

Canadian Data Report of
Fisheries and Aquatic Sciences 337

July 1982

LIGHT ATTENUATION IN THE EXPERIMENTAL LAKES AREA - 1981 DATA

by

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This is the 49th Data Report
from the Western Region, Winnipeg

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Cat. no. FS 97-13/337 ISSN 0706-6465

Correct citation for this publication is:

Shearer, J. A., and E. R. DeBruyn. 1982. Light attenuation in the Experimental Lakes Area - 1981 data. Can. Data Rep. Fish. Aquat. Sci. 337: iv + 51 p.

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ABSTRACT

Shearer, J. A., and E. R. DeBruyn. 1982. Light attenuation in the Experimental Lakes Area - 1981 data. Can. Data Rep. Fish. Aquat. Sci. 337: iv + 51 p.

Depth profiles of photosynthetically active radiation were measured periodically in twelve lake basins at the Experimental Lakes Area during 1981. These data are tabulated and plots of irradiance versus depth are provided. Mean attenuation coefficients have been calculated from the data.

Key words: light penetration; water transparency; limnological data.

RESUME

Shearer, J. A., and E. R. DeBruyn. 1982. Light attenuation in the Experimental Lakes Area - 1981 data. Can. Data Rep. Fish. Aquat. Sci. 337: iv + 51 p.

Nous avons mesuré périodiquement, au cours de l'année 1981, les profils de profondeur de la radiation photosynthétique dans treize bassins de lacs situées dans la Région des Lacs Expérimentaux. Nous avons établi des tables de ces données et nous avons figuré graphiquement les émissions de radiations face à la profondeur. A partir de ces données, nous avons calculé les coefficients moyens d'atténuation.

Mots-clés: pénétration de la lumière; transparence de l'eau; données limnologiques.

INTRODUCTION

This report presents irradiance versus depth data collected during 1981 for selected basins within the Experimental Lakes Area (ELA), northwestern Ontario (Johnson and Vallentyne 1971). These data were collected in conjunction with algal productivity studies (DeBruyn et al. 1982). The recorded irradiances can be defined as measures of photosynthetically active radiation (PAR) and represent the quantum flux density in the 400-700 nm waveband.

The content and format of this report are similar to those found in previous volumes of this annual series (Shearer 1976; Shearer and DeClercq 1976, 1977, 1978, 1979, 1980; Shearer and DeBruyn 1981). A brief description of methodology is provided and the attenuation data are presented both in tables and in graphs.

DATA COLLECTION AND ANALYSIS

The vertical attenuation of PAR was monitored in twelve ELA basins during the ice-free season of 1981. These basins are 114, 222, 223, 224, 226NE, 226SW, 227, 239, 302N, 302S, 661 and 979.

Lakes 114 and 223 were undergoing controlled acidification with H_2SO_4 (Schindler et al. 1980). Lake 227 was in its thirteenth year of artificial enrichment with nitrogen and phosphorus while 226NE and 226SW were in their first recovery year following eight years of nutrient additions (Schindler et al. 1971; Schindler 1975).

The separate basins of Lakes 226 and 302 are maintained by reinforced plastic "sea curtains".

The surveyed basins range in surface area from 1 to 56 hectares and in maximum depth from <1 to 30 meters.

Attenuation profiles were normally taken at two-week intervals in each basin (weather permitting). The two shallow bog lakes, 661 and 979, were each profiled on only two occasions.

Profiling equipment and techniques were unchanged from those described in the previous report (Shearer and DeBruyn 1981). A Licor LI-192S cosine response underwater quantum sensor was used in conjunction with an LI-185 meter. Whenever possible, profiles were taken near mid-morning or mid-afternoon (Combs 1977) and under clear or uniformly overcast skies.

Surface readings were taken in air and corrected for the sensor immersion effect. Each of these corrected values serves as the surface reference (100%) to which all underwater percentages for that profile refer. Whenever surface values fluctuated during the profiling activity, an LI-190S sensor was used as a deck cell and underwater readings were subsequently corrected for fluctuations in the deck value.

The profiles included in this report are presented in two forms. Appendix 1 lists the measured values of irradiance versus depth. The underwater irradiance values have been converted to percentages of the coincident surface irradiance. Appendix 2 presents plots of these data along with fitted curves calculated from the data. In both appendices the data are grouped by lake basin and listed chronologically.

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APPENDIX 1

This appendix lists the data for vertical attenuation profiles taken at the ELA during 1981.

All times are local, i.e. Central Daylight (CDT) from 26 April through 24 October, Central Standard (CST) before and after that period.

Each attenuation coefficient is the negative slope of a regression of the natural logarithm of the percent surface irradiance on depth. R^{**2} (or r^2) is a measure of the linearity of the above regression, wherein 1.00 would represent perfect linearity.

The depths are in meters. Irradiance values are actual, rather than fitted, and are given as percentages of the surface value (corrected for surface effect).

LAKE 114

DATE: 1 MAY TIME: 1055 HOURS
ATTENUATION COEFFICIENT: .64 R**2: .9769

DEPTH	% SURF.								
0.00	100.00	.50	64.05	1.00	37.84	2.00	19.14	3.00	11.93
4.00	7.44								

DATE: 17 MAY TIME: 1715 HOURS
ATTENUATION COEFFICIENT: .67 R**2: .9970

DEPTH	% SURF.								
0.00	100.00	.50	72.39	1.00	49.29	2.00	23.10	3.00	12.78
4.00	7.09								

DATE: 1 JUN TIME: 1030 HOURS
ATTENUATION COEFFICIENT: .60 R**2: .9836

DEPTH	% SURF.								
0.00	100.00	.50	68.52	1.00	43.25	2.00	22.54	3.00	14.01
4.00	8.95								

DATE: 19 JUN TIME: 1055 HOURS
ATTENUATION COEFFICIENT: .73 R**2: .9986

DEPTH	% SURF.								
0.00	100.00	.50	62.79	1.00	42.88	2.00	21.06	3.00	10.34
4.00	5.13								

DATE: 29 JUN TIME: 1100 HOURS
ATTENUATION COEFFICIENT: .99 R**2: .9963

DEPTH	% SURF.								
0.00	100.00	.50	59.19	1.00	33.17	2.00	14.18	3.00	5.85
4.00	1.70								

DATE: 13 JUL TIME: 1030 HOURS
ATTENUATION COEFFICIENT: 1.16 R**2: .9600

DEPTH	% SURF.								
0.00	100.00	.50	47.99	1.00	23.54	2.00	10.59	3.00	5.43
4.00	.59								

DATE: 27 JUL TIME: 0925 HOURS
ATTENUATION COEFFICIENT: .93 R**2: .9880

DEPTH	% SURF.								
0.00	100.00	.50	45.62	1.00	25.66	2.00	10.83	3.00	4.63
4.00	2.11								

DATE: 10 AUG TIME: 0930 HOURS
ATTENUATION COEFFICIENT: 1.03 R**2: .9787

DEPTH	% SURF.								
0.00	100.00	.50	38.41	1.00	19.03	2.00	7.33	3.00	3.13
4.00	1.34								

DATE: 24 AUG TIME: 0930 HOURS
ATTENUATION COEFFICIENT: .88 R**2: .9918

DEPTH	% SURF.								
0.00	100.00	.50	57.43	1.00	30.68	2.00	12.66	3.00	6.23
4.00	2.75								

DATE: 8 SEP TIME: 0930 HOURS
ATTENUATION COEFFICIENT: .85 R**2: .9924

DEPTH	% SURF.								
0.00	100.00	.50	52.89	1.00	29.97	2.00	12.41	3.00	5.57
4.00	2.79	5.00	1.25						

LAKE 114

DATE: 21 SEP TIME: 0840 HOURS
ATTENUATION COEFFICIENT: .69 R**2: .9871

DEPTH	% SURF.								
0.00	100.00	.50	63.17	1.00	35.41	2.00	16.85	3.00	9.42
4.00	5.34	5.00	2.91						

DATE: 5 OCT TIME: 0840 HOURS
ATTENUATION COEFFICIENT: .71 R**2: .9945

DEPTH	% SURF.								
0.00	100.00	.50	62.42	1.00	38.08	2.00	18.34	3.00	9.80
4.00	5.22	5.00	2.64						

LAKE 222

DATE: 1 MAY ATTENUATION COEFFICIENT: 1.54	TIME: 0920 HOURS R**2: .9824			
DEPTH % SURF. 0.00 100.00 4.00 .36	DEPTH % SURF. .50 36.69 5.00 .02	DEPTH % SURF. 1.00 18.35	DEPTH % SURF. 2.00 4.79	DEPTH % SURF. 3.00 1.40
DATE: 12 MAY ATTENUATION COEFFICIENT: 1.23	TIME: 0920 HOURS R**2: .9965			
DEPTH % SURF. 0.00 100.00 4.00 .79	DEPTH % SURF. .50 43.46 5.00 .16	DEPTH % SURF. 1.00 23.92	DEPTH % SURF. 2.00 7.87	DEPTH % SURF. 3.00 2.57
DATE: 27 MAY ATTENUATION COEFFICIENT: 1.16	TIME: 0925 HOURS R**2: .9891			
DEPTH % SURF. 0.00 100.00 4.00 1.23	DEPTH % SURF. .50 47.86 5.00 .21	DEPTH % SURF. 1.00 27.35	DEPTH % SURF. 2.00 9.57	DEPTH % SURF. 3.00 3.97
DATE: 19 JUN ATTENUATION COEFFICIENT: 1.11	TIME: 0930 HOURS R**2: .9978			
DEPTH % SURF. 0.00 100.00 4.00 1.05	DEPTH % SURF. .50 46.90 5.00 .34	DEPTH % SURF. 1.00 26.80	DEPTH % SURF. 2.00 9.78	DEPTH % SURF. 3.00 3.78
DATE: 9 JUL ATTENUATION COEFFICIENT: 1.25	TIME: 0945 HOURS R**2: .9959			
DEPTH % SURF. 0.00 100.00 4.00 .56	DEPTH % SURF. .50 41.95 5.00 .17	DEPTH % SURF. 1.00 19.81	DEPTH % SURF. 2.00 5.83	DEPTH % SURF. 3.00 1.57
DATE: 22 JUL ATTENUATION COEFFICIENT: 1.28	TIME: 0910 HOURS R**2: .9942			
DEPTH % SURF. 0.00 100.00 4.00 .57	DEPTH % SURF. .50 38.29 5.00 .12	DEPTH % SURF. 1.00 18.43	DEPTH % SURF. 2.00 4.68	DEPTH % SURF. 3.00 1.53
DATE: 4 AUG ATTENUATION COEFFICIENT: 1.33	TIME: 0940 HOURS R**2: .9921			
DEPTH % SURF. 0.00 100.00 4.00 .59	DEPTH % SURF. .50 39.49 5.00 .08	DEPTH % SURF. 1.00 19.75	DEPTH % SURF. 2.00 6.14	DEPTH % SURF. 3.00 1.90
DATE: 27 AUG ATTENUATION COEFFICIENT: 1.33	TIME: 1525 HOURS R**2: .9585			
DEPTH % SURF. 0.00 100.00 4.00 1.19	DEPTH % SURF. .50 51.35 5.00 .07	DEPTH % SURF. 1.00 27.55	DEPTH % SURF. 2.00 9.27	DEPTH % SURF. 3.00 3.63
DATE: 25 SEP ATTENUATION COEFFICIENT: 1.41	TIME: 1000 HOURS R**2: .9954			
DEPTH % SURF. 0.00 100.00 4.00 .32	DEPTH % SURF. .50 34.92 5.00 .07	DEPTH % SURF. 1.00 15.48	DEPTH % SURF. 2.00 3.64	DEPTH % SURF. 3.00 1.09

LAKE 223

DATE: 1 MAY ATTENUATION COEFFICIENT: .42	TIME: 0845 HOURS R**2: .9969
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.
0.00 100.00 .50 68.84 1.00 50.48 2.00 31.21 3.00 19.82	4.00 13.95 5.00 8.81 6.00 5.60 7.00 3.91 8.00 2.61
9.00 1.82 10.00 1.22 11.00 .84 12.00 .57 13.00 .37	
DATE: 12 MAY ATTENUATION COEFFICIENT: .38	TIME: 0820 HOURS R**2: .9970
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 76.21 1.00 61.98 2.00 34.67 3.00 28.14	4.00 19.43 5.00 13.15 6.00 9.35 7.00 6.37 8.00 4.59
9.00 3.35 10.00 2.18 11.00 1.47 12.00 .92 13.00 .54	
DATE: 27 MAY ATTENUATION COEFFICIENT: .36	TIME: 0825 HOURS R**2: .9534
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 78.32 1.00 66.06 2.00 50.96 3.00 40.77	4.00 30.76 5.00 25.10 6.00 19.44 7.00 14.34 8.00 9.53
9.00 6.45 10.00 4.40 11.00 2.45 12.00 1.15 13.00 .47	
DATE: 8 JUN ATTENUATION COEFFICIENT: .34	TIME: 0840 HOURS R**2: .8869
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 73.35 1.00 56.42 2.00 44.78 3.00 38.79	4.00 33.15 5.00 27.86 6.00 22.22 7.00 17.63 8.00 13.61
9.00 9.87 10.00 6.35 11.00 3.53 12.00 1.28 13.00 .35	
DATE: 19 JUN ATTENUATION COEFFICIENT: .38	TIME: 0900 HOURS R**2: .9548
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 80.99 1.00 63.32 2.00 47.12 3.00 33.87	4.00 24.00 5.00 17.96 6.00 13.69 7.00 10.16 8.00 7.14
9.00 5.08 10.00 3.40 11.00 1.59 12.00 .43	
DATE: 1 JUL ATTENUATION COEFFICIENT: .43	TIME: 1610 HOURS R**2: .9260
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 78.70 1.00 65.94 2.00 47.86 3.00 34.03	4.00 24.99 5.00 18.61 6.00 13.51 7.00 9.78 8.00 6.70
9.00 4.36 10.00 2.61 11.00 .83 12.00 .19	
DATE: 21 JUL ATTENUATION COEFFICIENT: .47	TIME: 0825 HOURS R**2: .9265
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 77.38 1.00 60.39 2.00 41.52 3.00 29.25	4.00 20.38 5.00 15.29 6.00 10.47 7.00 7.36 8.00 5.25
9.00 3.47 10.00 1.85 11.00 .48 12.00 .11	
DATE: 4 AUG ATTENUATION COEFFICIENT: .42	TIME: 0815 HOURS R**2: .9472
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 71.96 1.00 59.56 2.00 38.96 3.00 28.04	4.00 21.22 5.00 15.63 6.00 10.79 7.00 7.94 8.00 5.66
9.00 3.45 10.00 1.59 11.00 .38	
DATE: 14 AUG ATTENUATION COEFFICIENT: .45	TIME: 1030 HOURS R**2: .9157
DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF. DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 79.23 1.00 66.42 2.00 48.36 3.00 34.37	4.00 26.45 5.00 19.11 6.00 14.22 7.00 10.25 8.00 6.99
9.00 4.14 10.00 2.02 11.00 .69 12.00 .14	

LAKE 223

DATE: 27 AUG		TIME: 1435 HOURS	
ATTENUATION COEFFICIENT: .49		R**2: .9068	
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	84.52
4.00	22.99	5.00	16.70
9.00	3.40	10.00	1.69
		1.00	69.58
		6.00	12.37
		11.00	.47
		2.00	45.35
		7.00	9.24
		12.00	.08
		3.00	32.78
		8.00	6.18

DATE: 11 SEP		TIME: 1025 HOURS	
ATTENUATION COEFFICIENT: .52		R**2: .9286	
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	75.38
4.00	17.76	5.00	12.31
9.00	2.50	10.00	1.11
		1.00	61.14
		6.00	8.54
		11.00	.31
		2.00	37.86
		7.00	6.03
		12.00	.06
		3.00	25.63
		8.00	4.32

DATE: 25 SEP		TIME: 0930 HOURS	
ATTENUATION COEFFICIENT: .56		R**2: .9569	
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	62.75
4.00	10.21	5.00	6.59
9.00	1.14	10.00	.70
		1.00	45.73
		6.00	4.30
		11.00	.20
		2.00	26.80
		7.00	2.59
		12.00	.03
		3.00	16.59
		8.00	1.73

DATE: 12 OCT		TIME: 0915 HOURS	
ATTENUATION COEFFICIENT: .50		R**2: .9945	
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	57.95
4.00	7.95	5.00	4.82
9.00	.77	10.00	.48
		1.00	39.75
		6.00	3.00
		11.00	.29
		2.00	23.35
		7.00	1.99
		12.00	.21
		3.00	13.12
		8.00	1.31

LAKE 224

DATE: 1 MAY ATTENUATION COEFFICIENT: .28	TIME: 0820 HOURS R**2: .9973
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 72.63 1.00 61.37 2.00 40.92 3.00 30.07	6.00 13.09 7.00 10.23 8.00 7.61
4.00 22.50 5.00 17.18 11.00 3.21 12.00 2.39 13.00 1.85	14.00 1.63 15.00 1.05 16.00 .81 17.00 .63 18.00 .50
9.00 5.77 10.00 4.36	19.00 .40
DATE: 12 MAY ATTENUATION COEFFICIENT: .28	TIME: 0855 HOURS R**2: .9996
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 81.19 1.00 66.21 2.00 49.66 3.00 38.62	6.00 16.87 7.00 11.87 8.00 9.98
4.00 28.85 5.00 21.91 11.00 4.08 12.00 3.09 13.00 2.33	9.00 7.09 10.00 5.27 16.00 1.00 17.00 .75 18.00 .54
14.00 1.77 15.00 1.33	19.00 .42
DATE: 27 MAY ATTENUATION COEFFICIENT: .28	TIME: 0855 HOURS R**2: .9995
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 80.70 1.00 67.00 2.00 47.97 3.00 37.76	6.00 15.84 7.00 13.02 8.00 10.05
4.00 29.24 5.00 21.93 11.00 4.36 12.00 3.32 13.00 2.51	9.00 7.64 10.00 5.77 16.00 1.06 17.00 .79 18.00 .61
14.00 1.86 15.00 1.41	19.00 .45
DATE: 19 JUN ATTENUATION COEFFICIENT: .27	TIME: 0840 HOURS R**2: .9982
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 80.24 1.00 62.59 2.00 47.34 3.00 36.91	6.00 16.37 7.00 13.48 8.00 10.19
4.00 26.80 5.00 20.70 11.00 4.75 12.00 3.67 13.00 2.84	9.00 7.62 10.00 6.18 16.00 1.26 17.00 .92 18.00 .66
14.00 2.17 15.00 1.67	19.00 .47
DATE: 1 JUL ATTENUATION COEFFICIENT: .25	TIME: 1540 HOURS R**2: .9979
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 85.76 1.00 73.09 2.00 52.63 3.00 42.88	6.00 20.27 7.00 17.35 8.00 13.84
4.00 34.11 5.00 26.80 11.00 6.72 12.00 5.36 13.00 4.29	9.00 10.72 10.00 8.67 16.00 1.93 17.00 1.43 18.00 1.04
14.00 3.31 15.00 2.55	19.00 .76
DATE: 21 JUL ATTENUATION COEFFICIENT: .27	TIME: 0900 HOURS R**2: .9979
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 76.15 1.00 65.90 2.00 51.26 3.00 36.61	6.00 19.04 7.00 14.21 8.00 11.13
4.00 28.56 5.00 23.43 11.00 5.13 12.00 3.85 13.00 2.86	9.00 8.79 10.00 6.81 16.00 1.22 17.00 .93 18.00 .67
14.00 2.18 15.00 1.64	19.00 .45
DATE: 4 AUG ATTENUATION COEFFICIENT: .26	TIME: 0850 HOURS R**2: .9946
DEPTH % SURF.	DEPTH % SURF.
0.00 100.00 .50 74.66 1.00 64.13 2.00 53.60 3.00 42.69	6.00 21.44 7.00 17.99 8.00 14.64
4.00 33.88 5.00 27.18 11.00 6.13 12.00 4.63 13.00 3.43	9.00 11.29 10.00 8.23 16.00 1.43 17.00 1.05 18.00 .76
14.00 2.57 15.00 1.93	19.00 .53

