silt to silty clay
6)	2.5	sandy silt to clayey silt
7)	3	silty sand to sandy silt
8)	4	sand to silty sand
9)	5	sand
10)	6	gravelly sand to sand
11)	1	very stiff fine grained (*)
12)	2	sand to clayey sand (*)

(*) overconsolidated or cemented

Figure E.2 - Simplified Soil Classification Chart for Standard Electronic Friction Cone (Roberston et al, 1986)

APPENDIX F - RAW DATA

OCPT Detailed Data Report

12-Mar-96

SCAPS LIF and Geotechnical Data

Push Id	**NLFF01.CSV**	**North Coordinate (feet):**	202920.24
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782964.5
Time Started	9:26 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.42	432	4469	sand to silty sand	
0.68	453	2504	silty sand to sandy silt	
0.92	462	2239	sand to silty sand	
1.17	466	3922	sand to silty sand	
1.43	455	3039	sand to silty sand	
1.68	455	4283	sand to silty sand	
1.94	457	4484	silty sand to sandy silt	
2.19	460	4888	silty sand to sandy silt	
2.44	457	2646	silty sand to sandy silt	
2.70	460	2233	silty sand to sandy silt	
2.96	472	5058	sandy silt to silty clay	
3.47	455	5353	silty sand to sandy silt	
3.72	455	5580	sand to silty sand	
3.98	462	4839	sand to silty sand	
4.23	464	5041	sand to silty sand	
4.48	466	3696	silty sand to sandy silt	
4.73	472	3515	silty sand to sandy silt	
5.24	464	4579	clayey silt to silty clay	
5.50	464	4199	clayey silt to silty clay	
5.71	460	4524	sandy silt to silty clay	
5.96	485	3940	sand to silty sand	
6.21	462	4376	silty sand to sandy silt	
6.38	464	5632	silty sand to sandy silt	
6.48	466	6322	sandy silt to silty clay	
6.61	466	5176	sandy silt to silty clay	
6.86	462	6004	clayey silt to silty clay	
7.11	460	5975	clay	
7.27	468	6057	clay	
7.51	455	6313	clay	
7.76	460	6110	clay	
8.01	462	5865	silty clay to clay	
8.26	460	4871	clayey silt to silty clay	
8.40	464	6790	sandy silt to silty clay	
8.65	462	6375	sand	
8.91	464	2728	clay	
9.10	466	2968	sandy silt to silty clay	
9.36	470	2458	sand to silty sand	
9.61	466	2167	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	NLFF01.CSV	**North Coordinate (feet):**	202920.24
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782964.5
Time Started	9:26 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.86	468	2986	sand to silty sand	
10.12	464	1482	sand to silty sand	
10.37	464	877	sand to silty sand	
10.63	460	3594	sand to silty sand	
10.77	462	2111	sand to silty sand	
11.02	468	2465	sand	
11.23	464	3116	sand	
11.49	466	2705	sand to silty sand	
11.74	472	2544	silty sand to sandy silt	
12.00	460	2447	sandy silt to silty clay	
12.26	468	2232	clayey silt to silty clay	
12.51	455	2604	clayey silt to silty clay	
12.76	466	3813	clay	
13.26	483	5353	clayey silt to silty clay	
13.45	474	4778	clay	
13.62	468	4212	clay	
13.79	483	3976	clay	
14.04	462	4153	clay	
14.19	470	4158	clay	
14.44	483	4573	clay	
14.69	466	4916	clay	
14.94	462	4774	clay	
15.09	483	4795	organic material	
15.22	485	5155	clay	
15.31	487	4417	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF02.CSV**	**North Coordinate (feet):**	202921.6
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782913.3
Time Started	11:05 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	449	36469	clay	
0.42	472	3277	sand to silty sand	
0.62	464	2913	sandy silt to silty clay	
0.86	470	2922	sandy silt to silty clay	
1.10	468	3489	clayey silt to silty clay	
1.35	487	3343	clayey silt to silty clay	
1.60	483	2390	sandy silt to silty clay	
1.86	487	2369	clayey silt to silty clay	
2.11	481	2932	clayey silt to silty clay	
2.37	476	3269	sandy silt to silty clay	
2.63	489	3976	silty sand to sandy silt	
2.88	489	2023	sand to silty sand	
3.14	462	2309	sand to silty sand	
3.64	455	1504	sand to silty sand	
3.82	470	1568	silty sand to sandy silt	
4.06	468	1191	silty sand to sandy silt	
4.31	462	1207	silty sand to sandy silt	
4.43	483	1315	sandy silt to silty clay	
4.68	470	1151	silty sand to sandy silt	
4.93	466	881	silty sand to sandy silt	
5.18	468	1265	silty sand to sandy silt	
5.43	453	1123	silty sand to sandy silt	
5.69	460	1473	silty sand to sandy silt	
5.95	449	2953	sand to silty sand	
6.20	468	1244	clayey silt to silty clay	
6.45	449	1077	clay	
6.93	468	4271	silty sand to sandy silt	
7.15	472	2056	sandy silt to silty clay	
7.40	462	1024	clayey silt to silty clay	
7.65	445	883	silty clay to clay	
7.75	470	1180	sandy silt to silty clay	
7.99	470	1190	silty sand to sandy silt	
8.24	483	2283	sandy silt to silty clay	
8.49	485	1840	silty sand to sandy silt	
8.99	483	1993	silty sand to sandy silt	
9.25	470	1936	sandy silt to silty clay	
9.44	487	1852	clay	
9.69	470	2098	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF02.CSV**	**North Coordinate (feet):**	202921.6
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782913.3
Time Started	11:05 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.20	483	1387	sandy silt to silty clay	
10.45	451	1133	silty sand to sandy silt	
10.70	455	768	clayey silt to silty clay	
10.95	468	692	silty clay to clay	
11.08	457	866	sandy silt to silty clay	
11.33	462	879	clayey silt to silty clay	
11.58	455	964	clay	
11.77	462	1242	clayey silt to silty clay	
11.88	453	1149	sandy silt to silty clay	
12.01	464	1508	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF03.CSV**	**North Coordinate (feet):**	202868.7
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782880.68
Time Started	11:39 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	449	1017	sand to silty sand	
0.41	466	1447	gravely sand to sand	
0.65	447	1357	gravely sand to sand	
0.91	462	1187	sand	
1.16	472	1740	sand to silty sand	
1.40	460	1839	silty sand to sandy silt	
1.53	441	2187	very stiff fine grained	
1.78	464	2202	very stiff fine grained	
2.03	500	3212	clayey silt to silty clay	
2.40	504	2720	sand to silty sand	
2.64	474	1912	sand	
2.88	466	1521	sand	
3.13	428	1286	sand to silty sand	
3.38	483	1055	sand to silty sand	
3.63	487	1080	silty sand to sandy silt	
3.86	445	1174	sand to silty sand	
4.11	447	1376	sandy silt to silty clay	
4.36	460	636	very stiff fine grained	
4.61	436	668	silty sand to sandy silt	
4.83	466	675	sand	
5.07	460	590	silty sand to sandy silt	
5.32	487	649	sandy silt to silty clay	
5.57	457	627	silty sand to sandy silt	
5.83	403	635	silty sand to sandy silt	
6.33	449	582	silty sand to sandy silt	
6.59	464	1280	sandy silt to silty clay	
6.84	464	1919	silty sand to sandy silt	
7.35	483	1530	clayey silt to silty clay	
7.60	476	1259	clay	
7.85	487	3933	silty sand to sandy silt	
8.10	495	4338	sand	
8.20	476	2531	sand	
8.45	483	2055	sand to silty sand	
8.71	474	1284	silty sand to sandy silt	
8.96	457	679	sandy silt to silty clay	
9.21	462	613	sandy silt to silty clay	
9.46	453	606	sandy silt to silty clay	
9.60	491	590	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF03.CSV**	**North Coordinate (feet):**	202868.7
Date Started:	Friday, July 28, 1995	**East Coordinate (feet):**	782880.68
Time Started	11:39 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.85	460	569	sandy silt to silty clay	
10.10	460	549	silty sand to sandy silt	
10.60	455	526	silty sand to sandy silt	
10.85	504	538	silty sand to sandy silt	
11.10	457	639	silty sand to sandy silt	
11.35	445	538	silty sand to sandy silt	
11.51	468	512	silty sand to sandy silt	
11.76	455	538	sandy silt to silty clay	
12.01	466	552	silty sand to sandy silt	
12.27	466	522	sandy silt to silty clay	
12.52	470	537	sandy silt to silty clay	
12.77	466	504	silty sand to sandy silt	
13.02	460	525	silty sand to sandy silt	
13.27	474	533	silty sand to sandy silt	
13.52	474	511	silty sand to sandy silt	
13.77	464	534	silty sand to sandy silt	
14.02	460	534	silty sand to sandy silt	
14.28	441	631	sandy silt to silty clay	
14.53	472	413	sandy silt to silty clay	
14.78	491	481	silty sand to sandy silt	
15.03	474	509	sandy silt to silty clay	
15.28	466	519	sandy silt to silty clay	
15.53	476	525	clayey silt to silty clay	
15.70	470	541	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF04.CSV**	**North Coordinate (feet):**	203220.34
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782919.96
Time Started	12:18 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	453	16963	organic material	
0.41	487	3900	sand to silty sand	
0.51	466	3276	sand to silty sand	
0.66	464	3037	sand to silty sand	
0.90	468	3355	sand	
1.10	483	3018	sand to silty sand	
1.60	476	3246	silty sand to sandy silt	
1.85	500	2549	silty sand to sandy silt	
2.10	476	2093	silty sand to sandy silt	
2.34	476	2170	sand to silty sand	
2.60	487	2018	sand	
2.85	483	1176	sand to silty sand	
3.10	476	1521	sand to silty sand	
3.61	487	1879	sand to silty sand	
3.87	476	2025	silty sand to sandy silt	
4.13	495	2331	sand to silty sand	
4.38	481	2396	silty sand to sandy silt	
4.47	508	2363	silty sand to sandy silt	
4.72	489	2153	sand to silty sand	
4.97	483	2093	silty sand to sandy silt	
5.23	485	1452	silty sand to sandy silt	
5.48	487	1459	silty sand to sandy silt	
5.74	485	1329	silty sand to sandy silt	
5.99	483	1740	silty sand to sandy silt	
6.24	470	2020	sandy silt to silty clay	
6.49	462	1777	sandy silt to silty clay	
7.00	449	2436	sandy silt to silty clay	
7.25	462	2611	silty clay to clay	
7.51	455	1930	clayey silt to silty clay	
7.74	460	2375	clayey silt to silty clay	
7.99	466	2468	silty clay to clay	
8.23	449	2171	clay	
8.48	447	2326	silty clay to clay	
8.74	464	1856	silty sand to sandy silt	
8.99	441	1628	clay	
9.25	445	2308	clayey silt to silty clay	
9.51	460	2482	clay	
9.76	451	2140	silty clay to clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF04.CSV**	**North Coordinate (feet):**	203220.34
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782919.96
