

# Soil Characterization Laboratory Data

Prepared for USDA-Forest Service - Region One

Northern Idaho and Western Montana

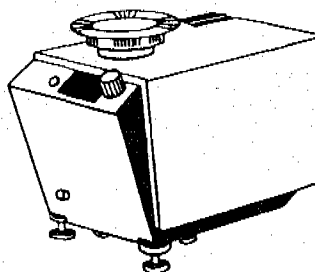
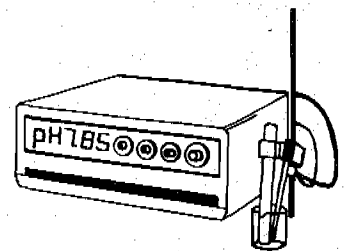
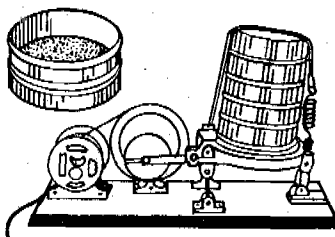
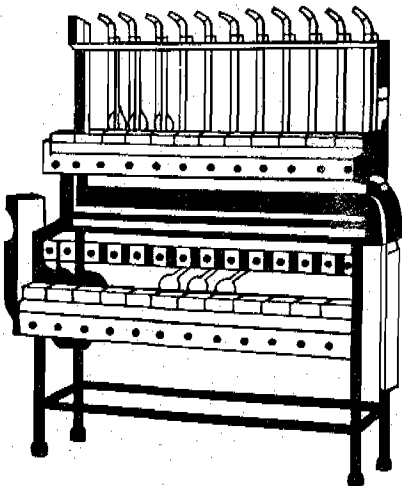
LIM Samples - 80 Pedons

April 1981



COLLEGE OF AGRICULTURE

DEPARTMENT OF PLANT AND SOIL SCIENCES



When you know	Multiply by	To find
in	2.5	cm
mi	1.6	km
oz	28.0	g
lb	0.45	kg
qt	0.95	l
gal	3.8	l
°F	5/9 (after subtracting 32)	°C

SOIL CHARACTERIZATION LABORATORY DATA

USDA-Forest Service - Region One  
Northern Idaho and Western Montana

LIM Samples - 80 Pedons

Contract No. 53-0343-9-229

April 1981

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## Soil Characterization Methodology<sup>1/</sup>

Soil samples are received in an unground condition, air-dried, passed through a 2 mm sieve, and mixed thoroughly. Soil samples are analyzed using standard methods in the Soil Characterization Laboratory at the University of Idaho (Soil Conservation Service, 1972).

Saturated soil pastes are mixed to determine pH and electrical conductivity (EC). The pH and EC determine whether the soils are acid or alkaline.

If the pH is under 7.0 and the EC is less than 1.0, the following acid analyses are performed. Ammonium acetate pH 7.0 is used to extract exchangeable cations and total cation exchange capacity (CEC) are obtained after soils are leached with 10% acidified NaCl. The exchangeable cations are determined on the Eppendorf flame photometer (Na and K) and the Perkin-Elmer spectrophotometer (Ca and Mg). Extractable hydrogen (exchangeable acidity) are extracted using barium chloride-triethanolamine. The exchangeable cations and hydrogen are calculated and reported in milliequivalents per 100 grams of soil. The base saturation percents are calculated from this data (see example 1). Available phosphorus is obtained using sodium acetate as an extractant, color is developed on filtrate, and solution  $\mu\text{g/ml}$  read on the Coleman 54 spectrophotometer.

If the pH is over 7.0 and the EC is over 1.0, the following alkaline analyses are performed. The extract obtained from the saturated soil paste is analyzed for soluble cations and anions. Soluble cations are determined on the Perkin-Elmer spectrophotometer (Ca and Mg) and the Eppendorf flame photometer (Na and K). Soluble anions (carbonates, bicarbonates, and chlorides) are determined by titration. Sulfates are determined by the colorimetric method. All soluble ions are reported in milliequivalents per 1000 grams (see example 2). Exchangeable cations are extracted with pH 9.0 ammonium acetate. Exchangeable cations and CEC are done as described under acid analyses. Carbonates as calcium carbonate ( $\text{CaCO}_3$  equivalent) are determined by hydrochloric acid treatment, titrimetric and reported in % by weight. Gypsum ( $\text{CaSO}_4$ ) percents are determined by precipitation in acetone and read from a standard curve prepared for the electrical conductivity meter. Available phosphorus is obtained using sodium bicarbonate as an extractant, color developed on filtrate, and solution  $\mu\text{g/ml}$  read on the Coleman 54 spectrophotometer.

Total nitrogen on all soils is obtained by a modified standard kjeldahl procedure on the Technicon Autoanalyzer. The CEC is run on the Technicon. Organic matter (OM) - organic carbon (OC) is heated to  $150^\circ\text{C}$  in sulfuric acid-potassium dichromate solution, cooled, water added, and titrated with ferrous sulfate. OC multiplied by 1.72 gives OM and is reported in percent by weight.

<sup>1/</sup> Soil characterization analyses flow chart shows the analyses performed schematically.



Acid soils requiring iron and aluminum analysis are usually extracted using two extracting solutions and determined on the Perkin-Elmer spectrophotometer. Phosphorus isotherms are run to determine phosphate requirements and volcanic ash presence (see example 4). NaF pH over 9.4 indicates presence of weathered volcanic ash or other amorphous materials. All results of these analyses are used to determine the presence of spodic horizon, ash, or amorphous material.

Physical analyses are performed on all soils. Particle size distribution (mechanical analyses) by the pipette and centrifuge method determine sand, silt, and clay. The centrifuge method for particle size provides an option to separate the silts into three fractions or obtain total silts. Sands are sieved into five fractions for further breakdown of textural class. Water retention at 1/3 bar (water holding capacity) and at 15 bar (wilting point) are determined by pressure plate extraction. Saran coated clods are weighed in water and oven dried to determine bulk density of soils. All physical analyses are presented in example 3.

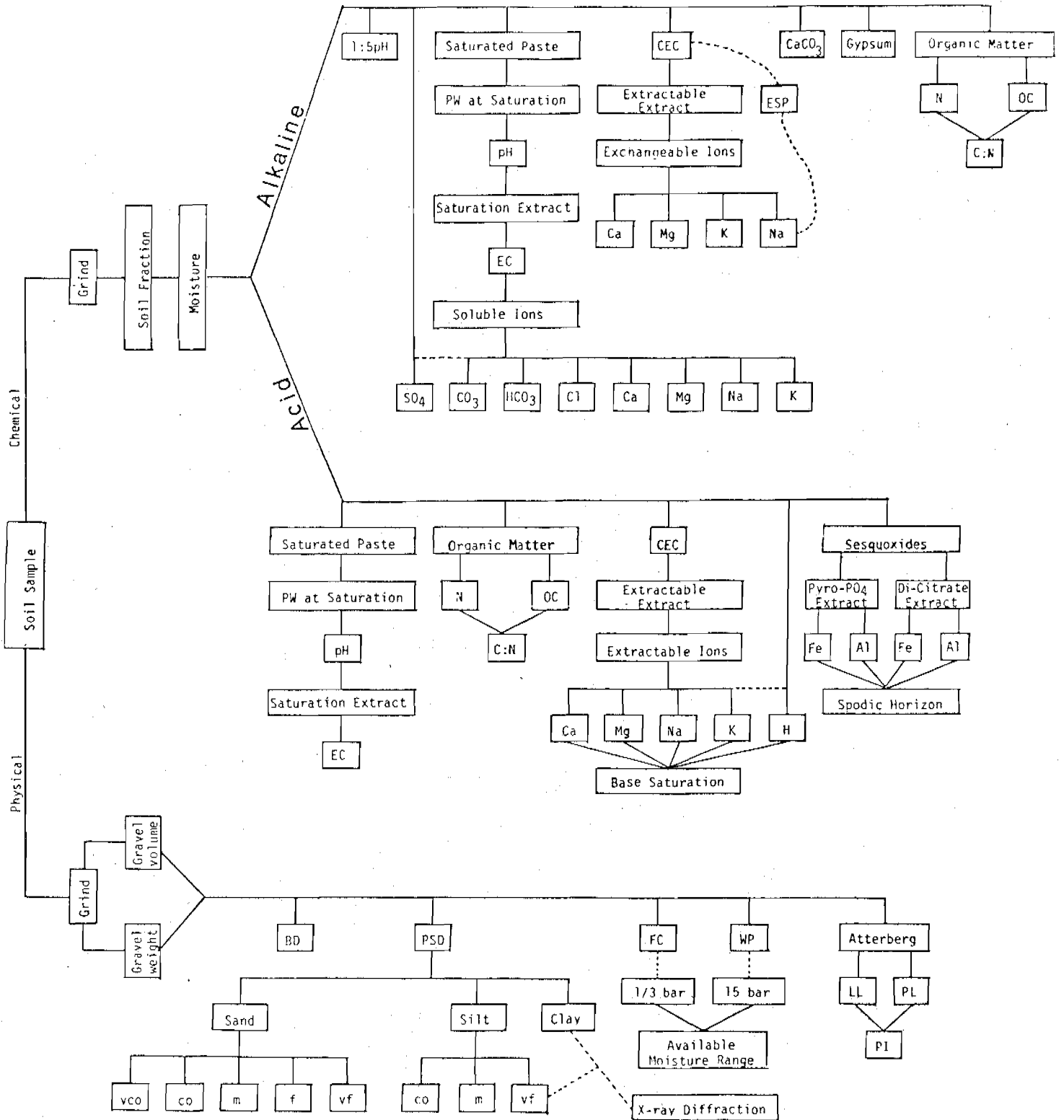
Particle size analyses using the Coulter Electronic Particle Analyzer--Model TAI1 is very useful on soils from low density volcanic ash or high silts such as loess materials. In addition to the sand fraction from the pipette method it provides 15 separations in the silt fraction (2-50  $\mu$ ) and 5 separations in the clay fraction (0.63-2  $\mu$ ). Example 5 shows the data obtained from the Coulter Counter particle size analysis. The computed data from the Coulter Counter is stored on Hewlett Packard computer tapes which enables the generation of distribution plots as shown in examples 6 and 7.

Clay identification is obtained by X-ray diffraction. Mg-saturated, glycolated, K-saturated, air-dried, and K-saturated, heated to 500°C gives all major clays present (see example 8). Table 1 is used to convert the degrees  $2\theta$  to angstroms. Clays are run from 3-30 degrees  $2\theta$ . Each major mark is one degree  $2\theta$ . Table 3 shows the angstrom peaks and clays that corresponds with the different treatments. Table 2 gives more information about peaks and clays in addition to Table 3.

March 1981

Anita L. Falen, Lab Supervisor  
Dr. Maynard A. Fosberg, Project  
Leader

# Flow Chart for Soil Characterization Analyses



Unnamed Gravelly Fine Sandy Loam 79-ID-0952 (070701R-2)

Classification: medial over loamy, mixed, frigid Andic Dystrachrepts.

General Site Characteristics

Location: Lincoln County, Montana; northeast of section 1, T. 59N., R. 2E.  
Forest: Kootenai National Forest; Troy Ranger District  
Area: Emerson Creek, point 3  
Described By/Date: T. Svalberg, P. Schoeneberger, and J. Collins on August 30, 1978  
Parent Rock/Material: loess/till  
Habitat Type: (Tsuga heterophylla)/(Clintonia uniflora)  
Topography:  
Landform: oversteepened drainage wall  
Weathering: normal  
Formation Name: granitic  
Slope: 70 percent toe  
Aspect: 300 degrees west-northwest  
Elevation: 4800 feet  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type: MOR  
Surface Rock: 2 percent  
Climate: frigid, vdic  
Precipitation: 80 inches  
Erosion: slight surface  
Infiltration: rapid  
Permeability: rapid  
Storage:  
Drainage: moderately excessive  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

O1&O2 1-0 centimeters (0.5-0 inches).

A2 0-2.5 centimeters (0-1 inches). Light gray (10YR 7/1) moist; no lab sample; silt loam; weak fine granular structure; soft, very friable, nonsticky and nonplastic; rounded and subrounded gravel and cobbles, trace percent by weight; many very fine, fine, and medium, common coarse roots; many very fine, fine vesicular and irregular pores; extremely acid pH 4.2, noncalcareous; percolation rapid; abrupt wavy boundary.

B21ir 2.5-13 centimeters (1-5 inches). Dark brown (7.5YR 3/4) moist; gravelly fine sandy loam; weak fine granular structure; soft, very friable, nonsticky and nonplastic; 23 percent gravels by weight; many very fine, fine, medium and coarse roots; many very fine and fine vesicular pores, many very fine and fine irregular pores; very strongly acid pH 5.0, noncalcareous; percolation rapid; clear wavy boundary.

B22ir 13-30 centimeters (5-12 inches). Dark yellowish brown (10YR 4/6) moist; gravelly fine sandy loam; weak medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; 19 percent gravels by weight; many very fine and fine, common medium and coarse roots; many very fine and fine vesicular and irregular pores, common fine continuous tubular pores; strongly acid pH 5.4, noncalcareous; percolation rapid; clear wavy boundary.

B3ir 30-76 centimeters (12-30 inches). Dark yellowish brown (10YR 4/6) moist; gravelly fine sandy loam; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; 19 percent gravels by weight; common very fine, fine and medium, few coarse roots; few very fine and fine vesicular pores, few very fine and fine continuous irregular pores; medium acid pH 5.7, noncalcareous; percolation rapid; clear irregular boundary.

IIC 76-99 centimeters (30-39 inches). Dark yellowish brown (10YR 4/5) matrix with partial band at lower boundary, dark yellowish brown (10YR 3/4) moist; gravelly sandy loam; massive structure; slightly hard, friable, slightly sticky and nonplastic; 28 percent gravels by weight; common very fine and fine, few medium roots; common very fine and fine irregular pores, common medium irregular and continuous pores; medium acid pH 5.7, noncalcareous; percolation rapid; gradual irregular boundary.

IIIC 99-132 centimeters (39-52 inches). Dark yellowish brown (10YR 4/4) moist; gravelly loamy coarse sand; single grained structure; soft, loose, nonsticky and nonplastic; 38 percent gravels by weight; common very fine and fine, few medium roots; many very fine and fine irregular pores, common medium continuous tubular pores; strongly acid pH 5.5, noncalcareous; percolation rapid; clear wavy boundary.

R 132+ centimeters (52+ inches).

Comments: Microsite location is along a stream bank. A2 is variable in depth (0.5-1 inch). B21 appears to be going towards B21ir. B3 and IIC consist of mixed materials with scattered pockets and partial (buried?) horizons, cause due to site location, fluvial reworking. Subsection delineation should correspond to M22.

Example 1. Acid Chemical Characterization

Pedon: Unnamed Silt Loam 79-ID-1141 (010701B-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	01&02 A2	2-0 0-10	NS 4.3	NS 0.19	NS 146	NS 0.7	NS 0.90	NS 0.35	NS 0.36	NS 0.17	NS no
2	B21ir	10-29	4.6	0.11	93	0.6	1.48	1.58	0.72	0.81	yes
3	B22ir	29-39	4.8	0.09	91	0.8	1.15	1.00	0.47	0.90	yes
4	B23ir	39-62	4.9	0.06	80	0.8	0.98	1.73	0.35	0.87	yes
5	B3ir	62-83	5.1	0.08	56	0.7	0.88	0.90	0.17	0.24	no

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Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%		%		ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.4	1.2	0.1	0.5	34.3	35.7	13	17.57	10.21	0.750	14	1.00	7.5
3	0.4	0.2	0.1	0.3	37.4	30.4	3	11.67	6.79	0.500	14	0.79	11.7
4	0.2	0.1	0.1	0.3	39.1	33.4	2	11.39	6.62	0.400	17	0.80	11.8
5	0.2	0.1	0.1	0.2	33.6	28.9	2	8.64	5.02	0.287	17	0.74	11.8
	0.2	0.1	0.1	0.2	19.7	17.5	3	3.39	1.97	0.139	14	0.55	11.7

Remarks: CEC's were leached with 10% NaCl.  
 CEC's and nitrogens were run on the Technicon Autoanalyzer.  
 Rock is not accounted for in data unless specified in the remarks.  
 BS % =  $\frac{Ca+Mg+Na+K}{Ca+Mg+Na+K+H} \times 100$   
 Soil fraction =  $\frac{wt. \text{ of soil (g)}}{wt. \text{ of soil + rock (g)}}$   
 When the soil sample contains no rock (>2mm), the soil fraction is 1.  
 nd - not determined  
 NS - no sample

Analysis by: Anita Falen

Example 2. Alkaline Characterization

Pedon: Unnamed Gravelly Loamy Sand 79-MT-0601 (080701R-1)

Date: July 1980

Sample No.	Horizon	Depth	pH 1:5	pH paste	EC $\times 10^3$	% Water at Saturation	Soluble Ions								SAR	
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>		
		cm	mmhos/cm			meq/1000 gms										
	02	3.5-2.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01	2.5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	A1	0-18	8.1	7.6	0.49	59	2.9	0.7	0.4	0.1	0.0	2.7	0.1	0.6		
2	B1t	18-33	7.3	6.8	0.32	62	1.1	1.3	0.2	0.1	0.0	1.5	0.1	0.5		
3	B2t	33-70	7.6	7.4	0.33	62	1.3	1.2	0.1	0.1	0.0	1.9	0.1	0.5		
4	C1ca	70-118	8.4	7.9	0.33	68	1.7	1.1	0.1	0.1	0.0	1.8	0.1	0.5		
5	C2ca	118-155	8.7	8.1	0.40	73	2.3	1.8	0.2	0.2	0.0	2.7	0.4	0.5		

VIII

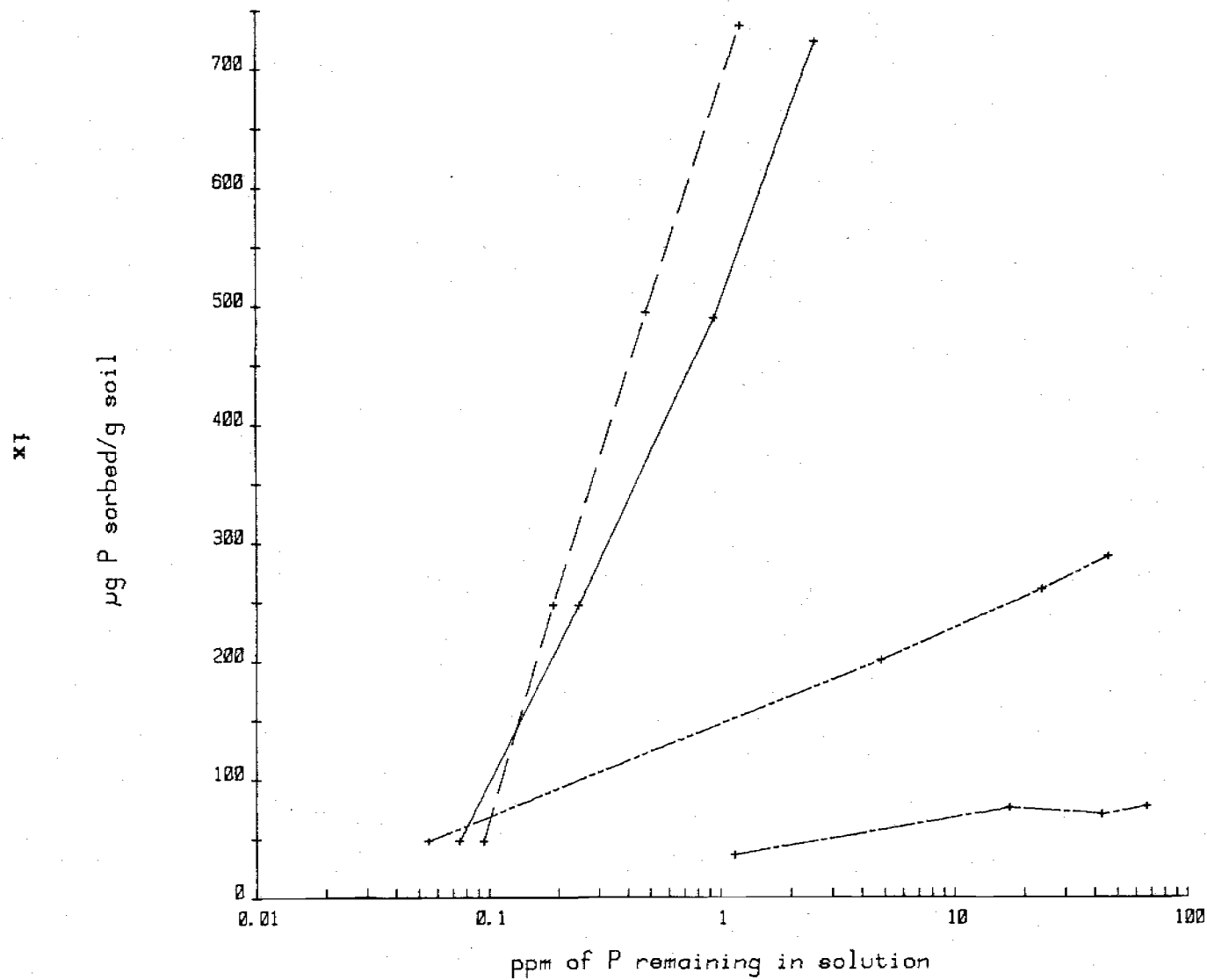
Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
		meq/100 gms				%	%	ratio	%	%	ppm			
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	19.0	1.5	0.6	0.2	18.2	3	3.44	2.00	0.162	12	nil	4.6	0.83	5.8
2	15.9	11.2	0.2	3.5	45.5	0	0.81	0.47	0.040	12	nil	nil	0.85	2.2
3	14.9	5.6	0.3	4.2	47.0	1	0.74	0.43	0.026	17	nil	nil	0.94	2.4
4	20.8	4.6	0.2	4.9	50.5	0	0.96	0.56	0.037	15	nil	0.2	0.91	3.0
5	17.8	5.3	0.4	5.9	50.5	1	1.03	0.60	0.045	13	nil	20.8	0.93	1.4

Remarks: CEC's were leached with 10% acidified NaCl.  
 CEC's and nitrogens were run on the Technicon Autoanalyzer.  
 Rock is not accounted for in data unless specified in the remarks.  
 Extract, cations - sol. cations (meq/100g) = exchangeable cations  
 Soil fraction = wt. of soil (g) / wt. of soil + rock (g)  
 When the soil sample contains no rock (>2mm), the soil fraction is 1.  
 ESP (exchangeable Na %) = exchangeable Na/CEC X 100  
 nil - analysis was run, but not detected  
 trace - analysis was run, but ( 0.1 detected  
 NS - no sample  
 SAR (sodium absorption ratio) = [Na] (meq/l) /  $\sqrt{[Ca] + [Mg]/2}$  (meq/l)

Analysis by: Zelda Fadness

### Example 4. Phosphorus Isotherm

79-MT-2732



µg/g soil	Soln ppm
----- A1	
49	0.08
248	0.25
491	0.95
724	2.59
----- B2	
49	0.10
248	0.19
495	0.49
738	1.25
- - - - - IIA2	
39	1.15
77	17.31
71	42.90
78	67.20
- - - - - IIA&B	
49	0.06
201	4.86
261	23.88
289	46.08

Example 3. Physical Analyses

Pedon: Unnamed Gravelly Silt Loam 79-ID-25149 (Bean Saddle Road)

Date: October 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.	
cm	%								%		
0-10	2.88	4.17	2.57	5.50	9.29	24.39	58.81	16.88	25	14	Gr. silt loam
10-43	1.60	2.45	1.70	4.51	7.76	18.88	53.54	28.46	27	17	Gr. silty clay loam
43-76	2.10	3.59	2.29	6.12	8.81	22.92	54.15	22.93	23	15	Gr. silt loam
76-127	3.13	4.28	3.80	6.88	9.38	26.67	43.22	30.11	41	28	Gr. clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
0-10	12.43	32.84	13.56			38.4	25.8	55	NP	ND
10-43	9.84	27.47	16.23			33.8	23.7	48	23	25
43-76	11.35	28.93	13.88			31.7	16.5	46	28	26
76-127	7.77	21.14	14.31			32.4	16.5	41	19	22

Remarks: Mechanicals were run by the Coulter Counter method.  
 5% sodium hexametaphosphate was added and samples were sonified.  
 Gr. = over 25% gravel by weight  
 V. gr. = 50-90% gravel by weight  
 Ext. v. gr. = over 90% by weight  
 TS + TSi + TC = 100%  
 NDNP = non-determinable, non-plastic  
 NP = not plastic  
 ND = not determinable  
 Liquid limit (L) - plastic limit (P) = plastic index (I)  
 Water contents were run on ground samples (< 2 mm.  
 % volume gr. = [(wt. gr./2.65)/(wt. gr./2.65 + wt. soil/DD)] x 100  
 NS = no sample

Analysis by: Anita Folen



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

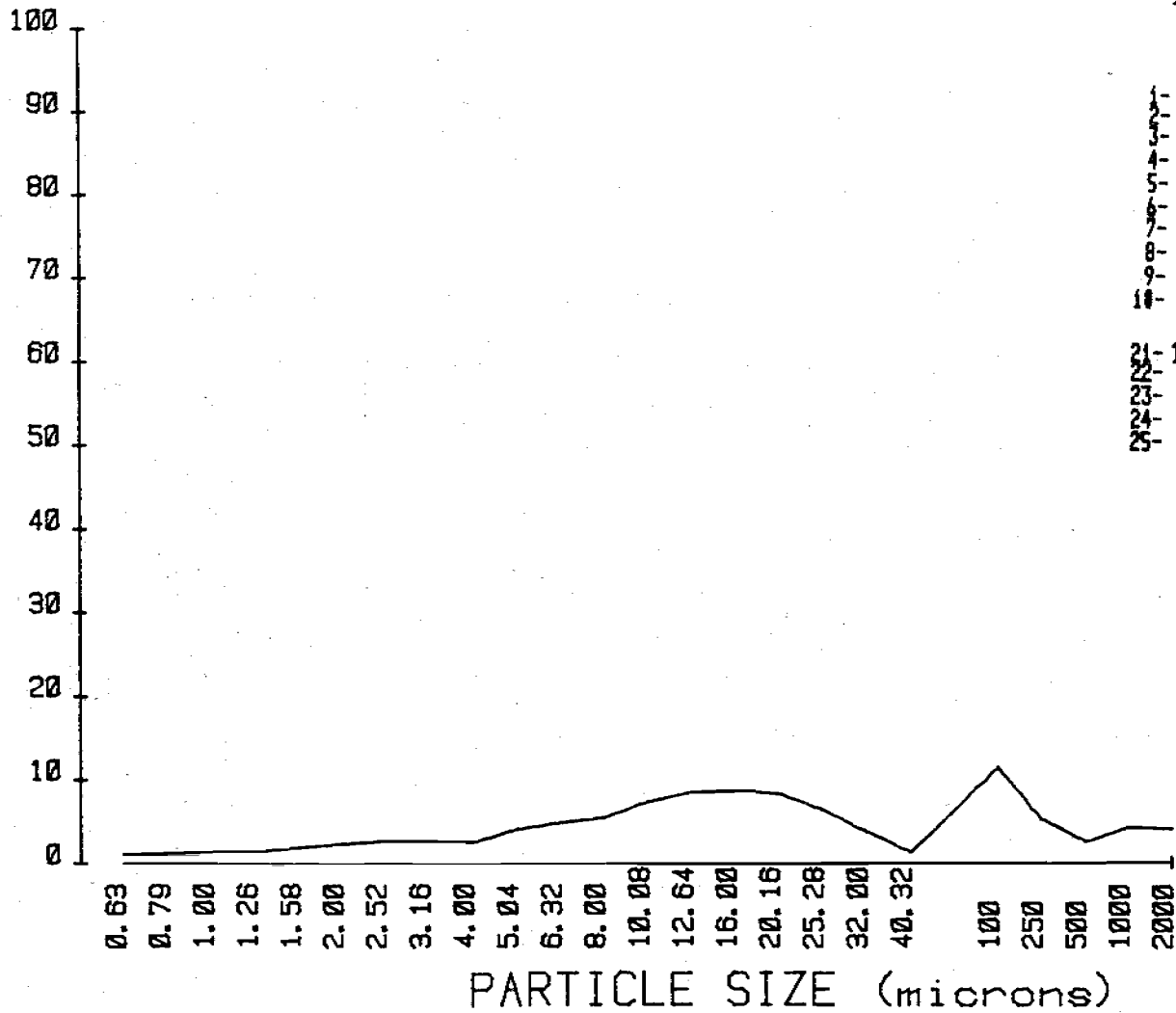
Example 5.

Identification		M1508-2	M1508-3	M1508-4	M1508-5
Units		-----%			
TC (0.63-2.00)		6.32	10.86	15.87	13.20
TSi (2.00-50)		66.59	57.90	56.21	41.95
TS (50-2000)		↓ 27.09	31.25	27.92	44.86
Clay	0.63-0.794	1 0.94	1.63	3.04	2.33
	0.794-1.00	2 1.09	1.74	2.67	2.23
	1.00-1.26	3 1.28	2.12	3.06	2.53
	1.26-1.59	4 1.25	2.17	2.96	2.51
	1.59-2.00	5 1.75	3.20	4.14	3.60
Fine Silt	2.00-2.52	6 2.20	4.15	5.08	4.38
	2.52-3.17	7 2.56	4.56	5.34	4.42
	3.17-4.00	8 2.42	3.58	3.88	3.13
	4.00-5.04	9 2.34	2.14	2.24	1.76
Medium Silt	5.04-6.35	10 3.93	4.96	5.12	4.01
	6.35-8.00	11 4.73	5.07	5.14	3.93
	8.00-10.08	12 5.31	5.04	4.73	2.05
	10.08-12.70	13 7.18	5.58	5.20	3.98
	12.70-16.0	14 8.34	5.73	5.06	3.93
	16.0-20.2	15 8.50	5.34	4.87	3.40
Coarse Silt	20.2-25.4	16 8.08	4.96	4.62	2.76
	25.4-32.0	17 6.16	3.27	2.82	1.59
	32.0-40.3	18 3.56	2.30	1.61	0.76
	40.3-50.8	19 1.17	1.19	0.40	0.12
	50.8-64.0	20 0.11	0.04	0.10	0.06
VFS (50-100)		21 11.28	8.17	6.12	8.88
FS (100-250)		22 5.10	6.19	6.50	10.16
MS (250-500)		23 2.48	3.31	3.40	5.16
CoS (500-1000)		24 4.21	5.90	5.35	8.84
VCoS (1000-2000)		25 4.02	7.68	6.35	11.82
Greater than 2000		↑ 30	31	31	35
Textural Class		Gr. SiL	Gr. SiL	Gr. SiL	Gr. loam

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

Example 6. PLOT SAND-SILT-CLAY

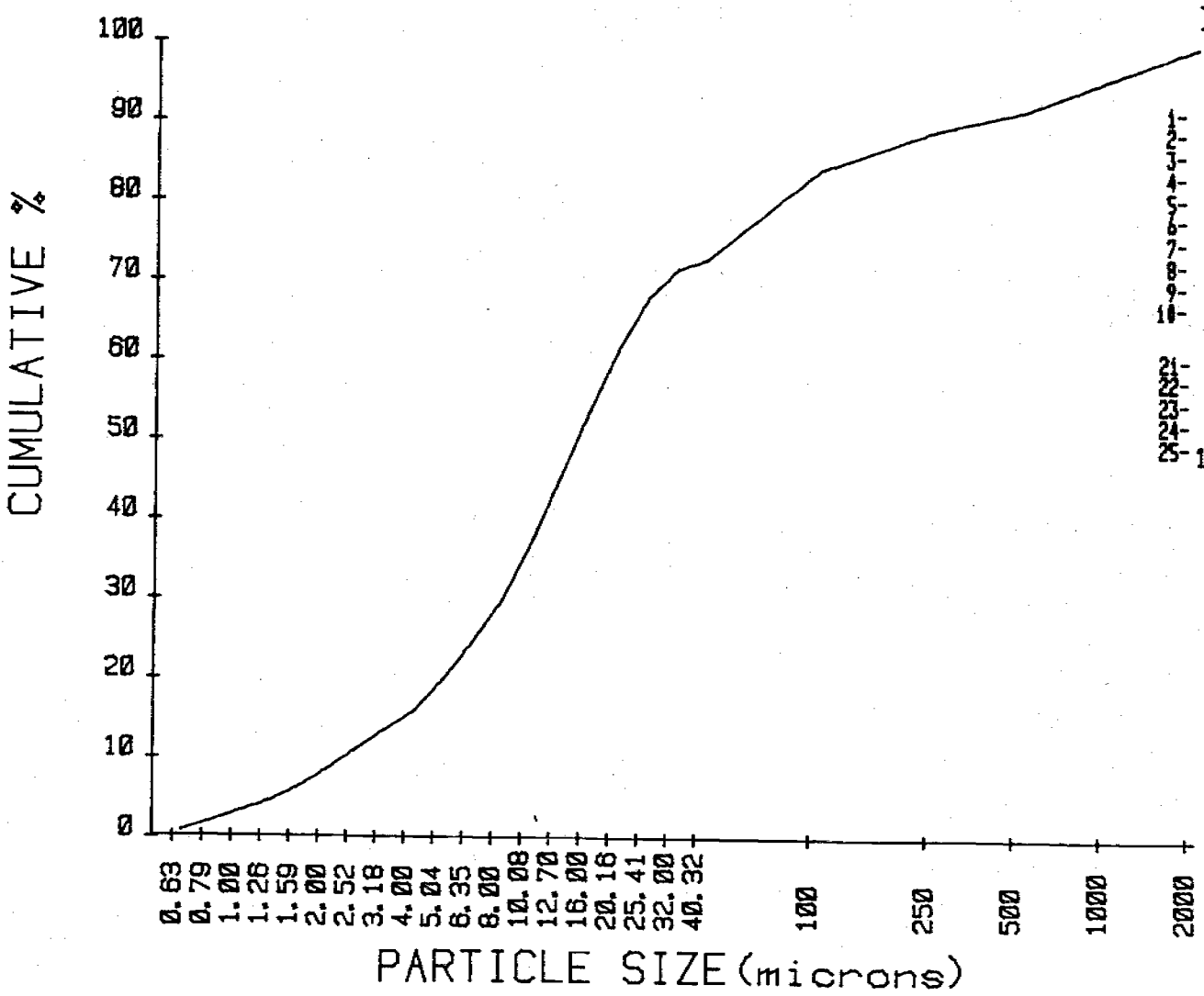
ID M1508-2



1-	0.94	4.73	-11
2-	1.09	5.31	-12
3-	1.28	7.18	-13
4-	1.25	8.34	-14
5-	1.75	8.50	-15
6-	2.20	8.08	-16
7-	2.56	6.16	-17
8-	2.42	3.56	-18
9-	2.34	1.17	-19
10-	3.93	0.11	-20
21-	11.28		
22-	5.10		
23-	2.48		
24-	4.21		
25-	4.02		

Example 7. CUMULATIVE CURVE SAND-SILT-CLAY

FIG



ID M1508-2

1-	0.94	24.50	-11
2-	2.03	29.81	-12
3-	3.31	36.99	-13
4-	4.56	45.33	-14
5-	6.32	53.83	-15
6-	8.52	61.91	-16
7-	11.08	68.07	-17
8-	13.50	71.63	-18
9-	15.84	72.80	-19
10-	19.77	72.91	-20
21-	84.19		
22-	89.29		
23-	91.77		
24-	95.98		
25-	100.00		

Example 8. Clay Identification Using X-Ray Diffraction

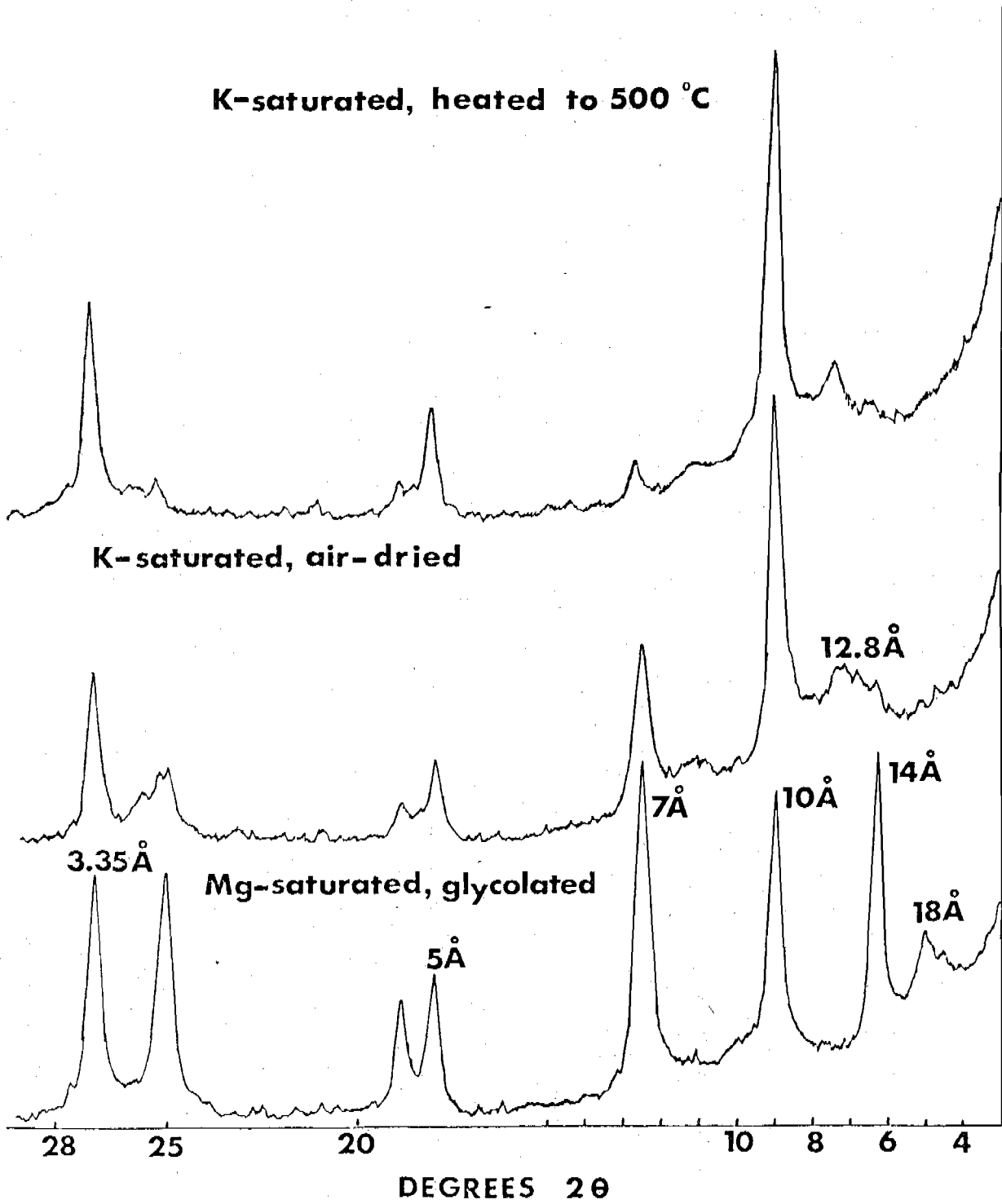


Table 1  
INTERPLANAR SPACINGS FOR ANGLE 2 $\theta$   
COPPER RADIATION

The following table has been computed using copper  $K\alpha_1$  radiation of 1.54050 Å. To change the "d" values to kX units, multiply by 0.9979. To obtain "d" values for the unresolved  $K\alpha$  doublet of 1.5418 Å, multiply the given "d" value for the observed angle by 1.0008. To obtain "d" values for copper  $K\alpha_2$  radiation of 1.54434 Å, multiply the given "d" value for the observed angle by 1.00249.

COPPER --  $K\alpha_1$   $\lambda = 1.54050$  Å

2 $\theta$	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0
0	$\infty$	862.63	441.32	294.21	220.66	176.53	147.11	125.09	110.33	98.076	88.263
1	38.283	80.245	73.555	67.897	63.047	58.845	55.167	51.922	49.038	46.457	44.135
2	44.135	42.033	40.122	38.378	36.779	35.308	33.950	32.693	31.526	30.440	29.425
3	29.425	28.476	27.587	26.751	25.964	25.223	24.522	23.859	23.232	22.636	22.071
4	22.071	21.532	21.020	20.531	20.065	19.619	19.193	18.785	18.394	18.018	17.659
5	17.859	17.312	16.979	16.660	16.352	16.054	15.768	15.491	15.225	14.967	14.717
6	14.717	14.476	14.243	14.017	13.798	13.586	13.381	13.181	12.988	12.800	12.617
7	12.817	12.440	12.267	12.099	11.936	11.777	11.622	11.471	11.325	11.182	11.042
8	11.042	10.906	10.773	10.643	10.517	10.394	10.273	10.155	10.040	9.9270	9.8168
9	9.8188	9.7098	9.6042	9.5010	9.4001	9.3015	9.2053	9.1105	9.0173	8.9264	8.8378
10	8.8373	8.7500	8.6645	8.5806	8.4989	8.4181	8.3387	8.2609	8.1847	8.1100	8.0360
11	8.0360	7.9644	7.8935	7.8234	7.7549	7.6880	7.6220	7.5571	7.4932	7.4305	7.3688
12	7.3688	7.3081	7.2484	7.1897	7.1320	7.0751	7.0192	6.9642	6.9100	6.8567	6.8042
13	6.8042	6.7524	6.7015	6.6513	6.6016	6.5532	6.5053	6.4580	6.4114	6.3655	6.3203
14	6.3206	6.2757	6.2317	6.1883	6.1456	6.1035	6.0619	6.0209	5.9804	5.9405	5.9011
15	5.9011	5.8623	5.8239	5.7860	5.7488	5.7119	5.6755	5.6395	5.6041	5.5691	5.5345
16	5.5345	5.5004	5.4666	5.4333	5.4004	5.3679	5.3358	5.3040	5.2727	5.2417	5.2111
17	5.2111	5.1809	5.1510	5.1214	5.0922	5.0633	5.0348	5.0065	4.9787	4.9511	4.9238
18	4.9238	4.8968	4.8701	4.8437	4.8176	4.7918	4.7663	4.7410	4.7160	4.6913	4.6669
19	4.6669	4.6426	4.6187	4.5950	4.5715	4.5482	4.5253	4.5026	4.4801	4.4577	4.4357
20	4.4357	4.4138	4.3922	4.3708	4.3496	4.3287	4.3079	4.2872	4.2669	4.2467	4.2267
21	4.2257	4.2069	4.1872	4.1678	4.1485	4.1295	4.1106	4.0919	4.0733	4.0550	4.0367
22	4.0367	4.0187	4.0008	3.9831	3.9656	3.9481	3.9309	3.9139	3.8969	3.8801	3.8635
23	3.8635	3.8469	3.8306	3.8144	3.7983	3.7824	3.7666	3.7509	3.7354	3.7200	3.7047
24	3.7047	3.6896	3.6746	3.6596	3.6449	3.6302	3.6157	3.6013	3.5870	3.5728	3.5587
25	3.5587	3.5448	3.5309	3.5172	3.5036	3.4901	3.4767	3.4634	3.4502	3.4371	3.4241
26	3.4241	3.4112	3.3984	3.3857	3.3731	3.3606	3.3482	3.3359	3.3236	3.3115	3.2995
27	3.2995	3.2875	3.2756	3.2639	3.2522	3.2406	3.2291	3.2176	3.2063	3.1951	3.1839
28	3.1839	3.1727	3.1617	3.1508	3.1399	3.1291	3.1184	3.1078	3.0973	3.0868	3.0763
29	3.0753	3.0650	3.0557	3.0455	3.0354	3.0253	3.0153	3.0054	2.9955	2.9857	2.9760

Table 1 continued  
 COPPER --  $K\alpha_1$   $\lambda = 1.54050 \text{ \AA}$

29	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0
30	2.9760	2.9664	2.9568	2.9472	2.9377	2.9283	2.9190	2.9098	2.9005	2.8914	2.8823
31	2.8823	2.8732	2.8643	2.8553	2.8465	2.8376	2.8289	2.8202	2.8116	2.8029	2.7945
32	2.7945	2.7859	2.7775	2.7691	2.7608	2.7526	2.7443	2.7362	2.7281	2.7200	2.7120
33	2.7120	2.7040	2.6961	2.6882	2.6804	2.6727	2.6649	2.6573	2.6496	2.6420	2.6345
34	2.6345	2.6270	2.6195	2.6121	2.6048	2.5974	2.5902	2.5830	2.5757	2.5686	2.5615
35	2.5615	2.5544	2.5474	2.5404	2.5334	2.5265	2.5196	2.5129	2.5060	2.4993	2.4926
36	2.4926	2.4859	2.4793	2.4727	2.4661	2.4596	2.4531	2.4466	2.4402	2.4338	2.4274
37	2.4274	2.4211	2.4149	2.4086	2.4024	2.3962	2.3901	2.3840	2.3779	2.3719	2.3659
38	2.3659	2.3599	2.3540	2.3480	2.3421	2.3362	2.3305	2.3247	2.3189	2.3131	2.3074
39	2.3074	2.3018	2.2962	2.2906	2.2849	2.2794	2.2739	2.2684	2.2629	2.2574	2.2521
40	2.2521	2.2467	2.2414	2.2360	2.2306	2.2254	2.2202	2.2149	2.2097	2.2045	2.1994
41	2.1994	2.1943	2.1892	2.1841	2.1791	2.1740	2.1691	2.1641	2.1592	2.1542	2.1493
42	2.1493	2.1445	2.1396	2.1347	2.1300	2.1252	2.1204	2.1157	2.1110	2.1063	2.1016
43	2.1016	2.0970	2.0924	2.0878	2.0832	2.0786	2.0741	2.0696	2.0651	2.0606	2.0562
44	2.0562	2.0517	2.0473	2.0429	2.0385	2.0342	2.0299	2.0256	2.0213	2.0170	2.0127
45	2.0127	2.0085	2.0043	2.0001	1.9959	1.9918	1.9876	1.9835	1.9795	1.9754	1.9713
46	1.9713	1.9673	1.9632	1.9592	1.9552	1.9513	1.9473	1.9433	1.9395	1.9356	1.9316
47	1.9316	1.9278	1.9239	1.9201	1.9163	1.9125	1.9087	1.9049	1.9012	1.8974	1.8937
48	1.8937	1.8900	1.8863	1.8826	1.8790	1.8754	1.8717	1.8682	1.8645	1.8609	1.8574
49	1.8574	1.8538	1.8503	1.8468	1.8433	1.8398	1.8364	1.8329	1.8294	1.8260	1.8226
50	1.8226	1.8192	1.8158	1.8124	1.8090	1.8057	1.8024	1.7990	1.7958	1.7924	1.7891
51	1.7891	1.7859	1.7827	1.7794	1.7762	1.7730	1.7697	1.7666	1.7634	1.7603	1.7571
52	1.7571	1.7539	1.7508	1.7477	1.7446	1.7415	1.7385	1.7354	1.7323	1.7293	1.7263
53	1.7263	1.7232	1.7202	1.7173	1.7143	1.7113	1.7083	1.7054	1.7025	1.6996	1.6966
54	1.6966	1.6937	1.6909	1.6879	1.6851	1.6822	1.6794	1.6765	1.6738	1.6709	1.6681
55	1.6681	1.6654	1.6625	1.6598	1.6570	1.6543	1.6515	1.6488	1.6461	1.6434	1.6407
56	1.6407	1.6380	1.6353	1.6326	1.6300	1.6273	1.6247	1.6221	1.6195	1.6168	1.6142
57	1.6142	1.6117	1.6091	1.6065	1.6040	1.6014	1.5988	1.5963	1.5938	1.5913	1.5888
58	1.5888	1.5863	1.5838	1.5813	1.5789	1.5764	1.5739	1.5715	1.5691	1.5666	1.5642
59	1.5642	1.5618	1.5594	1.5570	1.5546	1.5522	1.5499	1.5475	1.5452	1.5428	1.5405
60	1.5405	1.5382	1.5359	1.5336	1.5313	1.5289	1.5267	1.5244	1.5222	1.5199	1.5176
61	1.5176	1.5154	1.5132	1.5109	1.5087	1.5065	1.5043	1.5021	1.4999	1.4977	1.4955
62	1.4955	1.4934	1.4912	1.4890	1.4869	1.4847	1.4827	1.4805	1.4784	1.4763	1.4742
63	1.4742	1.4721	1.4699	1.4679	1.4659	1.4638	1.4617	1.4596	1.4576	1.4554	1.4535
64	1.4535	1.4515	1.4495	1.4475	1.4455	1.4434	1.4414	1.4394	1.4375	1.4355	1.4336
65	1.4336	1.4316	1.4297	1.4277	1.4257	1.4238	1.4219	1.4200	1.4180	1.4161	1.4143
66	1.4143	1.4123	1.4105	1.4086	1.4067	1.4048	1.4029	1.4011	1.3992	1.3974	1.3955
67	1.3955	1.3937	1.3918	1.3901	1.3882	1.3865	1.3846	1.3828	1.3810	1.3792	1.3774
68	1.3774	1.3757	1.3739	1.3721	1.3704	1.3686	1.3668	1.3651	1.3633	1.3616	1.3599
69	1.3599	1.3582	1.3564	1.3547	1.3530	1.3513	1.3496	1.3479	1.3462	1.3445	1.3429
70	1.3429	1.3412	1.3395	1.3379	1.3362	1.3346	1.3329	1.3313	1.3297	1.3281	1.3264
71	1.3264	1.3248	1.3232	1.3216	1.3200	1.3184	1.3167	1.3152	1.3136	1.3120	1.3104
72	1.3104	1.3089	1.3073	1.3057	1.3042	1.3026	1.3011	1.2995	1.2980	1.2965	1.2949
73	1.2949	1.2934	1.2919	1.2904	1.2889	1.2873	1.2859	1.2843	1.2829	1.2814	1.2798
74	1.2798	1.2784	1.2769	1.2755	1.2740	1.2725	1.2711	1.2696	1.2681	1.2668	1.2653
75	1.2653	1.2638	1.2624	1.2610	1.2596	1.2581	1.2567	1.2553	1.2539	1.2525	1.2511
76	1.2511	1.2497	1.2483	1.2470	1.2456	1.2442	1.2428	1.2414	1.2400	1.2387	1.2373
77	1.2373	1.2359	1.2346	1.2332	1.2319	1.2306	1.2292	1.2279	1.2266	1.2252	1.2239
78	1.2239	1.2226	1.2213	1.2200	1.2187	1.2174	1.2161	1.2148	1.2135	1.2122	1.2109
79	1.2109	1.2097	1.2084	1.2071	1.2058	1.2046	1.2033	1.2021	1.2008	1.1995	1.1983

Table 3

X-ray diffraction spacings obtained from  
planes of layer-silicate species as  
related to sample treatment

Diffraction spacing (A)	Mineral or minerals
Mg-saturated, air-dried	
14-15	Montmorillonite, vermiculite, chlorite
9.9-10.1	Mica (illite), halloysite
7.2- 7.5	Metahalloysite
7.15	Kaolinite, chlorite (2nd order maximum)
Mg-saturated, glycerol-solvated	
17.7-18.0	Montmorillonite
14.0-15.0	Vermiculite, chlorite
10.8	Halloysite
9.9-10.1	Mica (illite)
7.2- 7.5	Metahalloysite
7.15	Kaolinite, chlorite (2nd order maximum)
K-saturated, air-dried	
14.0-15.0	Chlorite, vermiculite (with interlayer Al)
12.4-12.8	Montmorillonite
9.9-10.1	Mica (illite), halloysite, vermiculite (contracted)
7.2- 7.5	Metahalloysite
7.15	Kaolinite, chlorite (2nd order maximum)
K-saturated, heated 500°C	
14.0	Chlorite
9.9-10.1	Mica, vermiculite (contracted), montmorillonite (contracted)
7.15	Chlorite (2nd order maximum)

Black, C. A., (ed.). 1965. Methods of soil analysis. American Society of  
Agronomy (ASA), Monograph 9, Part 1, Madison, Wisc., p. 690.

Table 2

Standard diffraction spacings of minerals common to soils  
or occasionally found in soils\*. @

d/n spacing, A	Order #	Mineral
32	1	Regular interstratification of chlorite + montmorillonite
28	1	Regular interstratification of montmorillonite + mica or chlorite + vermiculite
24	1	Regular interstratification of vermiculite + mica
19.2-19.5		Random mixture of 10 + 17.7A, etc.
17.7	1	Montmorillonite, glycerol solvated
17.2	1/1**	Random 50:50 mixture of 10 + 17.7A
17.0	1	Montmorillonite, ethylene glycol solvated
14.2	1	Chlorite or vermiculite
13.3	1/1	Random 50:50 mixture of 10 + 14A
11.0	1	Halloysite, glycerol solvated
10.2		Attapulgite
10.0	1	Illite, micas
9.5	1/2##	Random 60:40 mixture of 10:17.7A
9.2	1	Talc
9.2	1/2	Random 40:60 mixture of 10:17.7A
9.1	1	Pyrophyllite
8.85	2	Montmorillonite
8.6	1/1	Random mixture of 7 + 10A
8.40-8.48	1	Amphiboles
7.3	1	Antigorite, chrysotile
7.25-7.35	1	Partially dehydrated halloysite
7.2	1	Kaolinite, meta-halloysite
7.0-7.2	2	Chlorite or vermiculite
6.3-6.45		Feldspars
6.23		Boehmite
5.0	2	Muscovite
4.7-4.9	3	Chlorite
4.83		Gibbsite
4.6-4.7		Talc
4.6	3	Vermiculite
4.57		Pyrophyllite
4.45-4.6	110	Montmorillonite, vermiculite, muscovite, illite
4.45-4.46	110	Kaolinite
4.42	110	Meta-halloysite
4.34		Gibbsite
4.29		Gypsum
4.21		Quartz
4.15		Goethite
4.05		Cristobalite
3.66		Halloysite, glycerol solvated
3.59-3.64	2	Antigorite, chrysotile
3.57-3.58	2	Metahalloysite, kaolin
3.54	5	Montmorillonite, glycerol solvated
3.52-3.58	4	Chlorite
3.50-3.55	4	Vermiculite

\*Compiled from the literature, assisted by Dr. B. E. Brown.

#The "order" is chosen in such a way as to explain the basal reflections only; it is not necessarily the order which corresponds to the unit cell.

\*\*First order of each.

##First order of one, second order of the other.

@Jackson (1956) p. 212.



Table 2 - continued @

d/n spacing, A	Order #	Mineral
3.47		Anatase
3.35		Quartz
3.33	3	Muscovite, illite
3.21-3.28		K-feldspars
3.12-3.23		Plagioclase feldspars
3.1-3.25		Hornblende
3.15		Gypsum
3.03		Calcite
2.88		Dolomite
2.87		Gypsum
2.77-2.83		Apatite
2.73		Hornblende
2.69-2.73		Apatite
2.69		Hematite
2.54		Ilmenite
2.53		Magnetite
2.52		Olivine
2.51		Hematite
2.46		Olivine
2.43		Goethite
2.34		Boehmite
2.28		Calcite
2.19		Dolomite
1.92		Gypsum, calcite
1.88		Anatase
1.87		Calcite
1.85		Boehmite
1.81		Quartz
1.80		Dolomite
1.72		Ilmenite
1.69		Anatase
1.69		Hematite
1.61		Magnetite
1.53-1.55	060	Biotite, chlorite (trioctahedral)
1.50	060	Muscovite (dioctahedral)
1.49	060	Kaolinite
1.48		Magnetite
1.44		Hornblende

@Jackson (1956) p. 213

## METHODS AND REFERENCES FOR SOIL CHARACTERIZATION ANALYSES

University of Idaho Soil Characterization Laboratory  
Plant and Soil Science Department  
Moscow, Idaho 83843

Percent moisture by weight - Black, 1965.

pH, 1:5 pH - U. S. Salinity Laboratory, 1954.

E. C. on saturated paste extract - U. S. Salinity Laboratory, 1954.

Carbonates, titration - AOAC, 1945 and U. S. Salinity Laboratory, 1954.

Bicarbonates, titration - AOAC, 1945 and U. S. Salinity Laboratory, 1954.

Chlorides, titration - AOAC, 1945.

Sulfates by colorimetric method - Black, 1965.

Soluble cations Ca, Mg, Na, K (extract from saturated paste; Ca and Mg determined on PE atomic absorption and Na and K determined on the Eppendorf flame photometer) - Soil Conservation Service, 1972.

Total nitrogen determined on the Technicon Autoanalyzer-modification of Technicon Industrial method 321-74A, 1978.

Cation exchange capacity by ammonium saturation- Soil Conservation Service, 1972. Cations determined by PE atomic absorption; CEC determined on Technicon.

Extractable cations Ca, Mg, Na, K (extract from cation exchange capacity; cations replaced from soil with ammonium acetate, Ca and Mg determined on the PE atomic absorption and Na and K determined on the Eppendorf Flame photometer) - Soil conservation Service, 1972.

Exchangeable acidity by barium chloride-triethanolamine method - Black, 1965.

Gypsum by increase in soluble calcium plus magnesium content upon dilution- U. S. Salinity Laboratory, 1954.

Gypsum by precipitation in acetone - U. S. Salinity Laboratory, 1954.

Calcium carbonate equivalent by HCl treatment, titrimetric - U. S. Salinity Laboratory, 1954.

Organic carbon-organic matter by modified Walkley-Black method - Peech et al., 1947 and Walkley, 1935.

NaF pH used as a rapid test for allophane - Fieldes and Parrott, 1966.

- Extractable iron and aluminum for determination of spodic horizon (1) Dithionite citrate extraction, Fe and Al determined on PE atomic absorption - Holmgren, 1967. (2) Sodium pyrophosphate extraction, Fe and Al determined on PE atomic absorption - Bascomb, 1968.
- Phosphorus isotherms for determining phosphate requirements on soils - Fox and Kamprath, 1970, and Murphy and Riley, 1962.
- Available phosphorus of soils, (1) Sodium bicarbonate extraction - Olsen and Watanabe, 1965, and Olsen and et al., 1954; (2) sodium acetate extraction - Grewling and Peech, 1965, and Peech and English, 1944.
- Bulk density of soil clods by Saran method - Brasher et al., 1966.
- Water retention, 1/3 and 15 bars, by pressure plate extraction - U. S. Salinity Laboratory, 1954.
- Atterberg limits by ASTM method - Black, 1965.
- Soil textural class - Soil Survey Staff, 1951.
- Mechanical analysis by the pipette method - Kilmer and Alexander, 1949; Kilmer and Mullins, 1954; Tyner, 1939.
- Mechanical analysis by the centrifuge method - Jackson, 1956; Jackson, 1958; Kilmer and Alexander, 1949.
- Mechanical analysis by the Coulter Counter method - University of Idaho, Moscow, Idaho, 1979.
- Clay identification using x-ray diffraction - Jackson, 1956.
- Pyrophosphate color test used in determining histic horizons - Soil Survey Staff, 1975.
- Total phosphorus on soils - Jackson, 1956; Kitson and Mellons, 1944; Sherman, 1942.
- Allophane by cation exchange capacity delta value - Black, 1965.
- Manganese by dithionite-citrate extraction - Kilmer, 1960.

Prepared by Anita L. Falen, Supervisor, Soil Characterization Laboratory,  
July, 1979

# BEAVERHEAD



Unnamed Sandy Clay loam 79-MT-2901 (100701R-3)

Classification: coarse-loamy, mixed Argic Cryoboroll.

General Site Characteristics

Location: Madison County, Montana: approx. 1 mile west of Baldy Mtn., Gravelly Range,  
Sheridan Ranger District, NE1/4, SW1/4, SW1/4 of sec. 33, T. 7S., R. 38E.

Forest: Beaverhead National Forest

Area: Idaho Creek

Described By/Date: DJS on October 11, 1979

Parent Rock/Material: metamorphics-gneiss

Habitat Type: Alba/Caru h.t. - mountain sagebrush/grass park; large remnants of  
Douglas fir. Approximately 95 % ground cover and 5 % gravel or bare soil.

Topography: flat to slightly convex upper slope, near ridgetop, oriented slightly SW

Landform: pluvial-cyroplanated ridge

Weathering:

Formation Name:

Slope: 24 percent

Aspect: south 200 degrees

Elevation: 2453 m (8050 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate: cyclic

Precipitation: 76 cm

Erosion:

Infiltration: medium

Permeability: moderately rapid

Storage:

Drainage:

Air Temp: MSST-10.6 deg. C.

Soil Temp at 20 inches:

Salt/Alkal:

Remarks: Relatively shallow Boroll; rocks and stones increase with depth;  
extremely difficult to dig after a foot or so. Animal workings have mixed  
the surface layer to 20 or 25 centimeters.

Pedon Description

Ah 0-18 centimeters (0-7 inches). Very dark brown (10YR 2/2) sandy clay  
loam, dark brown (10YR 3/3) dry; moderate fine subangular blocky structure; loose, friable,  
nonsticky and slightly plastic; many very fine and fine roots; 15 percent gravels  
by weight; surface layer mixed by ground squirrels; clear smooth boundary.

Bh 18-30 centimeters (7-12 inches). Very dark brown (10YR 2/2) sandy clay  
loam, brown (10YR 4/3) dry; weak coarse prisms parting to moderate subangular blocky  
structure; loose, friable, slightly plastic; few very fine, common fine and medium  
roots; 15 percent gravels by weight; medium acid pH 5.7, noncalcareous; abrupt smooth  
boundary.

79-NT-2901 (cont.)

BC 30-71+ centimeters (12-28+ inches). Dark yellowish brown (10YR 4/6) gravelly sandy clay loam, light yellowish brown to brownish yellow (10YR 6/5) dry; common fine to medium faint yellow mottles (10YR 7/6-8); moderate coarse subangular blocky structure parting to weak fine subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few fine tubular pores; 24 percent gravels by weight; few thin clay films on ped faces, difficult to find in ped interiors; medium acid pH 5.8, noncalcareous; mottles possibly an influence of weathered bedrock.

Pedon: Unnamed Sandy Clay Loam 79-MT-2901 (100701R-3)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	Ah&Bh	0-30	5.7	0.31	58	1.0					
2	BC	30-71+	5.8	0.21	56	0.5					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms												
1	6.5	2.2	0.1	1.1	6.5	20.9	60	3.64	2.12	0.185	11	0.85	8.1
2	10.8	3.2	0.1	0.8	5.1	28.4	75	0.94	0.55	0.046	12	0.76	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



Pedon: Unnamed Sandy Clay Loam 79-MT-2901 (100701R-3)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt.		>2 mm vol.
0-30	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002			Sandy clay loam
30-71+											Gr. sandy clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3 Bar	15 Bar	Limit	Limit	Index
0-30	0.05-0.02	0.02-0.005	0.005-0.002			23.5	11.2	37	29	9
30-71+						26.1	14.0	43	18	25

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Clay Loam 79-MT-2902 (060801R-2)

Classification: loamy skeletal, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Madison County, Montana: approx. 1.5 miles southwest of Crockett Lake,  
Sheridan Ranger Dist., SE1/4, NW1/4, NW1/4 of sec. 31, T. 8S., R. 2W.

Forest: Beaverhead National Forest

Area: Buckskin Creek, Gravelly Range

Described By/Date: MH and JW on July 27, 1978

Parent Rock/Material: shale-sandstone

Habitat Type: Feid/Stri h.t.; approximately 75 % ground cover, 25 % surface gravel and bare soil.

Topography: rangeland, planar to steep convex-concave, early stage discontinuous landflow

Landform: early stage landflow

Weathering:

Formation Name:

Slope: 16 percent

Aspect: west 260 degrees

Elevation: 2450 m (8040 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate: cyclic, udic

Precipitation: 75 cm.

Erosion:

Infiltration: slow

Permeability: moderately slow

Storage:

Drainage: somewhat poor-mod. well

Air Temp: MSST-10.1 deg. C

Soil Temp at 20 inches:

Salt/Alkal:

Remarks: No field notes about mottling and clay films, but mottles are likely to be distinct below 40 centimeters due to water table fluctuation. Clay films are likely to be common and thick on ped faces of the lower B1 and IIR2.

Pedon Description

Ah 0-24 centimeters (0-9 inches). Very dark brown (10YR 2/2) gravelly clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many fine, common medium and coarse roots; 19 percent gravels by weight; strongly acid pH 5.4, noncalcareous; gradual wavy boundary.

B1 24-42 centimeters (9-17 inches). Dark brown (10YR 3/3) gravelly clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; slightly hard, firm, very sticky and plastic; many to common fine, common medium, and common to few coarse roots; 30 percent gravels by weight; thin patchy clay films; strongly acid pH 5.2, noncalcareous; diffuse wavy boundary.

79-MT-2902 (cont.)

IIB2        42-59 centimeters (17-23 inches). Dark reddish brown (SYR 3.5/4) gravelly clay loam, reddish brown (SYR 5.5/3) dry; massive structure; slightly hard, firm, very sticky and very plastic; common fine and medium, few coarse roots; 47 percent gravels by weight; strongly acid pH 5.3, noncalcareous; diffuse wavy boundary.

IIC        50-90+ centimeters (23-35+ inches). Dark reddish brown (SYR 3.5/2) gravelly clay, dark grayish brown (10YR 4/2) dry; massive structure; very hard, firm, sticky and very plastic; common fine and medium, few coarse roots to 70 centimeters; 25 percent gravels by weight; medium acid pH 5.7, noncalcareous.

Pedon: Unnamed Gravelly Clay Loam 79-MT-2902 (060801R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub> <sup>3</sup>	HCO <sub>3</sub> <sup>3</sup>	Cl	SO <sub>4</sub> <sup>4</sup>
							meq/1000 gms							
1	Ah	0-24	5.6	5.4	0.51	80	3.2	1.2	1.1	0.3	0.0	1.6	2.1	0.1
2	B1	24-42	5.7	5.2	0.51	47	1.5	0.6	0.6	0.1	0.0	0.8	1.2	0.0
3	IIB2	42-59	5.8	5.3	1.11	51	2.9	0.8	2.7	0.2	0.0	0.6	5.0	0.0
4	IIC	59-90+	6.3	5.7	1.14	59	4.0	0.7	2.4	0.1	0.0	1.2	4.8	0.1

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Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> <sup>3</sup> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
				meq/100 gms	%	% ratio		%	%					
1	9.7	2.1	0.2	0.9	32.0	0.6	8.53	4.96	0.471	11	nil	nil	0.81	2.3
2	3.4	1.9	0.1	0.6	23.8	0.4	2.18	1.27	0.133	10	nil	nil	0.70	1.5
3	7.4	1.7	0.5	0.6	21.3	2.3	1.14	0.67	0.073	9	nil	nil	0.53	1.5
4	12.8	1.7	0.4	0.6	28.2	1.4	0.66	0.39	0.066	6	nil	nil	0.75	1.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Clay Loam 79-MT-2902 (060801R-2)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	1/2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CM	-----X-----							-----X-----		
0-24						29.53	31.77	38.70	19	Gr. clay loam
24-42						44.42	26.41	29.17	30	Gr. clay loam
42-59						44.92	25.74	29.34	47	Gr. clay loam
59-90+						20.08	24.03	55.89	25	Gr. clay

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	g/cc		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
CM	-----X-----			-----g/cc-----		-----X-----		-----X-----		
0-24						33.2	21.3	52	27	26
24-42						21.8	12.2	32	18	14
42-59						21.2	11.6	32	12	20
59-90+						26.8	15.8	38	12	26

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Clay Loam 79-MT-0101 (090501B-1)

Classification: loamy-skeletal, mixed Calcic Pachic Cryoboroll.