LAKE 224

DATE: 14 AUG ATTENUATION COEFFICIENT: .26				TIME: 1050 HOURS R**2: .9913			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	85.38	1.00	75.89	2.00	61.66
4.00	39.13	5.00	32.61	6.00	26.33	7.00	21.70
9.00	13.87	10.00	10.55	11.00	7.89	12.00	5.75
14.00	3.27	15.00	2.43	16.00	1.79	17.00	1.28
19.00	.62						

DATE: 27 AUG ATTENUATION COEFFICIENT: .26				TIME: 1500 HOURS R**2: .9912			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	83.89	1.00	71.90	2.00	54.47
4.00	38.67	5.00	31.59	6.00	23.64	7.00	19.17
9.00	13.29	10.00	10.13	11.00	7.68	12.00	5.67
14.00	3.07	15.00	2.28	16.00	1.71	17.00	1.21
19.00	.58						

DATE: 11 SEP ATTENUATION COEFFICIENT: .27				TIME: 1045 HOURS R**2: .9931			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	84.23	1.00	68.91	2.00	52.07
4.00	30.63	5.00	26.03	6.00	20.67	7.00	16.54
9.00	11.10	10.00	8.65	11.00	6.51	12.00	4.78
14.00	2.56	15.00	1.85	16.00	1.36	17.00	.98
19.00	.47						

DATE: 25 SEP ATTENUATION COEFFICIENT: .28				TIME: 0910 HOURS R**2: .9903			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	69.39	1.00	55.04	2.00	40.68
4.00	23.21	5.00	18.90	6.00	14.72	7.00	11.49
9.00	7.54	10.00	6.22	11.00	4.98	12.00	3.71
14.00	1.90	15.00	1.36	16.00	.95	17.00	.68
19.00	.28						

DATE: 12 OCT ATTENUATION COEFFICIENT: .23				TIME: 1005 HOURS R**2: .9891			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	67.87	1.00	50.47	2.00	42.64
4.00	30.11	5.00	24.36	6.00	19.49	7.00	15.49
9.00	10.44	10.00	8.58	11.00	6.94	12.00	5.60
14.00	3.67	15.00	2.82	16.00	2.05	17.00	1.46
19.00	.66						

LAKE 226 NE

DATE: 1 MAY		TIME: 1000 HOURS	
ATTENUATION COEFFICIENT: .72		R**2: .9996	
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	66.67
4.00	5.56	5.00	2.59
9.00	.15		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	71.75
4.00	11.29	5.00	6.38
9.00	.48		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	61.10
4.00	8.86	5.00	5.04
9.00	.30		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	73.90
4.00	11.73	5.00	6.06
9.00	.27	10.00	.15
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	72.23
4.00	10.89	5.00	7.07
9.00	.21		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	68.18
4.00	9.40	5.00	5.41
9.00	.22		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	67.00
4.00	6.24	5.00	3.19
9.00	.14		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	61.62
4.00	5.13	5.00	2.60
9.00	.11		
DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	65.37
4.00	7.41	5.00	3.70
9.00	.14		

LAKE 226 NE

DATE: 28 AUG	TIME: 0945 HOURS			
ATTENUATION COEFFICIENT: .70	R**2: .9959			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 58.32	1.00 40.27	2.00 18.05	3.00 9.79
4.00 4.93	5.00 2.57	6.00 1.36	7.00 .76	8.00 .37
9.00 .12				
DATE: 11 SEP	TIME: 1130 HOURS			
ATTENUATION COEFFICIENT: .68	R**2: .9993			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 61.10	1.00 43.74	2.00 22.08	3.00 11.39
4.00 5.97	5.00 3.10	6.00 1.56	7.00 .80	8.00 .41
9.00 .18				
DATE: 25 SEP	TIME: 1045 HOURS			
ATTENUATION COEFFICIENT: .66	R**2: .9974			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 66.64	1.00 40.13	2.00 21.21	3.00 11.18
4.00 5.88	5.00 3.30	6.00 1.82	7.00 1.01	8.00 .51
9.00 .24	10.00 .10			
DATE: 12 OCT	TIME: 1125 HOURS			
ATTENUATION COEFFICIENT: .71	R**2: .9957			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 51.65	1.00 31.82	2.00 15.87	3.00 8.01
4.00 4.19	5.00 2.21	6.00 1.15	7.00 .58	8.00 .25

Lake 226 SW

13

DATE: 1 MAY
ATTENUATION COEFFICIENT: .65

TIME: 0955 HOURS
R**2: .9995

DATE: 12 MAY
ATTENUATION COEFFICIENT: .61

TIME: 1040 HOURS
R**2: .9995

DATE: 27 MAY
ATTENUATION COEFFICIENT: .60

TIME: 1025 HOURS
E**2: .9982

DATE: 4 JUN ATTENUATION COEFFICIENT: .61

TIME: 1030 HOURS
R**2: .9912

DEPTH	% SURF.								
0.00	100.00	.50	75.76	1.00	56.69	2.00	34.02	3.00	21.34
4.00	12.99	5.00	7.19	6.00	3.87	7.00	1.96	8.00	.92
9.00	.43	10.00	.19						

DATE: 19 JUN
ATTENUATION COEFFICIENT: .59

TIME: 1010 HOURS
R**2: .9904

DATE: 1 JUL ATTENUATION COEFFICIENT: .57

TIME: 1055 HOURS
R**2: .9917

DATE: 21 JUL ATTENUATION COEFFICIENT: .70

TIME: 1005 HOURS
R**2: .9987

DATE: 29 JUL ATTENUATION COEFFICIENT: .72

TIME: 0845 HOURS
R**2: .9977

DEPTH	% SURF.								
0.00	100.00	.50	67.48	1.00	39.91	2.00	18.32	3.00	8.68
4.00	.45	5.00	2.47	6.00	1.25	7.00	.59	8.00	.28

DATE: 14 AUG
ATTENUATION COEFFICIENT: .6

TIME: 1120 HOURS
R**2: .9977

DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	65.9
4.00	6.81	5.00	3.7
9.00	20		

JRF. DEPTH % SUR
.03 2.00 24.1

DATE: 27 AUG .
ATTENUATION COEFFICIENT: .6

TIME: 1605 HOURS
R**2: .9942

DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	61.8
4.00	6.18	5.00	3.5
9.00	1.5		

LAKE 226 SW

DATE: 11 SEP			TIME: 1120 HOURS		
ATTENUATION COEFFICIENT: .65			R**2: .9981		
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	65.19	1.00	45.63
4.00	5.79	5.00	3.36	6.00	1.87
9.00	.24			7.00	1.04
				3.00	10.72
				8.00	.49

DATE: 25 SEP			TIME: 1035 HOURS		
ATTENUATION COEFFICIENT: .65			R**2: .9984		
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	66.62	1.00	40.88
4.00	5.83	5.00	3.18	6.00	1.80
9.00	.24	10.00	.12	7.00	.99
				3.00	10.75
				8.00	.47

DATE: 12 OCT			TIME: 1115 HOURS		
ATTENUATION COEFFICIENT: .69			R**2: .9942		
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	51.72	1.00	30.56
4.00	4.29	5.00	2.27	6.00	1.20
				2.00	14.69
				7.00	.62
				3.00	8.35
				8.00	.28

LAKE 227

DATE: 21 APR ATTENUATION COEFFICIENT: 1.17				TIME: 0945 HOURS R**2: .9956			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	42.84	1.00	21.51	2.00	7.29
4.00	.75	5.00	.26			3.00	1.99

DATE: 4 MAY ATTENUATION COEFFICIENT: .98				TIME: 0810 HOURS R**2: .9969			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	45.58	1.00	25.71	2.00	11.61
4.00	1.76	5.00	.65	6.00	.21	3.00	4.56

DATE: 18 MAY ATTENUATION COEFFICIENT: .97				TIME: 0825 HOURS R**2: .9975			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	50.36	1.00	27.70	2.00	10.34
4.00	1.83	5.00	.67	6.00	.24	3.00	4.28

DATE: 1 JUN ATTENUATION COEFFICIENT: 1.09				TIME: 0820 HOURS R**2: .9951			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	44.79	1.00	23.50	2.00	8.74
4.00	.91	5.00	.41			3.00	2.90

DATE: 16 JUN ATTENUATION COEFFICIENT: 1.43				TIME: 0820 HOURS R**2: .9956			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	42.88	1.00	19.94	2.00	6.00
4.00	.24	5.00	.08			3.00	1.72

DATE: 29 JUN ATTENUATION COEFFICIENT: 1.57				TIME: 0835 HOURS R**2: .9937			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	34.02	1.00	15.98	2.00	4.02
4.00	.13					3.00	1.05

DATE: 13 JUL ATTENUATION COEFFICIENT: 1.70				TIME: 0825 HOURS R**2: .9862			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	37.29	1.00	16.90	2.00	4.47
4.00	.08					3.00	.98

DATE: 27 JUL ATTENUATION COEFFICIENT: 1.59				TIME: 0840 HOURS R**2: .9943			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	33.74	1.00	14.84	2.00	3.78
4.00	.12					3.00	.95

DATE: 10 AUG ATTENUATION COEFFICIENT: 1.60				TIME: 0820 HOURS R**2: .9923			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	31.96	1.00	12.05	2.00	2.43
4.00	.15					3.00	.58

DATE: 24 AUG ATTENUATION COEFFICIENT: 1.46				TIME: 0825 HOURS R**2: .9860			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	36.87	1.00	14.31	2.00	2.91
4.00	.29					3.00	.76

LAKE 227

LAKE 239

DATE: 21 APR ATTENUATION COEFFICIENT: .57 TIME: 1015 HOURS R**2: .9827

DEPTH	% SURF.								
0.00	100.00	.50	50.43	1.00	29.24	2.00	14.01	3.00	7.60
4.00	4.29	5.00	2.56	6.00	1.69	7.00	1.12	8.00	.66
9.00	.38	10.00	.22						

DATE: 1 MAY ATTENUATION COEFFICIENT: .60 TIME: 1155 HOURS R**2: .9987

DEPTH	% SURF.								
0.00	100.00	.50	66.50	1.00	43.32	2.00	24.48	3.00	13.00
4.00	7.15	5.00	4.03	6.00	2.27	7.00	1.28	8.00	.72
9.00	.42	10.00	.22						

DATE: 17 MAY ATTENUATION COEFFICIENT: .65 TIME: 1615 HOURS R**2: .9989

DEPTH	% SURF.								
0.00	100.00	.50	65.84	1.00	48.52	2.00	23.10	3.00	12.24
4.00	6.47	5.00	3.58	6.00	1.77	7.00	.92	8.00	.53
9.00	.30								

DATE: 3 JUN ATTENUATION COEFFICIENT: .61 TIME: 0935 HOURS R**2: .9994

DEPTH	% SURF.								
0.00	100.00	.50	70.79	1.00	46.77	2.00	25.28	3.00	13.91
4.00	7.84	5.00	4.30	6.00	2.34	7.00	1.24	8.00	.66
9.00	.38								

DATE: 16 JUN ATTENUATION COEFFICIENT: .60 TIME: 1015 HOURS R**2: .9990

DEPTH	% SURF.								
0.00	100.00	.50	65.90	1.00	46.13	2.00	24.16	3.00	13.18
4.00	7.80	5.00	4.28	6.00	2.42	7.00	1.30	8.00	.72
9.00	.40	10.00	.24						

DATE: 29 JUN ATTENUATION COEFFICIENT: .66 TIME: 1615 HOURS R**2: .9978

DEPTH	% SURF.								
0.00	100.00	.50	62.10	1.00	43.58	2.00	21.24	3.00	10.89
4.00	5.56	5.00	2.75	6.00	1.45	7.00	.83	8.00	.44
9.00	.26								

DATE: 13 JUL ATTENUATION COEFFICIENT: .74 TIME: 0845 HOURS R**2: .9909

DEPTH	% SURF.								
0.00	100.00	.50	55.98	1.00	27.99	2.00	14.00	3.00	5.67
4.00	2.80	5.00	1.36	6.00	.70	7.00	.38	8.00	.20
9.00	.12								

DATE: 27 JUL ATTENUATION COEFFICIENT: .69 TIME: 0905 HOURS R**2: .9943

DEPTH	% SURF.								
0.00	100.00	.50	58.79	1.00	35.55	2.00	15.96	3.00	8.01
4.00	3.75	5.00	1.88	6.00	.97	7.00	.55	8.00	.30
9.00	.16	10.00	.10						

DATE: 10 AUG ATTENUATION COEFFICIENT: .60 TIME: 1110 HOURS R**2: .9973

DEPTH	% SURF.								
0.00	100.00	.50	61.62	1.00	42.06	2.00	21.52	3.00	12.52
4.00	6.55	5.00	3.57	6.00	1.98	7.00	1.15	8.00	.66
9.00	.38	10.00	.23						

LAKE 239

DATE: 26 AUG ATTENUATION COEFFICIENT: .61				TIME: 1415 HOURS R**2: .9975			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	68.47	1.00	44.99	2.00	23.18
4.00	6.50	5.00	3.57	6.00	2.08	7.00	1.23
9.00	.38					3.00	12.32
						8.00	.65

DATE: 8 SEP ATTENUATION COEFFICIENT: .73				TIME: 1710 HOURS R**2: .9955			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	59.14	1.00	38.81	2.00	15.53
4.00	3.60	5.00	1.83	6.00	.93	7.00	.43
9.00	.14					3.00	7.21
						8.00	.24

DATE: 21 SEP ATTENUATION COEFFICIENT: .66				TIME: 1545 HOURS R**2: .9946			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	58.26	1.00	40.78	2.00	17.48
4.00	4.81	5.00	2.40	6.00	1.33	7.00	.71
9.00	.25					3.00	8.74
						8.00	.41

DATE: 7 OCT ATTENUATION COEFFICIENT: .72				TIME: 0915 HOURS R**2: .9932			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	52.32	1.00	33.44	2.00	14.04
4.00	3.16	5.00	1.63	6.00	.86	7.00	.44
9.00	.14					3.00	6.64
						8.00	.23

DATE: 14 NOV ATTENUATION COEFFICIENT: .67				TIME: 1330 HOURS R**2: .9932			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	51.05	1.00	31.73	2.00	14.79
4.00	4.01	5.00	2.16	6.00	1.19	7.00	.64
9.00	.20					3.00	7.70
						8.00	.34

LAKE 302 N

DATE: 1 MAY ATTENUATION COEFFICIENT: .57				TIME: 1030 HOURS R**2: .9968			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	69.39	1.00	51.45	2.00	26.92
4.00	7.72	5.00	4.13	6.00	2.37	7.00	1.36
9.00	.50	10.00	.31	11.00	.19		

DATE: 17 MAY ATTENUATION COEFFICIENT: .55				TIME: 1645 HOURS R**2: .9981			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	71.74	1.00	52.79	2.00	34.52
4.00	12.32	5.00	7.17	6.00	4.20	7.00	2.22
9.00	.66	10.00	.37				

DATE: 1 JUN ATTENUATION COEFFICIENT: .50				TIME: 0930 HOURS R**2: .9873			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	73.47	1.00	53.18	2.00	32.71
4.00	15.57	5.00	10.39	6.00	6.47	7.00	3.71
9.00	1.00	10.00	.44				

DATE: 16 JUN ATTENUATION COEFFICIENT: .56				TIME: 0915 HOURS R**2: .9925			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	68.79	1.00	47.86	2.00	28.71
4.00	11.61	5.00	6.94	6.00	4.01	7.00	2.39
9.00	.62	10.00	.25				

DATE: 29 JUN ATTENUATION COEFFICIENT: .52				TIME: 0945 HOURS R**2: .9792			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	69.14	1.00	49.18	2.00	34.21
4.00	15.25	5.00	9.91	6.00	6.45	7.00	3.71
9.00	.84	10.00	.34				

DATE: 13 JUL ATTENUATION COEFFICIENT: .66				TIME: 0930 HOURS R**2: .9937			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	84.37	1.00	54.59	2.00	28.54
4.00	8.69	5.00	5.03	6.00	2.83	7.00	1.48
9.00	.27	10.00	.11				

DATE: 23 JUL ATTENUATION COEFFICIENT: .67				TIME: 0900 HOURS R**2: .9883			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	94.02	1.00	65.92	2.00	35.01
4.00	9.94	5.00	5.71	6.00	3.29	7.00	1.69
9.00	.30	10.00	.10				

DATE: 10 AUG ATTENUATION COEFFICIENT: .65				TIME: 1010 HOURS R**2: .9919			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	73.32	1.00	48.04	2.00	26.29
4.00	8.85	5.00	5.06	6.00	2.67	7.00	1.24
9.00	.20						

DATE: 24 AUG ATTENUATION COEFFICIENT: .75				TIME: 1015 HOURS R**2: .8115			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	62.11	1.00	44.77	2.00	27.43
4.00	12.14	5.00	7.98	6.00	4.73	7.00	2.55
9.00	.38	10.00	.00				

LAKE 302 N

DATE: 8 SEP				TIME: 1025 HOURS			
ATTENUATION COEFFICIENT: .65				R**2: .9536			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	70.07	1.00	49.17	2.00	28.28
4.00	9.34	5.00	5.78	6.00	3.64	7.00	1.99
9.00	.42	10.00	.05				

DATE: 21 SEP				TIME: 0915 HOURS			
ATTENUATION COEFFICIENT: .61				R**2: .9634			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	59.29	1.00	45.06	2.00	24.43
4.00	9.13	5.00	5.41	6.00	3.34	7.00	2.03
9.00	.51	10.00	.07				

DATE: 5 OCT				TIME: 0910 HOURS			
ATTENUATION COEFFICIENT: .57				R**2: .9915			
DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.	DEPTH	% SURF.
0.00	100.00	.50	58.26	1.00	38.26	2.00	19.70
4.00	6.28	5.00	3.79	6.00	2.36	7.00	1.19
9.00	.55						

LAKE 302 S

DATE: 1 MAY TIME: 1035 HOURS
 ATTENUATION COEFFICIENT: .51 R**2: .9997
 DEPTH % SURF.
 0.00 100.00 .50 74.57 1.00 57.10 2.00 32.63 3.00 20.74
 4.00 12.23 5.00 7.52 6.00 4.54 7.00 2.78 8.00 1.68
 9.00 1.03

 DATE: 17 MAY TIME: 1655 HOURS
 ATTENUATION COEFFICIENT: .58 R**2: .9928
 DEPTH % SURF.
 0.00 100.00 .50 81.93 1.00 61.10 2.00 34.44 3.00 20.83
 4.00 13.05 5.00 7.53 6.00 4.17 7.00 2.17 8.00 1.03
 9.00 .44

 DATE: 1 JUN TIME: 0940 HOURS
 ATTENUATION COEFFICIENT: .57 R**2: .9560
 DEPTH % SURF.
 0.00 100.00 .50 70.53 1.00 50.78 2.00 31.53 3.00 23.10
 4.00 16.40 5.00 10.86 6.00 6.07 7.00 2.70 8.00 1.09
 9.00 .30

 DATE: 16 JUN TIME: 0935 HOURS
 ATTENUATION COEFFICIENT: .63 R**2: .9605
 DEPTH % SURF.
 0.00 100.00 .50 72.15 1.00 61.85 2.00 32.64 3.00 20.84
 4.00 13.63 5.00 8.65 6.00 4.87 7.00 2.10 8.00 .72
 9.00 .18

 DATE: 29 JUN TIME: 1025 HOURS
 ATTENUATION COEFFICIENT: .60 R**2: .9408
 DEPTH % SURF.
 0.00 100.00 .50 65.14 1.00 45.77 2.00 30.30 3.00 21.03
 4.00 14.02 5.00 9.40 6.00 5.44 7.00 2.58 8.00 .86
 9.00 .17

 DATE: 13 JUL TIME: 0920 HOURS
 ATTENUATION COEFFICIENT: .74 R**2: .8804
 DEPTH % SURF.
 0.00 100.00 .50 86.54 1.00 54.44 2.00 32.10 3.00 20.24
 4.00 12.56 5.00 7.75 6.00 4.47 7.00 2.02 8.00 .66
 9.00 .02

 DATE: 23 JUL TIME: 0910 HOURS
 ATTENUATION COEFFICIENT: .93 R**2: .7536
 DEPTH % SURF.
 0.00 100.00 .50 67.77 1.00 50.83 2.00 31.57 3.00 18.02
 4.00 11.86 5.00 7.01 6.00 3.77 7.00 1.51 8.00 .46
 9.00 .00