Time Started	12:18 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.26	451	2393	clay	
10.52	445	2505	clay	
10.77	449	2375	clayey silt to silty clay	
11.02	460	2466	clay	
11.27	445	3660	silty clay to clay	
11.52	462	2708	clay	
11.77	460	2578	clay	
11.91	451	2817	clay	
12.15	443	2670	clay	
12.41	445	2567	organic material	
12.67	460	2328	organic material	
12.92	455	2720	organic material	
13.17	470	2660	clay	
13.42	470	2492	clayey silt to silty clay	
13.67	470	3901	clay	
13.94	479	3775	clay	
14.19	470	3483	clay	
14.38	487	3341	organic material	
14.64	481	3255	organic material	
14.90	485	2774	clay	
15.15	466	2622	clay	
15.40	485	2914	sandy silt to silty clay	
15.65	470	2927	silty sand to sandy silt	
15.90	462	2748	clayey silt to silty clay	
16.16	481	2399	clay	
16.40	460	2777	clay	
16.92	483	3171	clay	
17.18	481	3093	clay	
17.43	481	2371	clay	
17.64	472	4224	clay	
17.90	462	1851	clay	
18.15	466	2211	clay	
18.40	470	2342	clay	
18.65	472	4306	clay	
18.91	472	4962	clay	
19.16	472	5013	clay	
19.32	462	5273	clay	
19.58	466	3390	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF04.CSV**	**North Coordinate (feet):**	203220.34
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782919.96
Time Started	12:18 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
20.09	464	1512	sandy silt to silty clay	
20.35	495	708	silty sand to sandy silt	
20.59	476	686	silty sand to sandy silt	
20.85	453	654	silty sand to sandy silt	
20.98	481	651	silty sand to sandy silt	
21.22	443	624	silty sand to sandy silt	
21.48	468	604	silty sand to sandy silt	
21.73	449	591	silty sand to sandy silt	
21.99	476	585	sandy silt to silty clay	
22.25	449	598	sandy silt to silty clay	
22.50	453	587	silty sand to sandy silt	
22.76	476	624	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF05.CSV**	**North Coordinate (feet):**	203273.98
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	783029.76
Time Started	12:58 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.11	485	5001	clay	
0.23	462	3351	sandy silt to silty clay	
0.47	468	3086	sand to silty sand	
0.72	443	2477	sand to silty sand	
0.97	481	2578	sand to silty sand	
1.20	470	2707	sand to silty sand	
1.45	464	3278	sand	
1.70	476	3502	sand	
1.95	449	3325	sand	
2.46	462	2858	sand to silty sand	
2.71	474	2985	sand to silty sand	
2.96	466	2746	silty sand to sandy silt	
3.21	466	2657	silty sand to sandy silt	
3.47	464	2946	silty sand to sandy silt	
3.72	457	2555	silty sand to sandy silt	
3.97	460	2778	silty sand to sandy silt	
4.23	464	2946	silty sand to sandy silt	
4.48	466	2875	sandy silt to silty clay	
4.73	489	2421	sandy silt to silty clay	
4.98	483	2087	sandy silt to silty clay	
5.24	481	2293	sandy silt to silty clay	
5.50	472	2592	sandy silt to silty clay	
5.74	455	2756	sandy silt to silty clay	
6.00	462	3552	clayey silt to silty clay	
6.25	447	4802	clayey silt to silty clay	
6.50	460	2803	silty clay to clay	
6.76	472	3426	silty clay to clay	
7.26	462	3608	silty clay to clay	
7.51	466	4410	clay	
7.77	466	3936	clay	
8.03	464	3322	clay	
8.29	466	6031	clay	
8.54	464	7576	clay	
8.80	462	5489	clay	
9.06	470	5381	clay	
9.57	466	4453	clay	
9.82	466	5360	clay	
10.08	472	4572	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF05.CSV**	**North Coordinate (feet):**	203273.98
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	783029.76
Time Started	12:58 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.58	457	3723	clay	
10.84	455	5082	clay	
11.09	470	5986	clay	
11.34	464	3593	clay	
11.59	457	6795	clay	
11.84	472	4666	clay	
12.10	464	2986	clay	
12.35	464	4706	clay	
12.60	466	4367	clay	
12.86	462	3101	clay	
13.12	466	4847	clay	
13.37	466	3811	clay	
13.89	468	3538	clay	
14.14	457	2857	clay	
14.40	451	2405	clay	
14.66	466	3587	clay	
14.91	460	4647	clay	
15.17	464	5262	clay	
15.43	474	6015	clay	
15.68	462	5813	clay	
16.19	472	7225	clay	
16.44	476	5980	clay	
16.69	470	4165	clay	
17.20	485	6300	clay	
17.45	466	3459	clay	
17.70	468	4585	clay	
17.88	462	3009	clay	
18.13	466	3906	clay	
18.38	470	3415	clay	
18.64	464	1291	clay	
18.90	466	636	clayey silt to silty clay	
19.40	466	853	silty sand to sandy silt	
19.65	445	836	silty sand to sandy silt	
19.90	451	848	silty sand to sandy silt	
20.40	449	870	silty sand to sandy silt	
20.65	468	864	silty sand to sandy silt	
20.90	466	802	silty sand to sandy silt	
21.14	447	826	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF05.CSV**	**North Coordinate (feet):**	203273.98
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	783029.76
Time Started	12:58 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
21.28	455	846	sandy silt to silty clay	
21.53	449	854	silty sand to sandy silt	
21.78	455	803	sandy silt to silty clay	
22.03	449	787	silty sand to sandy silt	
22.28	441	795	silty sand to sandy silt	
22.52	445	774	silty sand to sandy silt	
22.78	441	775	sandy silt to silty clay	
23.04	460	811	sandy silt to silty clay	
23.29	472	788	sandy silt to silty clay	
23.55	445	793	silty sand to sandy silt	
24.06	447	794	silty sand to sandy silt	
24.31	445	798	sandy silt to silty clay	
24.56	453	801	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF06.CSV**	**North Coordinate (feet):**	203343.05
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782934.34
Time Started	1:35 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	455	22074	sandy silt to silty clay	
0.41	464	4390	silty sand to sandy silt	
0.66	502	4486	silty sand to sandy silt	
0.91	502	3486	silty sand to sandy silt	
1.16	502	3021	silty sand to sandy silt	
1.41	485	2163	sand to silty sand	
1.66	483	1834	sand to silty sand	
1.92	493	1668	sand	
2.18	472	1814	sand to silty sand	
2.43	466	1804	sand to silty sand	
2.69	466	2435	silty sand to sandy silt	
2.93	460	2897	silty sand to sandy silt	
3.19	460	3304	sandy silt to silty clay	
3.71	455	2572	clayey silt to silty clay	
3.96	447	2513	clayey silt to silty clay	
4.18	460	3462	sandy silt to silty clay	
4.43	455	3250	sandy silt to silty clay	
4.55	462	2350	sandy silt to silty clay	
4.80	466	2062	sandy silt to silty clay	
5.05	468	3503	sandy silt to silty clay	
5.31	464	3815	sandy silt to silty clay	
5.57	460	3240	clayey silt to silty clay	
5.82	464	3468	clayey silt to silty clay	
6.07	468	2434	sandy silt to silty clay	
6.32	460	1253	sandy silt to silty clay	
6.57	462	2187	clayey silt to silty clay	
7.08	451	3000	silty clay to clay	
7.33	462	2120	clayey silt to silty clay	
7.58	455	1420	silty clay to clay	
7.84	466	2699	clay	
8.09	470	3164	clay	
8.35	466	2950	clay	
8.60	460	2897	clay	
8.86	466	3208	clay	
9.12	464	2958	clay	
9.38	464	4141	clay	
9.64	472	3717	clay	
9.89	472	3773	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF06.CSV**	**North Coordinate (feet):**	203343.05
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782934.34
Time Started	1:35 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.66	438	5011	organic material	
10.91	468	4197	organic material	
11.17	455	4310	organic material	
11.41	466	3528	organic material	
11.67	460	4320	organic material	
11.92	464	3416	organic material	
12.17	462	4196	organic material	
12.69	451	3798	organic material	
12.95	466	3740	organic material	
13.20	466	4356	organic material	
13.71	455	3782	clay	
13.96	462	3902	organic material	
14.21	464	4502	organic material	
14.46	470	4300	clay	
14.72	460	4693	organic material	
14.97	462	4104	clay	
15.22	466	4867	clay	
15.48	472	6536	clay	
15.73	466	4986	clay	
15.87	470	5224	clay	
16.05	483	7337	clay	
16.28	472	4317	clay	
16.53	481	5199	clay	
16.77	462	4082	clay	
17.03	476	3828	clay	
17.28	466	6404	clay	
17.54	470	4678	clay	
17.78	485	5946	silty clay to clay	
18.03	472	5743	gravely sand to sand	
18.28	485	7123	clay	
18.53	487	9036	sand to silty sand	
18.63	455	14947	sand to silty sand	
18.89	483	10473	sandy silt to silty clay	
19.14	481	4455	sandy silt to silty clay	
19.40	466	1395	silty sand to sandy silt	
19.65	466	678	silty sand to sandy silt	
19.90	485	601	sandy silt to silty clay	
20.15	457	608	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF06.CSV**	**North Coordinate (feet):**	203343.05
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782934.34
Time Started	1:35 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
20.41	464	600	sandy silt to silty clay	
20.66	455	670	sandy silt to silty clay	
20.92	464	672	silty sand to sandy silt	
21.06	447	780	silty sand to sandy silt	
21.31	449	751	silty sand to sandy silt	
21.56	445	732	silty sand to sandy silt	
21.81	462	736	silty sand to sandy silt	
22.07	451	734	silty sand to sandy silt	
22.58	436	765	sandy silt to silty clay	
22.83	464	743	sandy silt to silty clay	
23.10	470	712	sandy silt to silty clay	
23.35	455	739	silty sand to sandy silt	
23.86	460	721	sandy silt to silty clay	
24.12	436	717	sandy silt to silty clay	
24.26	464	694	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF07.CSV**	**North Coordinate (feet):**	203421.23
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782655.83
Time Started	2:12 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	487	2349	gravely sand to sand	
0.42	500	1814	gravely sand to sand	
0.66	476	1699	gravely sand to sand	
0.90	483	1884	sand to silty sand	
1.08	460	2154	sand to silty sand	
1.20	470	2105	sand to silty sand	
1.45	487	2036	silty sand to sandy silt	
1.70	481	2142	sandy silt to silty clay	
1.95	462	2135	very stiff fine grained	
2.21	481	2244	very stiff fine grained	
2.46	483	1647	clayey silt to silty clay	
2.72	462	1813	sandy silt to silty clay	
2.97	487	1849	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF08.CSV**	**North Coordinate (feet):**	203374.6
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782570.94
Time Started	5:54 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.25	464	13255	sand to silty sand	