General Site Characteristics

Location: Beaverhead County, Montana; approx. 1.1 miles northeast of Sourdough Peak, Tendoy Mountains, SW 1/4, SE 1/4, NW 1/4 of section 23, T. 13S., R. 11W.  
Forest: Beaverhead National Forest  
Area: Johnson Creek, Dillon Ranger District  
Described By/Date: MH and RP on October 5, 1978  
Parent Rock/Material: carbonates (limestones, dolomite)  
Habitat Type: rangeland  
Topography: convex gentle midslope, few LOS, poorly dissected  
Landform: strongly cryoplanted  
Weathering:  
Formation Name:  
Slope: 9 percent  
Aspect: northeast 66 degrees  
Elevation: 2713 m (8900 feet)  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate: cryic, udic  
Precipitation: 50 cm.  
Erosion:  
Infiltration: moderate  
Permeability: moderate  
Storage:  
Drainage: well drained  
Air Temp: MSST-8.3 deg. C  
Soil Temp at 28 inches: 4.4 deg. C  
Salt/Alkal:

Remarks: Threads of calcite are common throughout the BscA; threads and soft powdery forms are found in the Cca.

Pedon Description

Ah 0-26 centimeters (0-10 inches). Very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; weak fine to medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; 12 percent gravels by weight; neutral pH 6.7, noncalcareous; clear smooth boundary.

BscA 26-50 centimeters (10-20 inches). Brown (10YR 4/3) very gravelly loam, brown to pale brown (10YR 5.5/3) dry; weak to very weak medium to fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; 50 percent gravels by weight; mildly alkaline pH 7.5, strongly effervescent; clear smooth boundary.

Cca 50-75 centimeters (20-30 inches). Brown to grayish brown (1.25Y 5/3) very gravelly loam, light gray (10YR 7/2) dry; massive structure; soft, friable, slightly sticky and slightly plastic; 65 percent gravels by weight; mildly alkaline pH 7.8, strongly effervescent; gradual smooth boundary.

Pedon: Unnamed Clay Loam 79-MT-0101 (090501B-1)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
cm	----- % -----							----- % -----		
0-26						25.33	47.09	27.59	12	Clay loam
26-50						33.94	46.02	29.04	50	V.gr. loam
50-75						39.27	35.17	25.56	65	V.gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CeSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	----- % -----			----- g/cc -----		----- % -----		----- % -----	
0-26						35.6	18.7	NDNP	NDNP
26-50						25.5	13.9	37	22
50-75						28.7	16.9	35	25

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Pedon: Unnamed Clay Loam 79-MT-0101 (090501B-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
							meq/1000 gms							
1	Ah	0-26	6.9	6.7	0.62	95	6.4	0.9	0.3	0.2	0.0	4.4	1.1	0.1
2	Bsca	26-50	7.9	7.5	0.57	69	4.2	0.5	0.4	0.1	0.0	2.3	1.3	0.0
3	Cca	50-75	8.2	7.8	0.73	66	4.8	1.0	0.6	0.1	0.0	3.0	1.6	0.1

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Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms					%	% ratio		%	%	ppm				
1	16.4	1.4	0.1	0.8	36.1	0.3	7.03	4.09	0.434	9	nil	nil	0.88	3.2
2	11.8	1.8	0.1	0.4	25.7	0.4	2.68	1.56	0.170	9	nil	20.2	0.50	3.7
3	7.3	0.9	0.1	0.2	15.7	0.6	1.21	0.70	0.074	9	nil	40.3	0.35	5.9

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



Unnamed Gravelly Sandy Loam 79-MT-2903 (060801R-1)

Classification: coarse-loamy, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Beaverhead County (# is Madison County), Montana; approx. 2 miles south of Eureka Basin on West Fork Road, SW1/4, NW1/4, NW1/4 of sec. 24, T. 12S., R. 38W.  
Forest: Beaverhead National Forest  
Area: Anderson Creek, Gravelly Range, Madison Ranger District  
Described By/Date: RP and SS on September 26, 1968  
Parent Rock/Material: gray and yellow sandstone  
Habitat Type: mountain sagebrush (*Artemisia tridentata* subsp. *vaseyana*) makes up approximately 60 percent of the vegetation cover, grasses 25 percent and 5 percent forbs; 100 percent ground cover.  
Topography: flat, smooth, bedrock controlled dip slope  
Landform: smooth bedrock controlled slope  
Weathering:  
Formation Name:  
Slope: 20 percent  
Aspect: west  
Elevation: 2377 m (7800 feet)  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate: cryic, udic  
Precipitation: 71 cm.  
Erosion:  
Infiltration: mod.-mod. rapid  
Permeability: slow  
Storage:  
Drainage: well-excessively  
Air Temp: MSST-11.4 deg. C  
Soil Temp at 20 inches: 6.7 deg. C  
Salt/Alkal:

Remarks: B3 and Cr as used in this profile description imply that B and C material has moved on down into cracks between original bedrock. It does not imply that bedrock has been altered or weathered except for fracturing.

Pedon Description

A1 0-15 centimeters (0-6 inches). Very dark brown (10YR 2/2) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; loose, very friable, nonsticky and nonplastic; common fine roots; 25 percent gravels by weight; medium acid pH 5.9, noncalcareous; clear smooth boundary.

B2 15-66 centimeters (6-26 inches). Very dark grayish brown (10YR 3/2) gravelly sandy loam, dark grayish brown to grayish brown (10YR 4.5/2) dry; very weak coarse prismatic structure parting to weak moderate subangular blocky structure; soft, friable, slightly sticky and nonplastic; common fine roots; 22 percent gravels by weight; strongly acid pH 5.1, noncalcareous; abrupt wavy boundary; B2 has stronger chroma, weaker structure in 46-66 centimeter portion; pockets of B2 extend 15 centimeters into the B3.

79-MT-2983 (cont.)

B3            66-86 centimeters (26-34 inches). Light olive brown (2.5Y 5/4) gravelly sandy loam, light brownish gray (2.5Y 6.5/2) dry; very weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; 24 percent gravels by weight; strongly acid pH 5.2, noncalcareous; gradual smooth boundary; rock fragments oriented parallel to slope.

Cr            86-122+ centimeters (34-49+ inches). Brown to grayish brown (1.25Y 5/3) gravelly sandy loam, light grayish brown (2.5Y 5/2) dry; structureless; loose, very friable, nonsticky and nonplastic; roots absent; 27 percent gravels by weight; medium acid pH 5.6, noncalcareous; rock fragments oriented parallel to slope.

Soil: Unnamed Gravelly Sandy Loam 79-MT-2903 (060801R-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A1	0-6	5.9	0.72	75	12.3				
2	B2	6-26	5.1	0.42	58	3.8				
3	B3	26-34	5.2	0.26	36	3.2				
4	Cr	34-48	5.6	0.34	34	1.6				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	6.3	2.0	0.1	1.3	7.5	18.7	56	7.49	4.35	0.331	13	0.75	8.0
2	3.7	1.2	0.1	0.6	5.5	13.2	46	3.46	2.02	0.168	12	0.78	8.1
3	3.0	1.4	0.1	0.3	2.2	8.0	68	0.44	0.26	0.030	9	0.76	8.0
4	3.9	1.3	0.1	0.2	2.0	8.2	73	0.49	0.29	0.026	11	0.73	8.0

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Sandy Loam 79-MT-2903 (060801R-1)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
0-6							67.23	18.25	14.52	25	Gr. sandy loam
6-26							69.09	18.58	12.33	22	Gr. sandy loam
26-34							76.65	15.33	8.03	24	Gr. sandy loam
34-48							78.42	10.95	10.64	27	Gr. sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	%			g/cc		%		%
0-6				18.8	14.0	NDNP	NDNP	NDNP
6-26				13.2	8.8	NDNP	NDNP	NDNP
26-34				8.9	5.4	NDNP	NDNP	NDNP
34-48				8.9	5.7	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Loamy Sand 79-MT-2964 (100701R-2)

Classification: sandy, mixed Entic Cryumbrept.

General Site Characteristics

Location: Madison County, Montana: approx. one mile east-southeast of Pedro Point,  
Tobacco Root Mountains, NE 1/4, NE 1/4, SE 1/4 of section 21, T. 4S., R. 3W.

Forest: Beaverhead National Forest

Area: South Fork Ranshorn Creek, Sheridan Ranger District

Described By/Date: MH and JW on October 13, 1978

Parent Rock/Material: gneiss and associated metamorphic

Habitat Type: Pinal h.t.; (Carex, Stipa, Festuca idahoensis); 65-70 % ground cover,  
30-35 % erosion pavement of gravel.

Topography: backside of troughwall at ridgeline, planar to convex, LOS not well developed

Landform: moderately cryoplanted

Weathering:

Formation Name:

Slope: 36 percent

Aspect: south 202 degrees

Elevation: 2835 m (9300 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate: cryic, udic

Precipitation: 85 cm

Erosion:

Infiltration: rapid

Permeability: rapid

Storage:

Drainage: excess, -somewhat excess.

Air Temp: MSST-7.4 deg. C

Soil Temp at 20 inches: 4.4 deg. C

Salt/Alkal:

Remarks: Coniferous forest; The surface 10 centimeters was unconsolidated; from  
95 to 100+ centimeters was compacted.

Pedon Description

Ah 0-30 centimeters (0-12 inches). Dark brown (10YR 3/3) gravelly loamy sand,  
yellowish brown (10YR 5/4) dry; single grained; loose, nonsticky and nonplastic; common fine  
medium roots; 36 percent gravels by weight; strongly acid pH 5.1, noncalcareous; gradual  
smooth boundary.

C1 30-90 centimeters (12-35 inches). Yellowish brown (10YR 5/6) gravelly sand,  
very pale brown (10YR 7/4.5) dry; single grained; loose, nonsticky and nonplastic; common  
fine roots; 35 percent gravels by weight; strongly acid pH 5.1, noncalcareous; clear smooth  
boundary.

C2 90-100+ centimeters (35-39 inches). Gravel and sand; moderately consolidated;  
no lab sample.

Pedon: Unnamed Gravelly Loamy Sand 79-MT-2904 (100701R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-30	5.1	0.33	44	1.0				
2	C1	30-90	5.1	0.26	37	1.3				
	C2	90-100+	NS	NS	NS	NS				

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Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	1.1	0.5	0.1	0.2	5.8	7.7	25	1.83	1.06	0.052	20	0.73	8.8
2	0.6	0.4	0.1	0.1	4.0	4.8	19	0.57	0.33	0.026	13	0.65	8.8
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC' were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Loamy Sand 79-MT-2904 (100701R-2)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CM	%							%		
0-30						82.48	9.25	8.27	36	Gr. loamy sand
30-90						89.27	7.63	3.10	35	Gr. sand
90-100+						NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core	Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
CM	%			g/cc	%		%		
0-30					10.2	6.3	NDNP	NDNP	NDNP
30-90					6.8	4.2	NDNP	NDNP	NDNP
90-100+					NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Sandy Loam 79-MT-2905 (021001R-1)

Classification: coarse-loamy, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Madison County, Montana; approx. 1.5 miles north-northwest of Hoodoo Pass,  
Gravelly Range, SW 1/4, NW 1/4, SW 1/4 of section 29, T. 12S., R. 1E.

Forest: Beaverhead National Forest

Area: Meridian Creek, Madison Ranger District

Described By/Date: MH and JW on July 31, 1978

Parent Rock/Material: rhyolite

Habitat Type: Psme/Caru h.t., Agsp phase; nearly 100 percent ground cover (plant litter).  
Coniferous forest.

Topography: weakly dissected with a few LOS, concave slope

Landform: late-stage rejuvenated slope

Weathering:

Formation Name:

Slope: 50 percent

Aspect: west 258 degrees

Elevation: 2329 m (7640 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate: cryic, vdic

Precipitation: 100 cm.

Erosion:

Infiltration: moderately rapid

Permeability: moderately rapid

Storage:

Drainage: well-somewhat excess.

Air Temp: MSST-8.0 deg. C

Soil Temp at 20 inches: 10 deg.

Salt/Alkal:

Remarks: Some large cobbles and small boulder floaters are common throughout  
the profile.

Pedon Description

Ah 0-20 centimeters (0-8 inches). Black (10YR 2/1) sandy loam, very dark  
grayish brown to dark brown (10YR 3.5/2) dry; weak moderate angular blocky structure; soft,  
very friable, nonsticky and nonplastic; common medium and coarse roots; 2 percent gravels  
by weight; slightly acid pH 6.4, noncalcareous; gradual wavy boundary.

Bs 20-105 centimeters (8-41 inches). Dark gray (10YR 4/1) sandy loam,  
grayish brown (10YR 5/2) dry; weak moderate subangular blocky structure; soft, very friable,  
nonsticky and nonplastic; common medium and coarse roots; 15 percent gravels by weight;  
neutral pH 6.7, noncalcareous; gradual broken boundary.



79-MT-2905 (cont.)

C 105-160+ centimeters (41-63 inches). Grayish brown (10YR 5/2) gravelly sandy loam, light gray (10YR 7/1) dry; single grained; loose, friable, nonsticky and nonplastic; common medium and coarse roots; 26 percent gravels by weight; neutral pH 7.0, noncalcareous.

Pedon: Unnamed Sandy Loam 79-MT-2905 (021001R-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> <sub>10</sub> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-20	6.4	0.57	53	10.8				
2	Bs	20-105	6.7	0.34	84	7.0				
3	C	105-160+	7.0	1.22	90	9.4				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	DM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
meq/100 gms						%		%		ratio			
1	7.4	1.8	0.4	1.3	4.9	19.1	69	3.54	2.06	0.185	11	0.98	8.3
2	5.3	1.1	0.2	0.9	1.8	12.1	80	1.41	0.82	0.044	19	0.85	8.1
3	3.5	1.6	0.8	1.1	0.7	8.0	91	0.42	0.24	0.015	16	0.74	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-2905 (021001R-1)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.	
cm	%							%			
0-20						77.13	11.73	11.14	2		Sandy loam
20-105						76.67	14.67	8.66	15		Sandy loam
105-160+						71.86	24.40	3.75	26		Gr. sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core	Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	%			g/cc	%		%		
0-20					19.6	13.5	NDNP	NDNP	NDNP
20-105					12.5	7.4	NDNP	NDNP	NDNP
105-160+					15.6	7.3	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

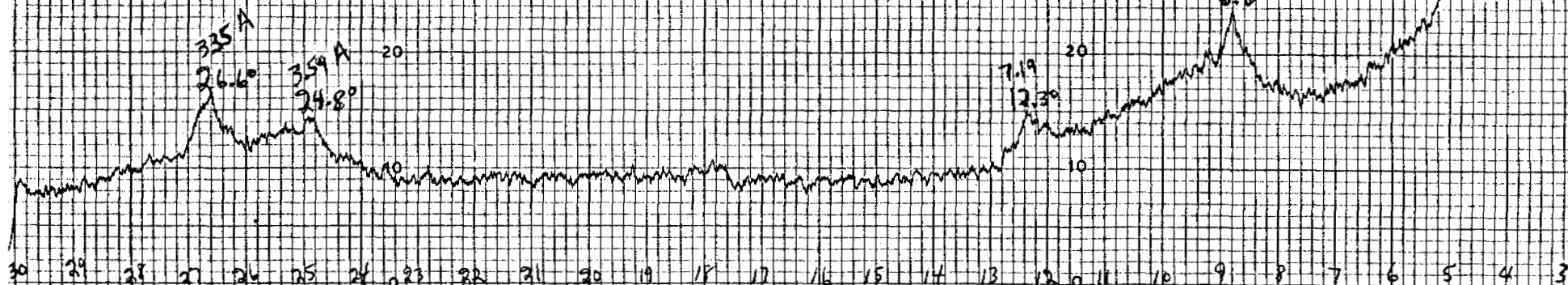
BH 17  
Mg-saturated, glycolated  
021001 R-1  
79-MT-2905-2  
Bs 20-105 cm

Slides prepared by: Falen and Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody and Falen

25

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody + Falen

Interpretation: Amorphous  
Small illite + Kaolinite



BH 17  
Mg-saturated, glycolated  
021001 R-1  
79-MT-2905-2  
Bs 20-105 cm.

0  
1  
2



BH 17  
K-saturated, air dried  
021001 R-1  
79-MT-2905-2  
Bs 20-105 cm

BH 17  
K-saturated, air dried  
021001 R-1  
79-MT-2905-2  
Bs 20-105 cm

26

3.33 Å

3.57 Å

7.19 Å

10.04 Å

30

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

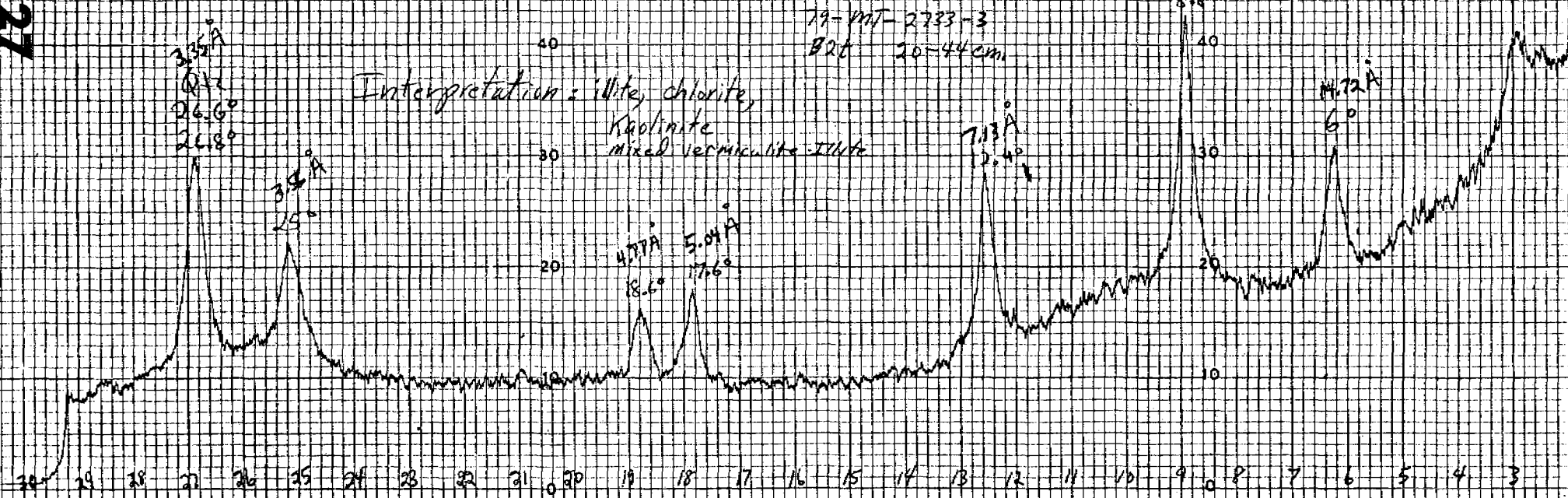
K 59  
Mg-saturated, glycolated  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

Slides prepared by: Falen and Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody and Falen

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody & Falen

K 59  
Mg-saturated, glycolated  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

Interpretation: illite, chlorite,  
Kaolinite  
mixed vermiculite-illite



Unnamed Sandy Loam 79-MT-2906 (021001R-2)

Classification: fine-loamy, mixed, cryic Mollic Paleboralf.

General Site Characteristics

Location: Madison County, Montana; approx. 1.75 miles north-northeast of Hoodoo Pass,  
Gravelly Range, NE 1/4, NE 1/4, SW 1/4 of section 29, T. 12S., R. 1E.  
Forest: Beaverhead National Forest  
Area: Meridian Creek, Madison Ranger District  
Described By/Date: MH and JW on August 1, 1978  
Parent Rock/Material: rhyolite  
Habitat Type: Abta/Caro h. t.; nearly 100 percent ground cover (plant cover and litter).  
Coniferous forest.  
Topography: gentle slopes, plane to slightly convex, no LOS  
Landform: weakly frost churned  
Weathering:  
Formation Name:  
Slope: 6 percent  
Aspect: east 72 degrees  
Elevation: 2367 m (7765 feet)  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate: cryic, udic  
Precipitation: 60 cm.  
Erosion:  
Infiltration: mod.-mod. slow  
Permeability: mod.-mod. slow  
Storage:  
Drainage: mod. well-well  
Air Temp: MSST-8.8 deg. C  
Soil Temp at 20 inches: 7.7 deg. C  
Salt/Alkal:

Remarks: There are a few stones and cobbles in the profile above the fragipan.

Pedon Description

Ah 0-17 centimeters (0-7 inches). Very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; very weak fine to moderate subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common to many fine, common medium and coarse roots; 16 percent gravels by weight; strongly acid pH 5.2, noncalcareous; clear smooth boundary.

E 17-67 centimeters (7-26 inches). Dark grayish brown (10YR 4/2) sandy loam, pale brown (10YR 6/3) dry; very weak medium to coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common to many fine, and common medium and coarse roots; 16 percent gravels by weight; medium acid pH 5.7, noncalcareous; discontinuous wavy boundary.



79-MT-2986 (cont.)

Bt 67-88 centimeters (26-35 inches). Brown (10YR 5/3) gravelly sandy loam, light brownish gray to pale brown (10YR 6.5/2) dry; very weak coarse angular blocky structure parting to weak fine subangular blocky structure; hard, friable, sticky and plastic; common to many fine roots; common fine tubular pores; 33 percent gravels by weight; medium acid pH 5.6, noncalcareous; abrupt smooth boundary.

Btx 88-112+ centimeters (35-44+ inches). Brown (10YR 4/3), brown (10YR 5/3) rubbed, gravelly sandy loam, very pale brown (10YR 7/3) dry; massive structure; very hard, firm, slightly sticky and plastic; very few roots on relic ped faces; 44 percent gravels by weight; neutral pH 6.9, noncalcareous.



Pedon: Unnamed Sandy Loam 79-MT-2906 (021001R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-17	5.2	0.52	84	1.0				
2	E	17-67	5.7	0.70	66	1.1				
3	Bt	67-88	5.6	0.63	61	0.8				
4	Btx	88-112+	6.9	1.70	59	1.9				

30

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	4.9	1.4	0.2	1.0	7.1	16.8	51	3.12	1.81	0.112	16	0.84	8.1
2	4.5	1.6	0.8	0.9	3.6	13.0	68	0.83	0.48	0.049	10	0.84	8.1
3	7.2	2.5	0.5	0.9	3.1	17.9	78	0.65	0.38	0.033	12	0.67	8.1
4	3.0	1.1	1.3	1.1	1.8	27.0	78	0.27	0.16	0.026	6	0.69	8.4

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-2906 (021001R-2)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	-----X-----							-----X-----		
0-17						57.54	29.71	12.76	16	Sandy loam
17-67						64.34	24.57	11.09	16	Sandy loam
67-88						60.40	21.43	18.16	33	Gr. sandy loam
88-112+						58.86	29.00	12.14	44	Gr. sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	-----X-----			-----g/cc-----		-----X-----		-----X-----		
0-17						24.0	12.3	NDNP	NDNP	NDNP
17-67						16.4	9.1	NDNP	NDNP	NDNP
67-88						20.1	12.1	NDNP	NDNP	NDNP
88-112+						22.5	14.2	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Clay 79-MT-2907 (030601R-3)

Classification: fine-clayey, mixed, cryic Pachic Cryoboroll.

General Site Characteristics

Location: Madison County, Montana; approx. 3.5 miles upstream from Three Forks  
Cow Camp, Gravelly Range, NE1/4, SW1/4, SW1/4 of section 10, T. 11S., R. 38E.

Forest: Beaverhead National Forest

Area: East Fork Ruby River, Sheridan Ranger District

Described By/Date: RJP and DJS on October 4, 1979

Parent Rock/Material: shale, sandstone and volcanic till

Habitat Type: depauperate undergrowth, possible h.t. 's are Picea/Smsst, Psme/Libo-  
Syal, and Psme/Syal-Syal; 98 percent ground cover (vegetation and  
litter), 2 percent stone and rock.

Topography: concave and convex rumpley glacial moraine

Landform: old glacial moraine

Weathering:

Formation Name:

Slope: 18 percent

Aspect: north 342 degrees

Elevation: 2198 m (7210 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock: 2 percent

Climate: cryic, udic

Precipitation: 75 cm.

Erosion:

Infiltration: mod. slow-mod.

Permeability: mod. slow-mod.

Storage:

Drainage: well drained

Air Temp: MSST-7.1 deg. C

Soil Temp at 20 inches:

Salt/Alkal:

Remarks: This particular profile may be marginal to the Pale-subgroup, but it has a fairly thick albic and strong demonstration of eluviation. Organic matter illuviation is at its maximum just above the boundary of Bth horizon. Tongueing of the albic, into the argillic, is not strong. However, light-colored fine sand grains through the EB, and color coats and skeletons on peds in the Bth are evidence of encroachment of the albic into underlying horizons.

Pedon Description

H 0-8 centimeters (3-0 inches). Trace of stone and rock; few fine, medium and coarse roots; abrupt smooth boundary.

E 0-8 centimeters (0-3 inches). Dark grayish brown (2.5Y 4/2) clay, light brownish gray (2.5Y 6/2) dry; moderate to strong coarse and medium platy structure parting to strong fine angular blocky structure; slightly hard, firm, sticky and plastic; many fine, medium, coarse and very coarse roots; few fine tubular pores; no gravels; medium acid pH 6.0, noncalcareous; abrupt smooth boundary.

EB 8-30 centimeters (3-12 inches). Very dark grayish brown (2.5Y 3/2) clay, grayish brown (2.5Y 5/2) dry; weak coarse prismatic structure parting to strong fine angular blocky structure; hard, firm, sticky and plastic; many medium, coarse and very coarse roots; few fine tubular pores; no gravels; common thin clay films on ped interiors; medium acid pH 5.7, noncalcareous; clear smooth boundary.

Bth 30-55 centimeters (12-22 inches). Black to very dark grayish brown (2.5Y 2/1-3/2) clay, dark grayish brown (2.5Y 4/2) dry; moderate coarse prismatic structure parting to strong medium to fine angular blocky structure; hard, very firm, very sticky and very plastic; few fine, common medium and coarse roots; common fine tubular pores; trace gravels by weight; common patchy skeletons on ped interiors; common thick clay films on ped surfaces; medium acid pH 5.9, noncalcareous; abrupt wavy boundary.

Bt 55-120 centimeters (22-47 inches). Olive (5Y 5/3) clay, grayish brown (2.5Y 5/2) dry; strong very coarse prismatic structure parting to coarse blocky structure; very hard, very firm, very sticky and very plastic; few fine, common medium and coarse roots; common fine tubular pores; trace gravels by weight; many very thick clay films on ped faces; thick continuous clay films on ped interiors; slightly acid pH 6.2, noncalcareous; diffuse smooth boundary.

BC 120-156+ centimeters (45-61+ inches). Olive (5Y 5/3) silty clay loam, light yellowish brown (2.5Y 6/4) dry; few fine distinct light olive brown (2.5Y 5/6), and few fine faint olive (5Y 5/6) mottles; moderate medium to coarse prismatic structure; very hard, very firm, very sticky and very plastic; few fine and coarse roots; common fine tubular pores; trace gravels by weight; common thick clay films on ped faces; thin clay films on interiors; slightly acid pH 6.5, noncalcareous; fungal mycelium throughout.

Pedon: Unnamed Clay 79-MT-2907 (030601R-3)

Date: April 1980

Sample No.	Horizon	Depth	pH paste	EC <sup>3</sup> <sub>10</sub>	% Water at Saturation	Available P	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
		cm	mmhos/cm		ppm		%				
1	H	0-0	NS	NS	NS	NS					
2	E	0-8	6.0	0.90	56	19.4					
3	EB	8-30	5.7	0.78	59	14.8					
4	Bth	30-55	5.9	0.51	59	9.9					
5	Bt	55-120	6.2	0.47	63	7.6					
	BC	120-156+	6.5	0.49	57	8.8					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	DM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
		meq/100 gms				%		%		ratio			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	15.8	3.4	0.3	2.1	7.6	43.2	74	5.31	3.08	0.172	18	1.00	8.2
3	11.9	2.6	0.4	2.0	6.9	39.6	71	2.81	1.63	0.111	15	1.00	8.4
4	15.3	3.3	0.4	1.6	6.2	39.3	77	2.18	1.27	0.104	12	trace	8.3
5	15.5	3.6	0.3	0.7	4.2	37.0	83	1.89	0.64	0.062	10	trace	8.2
	15.5	3.6	0.3	0.6	3.8	36.3	84	1.35	0.79	0.069	11	trace	8.2

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Clay 79-MT-2907 (030601R-3)

Date: October 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	-----X-----								-----X-----		
8- 0						MS	MS	MS	MS	MS	
0- 8						18.24	37.67	44.89	none		Clay
8- 30						17.29	38.43	44.28	none		Clay
30- 55						18.78	38.20	43.82	trace		Clay
55-120						23.19	34.83	41.99	trace		Clay
120-156+						19.30	40.85	39.85	trace		Silty clay loam

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core g/cc	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	-----X-----			-----g/cc-----	-----X-----		-----X-----		
8- 0					MS	MS	MS	MS	MS
0- 8					33.2	24.2	54	27	27
8- 30					31.1	19.3	43	19	25
30- 55					30.0	19.5	42	21	21
55-120					28.4	17.8	40	14	26
120-156+					29.7	17.7	38	10	28

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 MS-no sample  
 Water content-Anita Falen

Analysis by: Debbie Hall



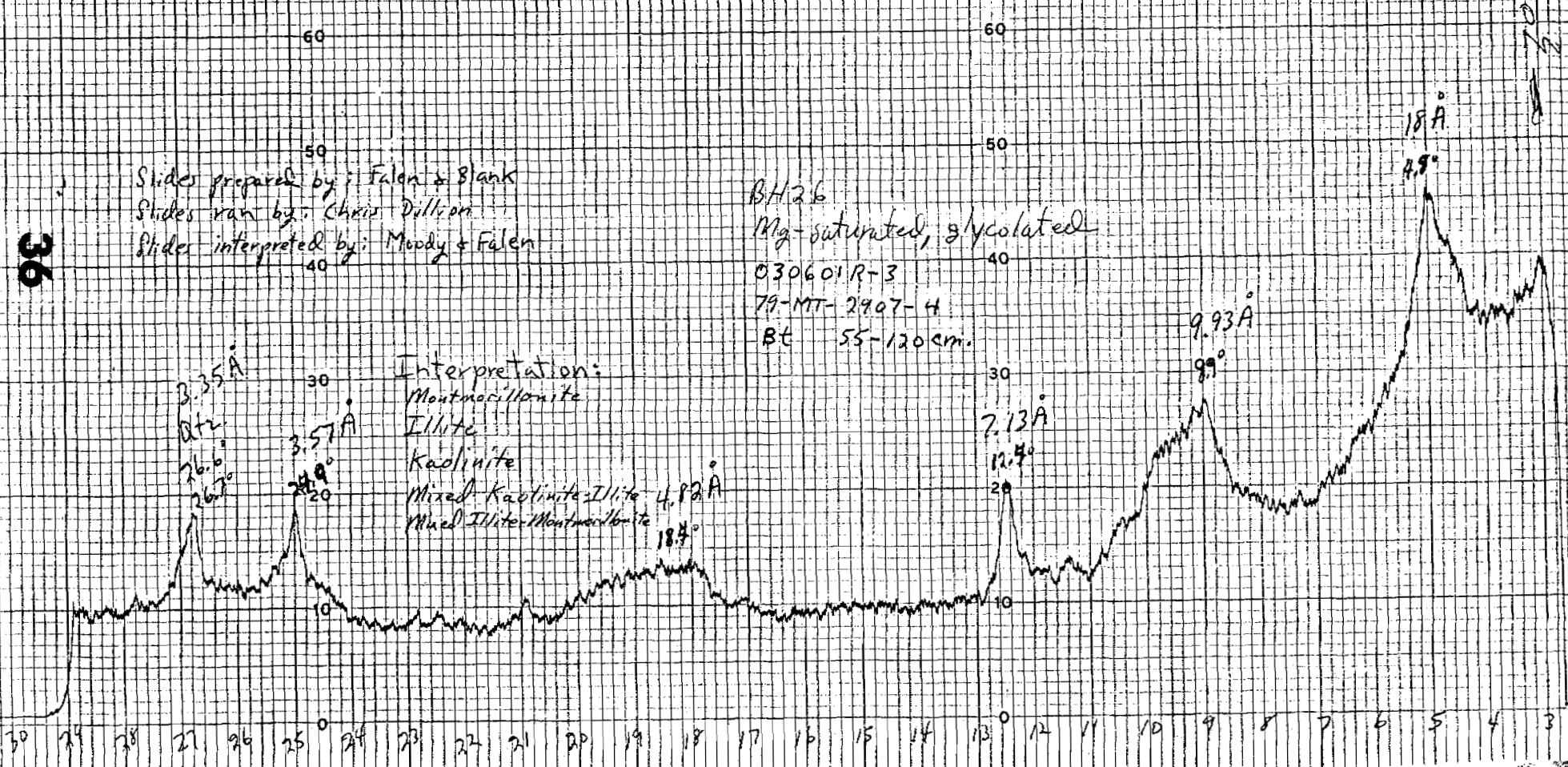
BH 26  
 Mg-saturated, glycolated  
 030601 R-3  
 79-MT-2907-4  
 Bt 55-120 cm

36

Slides prepared by: Falen & Blank  
 Slides ran by: Chris Dillon  
 Slides interpreted by: Moody & Falen

BH 26  
 Mg-saturated, glycolated  
 030601 R-3  
 79-MT-2907-4  
 Bt 55-120 cm.

Interpretation:  
 Montmorillonite  
 Illite  
 Kaolinite  
 Mixed Kaolinite-Illite  
 Mixed Illite-Montmorillonite





BH 26

K-saturated, air dried

030601 R-3

79-MT-2907-4

Bt 55-120 cm

37

90

80

70

60

50

40

30

20

10

0

BH 26  
K-saturated, airdried  
030601 R-3  
79-MT-2907-4  
Bt 55-120 cm

90

80

70

60

50

40

30

20

10

0

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

3.32A

3.57A

4.98A

7.53A

10.3A

11.78A

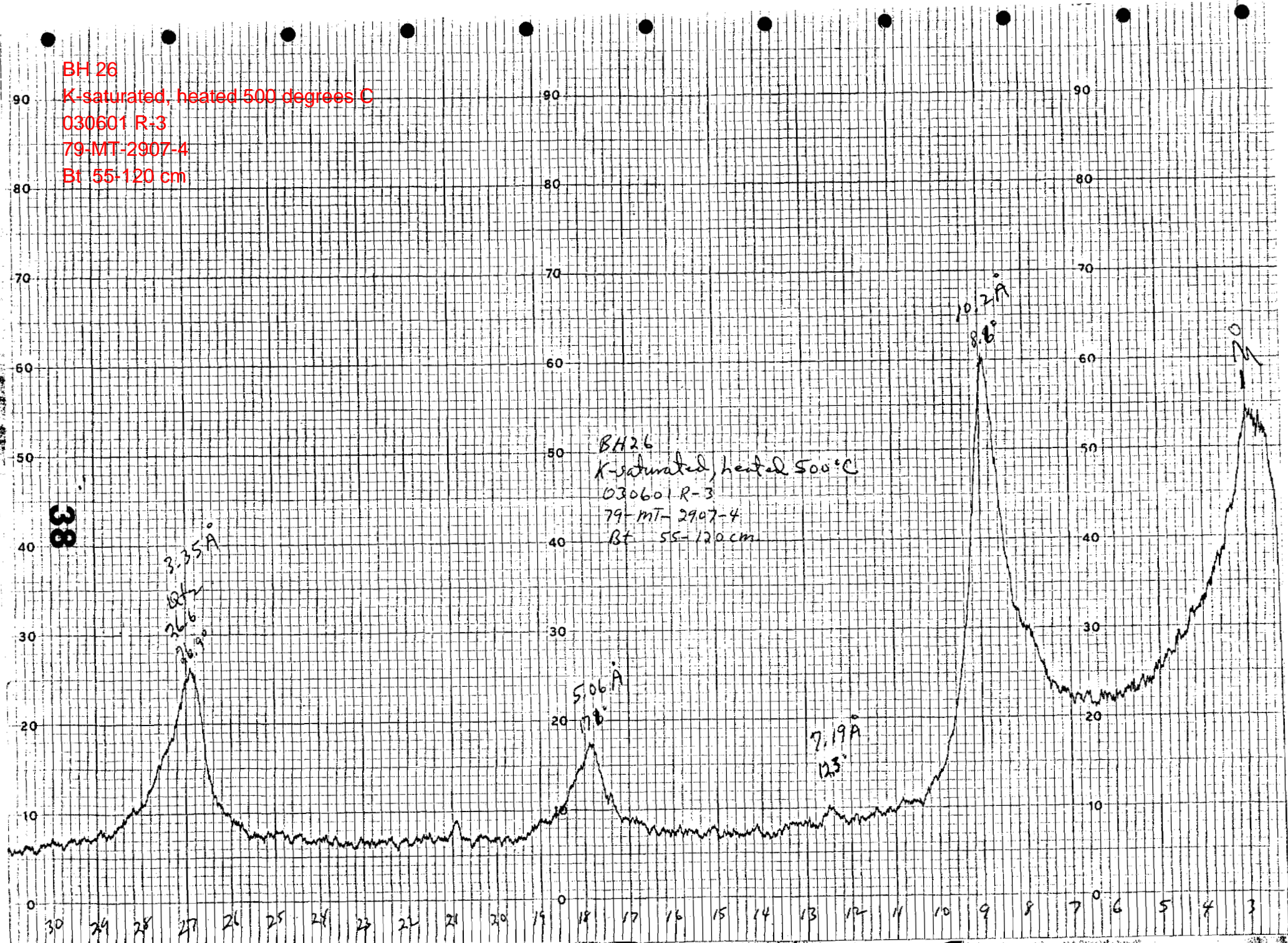
19.11



BH 26  
K-saturated, heated 500 degrees C  
030601 R-3  
79-MT-2907-4  
Bt 55-120 cm

38

BH 26  
K-saturated, heated 500°C  
030601 R-3  
79-MT-2907-4  
Bt 55-120 cm



Unnamed Gravelly Silt Loam 79-MT-0102 (170901B-1)

Classification: medial over fragmental, mixed Andic Cryochrept.

General Site Characteristics

Location: Beaverhead County, Montana; approx. 1.5 miles south-southeast of Boner Knob, Pioneer Mountains, NW 1/4, SW 1/4, SW 1/4 of section 28, T. 1S., R. 11W.

Forest: Beaverhead National Forest

Area: Adson Creek, Wise River Ranger District

Described By/Date: MH and JW on September 14, 1978

Parent Rock/Material: quartzite with apparent ash cap

Habitat Type: Abia/Liba h.t. Vasc phase; ground cover nearly 100 percent (plant and litter); surface gravel mixed in H horizon. Coniferous forest.

Topography: weakly dissected, few LOS

Landform: weakly cryoplanated

Weathering:

Formation Name:

Slope: 46 percent

Aspect: north 2 degrees

Elevation: 1990 m (6530 feet)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate: cryic, udic

Precipitation: 50 cm.

Erosion:

Infiltration: moderate

Permeability: moderate

Storage:

Drainage: well drained

Air Temp: MSST- 7.8 deg. C

Soil Temp at 20 inches:

Salt/Alkal:

Remarks: This particular profile seems to be intergrading towards a Spodosol; a spodic horizon is forming at 4-10 centimeters. The taxonomy does not provide for spodic intergrades from Cryochrepts, however. Surface horizon probably has an ash influence; it is dark when moist, but dries out light, and resists wetting. Further, the first three horizons are thixotropic; jelling when moistened and worked up. This is further evidence of ash accumulation, and provides a favorable condition for the development of a spodic horizon. The E, B21rh, and B22ir horizons are discontinuous. The rapid permeability of the fragmental subsoil probably accounts for the preservation of the ash cap on this site.

Peden Description

O 2-0 centimeters (1-0 inches). Twenty percent coarse fragments (angular gravel); abrupt smooth boundary.

A2 0-4 centimeters (0-2 inches). Dark gray (10YR 4/1) gravelly silt loam, light brownish gray (10YR 6/2) dry; very weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine, medium and many coarse roots; 28 percent gravels by weight; strongly acid pH 5.1, noncalcareous; abrupt irregular boundary.

79-MT-0102 (cont.)

B21rh 4-10 centimeters (2-4 inches). Dark yellowish brown to brown (10YR 4/4 to 7.5YR 4/4) silt loam, brown (10YR 5/3) dry; weak very fine to fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine, medium, and many coarse roots; 10 percent gravels by weight; very strongly acid pH 4.9, noncalcareous; clear irregular boundary.

C 36-70+ centimeters (14-28+ inches). Dark grayish brown (10YR 4/2) silt loam, light gray (2.5Y 7/2) dry; very weak fine subangular blocky structure parting to very weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine vesicular pores; 20 percent gravels by weight; strongly acid pH 5.5, noncalcareous.

Pedon: Unnamed Gravelly Silt Loam 79-MT-0102 (170901B-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC#10 <sup>3</sup> mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	2-0	NS	NS	NS	NS	NS	NS	NS	NS	
2	A2	0-4	5.1	0.48	102	6.1	nd	nd	nd	nd	
3	B21rh	4-10	4.9	0.38	77	3.3	0.80	0.40	0.12	0.23	no
3	B22ir	10-36	5.4	0.35	90	4.4	0.36	0.20	0.05	0.14	no
4	C	36-70	5.5	0.30	72	4.7	nd	nd	nd	nd	

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH			
	Ca	Mg	Na	K	H	Saturation					ratio	Fraction				
													meq/100 gms	%	%	
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			
2	2.4	0.8	0.1	1.5	10.9	16.3	31	6.30	3.66	0.894	39	0.72	9.5			
3	2.2	0.7	0.1	0.8	15.4	21.4	20	5.05	2.94	0.105	28	0.90	10.0			
3	3.3	0.9	0.2	1.0	11.9	23.4	31	2.73	1.59	0.075	21	0.82	9.9			
4	4.3	1.5	0.2	0.8	6.5	20.9	51	1.35	0.79	0.052	16	0.80	8.7			

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample  
 nd-not determined

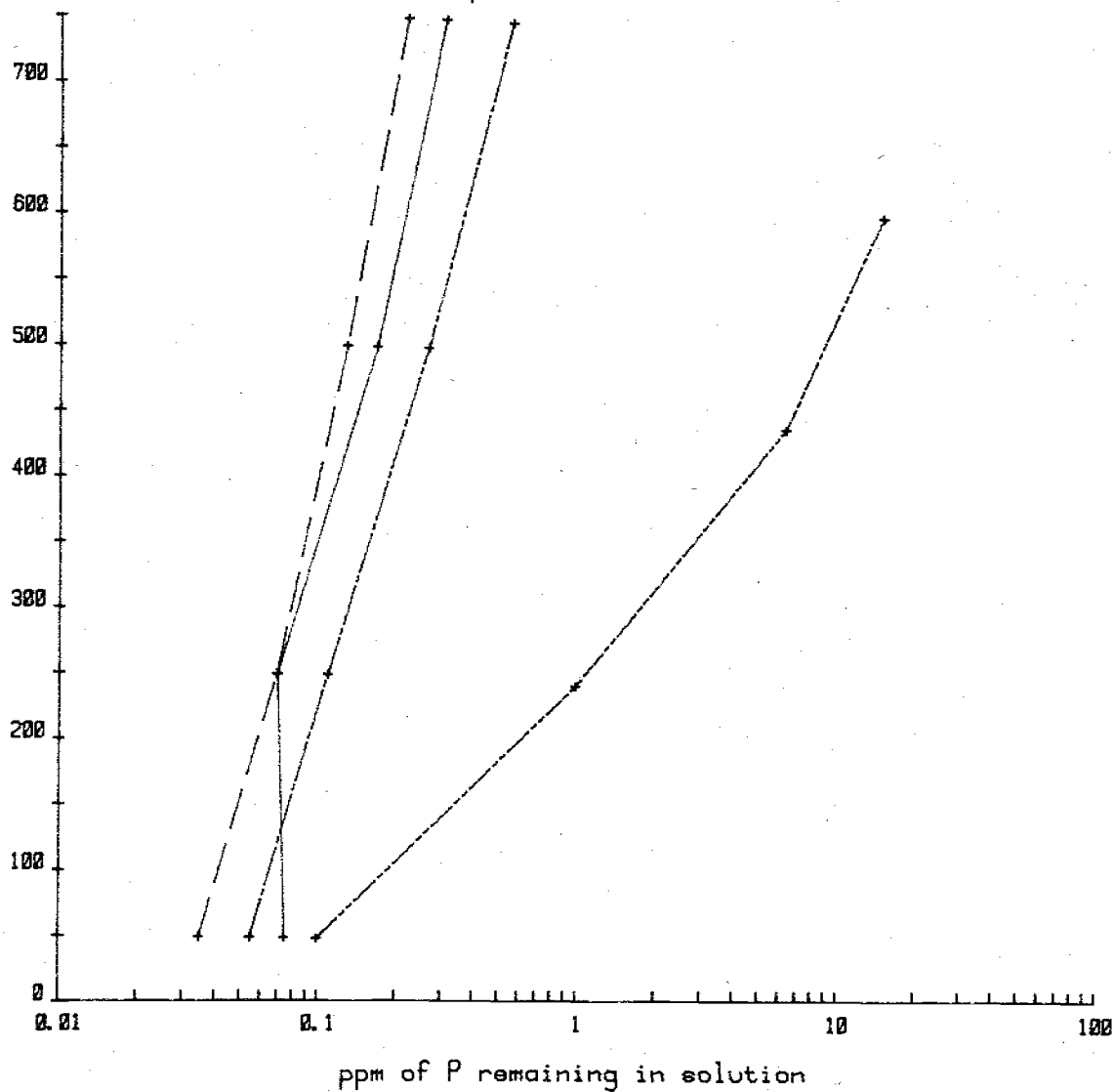
Analysis by: Zelda Fadness

17

# Phosphorus Isotherm

79-MT-0102

µg P/100g soil



µg/g soil	Soln ppm
----- A2	
49	0.08
249	0.07
498	0.17
747	0.32
----- B21irh	
50	0.04
249	0.07
499	0.13
748	0.23
----- B22ir	
49	0.06
249	0.11
497	0.27
744	0.58
----- C	
49	0.10
240	1.00
435	6.46
596	15.40

Pedon: Unnamed Gravelly Silt Loam 79-MT-0102 (170901B-1)

Date: October 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%								%		
2-0	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS
0-4	3.63	5.53	4.80	8.80	10.28	33.04	53.87	13.09	28		Gr. silt loam
4-10	1.45	3.99	3.15	6.02	12.56	27.15	60.14	12.71	10		Silt loam
10-36	1.56	2.51	1.82	4.15	14.90	24.91	60.49	6.60	18		Gr. silt loam
36-70	2.83	6.07	4.26	6.70	13.48	33.34	60.08	6.58	20		Gr. silt loam

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core	Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	%			g/cc	%		%		
2-0					NS	NS	NS	NS	NS
0-4					IS	IS	NDNP	NDNP	NDNP
4-10					37.0	13.2	NDNP	NDNP	NDNP
10-36					40.8	12.3	NDNP	NDNP	NDNP
36-70					31.9	9.3	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen  
 IS-insufficient sample

Analysis by: Anita Falen



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Beaverhead National Forest - LIM

Analysis by: Anita Falen and Debra Hall

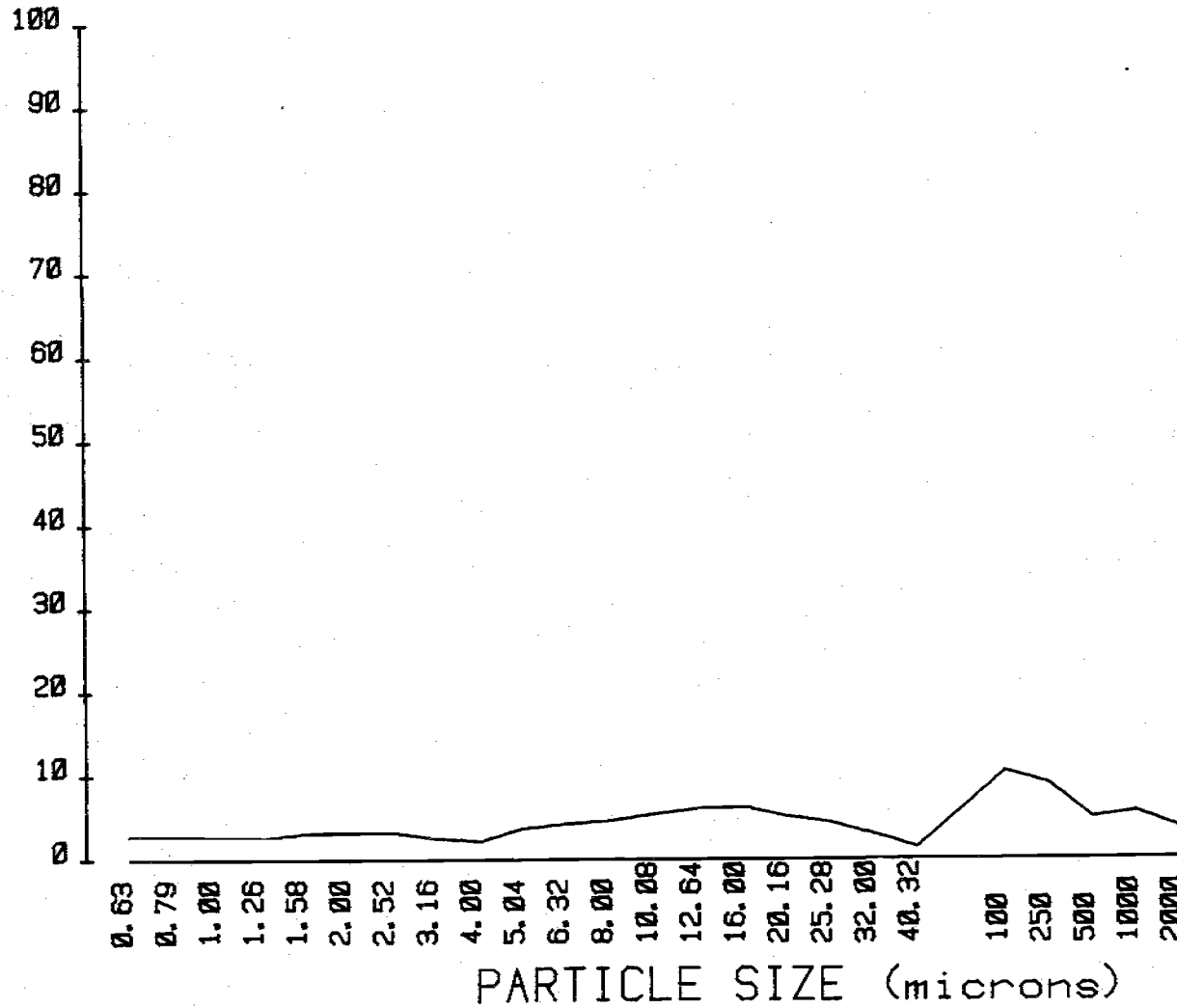
Date: January 1981

Identification		MO102-1	MO102-2	MO102-3	MO102-4
Units		-----%			
TC (0.63-2.00)		13.09	12.71	6.60	6.58
TSi (2.00-50)		53.87	60.14	68.49	60.08
TS (50-2000)		33.04	27.15	24.91	33.34
Clay	0.63-0.794	2.59	2.11	0.95	1.03
	0.794-1.00	2.52	2.11	0.99	1.13
	1.00-1.26	2.68	2.70	1.36	1.32
	1.26-1.59	2.36	2.46	1.35	1.29
	1.59-2.00	2.29	3.32	1.96	1.81
Fine Silt	2.00-2.52	3.18	3.62	2.30	2.20
	2.52-3.17	3.01	3.21	2.24	2.41
	3.17-4.00	2.33	2.46	1.92	2.16
	4.00-5.04	1.92	1.61	1.57	3.19
Medium Silt	5.04-6.35	3.48	3.75	3.52	3.84
	6.35-8.00	4.02	4.18	4.11	4.37
	8.00-10.08	4.42	4.76	4.91	4.80
	10.08-12.70	5.19	6.02	6.41	5.85
	12.70-16.0	5.85	6.60	7.42	6.68
	16.0-20.2	6.01	6.60	8.39	6.28
Coarse Silt	20.2-25.4	4.88	6.39	8.53	6.22
	25.4-32.0	4.17	5.25	7.63	5.47
	32.0-40.3	2.72	3.93	7.35	4.37
	40.3-50.8	1.16	1.78	2.19	1.18
	50.8-64.0	1.55	0.00	0.00	0.44
VFS (50-100)		10.28	12.56	14.90	13.48
FS (100-250)		8.80	6.02	4.15	6.70
MS (250-500)		4.80	3.15	1.82	4.26
CoS (500-1000)		5.53	3.99	2.51	6.07
VCoS (1000-2000)		3.63	1.45	1.56	2.83
Greater than 2000		28	10	18	20
Textural Class		Gr. SiL	SiL	Gr. SiL	Gr. SiL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M0102-1

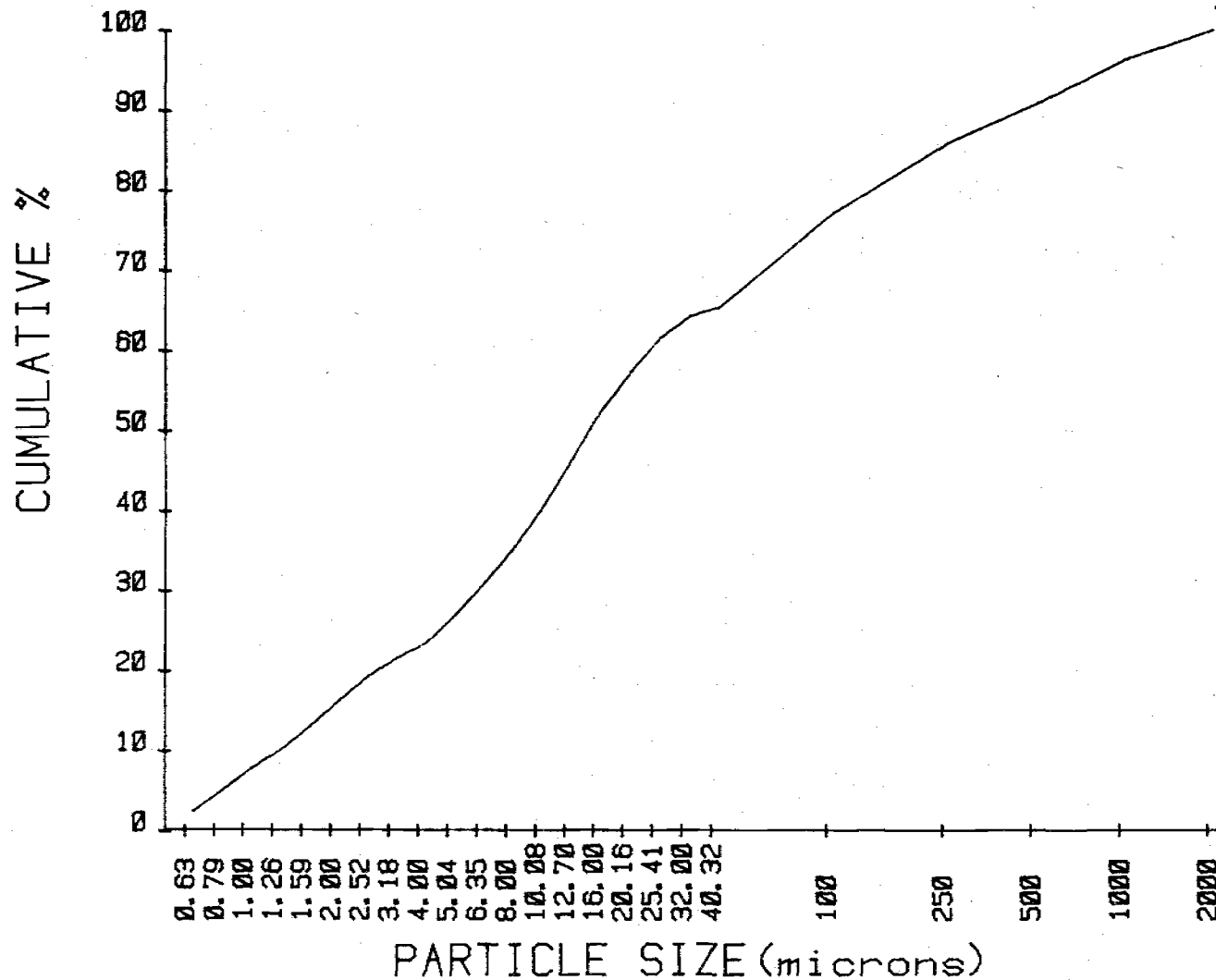


2.50	4.02
3.16	4.42
3.98	5.19
5.00	5.85
6.30	6.01
8.00	4.88
10.00	4.17
12.50	2.72
15.85	1.16
20.00	1.55
25.00	
31.50	
40.00	
50.00	
63.00	
80.00	
100.00	
125.00	
157.50	
200.00	
250.00	
315.00	
400.00	
500.00	
630.00	
800.00	
1000.00	
1250.00	
1575.00	
2000.00	



CUMULATIVE CURVE SAND-SILT-CLAY

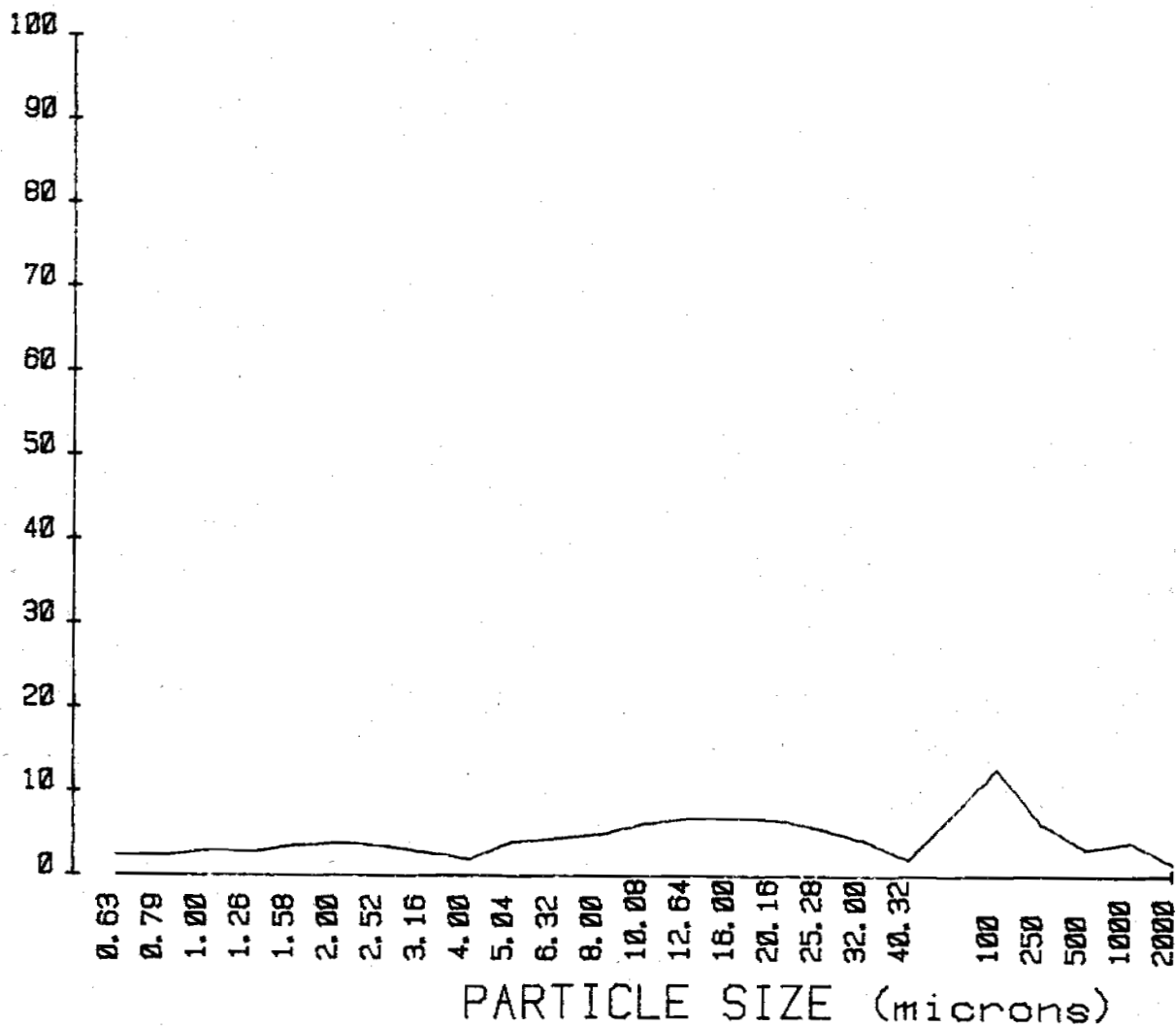
ID M0102-1



2.59	31.03
5.11	35.45
7.79	40.64
10.15	46.48
13.00	52.49
16.26	57.37
19.28	61.53
21.61	64.25
23.53	65.41
27.01	66.96
77.24	
86.04	
90.84	
96.37	
100.00	

PLOT SAND-SILT-CLAY

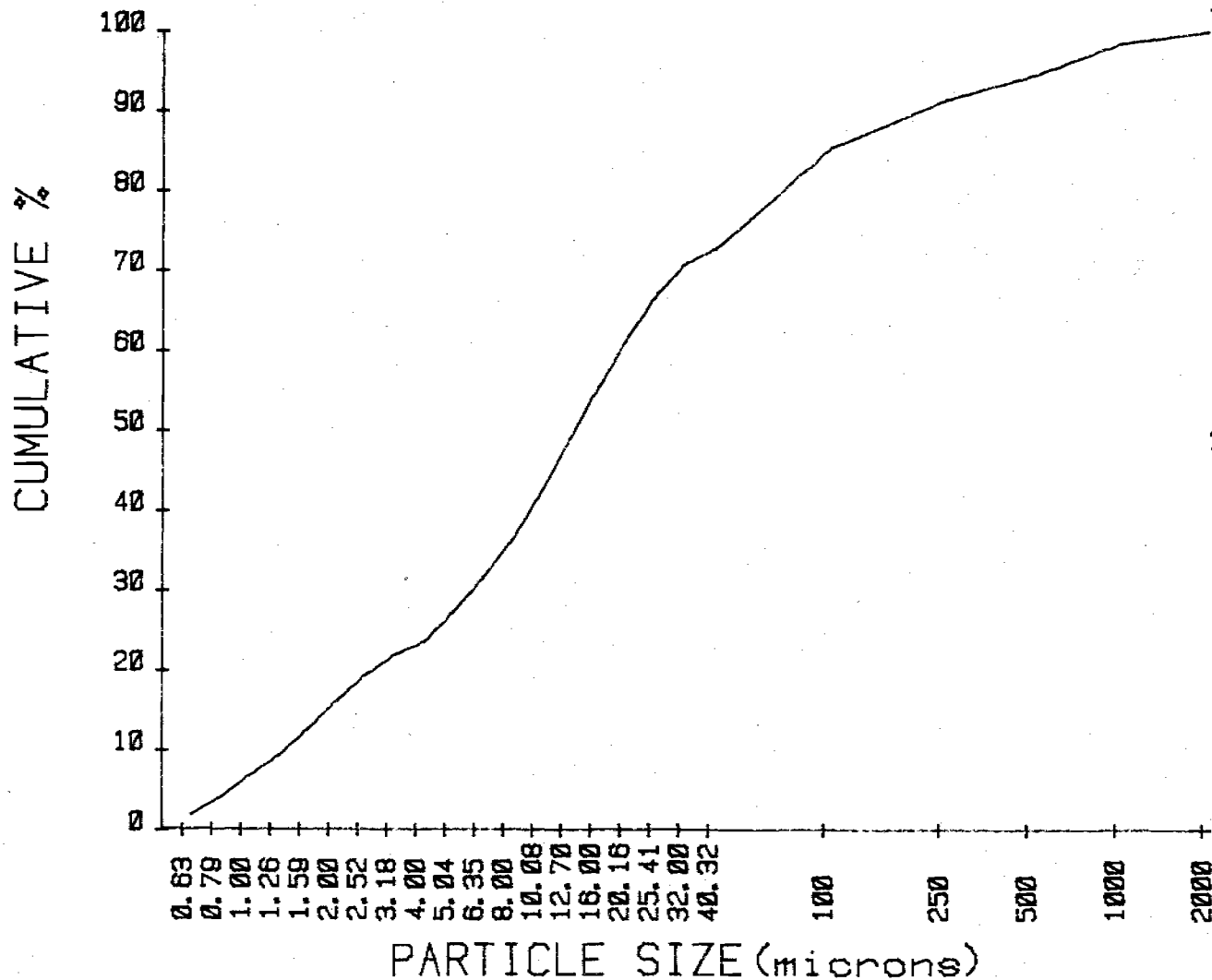
ID M0102-2



2.11	4.18
2.11	4.76
2.70	6.02
2.46	6.60
3.32	6.60
3.62	6.39
3.21	5.25
2.46	3.93
1.61	1.78
3.75	0.00
12.56	
6.02	
3.15	
2.99	
1.45	

CUMULATIVE CURVE SAND-SILT-CLAY

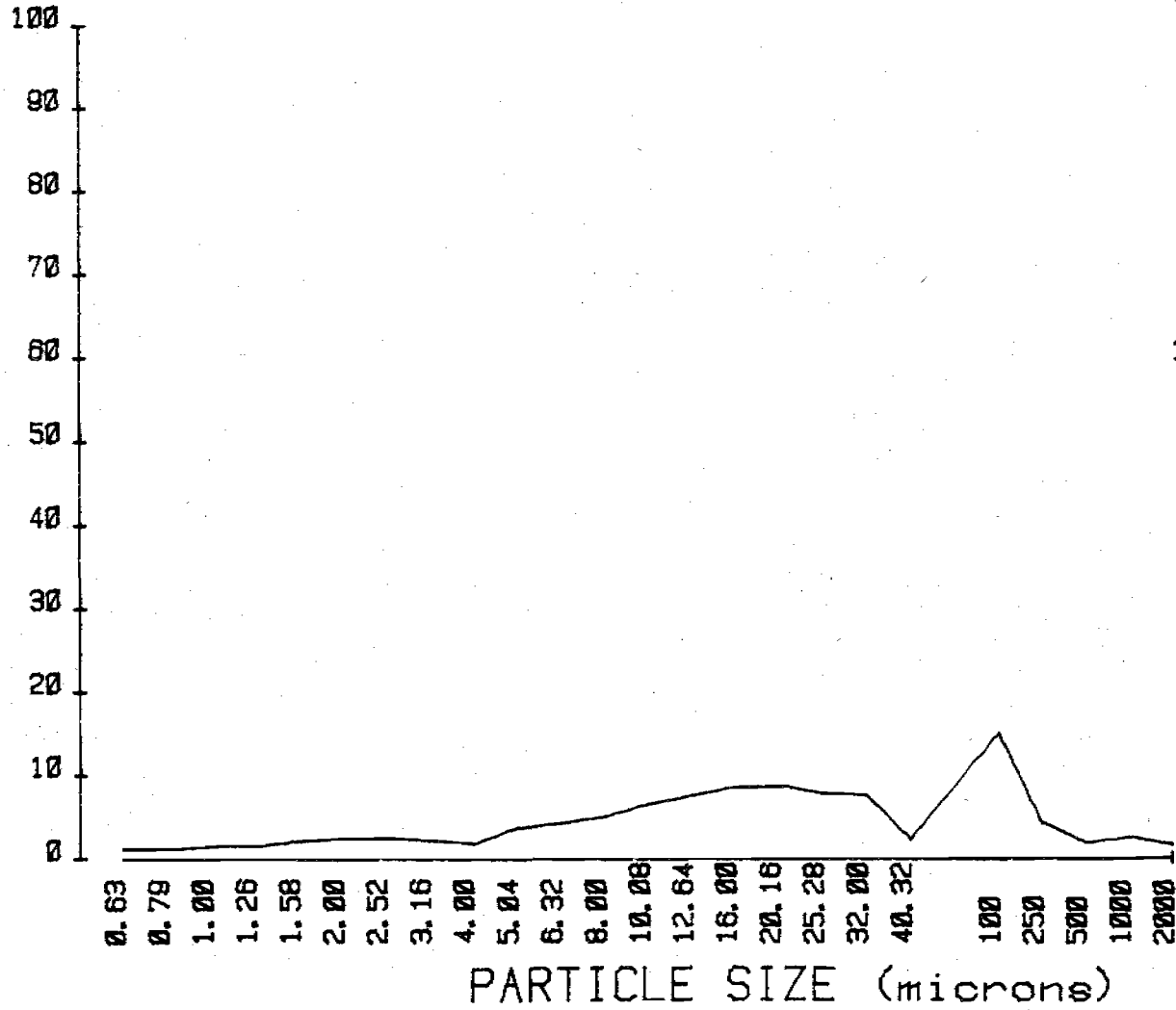
ID M0102-2



2.11	31.53
4.23	36.29
6.93	42.30
9.38	48.90
12.71	55.50
16.32	61.89
19.54	67.14
21.99	71.07
23.61	72.85
27.35	72.85
85.41	
91.43	
94.58	
98.57	
100.02	