 DATE: 10 AUG TIME: 1035 HOURS
 ATTENUATION COEFFICIENT: .79 R**2: .8684
 DEPTH % SURF.
 0.00 100.00 .50 71.87 1.00 53.60 2.00 31.67 3.00 18.52
 4.00 11.27 5.00 7.13 6.00 3.65 7.00 1.53 8.00 .53
 9.00 .01

 DATE: 24 AUG TIME: 1030 HOURS
 ATTENUATION COEFFICIENT: .80 R**2: .7468
 DEPTH % SURF.
 0.00 100.00 .50 65.18 1.00 46.65 2.00 29.45 3.00 20.51
 4.00 13.73 5.00 9.36 6.00 5.10 7.00 2.51 8.00 .98
 9.00 .00

LAKE 302 S

DATE: 8 SEP	TIME: 1035 HOURS			
ATTENUATION COEFFICIENT: .76	R**2: .8936			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 67.00	1.00 47.51	2.00 25.22	3.00 14.86
4.00 8.65	5.00 4.87	6.00 2.86	7.00 1.50	8.00 .65
9.00 .02				
DATE: 21 SEP.	TIME: 0930 HOURS			
ATTENUATION COEFFICIENT: .73	R**2: .9251			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 65.44	1.00 44.67	2.00 21.81	3.00 11.84
4.00 6.44	5.00 3.80	6.00 2.26	7.00 1.34	8.00 .66
9.00 .03				
DATE: 5 OCT	TIME: 0945 HOURS			
ATTENUATION COEFFICIENT: .49	R**2: .9911			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.50 57.78	1.00 40.61	2.00 22.16	3.00 14.36
4.00 8.95	5.00 6.07	6.00 4.00	7.00 2.19	8.00 1.56
9.00 .94				

LAKE 661

DATE: 22 JUN	TIME: 0930 HOURS			
ATTENUATION COEFFICIENT: 2.70	R**2: .9957			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.25 43.27	.50 23.73	.75 12.14	.85 9.77
DATE: 2 SEP	TIME: 1445 HOURS			
ATTENUATION COEFFICIENT: 3.15	R**2: .9971			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.25 48.97	.50 19.59	.75 9.79	

LAKE 979

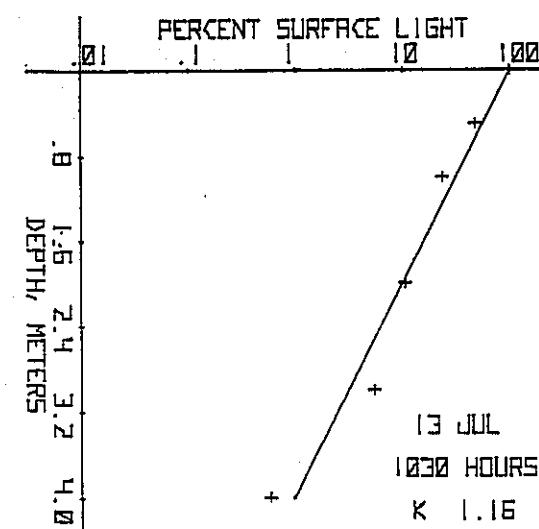
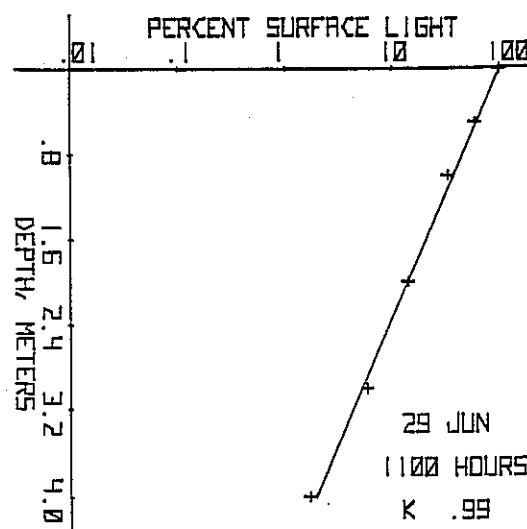
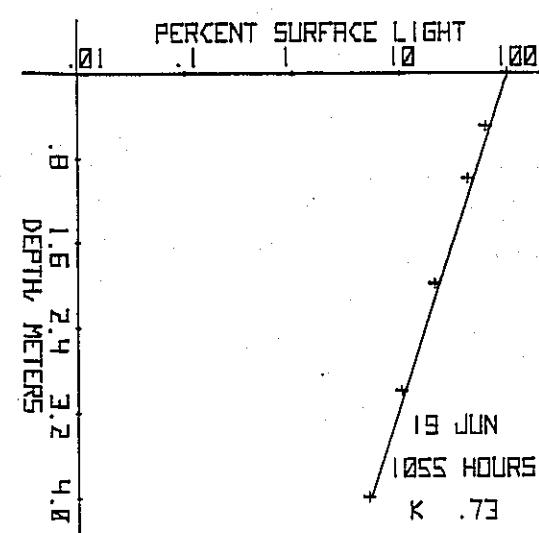
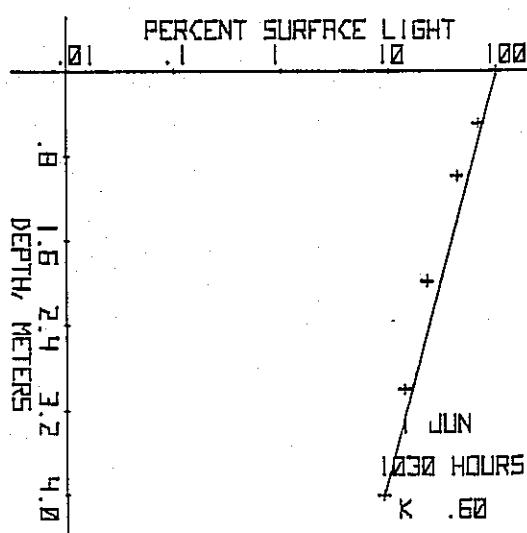
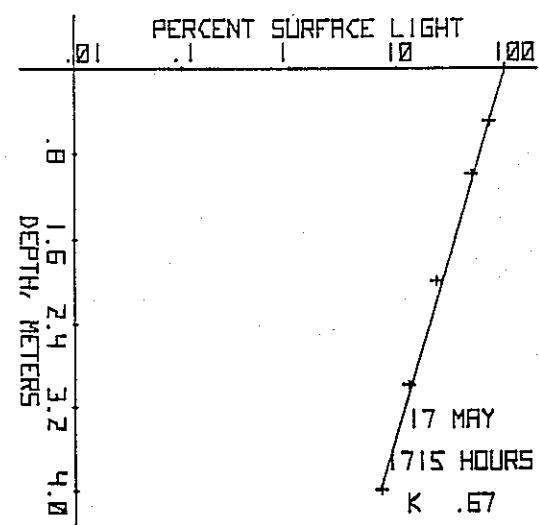
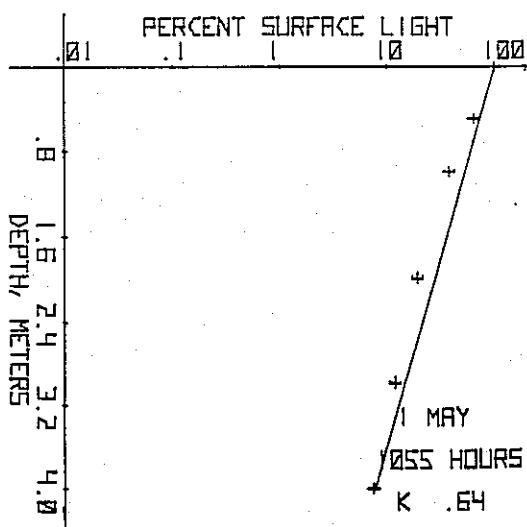
DATE: 22 JUN	TIME: 1045 HOURS			
ATTENUATION COEFFICIENT: 2.61	R**2: .9367			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.25 85.29	.50 35.01	.75 15.26	
DATE: 2 SEP	TIME: 1400 HOURS			
ATTENUATION COEFFICIENT: 1.09	R**2: .9645			
DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.	DEPTH % SURF.
0.00 100.00	.25 86.45	.50 56.53	.75 46.55	

APPENDIX 2

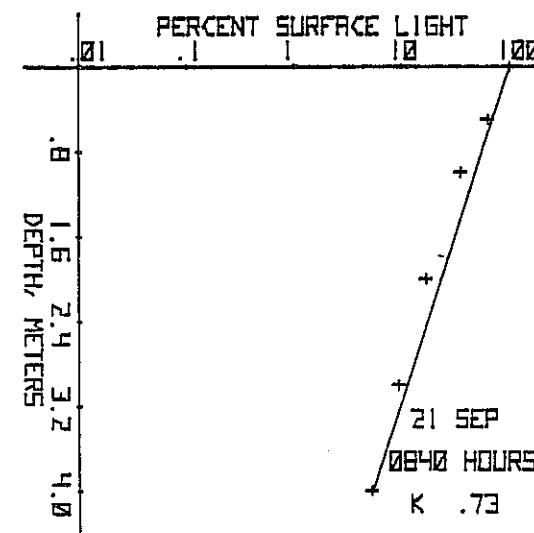
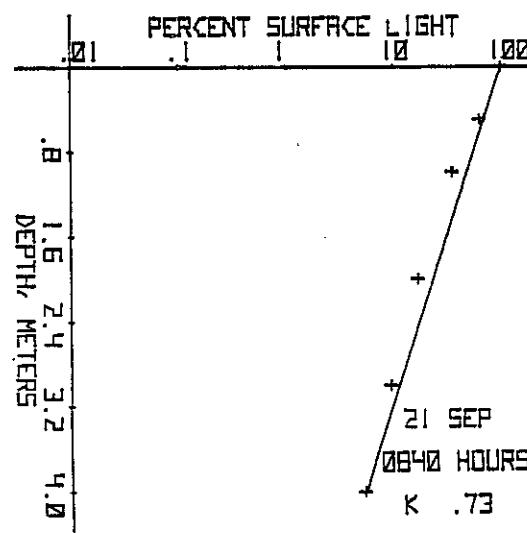
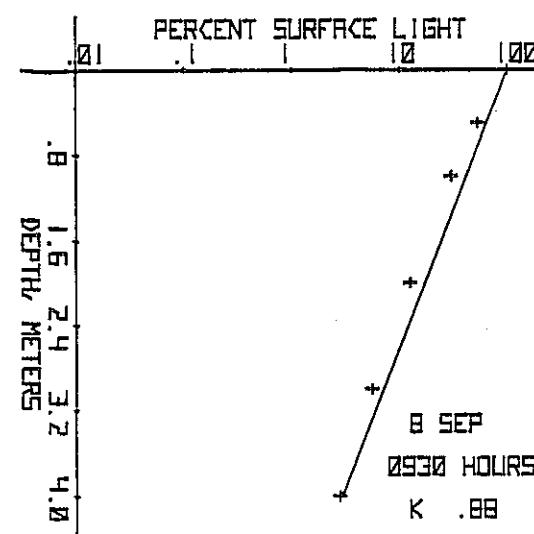
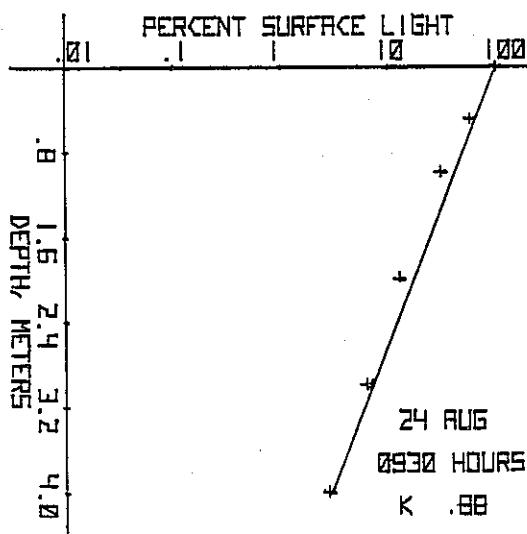
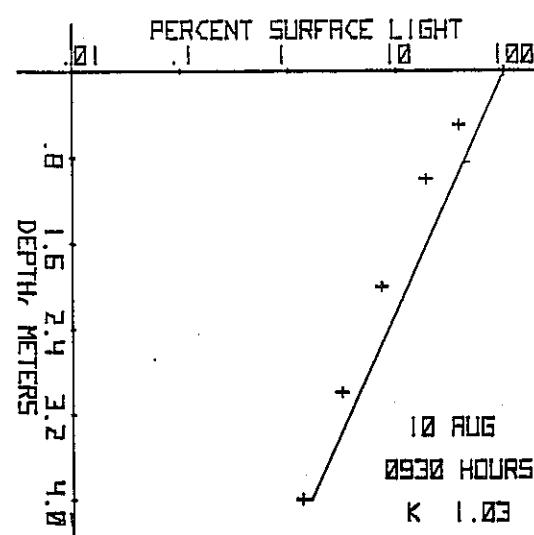
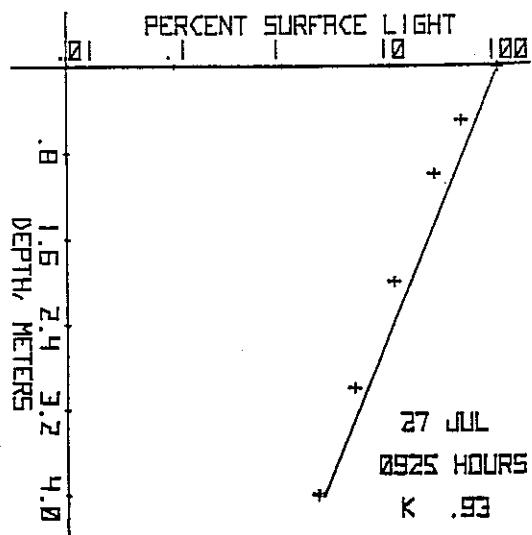
In this appendix, the measured irradiances (as percentages of surface irradiance) are plotted against depth (in meters). Percent light is plotted on a logarithmic scale, depth on a linear scale.

Each attenuation coefficient (K) is the negative slope of a regression of the natural logarithm of the percent surface light on depth. The solid line represents this regression and is an estimate of the percent surface light at depth, based on K . It has been drawn through 100% at 0 depth because this irradiance-depth relationship is fixed by definition.

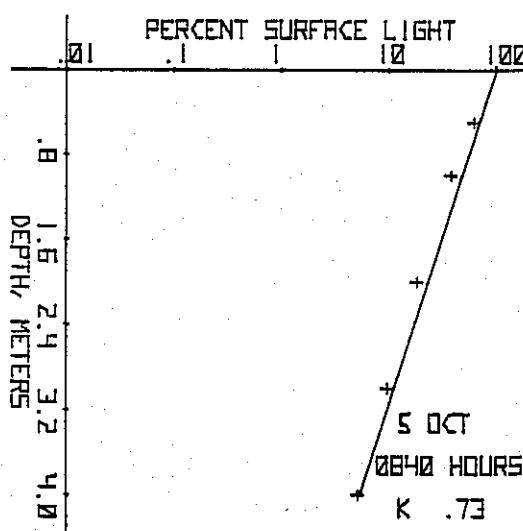
LAKE 114



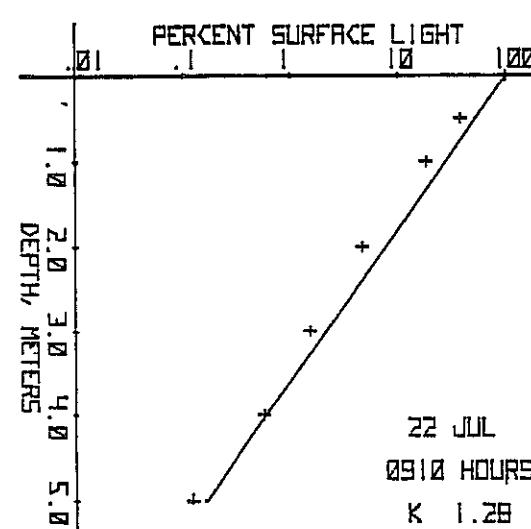
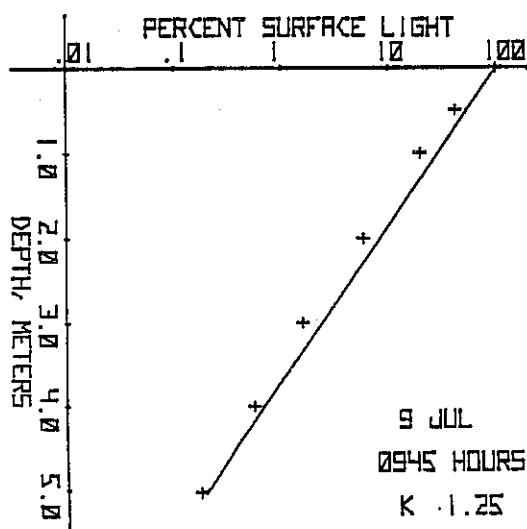
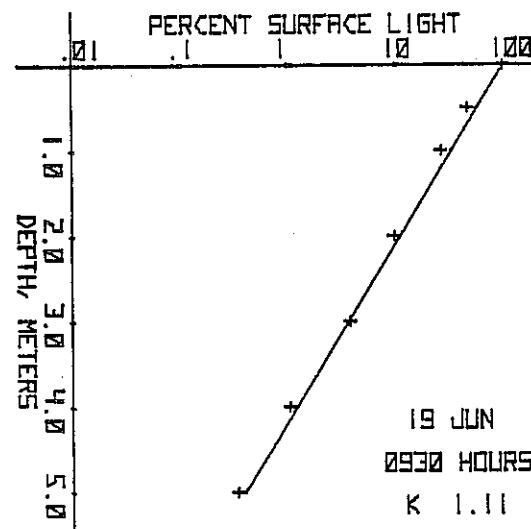
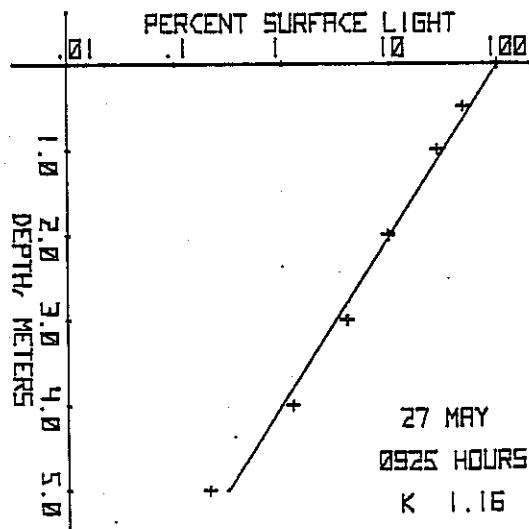
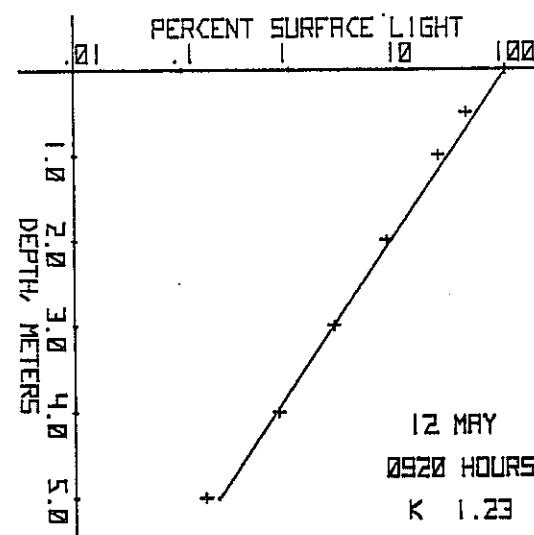
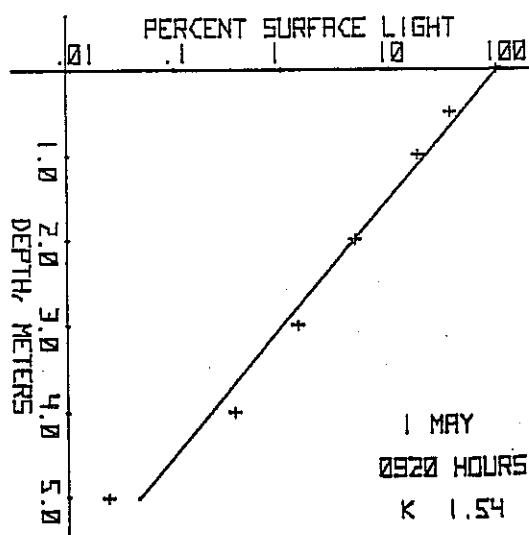
LAKE 114