0.49	460	988	sand to silty sand	
0.74	428	1343	gravely sand to sand	
1.23	430	1208	sand to silty sand	
1.48	426	2220	sand to clayey sand	
1.73	445	1622	sand to silty sand	
1.98	455	670	sand to silty sand	
2.17	468	578	silty sand to sandy silt	
2.42	457	1398	clayey silt to silty clay	
2.67	445	1975	sand to silty sand	
2.92	447	3351	sandy silt to silty clay	
3.17	453	2042	silty sand to sandy silt	
3.41	474	2122	sand	
3.91	483	3734	silty sand to sandy silt	
4.17	481	3598	silty sand to sandy silt	
4.42	468	2973	silty sand to sandy silt	
4.66	472	3251	silty sand to sandy silt	
4.91	483	3900	silty sand to sandy silt	
5.15	485	3655	clayey silt to silty clay	
5.40	474	3188	sandy silt to silty clay	
5.90	462	4002	clay	
6.16	489	3820	silty clay to clay	
6.42	481	2057	silty clay to clay	
6.67	453	1229	clay	
7.18	462	2936	silty clay to clay	
7.43	466	2552	clay	
7.68	466	4506	clay	
7.93	481	5208	clay	
8.18	460	4067	clayey silt to silty clay	
8.42	468	3920	clay	
8.68	468	4338	clay	
8.93	476	4918	clay	
9.18	455	6631	silty sand to sandy silt	
9.43	464	5482	silty sand to sandy silt	
9.68	466	4096	sand to silty sand	
9.93	466	3286	silty sand to sandy silt	
10.19	441	2509	sandy silt to silty clay	
10.45	455	2809	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF08.CSV**	**North Coordinate (feet):**	203374.6
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782570.94
Time Started	5:54 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.70	481	3598	clayey silt to silty clay	
10.95	500	3398	clayey silt to silty clay	
11.20	466	3154	clay	
11.31	508	2598	clay	
11.55	502	3150	clay	
11.81	502	3898	silty clay to clay	
12.06	487	3236	silty sand to sandy silt	
12.31	483	2443	clay	
12.81	504	4014	clay	
13.06	498	4000	clay	
13.32	502	3853	sandy silt to silty clay	
13.83	462	2050	sand	
14.08	455	1823	sand	
14.32	472	1811	sand	
14.45	455	1794	sand to silty sand	
14.70	443	1690	sand to silty sand	
14.95	436	1606	sand to silty sand	
15.20	472	1670	sand to silty sand	
15.45	449	1532	sand to silty sand	
15.70	447	1484	sand to silty sand	
15.95	457	1517	sand to silty sand	
16.45	457	1367	sand to silty sand	
16.94	464	1242	sand to silty sand	
17.18	432	687	sand to silty sand	
17.43	453	985	sand to silty sand	
17.68	457	869	sand to silty sand	
17.93	455	829	sand to silty sand	
18.17	445	878	sand to silty sand	
18.41	447	855	sand to silty sand	
18.66	441	826	sand to silty sand	
18.91	443	813	sand to silty sand	
19.15	445	748	sand to silty sand	
19.40	432	706	sand to silty sand	
19.65	474	709	sand to silty sand	
19.90	460	754	sand to silty sand	
20.64	464	731	silty sand to sandy silt	
20.89	457	708	sand to silty sand	
21.14	460	551	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF08.CSV**	**North Coordinate (feet):**	203374.6
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782570.94
Time Started	5:54 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
21.26	455	680	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF09.CSV**	**North Coordinate (feet):**	203417.02
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782619
Time Started	7:17 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	476	1830	sand	
0.40	466	1460	gravely sand to sand	
0.65	457	1438	gravely sand to sand	
0.89	476	1464	sand	
1.08	474	1533	sand to silty sand	
1.22	453	1438	silty sand to sandy silt	
1.47	455	2366	silty sand to sandy silt	
1.72	487	2230	silty sand to sandy silt	
1.97	487	2298	silty sand to sandy silt	
2.47	483	2180	silty sand to sandy silt	
2.72	445	2608	very stiff fine grained	
2.93	466	2470	very stiff fine grained	
3.17	470	2964	clay	
3.38	460	3631	clay	
3.62	462	3673	sandy silt to silty clay	
3.87	462	3347	clayey silt to silty clay	
4.11	457	4296	clayey silt to silty clay	
4.36	460	3612	silty clay to clay	
4.62	470	2890	clay	
4.75	462	3002	silty clay to clay	
5.00	441	23349	sand to silty sand	
5.25	438	115372	sand	
5.50	394	164071	silty clay to clay	
6.01	411	160143	clay	
6.27	382	154002	silty sand to sandy silt	
6.52	455	171890	silty sand to sandy silt	
6.77	432	121138	very stiff fine grained	
7.02	436	22626	silty clay to clay	
7.53	481	7435	sandy silt to silty clay	
7.77	460	9112	sandy silt to silty clay	
8.02	470	6999	sandy silt to silty clay	
8.26	468	5618	clayey silt to silty clay	
8.51	470	8376	clayey silt to silty clay	
8.77	466	5911	sandy silt to silty clay	
9.02	462	4943	clay	
9.27	455	4801	silty clay to clay	
9.52	468	4921	clayey silt to silty clay	
9.78	455	5623	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF09.CSV**	**North Coordinate (feet):**	203417.02
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782619
Time Started	7:17 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.03	464	5361	silty clay to clay	
10.78	457	4371	clay	
11.04	464	4542	clay	
11.29	460	5684	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	NLFF10.CSV	**North Coordinate (feet):**	203366.89
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782710.9
Time Started	8:02 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	455	26623	clayey silt to silty clay	
0.41	455	33205	sand to silty sand	
0.66	457	9042	sand to silty sand	
0.91	449	2623	sand to silty sand	
1.10	460	2372	sand to silty sand	
1.22	451	2192	sand to silty sand	
1.47	462	2039	sand to silty sand	
1.66	462	1576	sand to silty sand	
1.91	466	1421	sand to silty sand	
2.15	466	1639	silty sand to sandy silt	
2.36	466	1837	silty sand to sandy silt	
2.55	466	2355	silty sand to sandy silt	
2.70	462	2058	silty sand to sandy silt	
2.95	462	2893	sandy silt to silty clay	
3.16	443	2578	clayey silt to silty clay	
3.41	466	2314	silty clay to clay	
3.66	441	4118	sandy silt to silty clay	
3.91	445	3289	sand	
4.16	438	2650	sand	
4.40	445	3193	clay	
4.62	445	2297	sand to silty sand	
4.87	449	2296	sand	
5.12	453	2137	sand to silty sand	
5.37	449	3133	clay	
5.62	466	2806	clay	
5.87	447	3136	clay	
6.13	445	5002	clay	
6.39	445	2398	clay	
6.64	460	1397	clay	
7.15	466	1703	clay	
7.41	447	2075	clay	
7.65	468	2747	clay	
7.89	453	2523	clay	
8.14	449	2221	clay	
8.39	447	2262	clay	
8.64	447	1495	silty clay to clay	
8.90	474	1343	clay	
9.15	470	2106	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF10.CSV**	**North Coordinate (feet):**	203366.89
Date Started:	Saturday, July 29, 1995	**East Coordinate (feet):**	782710.9
Time Started	8:02 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.41	466	1657	clay	
9.66	455	1563	sandy silt to silty clay	
9.78	457	1963	clay	
9.95	462	1748	clay	
10.34	451	2204	clay	
10.59	468	2199	clay	
10.84	455	1611	clayey silt to silty clay	
11.09	455	2157	silty sand to sandy silt	
11.24	460	2796	silty sand to sandy silt	
11.49	457	2986	clay	
11.74	457	14897	clay	
11.99	453	38217	sand	
12.11	455	5562	gravely sand to sand	
12.36	462	3259	clay	
12.61	453	2249	very stiff fine grained	
12.86	447	2578	sandy silt to silty clay	
13.11	451	2773	silty sand to sandy silt	
13.36	457	3606	silty sand to sandy silt	
13.61	453	3952	sandy silt to silty clay	
13.86	464	2383	sandy silt to silty clay	
14.12	460	2534	sandy silt to silty clay	
14.37	449	2293	silty sand to sandy silt	
14.60	457	2286	sand to silty sand	
14.85	470	2140	silty sand to sandy silt	
15.10	466	1583	silty sand to sandy silt	
15.35	460	1534	silty sand to sandy silt	
15.60	460	1601	sandy silt to silty clay	
15.85	449	2201	sandy silt to silty clay	
16.10	468	2641	sandy silt to silty clay	
16.36	464	2757	silty sand to sandy silt	
16.61	462	2551	sandy silt to silty clay	
17.14	462	2838	silty sand to sandy silt	
17.38	464	1700	clay	
17.48	472	1516	silty clay to clay	
17.70	464	2117	silty clay to clay	
17.85	468	2702	silty clay to clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF11.CSV**	**North Coordinate (feet):**	203417.02
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782619
Time Started	1:19 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	466	677	silty sand to sandy silt	
0.42	455	1513	gravely sand to sand	
0.67	460	2544	gravely sand to sand	
0.92	466	1423	gravely sand to sand	
1.17	466	1228	sand	
1.42	460	2128	silty sand to sandy silt	
1.67	504	2522	silty sand to sandy silt	
1.92	466	2789	sandy silt to silty clay	
2.17	481	2509	silty sand to sandy silt	
2.68	498	1766	silty sand to sandy silt	
2.93	464	2143	silty sand to sandy silt	
3.44	470	3495	clay	
3.64	460	3262	silty clay to clay	
3.89	460	3035	sandy silt to silty clay	
4.15	468	4375	sandy silt to silty clay	
4.40	476	1638	sandy silt to silty clay	
4.66	470	1155	silty clay to clay	
4.91	430	2785	sandy silt to silty clay	
5.16	460	1078	clayey silt to silty clay	
5.41	453	3726	sand	
5.67	405	165262	silty sand to sandy silt	6500 ppm by TRPH 9073
6.18	438	53493	clay	6500 ppm by TRPH 9073
6.45	443	217820	clay	6500 ppm by TRPH 9073
6.70	377	172489	silty sand to sandy silt	6500 ppm by TRPH 9073
7.21	445	22418	silty sand to sandy silt	
7.46	462	19058	silty sand to sandy silt	
7.71	464	8812	silty sand to sandy silt	
7.97	487	10173	silty sand to sandy silt	
8.22	476	5828	silty sand to sandy silt	
8.47	472	6191	silty sand to sandy silt	
8.72	472	6874	sandy silt to silty clay	
8.97	466	7965	sandy silt to silty clay	
9.22	462	7832	silty sand to sandy silt	
9.73	466	6908	silty sand to sandy silt	
9.99	443	12902	silty sand to sandy silt	
10.24	466	5582	sand to silty sand	
10.49	447	3264	sand	
10.74	464	3484	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF11.CSV**	**North Coordinate (feet):**	203417.02
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782619
Time Started	1:19 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.99	455	8443	clay	
11.24	464	5921	clay ND	
11.35	464	4187	clayey silt to silty clay	