PLOT SAND-SILT-CLAY

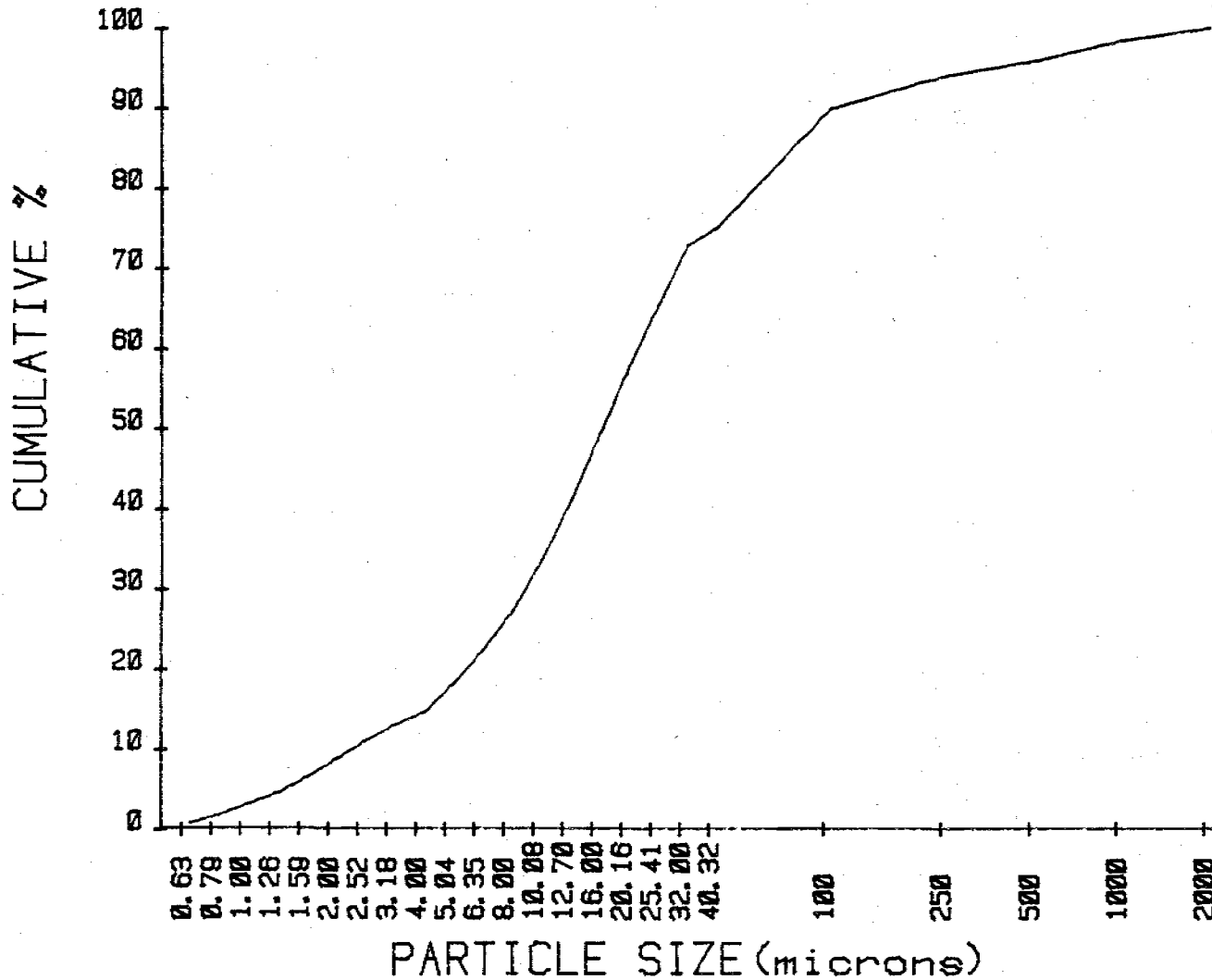
ID M0102-3



0.95	4.11
0.90	4.81
1.38	6.41
1.34	7.42
1.95	8.30
2.38	8.53
2.24	7.83
1.90	7.95
1.57	2.18
3.52	0.00
14.90	
4.15	
1.82	
2.51	
1.56	

CUMULATIVE CURVE SAND-SILT-CLAY

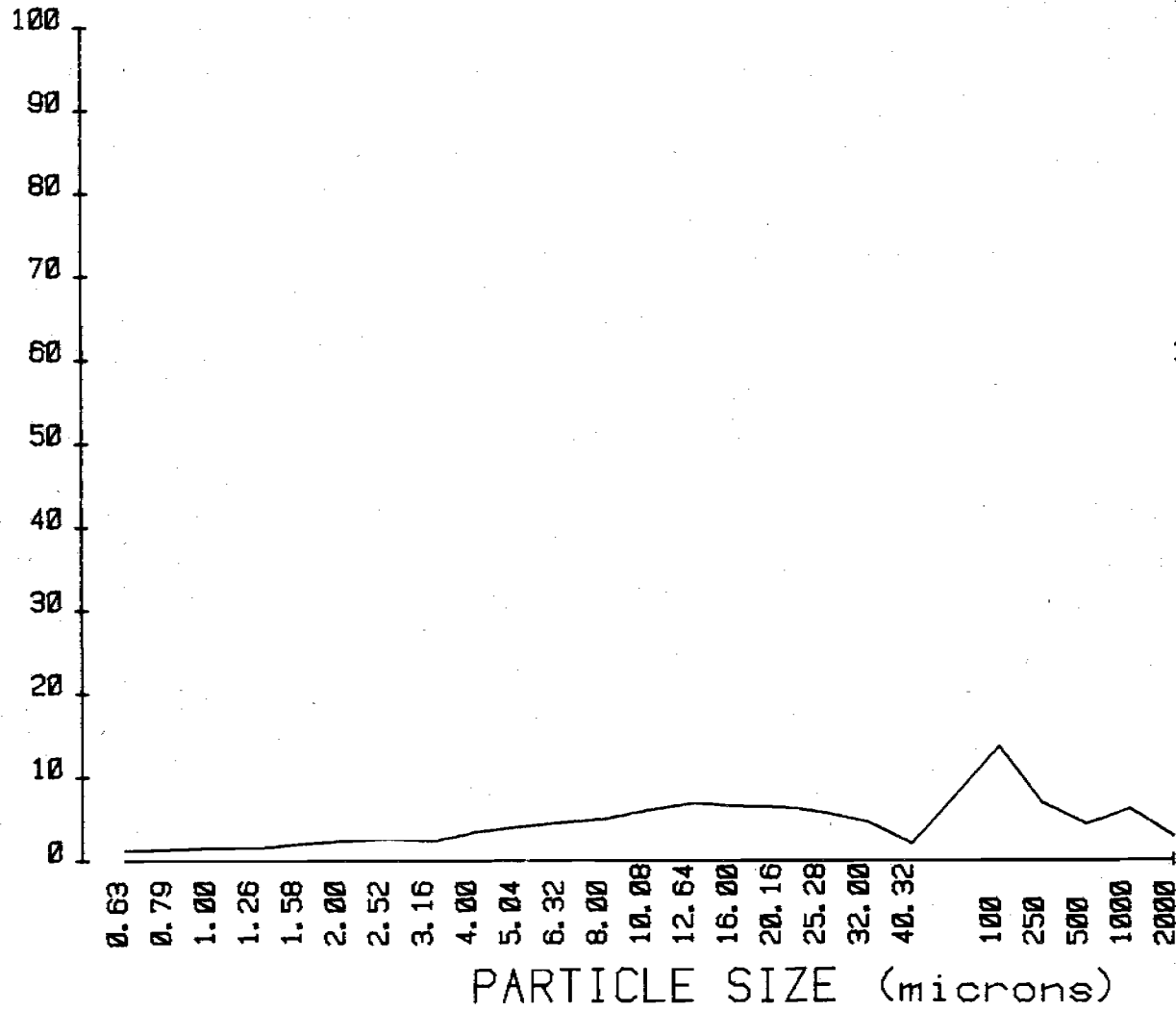
ID M0102-3



0.95	22.26
1.94	27.17
3.30	33.57
4.64	40.00
6.60	49.39
8.90	57.92
11.14	65.55
13.08	72.00
14.69	75.00
18.15	75.00
89.00	
94.14	
95.96	
98.47	
100.03	

PLOT SAND-SILT-CLAY

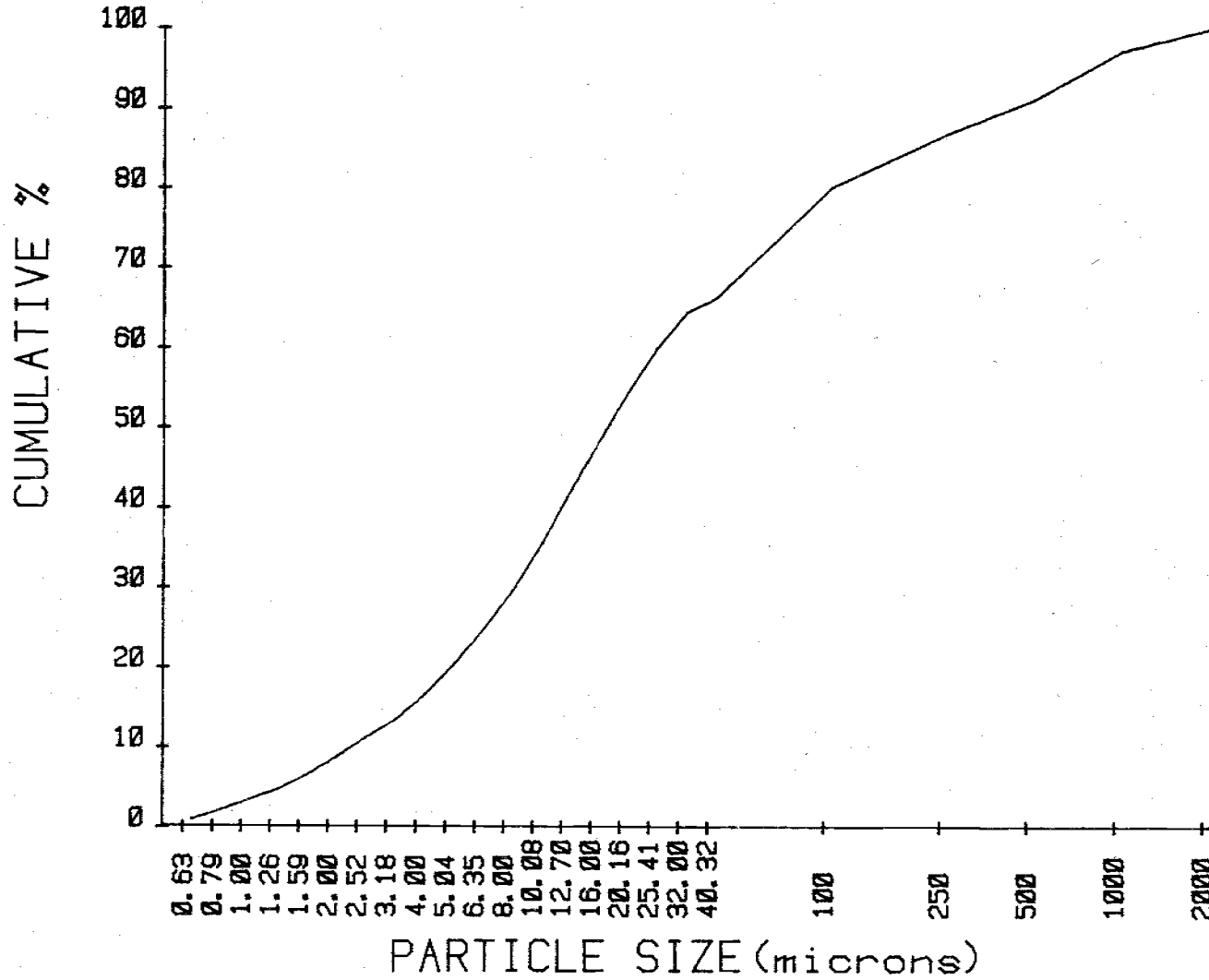
ID M0102-4



1.03	4.37
1.13	4.80
1.32	5.85
1.29	6.68
1.81	6.28
2.20	6.21
2.41	5.46
2.16	4.37
3.19	1.81
3.84	0.44
13.48	
6.70	
4.26	
6.07	
2.83	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M0102-4



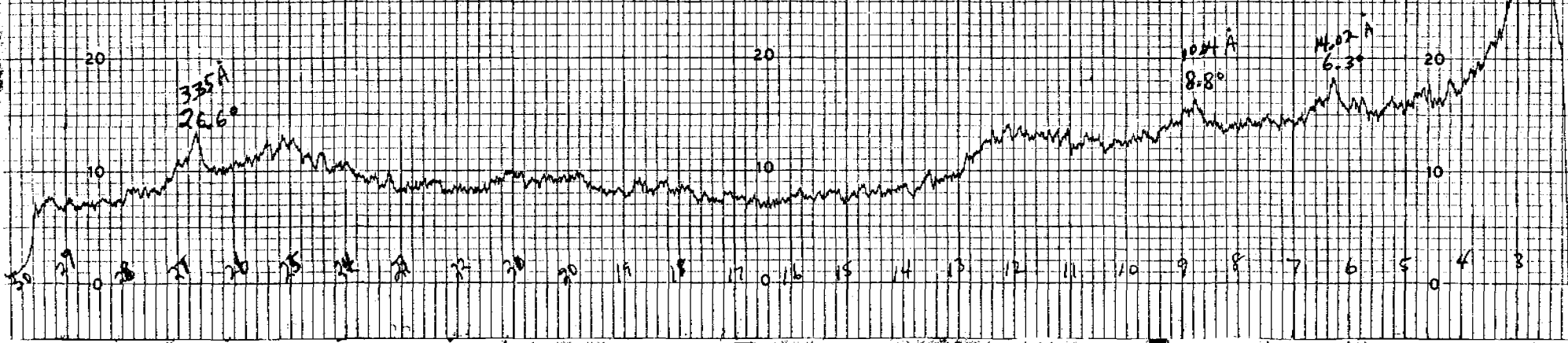
1.03	24.75
2.15	29.55
3.47	35.40
4.77	42.08
6.58	48.36
8.78	54.57
11.19	60.04
13.36	64.41
16.54	66.22
20.38	66.66
80.14	
86.84	
91.10	
97.17	
100.00	

BH 30  
Mg-saturated, glycolated  
170901 B-1  
79-MT-0102-3  
B225 10-36 inches

BH 30  
Mg-saturated, glycolated  
170901 B-1  
79-MT-0102-3  
B225 10-36"

53  
Slides prepared by: Folen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Folen

Interpretation: Amorphous  
Small amount of illite, vermiculite, + chlorite





BH 30  
K-saturated, air dried  
170901 B-1  
79-MT-0102-3  
B225 10-36 inches



54

BH 30  
K-saturated, air dried  
170901 B-1  
79-MT-0102-3  
B225 10-36"

10.04 A  
8.80

3.35 A  
RT  
26.6

29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

Unnamed Gravelly Fine Sandy Loam 79-MT-0103 (Anderson Mtn.)

Classification: coarse-loamy, mixed Dystric Cryochrept.

General Site Characteristics

Location: Beaverhead County, Montana; southeast of Chief Joseph Pass in the Bitterroot Range, southwest 1/4, northwest 1/4, southeast 1/4 of section 10, T. 2S., R. 19W.

Forest: Beaverhead National Forest

Area: Anderson Mountain, Wisdom Ranger District

Described By/Date: RJP and DJS on August 6, 1979

Parent Rock/Material: sandstone

Habitat Type: Abia/Mefe h.t., 80 percent ground cover; 20 percent stone and rock. Coniferous forest.

Topography: convex ridge top to flat to slightly convex simple slope, 40 % ave. sideslopes

Landform: moderately frost churned, sl. convex ridge top Climate: cryic, udic

Weathering: Precipitation: 102 cm.

Formation Name: Erosion:

Slope: 40 percent Infiltration: moderately rapid

Aspect: northeast Permeability: moderately rapid

Elevation: 2252 m (7390 feet) Storage:

Soil Depth: Drainage: well drained

Eff. Rooting Depth: Air Temp: MSST- 7.7 deg. C

Litter Type: Soil Temp at 20 inches:

Surface Rock: 20 percent Salt/Alkal:

Remarks: If ash cap in some areas is thick enough, the classification may be Andic Cryochrept and/or there would be a finer family class. Origin of ash/loess is unknown, but is probably from a local source. Nimlos (personal communication) sampled near Lost Trail Pass and found a high amount (~50 percent glass). Ottersburg (personal communication) sampled the profile described, but it did not qualify for an Andic subgroup.

Pedon Description

O1&O2 0.6-0 centimeters (0.25-0 inches). Abrupt smooth boundary.

A2 0-5 centimeters (0-2 inches). Gray (10YR 6/1) gravelly fine sandy loam, white (10YR 8/1) dry; weak fine platy structure; loose, nonsticky and nonplastic; common medium and fine roots; 24 percent gravels by weight; very strongly acid pH 4.5, noncalcareous; abrupt wavy boundary.

79-MT-0103 (cont.)

B21ir 5-13 centimeters (0-2 inches). Strong brown (7.5YR 5/6) gravelly fine sandy loam, yellowish brown (10YR 5/8) dry; weak very fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common medium and fine roots;

B22ir 13-41 centimeters (5-16 inches). Yellowish brown to brownish yellow (10YR 5/6-6/6) gravelly fine sandy loam, yellow to yellowish brown (10YR 7/6-5/8) dry; structureless; slightly hard, friable, slightly sticky and nonplastic; common medium and coarse roots; 28 percent gravels by weight; very strongly acid pH 4.9, noncalcareous; gradual smooth boundary.

B3 41-97 centimeters (16-38 inches). Yellowish brown to brownish yellow (10YR 5/6-6/6) gravelly fine sandy loam, yellow (10YR 7/6) dry; structureless; slightly hard, firm, slightly sticky and nonplastic; evidence of weak cementation observed by brittleness from 8.5-11.6 centimeter when dry; few coarse roots; 25 percent gravels by weight; very strongly acid pH 4.7, noncalcareous.

Pedon: Unnamed Gravelly Fine Sandy Loam 79-MT-0103 (Anderson Mtn)

Date: April 1980

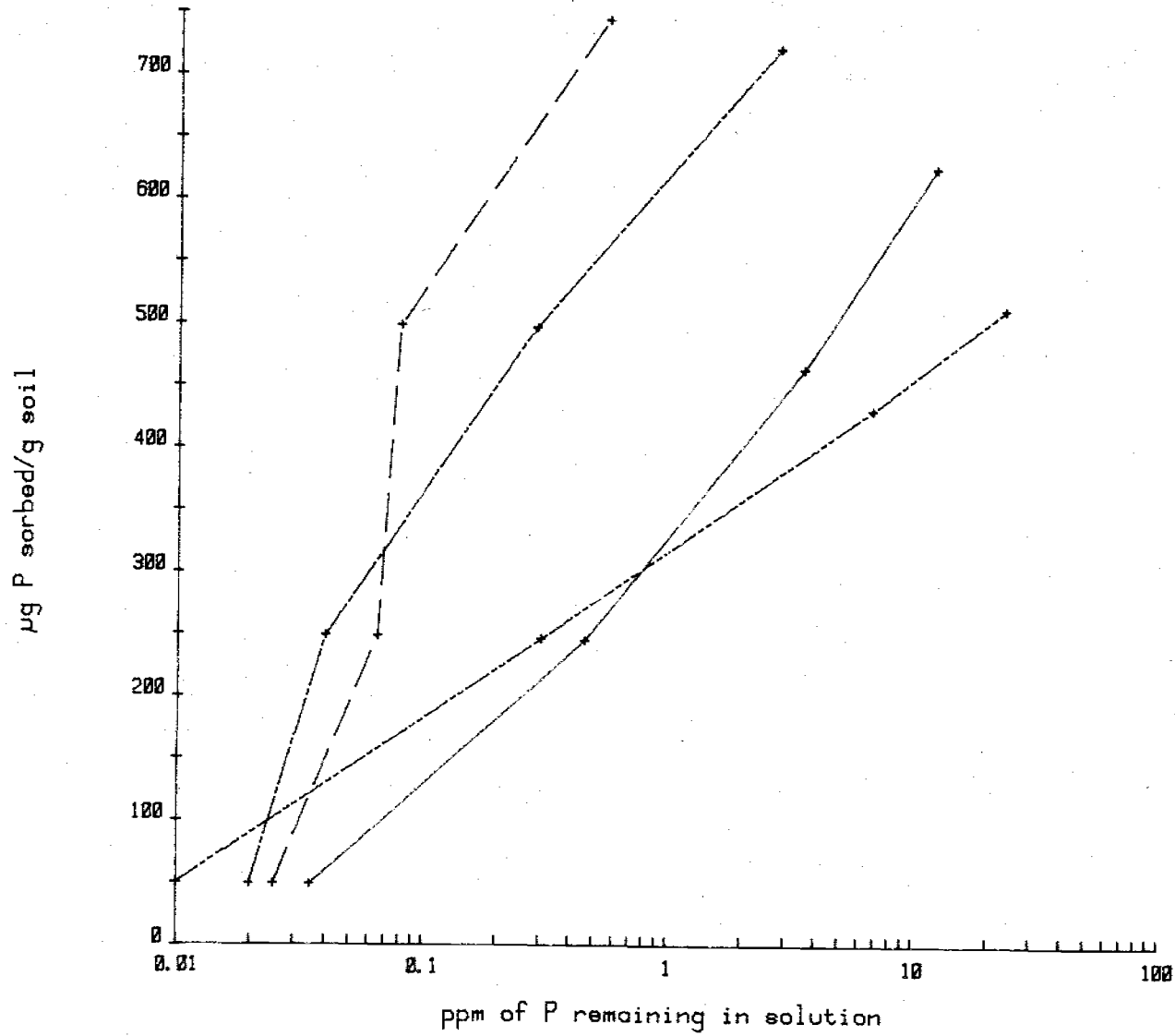
Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	B1&O2	1-0	NS	NS	NS	NS	NS	NS	NS	NS	
2	A2	0-5	4.5	0.16	60	3.8	0.17	0.09	0.05	0.07	no
3	B21r	5-13	4.7	0.11	48	2.7	0.60	0.28	0.08	0.14	no
3	B221r	13-41	4.9	0.13	37	1.0	0.26	0.13	0.01	0.07	no
4	B3	41-97	4.7	0.21	34	0.8	0.18	0.05	0.01	0.03	no

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	0.6	0.2	0.1	0.2	8.9	10.0	11	3.28	1.91	0.061	31	0.76	8.2
3	0.3	0.1	0.1	0.1	8.9	8.8	5	1.14	0.67	0.039	17	0.75	10.4
3	0.3	0.1	0.1	0.1	4.9	5.4	9	0.37	0.22	0.021	10	0.72	9.5
4	0.5	0.2	0.1	0.1	3.8	4.5	19	0.19	0.11	0.015	7	0.75	8.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

## Phosphorus Isotherm



79-MT-0103

μg/g soil	Soln ppm
----- A2	
50	0.04
245	0.46
464	3.63
626	12.44
----- B21ir	
50	0.03
249	0.07
499	0.08
744	0.57
----- B22ir	
50	0.02
250	0.04
497	0.29
721	2.86
----- B3	
50	0.01
247	0.31
431	6.90
512	23.76

Pedon: Unnamed Gravelly Fine Sandy Loam 79-MT-0103 (Anderson Mtn.)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt.		vol.
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002			
cm	%							%			
1-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-5	2.71	6.31	6.73	21.66	15.75	53.15	41.85	5.80	24		Gr. fine sandy loam
5-13	6.34	7.94	8.15	22.54	19.23	64.21	30.96	4.83	25		Gr. fine sandy loam
13-41	4.94	9.84	10.38	28.06	16.13	69.36	26.30	4.34	28		Gr. fine sandy loam
41-97	4.80	9.13	9.55	25.85	18.58	67.91	29.40	2.69	25		Gr. fine sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc		%		%	
1-0						NS	NS	NS	NS
0-5						22.1	6.4	NDNP	NDNP
5-13						14.1	6.8	NDNP	NDNP
13-41						10.7	4.8	NDNP	NDNP
41-97						10.3	3.5	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Beaverhead National Forest - LIM

Analysis by: Anita Falen and Debra Hall

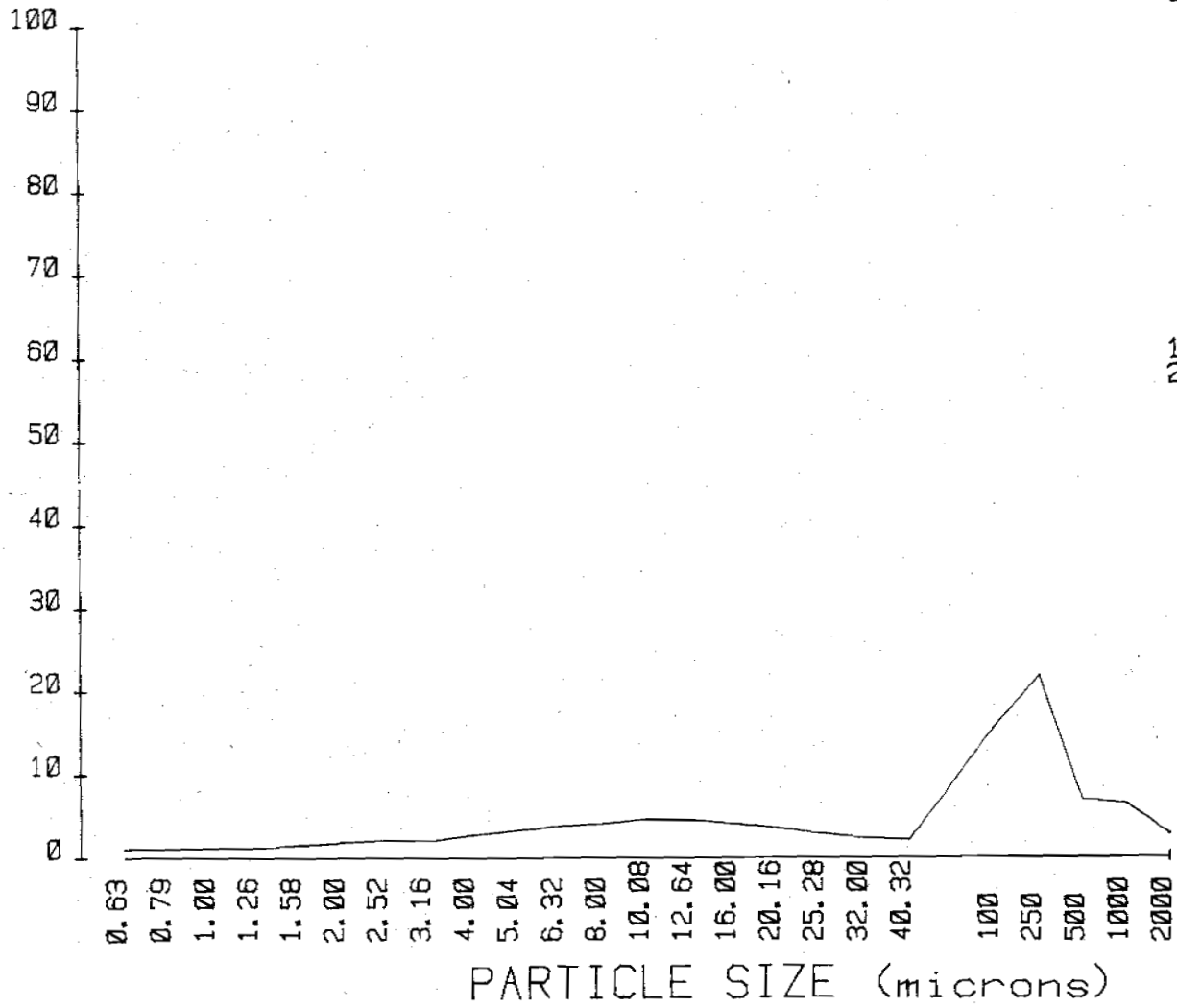
Date: January 1981

Identification		M0103-1	M0103-2	M0103-3	M0103-4
Units		-----%			
TC (0.63-2.00)		5.00	4.83	4.34	2.69
TSi (2.00-50)		41.85	30.96	26.30	29.40
TS (50-2000)		53.15	64.21	69.36	67.91
Clay	0.63-0.794	0.84	1.06	1.00	0.62
	0.794-1.00	0.88	1.00	0.86	0.49
	1.00-1.26	0.99	0.99	0.86	0.52
	1.26-1.59	0.95	0.82	0.72	0.46
	1.59-2.00	1.34	0.96	0.91	0.60
Fine Silt	2.00-2.52	1.66	1.06	1.03	0.72
	2.52-3.17	1.88	1.08	1.12	0.81
	3.17-4.00	1.81	1.03	1.07	0.83
	4.00-5.04	2.51	1.45	1.47	1.08
Medium Silt	5.04-6.35	3.08	1.87	1.83	1.41
	6.35-8.00	3.59	2.32	2.18	1.75
	8.00-10.08	3.89	2.74	2.41	2.06
	10.08-12.70	4.45	3.47	2.94	2.73
	12.70-16.0	4.29	3.95	3.06	3.32
	16.0-20.2	3.86	3.90	3.20	3.74
Coarse Silt	20.2-25.4	3.25	3.48	2.64	3.73
	25.4-32.0	2.61	2.59	1.95	3.38
	32.0-40.3	2.05	1.49	0.93	2.36
	40.3-50.8	1.92	0.50	0.29	1.35
	50.8-64.0	1.02	0.05	0.16	0.14
VFS (50-100)		15.75	19.23	16.13	18.58
FS (100-250)		21.66	22.54	28.06	25.85
MS (250-500)		6.73	8.15	10.38	9.55
CoS (500-1000)		6.31	7.94	9.84	9.13
VCoS (1000-2000)		2.71	6.34	4.94	4.80
Greater than 2000		24	25	28	25
Textural Class		Gr. FS1	Gr. FS1	Gr. FS1	Gr. FS1

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M0103-1

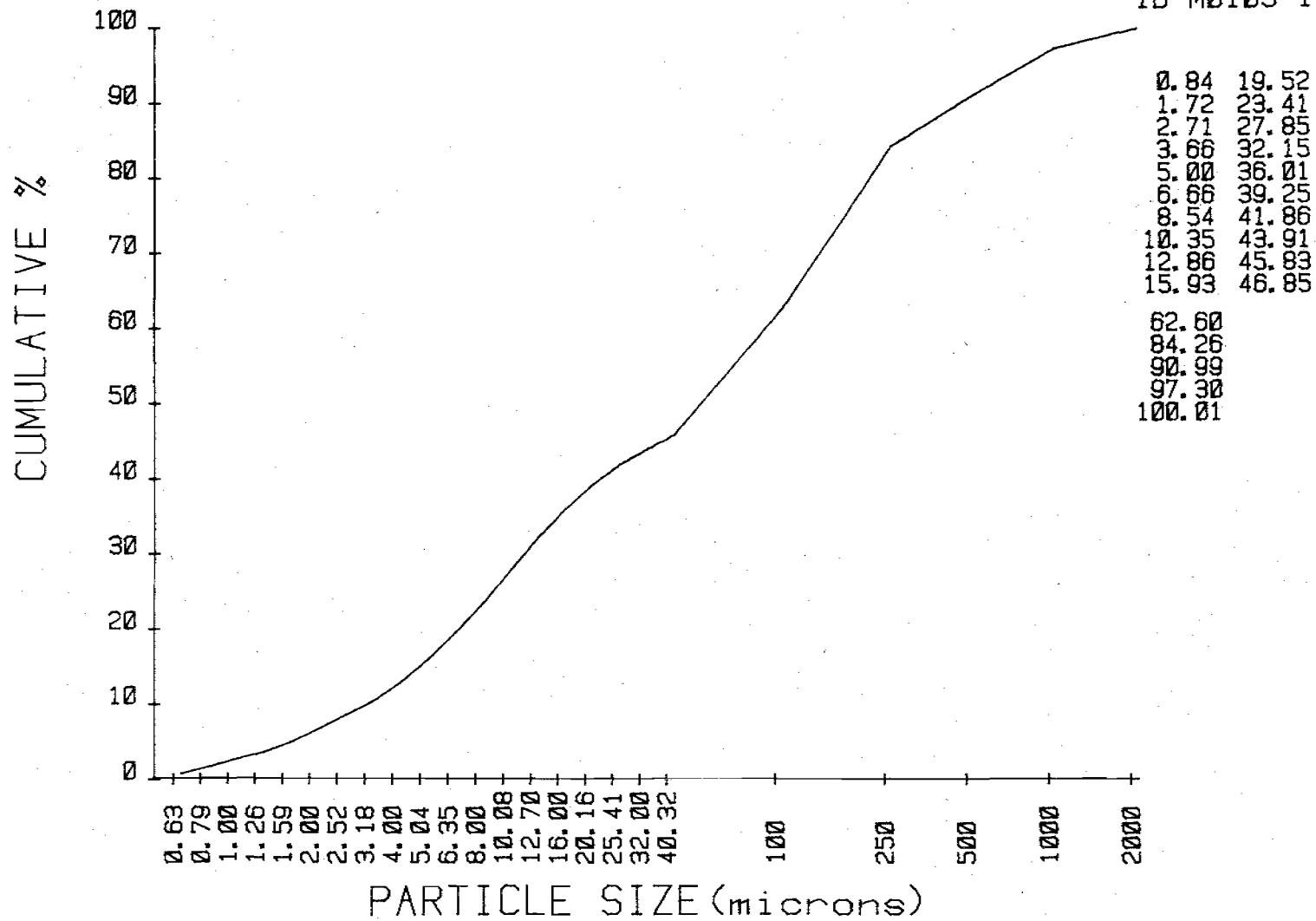


0.84	3.59
0.88	3.89
0.99	4.45
0.95	4.29
1.34	3.86
1.66	3.25
1.88	2.60
1.81	2.05
2.51	1.92
3.08	1.02
15.75	
21.66	
6.73	
6.31	
2.71	



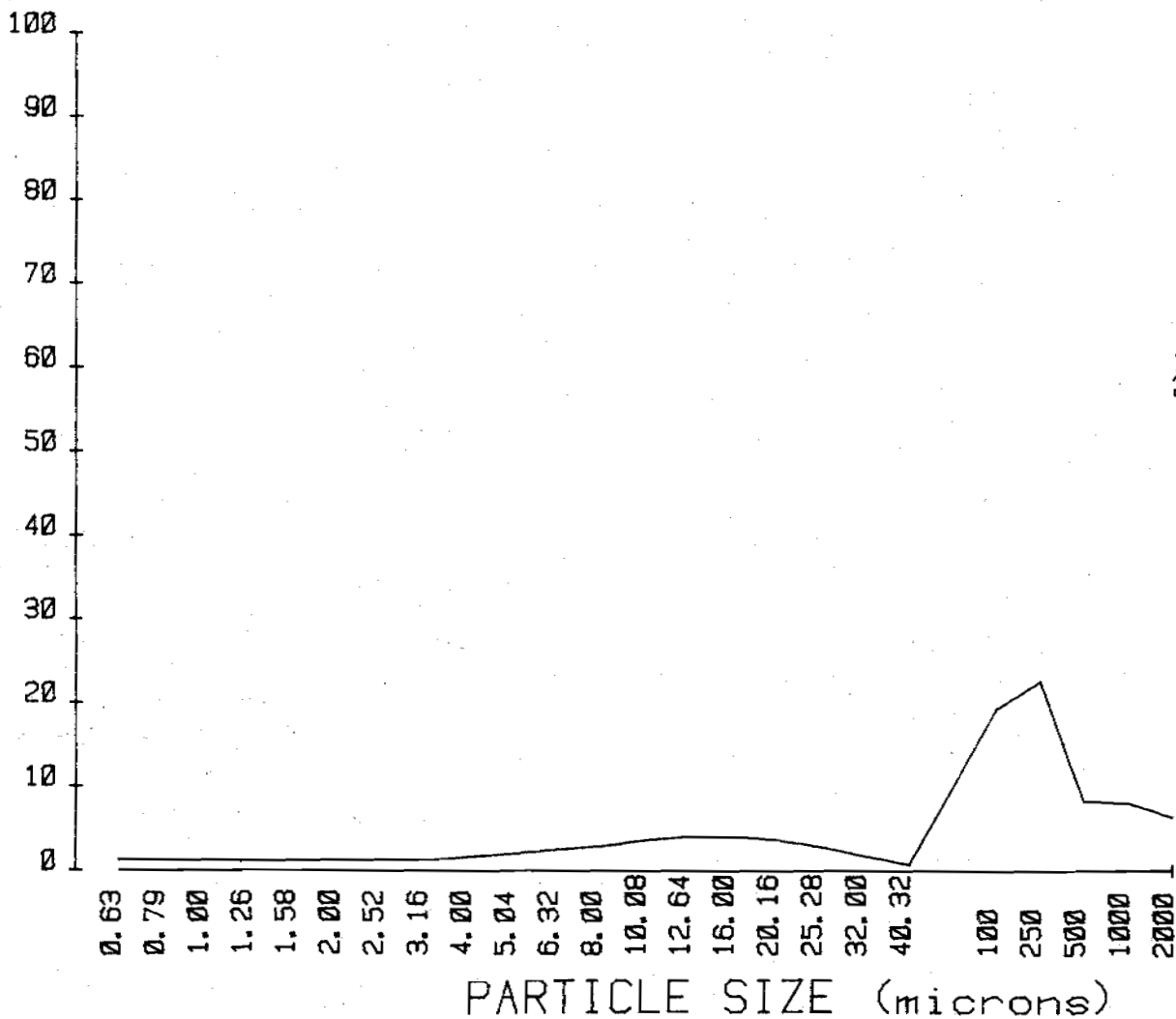
CUMULATIVE CURVE SAND-SILT-CLAY

ID M0103-1



PLOT SAND-SILT-CLAY

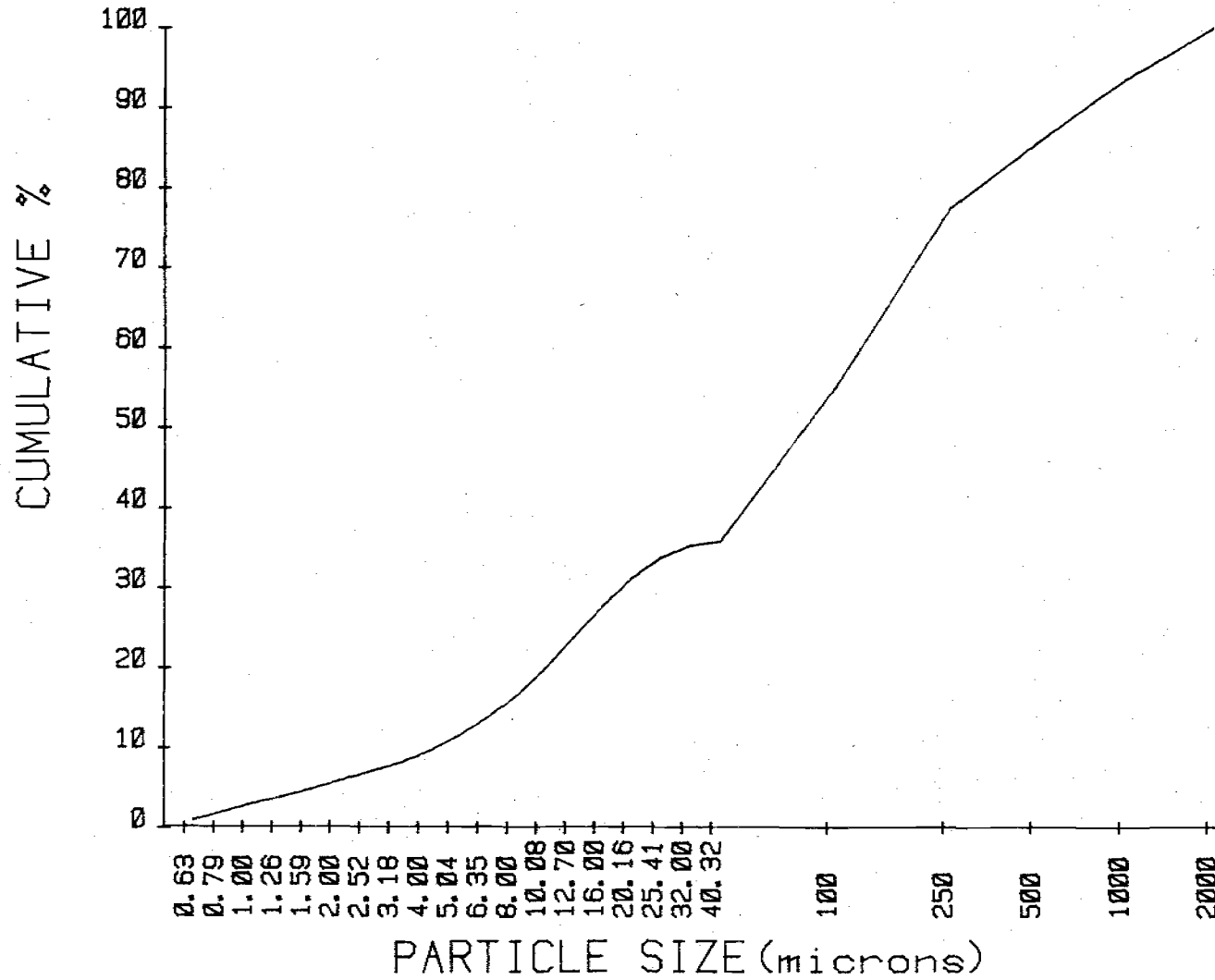
ID M0103-2



1.06	2.32
1.00	2.74
0.99	3.47
0.82	3.95
0.96	3.90
1.05	3.48
1.08	2.59
1.03	1.49
1.45	0.50
1.87	0.05
19.23	
22.54	
8.15	
7.94	
6.34	

CUMULATIVE CURVE SAND-SILT-CLAY

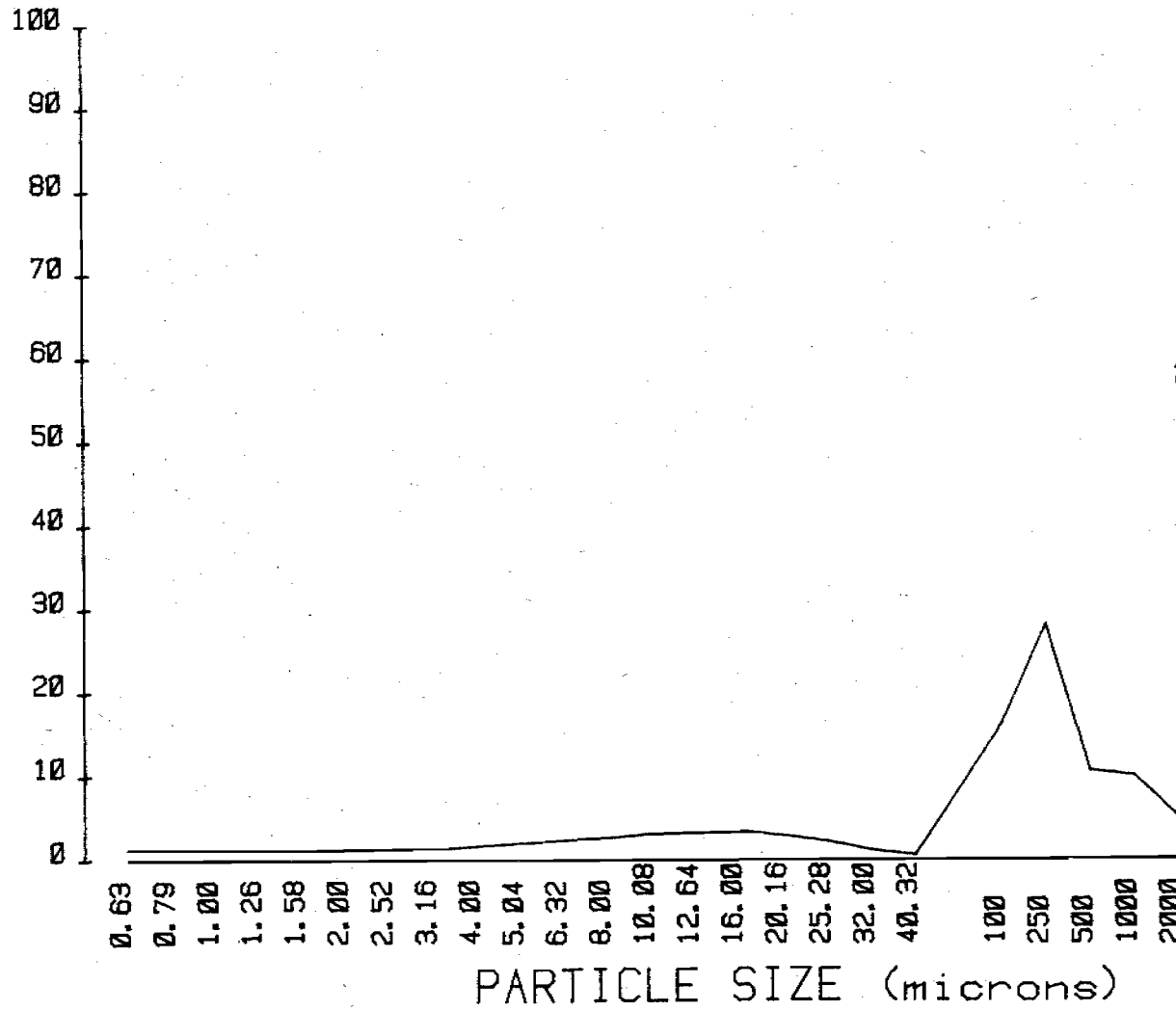
ID M0103-2



1.06	13.62
2.06	16.36
3.05	19.83
3.87	23.77
4.83	27.67
5.88	31.15
6.96	33.74
7.98	35.24
9.43	35.74
11.30	35.79
55.02	
77.56	
85.71	
93.65	
98.99	

PLOT SAND-SILT-CLAY

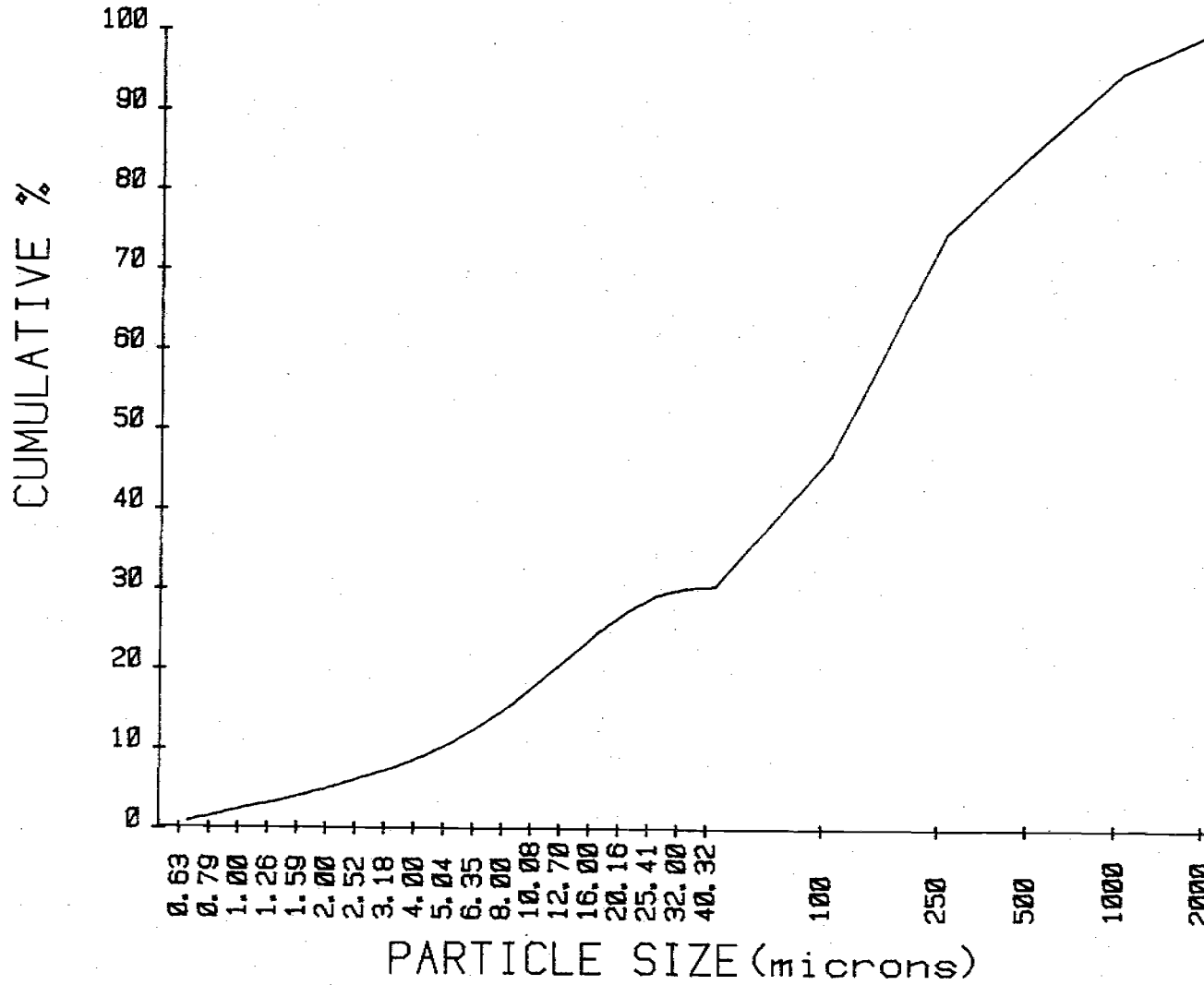
ID M0103-3



1.00	2.18
0.86	2.41
0.86	2.94
0.72	3.06
0.91	3.20
1.03	2.64
1.12	1.95
1.07	0.93
1.47	0.29
1.82	0.16
16.13	
28.06	
10.38	
9.84	
4.94	

CUMULATIVE CURVE SAND-SILT-CLAY

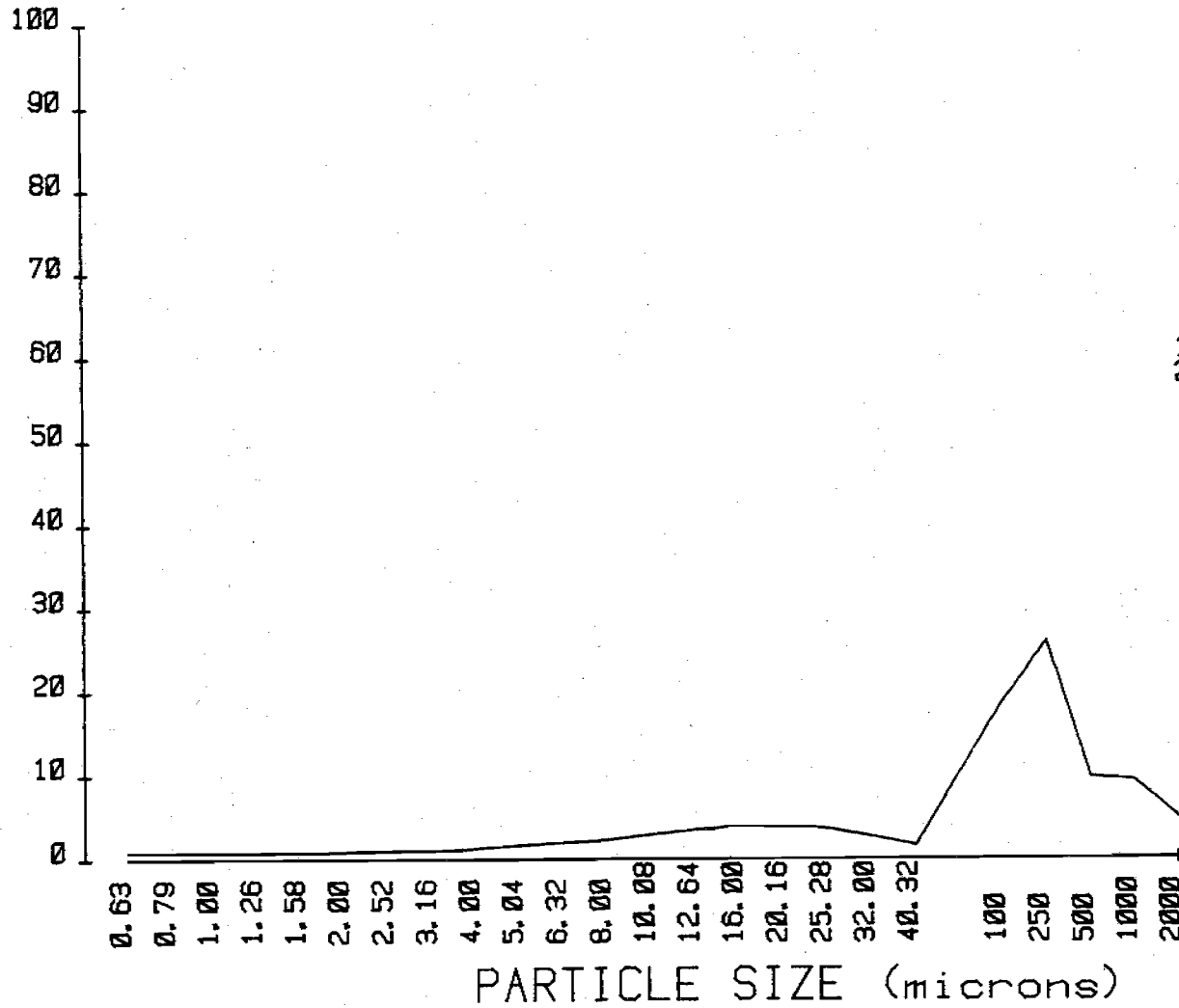
ID M0103-3



1.00	13.04
1.86	15.45
2.72	18.40
3.44	21.46
4.34	24.66
5.38	27.30
6.50	29.25
7.56	30.18
9.03	30.48
10.86	30.64
46.77	
74.83	
85.21	
95.05	
99.09	

PLOT SAND-SILT-CLAY

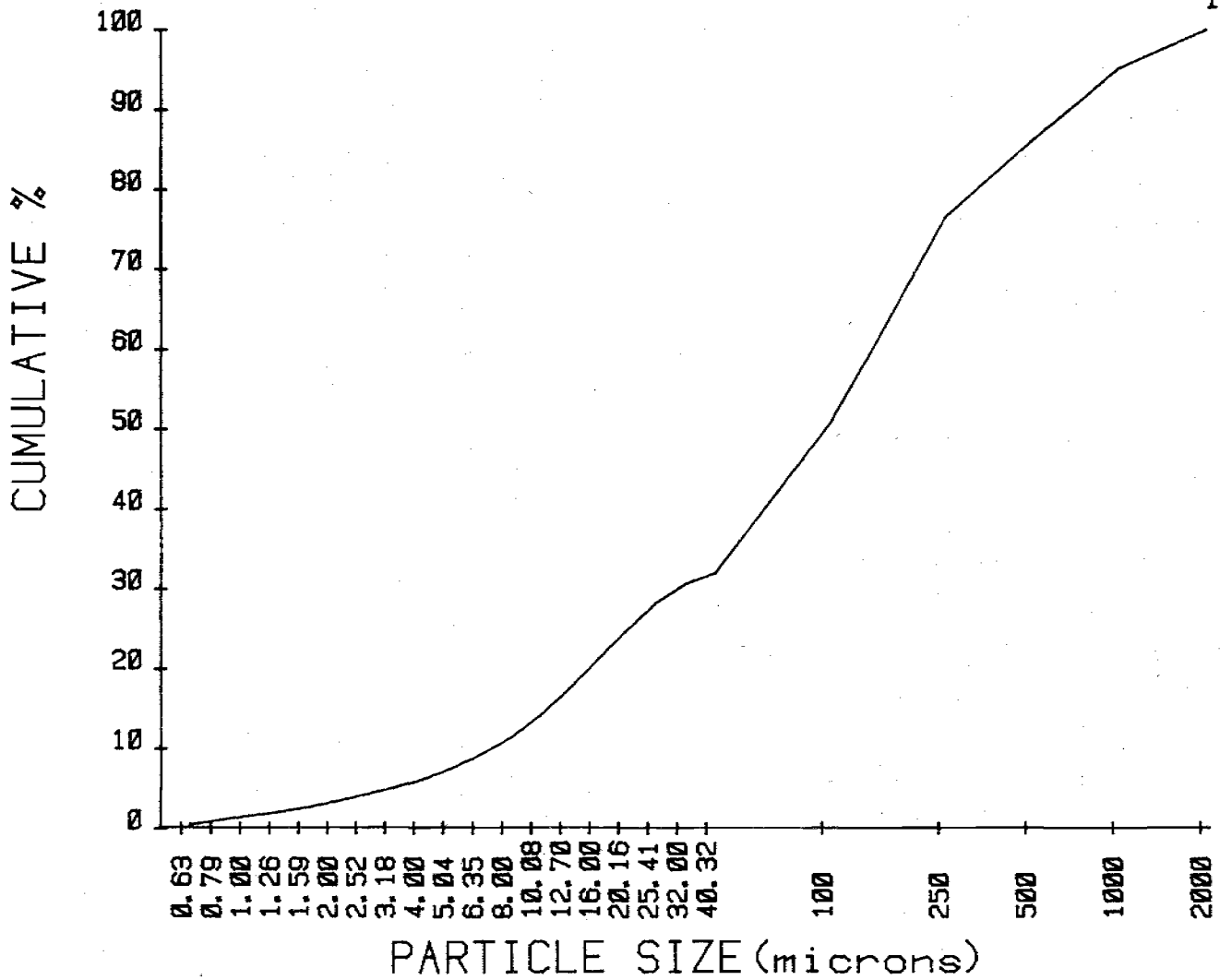
ID M0103-4



0.62	1.75
0.49	2.06
0.52	2.73
0.46	3.32
0.60	3.73
0.72	3.73
0.81	3.36
0.83	2.35
1.00	1.35
1.41	0.14
18.58	
25.95	
9.55	
9.13	
4.80	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M0103-4



0.62	9.29
1.11	11.35
1.63	14.08
2.09	17.40
2.69	21.13
3.41	24.86
4.22	28.24
5.05	30.59
6.13	31.95
7.54	32.09
50.67	
76.52	
86.07	
95.20	
100.00	

Unnamed Silty Clay 79-MT-2908 (Antelope Basin)

Classification: fine clayey, montmorillonitic Argic Vertic Cryoboroll.

General Site Characteristics

Location: Madison County, Montana: Eureka Basin Road, Gravelly Range, Sheridan Ranger District, NE 1/4, SW 1/4, NW 1/4 of section 12, T. 12S., R. 38E.

Forest: Beaverhead National Forest

Area: Fox Creek (West Fork of Madison River)

Described By/Date: RP and SS on October 4, 1968

Parent Rock/Material: shale

Habitat Type: Mountain sagebrush (*A. tridentata vaseyana*) 15 %; (*A. cana-cana*) 35 % grassland (sage tends to be on mounds); 100 % ground cover.

Topography: smooth, plane side slope, on the source of a 1st order stream

Landform:

Climate: cryic, vdic

Weathering:

Precipitation: 71 cm.

Formation Name:

Erosion:

Slope: 11 percent

Infiltration: medium to rapid

Aspect: west 270 degrees

Permeability: slow

Elevation: 2493 m (8180 feet)

Storage:

Soil Depth:

Drainage: moderately well

Eff. Rooting Depth:

Air Temp: MSST-10.2 deg. C

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks: Microrelief mounds 0.6-1.2 meters in diameter and 0.2-0.3 meters high; profile sampled in intermound. Profile has no coarse fragments throughout.

Pedon Description

Ah 0-18 centimeters (0-7 inches). Very dark brown (10YR 2/2) silty clay, grayish brown (10YR 5/2) dry; strong very fine granular structure; loose, friable, very sticky and plastic; common very fine and fine roots; strongly acid pH 5.2, noncalcareous; no gravels; clear smooth boundary.

B2t 18-61 centimeters (7-24 inches). Very dark gray (10YR 3/1) clay, gray (5Y 5/1) dry; strong coarse angular blocky structure; unsure of ped orientation, but there is a tendency of parallel epipeds; hard, extremely firm, very sticky and very plastic; many very fine roots on ped faces; very few fine vesicular pores; continuous thin clay films which line pores and very few thin clay films on ped faces; common slickensides on ped faces; 13 percent gravels by weight; strongly acid pH 5.2, noncalcareous; abrupt irregular boundary; tongues or pockets of B2t extend to 76 centimeters; BCca is as shallow as 41 centimeters.



79-MT-2908 (cont.)

13032/10  
BCca 61-86 centimeters (24-34 inches). Very dark gray (10YR 3/1) silty clay, gray (5Y 6/1) dry; many fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate very coarse angular blocky structure; very hard, extremely firm, very sticky and very plastic; few very fine roots; very few thin clay films on ped faces; neutral pH 7.3, violently effervescent; pH may be due to thinness of bedded shales; black noncalcareous shales have been identified elsewhere; 4 percent gravels by weight; clear wavy boundary.

Cca 86-132+ centimeters (34-52+ inches). Olive gray (5Y 4/2) variegated, very dark gray (5Y 3/1), olive (5Y 5/3) gravelly clay loam, light gray (5Y 7/2), variegated, gray (5Y 5.5/1) and pale olive (5Y 6/3) dry; common large prominent strong brown (7.5YR 5/8) mottles; finely bedded shales 1-3 mm (genetic structure absent); extremely hard, extremely firm, very sticky and very plastic; very few very fine roots; very few micro pores; mildly alkaline pH 7.5, violently effervescent; threads of carbonates between plates; blacker shales weakly calcareous; 28 percent gravels by weight.

Pedon: Unnamed Silty Clay 79-MT-2908 (Antelope Basin)

Date: April 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub> <sup>3</sup>	HCO <sub>3</sub> <sup>3</sup>	Cl	SO <sub>4</sub> <sup>4</sup>
							meq/1000 gms							
1	Ah	0-18	5.6	5.2	0.60	63	3.7	1.3	0.3	0.4	0.0	1.5	0.6	0.1
2	B2t	18-61	5.6	5.2	0.33	70	2.2	0.7	0.3	0.1	0.0	1.4	0.4	0.0
3	BCca	61-86	7.9	7.3	0.52	43	2.8	0.9	0.2	0.0	0.0	1.7	0.4	0.0
4	Cca	86-132+	8.2	7.5	0.45	61	2.6	0.6	0.3	0.1	0.0	2.1	0.2	0.1

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Sample No.	Exchangeable Ions				CEC	ESP	DM	DC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms					%	%	ratio	%	%	ppm				
1	10.6	2.4	0.1	1.0	35.4	0.3	5.78	3.36	0.331	10	nil	nil	1.00	1.9
2	17.8	3.5	0.1	0.9	52.9	0.2	2.11	1.23	0.131	9	nil	nil	0.87	0.9
3	18.5	2.3	0.4	0.5	40.0	1.0	1.56	0.91	0.088	10	nil	10.1	0.96	1.4
4	15.7	2.1	0.4	0.4	34.3	1.2	1.09	0.64	0.065	10	nil	10.3	0.72	0.7

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Silty Clay 79-MT-2988 (Antelope Basin)

Date: October 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%								%		
0-18						15.38	42.39	42.22	none		Silty clay
18-61						3.72	38.00	58.28	13		Clay
61-86						1.39	48.11	50.50	4		Silty clay
86-132+						28.74	33.01	38.25	28		Gr. clay loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic		
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index		
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-7						35.0	21.5	49	23	25
7-24						34.5	23.0	52	26	26
24-34						29.1	19.8	48	19	29
34-52+						29.3	18.2	42	14	28

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Clay Loam 79-MT-2989 (WF Cabin)

Classification: fine clayey, mixed Typic Cryumbrept.

General Site Characteristics

Location: Madison County, Montana: approx. 1/4 mile southeast of West Fork Cabin,  
Gravelly Range, NW 1/4, NE 1/4, SE 1/4 of section 7, T. 12S., R. 39E.

Forest: Beaverhead National Forest

Area: Fox Creek (West Fork Madison River), Madison Ranger District

Described By/Date: RP and SS on October 3, 1968

Parent Rock/Material: shales with mixed sandstone

Habitat Type: mountain and subalpine grassland; 100 % ground cover.

Topography: smooth to slightly convex lower slope, poorly dissected

Landform: weakly frost churned

Climate: cryic, udic

Weathering:

Precipitation: 71 cm.

Formation Name:

Erosion:

Slope: 8 percent

Infiltration: moderately slow

Aspect: northeast, lower 1/3 plane slope

Permeability: moderately slow

Elevation: 2585 m (8430 feet)

Storage:

Soil Depth:

Drainage: well-mod. well

Eff. Rooting Depth:

Air Temp: MSST-8.9 deg. C

Litter Type:

Soil Temp at 20 inches: 5 deg. C

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

Ah 0-13 centimeters (0-5 inches). Very dark grayish brown (10YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; very weak very fine granular structure; soft, very friable, sticky and plastic; common very fine and fine roots; 18 percent gravels by weight; very strongly acid pH 4.7, noncalcareous; clear smooth boundary.

A&B 13-51 centimeters (5-20 inches). Very dark grayish brown to dark brown (10YR 3.5/2) clay loam, grayish brown to brown (10YR 5/2.5) dry; weak coarse prismatic structure parting to weak medium subangular blocky structure; slightly hard, friable, very sticky and very plastic; common very fine and fine roots; 9 percent gravels by weight; very strongly acid pH 4.6, noncalcareous; abrupt wavy boundary.

79-NT-2989 (cont.)

B 51-86 centimeters (20-34 inches). Yellowish brown to light olive brown (1.25Y 5/4) gravelly clay loam, light yellowish brown (10YR 6/4) dry; moderate very coarse angular blocky structure parting to moderate medium angular blocky structure; hard, firm, very sticky and very plastic; few fine roots; common very fine discontinuous pores; 33 percent gravels by weight; continuous thin clay films on ped faces; very strongly acid pH 4.7, noncalcareous; gradual wavy boundary.