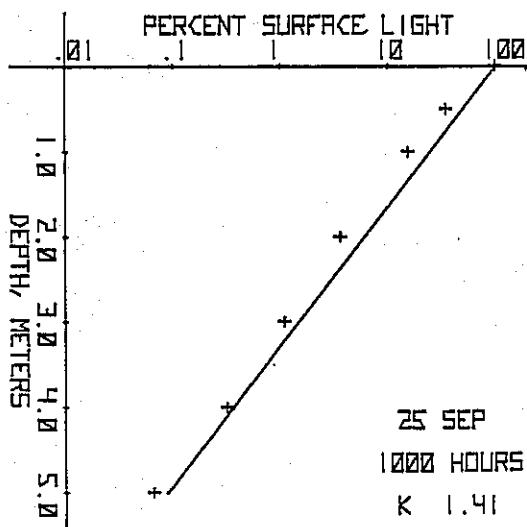
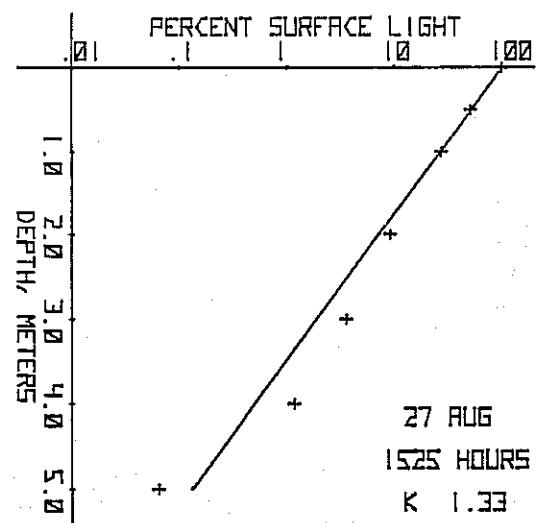
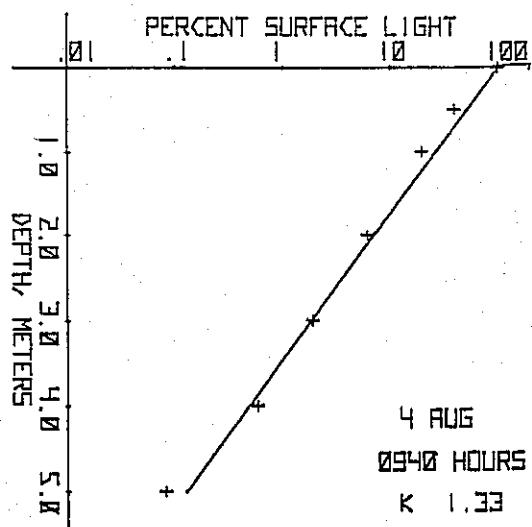
LAKE 114



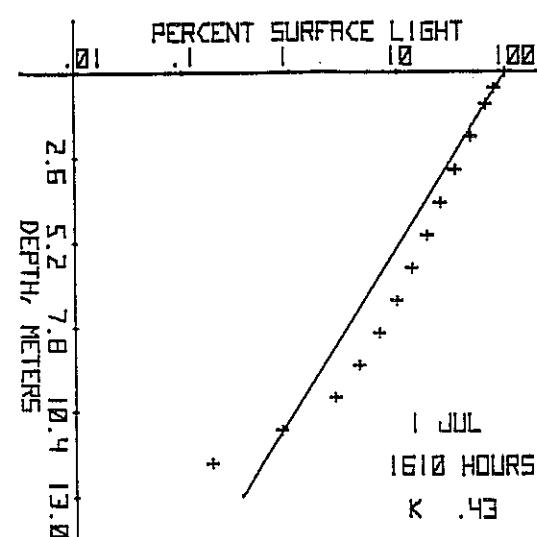
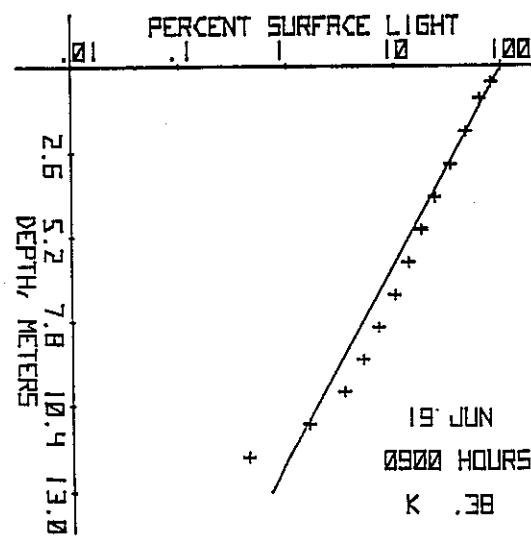
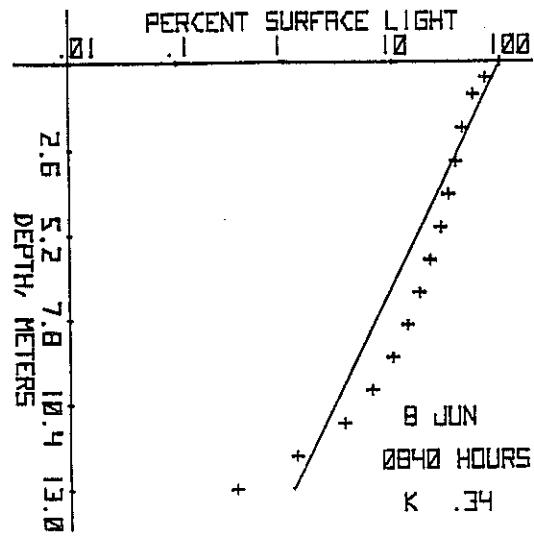
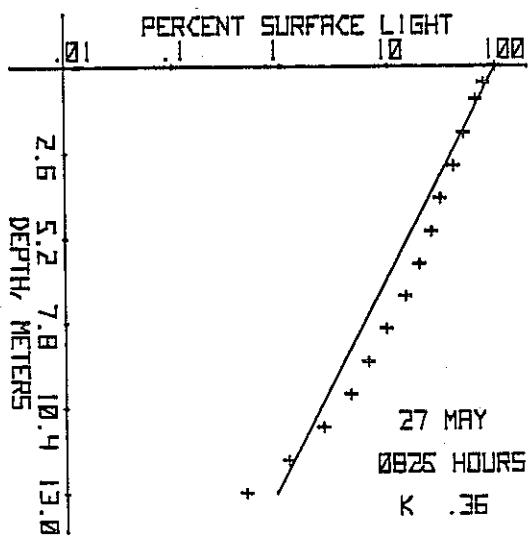
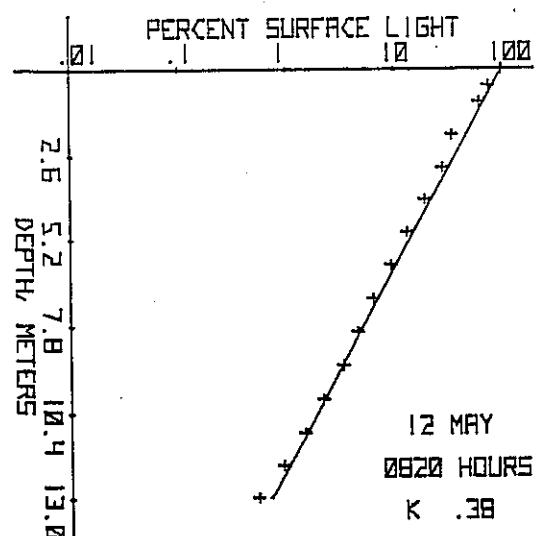
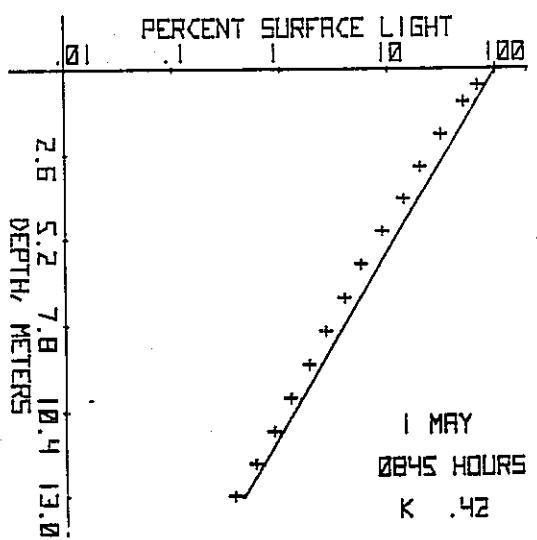
LAKE 222



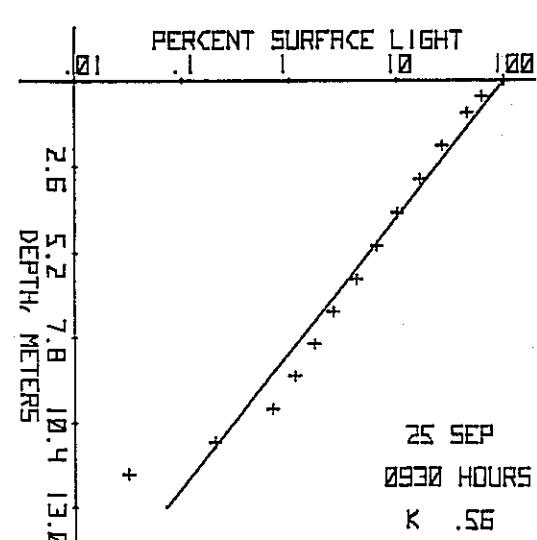
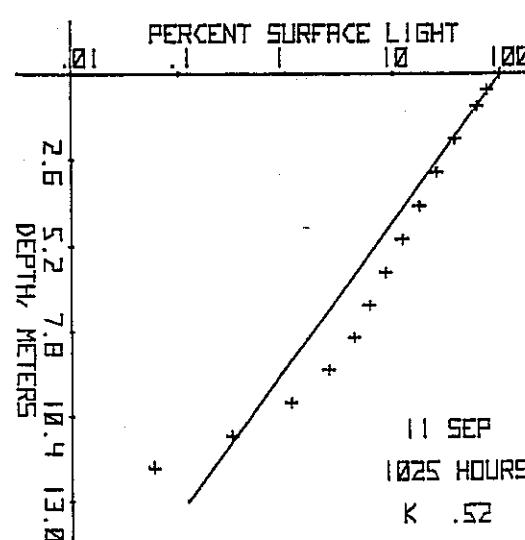
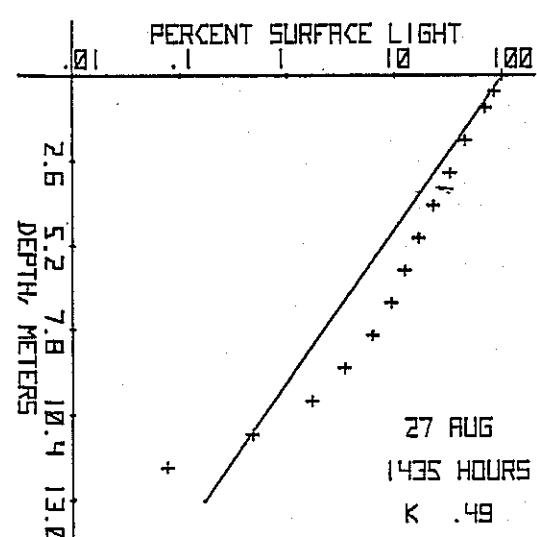
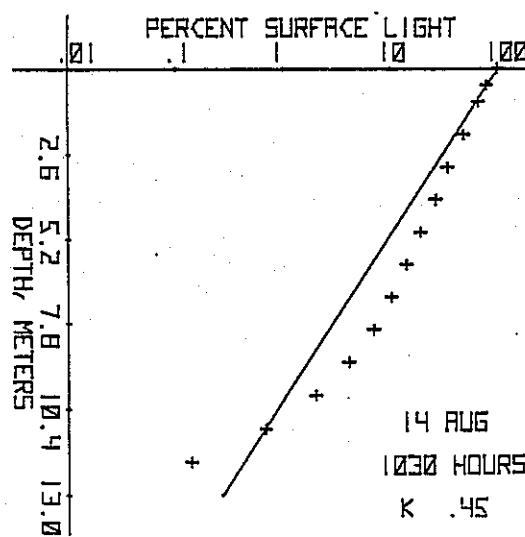
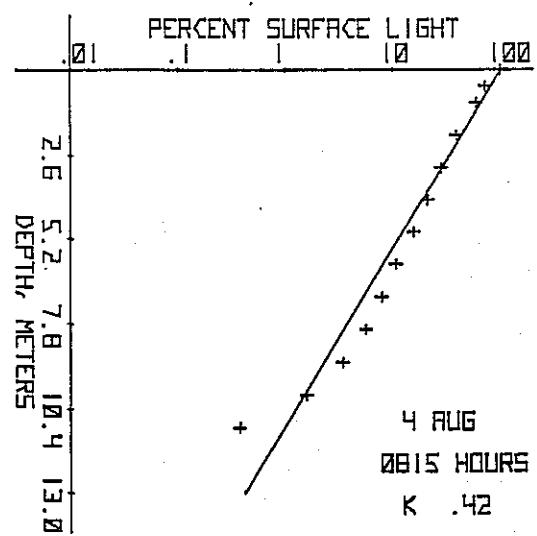
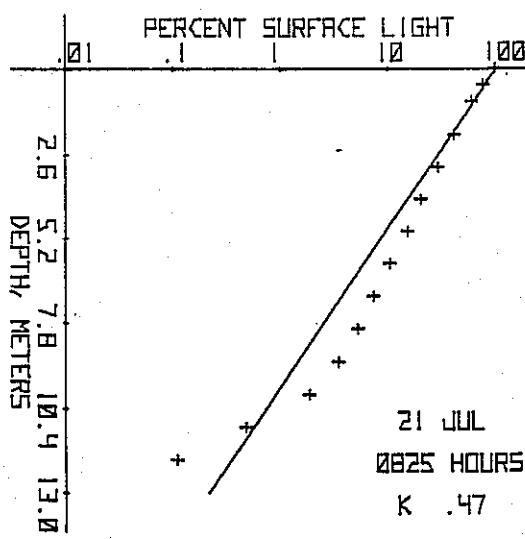
LAKE 222



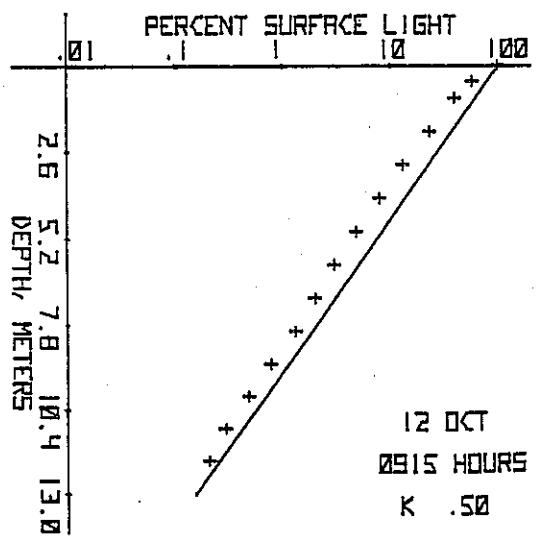
LAKE 223



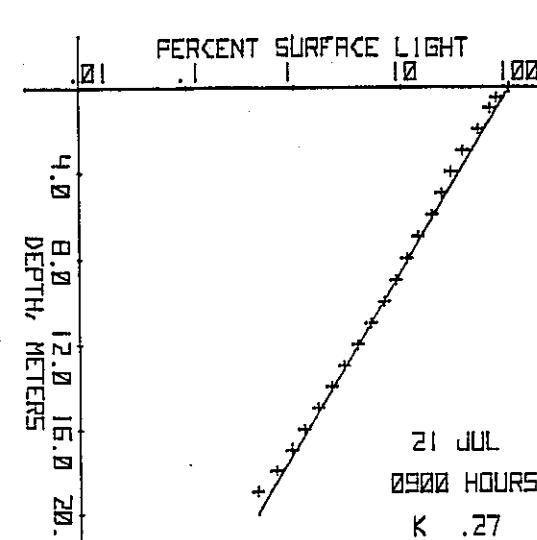
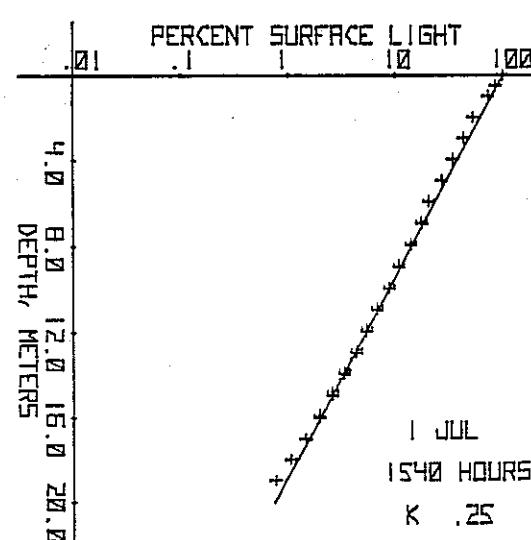
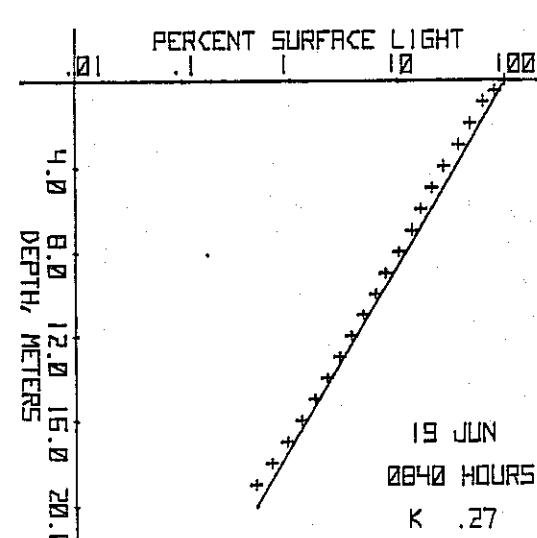
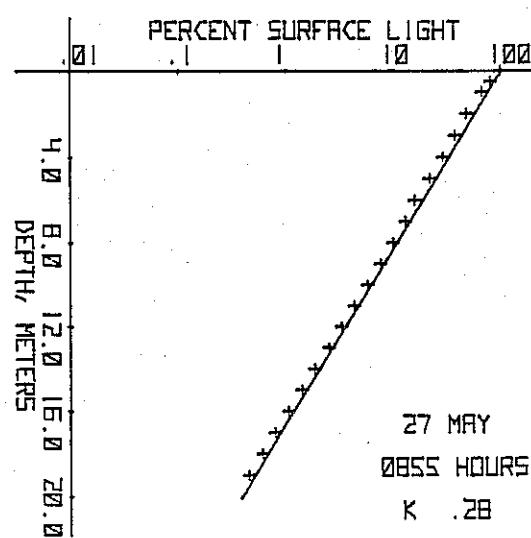
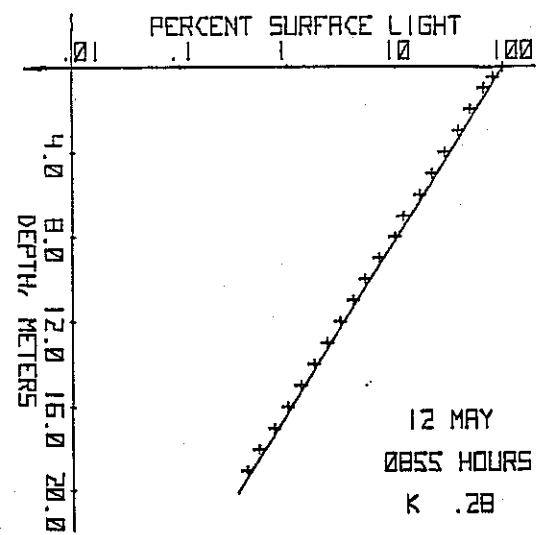
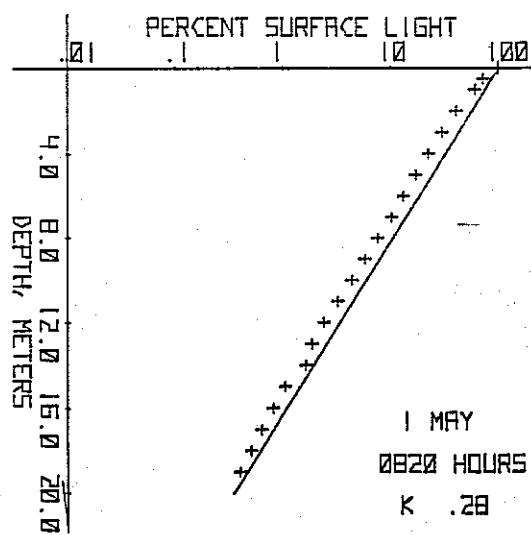
LAKE 223