SCAPS LIF and Geotechnical Data

Push Id	**NLFF12.CSV**	**North Coordinate (feet):**	203244.88
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782683.54
Time Started	2:13 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	453	42915	sensitive fine grained	
0.41	483	3838	silty sand to sandy silt	
0.68	504	3231	silty sand to sandy silt	
0.93	502	2548	silty sand to sandy silt	
1.18	485	3150	sand	
1.43	487	3874	sand	
1.68	485	2561	silty sand to sandy silt	
1.93	470	2507	sandy silt to silty clay	
2.18	460	2013	sandy silt to silty clay	
2.44	472	1724	sandy silt to silty clay	
2.94	466	1856	silty sand to sandy silt	
3.19	470	2224	sandy silt to silty clay	
3.45	470	2699	clayey silt to silty clay	
3.96	466	2073	sandy silt to silty clay	
4.21	495	2199	clay	
4.47	479	1702	silty clay to clay	
4.73	485	1846	sandy silt to silty clay	
4.97	487	2335	sandy silt to silty clay	
5.23	470	1683	sandy silt to silty clay	
5.48	485	1492	sandy silt to silty clay	
5.74	506	1587	sandy silt to silty clay	
6.13	493	1345	sandy silt to silty clay	
6.38	504	1381	sandy silt to silty clay	
6.64	476	1273	clayey silt to silty clay	
6.88	481	1525	sandy silt to silty clay	
7.13	470	1547	silty clay to clay	
7.43	502	1200	silty clay to clay	
7.63	493	1942	silty clay to clay	
7.88	479	2042	sand	
8.02	476	1258	sand	
8.27	470	2102	sandy silt to silty clay	
8.52	472	5155	clay	
8.76	466	6106	clay	
9.02	485	6452	clayey silt to silty clay	
9.28	476	13216	sand	
9.52	447	8871	gravely sand to sand	
9.77	462	3232	gravely sand to sand	
10.03	487	2443	sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF12.CSV**	**North Coordinate (feet):**	203244.88
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782683.54
Time Started	2:13 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.28	485	2218	sand to silty sand	
10.53	485	2432	sand	
11.03	500	3065	sand to silty sand	
11.29	514	2895	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF13.CSV**	**North Coordinate (feet):**	203289.06
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782582.87
Time Started	2:49 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	481	1969	silty sand to sandy silt	
0.38	466	1295	sand	
0.51	468	888	sand	
0.60	466	930	sand	
0.84	476	1219	sand to silty sand	
1.09	485	1387	silty sand to sandy silt	
1.26	483	2727	silty sand to sandy silt	
1.51	500	2953	sand to silty sand	
1.76	485	2564	silty sand to sandy silt	
2.01	487	2905	silty sand to sandy silt	
2.26	472	2469	sand	
2.51	483	1727	sand	
2.77	489	1496	sand	
3.02	485	1682	sand to clayey sand	
3.28	470	2238	sand to silty sand	
3.78	483	1873	sand to silty sand	
4.02	483	2838	sand to silty sand	
4.27	464	2819	silty sand to sandy silt	
4.47	468	2037	sandy silt to silty clay	
4.72	470	2195	silty sand to sandy silt	
4.98	491	2741	silty sand to sandy silt	
5.23	464	2213	sand to silty sand	
5.48	483	1942	silty sand to sandy silt	
5.74	476	1634	silty sand to sandy silt	
5.99	500	1246	silty sand to sandy silt	
6.25	466	1582	silty sand to sandy silt	
6.51	468	1879	silty sand to sandy silt	
6.76	462	2796	silty sand to sandy silt	
7.01	498	1633	silty sand to sandy silt	
7.27	500	1358	silty sand to sandy silt	
7.52	464	1102	silty sand to sandy silt	
7.88	474	2093	clayey silt to silty clay	
8.12	466	1979	sandy silt to silty clay	
8.37	487	2372	silty clay to clay	
8.63	472	3818	silty clay to clay	
8.89	506	4801	silty clay to clay	
9.14	468	3159	clayey silt to silty clay	
9.39	483	4173	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF13.CSV**	**North Coordinate (feet):**	203289.06
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782582.87
Time Started	2:49 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.64	481	6230	clay	
9.89	466	5523	clayey silt to silty clay	
10.40	472	3131	sandy silt to silty clay	
10.66	441	7683	sand	
10.91	462	6648	sand to silty sand	
11.14	489	4003	sand	
11.38	504	2841	sand	
11.63	491	2557	silty sand to sandy silt	
11.87	498	2598	silty sand to sandy silt	
12.13	502	3727	silty sand to sandy silt	
12.37	493	3269	silty sand to sandy silt	
12.62	483	3533	sandy silt to silty clay	
12.88	502	4453	clayey silt to silty clay	
13.14	508	4658	clayey silt to silty clay	
13.66	491	4449	sandy silt to silty clay	
13.92	502	4032	clayey silt to silty clay	
14.17	491	2535	silty sand to sandy silt	
14.41	502	863	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF14.CSV**	**North Coordinate (feet):**	203025.41
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782463.25
Time Started	3:31 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	455	45761	sand to silty sand	
0.42	476	3136	sand to silty sand	
0.67	483	2386	sandy silt to silty clay	
0.93	472	2210	sand to silty sand	
1.18	483	2737	sand to silty sand	
1.42	462	3404	sand	
1.53	474	1988	sand	
1.78	462	3030	sand	
2.03	481	2607	sand	
2.28	462	3307	sand to silty sand	
2.54	464	9684	sand to silty sand	
2.79	470	2929	sand to silty sand	
3.04	483	2950	silty sand to sandy silt	
3.30	483	3495	silty sand to sandy silt	
3.55	466	4094	silty sand to sandy silt	
4.06	455	1746	silty sand to sandy silt	
4.32	439	3819	sand to silty sand	
4.57	481	3205	silty clay to clay	
4.82	487	3070	silty clay to clay	
5.08	483	5196	silty clay to clay	
5.33	464	5583	clayey silt to silty clay	
5.85	493	3399	sandy silt to silty clay	
6.11	487	3248	sandy silt to silty clay	
6.36	487	2921	sandy silt to silty clay	
6.62	476	3174	sandy silt to silty clay	
6.87	451	4592	sandy silt to silty clay	
7.38	464	5007	silty sand to sandy silt	
7.63	453	8527	clayey silt to silty clay	
7.90	455	5488	clayey silt to silty clay	
8.13	464	3949	sandy silt to silty clay	
8.38	464	3501	sandy silt to silty clay	
8.64	464	2544	sandy silt to silty clay	
8.89	464	3294	sandy silt to silty clay	
9.14	462	2929	sandy silt to silty clay	
9.65	464	4207	sandy silt to silty clay	
9.91	468	7480	clay	
10.16	470	5069	sandy silt to silty clay	
10.66	468	6118	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF14.CSV**	**North Coordinate (feet):**	203025.41
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782463.25
Time Started	3:31 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.92	464	2891	clayey silt to silty clay	
11.17	460	3123	clay	
11.41	466	3453	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF15.CSV**	**North Coordinate (feet):**	203071
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782536.92
Time Started	4:14 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	455	32575	silty sand to sandy silt	
0.42	466	3271	silty sand to sandy silt	
0.67	504	2822	sandy silt to silty clay	
0.93	489	1657	sand to silty sand	
1.18	483	3108	sand	
1.43	470	5129	very stiff fine grained	
1.68	464	2042	very stiff fine grained	
1.93	508	2443	sandy silt to silty clay	
2.43	472	1721	sandy silt to silty clay	
2.69	466	2163	clay	
2.94	472	2958	silty clay to clay	
3.20	470	3213	silty sand to sandy silt	
3.45	479	1648	silty sand to sandy silt	
3.71	487	1398	silty sand to sandy silt	
4.21	470	1293	silty sand to sandy silt	
4.46	472	1283	sandy silt to silty clay	
4.72	476	1085	silty sand to sandy silt	
4.97	472	1166	silty sand to sandy silt	
5.17	483	1174	sand	
5.42	476	2694	sand	
5.67	464	1694	sand	
5.92	466	1051	sand to silty sand	
6.18	457	906	silty sand to sandy silt	
6.43	485	973	silty sand to sandy silt	
6.68	479	885	silty sand to sandy silt	
6.94	498	806	silty sand to sandy silt	
7.45	457	667	sand to silty sand	
7.70	470	764	silty sand to sandy silt	
7.95	460	708	silty sand to sandy silt	
8.21	462	580	silty sand to sandy silt	
8.30	453	629	silty sand to sandy silt	
8.55	455	589	silty sand to sandy silt	
8.79	453	572	silty sand to sandy silt	
9.05	436	608	silty sand to sandy silt	
9.31	464	784	sandy silt to silty clay	
9.57	443	679	sandy silt to silty clay	
9.82	498	620	sandy silt to silty clay	
10.07	426	628	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF15.CSV**	**North Coordinate (feet):**	203071
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782536.92
Time Started	4:14 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.33	460	708	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF16.CSV**	**North Coordinate (feet):**	0
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	0
Time Started	4:44 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	455	19038	sand to silty sand	
0.33	483	2858	silty sand to sandy silt	
0.43	485	3091	sandy silt to silty clay	
0.56	474	2945	clayey silt to silty clay	
0.73	500	2960	clay	
0.92	487	1859	clayey silt to silty clay	
1.11	468	1167	sandy silt to silty clay	
1.35	485	624	sandy silt to silty clay	
1.53	474	502	clayey silt to silty clay	
1.64	460	507	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF17.CSV**	**North Coordinate (feet):**	203158.99
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782468.87
Time Started	5:24 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.29	455	44987	silty sand to sandy silt	
0.54	485	2895	silty sand to sandy silt	
0.79	487	2484	sand to silty sand	
1.04	470	2526	sand to silty sand	
1.16	476	2617	sand	
1.41	483	2280	sand	
1.65	468	2543	sand	
1.90	470	1820	sand	
2.15	462	3213	sand to silty sand	
2.39	443	2677	very stiff fine grained	
2.64	451	1722	very stiff fine grained	13 ppm by TRPH 9073
2.90	476	1826	silty sand to sandy silt	13 ppm by TRPH 9073
3.09	476	1772	silty sand to sandy silt	13 ppm by TRPH 9073
3.26	476	3323	sandy silt to silty clay	13 ppm by TRPH 9073
3.76	498	2923	sandy silt to silty clay	13 ppm by TRPH 9073
4.01	485	3555	silty sand to sandy silt	13 ppm by TRPH 9073
4.27	470	3278	silty sand to sandy silt	
4.52	483	2954	clayey silt to silty clay	
4.77	472	2917	clay	
5.02	472	2619	clay	
5.27	483	7272	sand	
5.53	424	65423	very stiff fine grained	
5.62	426	20152	clay	
5.87	508	3273	clay	
6.12	510	2236	clay	
6.33	464	1424	sandy silt to silty clay	
6.59	485	1485	sandy silt to silty clay	
6.83	483	1616	silty sand to sandy silt	
7.08	464	1536	sandy silt to silty clay	
7.33	472	3540	sandy silt to silty clay	
7.58	466	3197	clay	
7.83	468	2310	clay	
8.08	483	3242	clayey silt to silty clay	
8.32	483	3621	silty clay to clay	
8.58	483	3845	silty clay to clay	
8.84	479	4389	clayey silt to silty clay	
9.08	468	3246	clayey silt to silty clay	
9.33	476	3155	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF17.CSV**	**North Coordinate (feet):**	203158.99
Date Started:	Tuesday, August 08, 1995	**East Coordinate (feet):**	782468.87
Time Started	5:24 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.58	489	4177	clayey silt to silty clay	
9.84	493	3667	silty sand to sandy silt	
10.09	464	1974	silty sand to sandy silt	
10.35	460	1554	sandy silt to silty clay	
10.48	455	1455	sandy silt to silty clay	
10.73	447	1332	clayey silt to silty clay	
10.97	483	3323	clayey silt to silty clay	
11.12	481	2149	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF18.CSV**	**North Coordinate (feet):**	203221.04
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782174.92
Time Started	9:17 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.30	455	19353	sand to silty sand	
0.60	457	3453	sandy silt to silty clay	
0.71	438	3515	clayey silt to silty clay	
0.86	447	3735	sandy silt to silty clay	
1.11	436	2898	sand	
1.36	455	3720	sand	
1.53	441	3316	sand	
1.67	441	3417	sand	
1.92	445	3480	sand	
2.11	443	3108	sand	
2.35	438	2740	sand to silty sand	
2.61	434	2938	silty sand to sandy silt	
2.86	432	2275	silty sand to sandy silt	
3.10	438	5554	silty sand to sandy silt	