C 86-137+ centimeters (34-54+ inches). Light olive brown (2.5Y 5/4) gravelly clay loam, light brownish gray to light yellowish brown (2.5Y 6/3) dry; common medium faint mottles light yellowish brown (2.5Y 6/4) and few fine prominent mottles olive brown (2.5Y 4/8); weak very coarse prismatic structure; very hard, extremely firm, very sticky and very plastic; very few very fine roots; common very fine distinct pores; 24 percent gravels by weight; medium acid pH 5.6, noncalcareous.

Pedon: Unnamed Clay Loam 79-MT-2909 (WF Cabin)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> x10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	Ah	0-5	4.7	0.47	76	1.9				
2	AB	5-20	4.6	0.35	64	2.4				
3	B	20-34	4.7	0.21	53	1.6				
4	C	34-54+	5.6	0.24	62	1.9				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
meq/100 gms					%			%		ratio			
1	7.3	2.4	0.2	0.6	15.0	30.2	41	7.09	4.12	0.405	10	0.90	8.3
2	7.0	2.3	0.2	0.4	12.9	29.5	43	3.91	2.27	0.219	10	0.91	8.4
3	24.2	3.7	0.2	0.4	7.8	36.6	78	0.78	0.45	0.050	9	0.67	8.1
4	14.8	3.4	0.2	0.4	4.2	37.9	82	0.39	0.23	0.036	8	0.79	8.2

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Clay Loam 79-MT-2909 (WF Cabin)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	-----X-----							-----Z-----		
0-5						27.74	37.40	34.86	10	Clay loam
5-20						32.09	32.94	34.97	9	Clay loam
20-34						34.27	29.06	36.67	33	Gr. clay loam
34-54+						28.74	33.01	38.25	21	Gr. clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	-----X-----			-----g/cc-----		-----Z-----		-----Z-----		
0-5						33.0	20.3	49	20	29
5-20						27.8	18.8	38	14	24
20-34						24.3	15.9	35	10	24
34-54+						24.2	16.4	36	10	27

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

# **BITTERROOT**





Unnamed Gravelly Sandy Loam 79-MT-4101 (050701R-2)

Classification: sandy skeletal, mixed Typic Cryoborolls.

General Site Characteristics

Location: Ravalli County, Montana: Sula Road, southeast 1/4 of section 22,  
T. 1N., R. 18W.

Forest: Bitterroot National Forest

Area: Meadow Creek

Described By/Date:

Parent Rock/Material: granitic

Habitat Type: open grass park

Topography: high elevation convex slopes

Landform:

Weathering:

Formation Name:

Slope: 30 percent

Aspect: south 240 degrees west

Elevation: 7250 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderately rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A1 0-21 centimeters (0-8 inches). Very dark brown (10YR 2/2) gravelly sandy loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many very fine roots; 31 percent gravels by weight; strongly acid pH 5.4, noncalcareous; abrupt smooth boundary.

B2 21-28 centimeters (8-11 inches). Dark brown (10YR 3/3) gravelly sandy loam; weak medium granular structure; friable, slightly sticky and slightly plastic; many very fine roots; 34 percent gravels by weight; strongly acid pH 5.3, noncalcareous; abrupt smooth boundary.

B3 28-38 centimeters (11-15 inches). Brown (10YR 5/3) gravelly sandy loam; single grained; loose, nonsticky and nonplastic; many very fine roots; 35 percent gravels by weight; strongly acid pH 5.4, noncalcareous; clear smooth boundary.

C 38-75 centimeters (15-30 inches). Light yellowish brown (10YR 6/4) gravelly sandy loam; single grained; loose, nonsticky and nonplastic; common very fine roots; 26 percent gravels by weight; strongly acid pH 5.2, noncalcareous.

Pedon: Unnamed Gravelly Sandy Loam 79-MT-4101 (050701R-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A1	0-21	5.4	0.21	58	1.5				
2	B2	21-28	5.3	0.15	52	0.5				
3	B3	28-38	5.4	0.16	39	0.3				
4	C	38-75	5.2	0.11	30	0.3				

08

Sample No.	Exchangeable Ions				Ext. Acidity		CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H									
	meq/100 gms													
1	5.0	1.7	<.1	0.7	8.5		13.4	47	5.04	2.93	0.233	13	0.69	9.2
2	3.8	0.9	<.1	0.6	9.2		13.4	37	4.50	2.62	0.212	12	0.66	9.3
3	3.0	1.0	<.1	0.4	7.4		10.0	37	2.02	1.17	0.130	9	0.65	9.4
4	3.0	1.0	<.1	0.2	3.4		8.0	55	0.59	0.34	0.832	11	0.74	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Sandy Loam 79-MT-4101 (050701R-2)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
0-21						69.40	20.84	9.76	31	Gr. sandy loam
21-28						71.85	19.57	8.58	34	Gr. sandy loam
28-38						73.78	19.31	6.91	35	Gr. sandy loam
38-75						76.88	15.25	7.88	26	Gr. sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-21						18.9	8.9	46	NP	ND
21-28						16.5	8.4	41	NP	ND
28-38						13.8	5.5	31	NP	ND
38-75						10.6	4.5	21	NP	ND

Remarks: Mechanicals were run by the pipette method  
Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Silt Loam 79-MT-4102 (100701R-3)

Classification: medial over loamy, mixed Andic Cryochrept or Typic Cryorthod.

General Site Characteristics

Location: Ravalli County, Montana: Darby Road, southeast 1/4 of section 26,  
T. 6N., R. 18W.

Forest: Bitterroot National Forest

Area: Daly Creek

Described By/Date:

Parent Rock/Material: calc-silicate with ash mantle

Habitat Type: subalpine fir/ Luzula, (vaccinium scoparium) phase

Topography: upper mountain slope-drainage head position

Landform:

Weathering:

Formation Name:

Slope: 40 percent

Aspect: south 220 degrees west

Elevation: 7540 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

- 0 4-8 centimeters (2-8 inches). Duff layer.
- A2 0-4 centimeters (0-2 inches). Dark grayish brown (10YR 4/2); no lab sample; loam; massive structure; very friable, slightly sticky and slightly plastic; many fine roots; very strongly acid pH 4.7, noncalcareous; abrupt smooth boundary.
- B21ir 4-20 centimeters (2-8 inches). Dark yellowish brown (10YR 4/4) gravelly silt loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; many fine roots; 29 percent gravels by weight; very strongly acid pH 4.7, noncalcareous.
- B22ir 20-43 centimeters (8-17 inches). Strong brown (7.5YR 5/6) gravelly loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; many fine roots; 39 percent gravels by weight; very strongly acid pH 4.8, noncalcareous; clear smooth boundary.

79-MT-4102 (cont.)

IIC 43-90 centimeters (17-35 inches). Yellowish brown (10YR 5/4) gravelly loam; massive structure; very friable, slightly sticky and slightly plastic; many fine roots; 43 percent gravels by weight; strongly acid pH 5.2, noncalcareous.

Note: A2, B21ir, and B22ir horizons appear to contain high ash content.

Pedon: Unnamed Gravelly Silt Loam 79-MT-4102 (100701R-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
	0	4-0	NS	NS	NS	NS				
	A2	0-4	NS	NS	NS	NS				
1	B21ir	4-20	4.7	0.27	57	0.8				
2	B22ir	20-43	4.8	0.15	56	0.1				
3	IIC	43-90	5.2	0.12	43	0.0				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms						%		%				
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	3.3	1.4	0.1	0.2	12.1	16.3	29	3.49	2.03	0.105	19	0.71	9.4
2	1.2	0.7	0.1	0.1	11.4	13.4	16	2.31	1.35	0.071	19	0.61	10.2
3	2.4	1.1	0.1	0.1	6.7	10.2	36	0.84	0.49	0.024	20	0.58	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Silt Loam 79-MT-4102 (100701R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	X							X		
4-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-20	4.35	7.73	5.27	7.91	12.28	37.52	53.56	8.92	29	Gr. silt loam
20-43	6.32	10.77	7.03	11.21	14.55	49.86	41.54	8.60	39	Gr. loam
43-90	6.88	11.60	7.94	11.03	14.47	51.90	40.81	7.29	43	Gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	X			g/cc		X		X	
4-0					NS	NS	NS	NS	NS
0-4					NS	NS	NS	NS	NS
4-20					24.1	7.7	32	NP	ND
20-43					17.8	6.5	NDNP	NDNP	NDNP
43-90					15.7	4.2	20	NP	ND

Remarks: Mechanicals were run by the Coulter Counter method  
Atterberg's were run by Debbie Hall

Analysis by: Anita Falen



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

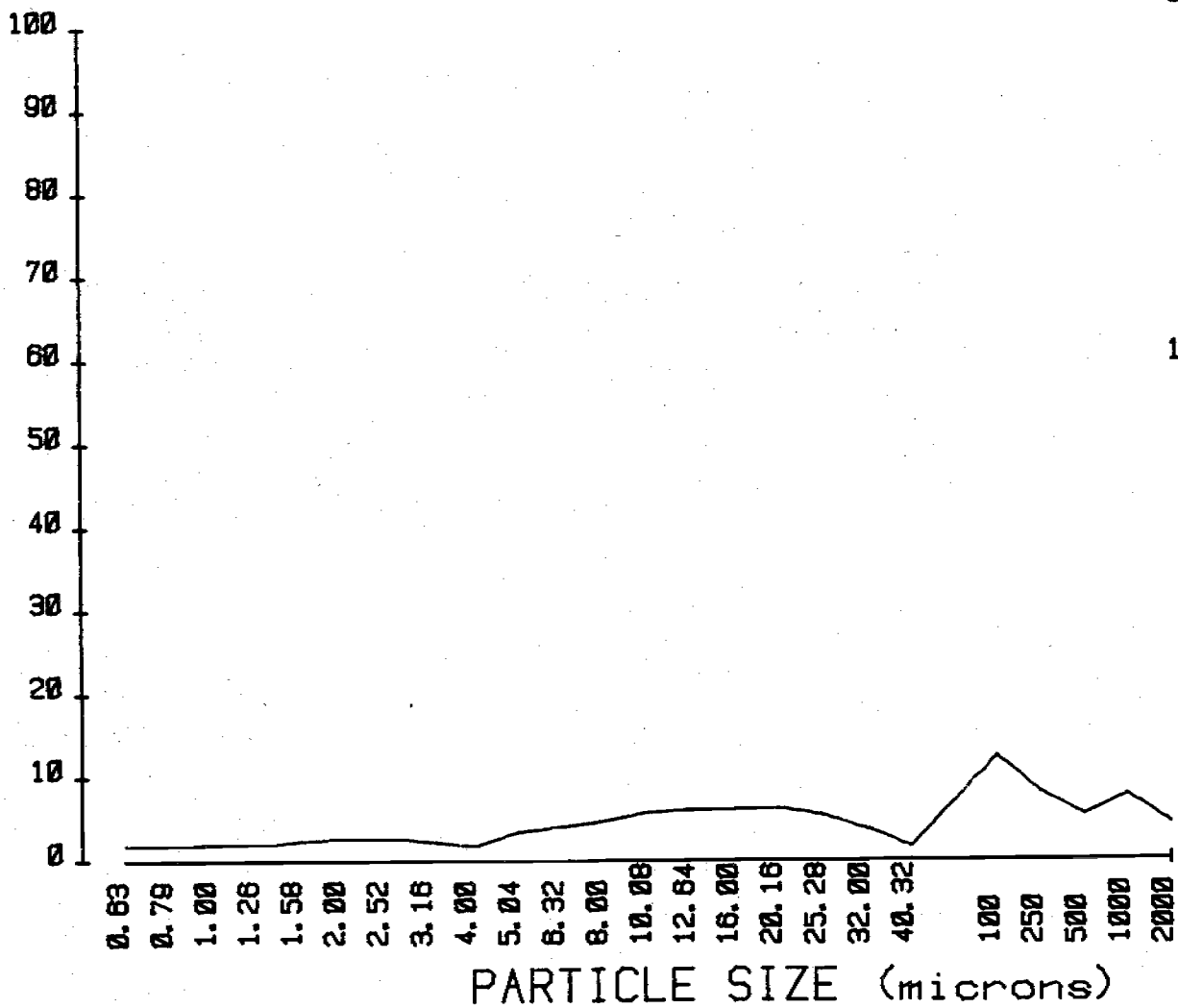
Date: January 1981

Identification		M4102-1	M4102-2	M4102-3	
Units		-----%			
TC (0.63-2.00)		8.92	8.60	7.29	
TSi (2.00-50)		53.56	41.54	40.81	
TS (50-2000)		37.52	49.86	51.90	
Clay	0.63-0.794	1.65	1.57	1.29	
	0.794-1.00	1.65	1.53	1.18	
	1.00-1.26	1.79	1.76	1.39	
	1.26-1.59	1.66	1.63	1.40	
	1.59-2.00	2.17	2.13	2.03	
Fine Silt	2.00-2.52	2.48	2.33	2.49	
	2.52-3.17	2.48	2.29	2.82	
	3.17-4.00	2.02	1.75	2.54	
	4.00-5.04	1.46	1.33	2.34	
Medium Silt	5.04-6.35	3.21	2.70	3.69	
	6.35-8.00	3.88	3.22	4.04	
	8.00-10.08	4.51	3.58	4.10	
	10.08-12.70	5.56	4.43	4.66	
	12.70-16.0	5.91	5.06	4.68	
	16.0-20.2	5.91	4.69	3.75	
Coarse Silt	20.2-25.4	6.02	4.03	2.62	
	25.4-32.0	5.16	3.33	1.63	
	32.0-40.3	3.50	2.07	0.72	
	40.3-50.8	1.39	0.68	0.43	
	50.8-64.0	0.09	0.07	0.30	
VFS (50-100)		12.28	14.55	14.47	
FS (100-250)		7.91	11.21	11.03	
MS (250-500)		5.27	7.03	7.94	
CoS (500-1000)		7.73	10.77	11.60	
VCoS (1000-2000)		4.35	6.32	6.88	
Greater than 2000		29	39	43	
Textural Class		Gr. SIL	Gr. loam	Gr. loam	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

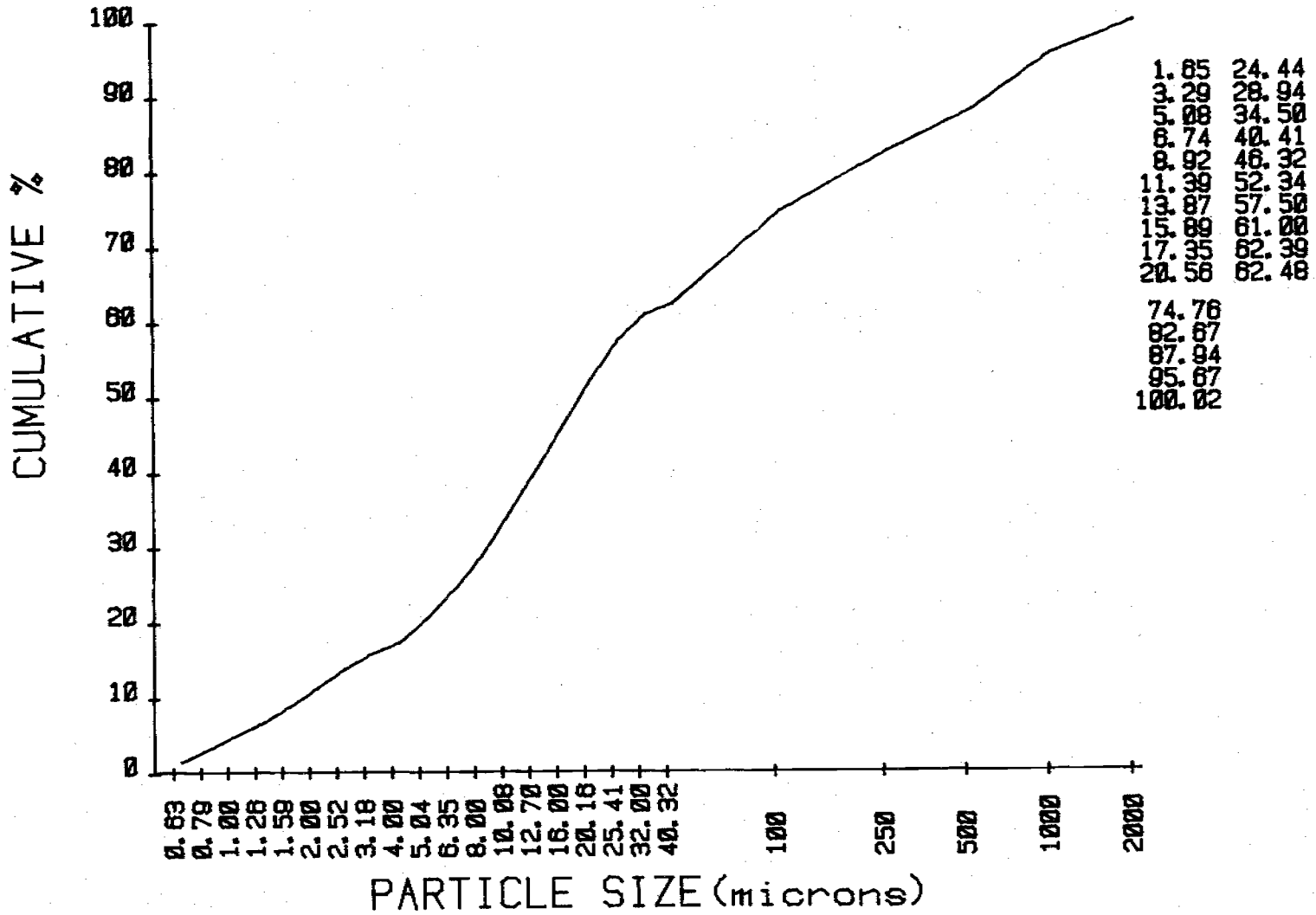
ID M4102-1



1.65	3.88
1.65	4.51
1.79	5.56
1.66	5.91
2.17	6.91
2.48	8.02
2.48	9.16
2.02	10.58
1.46	11.39
3.21	12.89
12.28	
7.91	
5.27	
7.73	
4.35	

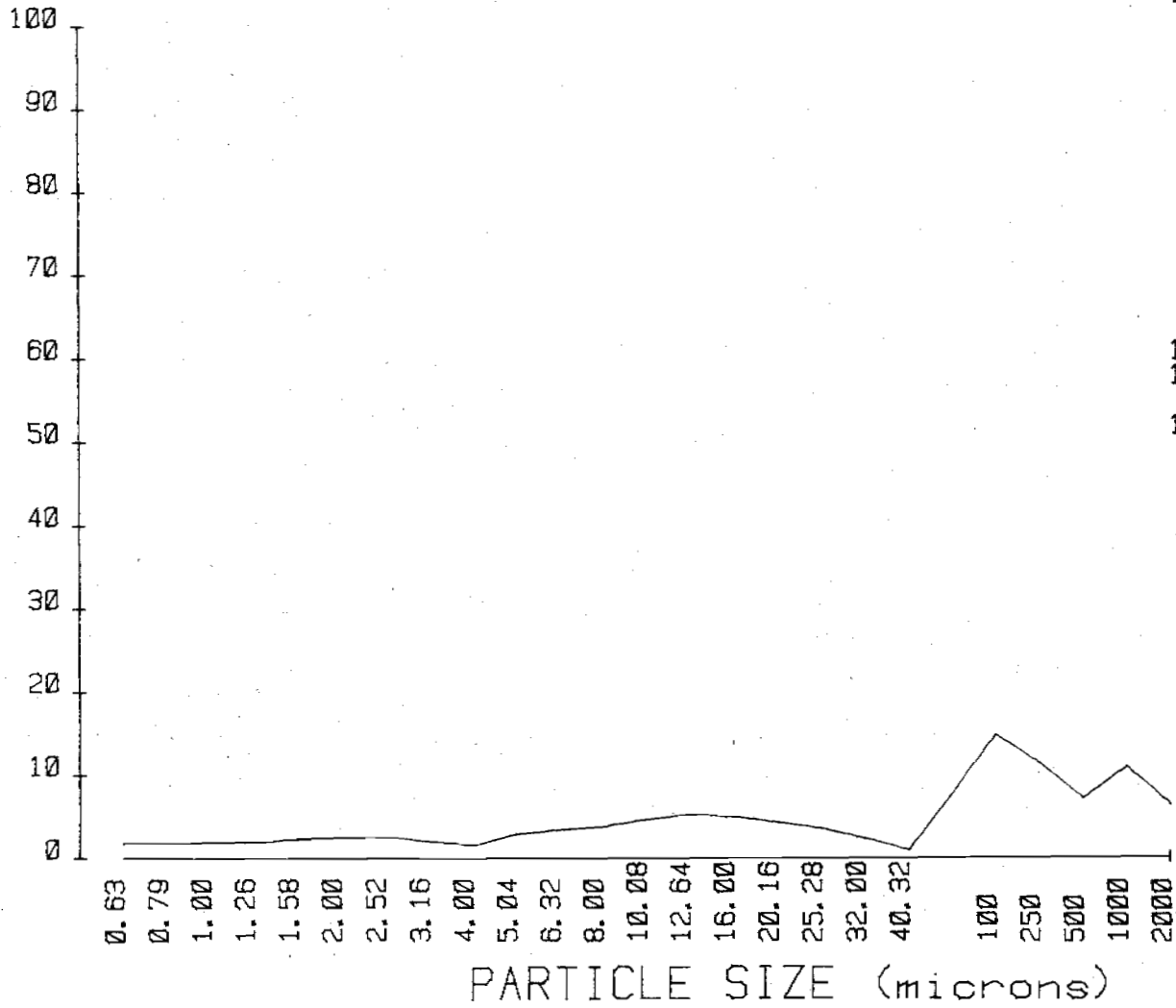
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M4102-1



PLOT SAND-SILT-CLAY

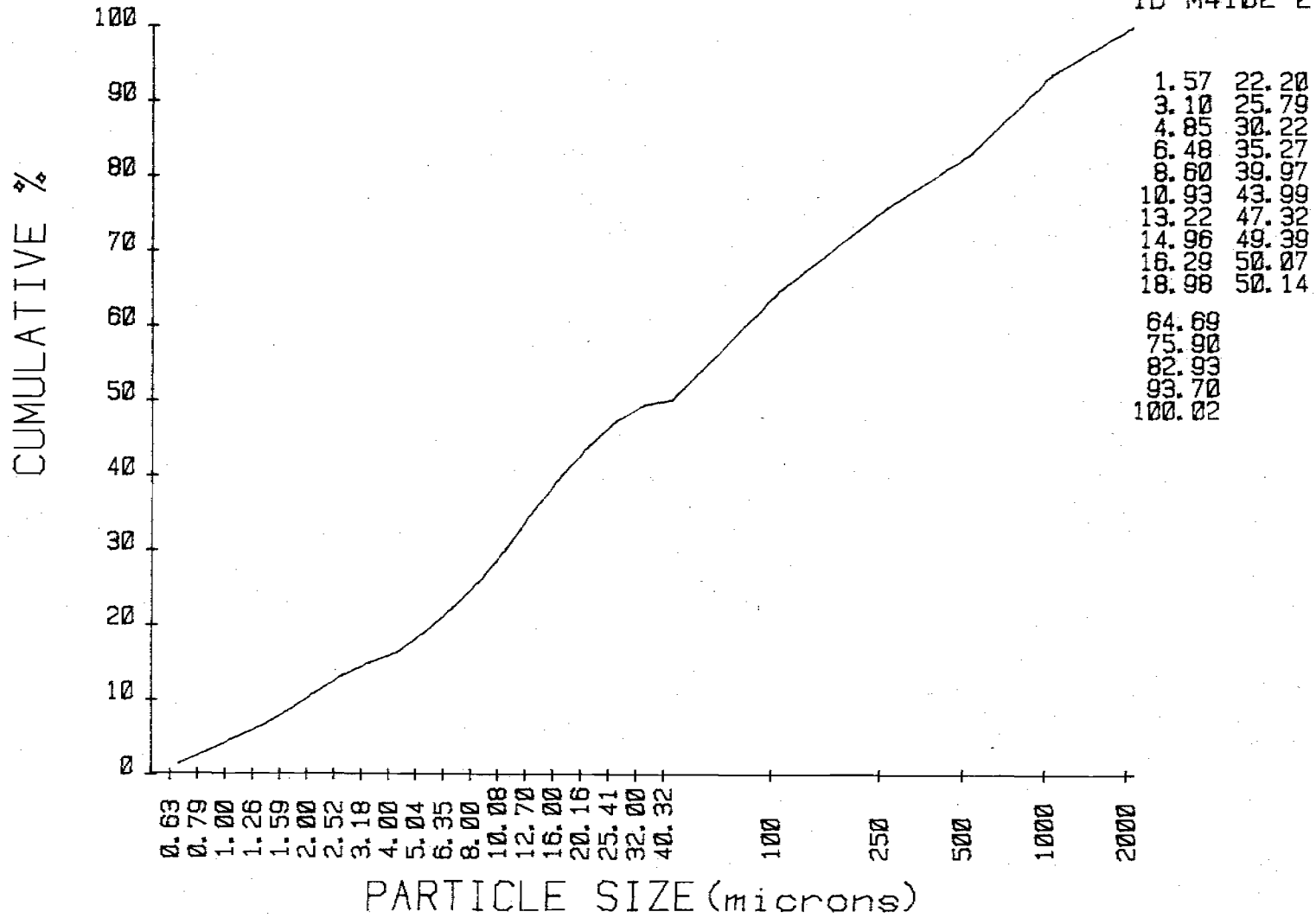
ID M4102-2



1.57	3.22
1.53	3.58
1.75	4.43
1.63	5.06
2.12	4.69
2.33	4.03
2.28	3.33
1.75	2.07
1.33	0.68
2.69	0.07
14.55	
11.21	
7.03	
10.77	
6.32	

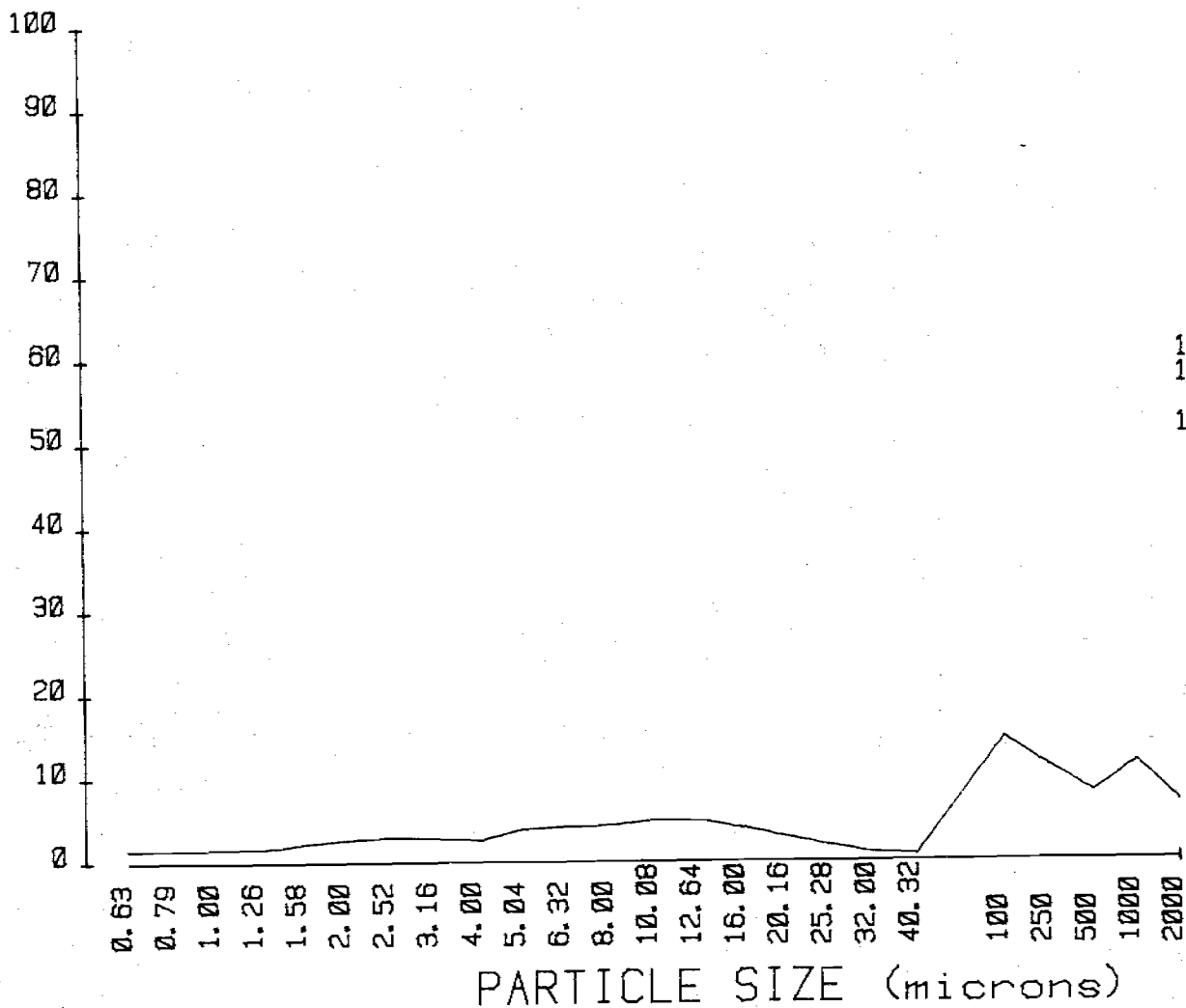
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4102-2



PLOT SAND-SILT-CLAY

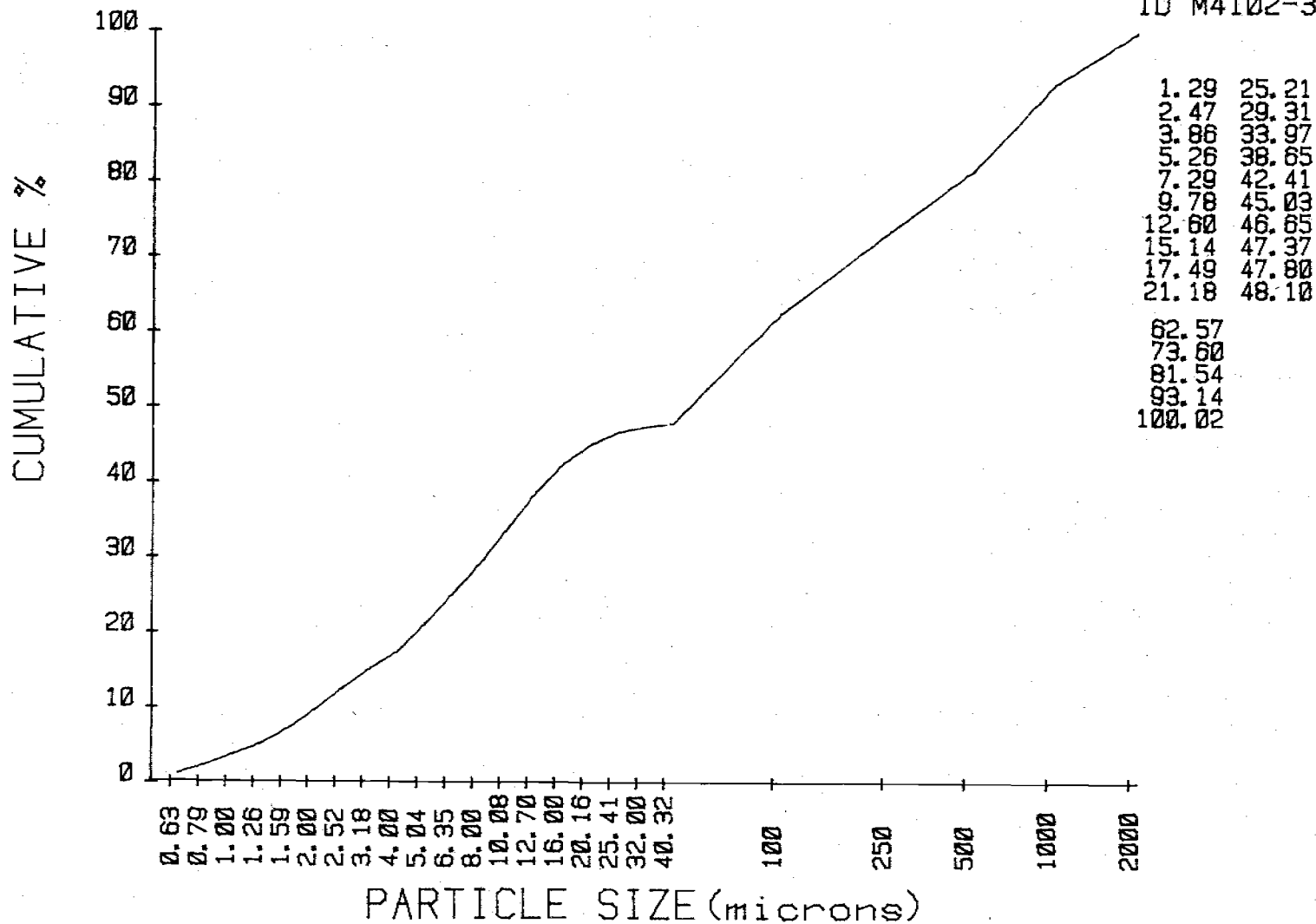
ID M4102-3



1.29	4.04
1.18	4.10
1.39	4.66
1.40	4.68
2.03	3.75
2.49	2.62
2.82	1.63
2.54	0.72
2.34	0.42
3.69	0.30
14.47	
11.03	
7.94	
11.60	
6.88	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4102-3



1.29	25.21
2.47	29.31
3.86	33.97
5.26	38.65
7.29	42.41
9.78	45.03
12.60	46.65
15.14	47.37
17.49	47.80
21.18	48.10
62.57	
73.60	
81.54	
93.14	
100.02	

Unnamed Very Gravelly Loam 79-MT-4103 (030301R-2)

Classification: medial over loamy-skeletal, mixed Andic Cryochrepts.

General Site Characteristics

Location: Ravalli County, Montana: West Fork Road, southwest 1/4 of section 24,  
T. 2S., R. 22W.

Forest: Bitterroot National Forest

Area: Lookout Mountain

Described By/Date:

Parent Rock/Material: quartzite with ash mantle

Habitat Type: subalpine fir/beargrass, (vaccinium scoparium) phase

Topography: mid-elevation mountain sideslope

Landform:

Weathering:

Formation Name:

Slope: 50 percent

Aspect: 320 degrees

Elevation: 6240 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 3-0 centimeters (1-0 inches). Duff layer.

A1 0-11 centimeters (0-4 inches). Dark brown (10YR 4/3) very gravelly loam; weak medium granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; medium acid pH 5.6, noncalcareous; 60 percent gravels by weight; clear smooth boundary.

B2ir 11-32 centimeters (4-13 inches). Dark brown (7.5YR 4/4) very gravelly loam; weak medium granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; 69 percent gravels by weight; strongly acid pH 5.5, noncalcareous; abrupt smooth boundary.

IIC 32-96+ centimeters (13-39+ inches). Very gravelly loamy sand; 1 centimeter to 16 centimeter size angular quartzite gravels that have fine sand and silt coatings on their surfaces; soil material does not fill voids between rock fragment.

Note: A1 and B2ir horizons appear to have high content of ash material.



Pedon: Unnamed Very Gravelly Loam 79-MT-4103 (030301R-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	0	3-0	NS	NS	NS	NS				
2	A1	0-11	5.6	0.22	72	0.0				
3	B21r	11-32	5.5	0.13	81	1.3				
	IIC	32-96	IS	IS	IS	IS				

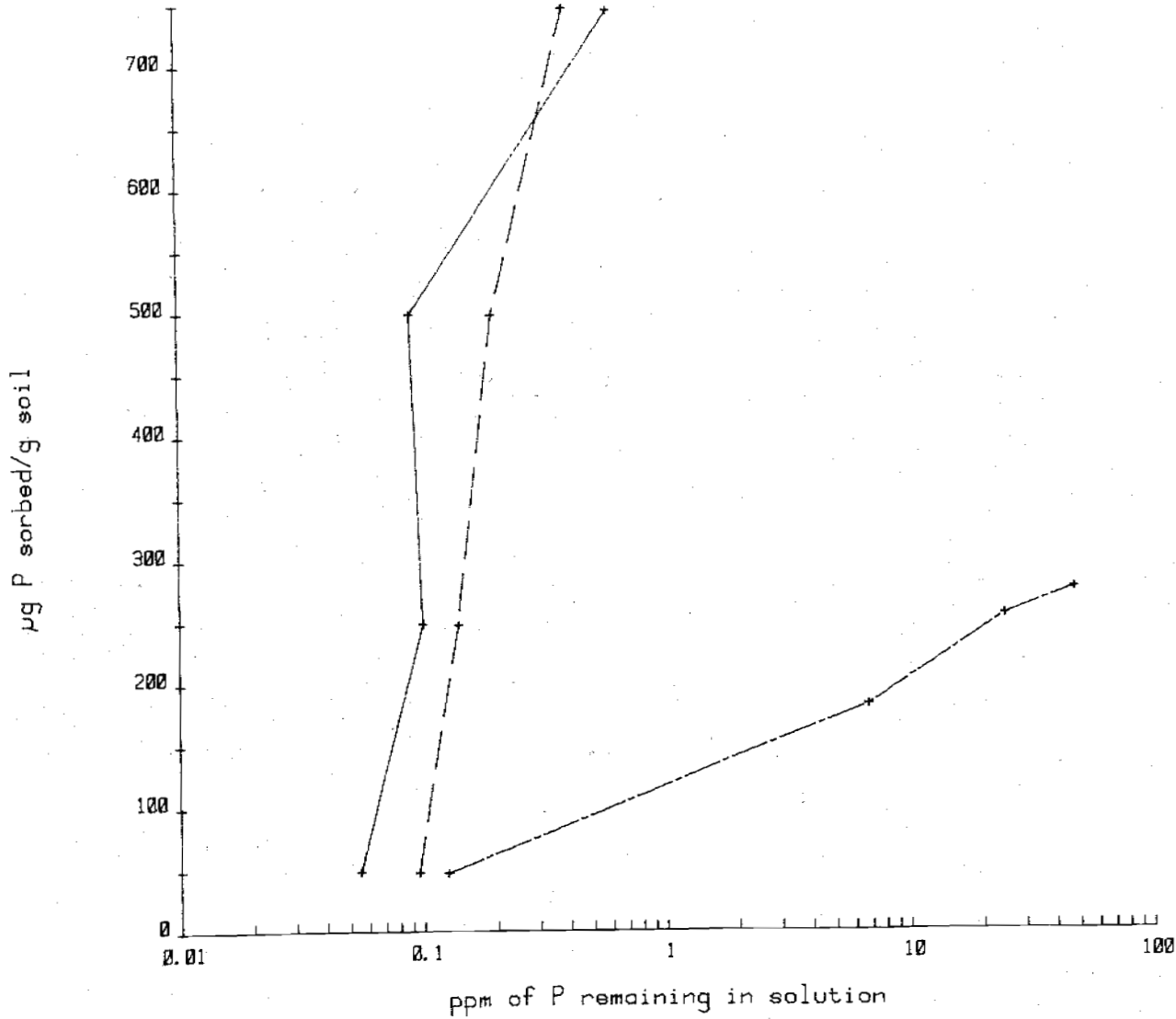
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil	NaF pH
	Ca	Mg	Na	K	H							Fraction	
	meq/100 gms				gms								
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.8	1.6	0.1	0.9	10.9	18.4	44	3.93	2.29	0.138	17	0.40	9.8
3	3.2	1.0	0.1	0.5	14.7	18.4	25	3.96	2.31	0.113	20	0.31	10.4
	3.5	1.8	0.1	0.2	IS	6.4	IS	1.26	0.73	0.035	21	0.03	IS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample  
 IS-insufficient sample

Analysis by: Zelda Fadness

### Phosphorus Isotherm

79-MT-4103



µg/g soil	Soln ppm
----- A1	
49	0.06
249	0.10
499	0.09
744	0.60
----- B2ir	
49	0.10
249	0.14
498	0.20
746	0.40
----- IIC	
49	0.13
183	6.75
255	24.50
276	47.38

Pedon: Unnamed Very Gravelly Loam 79-MT-4103 (030301R-2)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
3-0							NS	NS	NS	NS	
0-11							41.41	43.85	14.74	60	V.gr. loam
11-32							44.43	44.53	11.04	69	V.gr. loam
32-96							77.59	19.35	3.07	97	V.gr. loamy sand

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	%			g/cc		%		%
3-0						NS	NS	NS
0-11						36.6	10.1	ND
11-32						34.0	10.3	NDNP
32-96						IS	IS	IS

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 IS-insufficient sample

Analysis by: Debbie Hall

Unnamed Gravelly Loam 79-MT-4104 (020601R-3)

Classification: medial over loamy-skeletal, mixed Andic Cryochrepts.

General Site Characteristics

Location: Ravalli County, Montana: Stevensville Road, northeast 1/4 of section 19,  
T. 11N., R. 20W.

Forest: Bitterroot National Forest

Area: McClain Creek

Described By/Date:

Parent Rock/Material: micaceous schist with ash mantle

Habitat Type: alpine fir/(vaccinium globulare)

Topography: gently sloping ridges

Landform:

Weathering:

Formation Name:

Slope: 20 percent

Aspect: 350 degrees

Elevation: 5860 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderately rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-0 centimeters (2-0 inches). Duff layer.

A2 0-2 centimeters (0-1 inches). Very dark grayish brown (10YR 3/2); no lab sample; loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many medium and fine roots; 10-15 percent fine angular mica schist fragment; medium acid pH 6.0, noncalcareous; abrupt smooth boundary.

B2ir 2-26 centimeters (1-10 inches). Dark brown (7.5YR 4/4) gravelly loam; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; many medium and fine roots; 33 percent gravels by weight; medium acid pH 5.6, noncalcareous; abrupt wavy boundary.

IIC1 26-36 centimeters (10-14 inches). Brown (10YR 5/3) very gravelly sandy loam; massive structure; friable, slightly sticky and slightly plastic; many very fine roots; 67 percent gravels by weight; strongly acid pH 5.3, noncalcareous; clear smooth boundary.

79-MT-4104 (cont.)

IIC2 36-60 centimeters (14-24 inches). Brown (10YR 5/3) very gravelly loamy sand; massive structure; friable, slightly sticky and slightly plastic; many very fine roots; 68 percent gravels by weight; medium acid pH 5.7, noncalcareous.

Note: A2 and B21r horizons appear to have a high content of ash. High content of mica in C horizons gives a smeary or greasy feel.

Pedon: Unnamed Gravelly Loam 79-MT-4104 (020601R-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
	0	5-0	NS	NS	NS	NS				
	A2	0-2	NS	NS	NS	NS				
1	B2ir	2-26	5.6	0.21	84	0.8				
2	IIC1	26-36	5.3	0.13	46	0.0				
3	IIC2	36-60	5.7	0.14	50	0.4				

66

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	DC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms						%		%				
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	3.0	1.1	0.1	1.0	13.5	20.0	28	3.95	2.30	0.156	15	0.67	10.5
2	3.3	1.1	0.1	0.3	3.7	7.9	56	0.78	0.46	0.035	13	0.33	9.2
3	3.0	1.1	0.1	0.2	2.0	6.1	61	0.67	0.39	0.025	16	0.32	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zaida Fadness

Pedon: Unnamed Gravelly Loam 79-MT-4104 (020601R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.	
cm	%							%		
5-0						NS	NS	NS	NS	NS
0-2						NS	NS	NS	NS	NS
2-26						44.98	45.08	9.94	33	Gr. loam
26-36						63.62	31.68	4.70	67	V.gr. sandy loam
36-60						75.81	20.37	3.82	68	V.gr. loamy sand

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc		%		%	
5-0					NS	NS	NS	NS	NS
0-2					NS	NS	NS	NS	NS
2-26					32.7	11.1	NDNP	NDNP	NDNP
26-36					18.3	4.1	NDNP	NDNP	NDNP
36-60					15.1	3.5	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 NS-no sample

Analysis by: Debbie Hall

100

BT 12

Mg-saturated, glycolated

Q20601 R-3

79-MT-4104-3

IC1 26-36 cm

Slides prepared by: Falen and Blank

Slide run by: Chris Dillon

Slides interpreted by: Moody and Falen

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody + Falen

BT 12

Mg-saturated, glycolated

Q20601R-3

79-MT-4104-3

IC1 26-36 cm

Interpretation: illite, vermiculite

Kaolinite  
small amount chlorite

5.0348 Å

4.7663 Å

16.6°

7.1697 Å

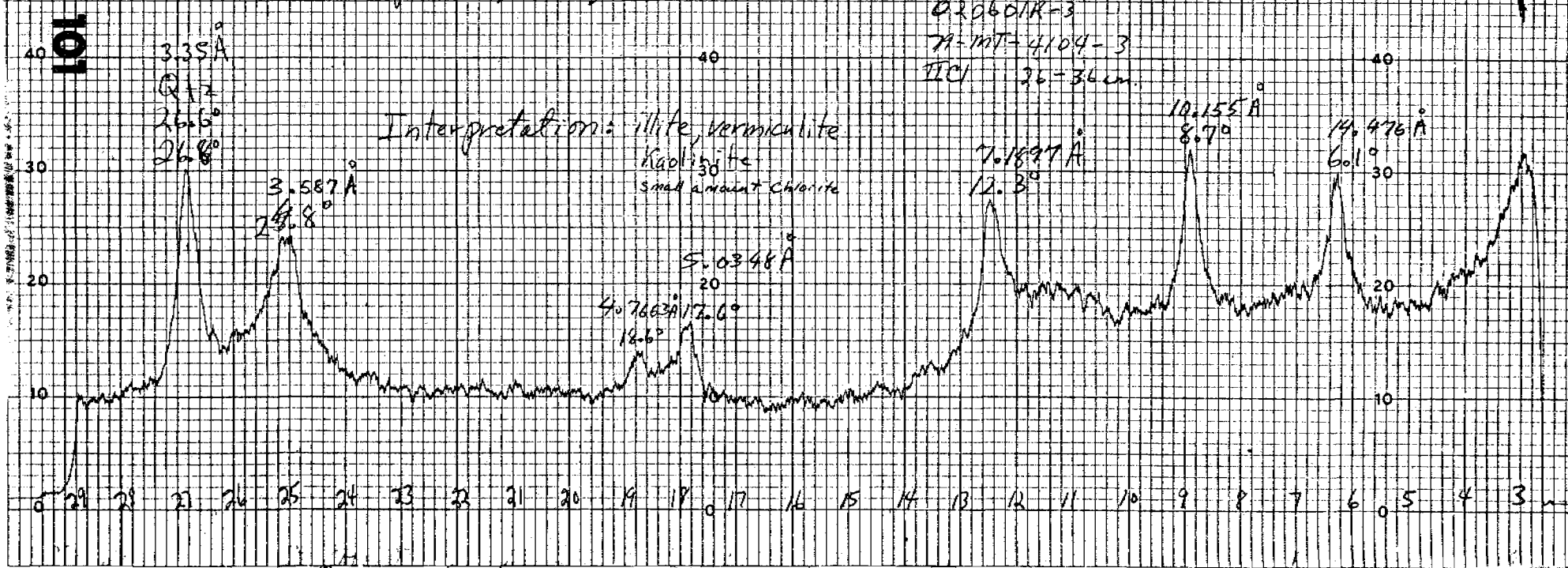
12.3°

10.155 Å

8.7°

14.476 Å

6.1°





BT 12  
K-saturated, air dried  
020601 R-3  
79-MT-4104-3  
ICI 26-36 cm

102

90  
80  
70  
60  
50  
40  
30  
20  
10

3.35 Å  
26.6°  
26.8°

3.587 Å  
24.8°

5.034 Å  
17.6°

90  
80  
70  
60  
50  
40  
30  
20  
10

BT 13  
K-saturated, air dried  
020601 R-3  
79-MT-4104-3  
ICI 26-36 cm

7.308 Å  
12.8°

10.04 Å  
8.8°

13 Å  
6.5°

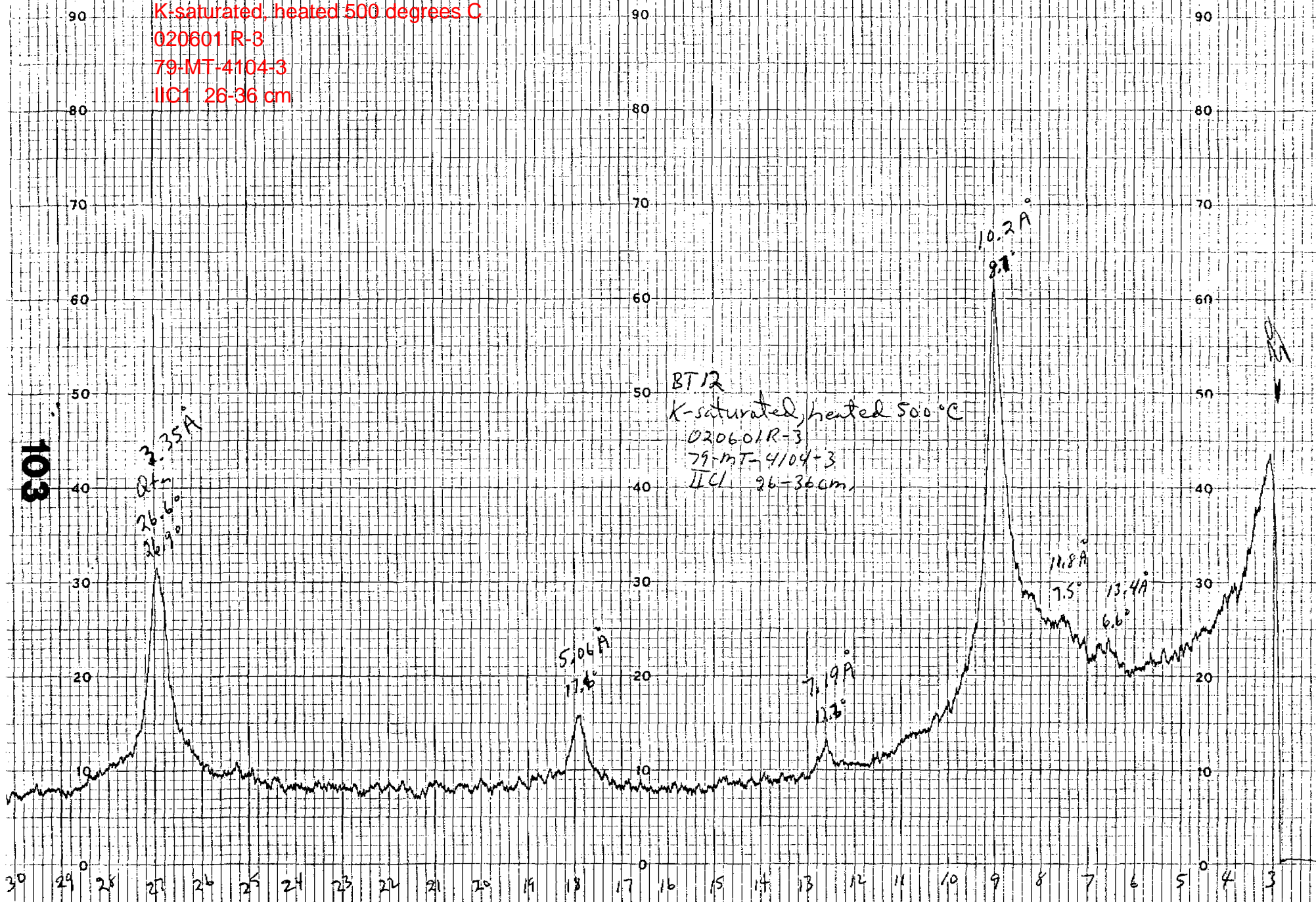
90  
80  
70  
60  
50  
40  
30  
20  
10

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

2θ



BT 12  
K: saturated, heated 500 degrees C  
020601R-3  
79-MT-4104-3  
LIC1 26-36 cm



Unnamed Very Fine Sandy Loam 79-MT-4105 (C-79-1)

Classification: medial over loamy, mixed Typic Cryorthod.

General Site Characteristics

Location: Ravalli County, Montana: Darby Road, northwest 1/4, southeast 1/4 of section 8, T. 4N., R. 18W.

Forest: Bitterroot National Forest

Area: Skalkaho Flat

Described By/Date:

Parent Rock/Material: depositional material from quartzite with volcanic ash mantle

Habitat Type: subalpine fir/twin flower h.t.

Topography: drainage bottom

Landform:

Weathering:

Formation Name:

Slope: 20 percent

Aspect: east

Elevation: 5800 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderate

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 2.5 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O 7-8 centimeters (3-8 inches). Partially decomposed needles, twigs, grasses, and mosses.

A2 0-6 centimeters (0-2 inches). Grayish brown (10YR 5/2) very fine sandy loam; massive structure; very friable, nonsticky and nonplastic; many fine and very fine roots; extremely acid pH 4.4, noncalcareous; 7 percent gravels by weight; abrupt smooth boundary.

B2ir 6-18 centimeters (2-7 inches). Dark brown (7.5YR 4/4) very fine sandy loam; very friable, nonsticky and nonplastic; many fine and very fine roots; medium acid pH 5.6, noncalcareous; 12 percent gravels by weight; abrupt smooth boundary.

11B3 18-32 centimeters (7-13 inches). Brown (10YR 5/4) very fine sandy loam; massive structure; very friable, nonsticky and nonplastic; strongly acid pH 5.5, noncalcareous; 8 percent gravels by weight; clear smooth boundary.

79-MT-4105 (cont.)

IIC1 32-54 centimeters (13-21 inches). Very pale brown (10YR 7/3) very fine sandy loam; massive structure; very friable, nonsticky and nonplastic; medium acid pH 5.9, noncalcareous; 6 percent gravels by weight.

IIC2 54-80 centimeters (21-32 inches). Very pale brown (10YR 7/3) no lab sample; gravelly fine sandy loam; single grained; nonsticky and nonplastic; 20 percent rounded quartzite gravels and cobbles.

Pedon: Unnamed Very Fine Sandy Loam 79-MT-4105 (C-79-1)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC#10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	7-0	NS	NS	NS	NS				
2	A2	0-6	4.4	0.34	64	1.9				
3	B2ir	6-18	5.6	0.11	66	0.5				
4	IIB3	18-32	5.5	0.12	45	0.2				
	IIC1	32-54	5.9	0.12	34	0.0				
	IIC2	54-80	NS	NS	NS	NS				

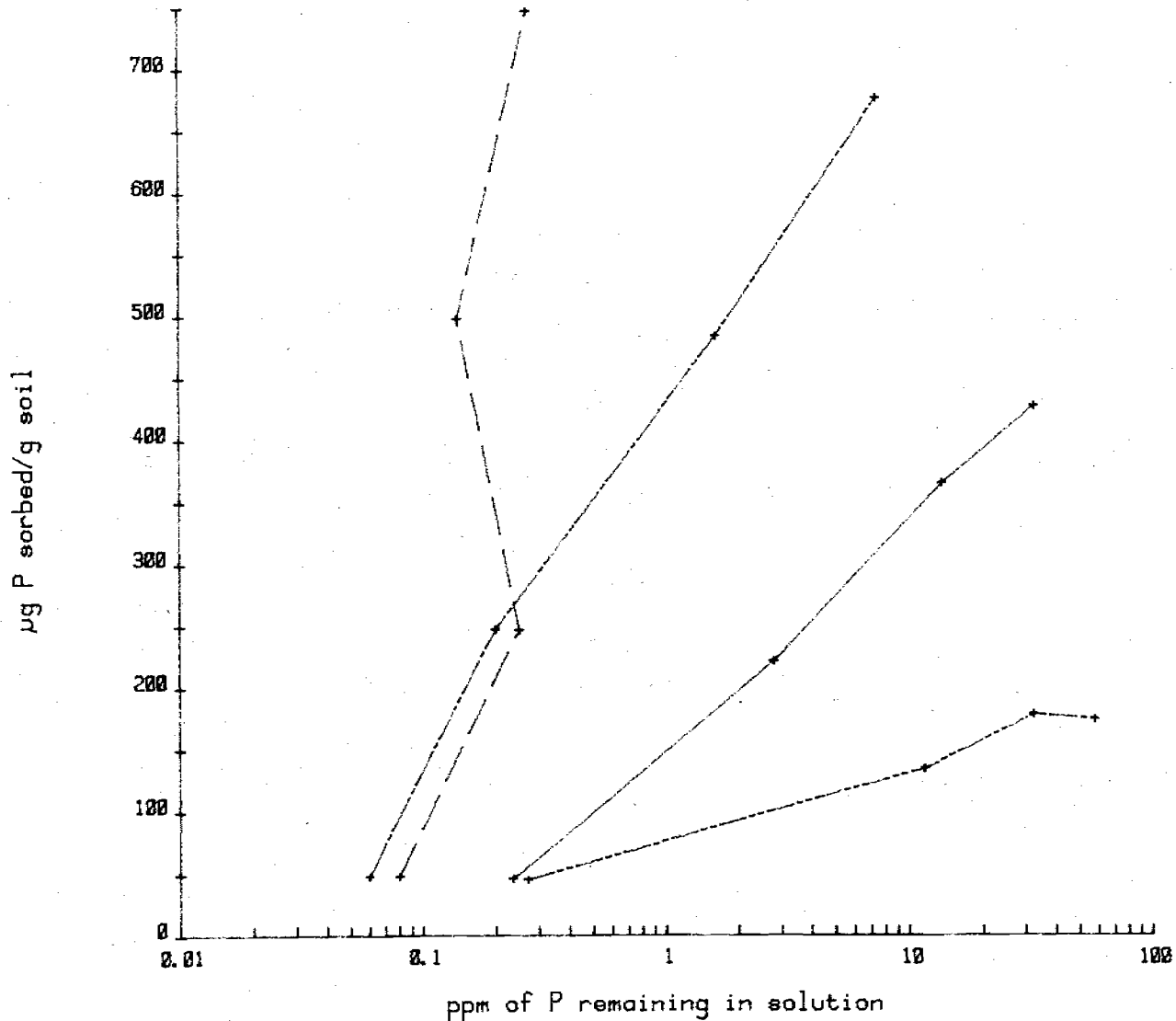
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	0.7	0.6	0.1	0.3	9.2	9.8	16	3.12	1.82	0.077	24	0.93	8.4
3	1.1	0.6	0.1	0.3	14.3	15.5	13	2.34	1.36	0.075	18	0.88	10.7
4	1.4	0.8	0.1	0.3	5.2	7.0	32	0.86	0.50	0.030	17	0.92	9.9
	3.5	1.4	0.1	0.1	1.7	4.6	75	0.19	0.11	0.012	9	0.94	9.3
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

### Phosphorus Isotherm

79-MT-4105



µg/g soil	Soln ppm
----- A2	
48	0.24
222	2.79
365	13.50
428	32.25
----- B2ir	
49	0.08
248	0.25
499	0.14
747	0.27
----- I1B3	
49	0.06
248	0.20
484	1.61
676	7.30
----- I1C1	
47	0.27
135	11.50
179	32.13
175	57.50

Pedon: Unnamed Very Fine Sandy Loam 79-MT-4105 (C-79-1)

Date: July 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	1/2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%								%		
7-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-6	0.30	1.17	3.50	14.02	29.61	48.62	47.39	3.99	7	7	Very fine sandy loam
6-18	1.26	2.73	5.35	19.72	23.19	52.25	43.31	4.44	12	12	Very fine sandy loam
18-32	0.60	2.03	5.26	19.35	30.02	57.26	39.21	3.53	8	8	Very fine sandy loam
32-54	0.40	1.82	6.11	25.08	26.60	60.00	37.62	2.38	6	6	Very fine sandy loam
54-80	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

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Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
7-0						NS	NS	NS	NS	NS
0-6						26.5	5.3	NDNP	NDNP	NDNP
6-18						23.9	10.9	NDNP	NDNP	NDNP
18-32						16.9	5.8	NDNP	NDNP	NDNP
32-54						15.2	3.3	NDNP	NDNP	NDNP
54-80						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

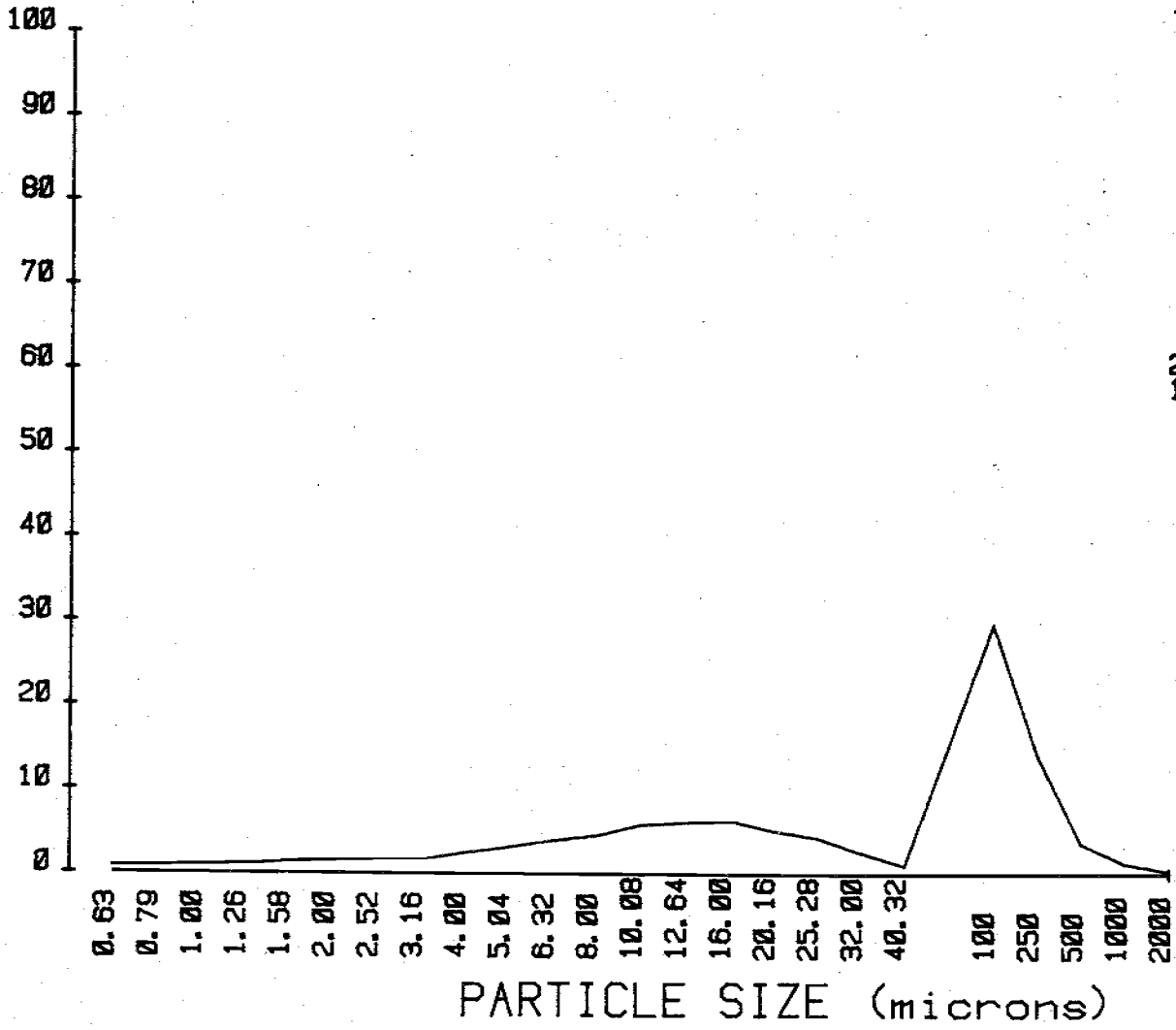
Identification	M4105-1	M4105-2	M4105-3	M4105-4
Units	-----%			
TC (0.63-2.00)	3.99	4.44	3.53	2.38
TSi (2.00-50)	47.39	43.31	39.21	37.62
TS (50-2000)	48.62	52.25	57.26	60.00
Clay	0.63-0.794	0.58	0.81	0.64
	0.794-1.00	0.65	0.80	0.61
	1.00-1.26	0.80	0.91	0.71
	1.26-1.59	0.81	0.82	0.66
	1.59-2.00	1.16	1.09	0.90
Fine Silt	2.00-2.52	1.42	1.26	1.08
	2.52-3.17	1.53	1.37	1.16
	3.17-4.00	1.36	1.24	1.10
	4.00-5.04	2.22	1.19	1.66
Medium Silt	5.04-6.35	2.93	2.13	2.18
	6.35-8.00	3.72	2.61	2.71
	8.00-10.08	4.34	3.15	3.18
	10.08-12.70	5.60	4.12	4.00
	12.70-16.0	5.95	5.09	4.59
	16.0-20.2	6.12	5.27	4.88
Coarse Silt	20.2-25.4	4.93	5.15	4.62
	25.4-32.0	4.09	4.85	4.11
	32.0-40.3	2.34	4.12	2.70
	40.3-50.8	0.77	1.68	1.01
	50.8-64.0	0.08	0.07	0.25
VFS (50-100)	29.61	23.19	30.02	26.60
FS (100-250)	14.02	19.72	19.35	25.08
MS (250-500)	3.50	5.35	5.26	6.11
CoS (500-1000)	1.17	2.73	2.03	1.82
VCoS (1000-2000)	0.30	1.26	0.60	0.40
Greater than 2000	7	12	8	6
Textural Class	VFSL	VFSL	VFSL	VFSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