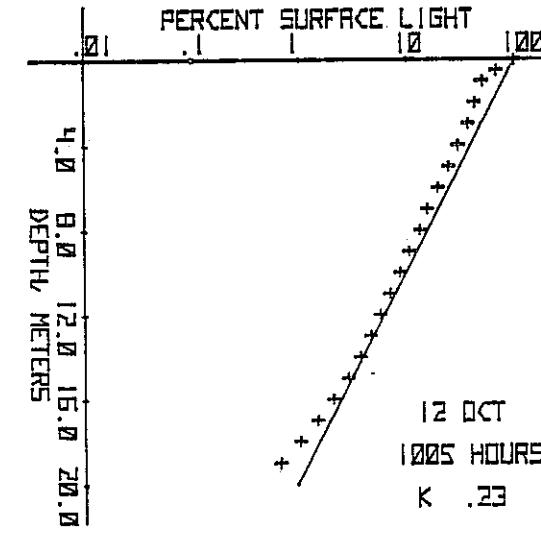
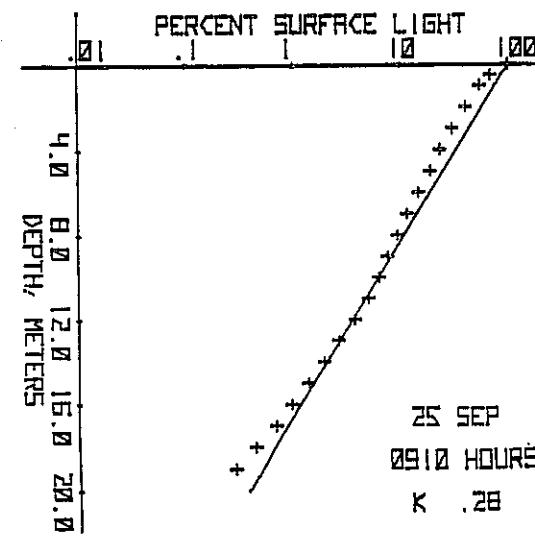
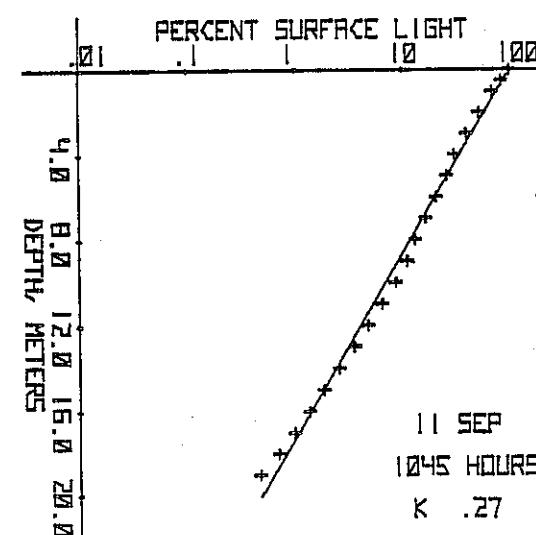
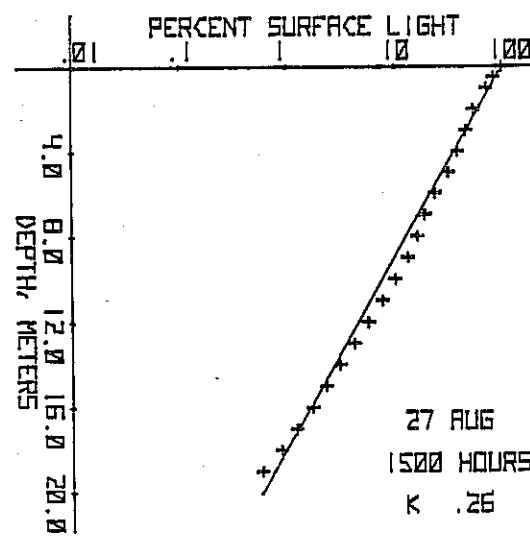
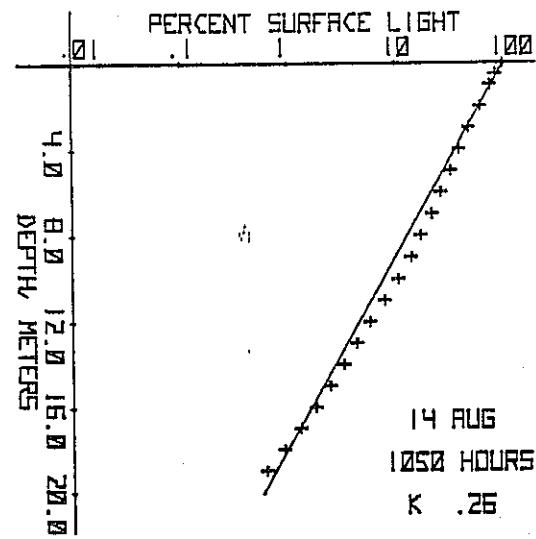
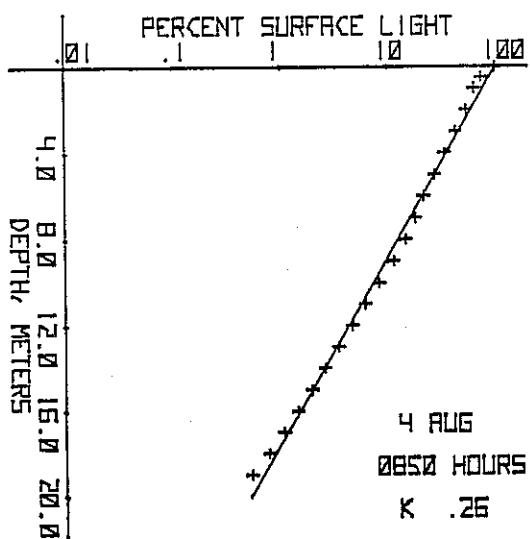
LAKE 223



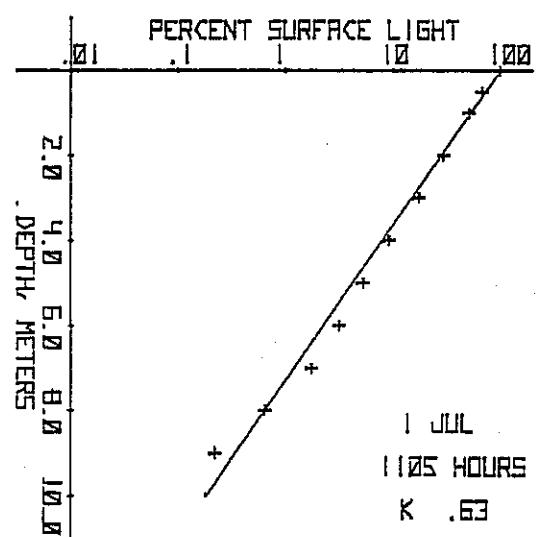
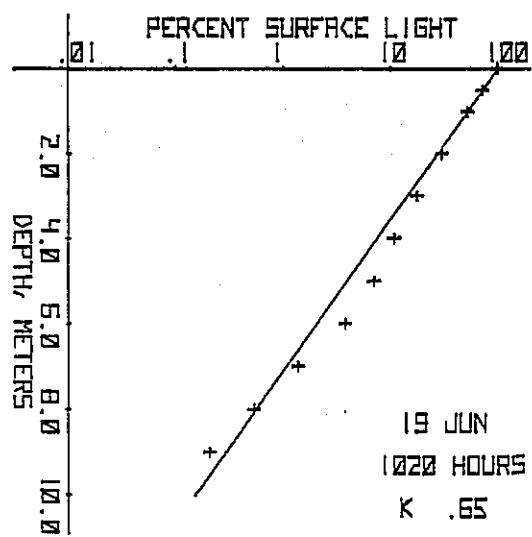
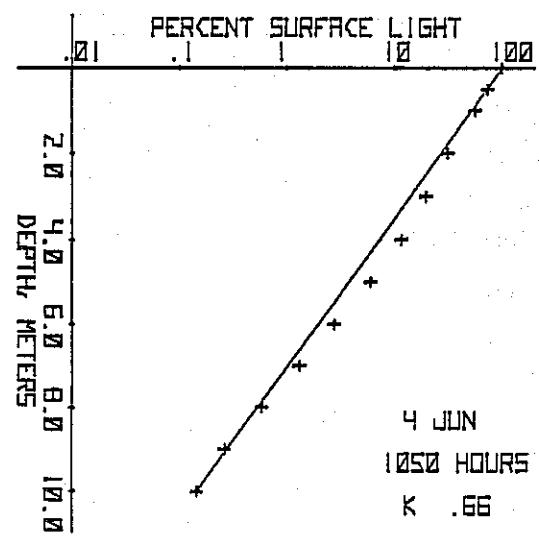
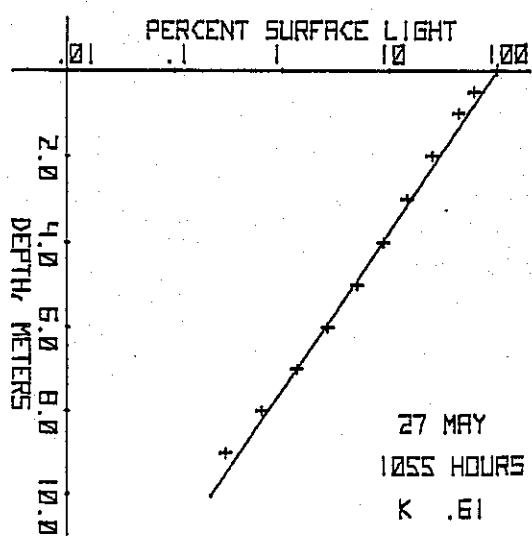
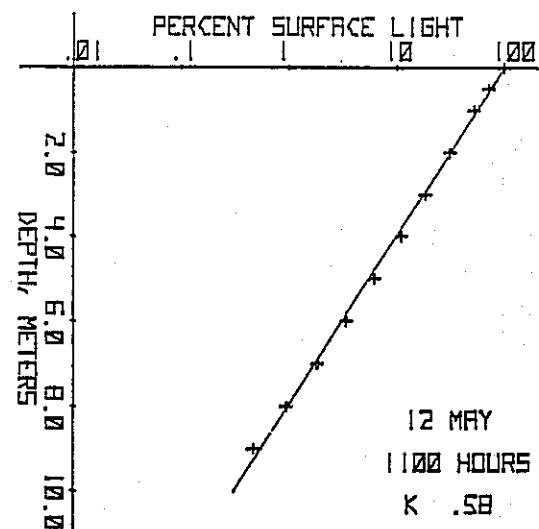
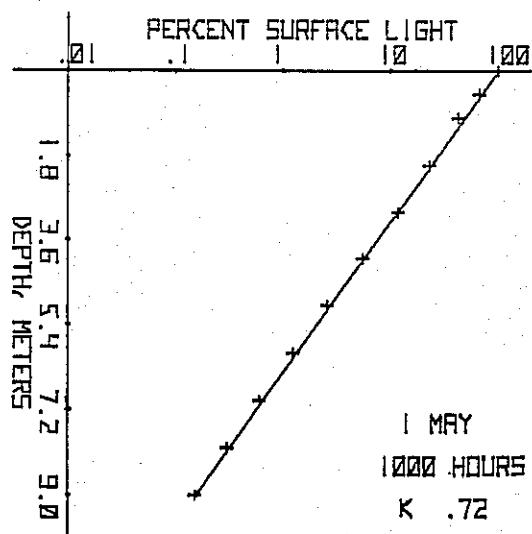
LAKE 224



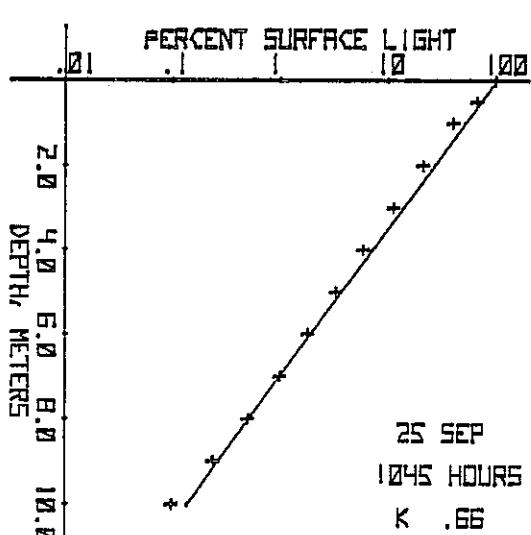
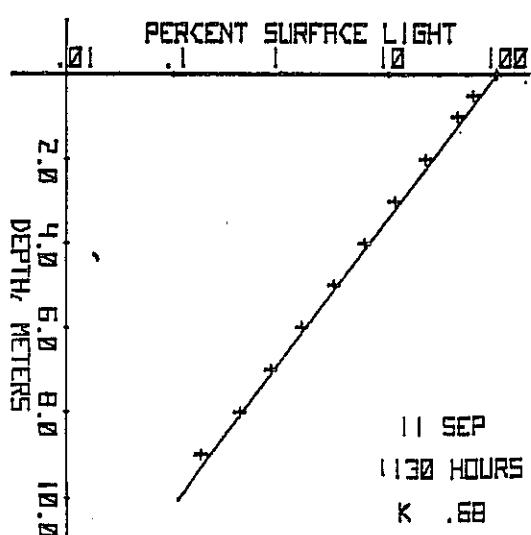
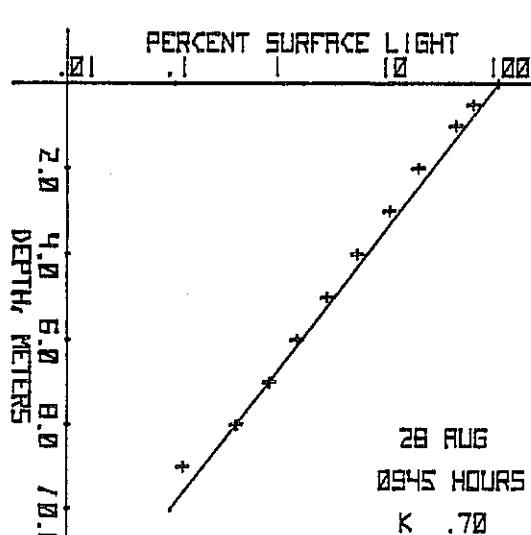
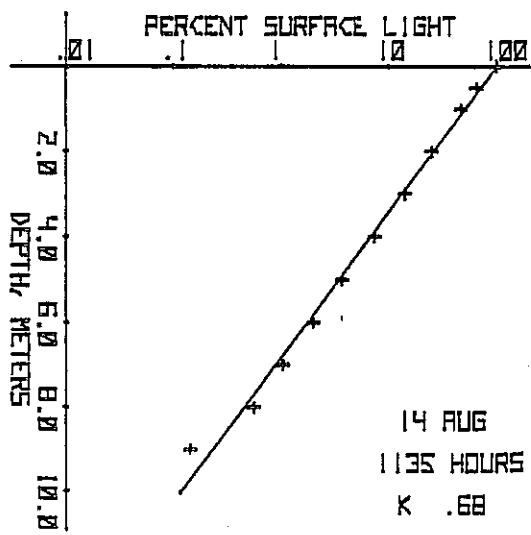
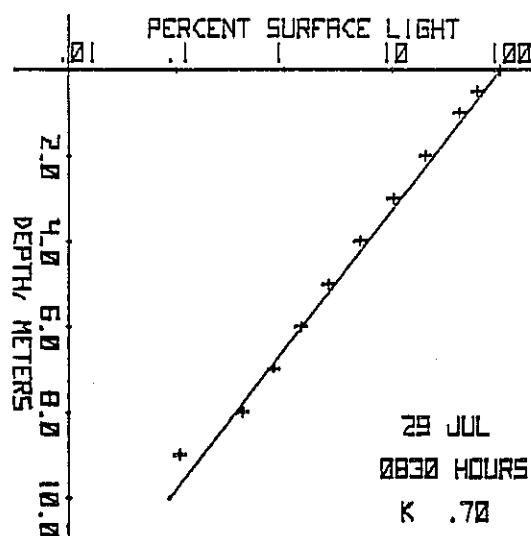
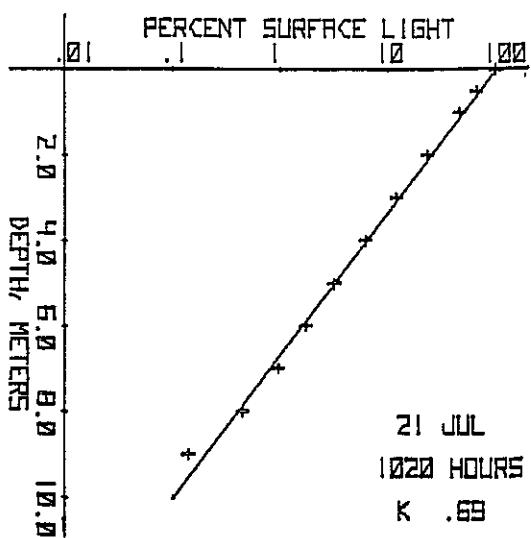
LAKE 224