3.36	438	4235	sand to clayey sand	
3.61	451	3136	silty sand to sandy silt	
4.12	455	2614	sand to silty sand	
4.38	438	2629	silty sand to sandy silt	
4.63	441	2480	silty sand to sandy silt	
4.89	436	2265	silty sand to sandy silt	
4.98	449	2424	silty sand to sandy silt	
5.23	451	2352	sandy silt to silty clay	
5.48	449	2501	sandy silt to silty clay	
5.74	451	2561	sandy silt to silty clay	
5.99	432	2273	sandy silt to silty clay	
6.24	441	2450	sandy silt to silty clay	
6.49	445	2771	clayey silt to silty clay	
6.75	447	2471	clayey silt to silty clay	
7.00	445	2324	clayey silt to silty clay	
7.51	441	2580	silty clay to clay	
7.77	455	2716	clayey silt to silty clay	
8.02	462	2932	silty clay to clay	
8.24	443	2286	clayey silt to silty clay	
8.49	447	2380	silty clay to clay	
8.74	443	2732	clayey silt to silty clay	
9.00	453	2552	sandy silt to silty clay	
9.25	447	2338	silty clay to clay	
9.75	443	2874	silty clay to clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF18.CSV**	**North Coordinate (feet):**	203221.04
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782174.92
Time Started	9:17 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.01	445	2887	clayey silt to silty clay	
10.27	449	2215	silty clay to clay	
10.73	451	3098	clay	
10.98	462	3653	clay	
11.17	462	3669	clay	
11.39	455	4250	silty clay to clay	
11.51	466	4909	silty clay to clay	
11.76	466	3643	clayey silt to silty clay	
12.01	451	2643	clay	
12.27	453	2416	clay	
12.52	462	3655	clay	
12.77	462	4007	silty clay to clay	
13.03	464	3624	silty clay to clay	
13.28	455	3588	clayey silt to silty clay	
13.53	451	2612	silty clay to clay	
14.04	474	5959	clay	
14.29	460	3390	silty clay to clay	
14.55	436	2691	clayey silt to silty clay	
14.80	460	4171	clay	
15.05	460	4066	clay	
15.31	466	3618	clay	
15.57	462	3685	silty clay to clay	
15.82	455	4536	clayey silt to silty clay	
16.08	455	3871	clayey silt to silty clay	
16.33	447	3730	clay	
16.58	462	4051	silty clay to clay	
16.83	451	4269	silty clay to clay	
17.34	453	5092	clay	
17.59	449	3500	clayey silt to silty clay	
17.85	447	3458	clayey silt to silty clay	
18.06	464	4647	clayey silt to silty clay	
18.31	441	3644	clayey silt to silty clay	
18.56	447	3328	clay	
18.82	447	3559	sandy silt to silty clay	
19.07	445	3221	silty sand to sandy silt	
19.32	436	2586	silty sand to sandy silt	
19.56	447	2765	sandy silt to silty clay	
19.82	460	3008	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF18.CSV**	**North Coordinate (feet):**	203221.04
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782174.92
Time Started	9:17 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
20.08	460	2913	silty sand to sandy silt	
20.59	436	1770	sand	
20.84	430	1743	sand to silty sand	
21.10	432	1634	sand to silty sand	
21.35	436	1590	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF19.CSV**	**North Coordinate (feet):**	203151.98
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782211.05
Time Started	10:41 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	460	3680	sand to silty sand	
0.42	441	2916	silty sand to sandy silt	
0.68	443	3206	sandy silt to silty clay	
0.94	449	3120	silty sand to sandy silt	
1.19	441	3594	silty sand to sandy silt	
1.43	436	3042	sandy silt to silty clay	
1.67	457	3050	silty sand to sandy silt	
1.93	460	3315	silty clay to clay	
2.18	468	3499	clay	
2.44	460	3963	clayey silt to silty clay	
2.69	462	4220	silty sand to sandy silt	
2.95	470	3834	sandy silt to silty clay	
3.20	464	4562	silty sand to sandy silt	
3.46	464	5767	clayey silt to silty clay	
3.97	464	6394	silty clay to clay	
4.22	470	5175	clayey silt to silty clay	
4.47	447	3738	silty sand to sandy silt	
4.71	455	2514	sand to silty sand	
4.96	462	2256	sand	
5.22	462	2368	sand to silty sand	
5.47	445	2614	silty sand to sandy silt	
5.72	447	2584	silty sand to sandy silt	
5.97	449	2884	silty sand to sandy silt	
6.22	449	3350	silty sand to sandy silt	
6.48	455	3793	sandy silt to silty clay	
6.74	462	2626	clayey silt to silty clay	
7.25	460	2562	silty clay to clay	
7.50	451	2286	clayey silt to silty clay	
7.76	460	2857	silty clay to clay	
8.01	466	2446	silty clay to clay	
8.25	455	2445	silty clay to clay	
8.50	441	2657	silty clay to clay	
8.77	447	2710	silty clay to clay	
9.03	464	3056	silty clay to clay	
9.30	485	5739	clayey silt to silty clay	
9.55	472	2998	clayey silt to silty clay	
9.80	466	3765	clayey silt to silty clay	
10.05	487	4368	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF19.CSV**	**North Coordinate (feet):**	203151.98
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782211.05
Time Started	10:41 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.30	457	3180	clayey silt to silty clay	
10.55	460	3028	clayey silt to silty clay	
10.81	468	2631	clayey silt to silty clay	
11.06	445	4344	clayey silt to silty clay	
11.28	460	3601	clayey silt to silty clay	
11.53	460	3769	clayey silt to silty clay	
11.79	464	3173	clayey silt to silty clay	
12.04	453	3120	clayey silt to silty clay	
12.29	464	4214	clayey silt to silty clay	
12.54	460	4763	clayey silt to silty clay	
12.79	474	5001	clayey silt to silty clay	
13.05	472	3976	clayey silt to silty clay	
13.30	460	3909	silty clay to clay	
13.56	468	4480	silty clay to clay	
14.08	483	4469	clayey silt to silty clay	
14.33	483	5419	clay	
14.56	466	4251	clay	
14.81	457	4055	clayey silt to silty clay	
15.01	466	4007	clayey silt to silty clay	
15.26	462	3498	silty clay to clay	
15.35	466	3471	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF20.CSV**	**North Coordinate (feet):**	203090.27
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782101.26
Time Started	11:19 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.30	586	4723	sand to silty sand	
0.55	457	3511	sand to silty sand	
0.81	464	3866	sand to silty sand	
1.06	449	3675	sand to silty sand	
1.31	455	3232	sand	
1.40	462	2731	sand to silty sand	
1.65	457	3538	sand to silty sand	
1.92	455	4587	sand to silty sand	
2.43	455	5980	sand to silty sand	
2.67	462	5855	silty sand to sandy silt	
2.93	460	6757	silty sand to sandy silt	
3.19	457	7130	silty sand to sandy silt	
3.45	455	6893	sandy silt to silty clay	
3.70	462	5058	sandy silt to silty clay	
3.97	457	3901	sandy silt to silty clay	
4.21	457	3363	clayey silt to silty clay	
4.47	466	3384	sandy silt to silty clay	
4.70	460	3107	sandy silt to silty clay	
4.96	462	3249	sandy silt to silty clay	
5.14	464	4095	sandy silt to silty clay	
5.40	457	3544	clayey silt to silty clay	
5.66	460	4598	silty clay to clay	
5.91	455	3359	silty sand to sandy silt	
6.16	470	3942	sandy silt to silty clay	
6.42	466	4226	clay	
6.67	468	4504	clay	
7.18	472	4812	clay	
7.43	470	5265	clay	
7.69	464	4987	clay	
7.94	468	4928	clay	
8.20	462	5012	silty clay to clay	
8.44	455	4705	clayey silt to silty clay	
8.70	464	5451	clay	
8.96	466	6490	clay	
9.21	476	7056	clay	
9.41	474	6164	clay	
9.67	464	7237	clay	
9.93	464	6796	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF20.CSV**	**North Coordinate (feet):**	203090.27
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782101.26
Time Started	11:19 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.43	483	6781	silty clay to clay	
10.68	470	6274	silty clay to clay	
10.93	460	5101	silty clay to clay	
11.19	462	5580	clayey silt to silty clay	
11.45	460	5609	clayey silt to silty clay	
11.70	464	7381	silty sand to sandy silt	
11.95	470	5475	sandy silt to silty clay	
12.21	460	5657	clay	
12.46	455	6167	clay	
12.71	466	7783	clay	
12.97	466	6615	clay	
13.23	470	6703	clay	
13.74	464	5028	clay	
13.99	466	8169	clay	
14.25	466	6342	clay	
14.50	472	6013	clay	
14.76	466	5866	clay	
15.01	470	6194	clay	
15.26	470	6327	clay	
15.39	464	5636	clay	
15.57	470	5382	clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF21.CSV**	**North Coordinate (feet):**	203409.66
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	781982.35
Time Started	6:00 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.28	508	4292	sand	
0.48	447	3008	sand	
0.73	510	6850	sand	
0.98	578	9451	sand	
1.23	540	5416	sand	
1.47	504	2300	sand	
1.72	462	2386	sand	
1.97	441	1680	sand	
2.23	441	1720	silty sand to sandy silt	
2.48	436	1689	silty sand to sandy silt	
2.73	445	1763	sand to silty sand	
2.99	438	2053	sand to silty sand	
3.24	455	2902	sand to silty sand	
3.49	462	3284	sand to silty sand	
4.00	466	3476	sand to silty sand	
4.25	466	2948	silty sand to sandy silt	
4.51	443	2985	silty sand to sandy silt	
4.61	464	3738	silty sand to sandy silt	
4.86	449	3712	silty sand to sandy silt	
5.06	470	5637	silty sand to sandy silt	
5.31	455	3544	sandy silt to silty clay	
5.57	468	3696	sand to silty sand	
5.82	466	4394	sandy silt to silty clay	
6.08	455	3939	sandy silt to silty clay	
6.34	449	3711	silty sand to sandy silt	
6.59	464	5017	clayey silt to silty clay	
6.85	466	4804	sandy silt to silty clay	
7.11	466	5190	sandy silt to silty clay	
7.62	466	3972	sandy silt to silty clay	
7.87	470	4261	clayey silt to silty clay	
8.13	464	4207	sandy silt to silty clay	
8.38	464	4814	sandy silt to silty clay	
8.64	455	3988	sandy silt to silty clay	
8.89	466	3702	sandy silt to silty clay	
9.15	443	3748	sandy silt to silty clay	
9.40	451	4791	silty sand to sandy silt	
9.65	470	4340	clayey silt to silty clay	
9.90	464	4948	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF21.CSV**	**North Coordinate (feet):**	203409.66
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	781982.35
Time Started	6:00 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.42	460	3602	silty clay to clay	
10.68	464	3858	clayey silt to silty clay	
10.94	449	4082	clayey silt to silty clay	
11.19	462	3284	sandy silt to silty clay	
11.44	449	3444	clayey silt to silty clay	
11.69	462	3868	clayey silt to silty clay	
11.96	472	4163	clayey silt to silty clay	
12.21	468	4322	clayey silt to silty clay	
12.47	468	4934	clayey silt to silty clay	
12.72	460	4777	sandy silt to silty clay	
13.23	472	4622	clayey silt to silty clay	
13.74	466	4745	clayey silt to silty clay	
13.99	460	4096	silty clay to clay	
14.25	470	6019	clayey silt to silty clay	
14.48	472	5077	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF22.CSV**	**North Coordinate (feet):**	203391.78
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782058.82
Time Started	4:33 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	447	2477	clayey silt to silty clay	
0.41	466	2566	silty sand to sandy silt	
0.66	468	3189	sandy silt to silty clay	
0.91	466	3035	sandy silt to silty clay	
1.11	460	3747	silty sand to sandy silt	
1.35	462	5805	sand	
1.61	462	3852	sand	
1.71	445	2937	silty sand to sandy silt	
1.80	464	3528	sandy silt to silty clay	
1.94	445	4098	clayey silt to silty clay	
2.19	449	3315	sand to silty sand	
2.44	445	3715	clay	
2.70	438	3198	clay	
2.95	464	3938	sandy silt to silty clay	
3.20	445	3847	silty sand to sandy silt	
3.45	447	3381	sandy silt to silty clay	
3.66	457	3480	silty sand to sandy silt	
3.91	449	4130	silty sand to sandy silt	
4.17	447	2531	silty sand to sandy silt	
4.42	476	3267	silty sand to sandy silt	
4.67	487	3699	silty sand to sandy silt	
4.92	479	3704	sand to silty sand	
5.39	464	3067	sandy silt to silty clay	
5.63	474	3040	silty sand to sandy silt	
5.88	500	3291	silty sand to sandy silt	
6.13	510	4215	sandy silt to silty clay	
6.38	474	4057	sandy silt to silty clay	
6.64	485	3676	sandy silt to silty clay	
6.89	483	4394	silty sand to sandy silt	
7.14	483	6136	silty sand to sandy silt	
7.39	476	5844	silty sand to sandy silt	