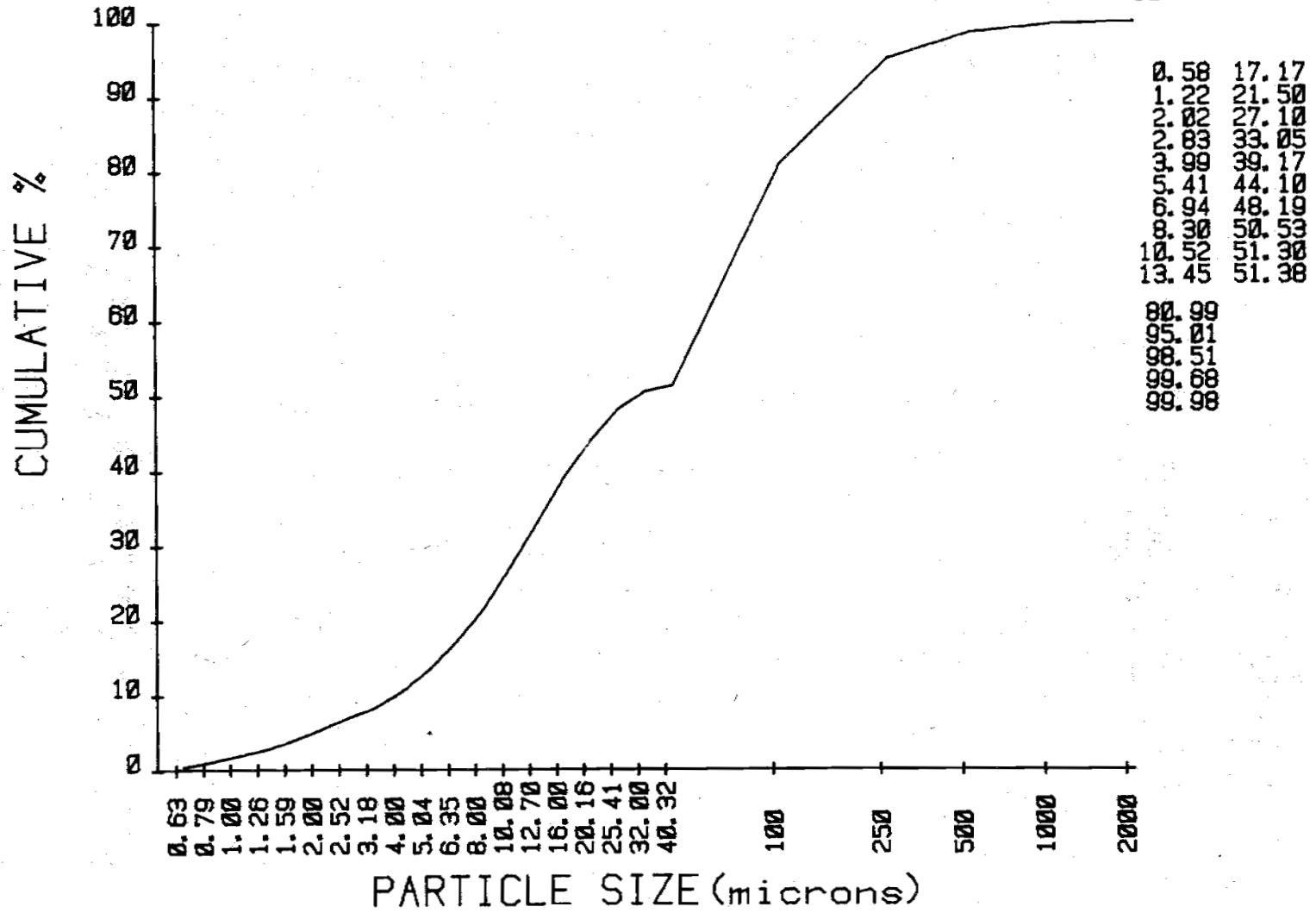
ID M4105-1



0.58	3.72
0.65	4.34
0.80	5.60
0.81	5.95
1.17	6.12
1.42	4.93
1.53	4.89
1.36	2.34
2.22	0.77
2.93	0.08
29.61	
14.02	
3.50	
1.17	
0.30	

CUMULATIVE CURVE SAND-SILT-CLAY

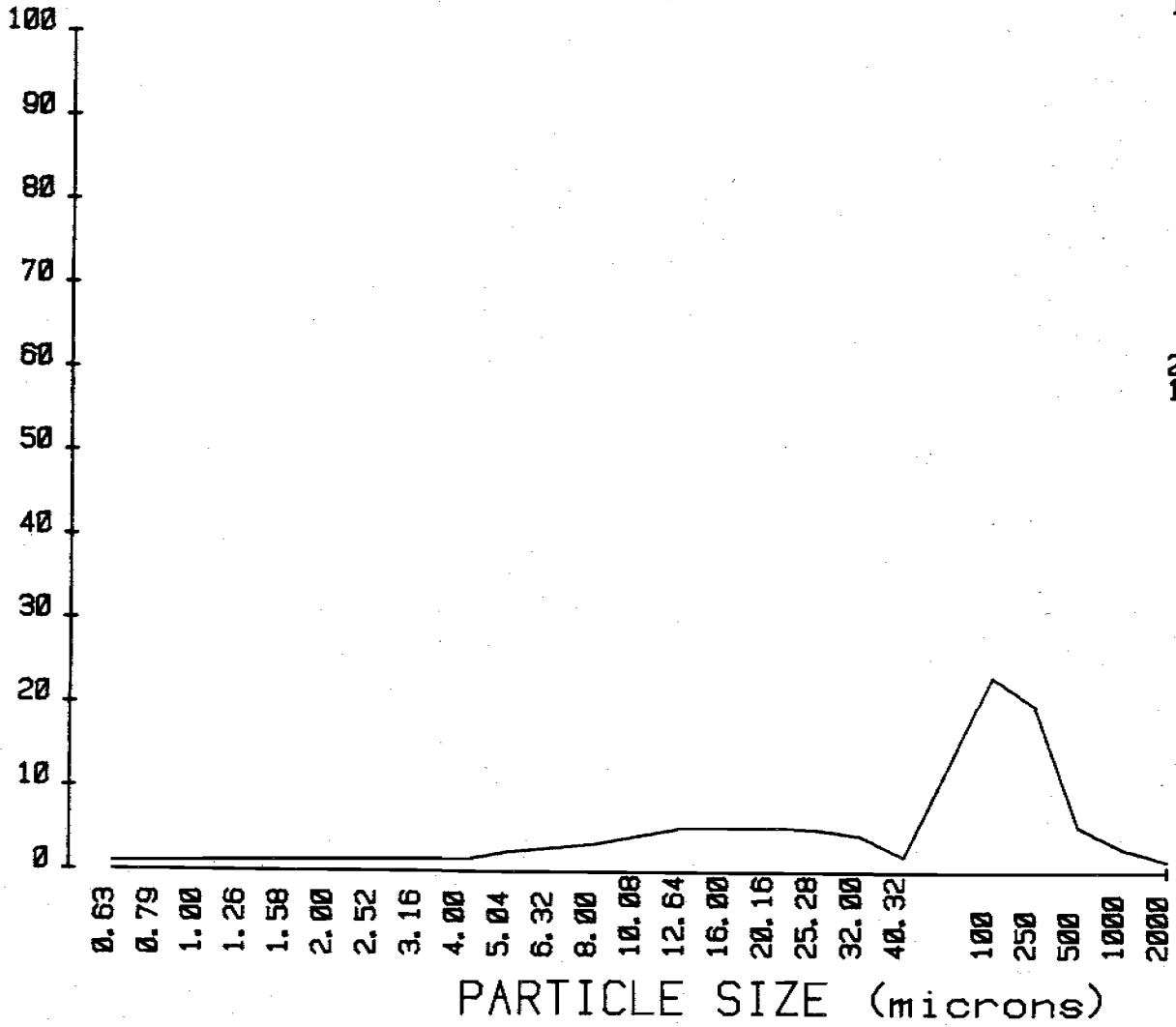
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PLOT SAND-SILT-CLAY

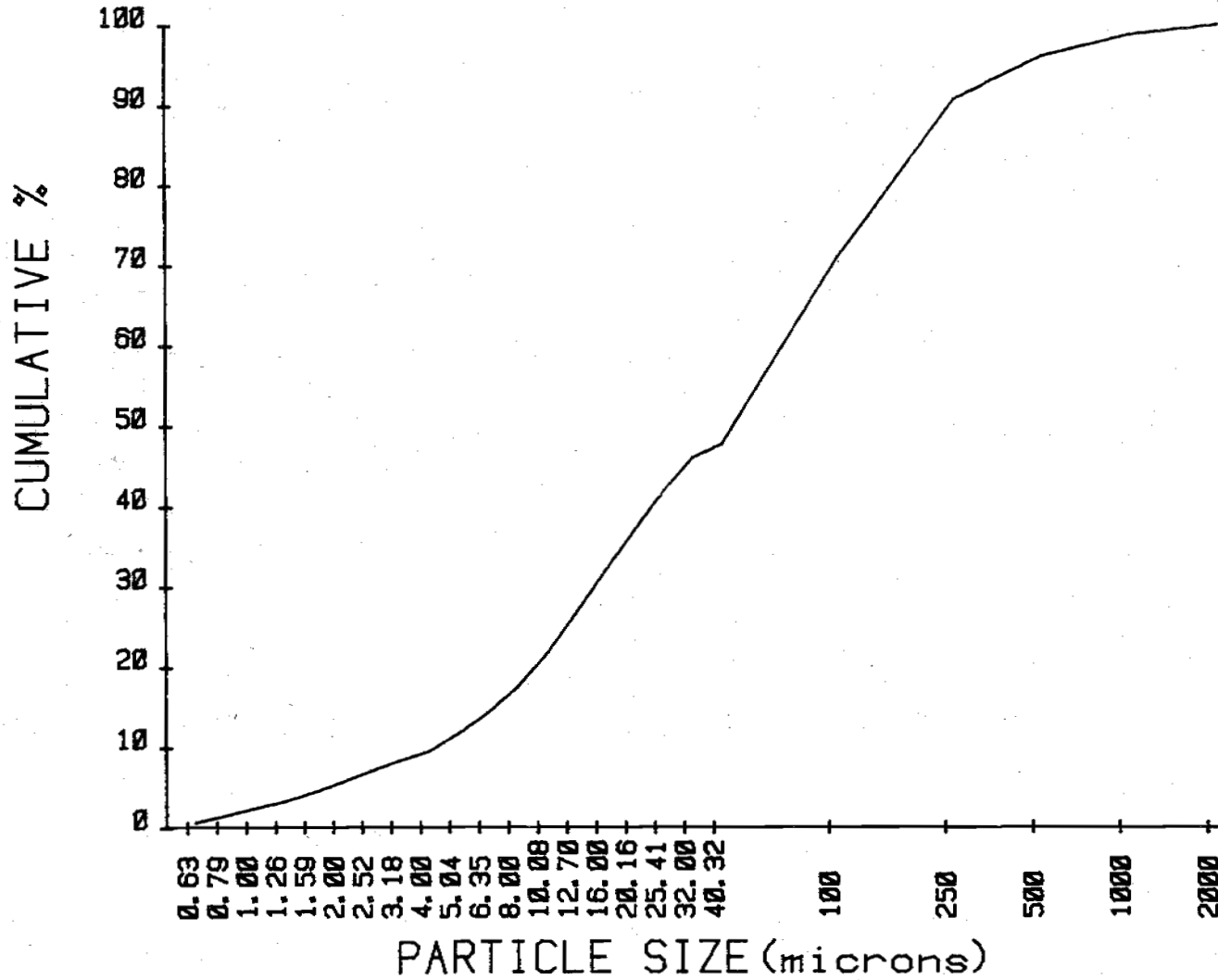
ID M4105-2



0.81	2.61
0.80	3.15
0.91	4.12
0.82	5.00
1.00	5.27
1.26	5.15
1.37	4.85
1.24	4.12
1.19	1.68
2.13	0.07
23.19	
19.72	
5.95	
2.73	
1.26	

CUMULATIVE CURVE SAND-SILT-CLAY

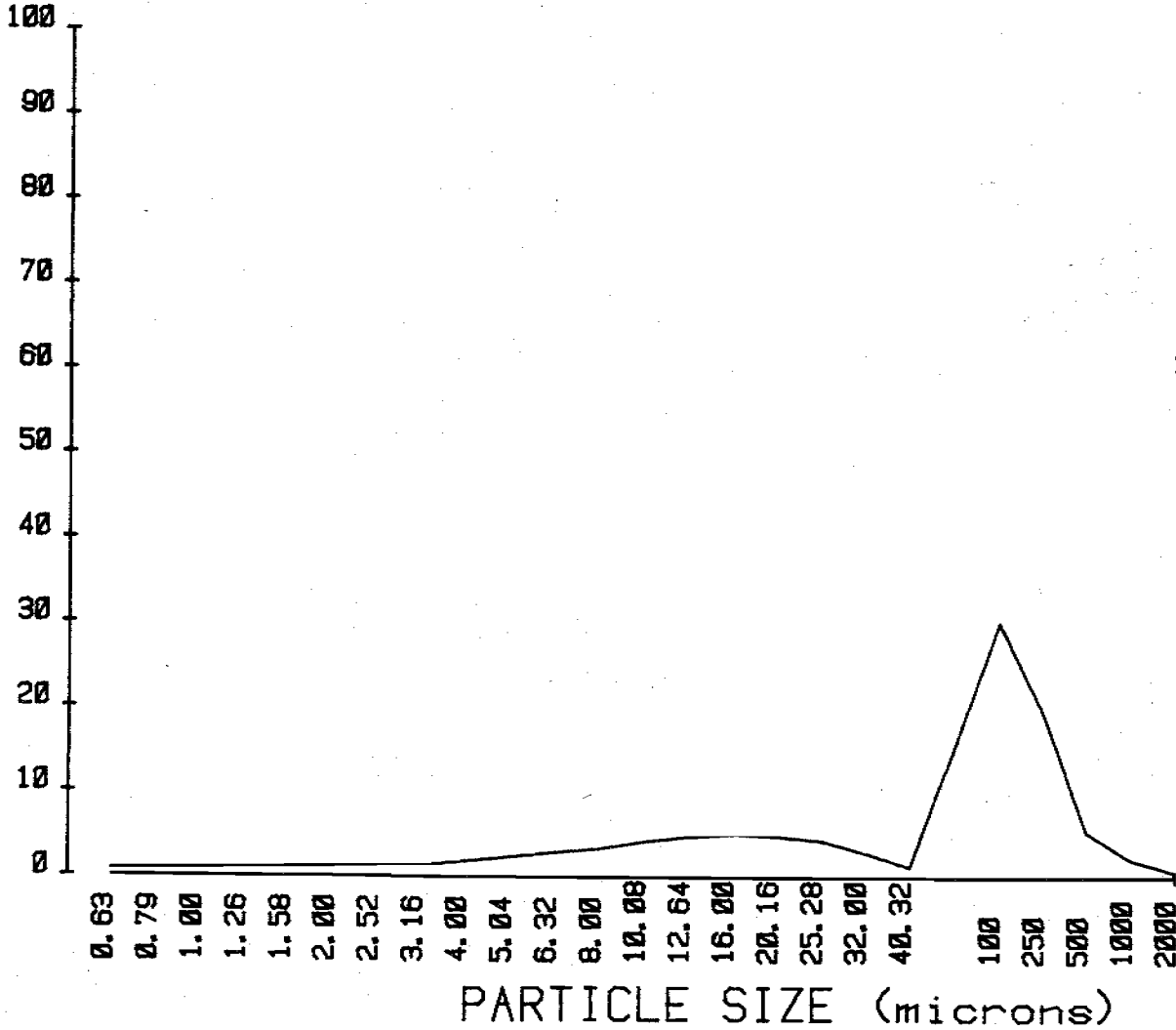
ID M4105-2



0.81	14.24
1.62	17.40
2.52	21.52
3.35	26.61
4.44	31.88
5.70	37.02
7.07	41.88
8.31	46.00
9.50	47.68
11.63	47.75
70.94	
90.66	
96.01	
98.74	
100.00	

PLOT SAND-SILT-CLAY

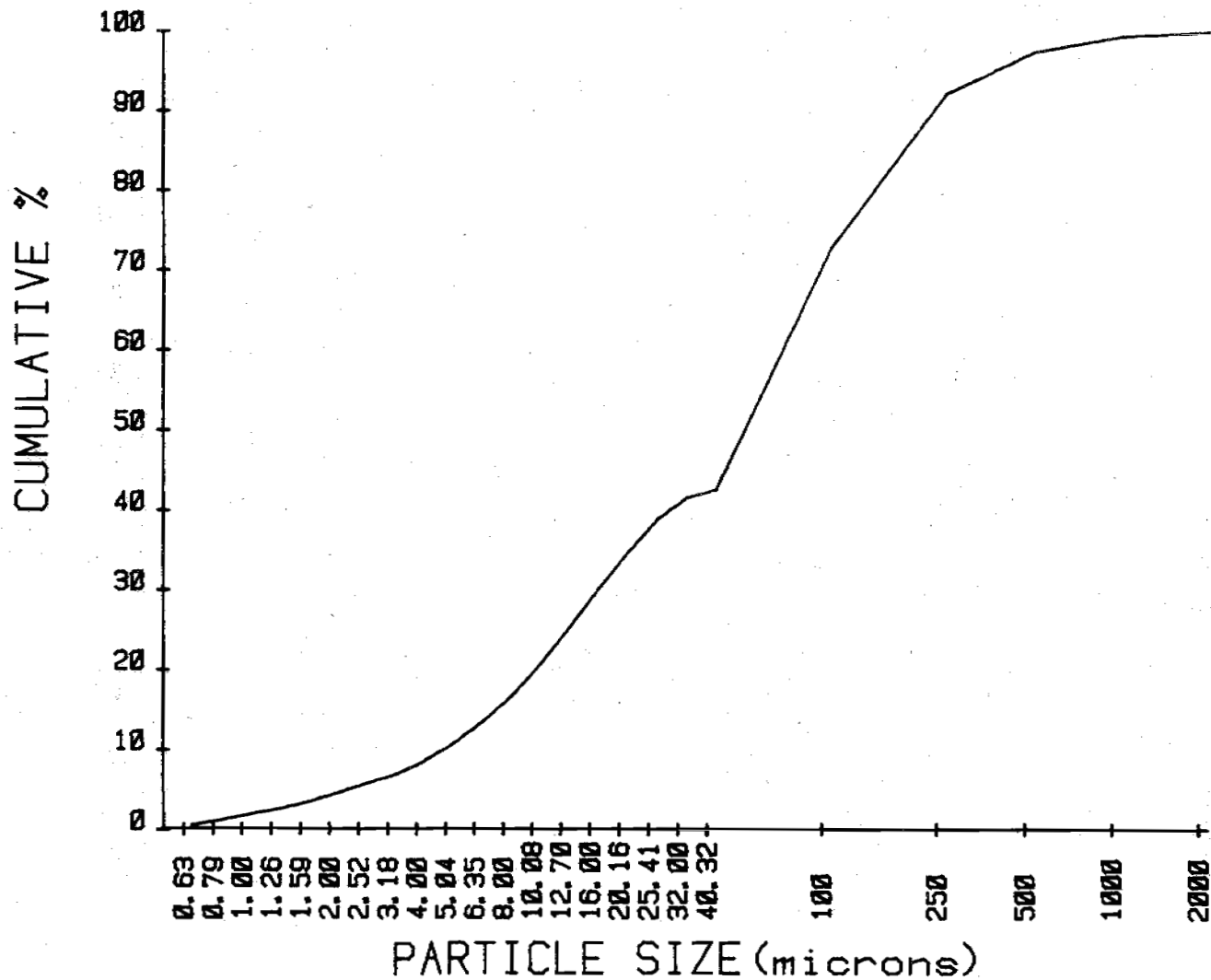
ID M4105-3



0.64	2.71
0.61	3.18
0.71	4.00
0.66	4.50
0.90	4.88
1.08	4.62
1.16	4.11
1.10	2.70
1.66	1.01
2.18	0.25
30.02	
19.95	
5.26	
2.03	
0.60	

CUMULATIVE CURVE SAND-SILT-CLAY

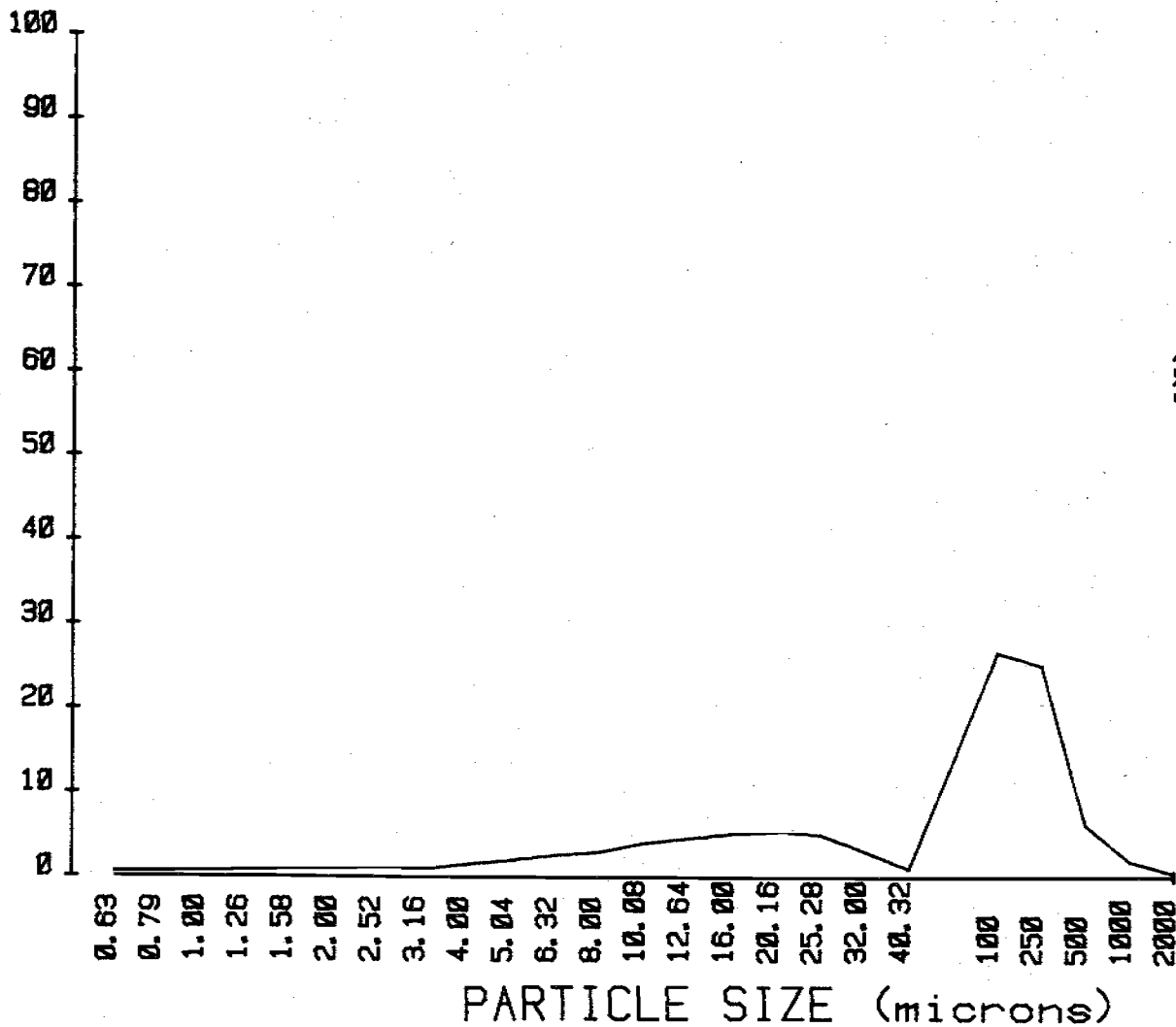
ID M4105-3



0.64	13.41
1.25	16.59
1.96	20.50
2.63	25.18
3.53	30.06
4.60	34.68
5.77	38.78
6.87	41.48
8.53	42.49
10.70	42.74
72.76	
92.11	
97.37	
99.40	
100.00	

# PLOT SAND-SILT-CLAY

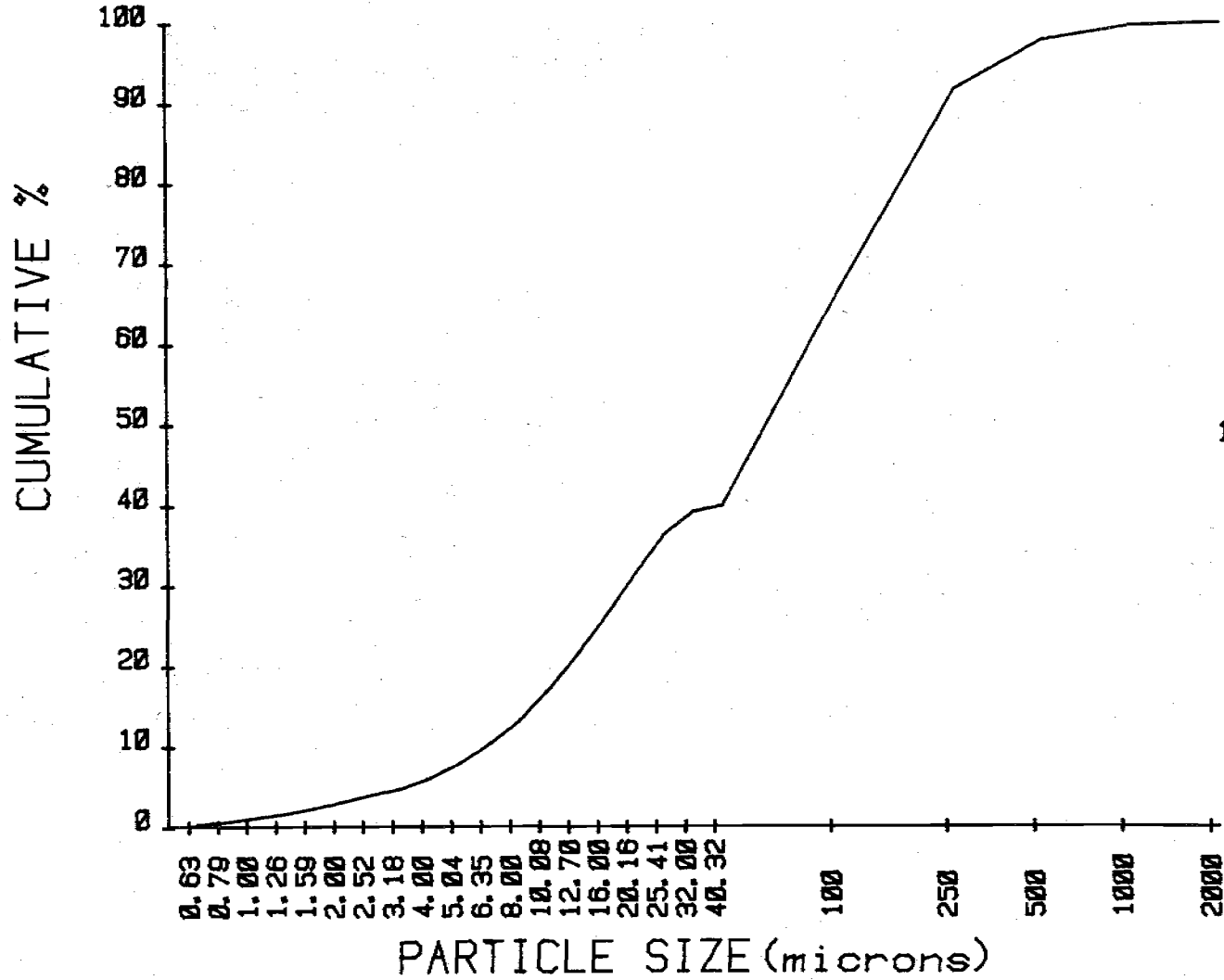
ID M4105-4



0.38	2.35
0.41	2.78
0.48	3.82
0.46	4.42
0.65	4.98
0.79	5.25
0.86	4.86
0.75	2.81
1.32	0.75
1.82	0.05
26.60	
25.08	
6.11	
1.82	
0.40	

### CUMULATIVE CURVE SAND-SILT-CLAY

ID M4105-4



0.38	10.27
0.79	13.05
1.27	16.87
1.73	21.29
2.38	26.28
3.17	31.53
4.03	36.39
4.78	39.20
6.11	39.95
7.92	40.00
66.60	
91.68	
97.79	
99.61	
100.01	



Unnamed Very Gravelly Coarse Sandy Loam 79-MT-4186 (040401R-3)

Classification: sandy skeletal, mixed Typic Cryochrepts.

General Site Characteristics

Location: Ravalli County Montana: West Fork Road, southwest 1/4 of section 4,  
T. 1S., R. 21W.  
Forest: Bitterroot National Forest  
Area: Rombo Drainage  
Described By/Date:  
Parent Rock/Material: weathered from granite  
Habitat Type: Abia/Vagl, Xete h.t.  
Topography: slightly convex slope  
Landform:  
Weathering:  
Formation Name:  
Slope: 45 percent  
Aspect: northeast 60 degrees  
Elevation: 6900 feet  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Erosion:  
Infiltration:  
Permeability: moderately rapid  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

- O 3-8 centimeters (1-0 inches). Partially decomposed leaves, twigs, and needles.
- A1 0-3 centimeters (0-1 inches). Dark brown (10YR 3/3) moist; no lab sample; gravelly loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many fine and very fine roots; strongly acid pH 5.4, noncalcareous; no percent gravels by weight; abrupt smooth boundary.
- B2 3-27 centimeters (1-11 inches). Dark yellowish brown (10YR 4/4) moist; very gravelly coarse sandy loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many very fine roots; strongly acid pH 5.3, noncalcareous; 65 percent gravels by weight; clear smooth boundary.
- C1 27-36 centimeters (11-14 inches). Yellowish brown (10YR 5/6) moist; very gravelly coarse sandy loam; single grained; loose, nonsticky and nonplastic; many very fine roots; strongly acid pH 5.5, noncalcareous; 75 percent gravels by weight; clear wavy boundary.

79-MT-4106 (cont.)

C2        36-70+ centimeters (14-28+ inches). Very gravelly coarse sandy loam; highly weathered granite rock can be dug with a shovel; strongly acid pH 5.5, noncalcareous; 66 percent gravels by weight.

Pedon: Unnamed Very Gravelly Coarse Sandy Loam 79-MT-4106 (040401R-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> <sub>10</sub> mmhos/cm	Z Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	3-0	NS	NS	NS	NS				
2	A1	0-3	NS	NS	NS	NS				
3	B2	3-27	5.4	0.16	60	0.5				
	C1	27-36	5.3	0.15	45	0.4				
	C2	36-70+	5.5	0.10	36	0.3				

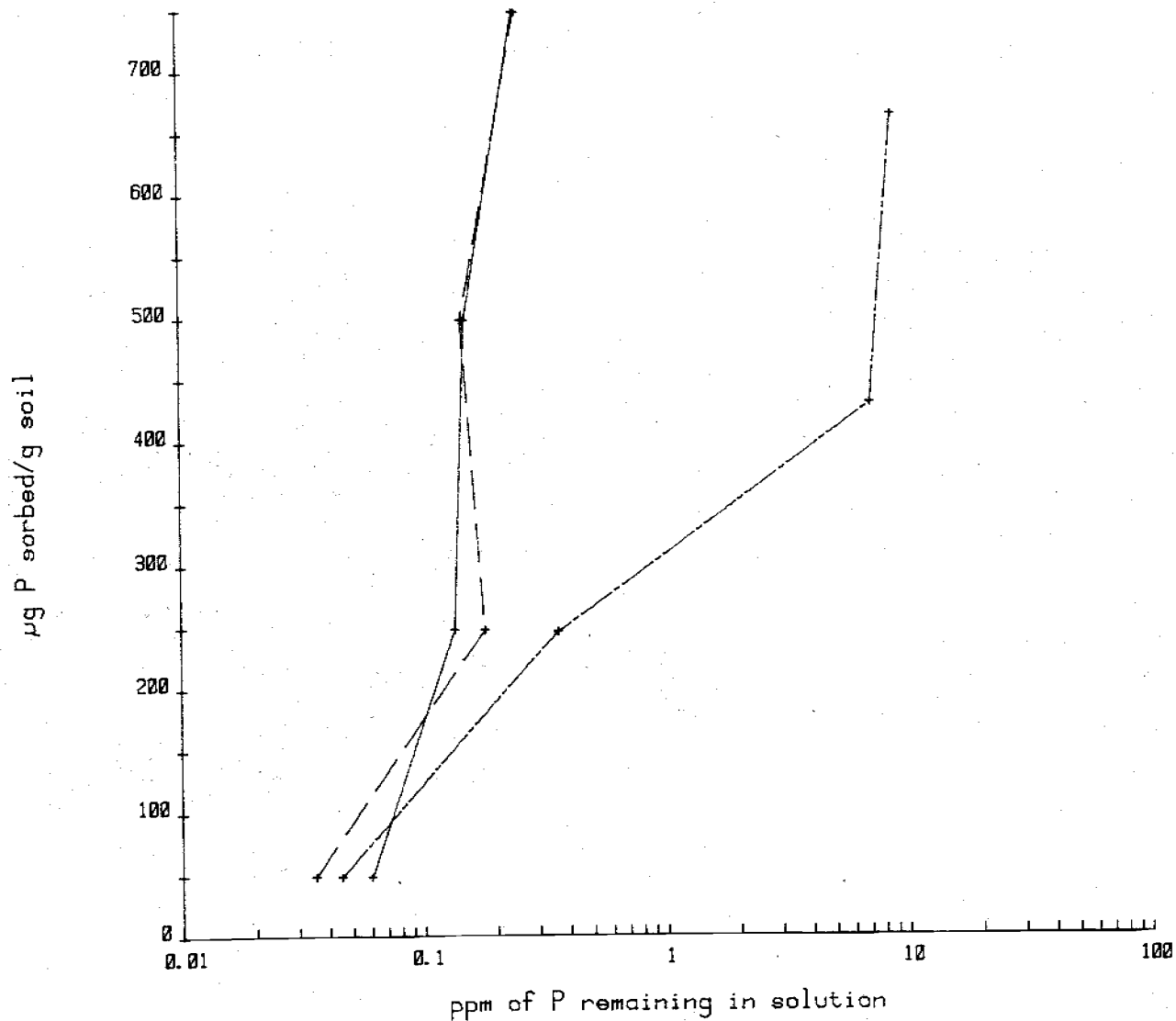
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms						%		%				
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	1.2	0.3	0.1	0.4	11.2	13.8	15	3.55	2.06	0.092	22	0.35	10.7
3	0.7	0.2	0.1	0.3	7.0	8.4	16	1.95	0.90	0.057	16	0.25	10.6
	0.5	0.2	0.1	0.1	2.7	3.6	23	0.31	0.18	0.014	13	0.34	9.5

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-4106



µg/g soil	Soln ppm
----- B2	
49	0.06
249	0.14
499	0.15
748	0.25
----- C1	
50	0.04
248	0.18
499	0.15
748	0.25
----- C2	
50	0.05
246	0.36
430	7.00
664	8.65

Pedon: Unnamed Very Gravelly Coarse Sandy Loam 79-MT-4106 (040401R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
cm	%							%		
3-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-27	22.19	17.34	6.32	6.46	6.23	58.53	33.11	8.36	65	V. gr. coarse sandy loam
27-36	27.57	21.29	7.36	5.37	7.24	68.83	24.69	6.48	75	V. gr. coarse sandy loam
36-70	28.30	32.40	14.06	11.56	4.18	59.02	7.57	1.93	66	V. gr. coarse sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
3-0						NS	NS	NS	NS	NS
0-3						NS	NS	NS	NS	NS
3-27						23.5	9.6	NDNP	NDNP	NDNP
27-36						16.4	6.3	NDNP	NDNP	NDNP
36-70						5.8	3.5	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
Atterbergs were run by Debbie Hall

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

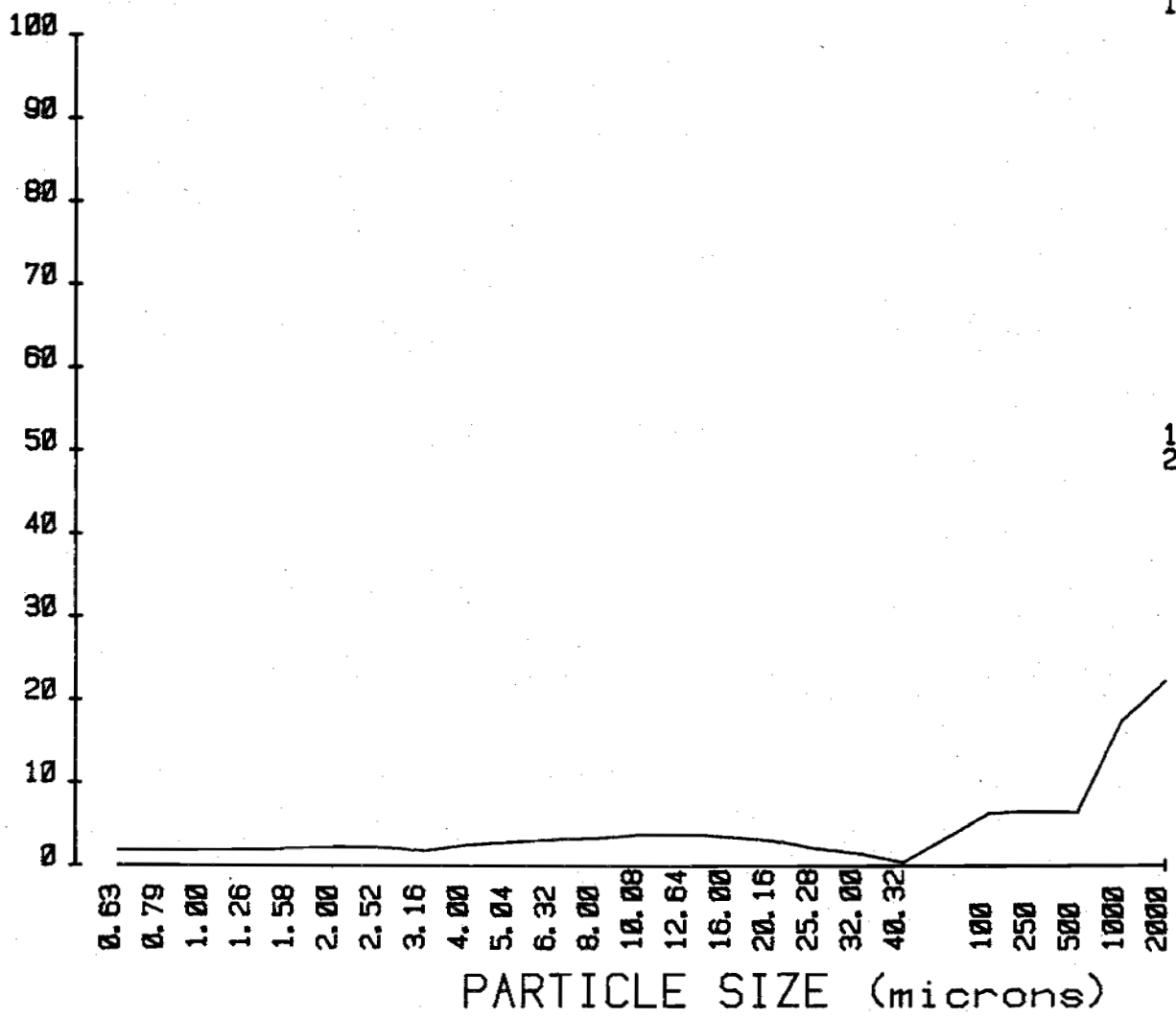
Date: January 1981

Identification		M4106-1	M4106-2	M4106-3	
Units		-----			%
TC (0.63-2.00)		8.36	6.48	1.93	
TSi (2.00-50)		33.11	24.69	7.57	
TS (50-2000)		58.53	68.83	90.50	
Clay	0.63-0.794	1.62	1.31	0.42	
	0.794-1.00	1.58	1.20	0.35	
	1.00-1.26	1.72	1.32	0.38	
	1.26-1.59	1.54	1.17	0.34	
	1.59-2.00	1.90	1.49	0.44	
Fine Silt	2.00-2.52	2.01	1.59	0.50	
	2.52-3.17	1.93	1.53	0.51	
	3.17-4.00	1.55	1.25	0.50	
	4.00-5.04	2.28	0.94	0.42	
Medium Silt	5.04-6.35	2.68	1.73	0.66	
	6.35-8.00	2.96	1.97	0.68	
	8.00-10.08	3.11	2.15	0.64	
	10.08-12.70	3.57	2.47	0.70	
	12.70-16.0	3.64	2.72	0.65	
	16.0-20.2	3.28	2.67	0.66	
Coarse Silt	20.2-25.4	2.84	2.27	0.60	
	25.4-32.0	1.82	1.96	0.56	
	32.0-40.3	1.21	0.78	0.29	
	40.3-50.8	0.20	0.47	0.16	
	50.8-64.0	0.05	0.18	0.04	
VFS (50-100)		6.23	7.24	4.18	
FS (100-250)		6.46	5.37	11.56	
MS (250-500)		6.32	7.36	14.06	
CoS (500-1000)		17.34	21.29	32.40	
VCoS (1000-2000)		22.19	27.57	28.30	
Greater than 2000		65	75	66	
Textural Class		V. gr. CoSL	V. Gr. SL	V.gr. CoS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

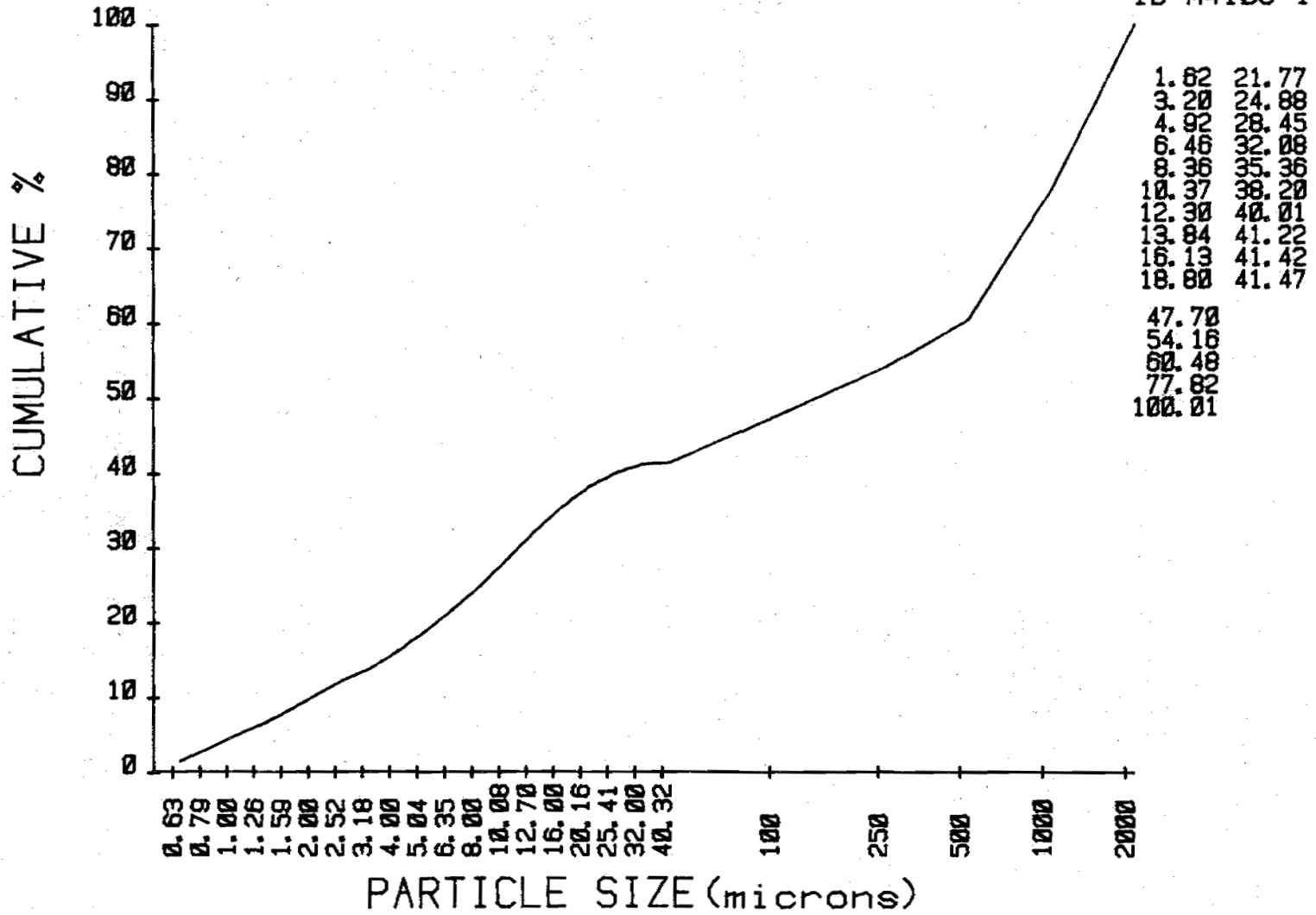
ID M4106-1



1.62	2.96
1.58	2.11
1.72	3.57
1.54	3.64
1.90	3.28
2.01	2.84
1.93	1.82
1.55	1.21
2.28	0.20
2.68	0.65
6.23	
6.46	
6.32	
17.34	
22.19	

CUMULATIVE CURVE SAND-SILT-CLAY

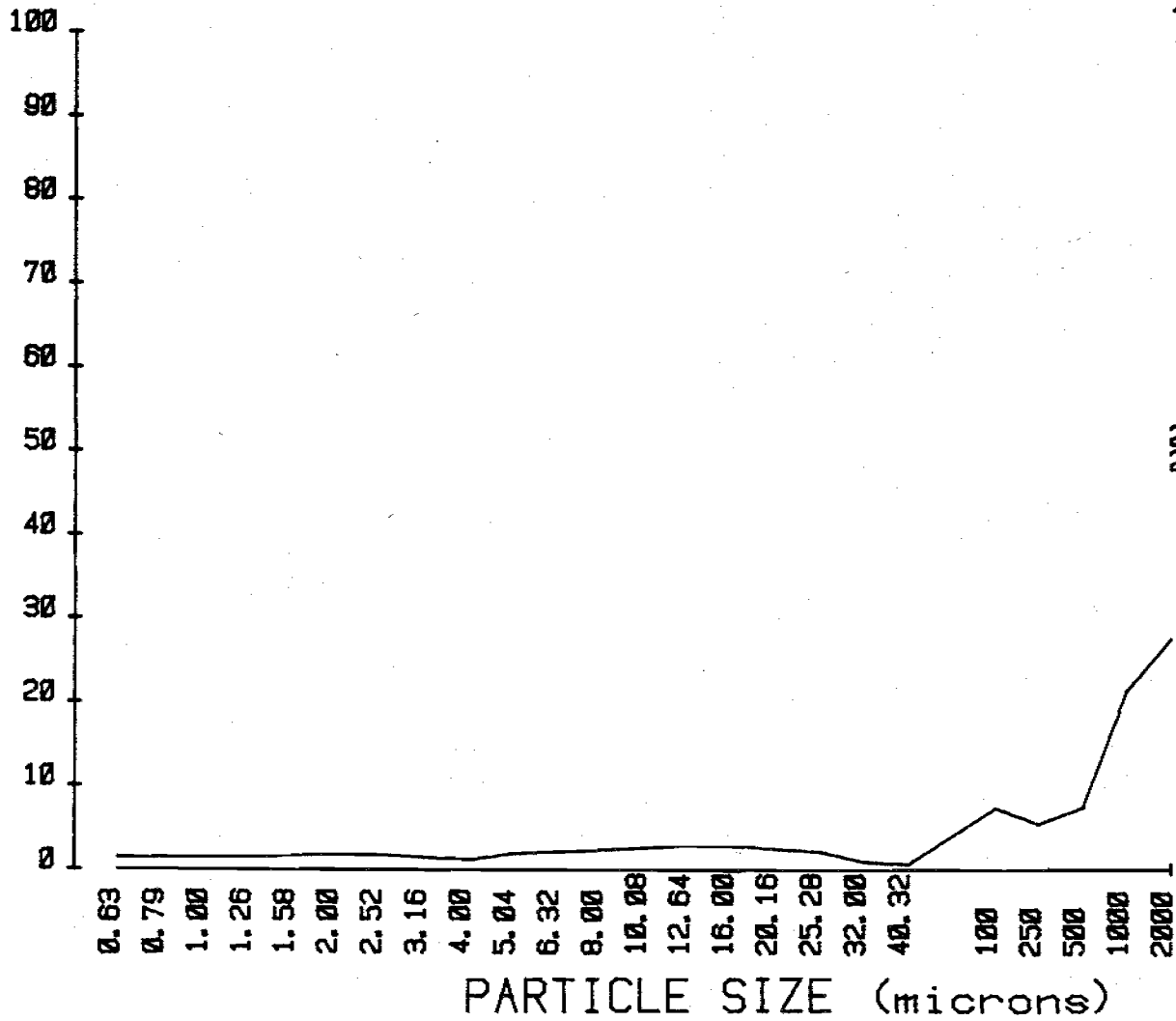
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PLOT SAND-SILT-CLAY

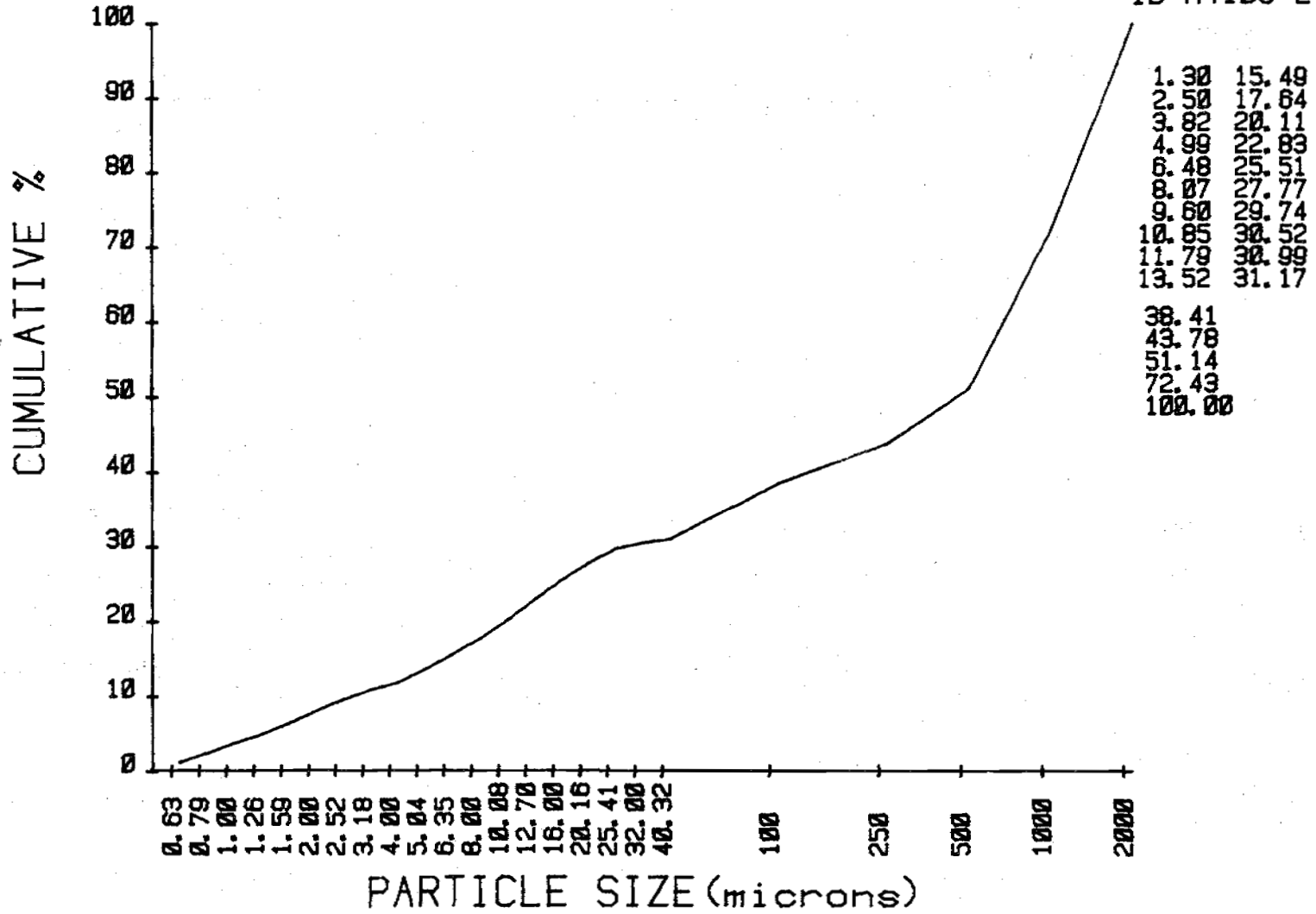
ID M4106-2



1.30	1.97
1.20	2.15
1.32	2.47
1.17	2.72
1.49	2.87
1.59	2.27
1.53	1.96
1.25	0.78
0.94	0.47
1.73	0.18
7.24	
5.97	
7.36	
21.29	
27.57	

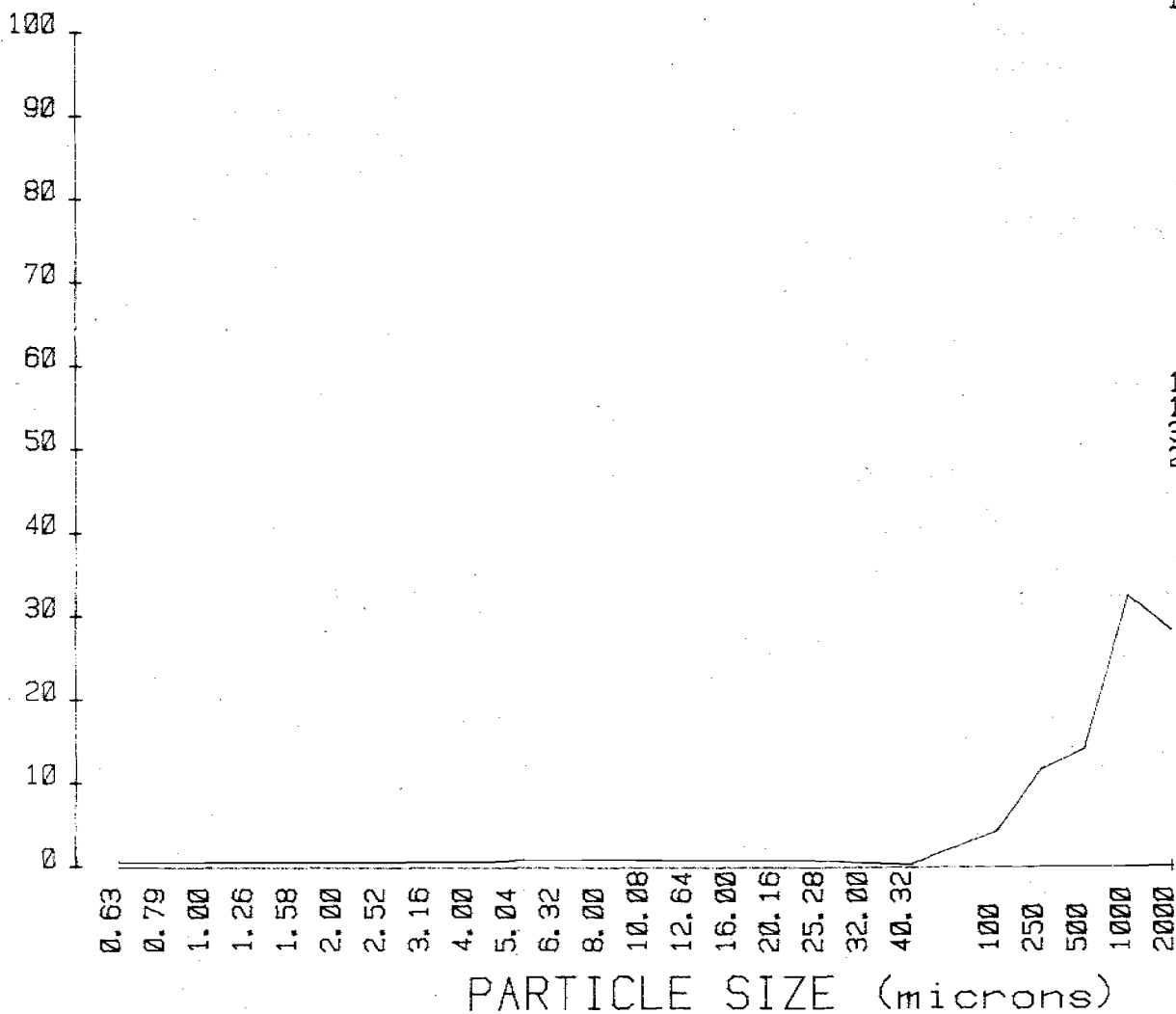
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4106-2



PLOT SAND-SILT-CLAY

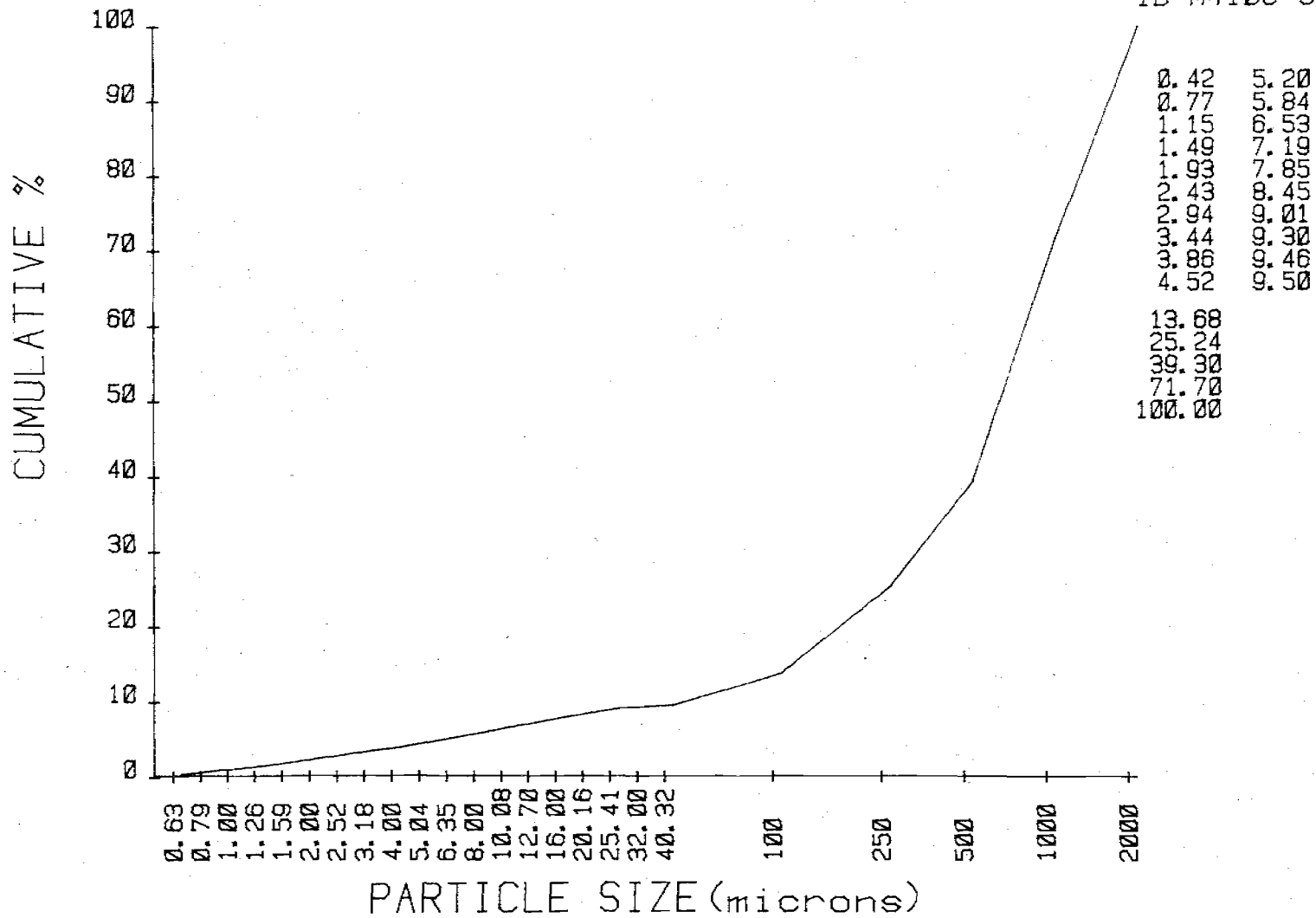
ID M4106-3



0.42	0.68
0.35	0.64
0.38	0.70
0.34	0.65
0.44	0.66
0.50	0.60
0.51	0.56
0.50	0.29
0.42	0.16
0.66	0.04
4.18	
11.56	
14.06	
32.40	
28.30	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4106-3



Unnamed Very Gravelly Sandy Loam 79-MT-4107 (C-79-3)

Classification: sandy skeletal, mixed Typic Cryochrept.

General Site Characteristics

Location: Ravalli County, Montana: southeast 1/4 of section 10, T. 3S., R. 22W.,  
in Douglas Fir stand just below road

Forest: Bitterroot National Forest

Area:

Described By/Date:

Parent Rock/Material: porphyritic andesite

Habitat Type: Douglas fir/pinegrass h.f.

Topography: med. steep sideslope

Landform:

Weathering:

Formation Name:

Slope: 20 percent

Aspect: southwest

Elevation: 6120 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderately rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 4-8 centimeters (2-8 inches). Partially decomposed twigs, needles, and grass.

A1 0-6 centimeters (0-2 inches). Very dark grayish brown (10YR 3/2) very gravelly sandy loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many very fine roots; 64 percent gravels by weight; strongly acid pH 5.5, noncalcareous; abrupt smooth boundary.

B2 6-36 centimeters (2-14 inches). Dark brown (10YR 4/3) gravelly sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and very fine roots; 41 percent gravels by weight; medium acid pH 5.6, noncalcareous; gradual wavy boundary.

C1 36-70 centimeters (14-28 inches). Yellowish brown (10YR 5/4) very gravelly loamy sand; weak medium subangular blocky structure; nonsticky and nonplastic; many very fine and fine roots; medium acid pH 5.9, noncalcareous; 57 percent gravels by weight.

C2 70+ centimeters (28+ inches). No lab sample; weathered coarse grained volcanic rock (porphyritic andesite).

Pedon: Unnamed Very Gravelly Sandy Loam 79-MT-4107 (C-79-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1 3 3	0	4-0	NS	NS	NS	NS				
	A1	0-6	5.5	0.20	84	5.5				
	B2	6-36	5.6	0.12	33	1.2				
	C1	36-70	5.9	0.10	27	0.8				
	C2	70+	NS	NS	NS	NS				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1 3 3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11.0	1.2	0.1	0.8	13.4	28.8	49	9.27	5.39	0.194	28	0.36	8.8
	3.5	0.7	<.1	0.3	3.2	8.4	58	0.69	0.40	0.037	11	0.59	9.3
	3.7	0.8	<.1	0.2	2.3	7.7	67	0.38	0.22	0.021	10	0.43	8.9
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run by the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Very Gravelly Sandy Loam 79-MT-4107 (C-79-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
4-0							NS	NS	NS	NS	NS
0-6							67.52	24.07	8.42	64	V.gr. sandy loam
6-36							66.32	35.74	7.94	41	Gr. sandy loam
36-70							71.25	20.31	8.44	57	V.gr. sandy loam
70+							NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	%			g/cc		%		%
4-0						NS	NS	NS
0-6						30.2	14.2	NDNP
6-36						14.8	7.6	NDNP
36-70						13.9	7.2	NDNP
70+						NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Loamy Coarse Sand 79-MT-4108 (060701R-3)

Classification: coarse loamy, mixed Alfic Cryochrepts.

General Site Characteristics

Location: Ravalli County, Montana: south 1/2, southeast 1/4 of section 20, T. 2N.,  
R. 18W.

Forest: Bitterroot National Forest

Area:

Described By/Date:

Parent Rock/Material: granite

Habitat Type: Douglas fir/snowberry, pinegrass phase-willow is common

Topography: rolling mid slopes

Landform:

Weathering:

Formation Name:

Slope: 30 percent

Aspect: 190 degrees

Elevation: 5740 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderate

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 2-0 centimeters (1-0 inches). Partially decomposed grass and needle litter.

A1 0-10 centimeters (0-4 inches). Very dark grayish brown (10YR 3/2) gravelly loamy coarse sand; weak fine granular structure; very friable, slightly sticky and nonplastic; many very fine roots; slightly acid pH 6.2, noncalcareous; 28 percent gravels by weight; abrupt smooth boundary.

B21 10-49 centimeters (4-19 inches). Yellowish brown (10YR 5/4) gravelly loamy coarse sand; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common fine roots; 29 percent gravels by weight; slightly acid pH 6.2, noncalcareous; clear wavy boundary.

B22t & C 49-214 centimeters (19-84 inches). Yellowish brown (10YR 5/4) gravelly loamy coarse sand; massive structure; very friable, nonsticky and nonplastic; common very fine roots; 25 percent gravels by weight; strongly acid pH 5.5, noncalcareous; commonly through the horizon are thin 1-6 centimeter thick lamellae occurring at 6 to 12 centimeter spacings; C material--yellowish brown (10YR 5/4) gravelly sandy clay loam; weak medium subangular blocky structure; friable, sticky and slightly plastic; thin patchy clay films on peds; abrupt smooth boundary.