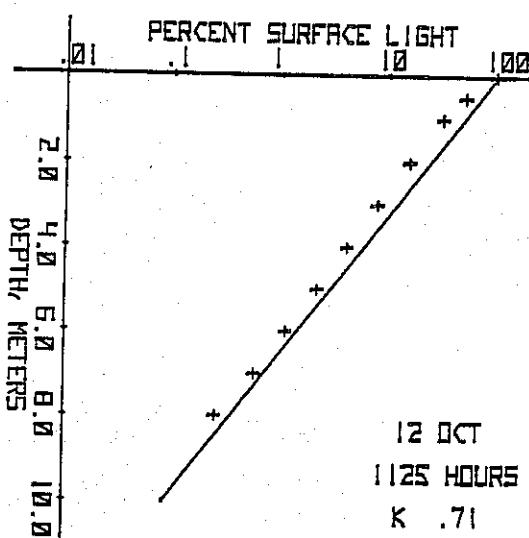
LAKE 226NE



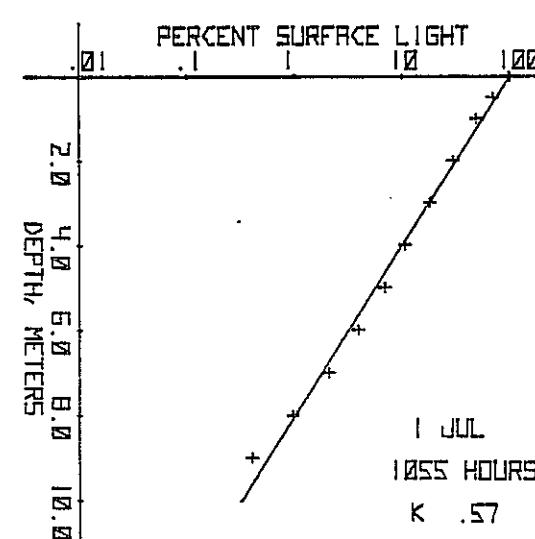
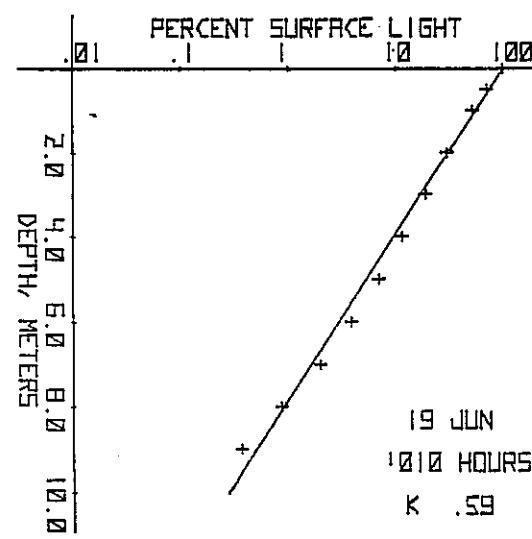
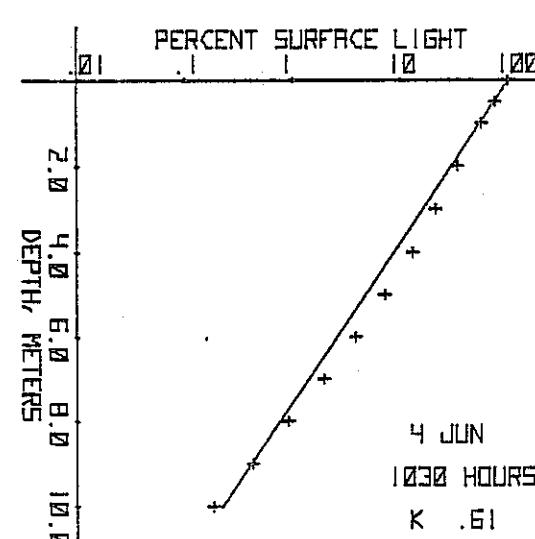
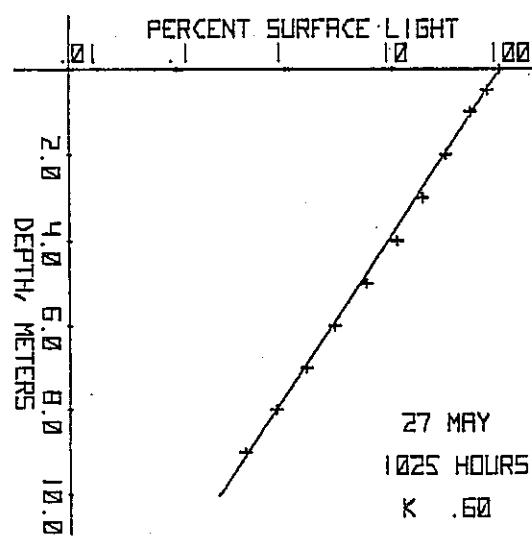
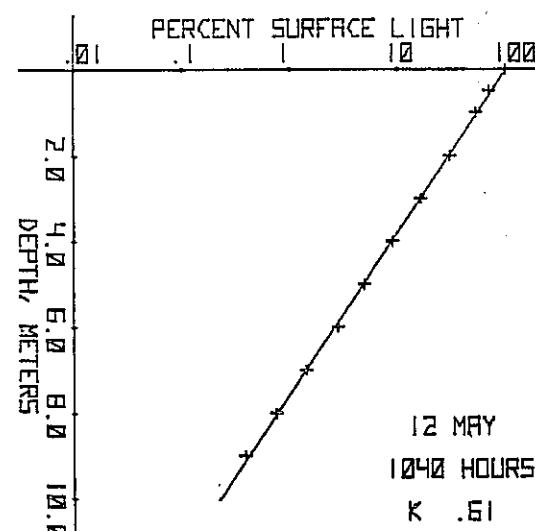
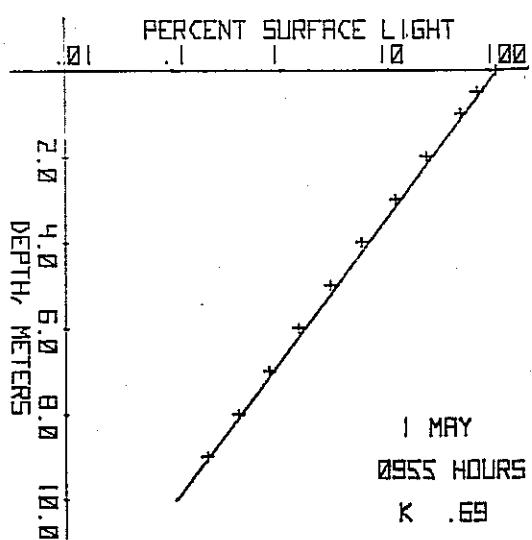
LAKE 226NE



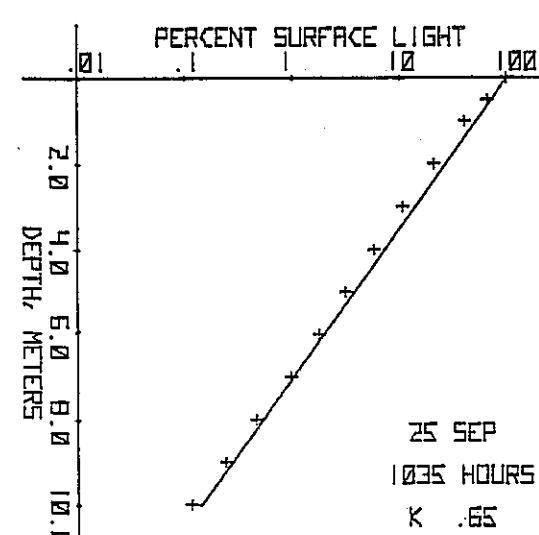
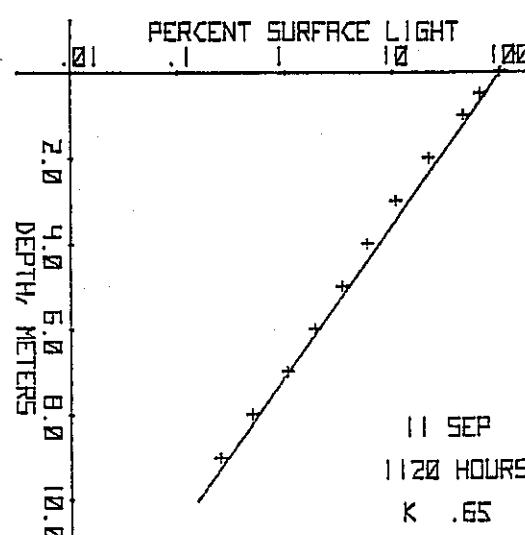
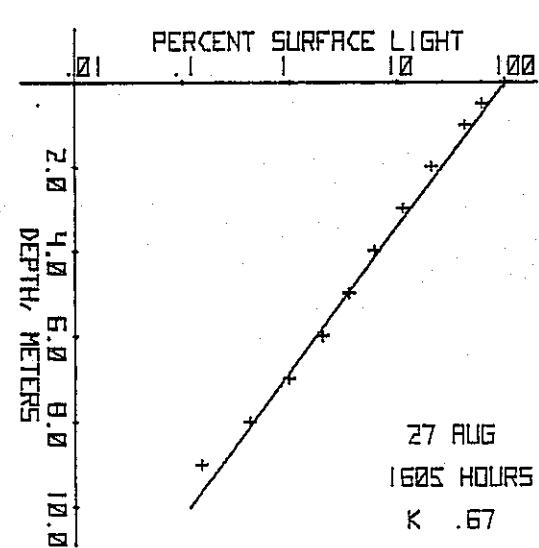
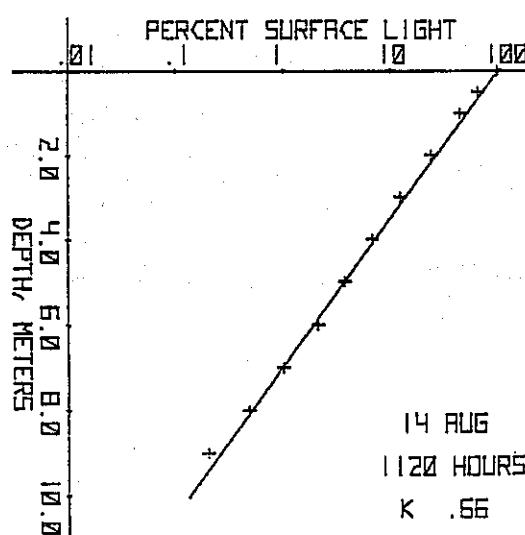
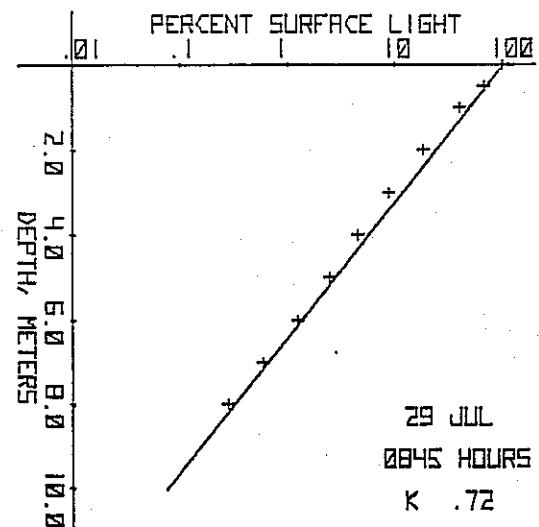
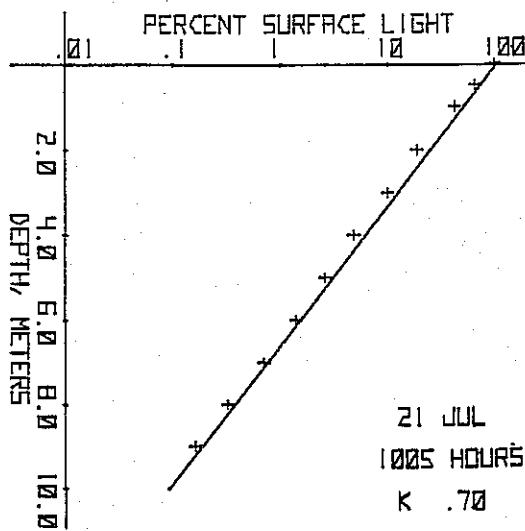
LAKE 226NE



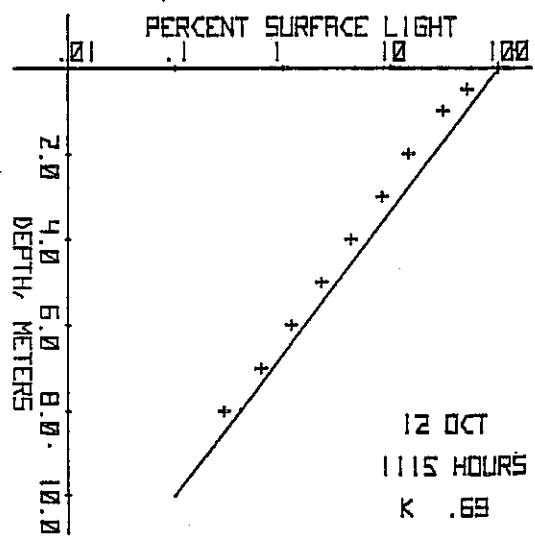
LAKE 2265W



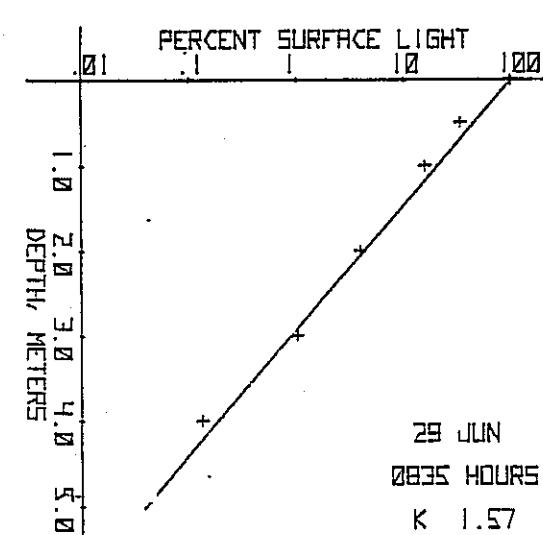
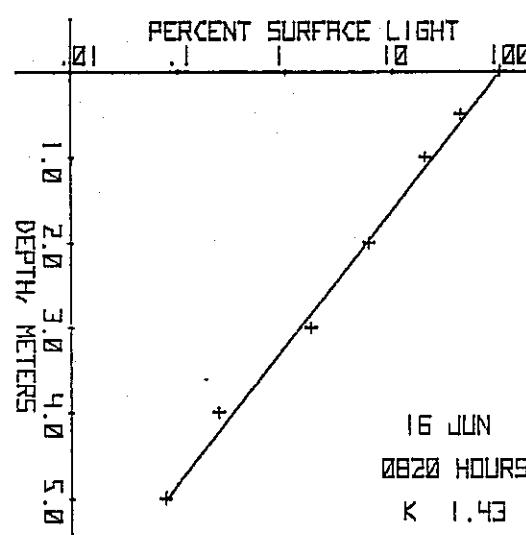
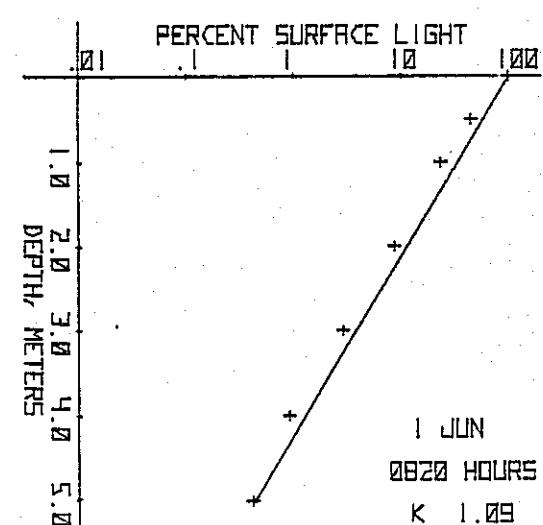
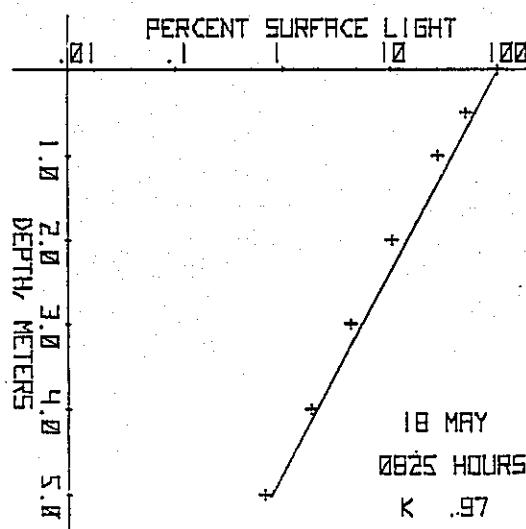
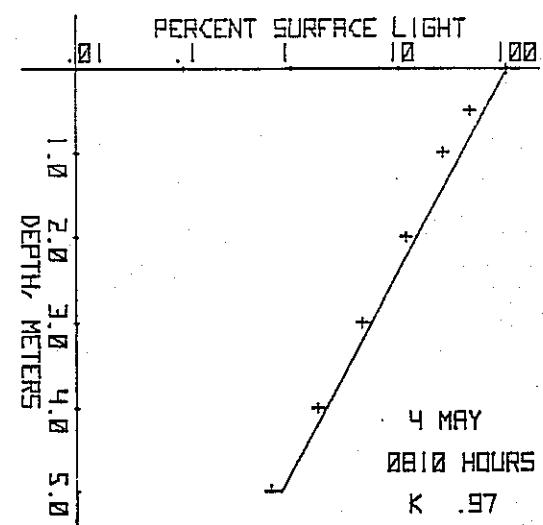
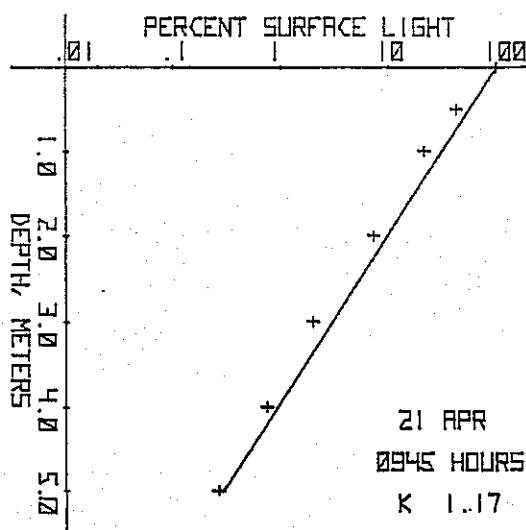
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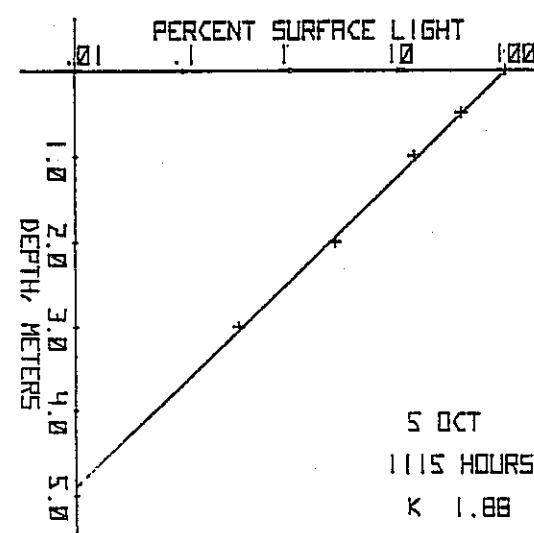
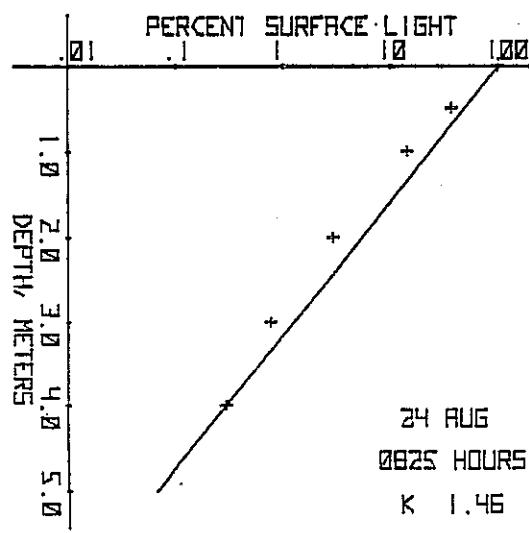
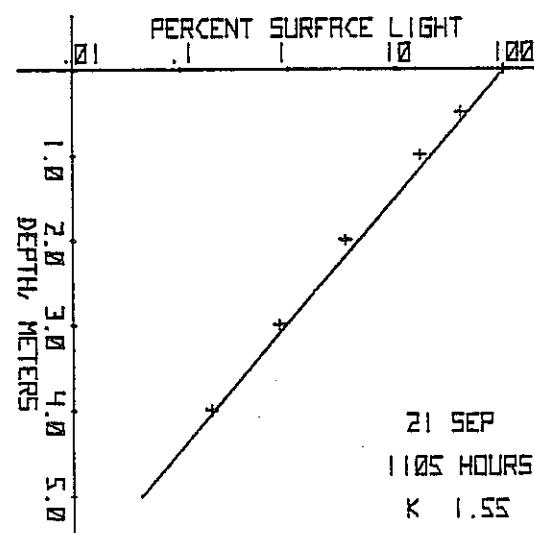
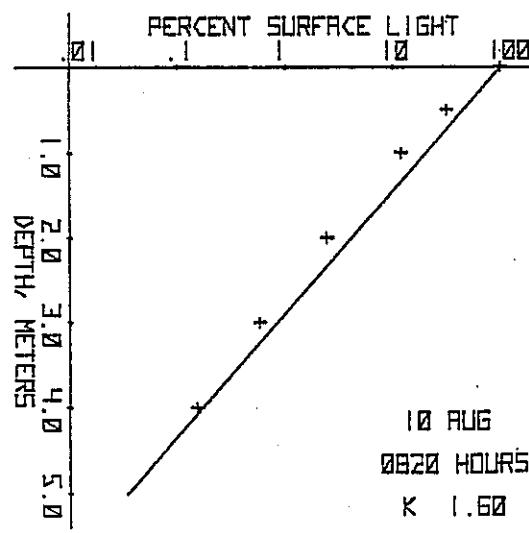
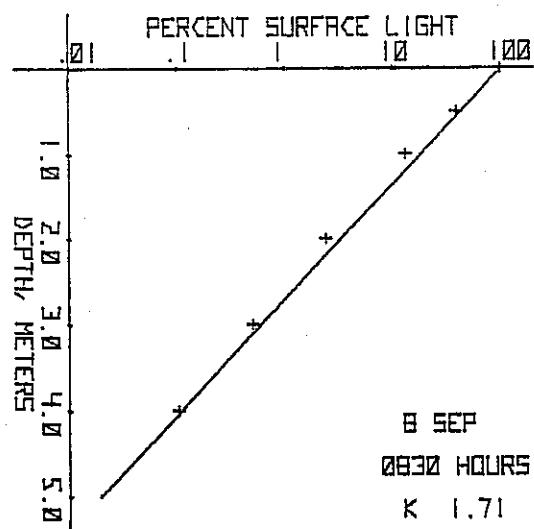
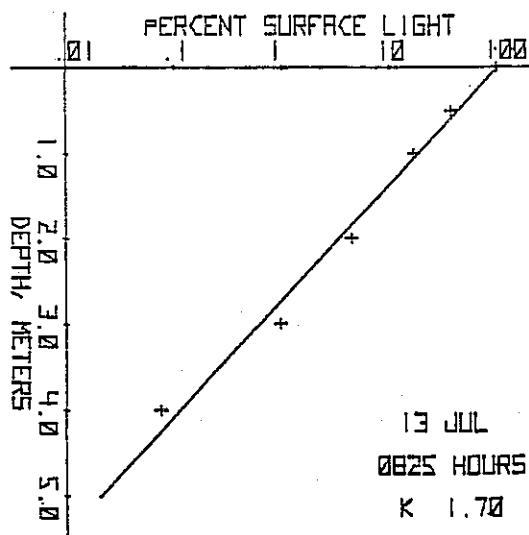
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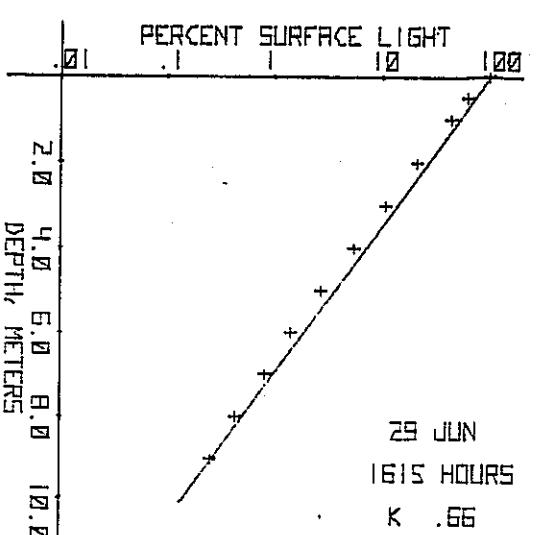
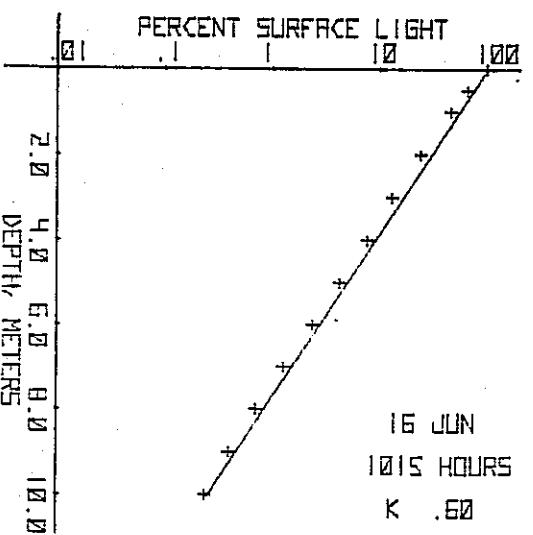
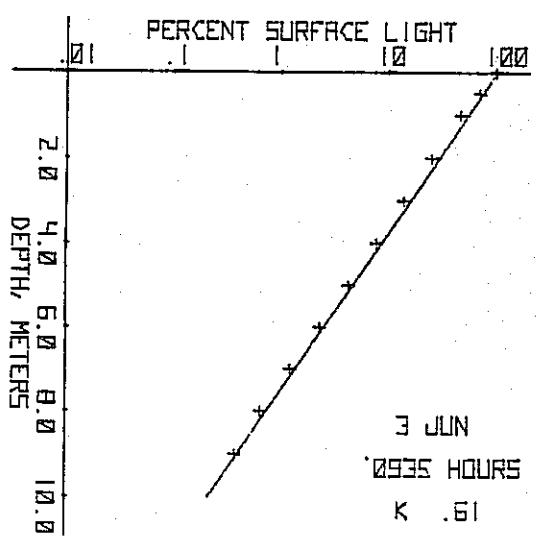
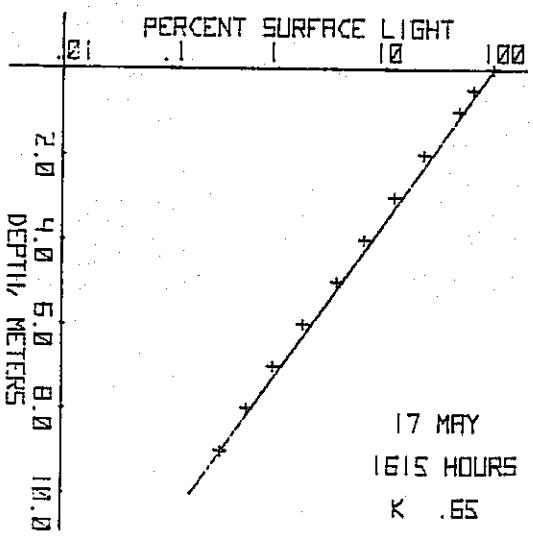
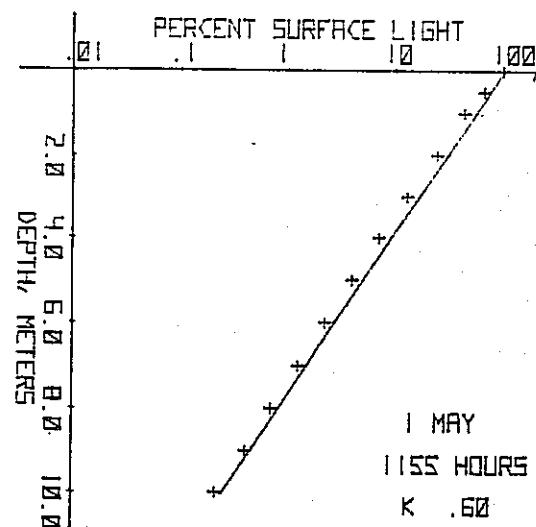
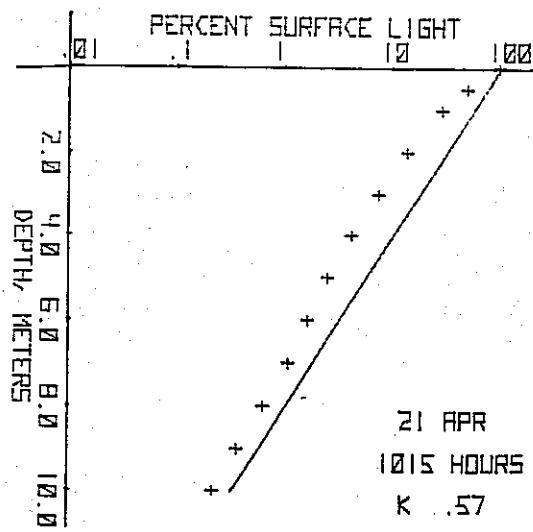
LAKE 227