7.64	460	4492	silty sand to sandy silt	
7.90	470	3265	sand to silty sand	
8.00	441	1530	silty sand to sandy silt	
8.21	464	2381	silty sand to sandy silt	
8.42	457	2079	sandy silt to silty clay	
8.66	462	1851	silty sand to sandy silt	
8.91	453	1961	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF22.CSV**	**North Coordinate (feet):**	203391.78
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782058.82
Time Started	4:33 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.16	460	2175	sandy silt to silty clay	
9.42	476	3944	clayey silt to silty clay	
9.68	464	4066	silty clay to clay	
9.94	466	3892	sandy silt to silty clay	
10.45	468	3201	sand	
10.70	464	3076	sand	
10.95	481	3138	silty clay to clay	
11.19	466	3090	silty clay to clay	
11.45	436	2513	sandy silt to silty clay	
11.61	462	3053	sandy silt to silty clay	
11.86	470	3640	sandy silt to silty clay	
12.12	476	3261	sandy silt to silty clay	
12.38	460	3688	sandy silt to silty clay	
12.64	470	3195	sandy silt to silty clay	
12.89	479	4014	clayey silt to silty clay	
13.15	468	3563	clayey silt to silty clay	
13.41	472	3502	clayey silt to silty clay	
13.66	470	3259	clayey silt to silty clay	
14.17	470	3026	clayey silt to silty clay	
14.42	460	2136	clayey silt to silty clay	
14.67	474	3036	sandy silt to silty clay	
14.90	472	3060	clayey silt to silty clay	
15.15	464	2947	clayey silt to silty clay	
15.40	462	2578	clayey silt to silty clay	
15.65	466	2636	sandy silt to silty clay	
15.91	470	2878	sandy silt to silty clay	
16.17	464	2258	sandy silt to silty clay	
16.42	466	3294	sandy silt to silty clay	
16.67	468	2662	sandy silt to silty clay	
16.93	460	2290	sandy silt to silty clay	
17.43	466	6440	sand to silty sand	
17.69	453	4617	sand to silty sand	
17.95	460	2889	silty sand to sandy silt	
18.20	470	3401	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF23.CSV**	**North Coordinate (feet):**	203451.38
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782103.36
Time Started	12:00 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	449	28992	silty clay to clay	
0.42	447	15670	clayey silt to silty clay	
0.68	464	4284	sandy silt to silty clay	
0.94	462	8603	silty sand to sandy silt	
1.19	462	9618	silty sand to sandy silt	
1.45	460	6098	silty sand to sandy silt	
1.69	485	4511	sand to silty sand	
1.94	487	3902	sandy silt to silty clay	
2.20	464	3613	sand to silty sand	
2.46	468	3544	silty sand to sandy silt	
2.71	476	3901	sandy silt to silty clay	
2.96	462	4614	sandy silt to silty clay	
3.22	462	4924	sandy silt to silty clay	
3.47	455	7923	clayey silt to silty clay	
3.98	441	4412	silty sand to sandy silt	
4.23	462	4379	silty sand to sandy silt	
4.48	466	5323	silty sand to sandy silt	
4.74	464	4367	silty sand to sandy silt	
4.99	455	4195	sandy silt to silty clay	
5.24	468	5134	sandy silt to silty clay	
5.35	457	4813	clayey silt to silty clay	
5.47	462	4938	clayey silt to silty clay	
5.88	466	8354	silty clay to clay	
6.08	462	5209	silty clay to clay	
6.33	466	6605	silty clay to clay	
6.55	460	6542	clayey silt to silty clay	
6.65	466	6344	silty clay to clay	
6.90	472	5425	silty sand to sandy silt	
7.40	464	5842	silty sand to sandy silt	
7.65	466	5127	sand	
7.77	468	5251	silty sand to sandy silt	
7.96	483	5119	silty sand to sandy silt	
8.12	466	5269	silty sand to sandy silt	
8.62	479	5475	sand	
8.87	460	4538	sand	
9.13	466	5693	very stiff fine grained	
9.39	464	4992	very stiff fine grained	
9.64	460	4359	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF23.CSV**	**North Coordinate (feet):**	203451.38
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782103.36
Time Started	12:00 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.89	460	5073	sandy silt to silty clay	
10.14	474	4829	sandy silt to silty clay	
10.65	464	3781	sandy silt to silty clay	
10.91	479	4992	sandy silt to silty clay	
11.16	460	4555	clayey silt to silty clay	
11.40	464	5743	clayey silt to silty clay	
11.65	462	5634	sandy silt to silty clay	
11.90	487	5574	sandy silt to silty clay	
12.16	462	5630	sandy silt to silty clay	
12.41	483	4914	silty sand to sandy silt	
12.66	466	4425	sandy silt to silty clay	
12.91	472	6221	sandy silt to silty clay	
13.17	455	5456	sandy silt to silty clay	
13.42	466	4318	sandy silt to silty clay	
13.93	466	4968	sandy silt to silty clay	
14.19	468	4989	sandy silt to silty clay	
14.44	462	5159	sandy silt to silty clay	
14.69	466	6661	sandy silt to silty clay	
14.94	485	8255	sandy silt to silty clay	
15.20	460	5479	sandy silt to silty clay	
15.46	472	6380	sandy silt to silty clay	
15.71	464	9853	sandy silt to silty clay	
15.96	470	9074	sandy silt to silty clay	
16.22	474	6835	clayey silt to silty clay	
16.47	470	6469	clayey silt to silty clay	
16.72	470	6194	sandy silt to silty clay	
17.22	485	6595	clayey silt to silty clay	
17.47	464	4398	clayey silt to silty clay	
17.73	472	11772	sandy silt to silty clay	
17.97	462	13197	silty sand to sandy silt	
18.23	460	8249	silty sand to sandy silt	
18.48	457	4781	sand to silty sand	
18.74	466	4297	sand to silty sand	
18.99	464	4757	sand to silty sand	
19.24	462	4471	silty sand to sandy silt	
19.50	464	4750	silty sand to sandy silt	
19.76	468	3910	sand to silty sand	
20.01	447	2297	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF23.CSV**	**North Coordinate (feet):**	203451.38
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782103.36
Time Started	12:00 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
20.51	449	1684	sand to silty sand	
20.76	436	1708	silty sand to sandy silt	
21.01	432	1519	sand to silty sand	
21.26	434	1446	sand to silty sand	
21.51	432	1484	silty sand to sandy silt	
21.76	434	1434	silty sand to sandy silt	
22.01	436	1534	sand to silty sand	
22.26	432	1416	silty sand to sandy silt	
22.52	432	1324	sand to silty sand	
22.77	436	1327	silty sand to sandy silt	
23.03	441	1292	silty sand to sandy silt	
23.28	432	1287	silty sand to sandy silt	
23.53	432	1221	silty sand to sandy silt	
23.79	438	1411	sand to silty sand	
24.05	432	1461	sand to silty sand	
24.30	432	1194	silty sand to sandy silt	
24.53	436	1299	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF24.CSV**	**North Coordinate (feet):**	203505.72
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	781977.44
Time Started	5:19 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.10	533	4873	gravely sand to sand	
0.30	525	6500	sand	
0.55	462	3244	gravely sand to sand	
0.80	438	2143	sand	
1.06	441	2072	sand to silty sand	
1.30	443	1595	sand	
1.55	447	1630	sand	
1.80	436	1444	sand	
2.05	436	1254	sand	
2.30	436	1325	gravely sand to sand	
2.55	436	1288	gravely sand to sand	
2.80	434	1476	sand to silty sand	
3.06	466	2246	sand to silty sand	
3.31	464	2466	sand to silty sand	
3.82	472	2673	sand	
4.08	464	2279	sand to silty sand	
4.33	474	2459	silty sand to sandy silt	
4.59	457	2176	sand to silty sand	
4.85	441	1818	silty sand to sandy silt	
5.10	468	1855	sandy silt to silty clay	
5.35	483	2529	silty sand to sandy silt	
5.85	457	2289	sandy silt to silty clay	
6.11	481	2710	sandy silt to silty clay	
6.36	483	2837	sandy silt to silty clay	
6.61	464	2122	clayey silt to silty clay	
7.13	464	3381	clayey silt to silty clay	
7.38	468	3632	clayey silt to silty clay	
7.63	451	3205	clayey silt to silty clay	
7.89	466	3105	clayey silt to silty clay	
8.13	462	3370	clayey silt to silty clay	
8.38	491	4908	clayey silt to silty clay	
8.63	462	4096	clayey silt to silty clay	
8.89	466	4348	clayey silt to silty clay	
9.14	504	4393	clayey silt to silty clay	
9.39	470	3913	clayey silt to silty clay	
9.65	487	5272	clayey silt to silty clay	
9.90	487	5230	clayey silt to silty clay	
10.16	464	4211	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF24.CSV**	**North Coordinate (feet):**	203505.72
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	781977.44
Time Started	5:19 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.42	472	4536	clayey silt to silty clay	
10.68	466	4108	clayey silt to silty clay	
10.93	483	5174	clayey silt to silty clay	
11.19	476	4891	clayey silt to silty clay	
11.44	483	5357	clayey silt to silty clay	
11.69	483	4289	clayey silt to silty clay	
11.95	474	4575	clayey silt to silty clay	
12.20	466	4183	clayey silt to silty clay	
12.45	474	4725	clayey silt to silty clay	
12.96	464	3705	clayey silt to silty clay	
13.21	468	3800	clayey silt to silty clay	
13.97	464	3817	sandy silt to silty clay	
14.22	468	2948	clayey silt to silty clay	
14.48	491	6342	sandy silt to silty clay	
14.73	476	4085	sandy silt to silty clay	
14.99	470	4098	sandy silt to silty clay	
15.24	462	4376	sandy silt to silty clay	
15.50	468	4273	sandy silt to silty clay	
15.75	487	7151	clayey silt to silty clay	
15.97	472	4400	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF25.CSV**	**North Coordinate (feet):**	203362.33
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782213.86
Time Started	3:37 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.16	457	2053	sandy silt to silty clay	
0.39	468	3222	sand to silty sand	
0.60	462	2288	sand to silty sand	
0.84	464	2133	sandy silt to silty clay	
1.09	464	2379	silty sand to sandy silt	
1.28	453	2906	sandy silt to silty clay	
1.41	464	3103	sandy silt to silty clay	
1.62	464	4115	clayey silt to silty clay	
1.85	466	5101	clayey silt to silty clay	
2.02	483	4881	silty clay to clay	
2.27	498	4874	clayey silt to silty clay	
2.52	460	4423	sand	
2.76	443	2027	sand	
3.01	436	1976	sand to silty sand	
3.27	451	1966	sand to silty sand	
3.38	445	2232	silty sand to sandy silt	
3.73	438	2422	sand	
3.98	432	1650	silty sand to sandy silt	
4.24	466	3678	silty sand to sandy silt	
4.49	447	2544	very stiff fine grained	
4.74	432	1844	very stiff fine grained	
5.00	447	2447	silty sand to sandy silt	
5.25	438	2879	silty sand to sandy silt	
5.51	460	3368	sandy silt to silty clay	
5.76	462	3048	silty sand to sandy silt	
6.01	462	3348	sandy silt to silty clay	
6.26	460	3834	sandy silt to silty clay	
6.51	462	3498	sandy silt to silty clay	
6.76	443	2838	clayey silt to silty clay	
6.96	453	2763	sandy silt to silty clay	
7.20	451	2241	clayey silt to silty clay	
7.46	443	1820	sandy silt to silty clay	
7.63	443	1861	sandy silt to silty clay	
7.83	438	1849	sandy silt to silty clay	
7.95	441	1659	clayey silt to silty clay	
8.16	453	1501	silty clay to clay	
8.36	438	1638	clayey silt to silty clay	
8.62	441	1446	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF25.CSV**	**North Coordinate (feet):**	203362.33
Date Started:	Thursday, August 10, 1995	**East Coordinate (feet):**	782213.86
Time Started	3:37 PM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
8.86	436	1595	sand to silty sand	
9.12	447	2183	sand to silty sand	
9.37	447	2405	clay	
9.62	441	2249	sandy silt to silty clay	
10.13	438	1471	sand	
10.38	441	1965	very stiff fine grained	
10.63	462	4681	very stiff fine grained	
10.89	462	5849	clay	
11.14	483	5005	clay	
11.26	502	5808	silty clay to clay	
11.52	498	6005	sandy silt to silty clay	
11.76	470	6495	sandy silt to silty clay	
12.01	487	6171	silty sand to sandy silt	
12.26	483	5955	silty sand to sandy silt	
12.51	468	6225	silty sand to sandy silt	
12.77	466	5251	silty sand to sandy silt	
13.03	470	4652	sand to silty sand	
13.28	466	3443	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF26.CSV**	**North Coordinate (feet):**	203342.35
Date Started:	Wednesday, August 09, 1995	**East Coordinate (feet):**	782291.38
Time Started	11:16 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.30	540	3139	sand	