Pedon: Unnamed Gravelly Loamy Coarse Sand 79-MT-4108 (060701R-3)

Date: January 1981

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mahos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	2-0	NS	NS	NS	NS				
2	A1	0-10	6.2	0.21	51	2.8				
3	B21	10-49	6.2	0.12	32	2.4				
3	B22t & C	49-214	5.5	0.11	29	1.8				

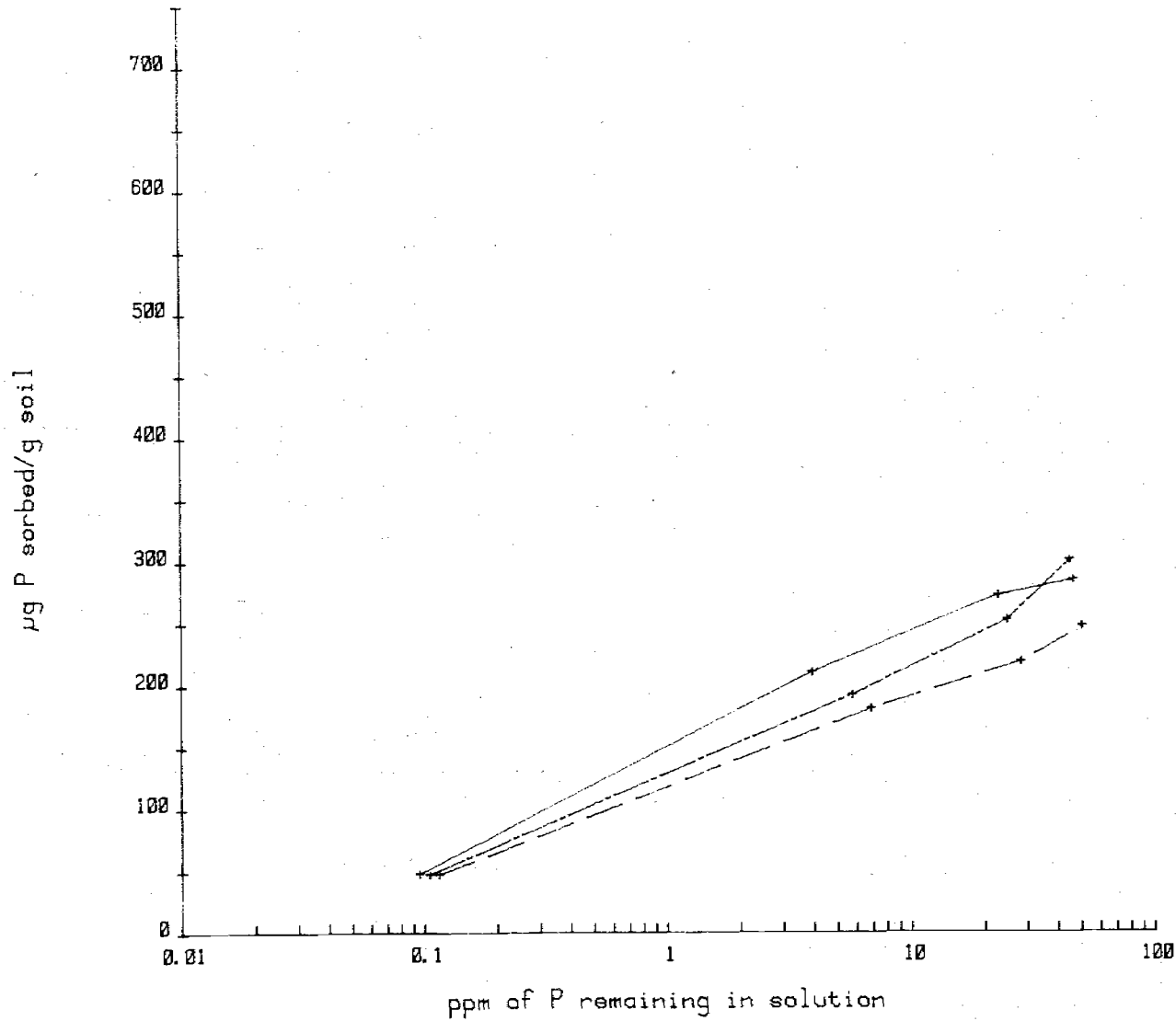
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms						%		%				
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.7	1.2	0.1	0.4	2.8	9.6	73	2.24	1.30	0.075	17	0.72	8.1
3	1.8	0.7	0.1	0.3	1.4	6.1	67	0.38	0.22	0.023	19	0.72	8.5
3	4.8	1.8	0.1	0.4	2.1	8.9	77	0.42	0.24	0.019	13	0.75	8.5

Remarks: CEC's were leached with acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-4108



µg/g soil	Soln ppm	
		————— A1
49	0.10	
211	3.93	
273	22.75	
285	46.50	
		- - - - - B21
49	0.12	
181	6.88	
219	28.13	
248	50.25	
		- · - · - · B22t & C
49	0.11	
193	5.75	
253	24.75	
301	44.88	

Pedon: Unnamed Gravelly Loamy Coarse Sand 79-MT-4108 (060701R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
CM	%								%		
2- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 10	17.87	23.33	12.16	15.64	8.12	77.12	20.27	2.61	29		Gr. loamy coarse sand
10- 49	18.34	23.37	13.22	17.22	8.95	81.10	15.79	3.11	29		Gr. loamy coarse sand
49-214	16.05	23.05	13.50	19.02	8.59	80.21	14.74	5.05	25		Gr. loamy coarse sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
CM	%			g/cc		%		%		
2- 0						NS	NS	NS	NS	NS
0- 10						15.2	6.3	NDNP	NDNP	NDNP
10- 49						9.9	4.4	NDNP	NDNP	NDNP
49-214						10.7	5.7	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
Atterbergs were run by Debbie Hall

Analysis by: Anita Folen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

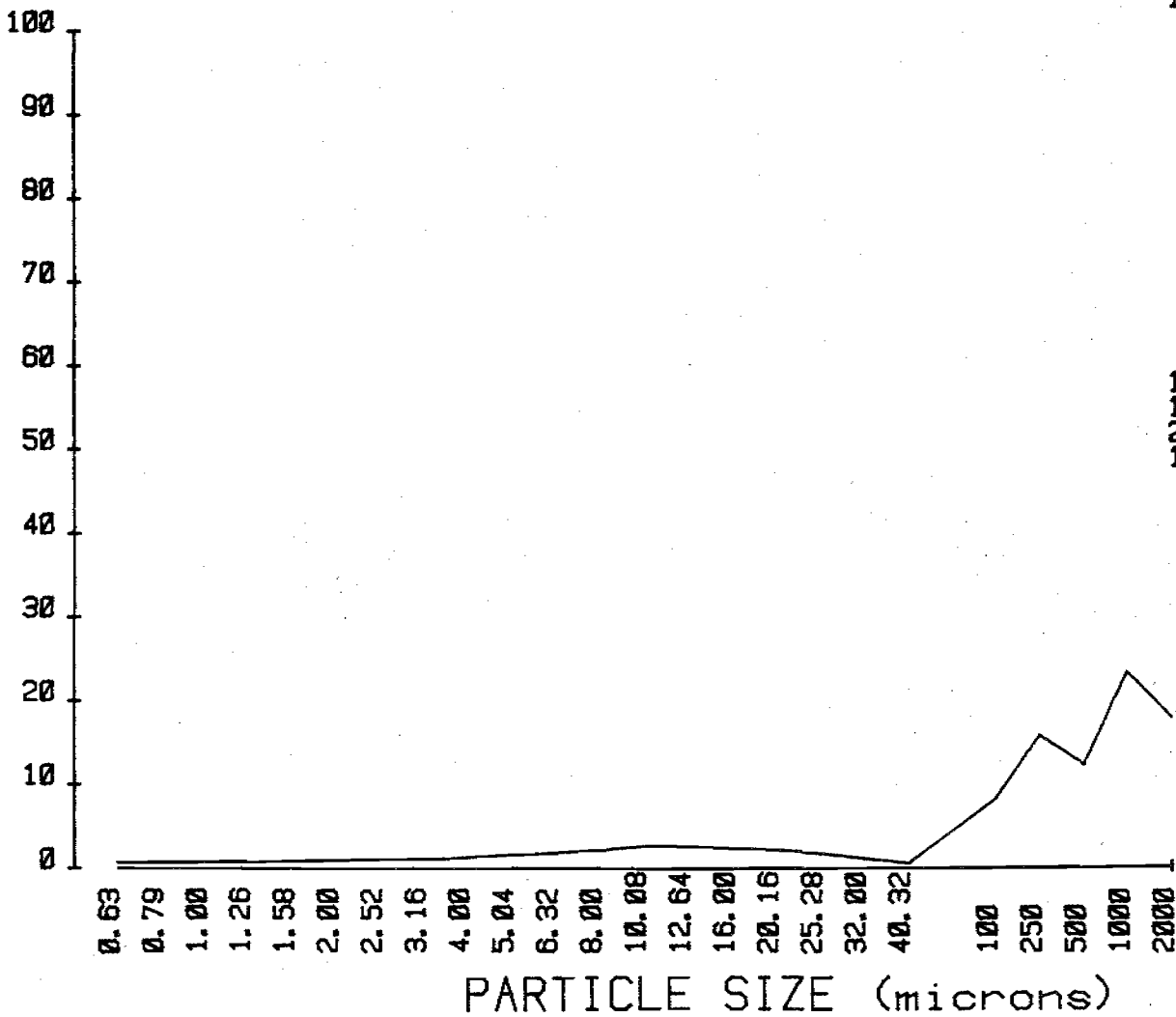
Date: January 1981

Identification		M4108-1	M4108-2	M4108-3	
Units		-----			%
TC (0.63-2.00)		2.61	3.11	5.05	
TSi (2.00-50)		20.27	15.79	14.74	
TS (50-2000)		77.12	81.10	80.21	
Clay	0.63-0.794	0.47	0.71	1.28	
	0.794-1.00	0.45	0.60	1.02	
	1.00-1.26	0.54	0.62	0.99	
	1.26-1.59	0.49	0.52	0.79	
	1.59-2.00	0.66	0.67	0.98	
Fine Silt	2.00-2.52	0.79	0.75	0.99	
	2.52-3.17	0.84	0.74	1.00	
	3.17-4.00	0.81	0.70	0.77	
	4.00-5.04	1.07	0.83	0.72	
Medium Silt	5.04-6.35	1.37	0.99	0.92	
	6.35-8.00	1.67	1.13	1.02	
	8.00-10.08	1.99	1.17	1.07	
	10.08-12.70	2.45	1.54	1.40	
	12.70-16.0	2.31	1.67	1.59	
	16.0-20.2	2.11	1.82	1.63	
Coarse Silt	20.2-25.4	1.95	1.72	1.44	
	25.4-32.0	1.52	1.39	1.35	
	32.0-40.3	0.93	1.02	0.66	
	40.3-50.8	0.37	0.33	0.14	
	50.8-64.0	0.12	0.02	0.03	
VFS (50-100)		8.12	8.95	8.59	
FS (100-250)		15.64	17.22	19.02	
MS (250-500)		12.16	13.22	13.50	
CoS (500-1000)		23.33	23.37	23.05	
VCoS (1000-2000)		17.87	18.34	16.05	
Greater than 2000		28	29	25	
Textural Class		Gr. LCoS	Gr. LCoS	Gr. LCoS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

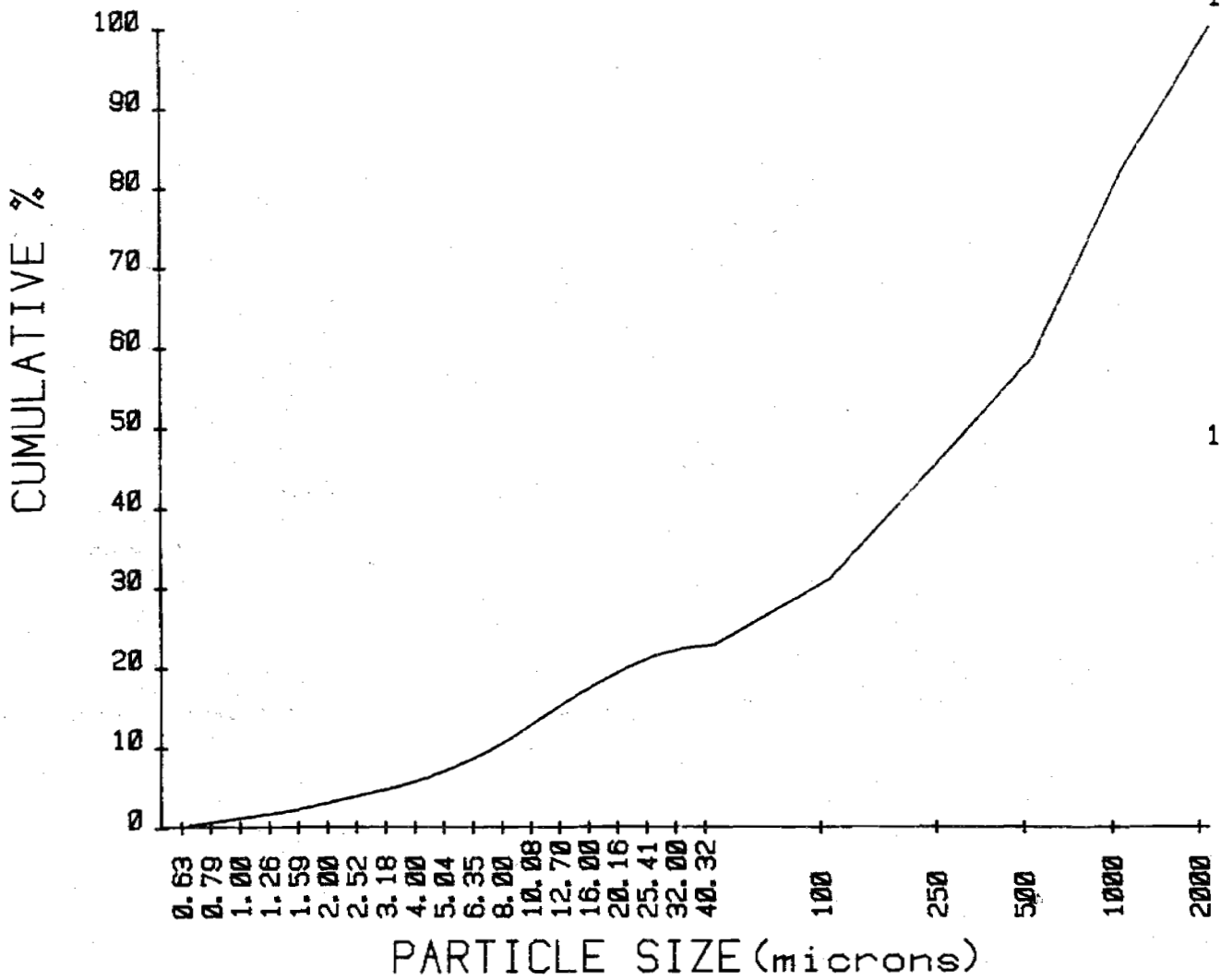
ID M4108-1



0.47	1.66
0.45	1.99
0.54	2.45
0.49	2.31
0.66	2.11
0.79	1.95
0.84	1.52
0.81	0.93
1.07	0.37
1.37	0.12
8.12	
15.64	
12.16	
23.33	
17.87	

### CUMULATIVE CURVE SAND-SILT-CLAY

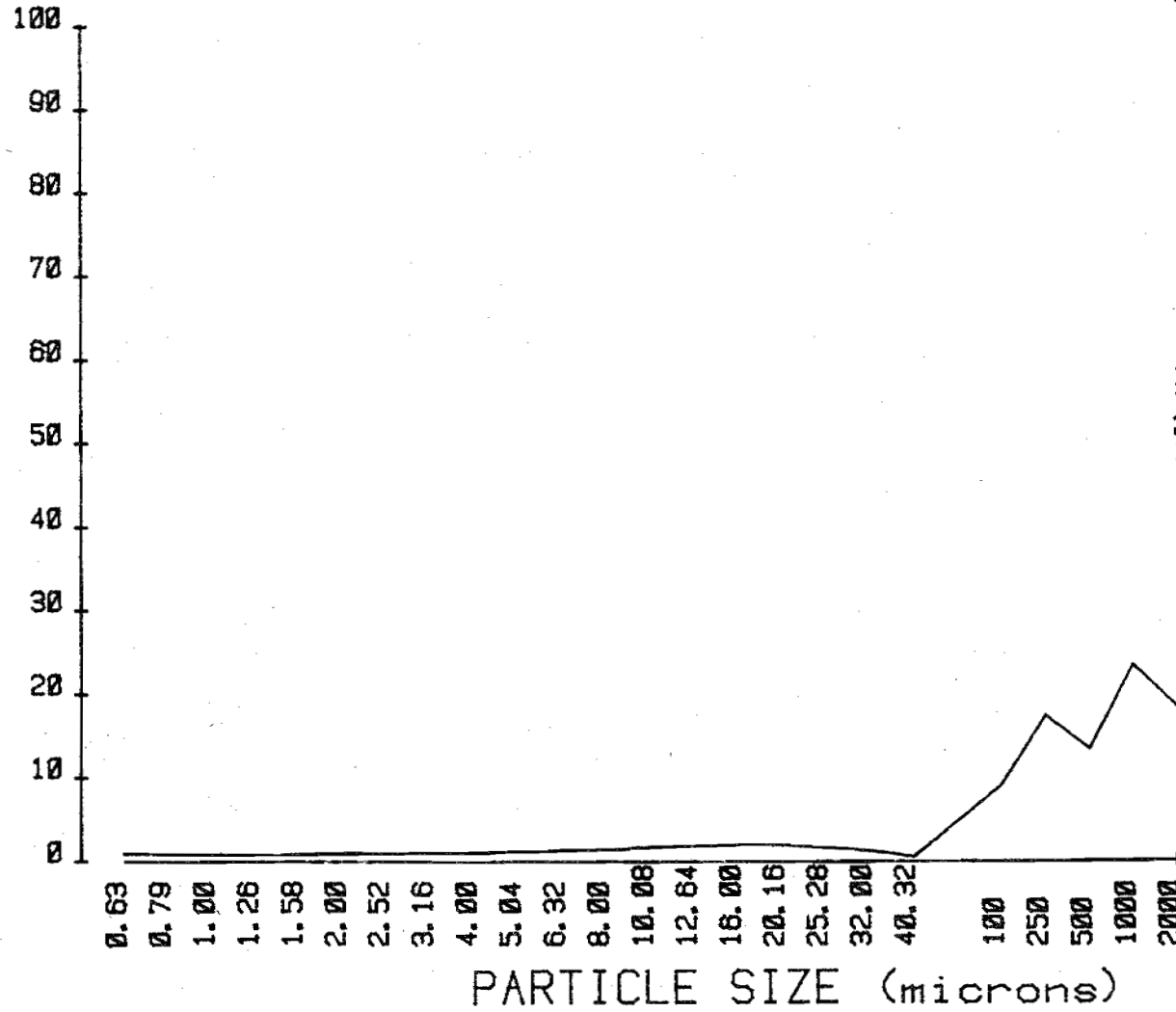
ID M4108-1



0.47	9.15
0.92	11.14
1.45	13.58
1.95	15.80
2.61	18.00
3.39	19.95
4.23	21.47
5.04	22.39
6.11	22.76
7.48	22.88
31.00	
46.64	
58.80	
82.13	
100.00	

PLOT SAND-SILT-CLAY

ID M4108-2

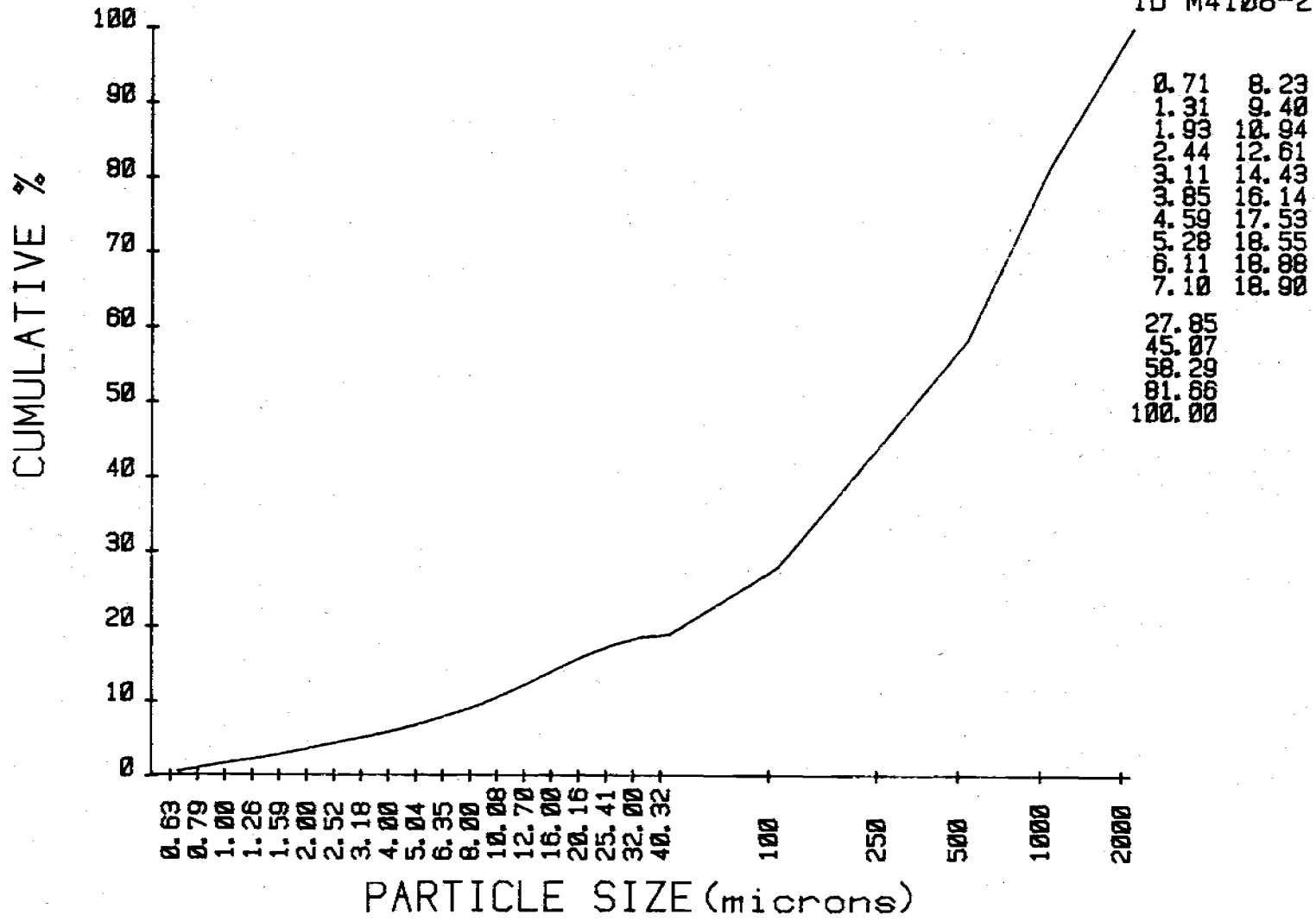


0.71	1.13
0.80	1.17
0.82	1.54
0.82	1.67
0.87	1.82
0.75	1.72
0.74	1.36
0.80	1.82
0.83	0.33
0.99	0.82
8.95	
17.22	
13.22	
23.37	
18.34	

x

CUMULATIVE CURVE SAND-SILT-CLAY

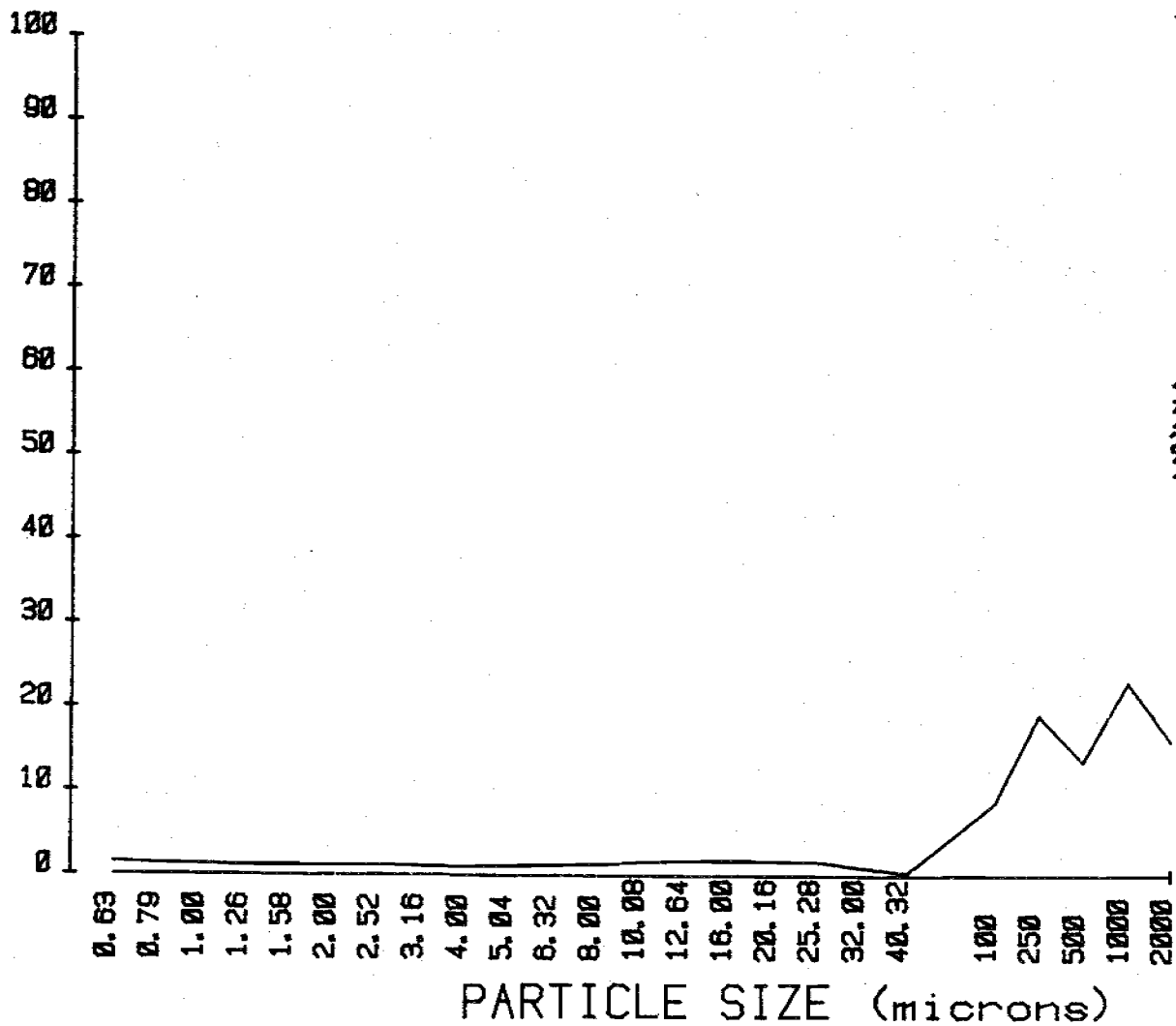
ID M4108-2





PLOT SAND-SILT-CLAY

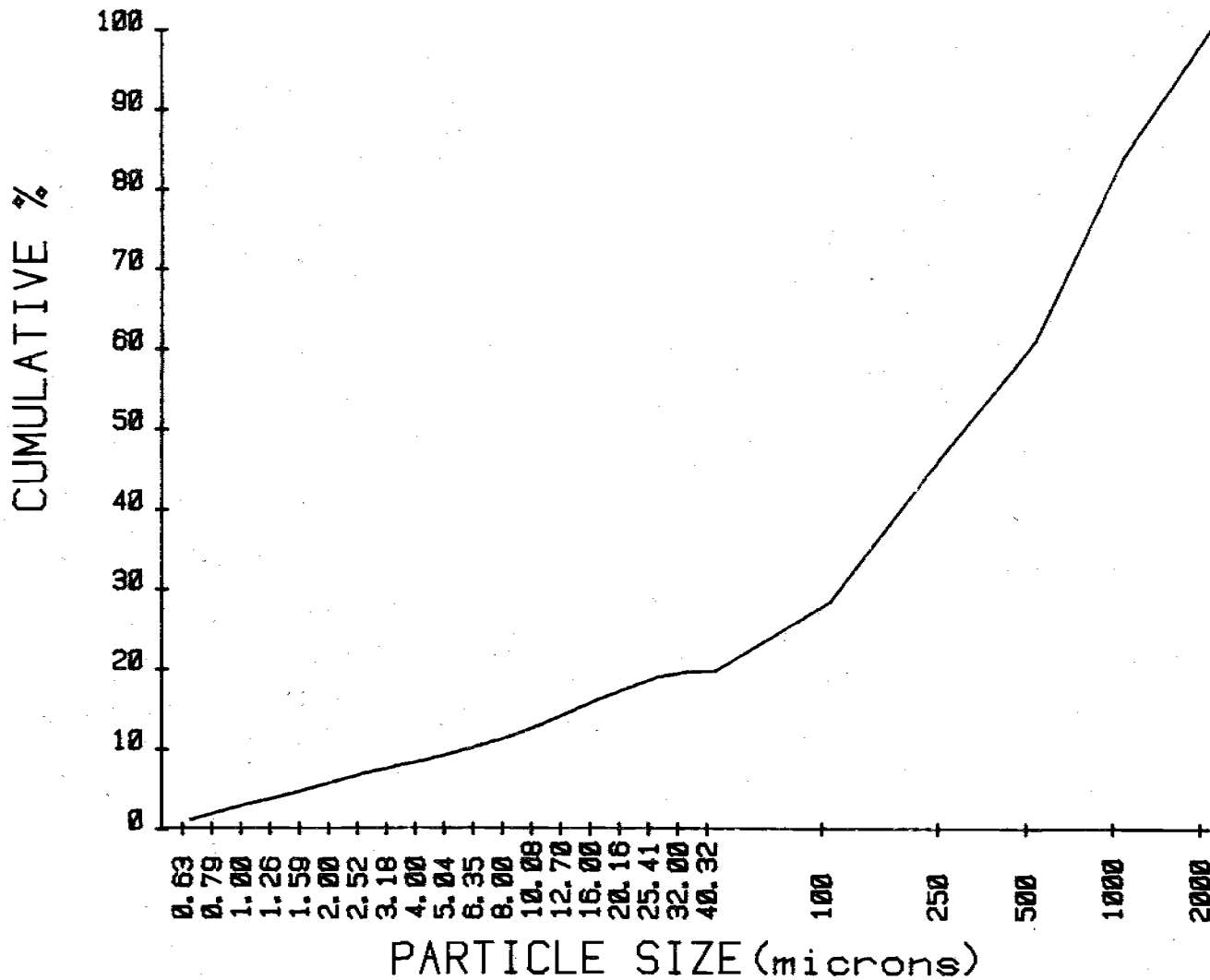
ID M4108-3



1.28	1.02
1.02	1.07
0.98	1.40
0.79	1.50
0.98	1.03
0.98	1.44
1.00	1.35
0.77	0.08
0.72	0.14
0.92	0.02
0.58	
0.02	
0.58	
0.05	
0.05	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4108-3



1.28	10.48
2.30	11.55
3.20	12.95
4.00	14.54
5.05	16.17
6.04	17.61
7.04	18.96
7.81	19.63
8.53	19.77
9.46	19.79
28.38	
47.40	
60.90	
83.95	
100.00	

BT 26  
Mg-saturated, glycolated  
060701 R-3  
79-MT-4108-3  
B243C 49-214 cm

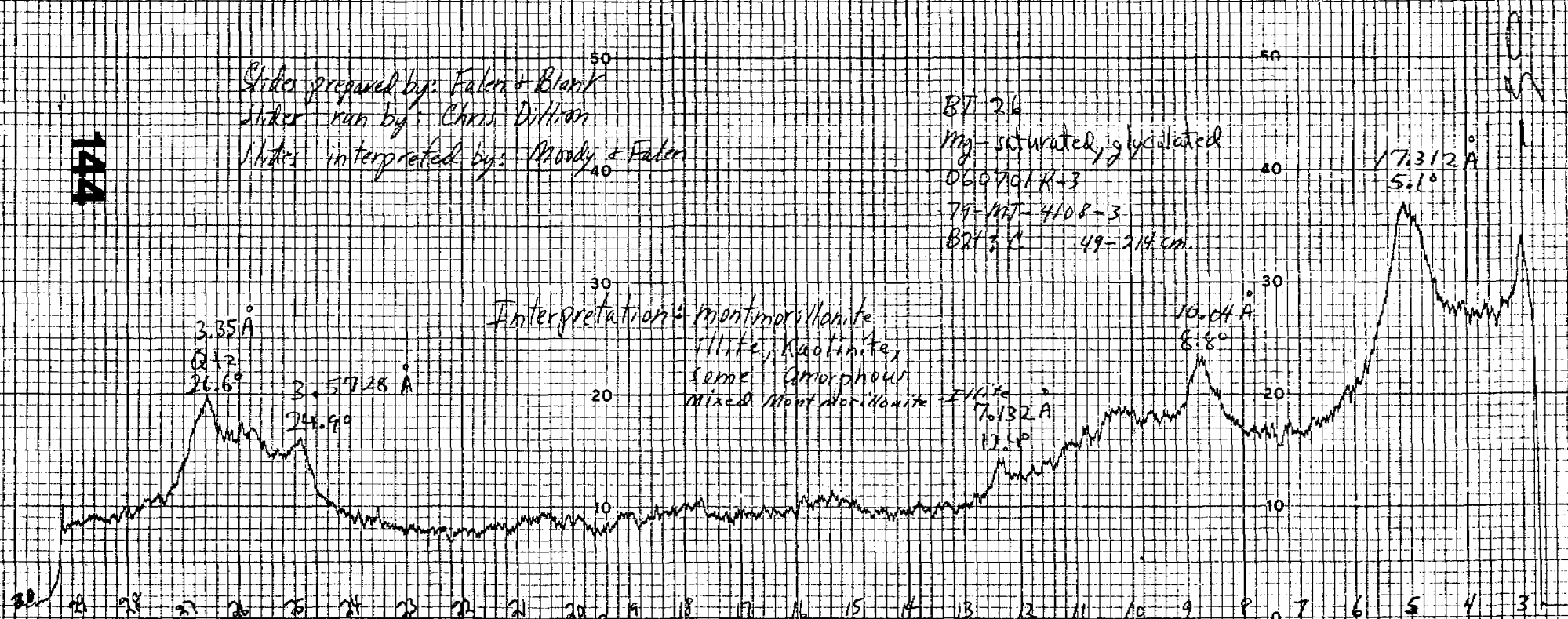
Slides prepared by: Falen and Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody and Falen

144

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

BT 26  
Mg-saturated, glycolated  
060701 R-3  
79-MT-4108-3  
B243C 49-214 cm

Interpretation: montmorillonite,  
illite, kaolinite,  
some amorphous  
mixed Montmorillonite - Illite





BT-26

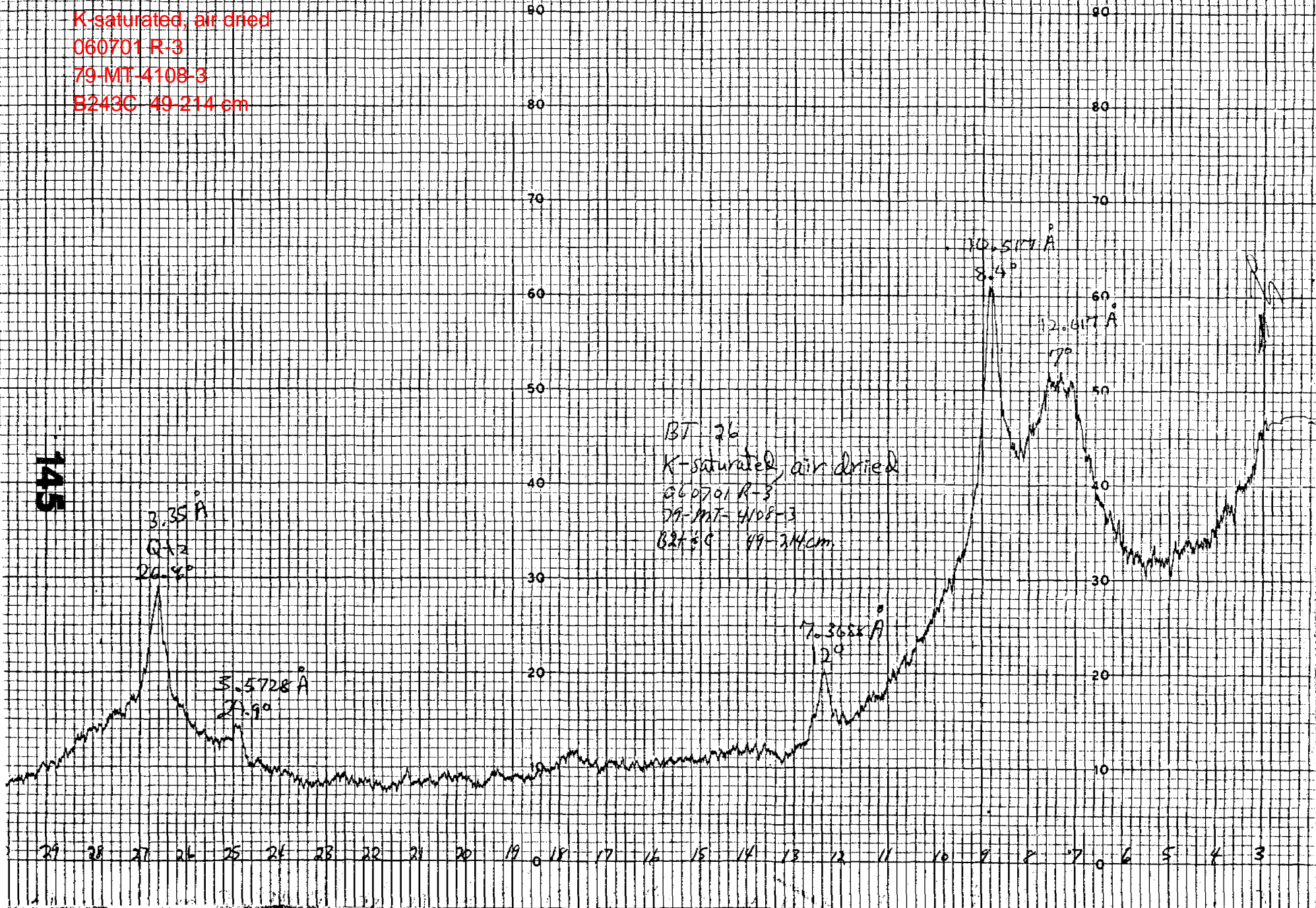
K-saturated, air dried

060701 R-3

79-MT-4108-3

B243C 49-214 cm

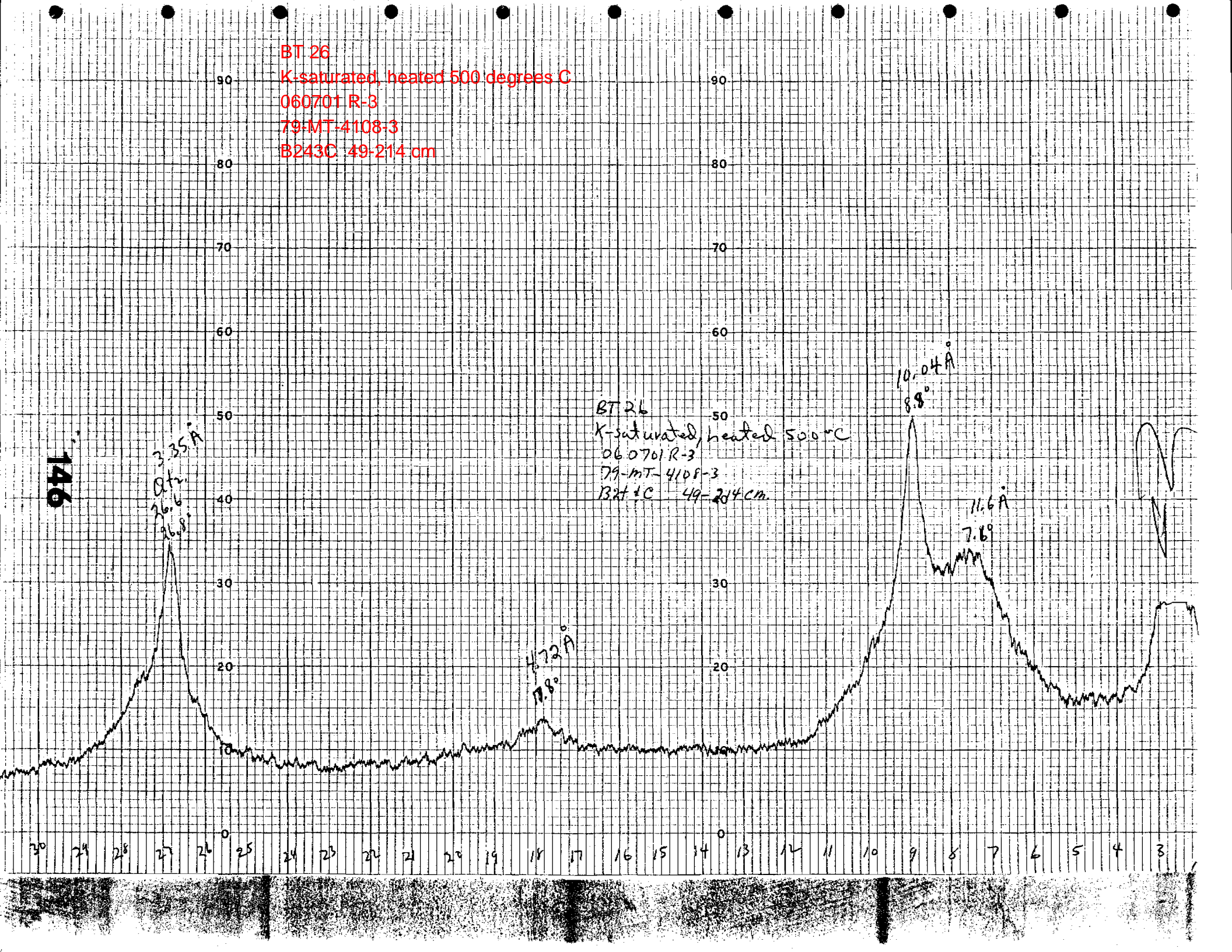
145



BT 26  
K-saturated, heated 500 degrees C  
060701 R-3  
79-MT-4108-3  
B243C 49-214 cm

146

BT 26  
K-saturated, heated 500°C  
060701 R-3  
79-MT-4108-3  
B243C 49-214 cm



Unnamed Gravelly Loam 79-MT-4189 (C-77-2)

Classification: fine clayey, mixed Glosic Cryoboralf.

General Site Characteristics

Location: Ravalli County, Montana: 26 miles south & 8 miles west of Darby in the northeast 1/4 of section 29, T. 25S., R. 22W.

Forest: Bitterroot National Forest

Area: West Creek No. BIIIBM

Described By/Date: Norm Davis and Bob Hammer on September 27, 1979

Parent Rock/Material: tertiary sediments

Habitat Type: Douglas fir/pinegrass h.t. with mature ponderosa pine

Topography: south facing, smooth 3 percent convex slope near hilltop

Landform:

Climate:

Weathering:

Precipitation: AP-30 inches

Formation Name:

Erosion:

Slope: 3 percent

Infiltration:

Aspect:

Permeability: slow

Elevation: 5500 feet

Storage:

Soil Depth:

Drainage: somewhat poorly drained

Eff. Rooting Depth:

Air Temp: MAT-42 deg. C

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks: This is a moderate use (several passes of a D-6 cat) pit of a study of soil compaction by tractor logging, wherein structure of surface horizons typically changed from subangular blocky to platy. This pit shows more mottling, and no calcium carbonate, compared to the other 17 pits of the compaction study. B3t horizons are of suspected different clay type from B2t horizons. All colors in B horizon are moist.

Pedon Description

A21 0-15 centimeters (0-6 inches). Gray (10YR 6/1); no lab sample; loam; dark gray brown (10YR 4/2) moist; moderate coarse platy structure; hard, very friable, slightly sticky and slightly plastic; abundant very fine, fine, and medium roots; very strongly acid pH 5.0, noncalcareous; clear smooth boundary.

A22 15-33 centimeters (6-13 inches). Light gray (10YR 7/2) gravelly loam, dark brown (7.5YR 4/4) moist; massive structure parting to weak coarse prismatic structure; hard, friable, sticky and plastic; abundant very fine, fine, and medium roots; strongly acid pH 5.0, noncalcareous; 25 percent gravels by weight; smooth boundary.

A&B 33-40 centimeters (13-16 inches). White (10YR 8/2) gravelly sandy loam, brown (10YR 5/3) moist; weak coarse platy structure; hard, very friable, slightly sticky and slightly plastic; abundant very fine, fine, and medium roots; strongly acid pH 5.4, noncalcareous; 36 percent gravels by weight; abrupt smooth boundary.



79-MT-4109 (cont.)

B21t 40-57 centimeters (16-22 inches). Brown (7.5YR 5/4) gravelly clay, with many distinct mottles yellowish red (5YR 5/6) and red (2.5YR 4/6); strong coarse columnar structure; extremely hard, firm, very sticky and very plastic; abundant fine roots along ped faces; dark organic staining on ped faces; continuous thick clay films on ped faces; very strongly acid pH 5.0, noncalcareous; 34 percent gravels by weight; clear smooth boundary.

B22t 57-78 centimeters (22-31 inches). Brown (7.5YR 5/4) gravelly clay, with common medium distinct mottles of yellowish red (5YR 4/6); strong coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; abundant fine roots along ped faces; dark organic staining on ped faces; slickensides; strongly acid pH 5.3, noncalcareous; 31 percent gravels by weight; abrupt smooth boundary.

B23t 79-93 centimeters (31-37 inches). Dark yellowish brown (10YR 4/4) clay; strong coarse angular blocky structure; no lab sample; extremely hard, firm, very sticky and very plastic; abundant fine roots along ped faces; dark organic staining on ped faces; continuous thick clay films on ped faces; slickensides; clear smooth boundary.

IIB31t 93-128 centimeters (37-50 inches). Dark brown (10YR 4/3) clay; strong fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; abundant fine roots along ped faces; dark organic staining on ped faces; continuous thick clay films on ped faces; slickensides; slightly acid pH 6.3, noncalcareous; no gravels; suspect clay type change in this horizon and underlying horizon from that in overlying horizon; abrupt smooth boundary.

IIB32t 128-165 centimeters (50-65 inches). Light brown gray (2.5YR 6/2); no lab sample; clay, with few medium distinct mottles of strong brown (7.5YR 5/6); strong fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; plentiful fine roots along ped faces; dark organic staining on ped faces; continuous thick clay films on ped faces; slickensides.

Pedon: Unnamed Gravelly Loam 79-MT-4109 (C-77-2)

Date: January 1981

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A21	0-15	NS	NS	NS	NS				
	A22	15-33	5.0	0.17	40	0.0				
	A&B	33-40	5.4	0.12	30	0.0				
	B21†	40-57	5.0	0.10	58	0.0				
4	B22†	57-78	5.3	0.20	63	0.0				
	B23†	78-93	NS	NS	NS	NS				
5	IR31†	93-128	6.3	0.24	64	0.0				
	IR32†	128-165	NS	NS	NS	NS				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2.0	1.2	0.1	0.2	5.4	8.4	39	1.49	0.86	0.056	16	0.75	8.1
	3.8	2.2	0.1	0.2	3.0	8.8	68	0.54	0.31	0.025	12	0.64	8.5
	12.2	10.3	0.2	0.6	10.0	31.4	70	1.06	0.61	0.051	12	0.66	9.3
4	15.5	10.2	0.3	0.6	7.9	34.4	77	0.94	0.54	0.045	12	0.69	9.0
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5	17.5	11.9	0.4	0.5	6.0	35.7	83	0.26	0.17	0.016	11	1.0	8.7
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zeida Fadness



Pedon: Unnamed Gravelly Loam 79-MT-4109 (C-77-2)

Date: July 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	-----X-----								-----X-----		
0-15						NS	NS	NS	NS	NS	NS
15-33						51.05	39.81	9.15	25		Gr. loam
33-40						62.10	24.71	13.19	36		Gr. sandy loam
40-57						33.20	17.74	49.06	34		Gr. clay
57-78						29.52	20.85	49.62	31		Gr. clay
78-93						NS	NS	NS	NS		NS
93-128						23.51	21.21	55.28	none		Clay
128-165						NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	-----X-----			g/cc	-----X-----		-----X-----		
0-15					NS	NS	NS	NS	NS
15-33					21.7	5.6	21	NP	ND
33-40					16.9	6.1	16	NP	ND
40-57					36.2	19.0	47	11	36
57-78					38.2	24.1	52	15	37
78-93					NS	NS	NS	NS	NS
93-128					39.5	22.7	57	14	42
128-165					NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 NS-no sample

Analysis by: Debbie Hall

Unnamed Gravelly Coarse Sandy Loam 79-MT-4118 (C-77-4)

Classification: coarse loamy, mixed Typic Cryoboralfs.

General Site Characteristics

Location: Ravalli County, Montana: Sula Road, section 19, T. 1N., R. 18W. near Guide Saddle

Forest: Bitterroot National Forest

Area:

Described By/Date:

Parent Rock/Material: gneiss and granite

Habitat Type: Douglas fir/snowberry-pinegrass phase; ponderosa pine plantation

Topography: gentle sloping ridgetop

Landform:

Weathering:

Formation Name:

Slope: 8 percent

Aspect: south, southwest

Elevation: 5844 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: mod. to 50 cm.

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 9 deg. C

Salt/Alkal:

Remarks:

Pedon Description

A11 0-6 centimeters (0-2 inches). Very dark grayish brown (10YR 3/2); no lab sample; sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many very fine roots; pH 6.5; abrupt smooth boundary.

A12 6-16 centimeters (2-6 inches). Dark brown (10YR 3/3) gravelly coarse sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; common very fine roots; slightly acid pH 6.3, noncalcareous; 24 percent gravels by weight; abrupt wavy boundary.

B21 16-38 centimeters (6-15 inches). Dark brown (10YR 4/3) gravelly coarse sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; common very fine roots; slightly acid pH 6.3, noncalcareous; 22 percent gravels by weight; clear smooth boundary.

B22t 38-50 centimeters (15-20 inches). Dark brown (10YR 4/3) gravelly coarse sandy loam with common thin (4 centimeter) dark brown (7.5YR 4/4) sandy clay loam lamellae; weak fine subangular blocky structure; common fine roots; slightly acid pH 6.2, noncalcareous; 23 percent gravels by weight; clear smooth boundary.

B23t 50-78 centimeters (20-31 inches). Strong brown (7.5YR 5/6) prism interior, dark brown (7.5YR 4/4) prism faces, sandy loam; moderate very coarse prismatic structure; hard, friable, sticky and plastic; thick continuous clay film and organic stains on prism faces; common fine roots in cracks between prisms; slightly acid pH 6.3, noncalcareous; 14 percent gravels by weight; clear smooth boundary.

B24t 78-100 centimeters (31-39 inches). Strong brown (7.5YR 5/6) prism interior, dark brown (10YR 3/3) prism faces; sandy loam; strong very coarse prismatic structure; very hard, firm, very sticky and very plastic; continuous clay films on ped faces; medium acid pH 5.8, noncalcareous; 12 percent gravels by weight; common fine roots between prisms.

B3t 100-120 centimeters (39-47 inches). Strong brown (7.5YR 5/6) gravelly coarse sandy loam; weak coarse prismatic structure; very hard, sticky and very plastic; slightly acid pH 6.4, noncalcareous; 17 percent gravels by weight.

Note: It is common to encounter decomposed gneiss and granite rock at depths of 100-120 centimeters in the area.

Pedon: Unnamed Gravelly Coarse Sandy Loam 79-MT-4110 (C-77-4)

Date: January 1981

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	A11	0-6	NS	NS	NS	NS				
2	A12	6-16	6.3	0.43	53	6.5				
3	B21	16-38	6.3	0.16	34	2.4				
4	B22t	38-50	6.2	0.10	32	1.8				
5	B23t	50-78	6.3	0.09	34	1.9				
6	B24t	78-100	5.8	0.12	37	0.4				
	B3t	100-120	6.4	0.11	32	0.0				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH			
	Ca	Mg	Na	K	H	Saturation					Fraction					
													meq/100 gms	%	%	ratio
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			
2	7.9	1.5	0.1	1.4	5.5	15.5	66	3.49	2.03	0.099	21	0.76	8.9			
3	5.0	1.0	0.1	0.9	2.9	8.9	71	0.73	0.42	0.039	11	0.78	8.5			
4	5.4	1.4	0.1	0.6	2.7	10.2	74	0.47	0.28	0.022	13	0.77	8.6			
5	7.4	2.3	0.1	0.6	2.7	12.9	79	0.25	0.15	0.014	11	0.86	8.8			
6	9.5	3.3	0.1	0.8	4.8	19.3	74	0.32	0.19	0.012	16	0.88	8.8			
	7.7	2.5	0.1	0.6	3.1	15.0	78	0.22	0.13	0.007	19	0.83	9.1			

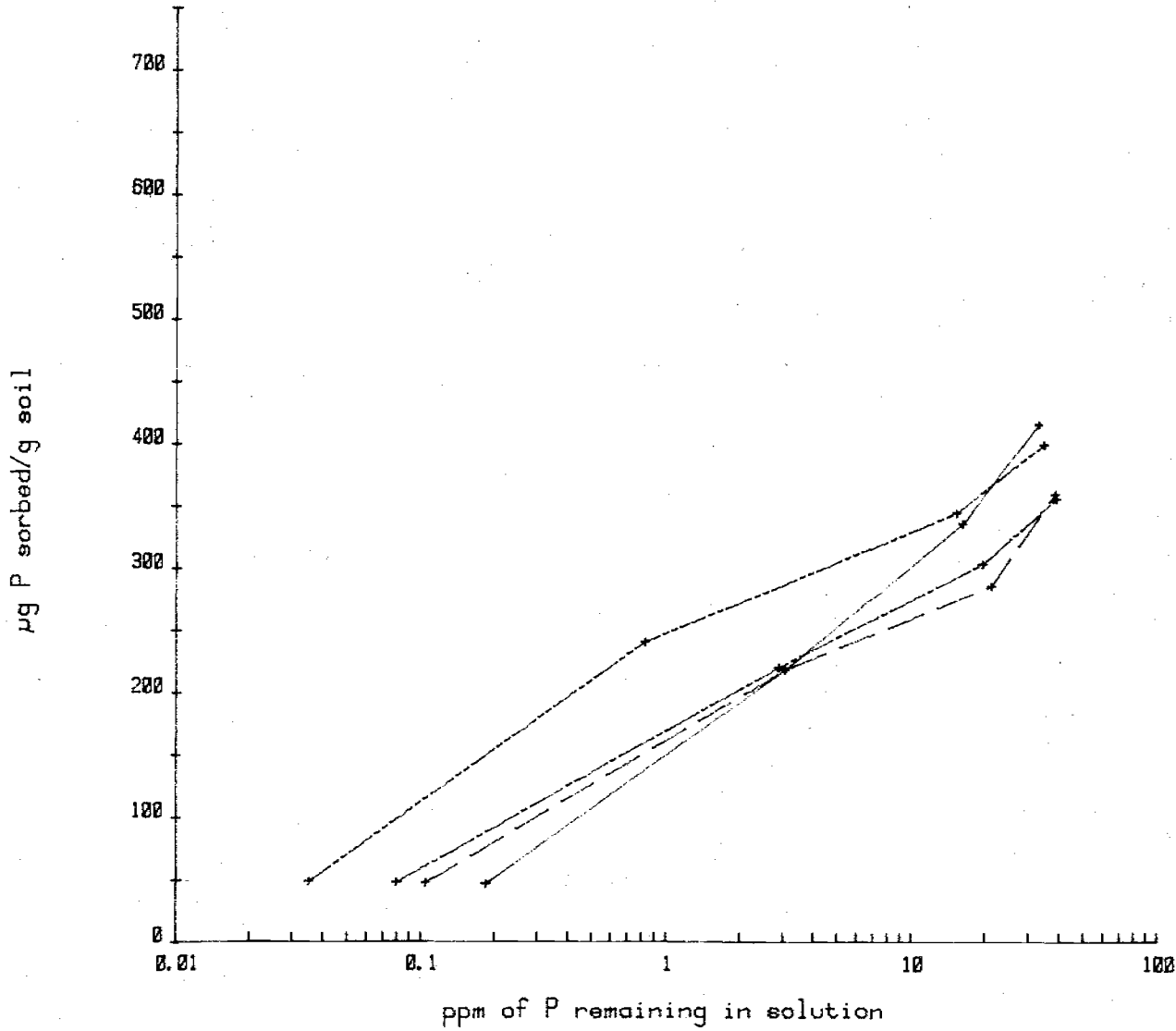
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

153

# Phosphorus Isotherm

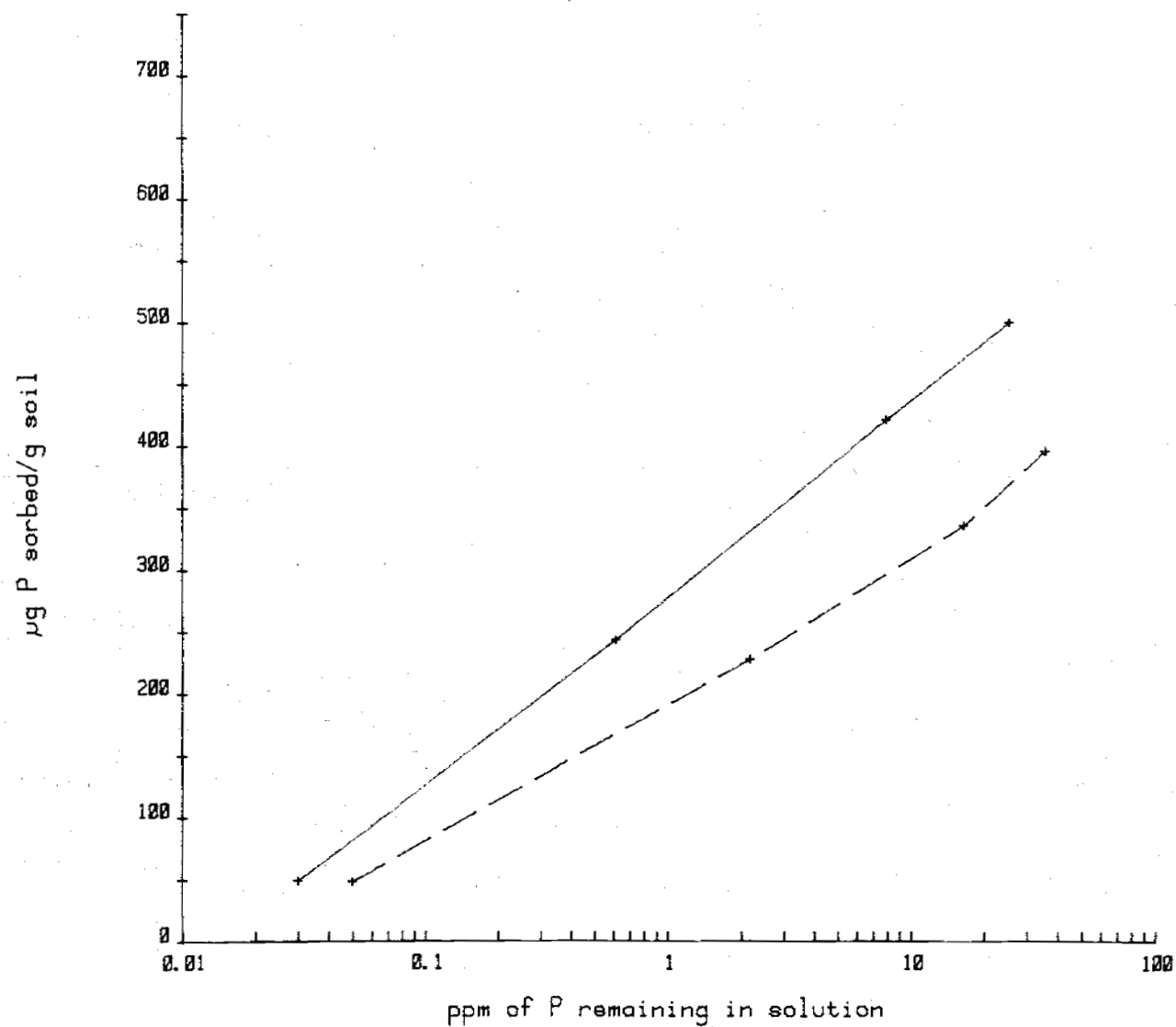
79-MT-4118



µg/g soil	Soln ppm
----- A12	
48	0.19
219	3.08
336	16.38
416	33.38
----- B21	
49	0.11
219	3.08
286	21.38
360	39.08
----- B22t	
49	0.08
221	2.90
304	19.63
356	39.38
----- B23t	
50	0.04
242	0.83
345	15.50
400	35.00

# Phosphorus Isotherm

79-MT-4118



µg/g soil	Soln ppm
----- B24t	
50	0.03
244	0.61
421	7.88
500	25.00
----- B3t	
50	0.05
228	2.17
336	16.38
396	35.38

Pedon: Unnamed Gravelly Coarse Sandy Loam 79-MT-4110 (C-77-4)

Date: July 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	wt. vol.	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002			
cm	%								%		
0- 6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
6- 16	15.44	20.81	10.30	13.81	7.53	67.88	27.19	4.93	24		Gr. coarse sandy loam
16- 38	22.13	23.13	10.27	11.78	6.63	73.93	21.43	4.64	22		Gr. coarse sandy loam
38- 50	9.19	20.06	11.97	17.43	10.28	68.91	24.40	6.69	23		Gr. coarse sandy loam
50- 78	5.43	16.05	10.05	13.18	9.33	54.02	34.64	11.34	14		Sandy loam
78-100	6.09	17.67	11.64	19.74	11.55	66.67	56.66	7.67	12		Sandy loam
100-120	7.81	20.25	10.12	13.69	8.34	60.18	29.09	10.73	17		Gr. coarse sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density	Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc		%		%	
0- 6						NS	NS	NS	NS
6- 16						21.0	10.2	NDNP	NDNP
16- 38						13.5	6.7	NDNP	NDNP
38- 50						13.2	7.7	NDNP	NDNP
50- 78						12.9	8.1	NDNP	NDNP
78-100						20.7	13.0	31	10
100-120						14.7	9.4	28	NP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: **Bitterroot National Forest-LIM**

Analysis by: **Anita and Debbie**

Date: **January 1981**

Identification		M4110-1	M4110-2	M4110-3	M4110-4
Units		-----%			
TC (0.63-2.00)		4.93	4.64	6.69	11.34
TSi (2.00-50)		27.19	21.43	24.40	34.64
TS (50-2000)		67.88	73.93	68.91	54.02
Clay	0.63-0.794	0.91	1.01	1.38	2.39
	0.794-1.00	0.86	0.89	1.28	2.14
	1.00-1.26	0.98	0.91	1.40	2.33
	1.26-1.59	0.92	0.81	1.17	1.96
	1.59-2.00	1.26	1.04	1.48	2.51
Fine Silt	2.00-2.52	1.50	1.14	1.64	2.66
	2.52-3.17	1.51	1.15	1.61	2.62
	3.17-4.00	1.29	0.95	1.31	2.00
	4.00-5.04	1.25	1.41	1.75	2.91
Medium Silt	5.04-6.35	1.92	1.63	1.95	3.26
	6.35-8.00	2.36	1.83	2.02	3.29
	8.00-10.08	2.71	1.89	1.81	2.78
	10.08-12.70	3.45	2.21	2.13	3.02
	12.70-16.0	3.09	2.32	2.07	2.98
	16.0-20.2	2.82	2.23	2.03	2.95
Coarse Silt	20.2-25.4	2.15	1.91	2.00	2.33
	25.4-32.0	1.58	1.48	1.96	0.00
	32.0-40.3	0.97	1.11	1.36	2.70
	40.3-50.8	0.56	0.15	0.57	1.10
	50.8-64.0	0.05	0.03	0.19	0.07
VFS (50-100)		7.53	6.63	10.28	9.33
FS (100-250)		13.81	11.78	17.43	13.18
MS (250-500)		10.30	10.27	11.97	10.05
CoS (500-1000)		20.81	23.13	20.06	16.05
VCoS (1000-2000)		15.44	22.13	9.19	5.43
Greater than 2000		24	22	23	14
Textural Class		Gr. CoSL	Gr. CoSL	Gr. CoSL	Sandy loam

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

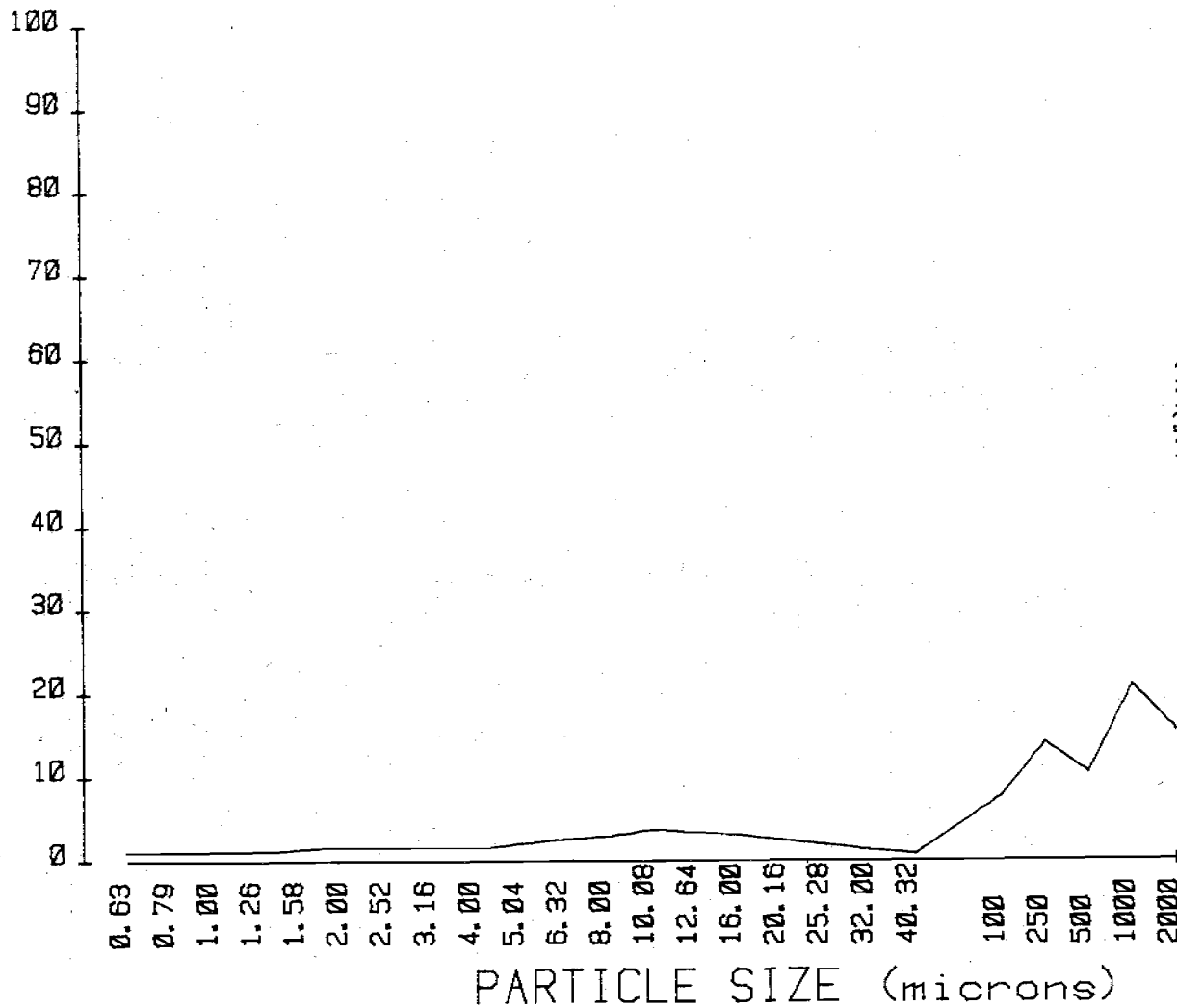
Date: January 1981

Identification		M4110-5	M4110-6		
Units		-----%			
TC (0.63-2.00)		7.67	10.73		
TSi (2.00-50)		25.66	29.09		
TS (50-2000)		66.67	60.18		
Clay	0.63-0.794	1.75	2.25		
	0.794-1.00	1.47	2.01		
	1.00-1.26	1.55	2.20		
	1.26-1.59	1.29	1.86		
	1.59-2.00	1.61	2.41		
Fine Silt	2.00-2.52	1.68	2.66		
	2.52-3.17	1.60	2.67		
	3.17-4.00	1.29	1.98		
	4.00-5.04	1.74	1.62		
Medium Silt	5.04-6.35	1.99	2.42		
	6.35-8.00	2.03	2.38		
	8.00-10.08	1.90	2.11		
	10.08-12.70	2.07	2.38		
	12.70-16.0	2.15	2.28		
	16.0-20.2	2.26	2.34		
Coarse Silt	20.2-25.4	2.33	2.21		
	25.4-32.0	2.27	2.31		
	32.0-40.3	1.66	1.18		
	40.3-50.8	0.64	0.53		
	50.8-64.0	0.05	0.05		
VFS (50-100)		11.55	8.34		
FS (100-250)		19.74	13.69		
MS (250-500)		11.64	10.12		
CoS (500-1000)		17.67	20.25		
VCoS (1000-2000)		6.09	7.81		
Greater than 2000		12	17		
Textural Class		Sandy loam	Gr. CoSL		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M4110-1