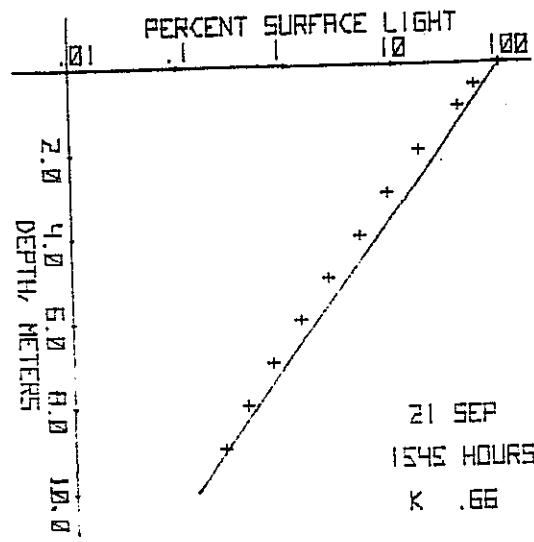
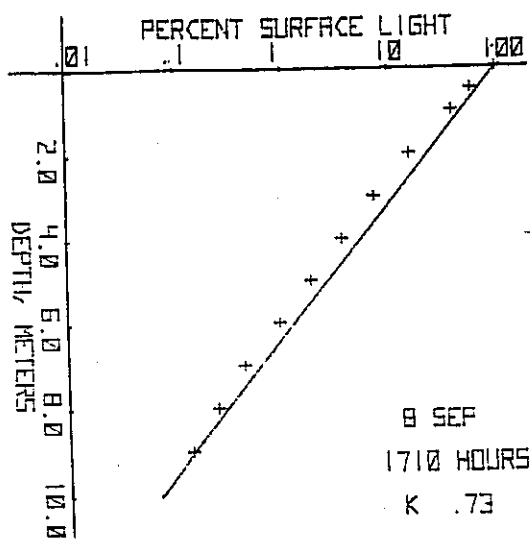
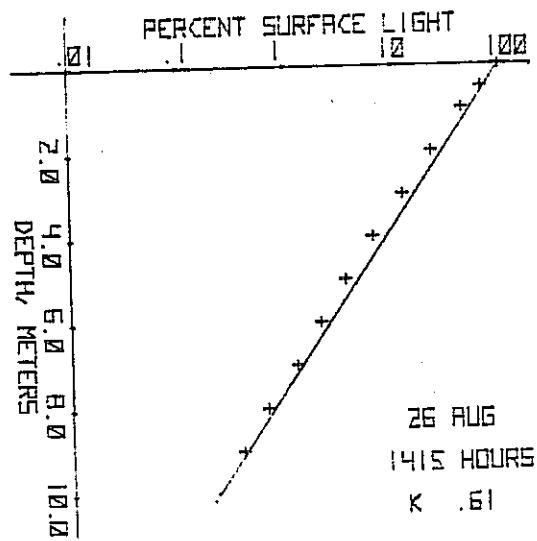
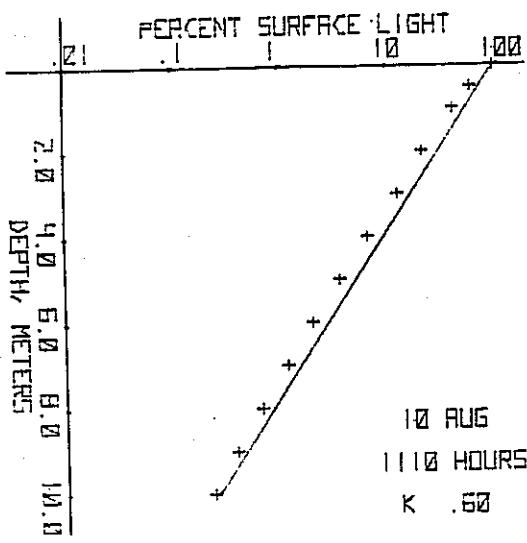
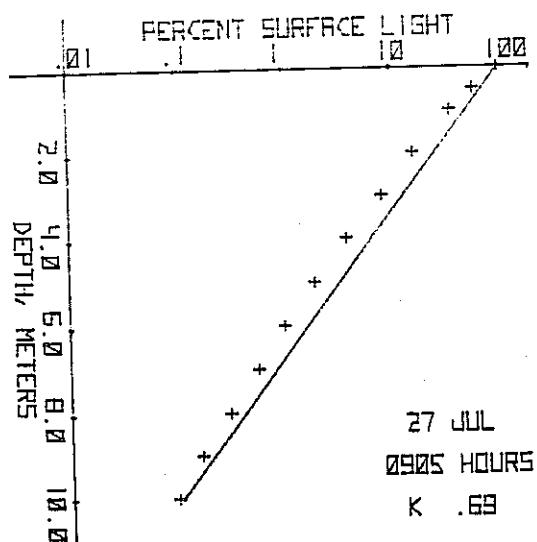
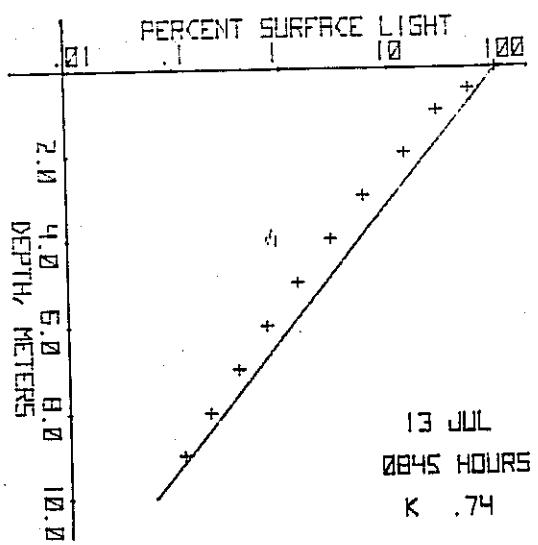
LAKE 227



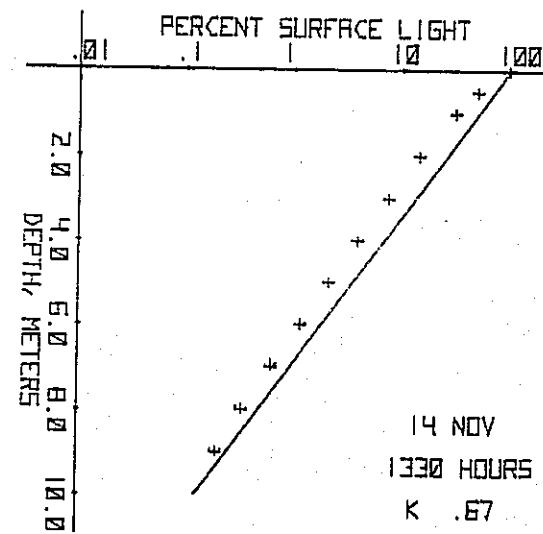
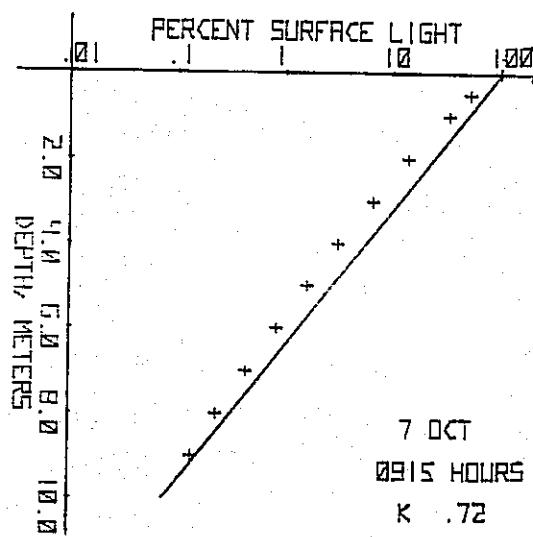
LAKE 235