0.55	523	1864	sand	
0.79	479	1996	sand to silty sand	
1.04	460	937	sand to silty sand	
1.28	483	881	silty sand to sandy silt	
1.37	491	775	sand to silty sand	
1.62	470	703	sand	
1.87	455	605	sand	
2.13	441	790	very stiff fine grained	
2.37	432	1853	very stiff fine grained	
2.87	428	1618	silty sand to sandy silt	
3.09	441	1509	silty sand to sandy silt	
3.34	438	1577	silty sand to sandy silt	
3.84	438	1734	clayey silt to silty clay	
4.09	432	1705	clayey silt to silty clay	
4.34	438	1896	sandy silt to silty clay	
4.48	432	1876	sandy silt to silty clay	
4.66	436	1833	silty sand to sandy silt	
4.91	432	1845	sandy silt to silty clay	
5.16	438	1636	sandy silt to silty clay	
5.25	443	2071	sandy silt to silty clay	
5.50	436	1931	sandy silt to silty clay	
5.75	432	1819	sandy silt to silty clay	
6.00	430	1799	sandy silt to silty clay	
6.24	441	2060	clayey silt to silty clay	
6.50	432	1871	sandy silt to silty clay	
6.74	434	1974	sand to silty sand	
7.00	436	1954	clay	
7.25	432	2146	silty clay to clay	
7.44	438	2286	clayey silt to silty clay	
7.69	436	1898	sandy silt to silty clay	
7.90	443	2190	clayey silt to silty clay	
7.98	436	2249	clayey silt to silty clay	
8.15	434	1650	sandy silt to silty clay	
8.40	432	1839	sandy silt to silty clay	
8.64	434	1809	sandy silt to silty clay	
8.89	441	1894	sandy silt to silty clay	
9.15	434	2137	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF26.CSV**	**North Coordinate (feet):**	203342.35
Date Started:	Wednesday, August 09, 1995	**East Coordinate (feet):**	782291.38
Time Started	11:16 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.40	436	2127	sandy silt to silty clay	
9.66	445	2544	sandy silt to silty clay	
9.91	434	2105	sandy silt to silty clay	
10.16	432	2190	sandy silt to silty clay	
10.42	447	2571	silty sand to sandy silt	
10.67	436	1567	clayey silt to silty clay	
10.93	455	1657	clay	
11.17	443	1512	silty clay to clay	
11.27	462	1602	clayey silt to silty clay	
11.52	441	1477	clayey silt to silty clay	
11.77	432	1497	clayey silt to silty clay	
12.02	449	1428	clayey silt to silty clay	
12.27	441	1322	sandy silt to silty clay	
12.51	443	1539	sandy silt to silty clay	
12.76	445	1435	sandy silt to silty clay	
13.01	455	1515	sandy silt to silty clay	
13.26	443	1598	clayey silt to silty clay	
13.77	441	1726	silty sand to sandy silt	
14.02	438	1545	clayey silt to silty clay	
14.26	441	1797	clayey silt to silty clay	
14.51	466	1783	sandy silt to silty clay	
14.76	460	1932	silty clay to clay	
15.00	447	2131	clayey silt to silty clay	
15.24	438	1983	sandy silt to silty clay	
15.35	436	1586	silty sand to sandy silt	
15.60	443	1432	sand to silty sand	
15.84	438	1207	sand to silty sand	
16.10	436	935	sand to silty sand	
16.60	436	865	sand to silty sand	
16.85	438	909	sand to silty sand	
17.10	438	851	sand to silty sand	
17.35	428	855	sand to silty sand	
17.59	428	828	sand to silty sand	
18.07	432	782	sand to silty sand	
18.32	430	806	sand to silty sand	
18.57	436	838	sand to silty sand	
18.82	436	791	sand to silty sand	
19.06	436	836	sand to silty sand	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF26.CSV**	**North Coordinate (feet):**	203342.35
Date Started:	Wednesday, August 09, 1995	**East Coordinate (feet):**	782291.38
Time Started	11:16 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
19.31	436	803	sand to silty sand	
19.56	438	816	sand to silty sand	
19.81	434	669	sand to silty sand	
20.23	436	728	sand to silty sand	
20.45	443	807	sand to silty sand	
20.69	432	794	sand to silty sand	
20.95	438	782	sand to silty sand	
21.11	434	779	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	NLFF27.CSV	**North Coordinate (feet):**	203333.58
Date Started:	Friday, August 11, 1995	**East Coordinate (feet):**	782341.89
Time Started	8:33 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.12	457	4232	sandy silt to silty clay	
0.36	449	3642	sand to silty sand	
0.61	462	3798	sand to silty sand	
0.87	451	3280	silty sand to sandy silt	
1.12	470	3501	silty sand to sandy silt	
1.37	466	3456	sandy silt to silty clay	
1.62	470	3448	clayey silt to silty clay	
1.87	457	3410	clayey silt to silty clay	
2.13	466	3058	sand to silty sand	
2.38	464	2771	sand	
2.62	472	2411	sand	
2.88	441	2433	sand to silty sand	
3.14	464	2590	silty sand to sandy silt	
3.39	449	2225	sand to silty sand	
3.90	447	4162	sandy silt to silty clay	
4.15	434	2344	sandy silt to silty clay	
4.40	434	2361	silty sand to sandy silt	
4.65	445	2705	sandy silt to silty clay	
4.84	447	2292	sandy silt to silty clay	
5.08	443	2437	sandy silt to silty clay	
5.33	443	2527	sandy silt to silty clay	
5.58	443	2440	sandy silt to silty clay	
5.83	462	2337	sandy silt to silty clay	
6.08	460	1972	sandy silt to silty clay	
6.34	449	2196	sandy silt to silty clay	
6.59	455	2327	clayey silt to silty clay	
7.10	445	2495	silty sand to sandy silt	
7.35	462	2155	silty sand to sandy silt	
7.60	460	2157	sandy silt to silty clay	
7.78	462	2035	sandy silt to silty clay	
8.04	436	1685	sandy silt to silty clay	
8.29	441	2347	sandy silt to silty clay	
8.54	445	2342	sandy silt to silty clay	
8.80	443	2384	sandy silt to silty clay	
9.05	447	3195	sandy silt to silty clay	
9.30	466	3633	sandy silt to silty clay	
9.56	464	3442	sandy silt to silty clay	
9.81	460	3155	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF27.CSV**	**North Coordinate (feet):**	203333.58
Date Started:	Friday, August 11, 1995	**East Coordinate (feet):**	782341.89
Time Started	8:33 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.28	453	3774	sandy silt to silty clay	
10.53	466	3540	sandy silt to silty clay	
10.78	453	3252	sandy silt to silty clay	
11.03	464	3253	sandy silt to silty clay	
11.29	449	2911	sandy silt to silty clay	
11.55	441	3239	sandy silt to silty clay	
11.80	462	3020	sandy silt to silty clay	
12.05	462	3395	sandy silt to silty clay	
12.30	445	2991	sandy silt to silty clay	
12.81	466	3101	silty sand to sandy silt	
13.06	455	3193	silty sand to sandy silt	
13.31	447	2403	silty sand to sandy silt	
13.57	460	2919	silty sand to sandy silt	
13.82	462	3136	silty sand to sandy silt	
14.07	462	2795	sandy silt to silty clay	
14.32	466	3083	sandy silt to silty clay	
14.42	455	3161	sandy silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF28.CSV**	**North Coordinate (feet):**	203394.58
Date Started:	Friday, August 11, 1995	**East Coordinate (feet):**	782417.66
Time Started	9:17 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	464	3672	sand	
0.42	457	3333	sand	
0.67	462	3110	sand to silty sand	
0.92	466	2798	sand to silty sand	
1.18	457	2686	sand	
1.39	464	2414	sand to silty sand	
1.64	447	2128	sand to silty sand	
1.89	460	2044	sand to silty sand	
2.14	443	2367	sand to silty sand	
2.39	466	2247	sand to silty sand	
2.64	457	2045	silty sand to sandy silt	
2.89	457	2633	clayey silt to silty clay	
3.15	481	2921	sandy silt to silty clay	
3.40	468	2589	sandy silt to silty clay	
3.66	453	2259	silty sand to sandy silt	
3.91	485	3438	silty sand to sandy silt	
4.16	449	2114	silty sand to sandy silt	
4.41	436	1913	sandy silt to silty clay	
4.55	481	3863	sandy silt to silty clay	
4.80	445	1833	sand to silty sand	
5.05	413	18692	sandy silt to silty clay	
5.55	476	3987	sandy silt to silty clay	
5.80	489	4606	silty sand to sandy silt	
6.05	502	7023	silty sand to sandy silt	
6.31	470	4232	silty sand to sandy silt	
6.56	498	4621	silty sand to sandy silt	
6.95	502	5057	silty sand to sandy silt	
7.18	489	3923	silty sand to sandy silt	
7.43	474	3800	silty sand to sandy silt	
7.69	466	3771	silty sand to sandy silt	
7.82	487	4280	silty sand to sandy silt	
8.07	483	4350	silty sand to sandy silt	
8.32	472	4987	silty sand to sandy silt	
8.58	464	5764	silty sand to sandy silt	
8.83	483	5197	silty sand to sandy silt	
9.09	483	5206	silty sand to sandy silt	
9.34	487	5829	silty sand to sandy silt	
9.59	483	5683	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF28.CSV**	**North Coordinate (feet):**	203394.58
Date Started:	Friday, August 11, 1995	**East Coordinate (feet):**	782417.66
Time Started	9:17 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.85	483	5963	silty sand to sandy silt	
10.36	483	5563	silty sand to sandy silt	
10.61	485	6149	silty sand to sandy silt	
10.87	483	5637	silty sand to sandy silt	
10.99	487	5990	silty sand to sandy silt	
11.10	481	5841	silty sand to sandy silt	
11.35	489	5692	silty sand to sandy silt	
11.61	481	5161	silty sand to sandy silt	
11.85	487	5348	silty sand to sandy silt	
12.11	485	4089	silty sand to sandy silt	
12.36	483	4986	silty sand to sandy silt	
12.62	481	5296	silty sand to sandy silt	
12.88	470	4523	silty sand to sandy silt	
13.13	468	5206	silty sand to sandy silt	
13.64	487	4493	silty sand to sandy silt	
13.90	476	3323	silty sand to sandy silt	
14.15	460	3584	silty sand to sandy silt	
14.38	464	4100	silty sand to sandy silt	
14.63	479	3560	silty sand to sandy silt	
14.84	462	3863	silty sand to sandy silt	
15.30	470	3204	silty sand to sandy silt	
15.55	457	3124	silty sand to sandy silt	
15.80	468	3269	silty sand to sandy silt	
16.05	487	3185	sandy silt to silty clay	
16.30	462	2964	clayey silt to silty clay	
16.80	460	4482	sand	
17.02	468	2820	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF29A.CSV**	**North Coordinate (feet):**	203399.49
Date Started:	Saturday, August 12, 1995	**East Coordinate (feet):**	782476.94
Time Started	9:00 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	464	29474	sand to silty sand	
0.31	455	3442	sand	
0.56	457	3001	sand to silty sand	
0.81	462	3758	sandy silt to silty clay	
1.06	457	3410	sand to silty sand	
1.18	464	2968	silty sand to sandy silt	
1.31	468	2989	sandy silt to silty clay	
1.46	447	2687	sandy silt to silty clay	
1.96	455	3032	clayey silt to silty clay	
2.22	455	4924	sandy silt to silty clay	
2.47	447	6907	sandy silt to silty clay	
2.73	455	3850	sandy silt to silty clay	
2.98	462	4392	silty sand to sandy silt	
3.23	432	2451	silty sand to sandy silt	
3.66	462	3020	silty sand to sandy silt	
3.90	462	3137	silty sand to sandy silt	
4.15	449	3726	silty clay to clay	
4.40	464	4266	sandy silt to silty clay	
4.86	453	4545	silty sand to sandy silt	
5.10	453	4543	silty sand to sandy silt	
5.36	466	3520	silty sand to sandy silt	
5.61	455	2980	silty sand to sandy silt	
5.86	468	3707	silty sand to sandy silt	
5.97	455	3501	silty sand to sandy silt	
6.13	462	3954	silty sand to sandy silt	
6.37	481	4067	silty sand to sandy silt	
6.63	453	3070	silty sand to sandy silt	
7.04	462	4153	clayey silt to silty clay	27 ppm by TRPH 9073
7.13	472	5968	silty clay to clay	27 ppm by TRPH 9073
7.24	468	5638	clay	27 ppm by TRPH 9073
7.42	468	7833	clay	27 ppm by TRPH 9073
7.67	466	10586	clay	27 ppm by TRPH 9073
7.82	468	13630	clay	27 ppm by TRPH 9073
7.93	466	11338	clay	27 ppm by TRPH 9073
8.18	462	17383	sand to silty sand	27 ppm by TRPH 9073
8.43	470	6891	sand	27 ppm by TRPH 9073
8.68	481	6234	silty sand to sandy silt	
8.94	466	4514	silty sand to sandy silt	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF29A.CSV**	**North Coordinate (feet):**	203399.49
Date Started:	Saturday, August 12, 1995	**East Coordinate (feet):**	782476.94
Time Started	9:00 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
9.19	476	3152	sand	
9.69	457	1885	sand	
9.95	455	1763	sand to silty sand	
10.20	443	1962	sand	
10.45	445	2348	sand	
10.71	436	2693	sand to silty sand	
10.96	436	2864	sand to silty sand	
11.22	436	2957	sand to silty sand	