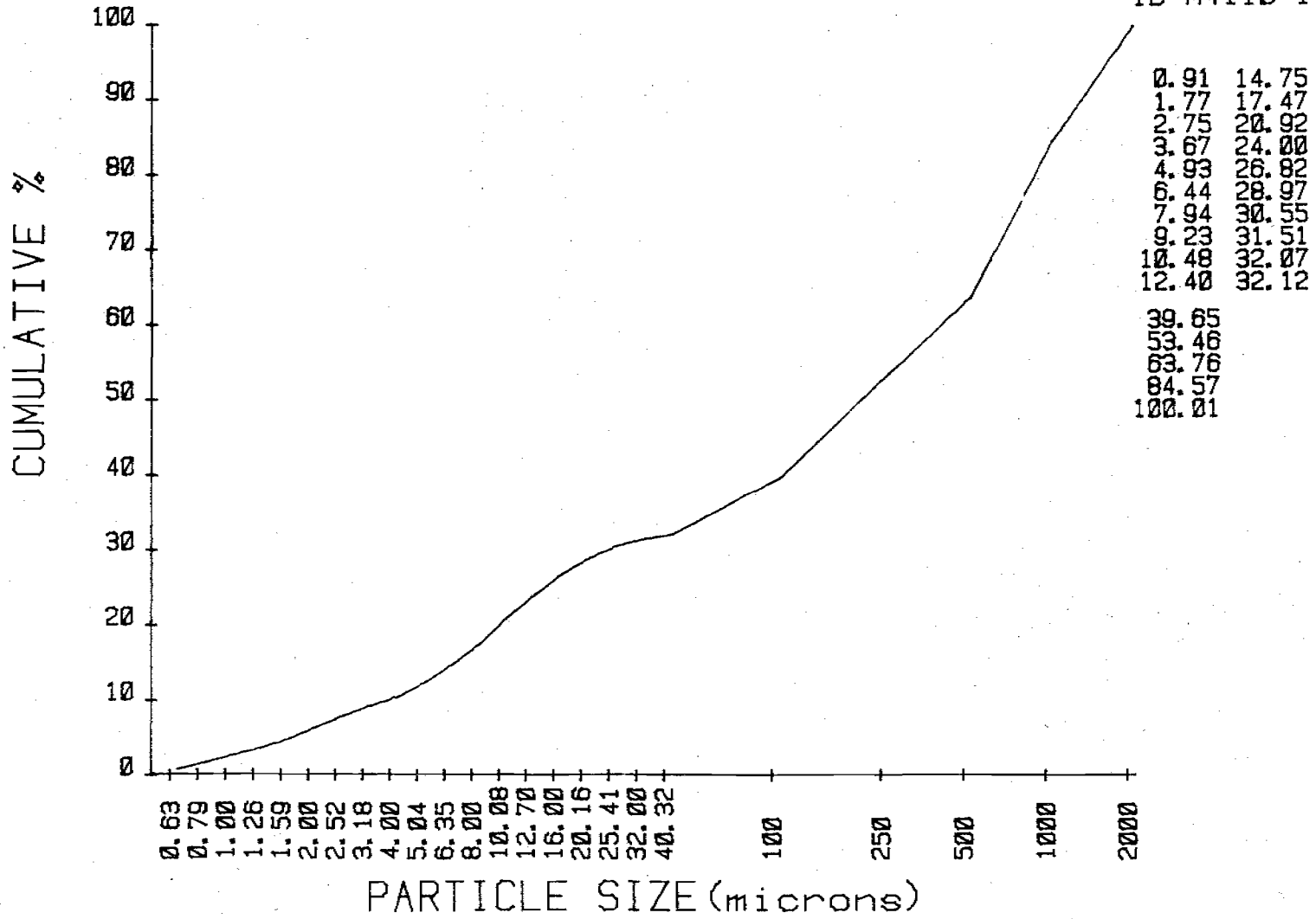


0.91	2.36
0.86	2.71
0.98	3.45
0.92	3.09
1.26	2.82
1.50	2.15
1.51	1.58
1.29	0.97
1.24	0.56
1.92	0.05
7.53	
13.81	
10.30	
20.81	
15.44	

z

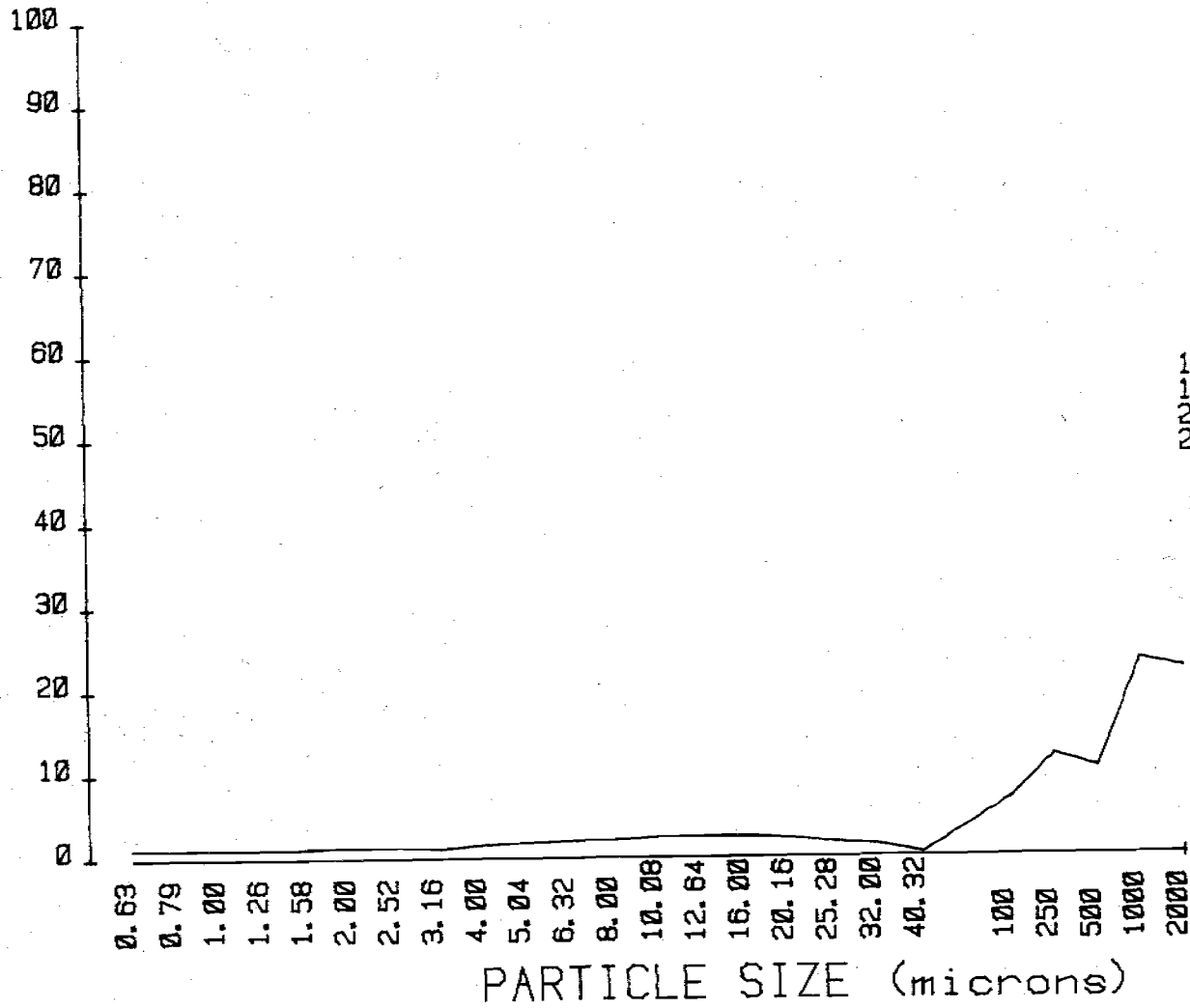
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4110-1



PLOT SAND-SILT-CLAY

ID M4110-2

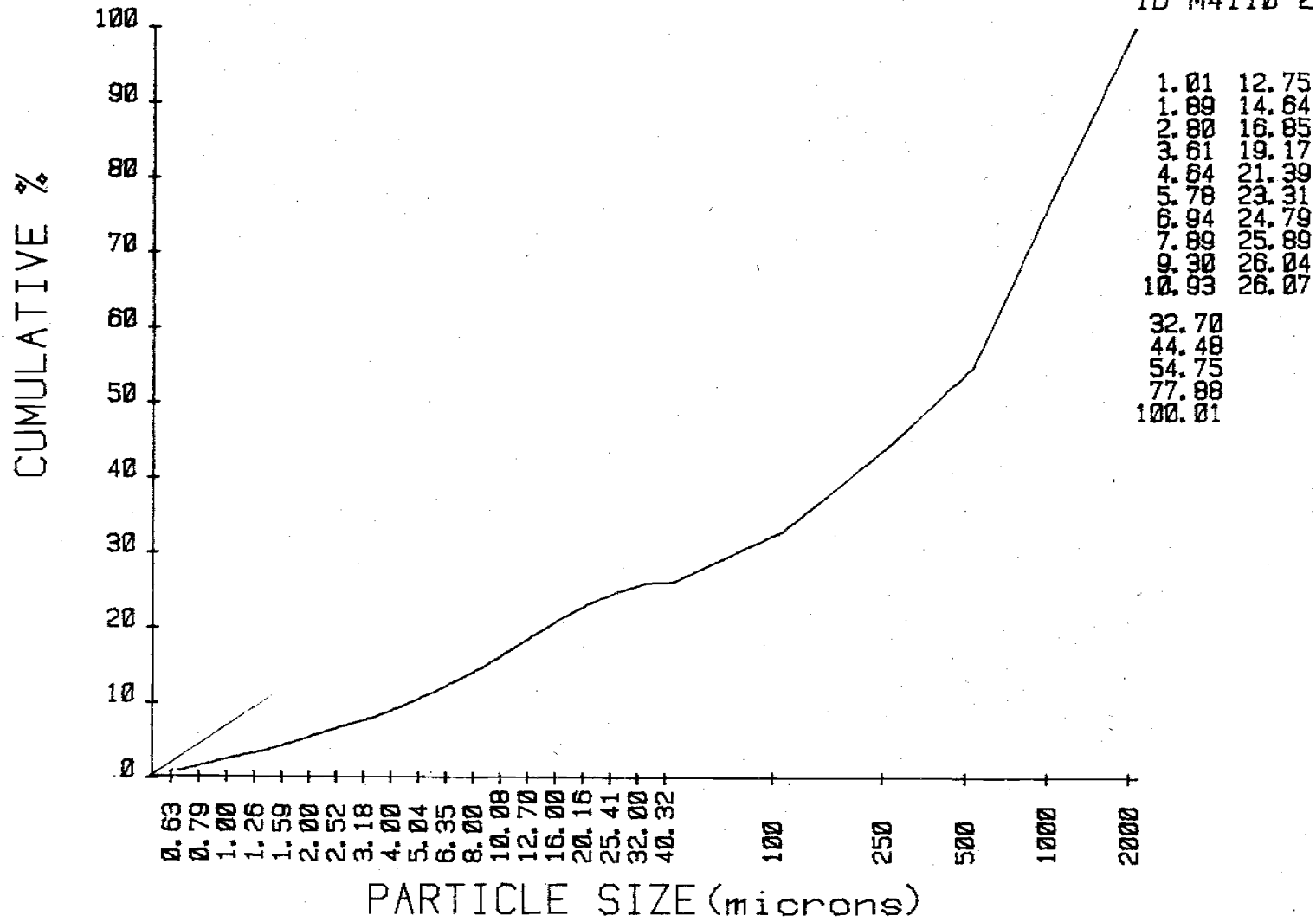


1.01	1.83
0.88	1.89
0.91	2.21
0.81	2.32
1.04	2.23
1.14	1.91
1.15	1.48
0.95	1.10
1.41	0.15
1.63	0.03
6.63	
11.78	
10.27	
23.13	
22.13	

191

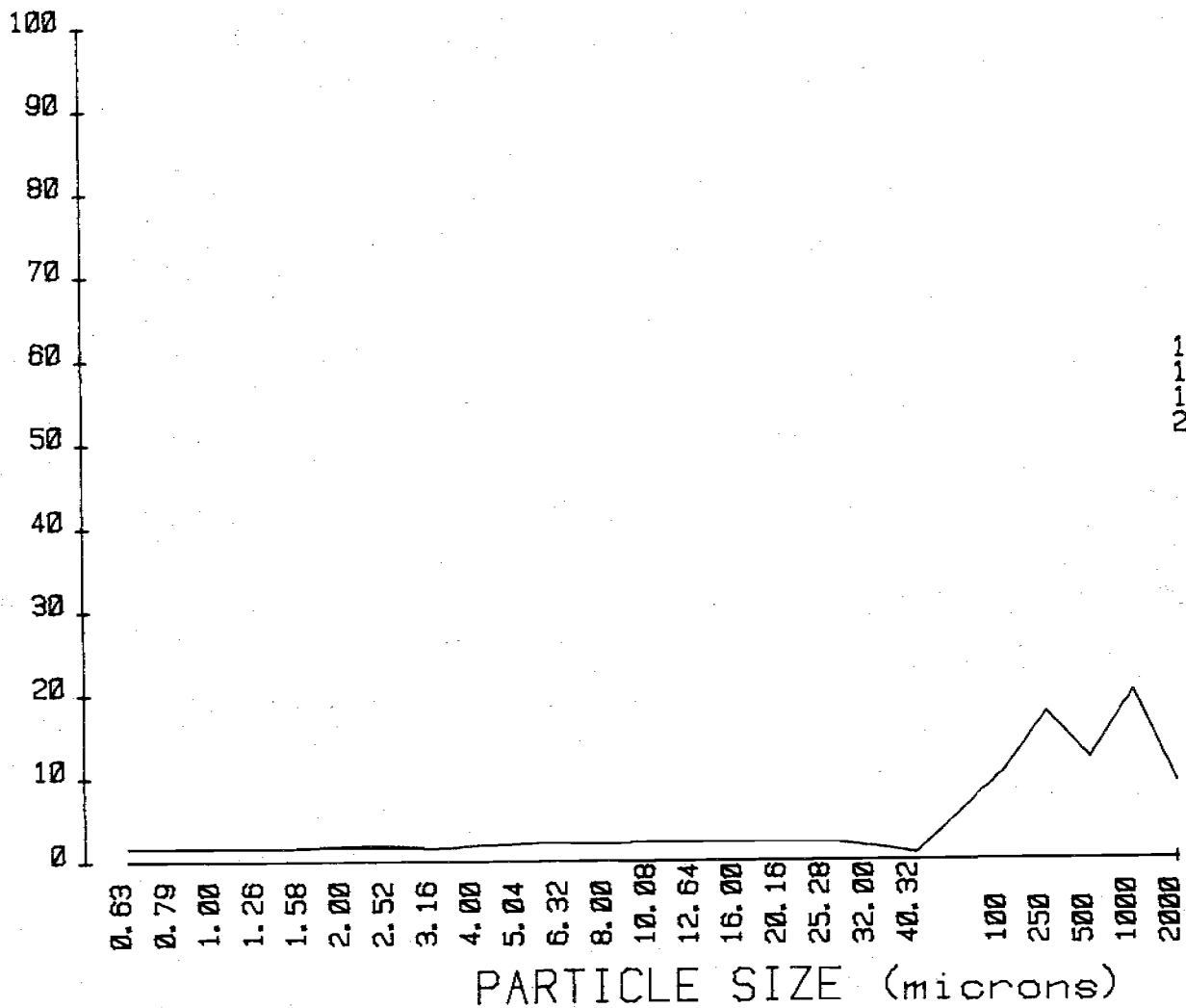
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4110-2



PLOT SAND-SILT-CLAY

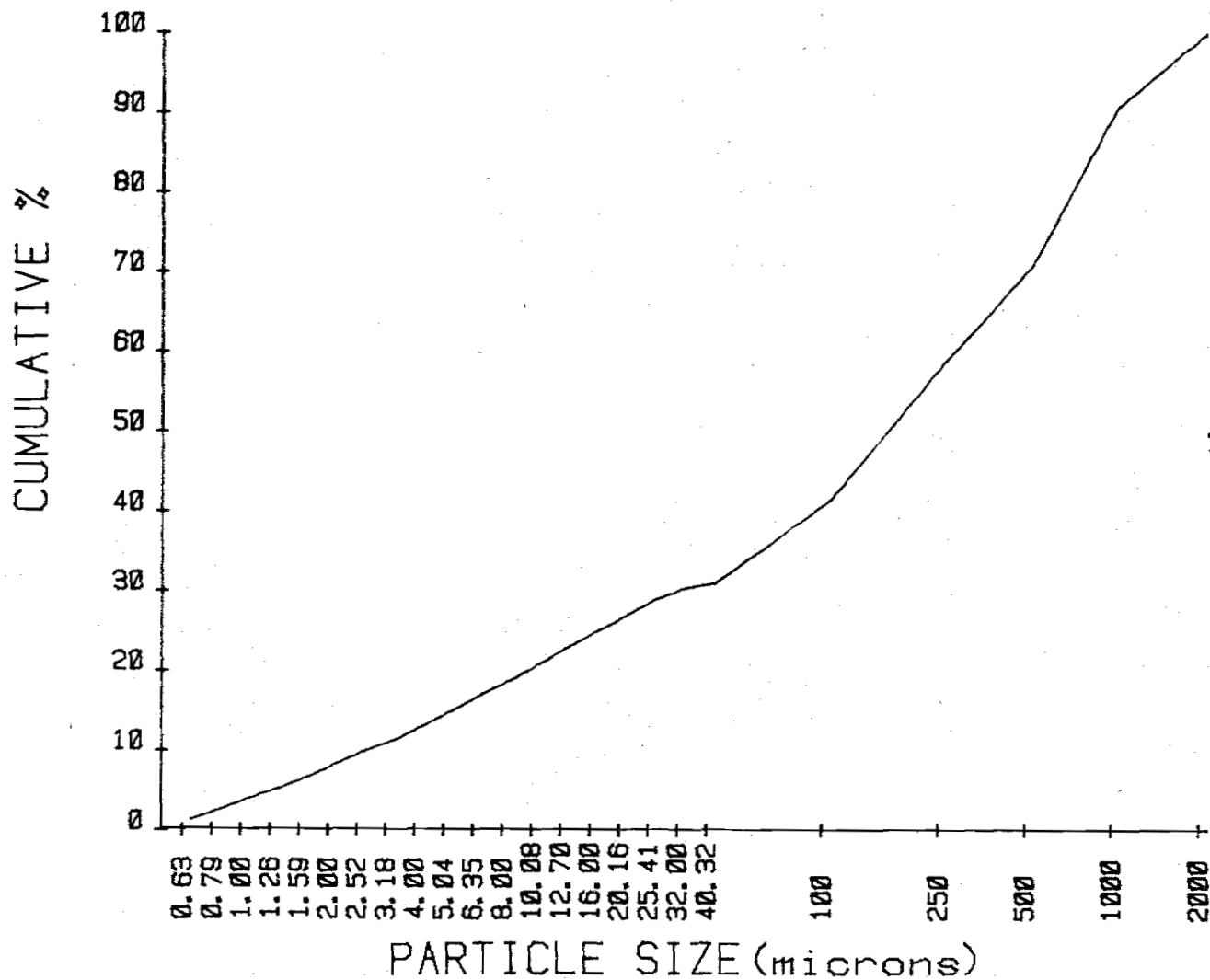
ID M4110-3



1.38	2.02
1.28	1.81
1.40	2.13
1.17	2.07
1.48	2.03
1.64	2.00
1.61	1.96
1.30	1.36
1.75	0.57
1.95	0.19
10.28	
17.43	
11.97	
20.06	
9.19	

CUMULATIVE CURVE SAND-SILT-CLAY

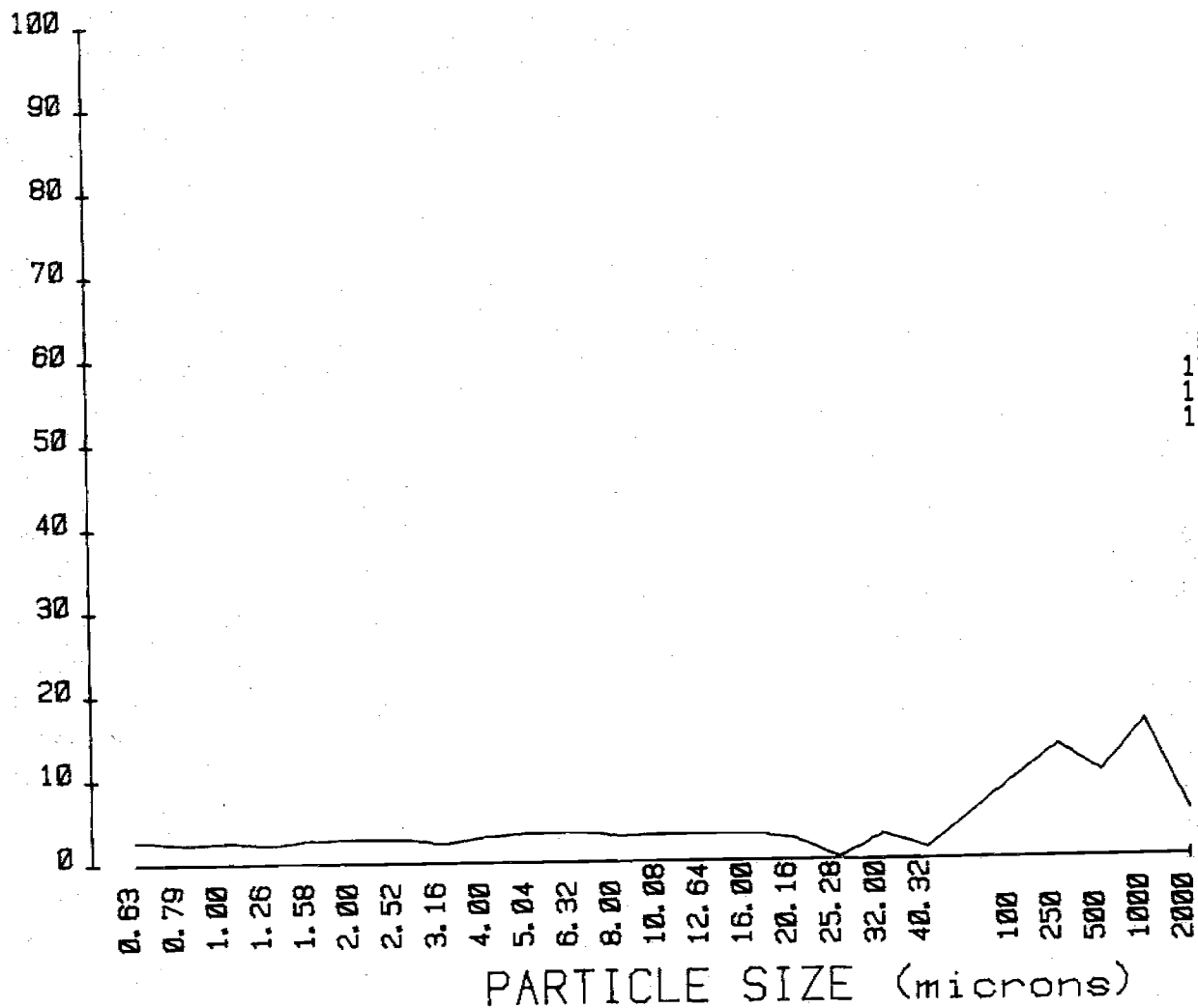
ID M4110-3



1.38	16.97
2.65	18.78
4.05	20.91
5.22	22.98
6.69	25.01
8.33	27.02
9.95	28.98
11.25	30.33
13.00	30.90
14.94	31.09
41.37	
58.80	
70.77	
90.83	
100.02	

PLOT SAND-SILT-CLAY

ID M4110-4

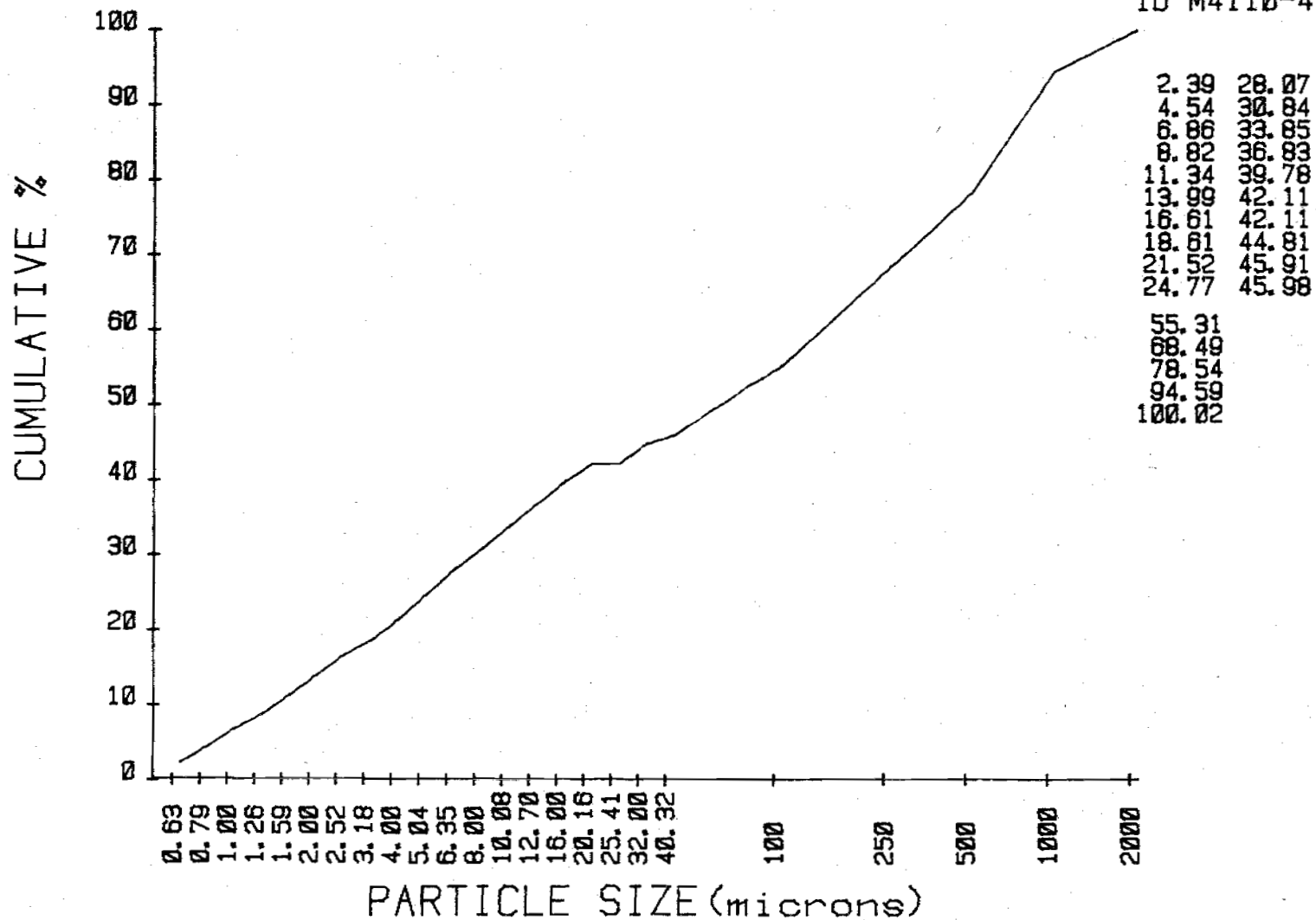


2.30	3.29
2.14	2.77
2.33	3.01
1.96	2.98
2.51	2.95
2.66	2.33
2.62	2.00
2.00	2.70
2.91	1.10
3.25	0.07
9.33	
13.10	
10.05	
16.05	
5.43	



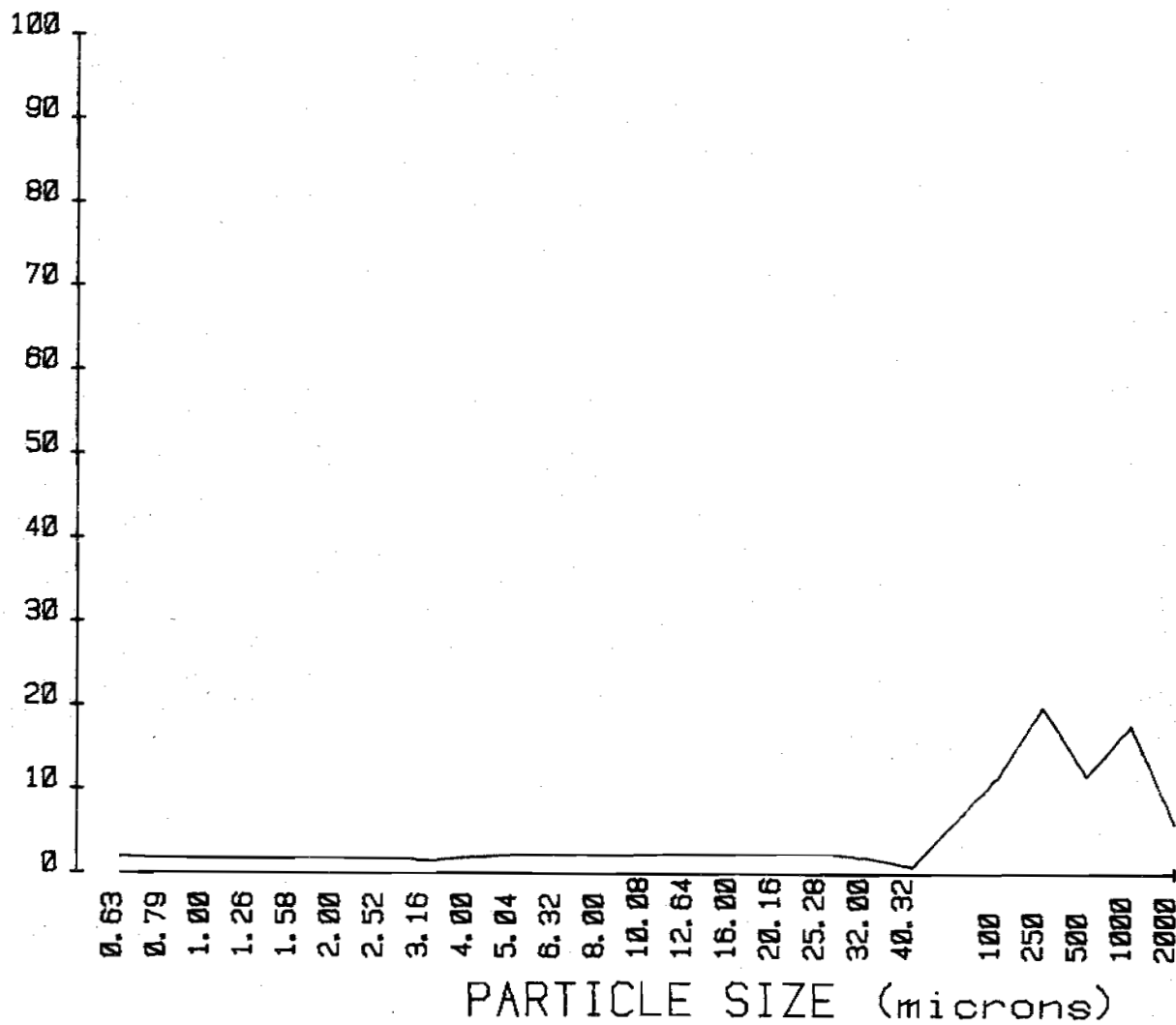
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4110-4



PLOT SAND-SILT-CLAY

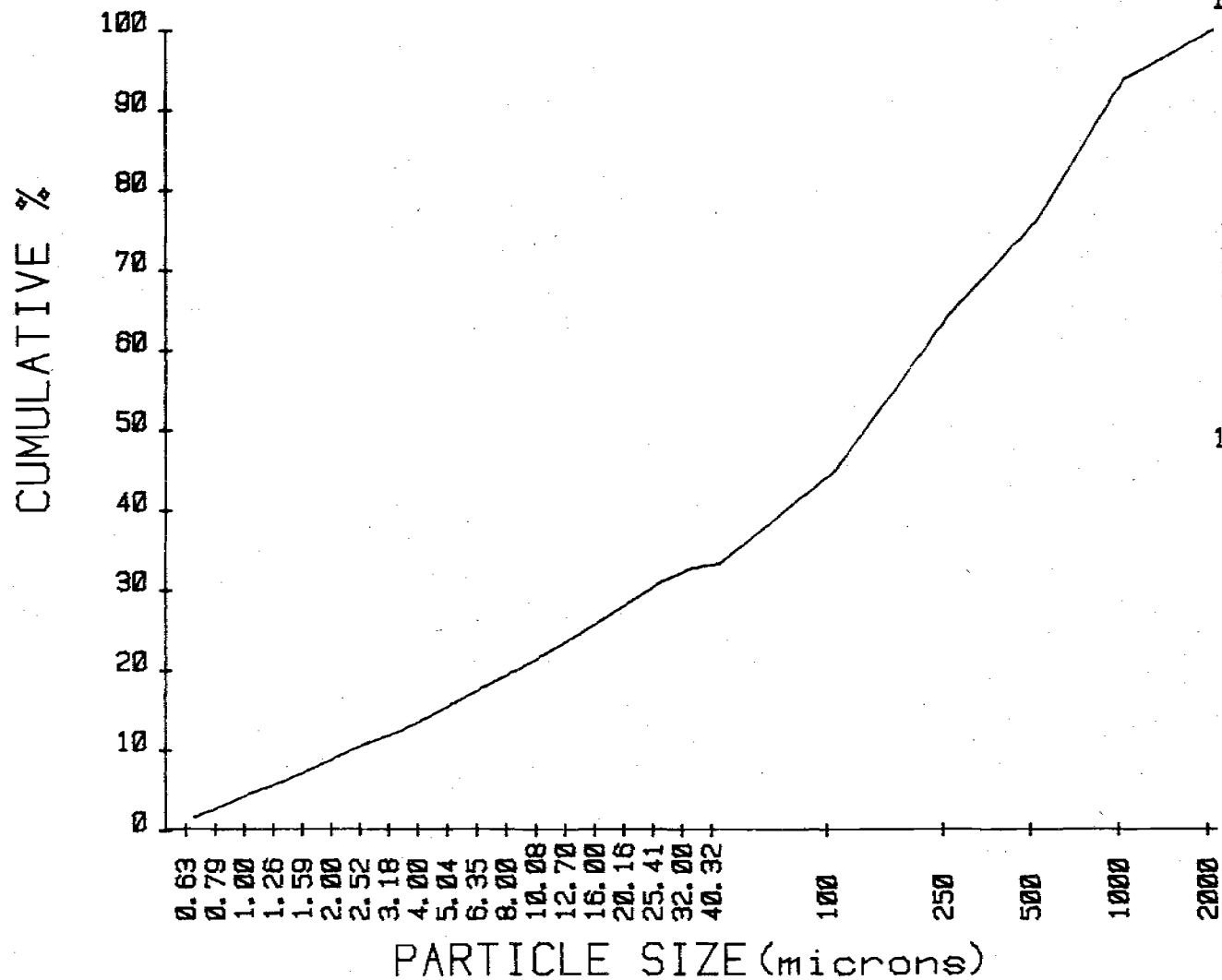
ID M4110-5



- 1.75
- 1.47
- 1.55
- 1.29
- 1.61
- 1.68
- 1.60
- 1.29
- 1.74
- 1.99
- 2.03
- 1.90
- 2.07
- 2.15
- 2.26
- 2.33
- 2.27
- 1.66
- 0.64
- 0.05
- 11.55
- 19.74
- 11.64
- 17.67
- 6.09

### CUMULATIVE CURVE SAND-SILT-CLAY

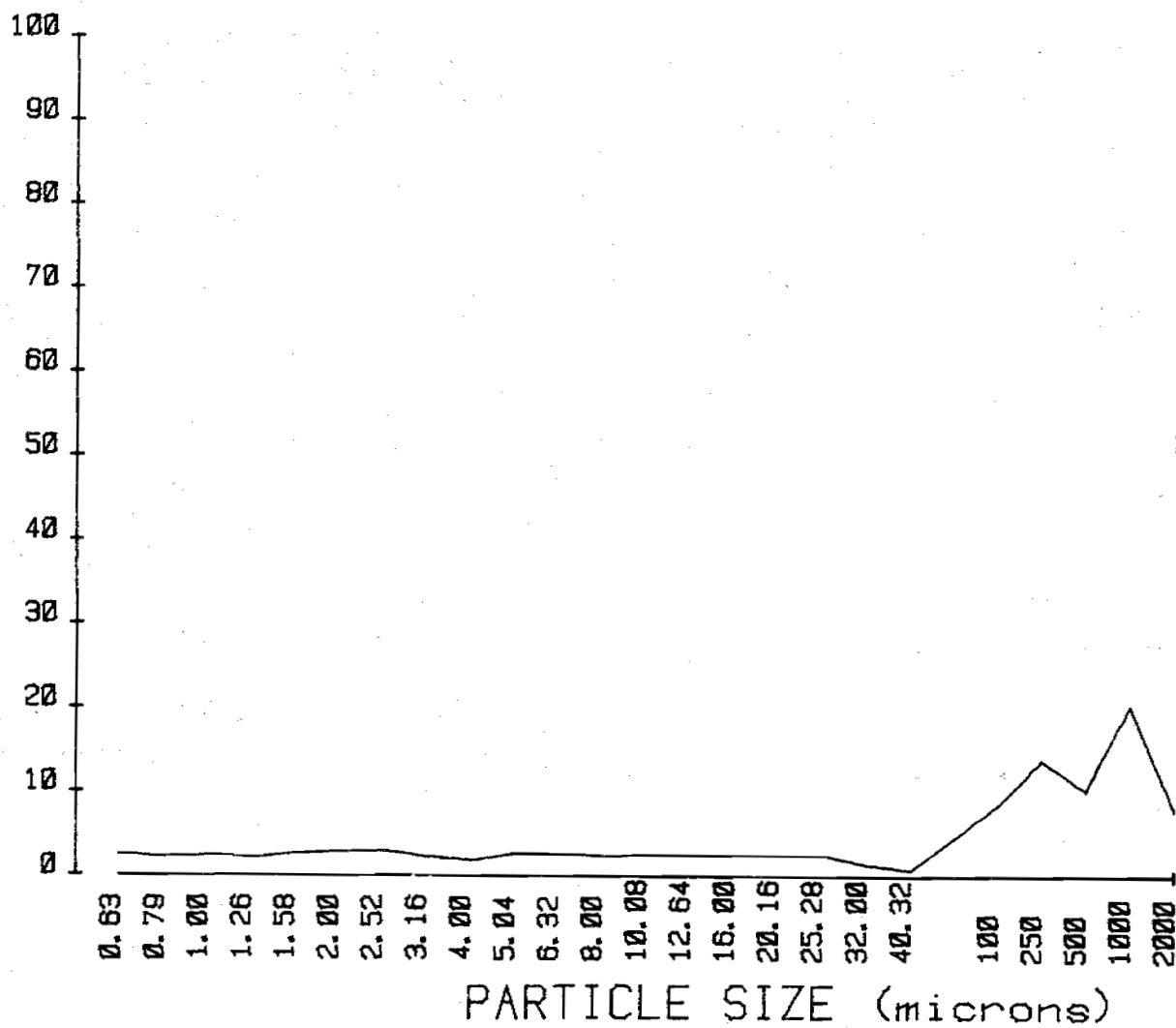
ID M4110-5



1.75	17.99
3.22	19.89
4.76	21.97
6.06	24.12
7.67	26.38
9.34	28.71
10.95	30.96
12.23	32.64
13.97	33.28
15.96	33.33
44.88	
64.52	
76.26	
93.93	
100.02	

PLOT SAND-SILT-CLAY

ID M4110-6



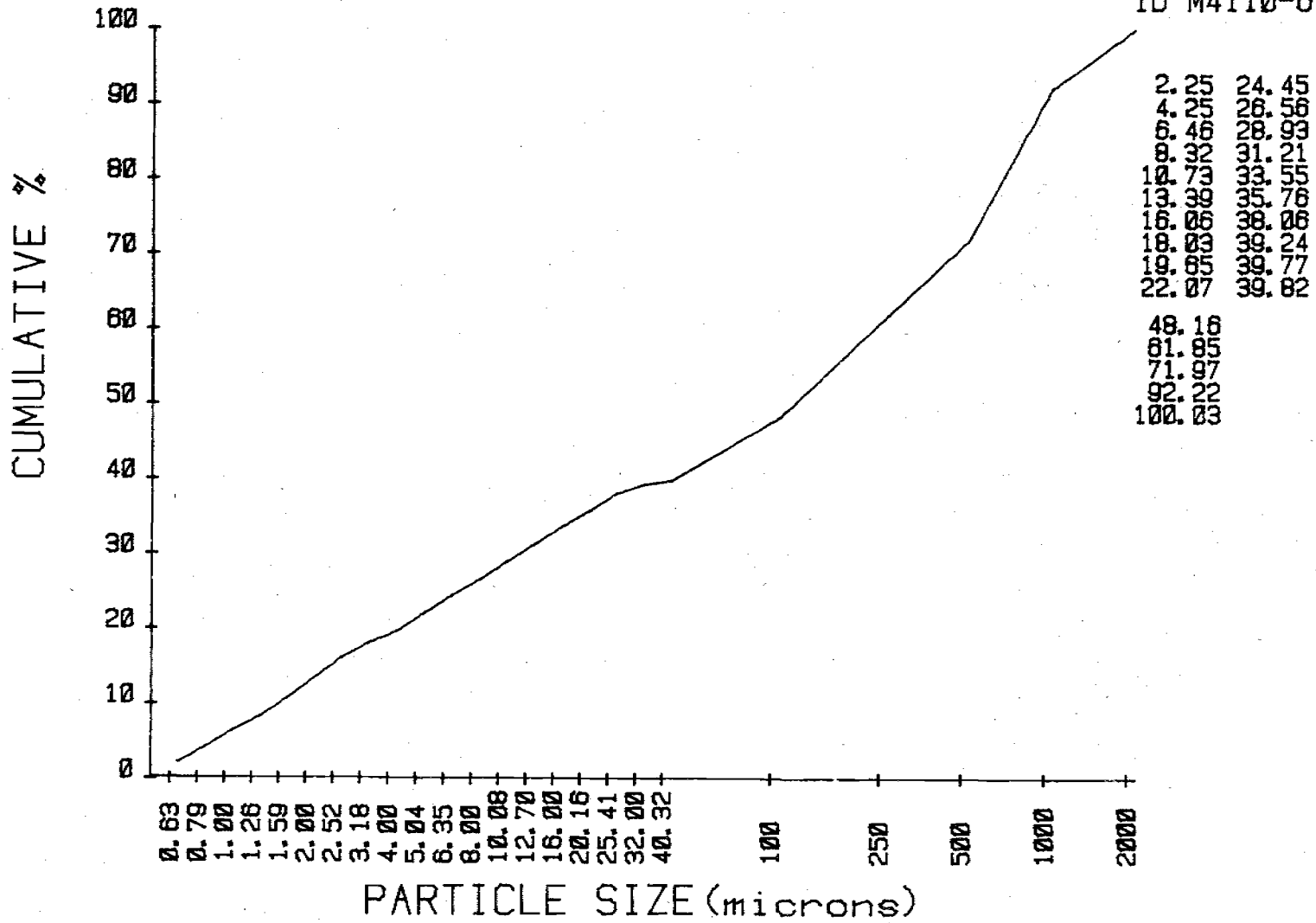
2.25	2.38
2.01	2.10
2.20	2.38
1.86	2.28
2.41	2.34
2.66	2.21
2.67	2.31
1.97	1.18
1.62	0.53
2.42	0.05
8.34	
13.69	
10.12	
20.25	
7.81	

69T

x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4110-6



BT 34  
Mg-saturated, glycolated  
C-77-4  
79-MT-4110-4  
B224 38-50 cm





BT 34  
K-saturated, air dried  
C-77-4  
79-MT-4110-4  
B224 38-50 cm

90

80

70

60

50

40

30

20

10

172

2.32 Å

3.44 Å

4.98 Å

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

90

80

70

60

50

40

30

20

10

7.13 Å

20.4 Å

BT 34  
K-saturated, air dried  
C-77-4  
79-MT-4110-4  
B224 38-50 cm

Unnamed Sandy Loam 79-MT-4111 (C-78-1)

Classification: fine loamy, mixed Glessic Cryoboralf.

General Site Characteristics

Location: Ravalli County, Montana: Sula Road, southwest corner of northwest 1/4 of section 4, T. 1S., R. 19W.

Forest: Bitterroot National Forest

Area: Waugh Gulch

Described By/Date:

Parent Rock/Material: tertiary volcanics

Habitat Type: Douglas fir/pinegrass h.t.

Topography: gently sloping dissected terrace

Landform:

Weathering:

Formation Name:

Slope: 10-15 percent

Aspect: northeast

Elevation: 5200 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: slow to very slow

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

0 3-0 centimeters (1-0 inches). Partially decomposed leaves, twigs, and needles.

A21 0-12 centimeters (0-5 inches). Dark brown (10YR 4/2) moist; sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many very fine roots, common fine roots; medium acid pH 5.6, noncalcareous; 8 percent gravels by weight; clear smooth boundary.

A22 12-24 centimeters (5-9 inches). Light yellowish brown (10YR 6/4) moist; loamy sand; single grained; very friable, slightly sticky and slightly plastic; many very fine roots, common fine roots; strongly acid pH 5.5, noncalcareous; 6 percent gravels by weight; abrupt smooth boundary.

B21t 24-44 centimeters (9-17 inches). Yellowish brown (10YR 5/6) moist; sandy clay loam; moderate coarse columnar structure parting to strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and common fine roots; roots are concentrated between peds; continuous moderately thick clay films on peds; strongly acid pH 5.3, noncalcareous; no gravels; gradual smooth boundary.



79-MT-4111 (cont.)

B22t 44-65 centimeters (17-26 inches). Yellowish brown (10YR 5/6) moist; sandy clay loam; strong coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots concentrated between peds; continuous moderately thick clay films on peds; medium acid pH 5.8, noncalcareous; no gravels; clear smooth boundary.

B3t 65-80 centimeters (26-32 inches). Yellowish brown (10YR 5/4) moist; very gravelly sandy clay loam; massive structure to weak subangular blocky structure; very firm, very sticky and very plastic; few fine and medium roots; medium acid pH 6.0, noncalcareous; 87 percent gravels by weight.

Pedon: Unnamed Sandy Loam 79-MT-4111 (C-78-1)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	0-0	NS	NS	NS	NS				
2	A21	0-12	5.6	0.17	38	1.3				
3	A22	12-24	5.5	0.10	29	0.8				
4	B21†	24-44	5.3	0.11	46	0.8				
5	B22†	44-65	5.8	0.16	45	0.4				
5	B3†	65-80	6.0	0.21	44	0.9				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	DM	DC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H		Saturation						
	meq/100 gms						%		%		ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.3	1.3	0.1	0.4	3.8	8.0	57	1.41	0.82	0.051	16	0.92	9.1
3	2.3	1.0	0.1	0.3	2.4	5.0	60	0.40	0.23	0.016	14	0.94	9.2
4	10.3	3.8	0.1	0.8	5.3	21.2	74	0.57	0.33	0.023	14	1.00	9.3
5	10.2	3.9	0.1	0.8	4.2	19.3	78	0.42	0.25	0.015	17	1.00	9.5
5	9.4	3.4	0.1	0.7	5.1	20.2	73	0.89	0.52	0.025	21	0.13	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Peden: Unnamed Sandy Loam 79-MT-4111 (C-78-1)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
3-0						NS	NS	NS	NS	NS
0-12						73.58	20.58	5.84	8	Sandy loam
12-24						77.95	17.27	4.78	6	Loamy sand
24-44						56.15	14.34	29.51	none	Sandy clay loam
44-65						56.01	17.50	26.49	none	Sandy clay loam
65-80						55.38	18.76	25.87	87	V.gr. sandy clay loam

Depth	Silt Size Distribution (mm)			Bulk Density	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Clod	Core	Bar	Bar	
cm	%			g/cc	%		%		
3-0					NS	NS	NS	NS	NS
0-12					16.1	7.3	NDNP	NDNP	NDNP
12-24					12.6	5.4	NDNP	NDNP	NDNP
24-44					27.2	16.8	36	15	21
44-65					24.9	15.1	33	12	20
65-80					23.4	14.4	34	15	19

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 NS-no sample

Analysis by: Debbie Hall

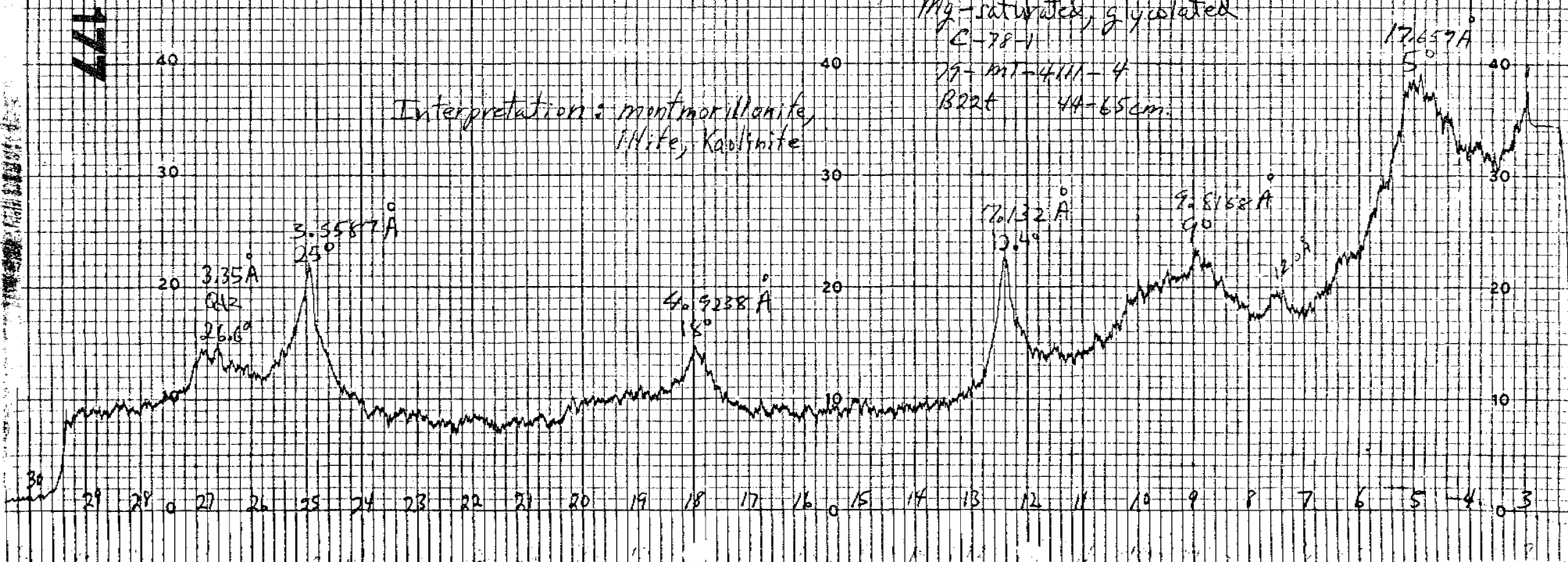
BT 41  
Mg-saturated, glycolated  
C-78-1  
79-MT-4111-4  
B224 44-65 cm

Slides prepared by: Faten and Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody and Faten

Slides prepared by: Faten + Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody + Faten

Interpretation: montmorillonite,  
Illite, Kaolinite

BT 41  
Mg-saturated, glycolated  
C-78-1  
79-MT-4111-4  
B224 44-65 cm.

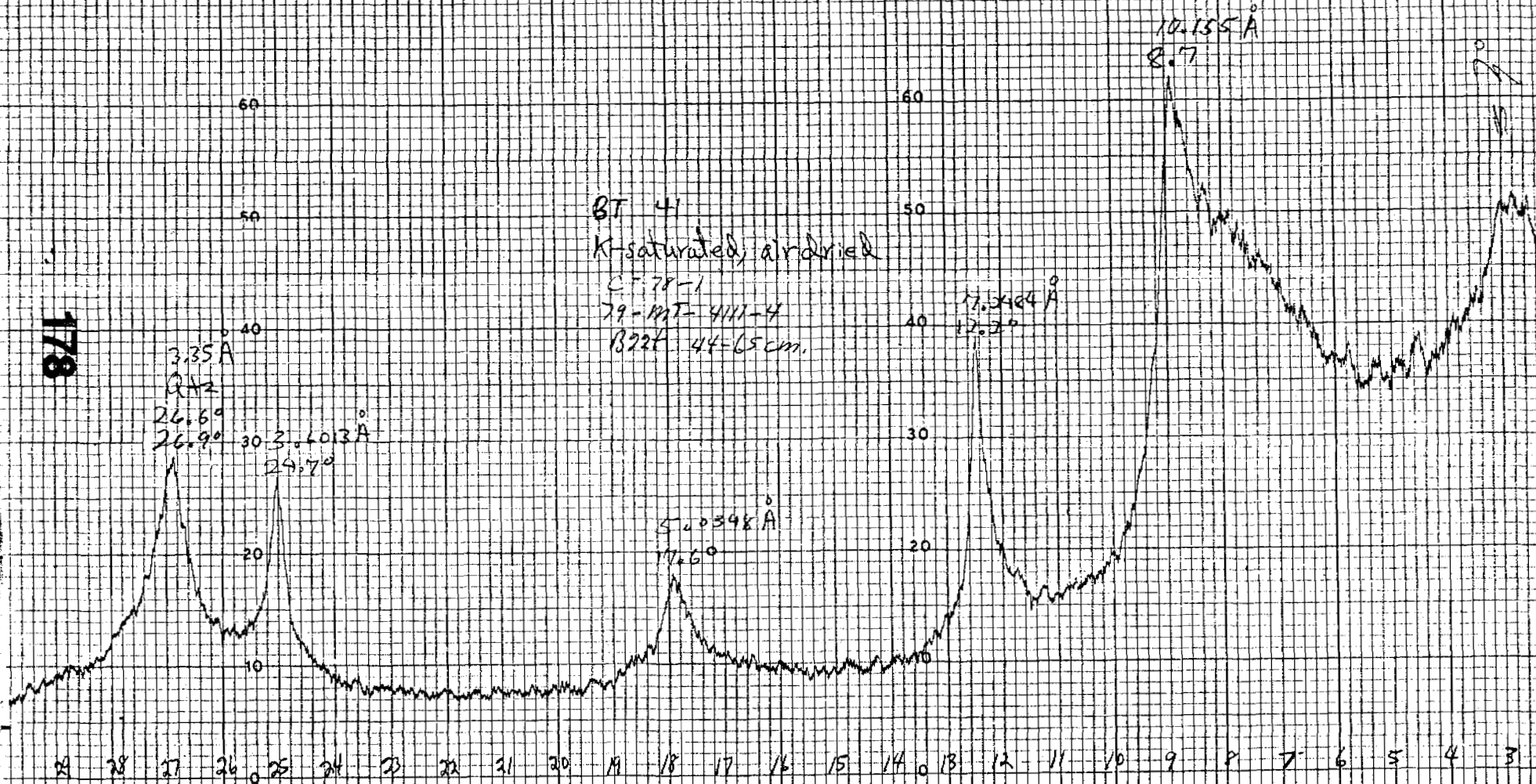




BT 41  
K-saturated, air dried  
C-78-1  
79-MT-4111-4  
B224 44-65 cm

BT 41  
K-saturated, air dried  
C-78-1  
79-MT-4111-4  
B224 44-65 cm.

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Unnamed Gravelly Sandy Loam 79-MT-4112 (C-79-4)

Classification: coarse loamy, mixed, frigid Typic Haploxerolls.

General Site Characteristics

Location: Ravalli County, Montana: northeast 1/4 of section 11, T. 2N., R. 20W.

Forest: Bitterroot National Forest

Area:

Described By/Date:

Parent Rock/Material: granitic

Habitat Type: Idaho fescue, bluebunch wheatgrass, mountain sagebrush, and widely scattered Douglas fir and Ponderosa pine

Topography: south facing, 45 percent convex slope near hilltop

Landform:

Climate:

Weathering:

Precipitation:

Formation Name:

Erosion:

Slope:

Infiltration:

Aspect:

Permeability: rapid

Elevation: 6100 feet

Storage:

Soil Depth:

Drainage: well drained

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A11 0-10 centimeters (0-4 inches). Very dark gray brown (10YR 3/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; loose, very friable, slightly sticky and slightly plastic; many very fine roots; neutral pH 6.6, noncalcareous; 22 percent gravels by weight; abrupt smooth boundary.

B1 10-26 centimeters (4-10 inches). Dark grayish brown (10YR 4/3) gravelly sandy loam; very dark grayish brown (10YR 3/3) moist; weak fine subangular blocky structure parting to moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly acid pH 6.2, noncalcareous; 27 percent gravels by weight; clear smooth boundary.

B2 26-43 centimeters (10-17 inches). Dark brown (7.5YR 4/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly acid pH 6.5, noncalcareous; 29 percent gravels by weight; abrupt wavy boundary.

79-MT-4112 (cont.)

C            43-56 centimeters (17-22 inches). Brown (7.5YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, friable, nonsticky and slightly plastic; common fine roots; slightly acid pH 6.2, noncalcareous; 64 percent gravels by weight.

Pedon: Unnamed Gravelly Sandy Loam 79-NT-4112 (C-79-4)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	A11	0-10	6.6	0.26	51	2.3				
2	B1	10-26	6.2	0.16	46	0.3				
3	B2	26-43	6.5	0.15	34	0.0				
4	C	43-56	6.2	0.14	34	0.9				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	D:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms					%		%					
1	8.4	2.9	0.1	1.0	3.3	14.8	79	3.28	1.91	0.164	12	0.78	9.2
2	6.3	2.1	0.1	0.6	2.7	11.4	77	1.76	1.02	0.083	12	0.73	9.2
3	6.0	2.4	0.1	0.5	2.7	10.5	77	0.81	0.47	0.052	9	0.71	9.2
4	7.3	3.4	0.1	0.6	3.1	12.2	79	0.69	0.40	0.043	9	0.36	9.2

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



Pedon: Unnamed Gravelly Sandy Loam 79-MT-4112 (C-79-4)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
CM	-----X-----							-----X-----			
0-10						75.69	12.80	11.51	22		Gr. sandy loam
10-26						73.38	14.99	11.63	27		Gr. sandy loam
26-43						73.33	14.26	12.41	29		Gr. sandy loam
43-56						76.67	9.53	13.80	64		V.gr. sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Core	Bar	Bar	Bar			
CM	-----X-----			-----g/cc-----		-----X-----		-----X-----		
0-10						14.2	8.6	NDNP	NDNP	NDNP
10-26						11.9	7.0	25	NP	ND
26-43						11.6	7.3	23	NP	ND
43-56						11.8	7.4	23	NP	ND

Remarks: Mechanicals were run by the pipette method  
Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Very Fine Sandy Loam 79-MT-4113 (C-77-1)

Classification: medial over loamy, mixed Eutric Cryandepts.

General Site Characteristics

Location: Ravalli County, Montana: Darby Road, southwest 1/4 of section 7,  
T. 4N., R. 18W.

Forest: Bitterroot National Forest

Area: Bald Top

Described By/Date:

Parent Rock/Material: quartzite with ash mantle

Habitat Type: subalpine fir/menziesia h.t.

Topography: upper mountain slopes and ridges

Landform:

Weathering:

Formation Name:

Slope: 25 percent

Aspect: north-northeast

Elevation: 7120 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderate

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 6.5 deg. C

Salt/Alkal:

Remarks:

Pedon Description

- O 4-0 centimeters (2-0 inches). Duff layer.
- A2 0-5 centimeters (0-2 inches). Gray (10YR 6/1) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive structure; very friable, nonsticky and nonplastic; many very fine roots; very strongly acid pH 4.9, noncalcareous; no gravels; abrupt smooth boundary.
- B21ir 5-12 centimeters (2-5 inches). Reddish brown (5YR 4/4) silt loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine roots; 7 percent gravels by weight; strongly acid pH 5.2, noncalcareous; abrupt wavy boundary.
- B22ir 12-37 centimeters (5-15 inches). Dark brown (7.5YR 4/4) moist; very fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine roots; strongly acid pH 5.4, noncalcareous; 15 percent gravels by weight; abrupt smooth boundary.

79-MT-4113 (cont.)

IIC1 37-62 centimeters (15-24 inches). Pale brown (10YR 6/3) moist; very fine sandy loam; massive structure; very friable, nonsticky and nonplastic; 13 percent gravels by weight; strongly acid pH 5.5, noncalcareous; abrupt smooth boundary.

IIC2 62-110+ centimeters (24-43+ inches). Light yellowish brown (10YR 6/4) moist; gravelly very fine sandy loam; massive structure; very friable, nonsticky and nonplastic; 23 percent gravels by weight; strongly acid pH 5.4, noncalcareous.

Pedon: Unnamed Very Fine Sandy Loam 79-MT-4113 (C-77-1)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	4- 0	NS	NS	NS	NS				
2	A2	0- 5	4.9	0.11	64	0.4				
3	B21ir	5- 12	5.2	0.05	82	0.9	0.93	0.98	0.16	0.31
3	B22ir	12- 37	5.4	0.04	68	0.0	0.43	0.53	0.07	0.15
4	IIC1	37- 62	5.5	0.06	38	0.0				
5	IIC2	62-110+	5.4	0.06	39	0.0				

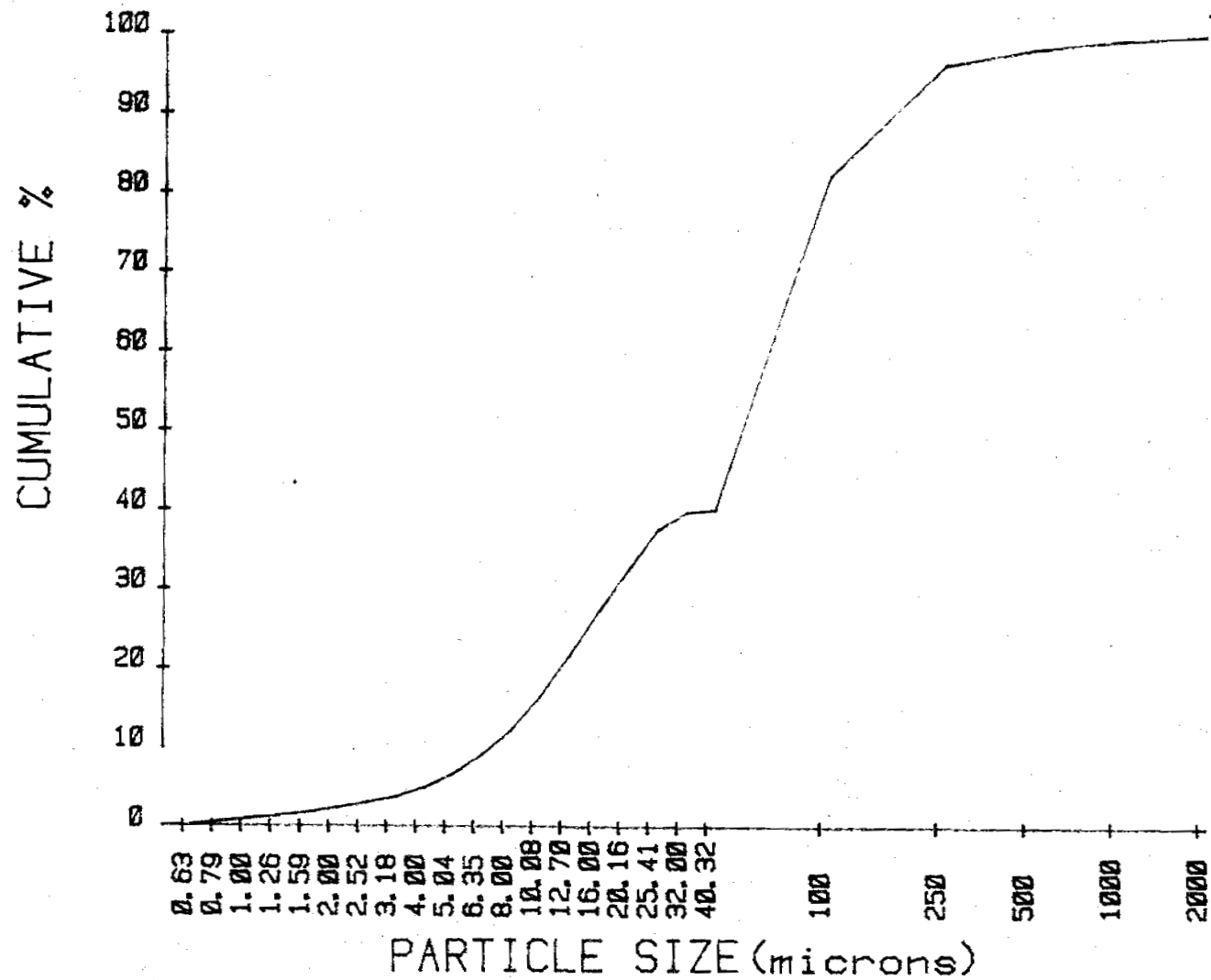
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	DM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation	%	%	ratio	Fraction			
	meq/100 gms												
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	1.3	0.8	0.1	0.2	7.7	7.7	24	2.58	1.50	0.075	20	1.00	9.0
3	0.4	0.2	0.1	0.3	27.9	23.4	3	5.38	3.13	0.144	22	0.93	10.9
3	0.5	0.2	0.5	0.2	14.6	12.0	9	2.37	1.38	0.083	17	0.85	10.8
4	1.2	0.4	0.1	0.1	2.9	3.6	38	0.21	0.12	0.008	15	0.87	9.4
5	1.4	1.0	0.1	0.1	3.3	4.3	44	0.17	0.10	0.003	33	0.77	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample  
 Samples 3&4 are not spodic

Analysis by: Zelda Fadness

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4113-5



0.35	9.13
0.71	12.20
1.00	16.41
1.43	21.61
1.89	27.33
2.46	32.58
3.11	37.51
3.78	39.73
4.96	40.11
6.69	40.17
82.14	
96.27	
98.23	
99.40	
100.00	

200

Unnamed Gravelly Sandy Loam 79-MT-4114 (C-79-2)

Classification: coarse loamy-skeletal, mixed Dystric Xerorthent.

General Site Characteristics

Location: Ravalli County, Montana: Darby Road, northwest 1/4 of section 5,  
T. 3N., R. 21W.

Forest: Bitterroot National Forest

Area: Waddell Drainage

Described By/Date:

Parent Rock/Material: granite

Habitat Type: Douglas fir/snowberry h.t.

Topography: gentle rolling lower mountain slopes

Landform:

Weathering:

Formation Name:

Slope: 18 percent

Aspect: southeast

Elevation: 4780 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: mod. to 88 cm.

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 6.8 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O 3-8 centimeters (1-8 inches). Duff layer.

A1 0-6 centimeters (0-2 inches). Very dark grayish brown (10YR 3/2) gravelly sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; 18 percent gravels by weight; medium acid pH 5.8, noncalcareous; abrupt smooth boundary.