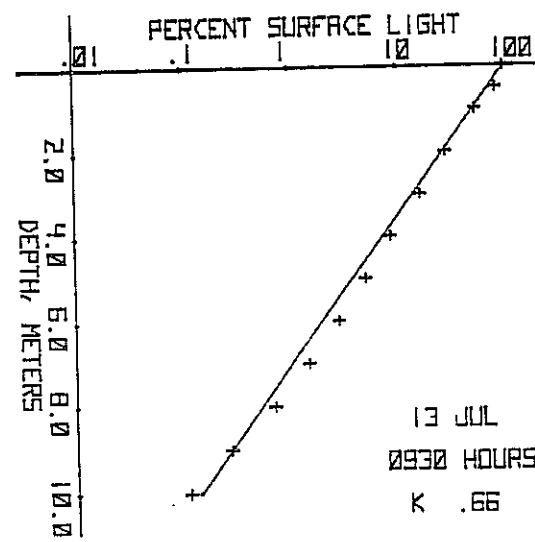
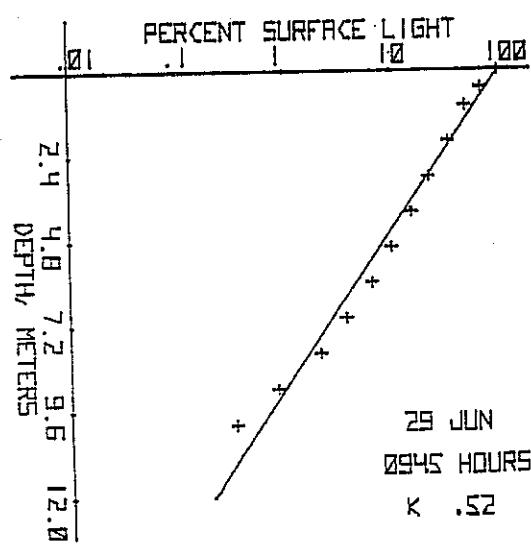
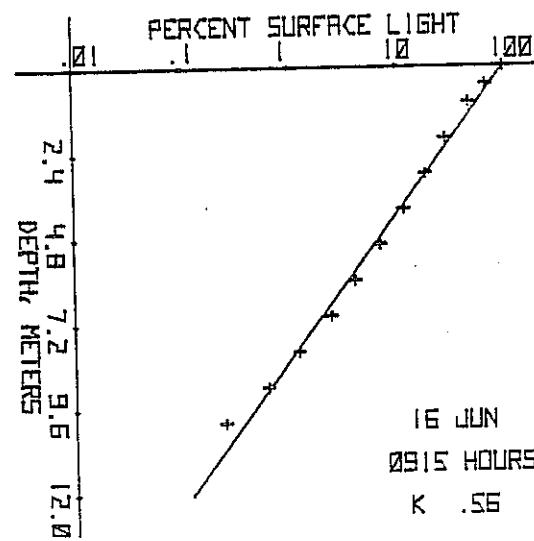
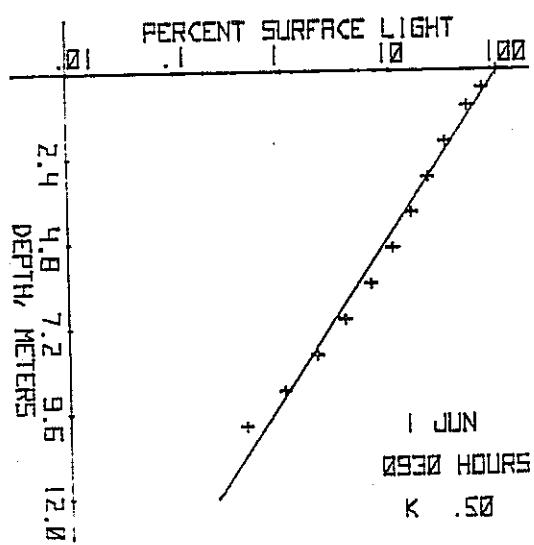
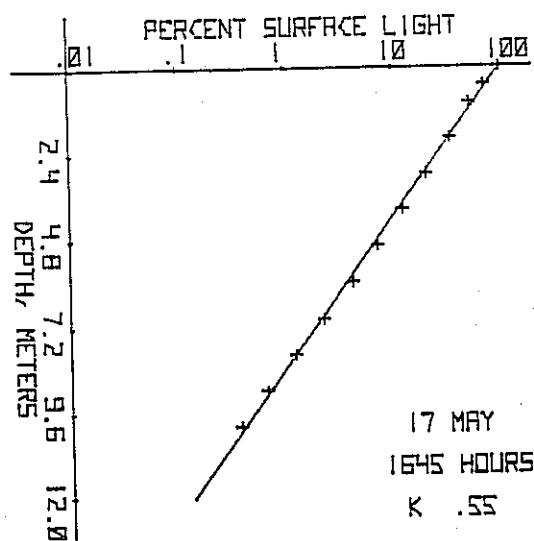
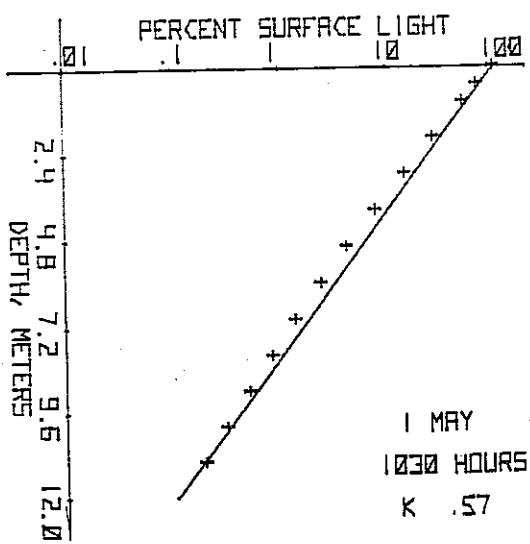
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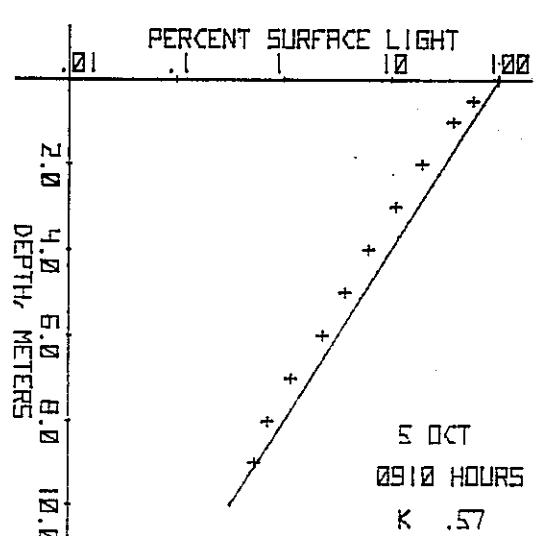
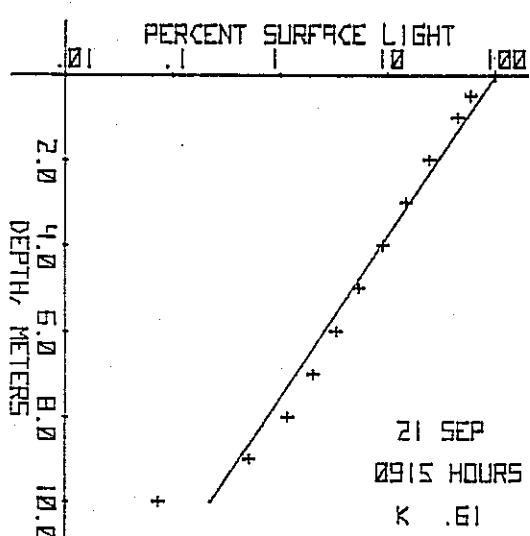
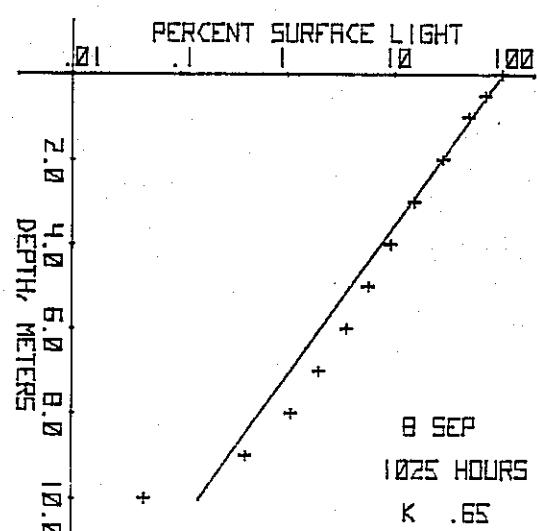
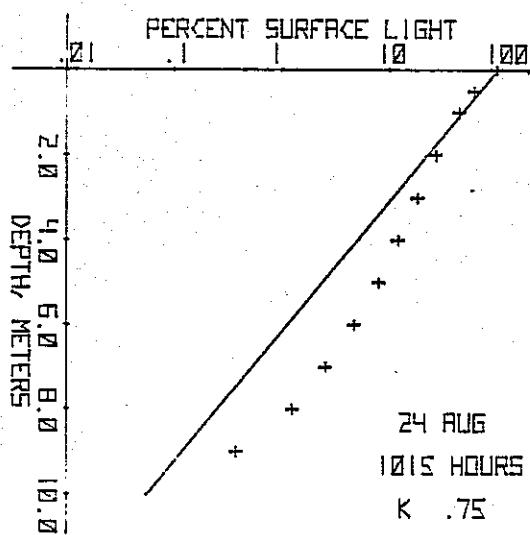
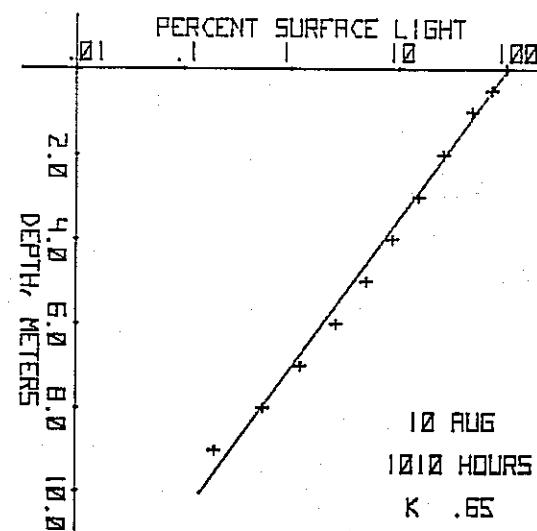
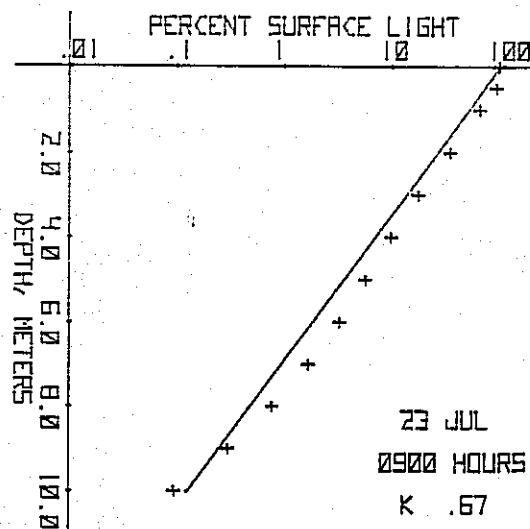
LAKE 239



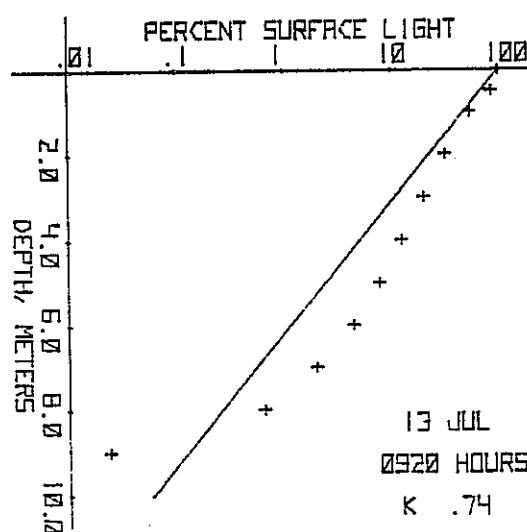
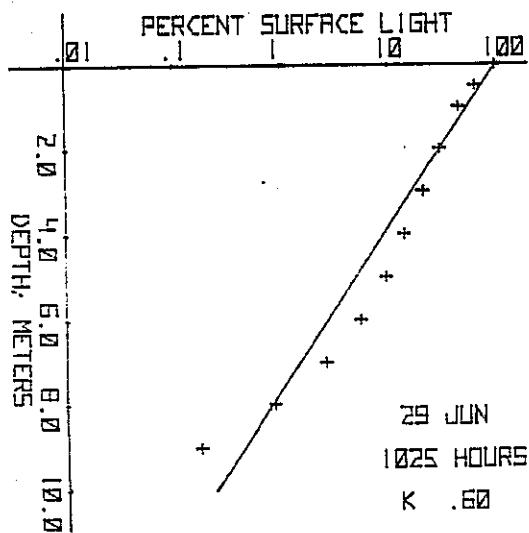
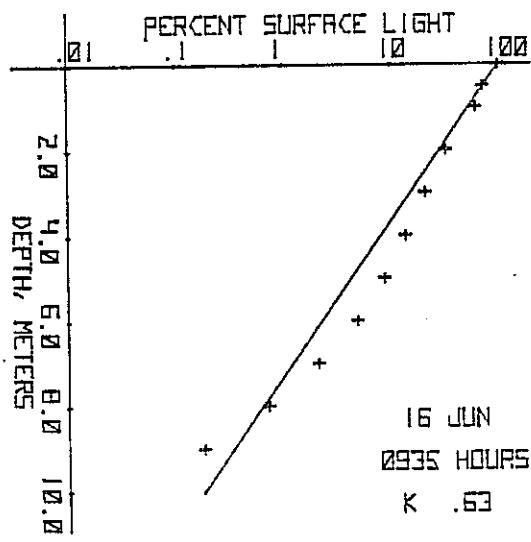
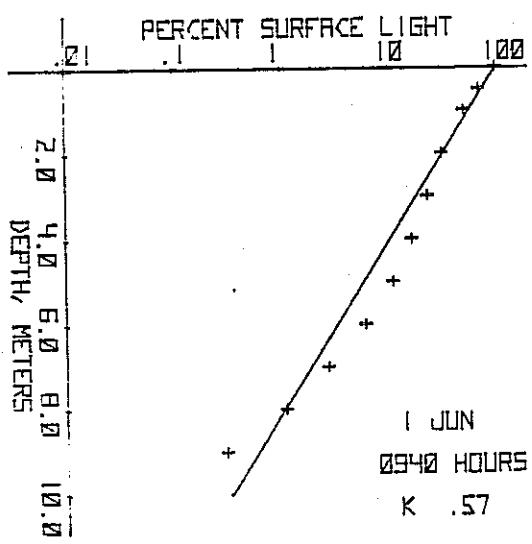
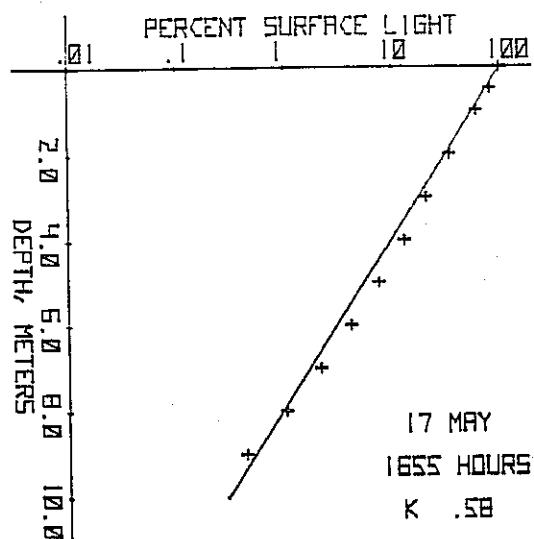
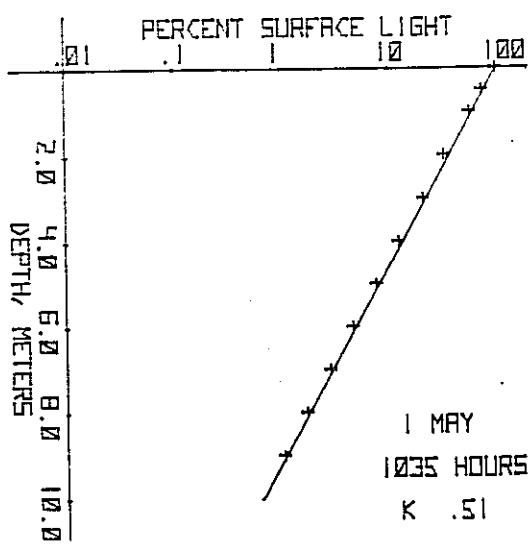
LAKE 302N



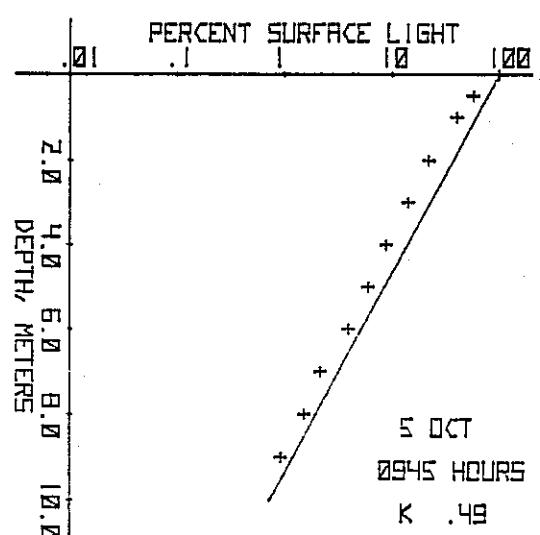
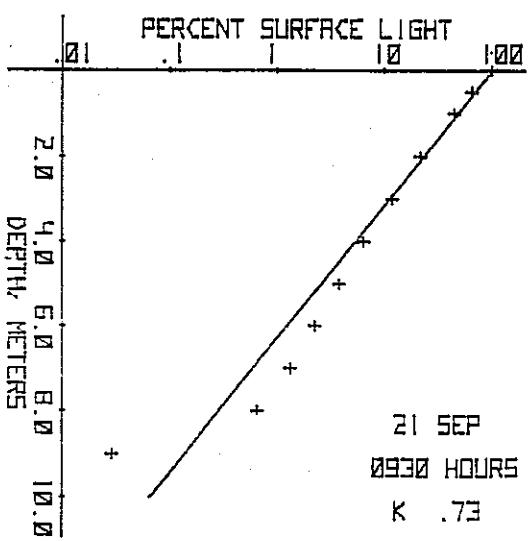
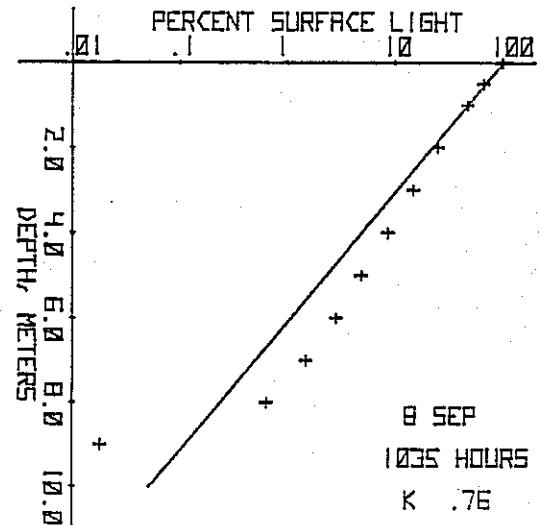
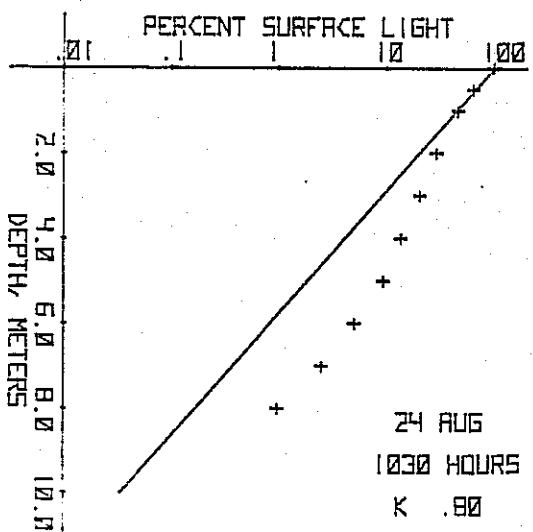
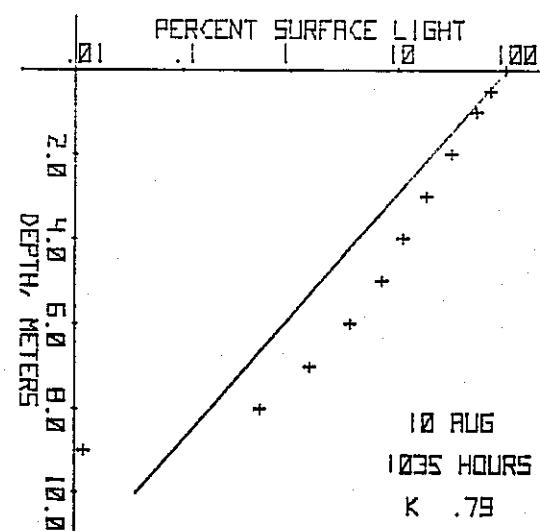
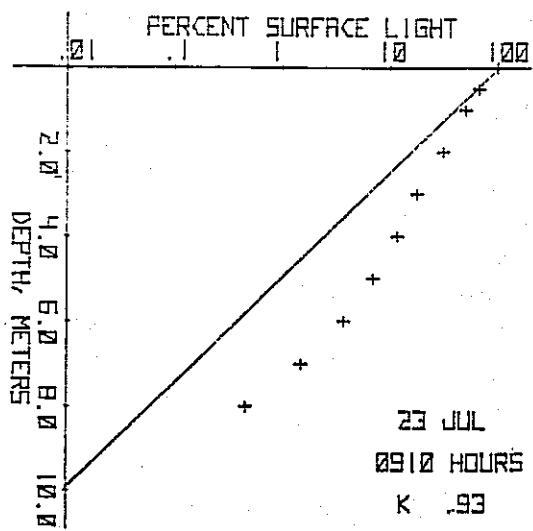
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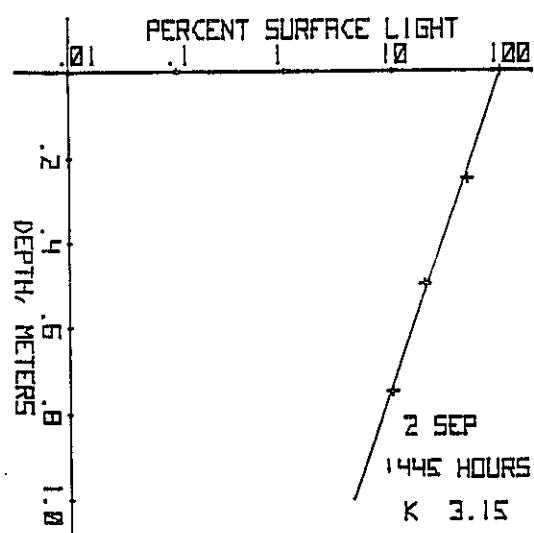
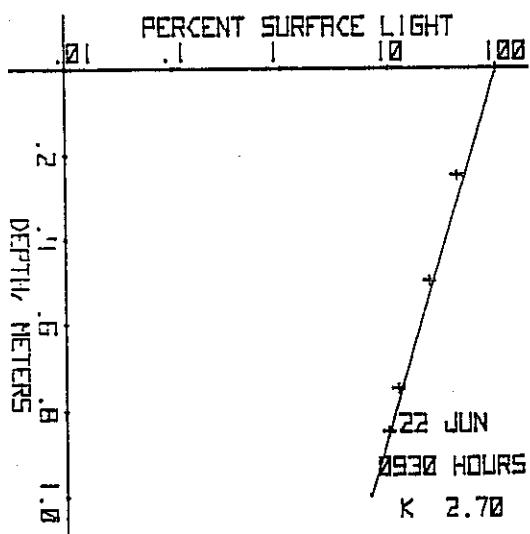
LAKE 3025



LAKE 3025



LAKE 661



LAKE 979