Summary data based on field data that was collected using SCAPS.

SCAPS LIF and Geotechnical Data

Push Id	**NLFF30.CSV**	**North Coordinate (feet):**	203227.7
Date Started:	Saturday, August 12, 1995	**East Coordinate (feet):**	782347.85
Time Started	8:02 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
0.17	455	32745	silty sand to sandy silt	
0.42	466	3123	silty sand to sandy silt	
0.67	460	2975	silty clay to clay	
0.92	460	3258	silty clay to clay	
1.36	481	3499	silty clay to clay	
1.61	470	3440	sandy silt to silty clay	
1.86	462	3406	silty sand to sandy silt	
2.12	464	3150	sand to silty sand	
2.37	462	2561	sand to silty sand	
2.61	453	2336	sand to silty sand	
2.86	460	2230	silty sand to sandy silt	
3.11	464	2325	silty sand to sandy silt	
3.36	466	1941	silty sand to sandy silt	
3.86	487	4110	silty sand to sandy silt	
4.11	460	2732	silty sand to sandy silt	
4.36	445	2241	silty sand to sandy silt	
4.61	462	2197	silty sand to sandy silt	
4.86	483	2447	silty sand to sandy silt	
5.11	466	2716	silty sand to sandy silt	
5.36	462	2720	sandy silt to silty clay	
5.61	462	2687	sandy silt to silty clay	
5.86	466	3083	sandy silt to silty clay	
6.11	472	3859	sandy silt to silty clay	
6.37	481	4125	sandy silt to silty clay	
6.62	468	2418	sandy silt to silty clay	
7.13	487	5339	clay	
7.39	476	4410	clay	
7.65	468	4287	clay	
7.88	460	4600	sandy silt to silty clay	
8.13	462	2997	silty sand to sandy silt	
8.38	468	2063	silty sand to sandy silt	
8.64	451	1892	silty sand to sandy silt	
8.89	462	2098	sandy silt to silty clay	
9.14	466	2976	sandy silt to silty clay	
9.39	445	2048	sandy silt to silty clay	
9.65	464	2009	silty clay to clay	
9.90	455	4078	clay	
10.41	457	2970	clayey silt to silty clay	

Summary data based on field data that was collected using SCAPS

SCAPS LIF and Geotechnical Data

Push Id	**NLFF30.CSV**	**North Coordinate (feet):**	203227.7
Date Started:	Saturday, August 12, 1995	**East Coordinate (feet):**	782347.85
Time Started	8:02 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation
10.67	462	5891	clayey silt to silty clay	
10.89	466	7371	clay	

SCAPS LIF and Geotechnical Data

Push Id	**NLFF30.CSV**	**North Coordinate (feet):**	203227.7
Date Started:	Saturday, August 12, 1995	**East Coordinate (feet):**	782347.85
Time Started	8:02 AM	**Elevation (feet):**	0
		Fluorescent Threshold (counts)	**6973**

Depth (feet)	Peak Wavelength (nm)	Normalized Intensity	Soil Classification based on CPT data	Interpretation

Summary data based on field data that was collected using SCAPS