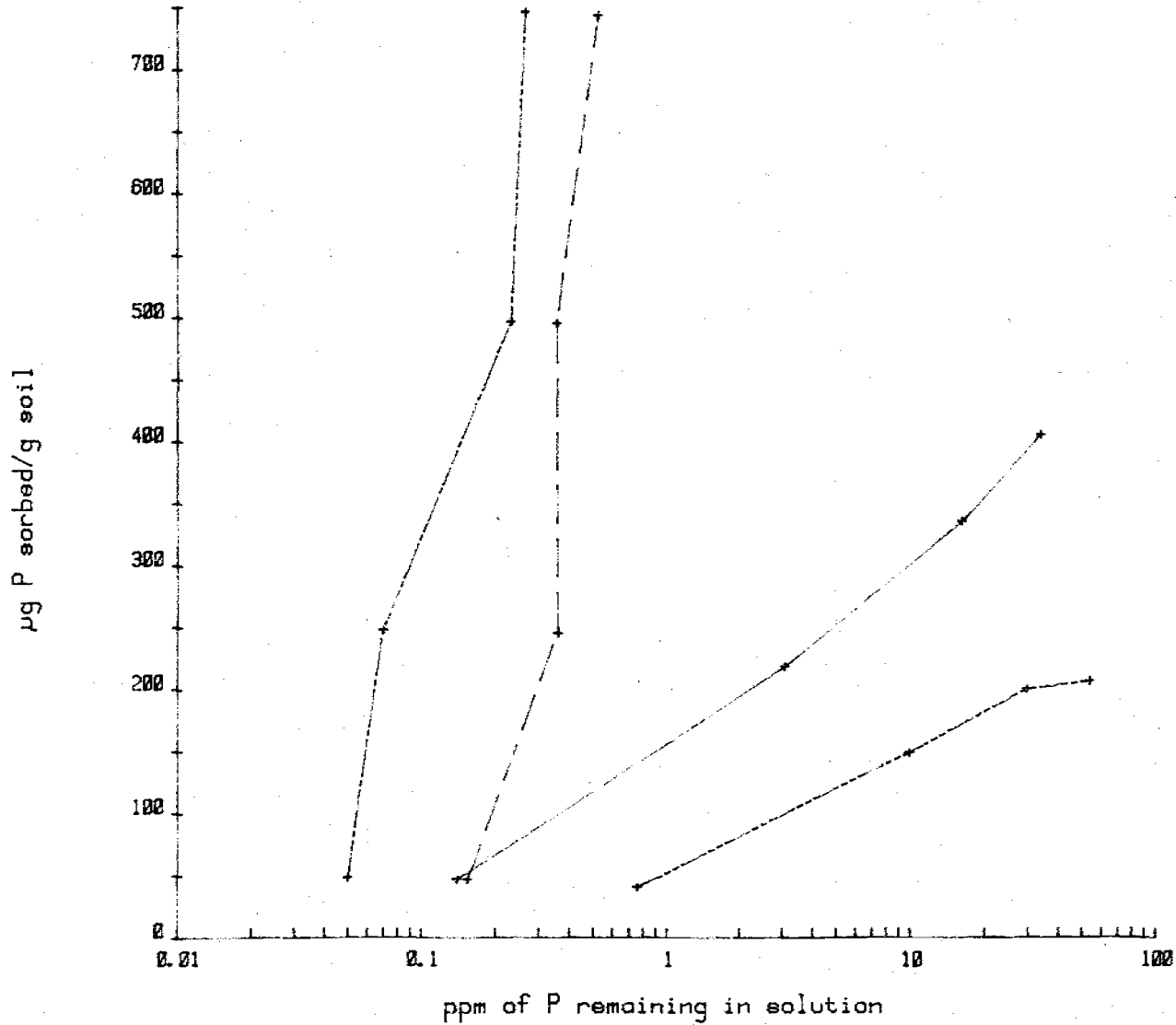
C1 6-28 centimeters (2-11 inches). Brown (10YR 5/3) gravelly sandy loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; 18 percent gravels by weight; strongly acid pH 5.3, noncalcareous; gradual smooth boundary.

C2 28-80 centimeters (11-32 inches). Pale brown (10YR 6/3) sandy loam; massive structure; very friable, slightly sticky and nonplastic; common fine and medium roots; 16 percent gravels by weight; medium acid pH 5.9, noncalcareous; abrupt smooth boundary.

C3 80-110 centimeters (32-43 inches). Gravelly loamy sand; strongly weathered granitic bedrock that retains its rock structure but can be dug with a spade; 18 percent gravels by weight; slightly acid pH 6.2, noncalcareous.

### Phosphorus Isotherm

79-MT-4113



µg/g soil	Soil ppm
----- A2	
49	0.14
219	3.10
336	16.38
486	34.38
----- B21ir	
48	0.16
246	0.36
496	0.36
745	0.54
----- B22ir	
50	0.05
249	0.07
498	0.24
747	0.27
----- IIC1	
42	0.76
150	10.00
201	29.88
288	54.25

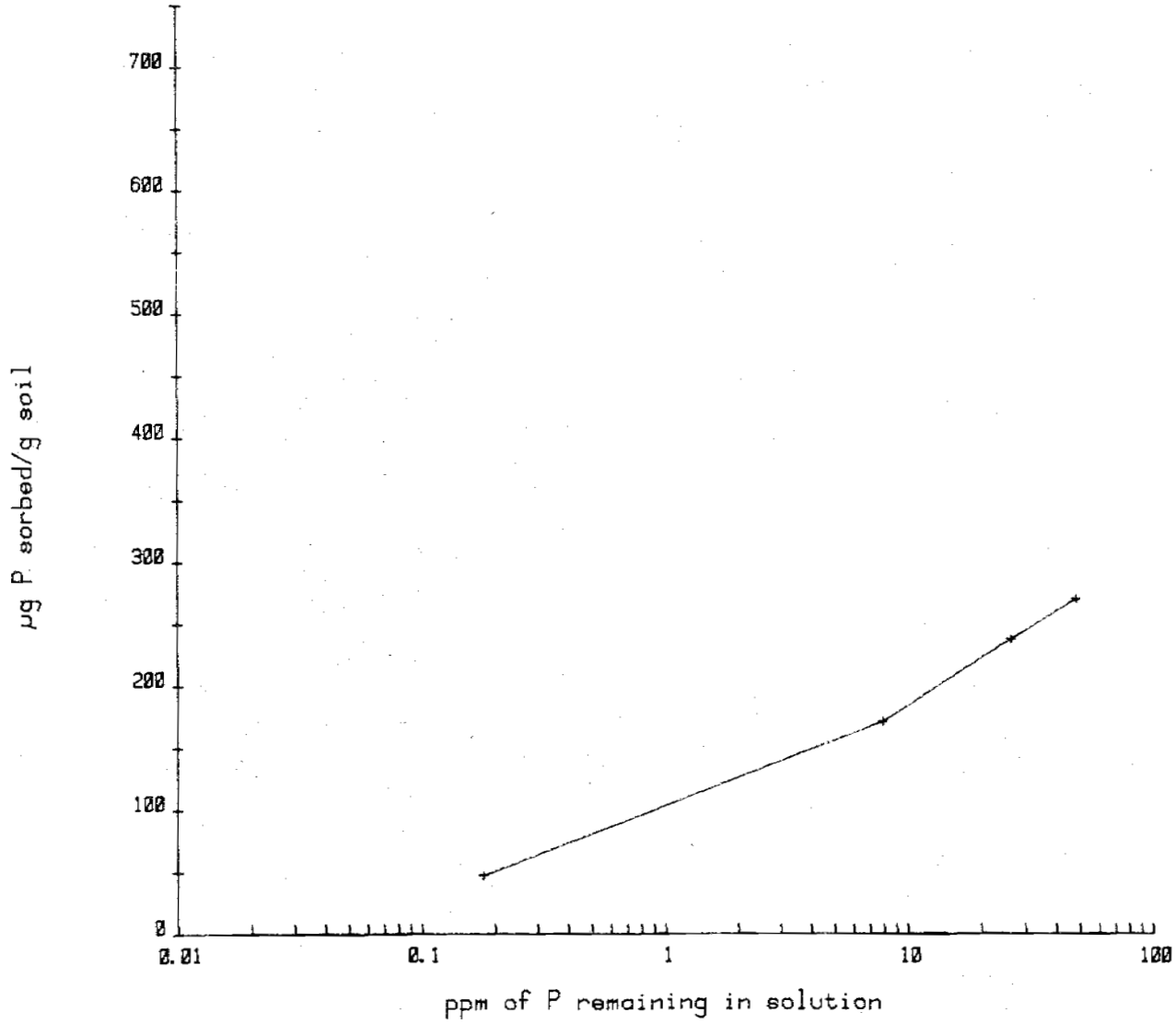
# Phosphorus Isotherm

79-MT-4113

µg/g soil    Soln ppm

———— IIC2

48	0.18
171	7.89
239	26.25
270	48.00





Pedon: Unnamed Very Fine Sandy Loam 79-MT-4113 (C-77-1)

Date: July 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	NS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%								%		
4- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 5	0.16	0.39	0.69	16.91	29.41	47.56	47.08	5.36	none		Very fine sandy loam
5- 12	0.23	0.74	1.10	10.40	28.91	41.37	53.05	5.58	7		Silt loam
12- 37	0.57	0.85	1.33	17.69	30.06	50.51	45.61	3.88	15		Very fine sandy loam
37- 62	1.02	2.19	3.60	23.08	34.32	64.21	34.51	1.28	13		Very fine sandy loam
62-110+	0.60	1.17	1.96	14.13	41.97	59.83	38.28	1.90	23		Gr. very fine sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod Core	Bar	Bar			
cm	%			g/cc	%		%		
4- 0					NS	NS	NS	NS	NS
0- 5					27.1	6.2	NDNP	NDNP	NDNP
5- 12					33.5	15.6	NDNP	NDNP	NDNP
12- 37					22.4	9.2	NDNP	NDNP	NDNP
37- 62					11.7	2.3	NDNP	NDNP	NDNP
62-110					11.8	2.3	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen  
 NS--no sample

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M4113-1	M4113-2	M4113-3	M4113-4
Units		-----%			
TC (0.63-2.00)		5.36	5.58	3.88	1.28
TSi (2.00-50)		47.08	53.05	45.61	34.51
TS (50-2000)		47.55	41.37	50.51	64.21
Clay	0.63-0.794	0.89	1.24	0.78	0.23
	0.794-1.00	0.86	1.10	0.71	0.24
	1.00-1.26	1.04	1.10	0.76	0.25
	1.26-1.59	1.05	0.95	0.70	0.23
	1.59-2.00	1.52	1.20	0.93	0.33
Fine Silt	2.00-2.52	1.83	1.33	1.11	0.42
	2.52-3.17	1.85	1.44	1.26	0.51
	3.17-4.00	1.46	1.36	1.30	0.54
	4.00-5.04	1.22	2.01	1.36	0.74
Medium Silt	5.04-6.35	2.64	2.64	2.25	0.84
	6.35-8.00	3.30	3.36	2.90	1.55
	8.00-10.08	3.96	4.12	3.51	1.98
	10.08-12.70	4.97	5.44	4.73	2.83
	12.70-16.0	5.70	6.55	5.72	3.78
	16.0-20.2	5.96	6.69	6.15	4.69
Coarse Silt	20.2-25.4	5.68	6.62	6.15	5.23
	25.4-32.0	4.75	6.03	4.77	5.59
	32.0-40.3	2.73	3.64	3.10	4.37
	40.3-50.8	0.96	1.73	1.16	1.40
	50.8-64.0	0.08	0.09	0.16	0.06
VFS (50-100)		29.41	28.91	30.06	34.32
FS (100-250)		16.91	10.40	17.69	23.08
MS (250-500)		0.69	1.10	1.33	3.60
CoS (500-1000)		0.39	0.74	0.85	2.19
VCoS (1000-2000)		0.16	0.23	0.57	1.02
Greater than 2000		none	7	15	13
Textural Class		VFSL	Silt loam	VFSL	VFSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: **Bitterroot National Forest-LIM**

Analysis by: **Anita and Debbie**

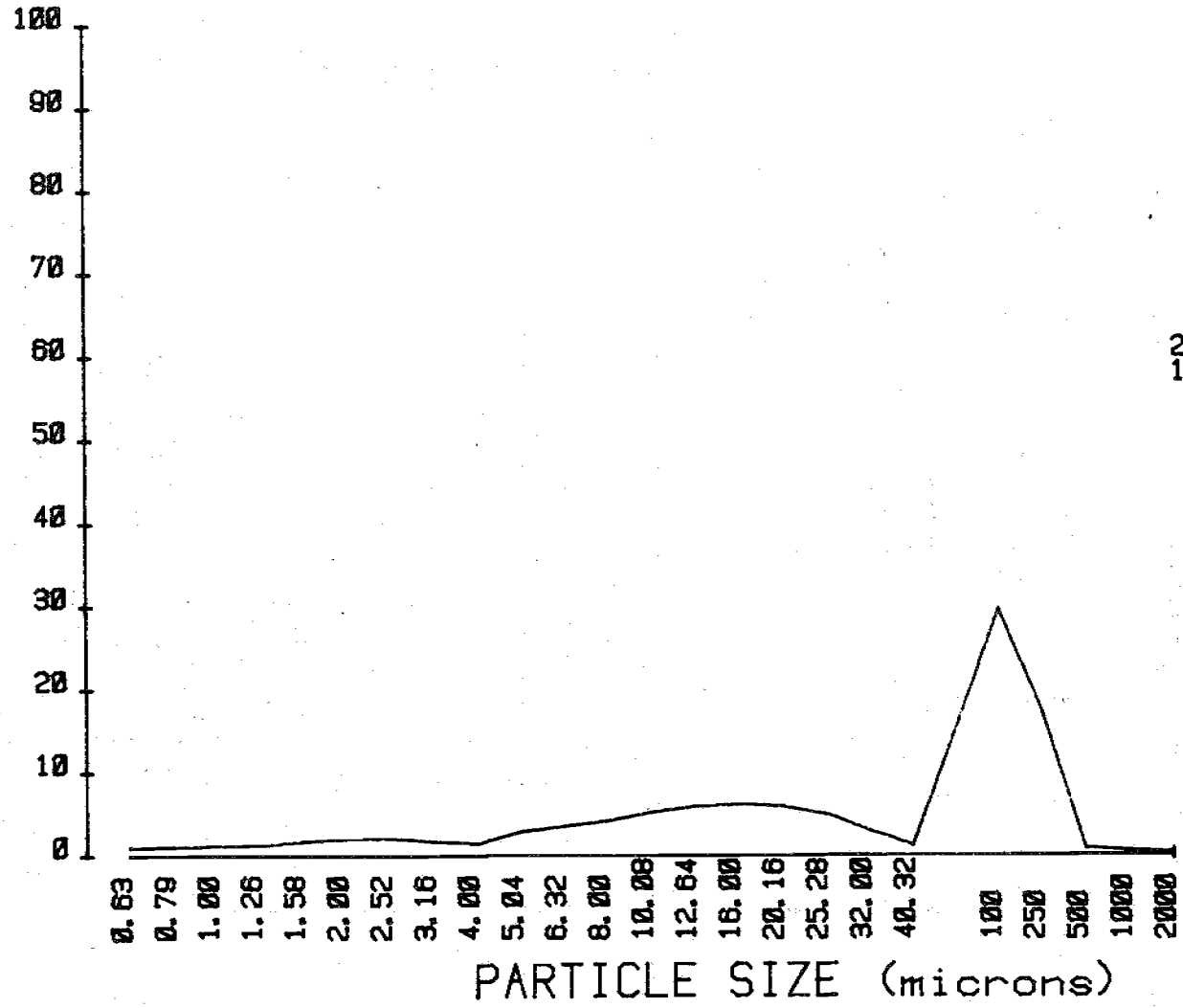
Date: **January 1981**

Identification		M4113-5		
Units		-----%		
TC (0.63-2.00)		1.90		
TSi (2.00-50)		38.28		
TS (50-2000)		59.83		
Clay	0.63-0.794	0.35		
	0.794-1.00	0.36		
	1.00-1.26	0.38		
	1.26-1.59	0.34		
	1.59-2.00	0.40		
Fine Silt	2.00-2.52	0.57		
	2.52-3.17	0.65		
	3.17-4.00	0.68		
	4.00-5.04	1.18		
Medium Silt	5.04-6.35	1.73		
	6.35-8.00	2.44		
	8.00-10.08	3.07		
	10.08-12.70	4.21		
	12.70-16.0	5.20		
	16.0-20.2	5.72		
Coarse Silt	20.2-25.4	5.25		
	25.4-32.0	4.93		
	32.0-40.3	2.22		
	40.3-50.8	0.39		
	50.8-64.0	0.06		
VFS (50-100)		41.97		
FS (100-250)		14.13		
MS (250-500)		1.96		
CoS (500-1000)		1.17		
VCoS (1000-2000)		0.60		
Greater than 2000		23		
Textural Class		VFSL		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

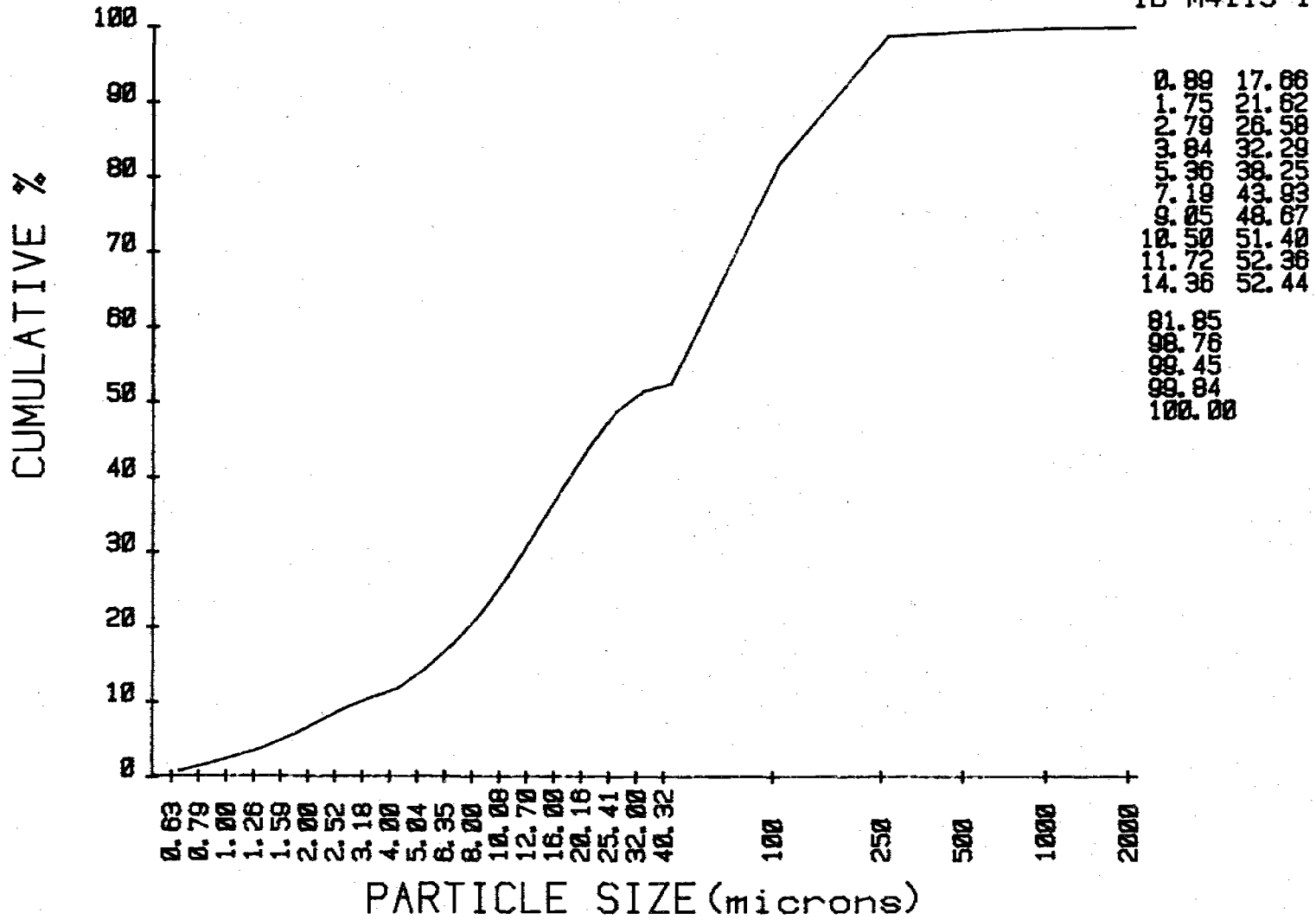
ID M4113-1



0.89	3.29
0.86	3.96
1.04	4.97
1.05	5.78
1.52	5.96
1.83	5.88
1.85	4.75
1.46	2.73
1.22	0.96
2.64	0.08
29.41	
16.91	
0.89	
0.39	
0.16	

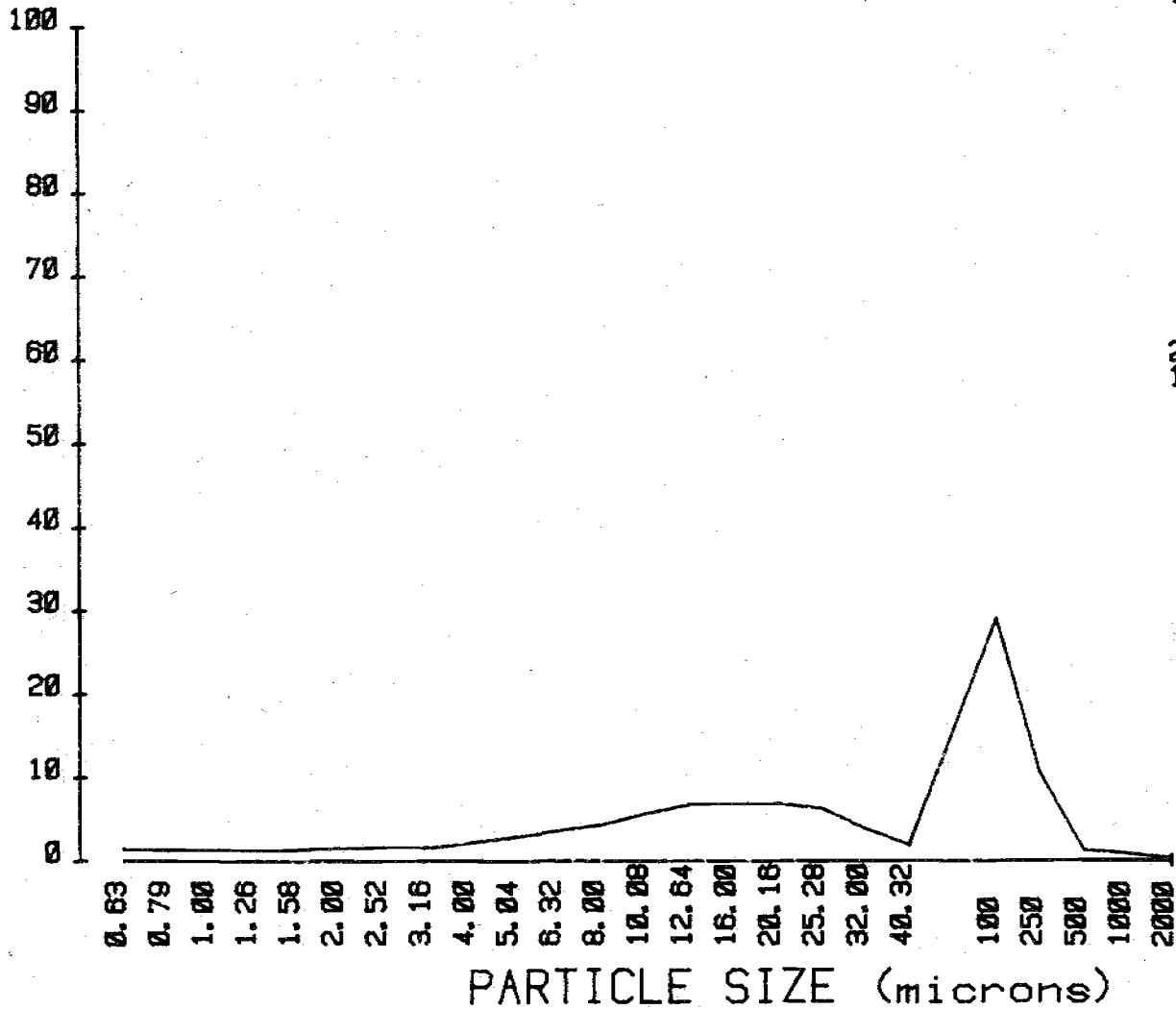
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4113-1



PLOT SAND-SILT-CLAY

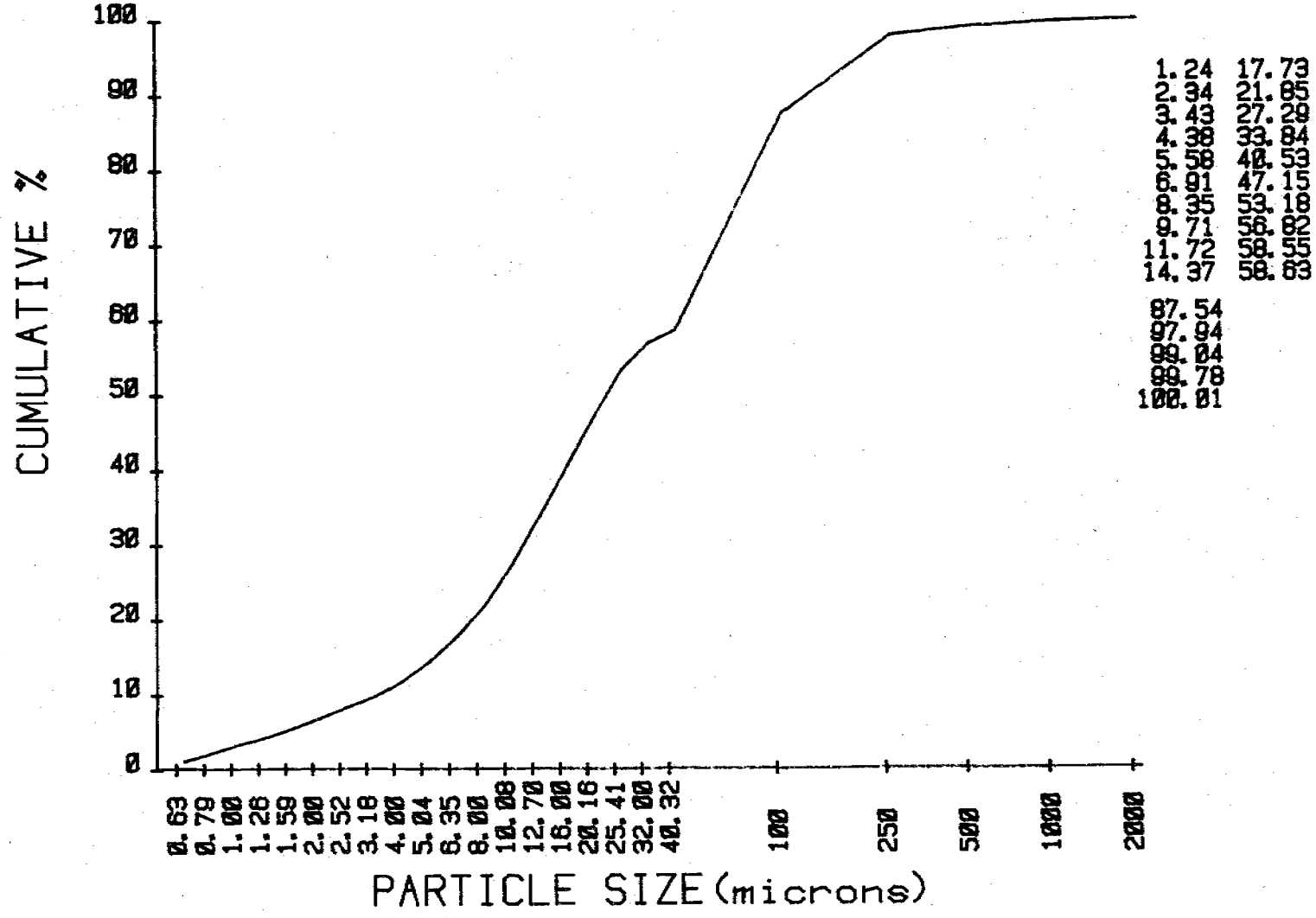
ID M4113-2



1.24	3.36
1.10	4.12
1.00	5.44
0.95	6.55
1.20	6.69
1.33	6.62
1.44	6.83
1.36	3.64
2.01	1.73
2.64	0.88
28.91	
10.40	
1.10	
0.74	
0.23	

CUMULATIVE CURVE SAND-SILT-CLAY

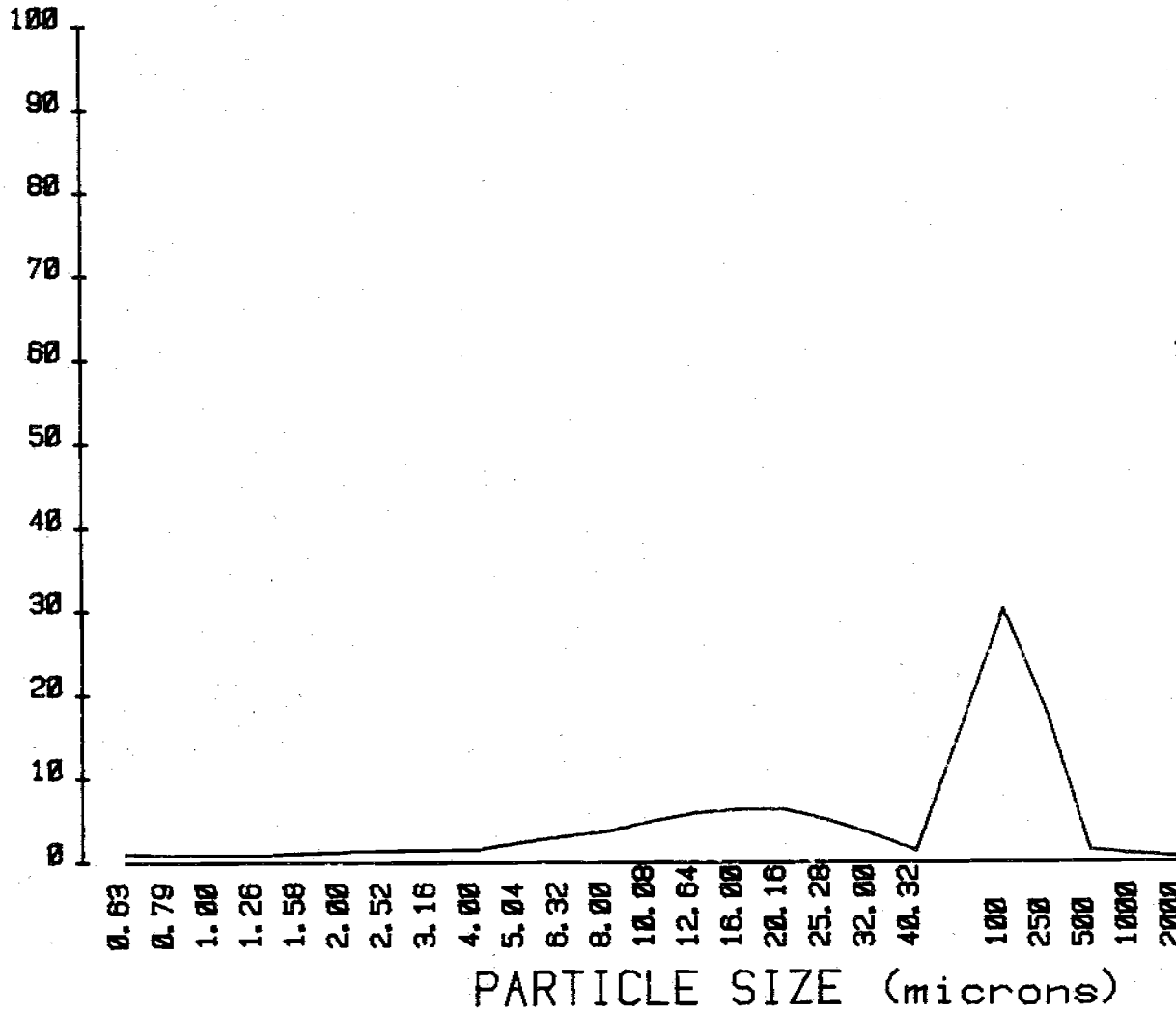
ID M4113-2



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PLOT SAND-SILT-CLAY

ID M4113-3

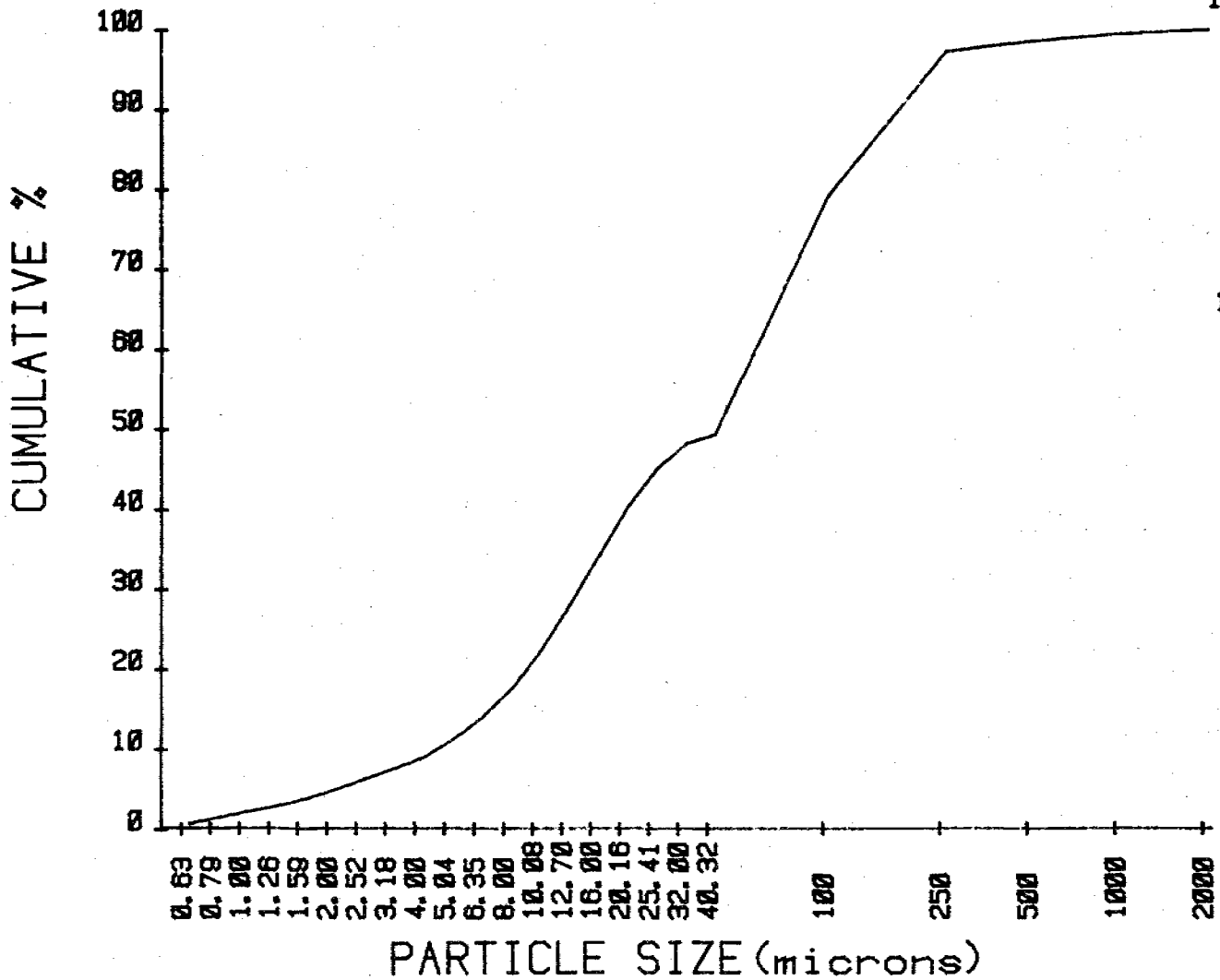


0.78	2.98
0.71	3.51
0.76	4.73
0.70	5.72
0.92	6.15
1.11	6.15
1.26	4.77
1.30	3.10
1.35	1.16
2.25	0.16
30.00	
17.00	
1.33	
0.85	
0.57	



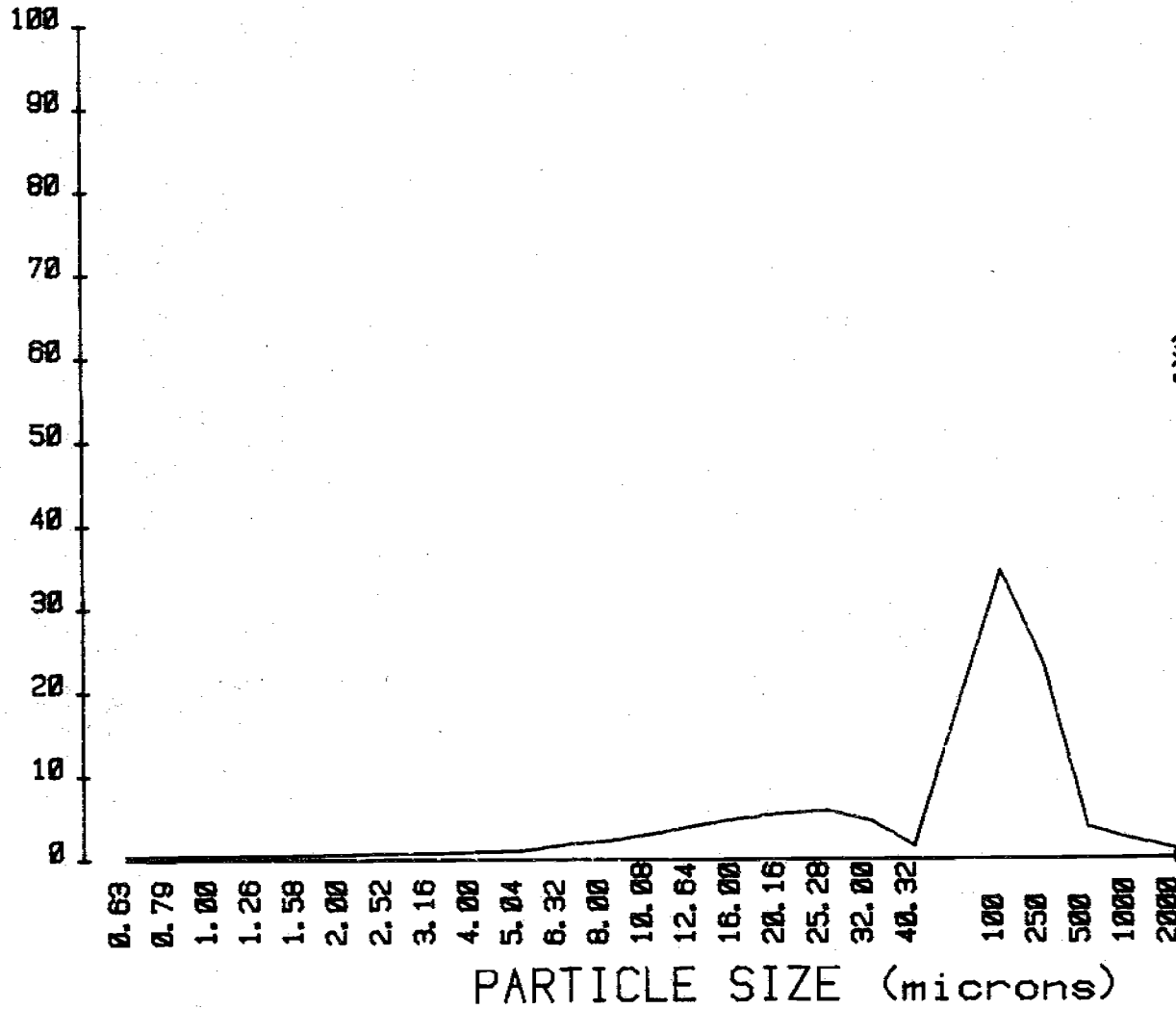
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4113-3



PLOT SAND-SILT-CLAY

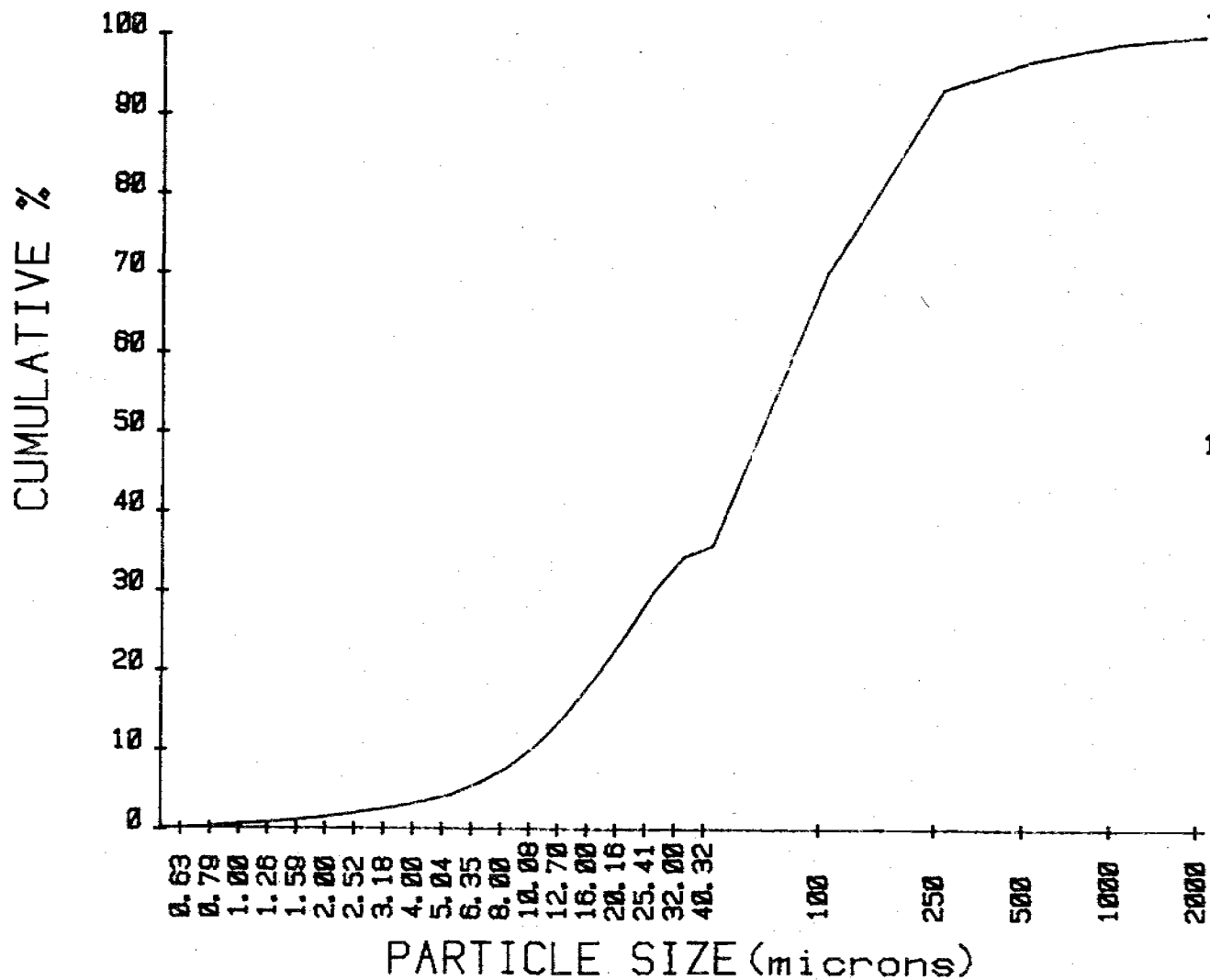
ID M4113-4



0.23	1.55
0.24	1.96
0.25	2.83
0.33	3.78
0.42	4.66
0.51	5.23
0.54	5.56
0.74	5.37
0.84	1.48
34.32	0.86
29.88	
3.68	
2.19	
1.82	

CUMULATIVE CURVE SAND-SILT-CLAY

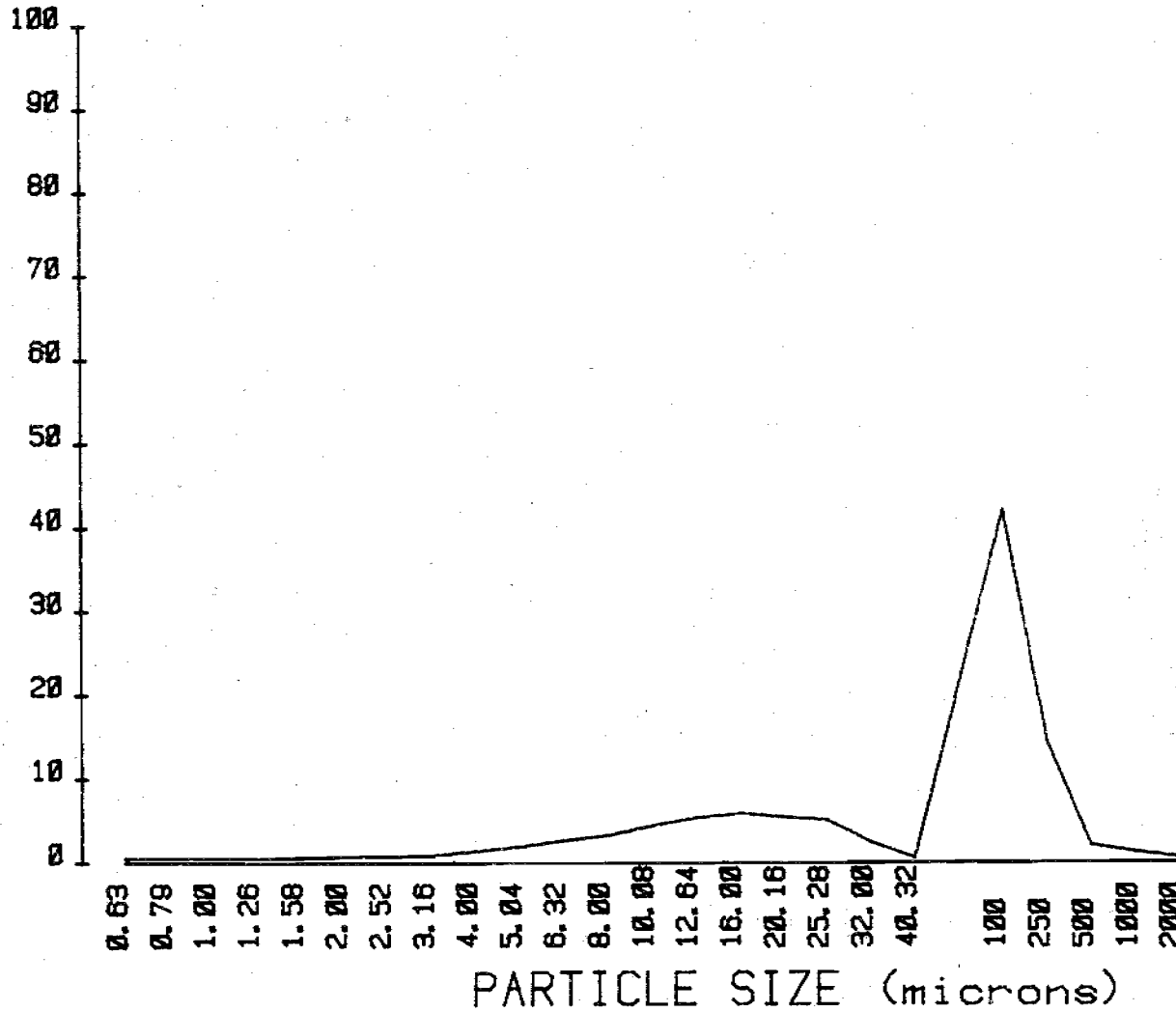
ID M4113-4



0.23	5.87
0.47	7.65
0.73	10.68
0.96	14.46
1.28	19.15
1.70	24.38
2.21	29.96
2.75	34.33
3.48	35.73
4.33	35.78
70.11	
93.19	
96.79	
98.98	
100.00	

PLOT SAND-SILT-CLAY

ID M4113-5



0.35	2.44
0.36	3.07
0.38	4.21
0.34	5.20
0.46	5.72
0.57	5.25
0.65	4.93
0.67	2.22
1.18	0.98
1.73	0.06
41.97	
14.13	
1.96	
1.17	
0.60	

66T

Pedon: Unnamed Gravelly Sandy Loam 79-MT-4114 (C-79-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	3-0	NS	NS	NS	NS				
2	A1	0-6	5.8	0.31	61	2.1				
3	C1	6-28	5.3	0.20	30	2.5				
3	C2	28-80	5.9	0.26	26	0.4				
4	C3	80-110	6.2	0.17	31	0.0				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	6.7	1.3	0.1	0.5	9.7	15.4	47	5.64	3.28	0.153	21	0.82	8.9
3	1.1	1.2	0.1	0.2	3.1	3.6	45	0.65	0.30	0.023	17	0.82	9.2
3	1.4	0.7	0.1	0.1	1.6	2.7	59	0.39	0.23	0.014	16	0.48	9.3
4	1.4	0.7	0.1	0.2	0.7	2.1	77	0.11	0.06	0.006	10	0.40	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Sandy Loam 79-MT-4114 (C-79-2)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%							%			
3- 0						NS	NS	NS	NS		NS
0- 6						68.48	27.43	4.09	18		Gr. sandy loam
6- 28						69.72	28.84	1.44	18		Gr. sandy loam
28- 80						69.60	21.98	8.42	16		Sandy loam
80-110						84.59	8.35	7.06	18		Gr. loamy sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
3- 0						NS	NS	NS	NS	NS
0- 6						21.1	8.9	NDNP	NDNP	NDNP
6- 28						11.2	4.1	NDNP	NDNP	NDNP
28- 80						11.1	3.8	NDNP	NDNP	NDNP
80-110						5.7	2.3	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 NS-no sample

Analysis by: Debbie Hall

Unnamed Gravelly Coarse Sandy Loam 79-MT-4115 (050701R-3)

Classification: coarse loamy-skeletal, mixed Dystric Cryochrept.

General Site Characteristics

Location: Ravalli County, Montana: northeast 1/4, southeast 1/4 of section 22,  
T. 1N., R. 18W.

Forest: Bitterroot National Forest

Area:

Described By/Date:

Parent Rock/Material: granite

Habitat Type: subalpine fir/beargrass, (*vaccinium globulare*) phase

Topography: high elevation gentle convex slope

Landform:

Weathering:

Formation Name:

Slope: 30 percent

Aspect: north 50 degrees east

Elevation: 7190 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability: moderately rapid

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

0 4-8 centimeters (2-3 inches). Partially decomposed leaves, twigs, needles and grass.

A1 0-7 centimeters (0-3 inches). Dark brown (10YR 3/3); gravelly coarse sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many fine and very fine roots; 41 percent gravels by weight; strongly acid pH 5.2, noncalcareous; abrupt smooth boundary.

B2\* 7-27 centimeters (0-3 inches). Dark brown (7.5YR 4/4); gravelly coarse sandy loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; many fine and very fine roots; 33 percent gravel by weight; very strongly acid pH 5.0, noncalcareous; clear smooth boundary.

B3 27-34 centimeters (11-13 inches). Yellowish brown (10YR 5/4); gravelly coarse sandy loam; single grained; loose, nonsticky and nonplastic; many fine and very fine roots; 33 percent gravels by weight; very strongly acid pH 4.9, noncalcareous; clear smooth boundary.

79-MT-4115 (cont.)

IIC1 34-57 centimeters (13-22 inches). Light yellowish brown (10YR 6/4); gravelly loamy coarse sand; single grained; loose, nonsticky and nonplastic; common fine roots; 31 percent gravels by weight; strongly acid pH 5.1, noncalcareous; abrupt smooth boundary.

IIC2 57-90 centimeters (22-35 inches). Light yellowish brown (10YR 6/4); gravelly loamy coarse sand; single grained; loose, nonsticky and nonplastic; few fine roots; 19 percent gravels by weight; strongly acid pH 5.3, noncalcareous.

\* May have ash influence.



Pedon: Unnamed Gravelly Coarse Sandy Loam 79-MT-4115 (050701R-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	4-0	NS	NS	NS	NS				
2	A1	0-7	5.2	0.30	93	1.2				
3	B2	7-27	5.0	0.10	46	0.6				
4	B3	27-34	4.9	0.07	43	0.7				
5	IIC1	34-57	5.1	0.09	27	0.1				
	IIC2	57-90	5.3	0.07	28	0.0				

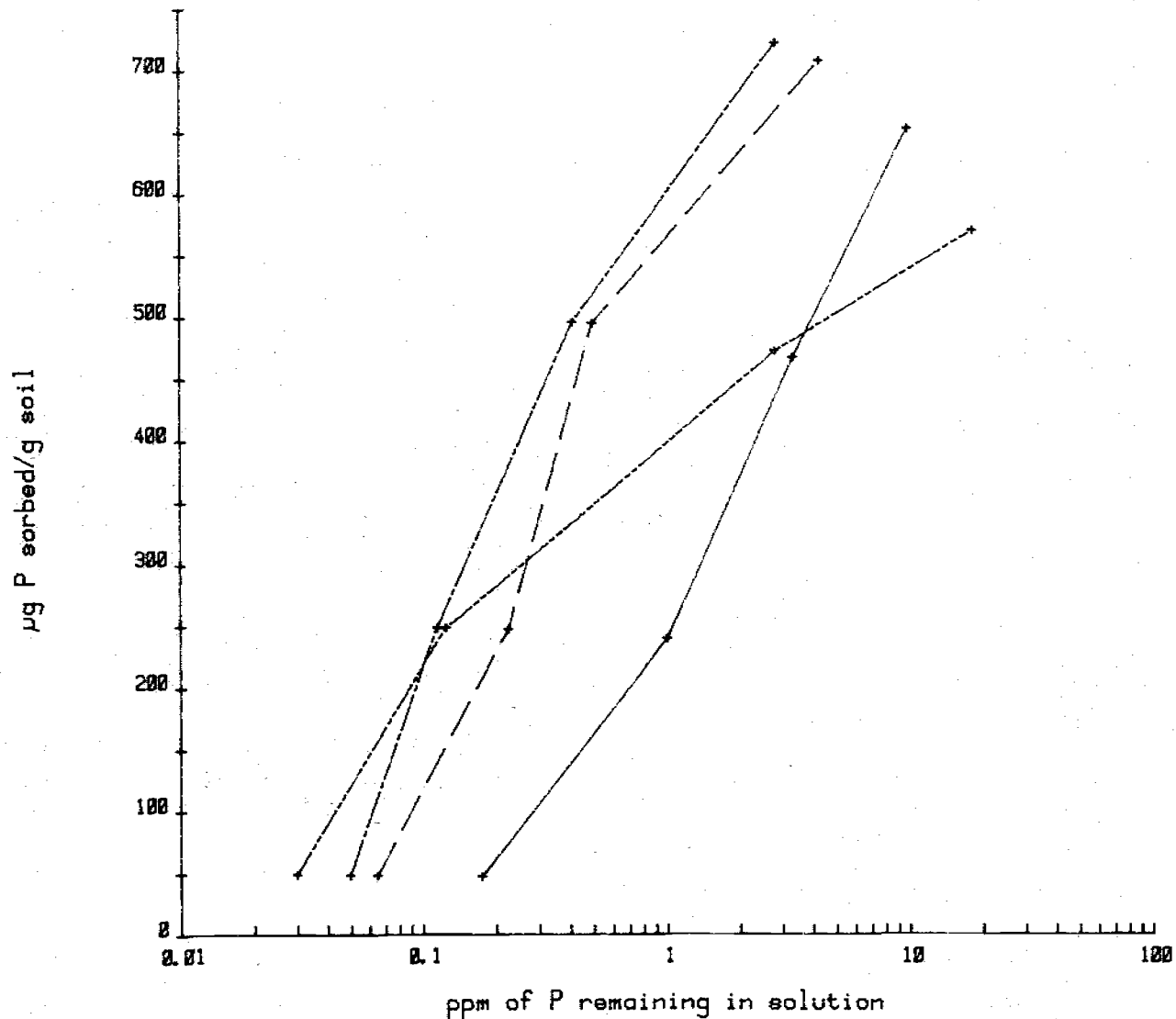
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation	%	%	ratio	Fraction			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.4	1.7	0.1	0.7	15.3	22.3	34	8.47	4.92	0.198	25	0.59	8.6
3	1.0	0.3	0.1	0.3	9.3	9.6	15	1.70	0.99	0.042	24	0.67	9.4
4	1.3	0.3	0.1	0.2	7.7	8.6	20	0.87	0.51	0.031	16	0.67	9.6
5	2.0	1.6	0.1	0.1	5.1	7.1	43	0.60	0.35	0.014	24	0.69	9.3
	2.3	0.8	0.1	0.1	3.0	5.0	52	0.27	0.16	0.007	23	0.81	9.3

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fodness

# Phosphorus Isotherm

79-MT-4115



µg/g soil	Soln ppm
----- A1	
48	0.18
240	1.00
467	3.31
653	9.75
----- B2	
49	0.07
248	0.23
495	0.50
788	4.25
----- B3	
50	0.05
249	0.12
496	0.41
722	2.01
----- HCl	
50	0.03
249	0.13
472	2.79
570	18.00

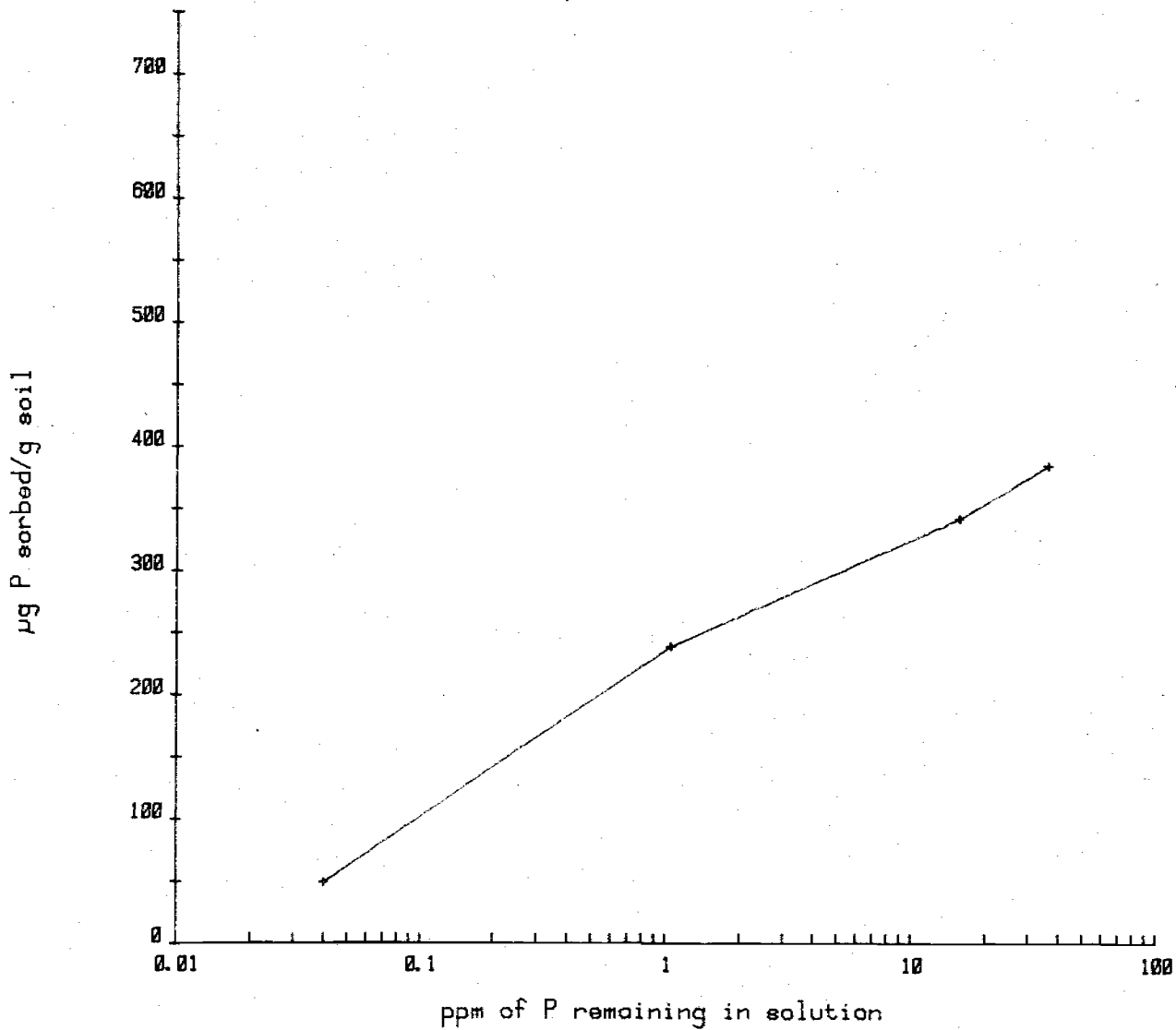
# Phosphorus Isotherm

79-MT-4115

µg/g soil    Soln ppm

———— IIC2

50	0.04
240	1.05
343	15.75
385	36.50



Pedon: Unnamed Gravelly Coarse Sandy Loam 79-MT-4115 (050701R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCs	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.	
cm	%							%			
4-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-7	18.53	21.32	10.59	10.54	5.78	66.75	28.90	4.35	41		Gr. coarse sandy loam
7-27	24.14	23.19	9.38	5.50	10.24	72.45	22.17	5.38	33		Gr. coarse sandy loam
27-34	20.26	23.07	10.78	11.79	6.57	72.47	23.06	4.47	33		Gr. coarse sandy loam
34-57	25.04	23.07	10.82	10.37	8.91	78.22	17.41	4.38	31		Gr. loamy coarse sand
57-90	19.68	26.64	14.97	15.65	6.93	83.87	12.61	3.52	19		Gr. loamy coarse sand

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	%			g/cc		%		
4-0						NS	NS	NS
0-7						30.0	15.1	NDNP
7-27						14.7	6.3	NDNP
27-34						13.9	5.1	NDNP
34-57						12.9	4.0	NDNP
57-90						8.8	3.4	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M4115-1	M4115-2	M4115-3	M4115-4
Units		-----%			
TC (0.63-2.00)		4.35	5.38	4.47	4.38
TSi (2.00-50)		28.90	22.17	23.06	17.41
TS (50-2000)		66.75	72.45	72.47	78.22
Clay	0.63-0.794	0.89	0.98	0.84	0.60
	0.794-1.00	0.81	0.95	0.76	0.65
	1.00-1.26	0.83	1.08	0.86	0.85
	1.26-1.59	0.77	1.02	0.84	0.91
	1.59-2.00	1.06	1.36	1.17	1.37
Fine Silt	2.00-2.52	1.29	1.55	1.40	1.62
	2.52-3.17	1.51	1.53	1.50	1.54
	3.17-4.00	1.34	1.17	1.28	1.13
	4.00-5.04	1.63	1.68	1.61	1.41
Medium Silt	5.04-6.35	1.79	1.88	1.77	1.43
	6.35-8.00	2.18	2.05	1.89	1.35
	8.00-10.08	2.50	2.18	1.88	1.23
	10.08-12.70	2.85	2.36	2.14	1.30
	12.70-16.0	3.02	2.18	2.24	1.35
	16.0-20.2	2.85	2.04	2.24	1.41
Coarse Silt	20.2-25.4	3.07	1.71	1.91	1.24
	25.4-32.0	2.50	1.01	1.34	1.02
	32.0-40.3	1.66	0.65	1.25	0.91
	40.3-50.8	0.53	0.15	0.51	0.28
	50.8-64.0	0.19	0.03	0.09	0.19
VFS (50-100)		5.78	10.24	6.57	8.91
FS (100-250)		10.54	5.50	11.79	10.37
MS (250-500)		10.59	9.38	10.78	10.82
CoS (500-1000)		21.32	23.19	23.07	23.07
VCoS (1000-2000)		18.53	24.14	20.26	25.04
Greater than 2000		41	33	33	31
Textural Class		Gr. CoSL	Gr. CoSL	Gr. CoSL	Gr. LCoS

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Bitterroot National Forest-LIM

Analysis by: Anita Falen

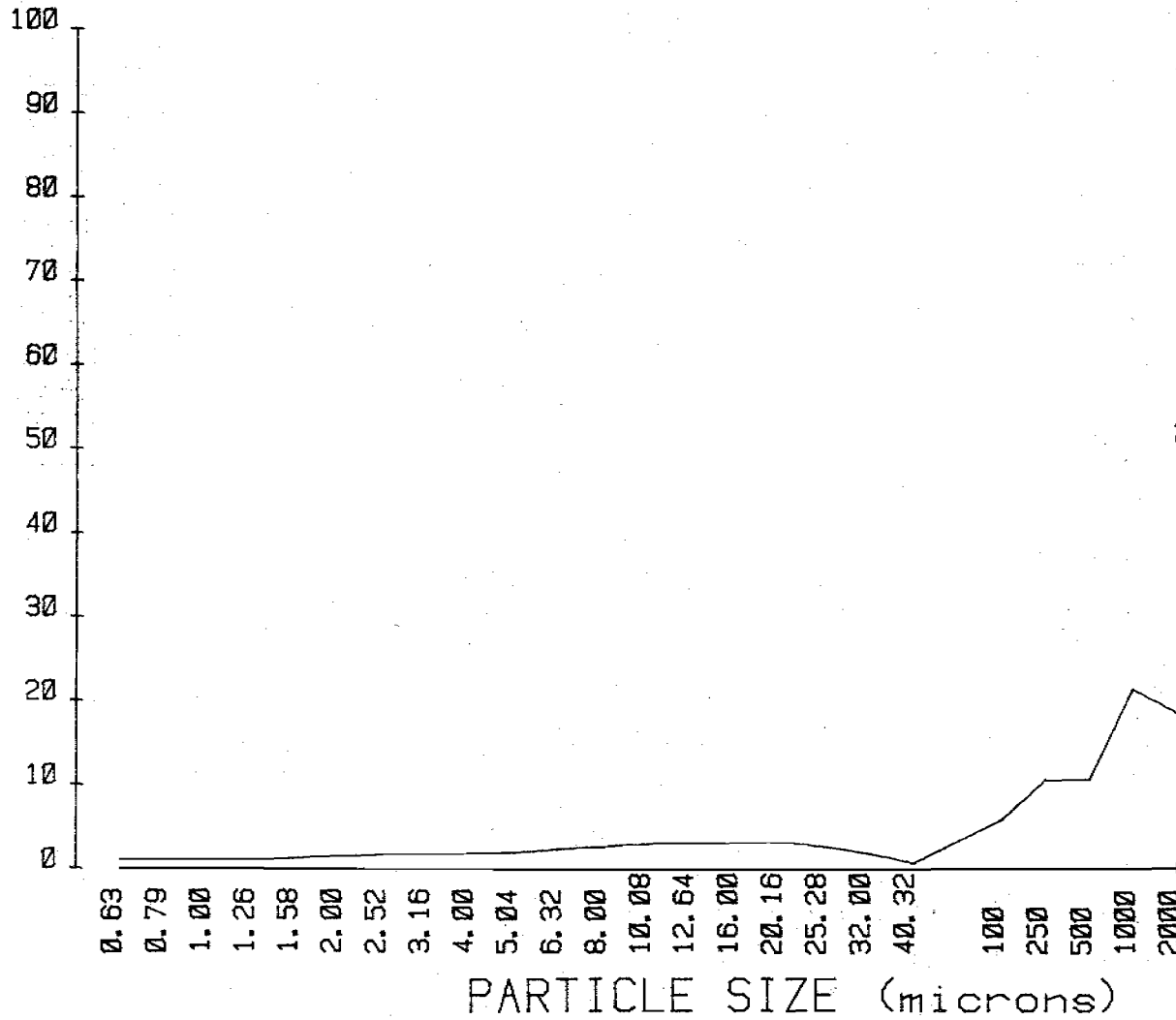
Date: January 1981

Identification		M4115-5		
Units		-----%		
TC (0.63-2.00)		3.52		
TSi (2.00-50)		12.61		
TS (50-2000)		83.87		
Clay	0.63-0.794	0.61		
	0.794-1.00	0.65		
	1.00-1.26	0.74		
	1.26-1.59	0.66		
	1.59-2.00	0.86		
Fine Silt	2.00-2.52	1.00		
	2.52-3.17	1.00		
	3.17-4.00	0.83		
	4.00-5.04	0.90		
Medium Silt	5.04-6.35	0.92		
	6.35-8.00	0.90		
	8.00-10.08	0.81		
	10.08-12.70	0.98		
	12.70-16.0	1.04		
	16.0-20.2	1.11		
Coarse Silt	20.2-25.4	1.05		
	25.4-32.0	0.97		
	32.0-40.3	0.77		
	40.3-50.8	0.32		
	50.8-64.0	0.02		
VFS (50-100)		6.93		
FS (100-250)		15.65		
MS (250-500)		14.97		
CoS (500-1000)		26.64		
VCoS (1000-2000)		19.68		
Greater than 2000		19		
Textural Class		Gr.LCS		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

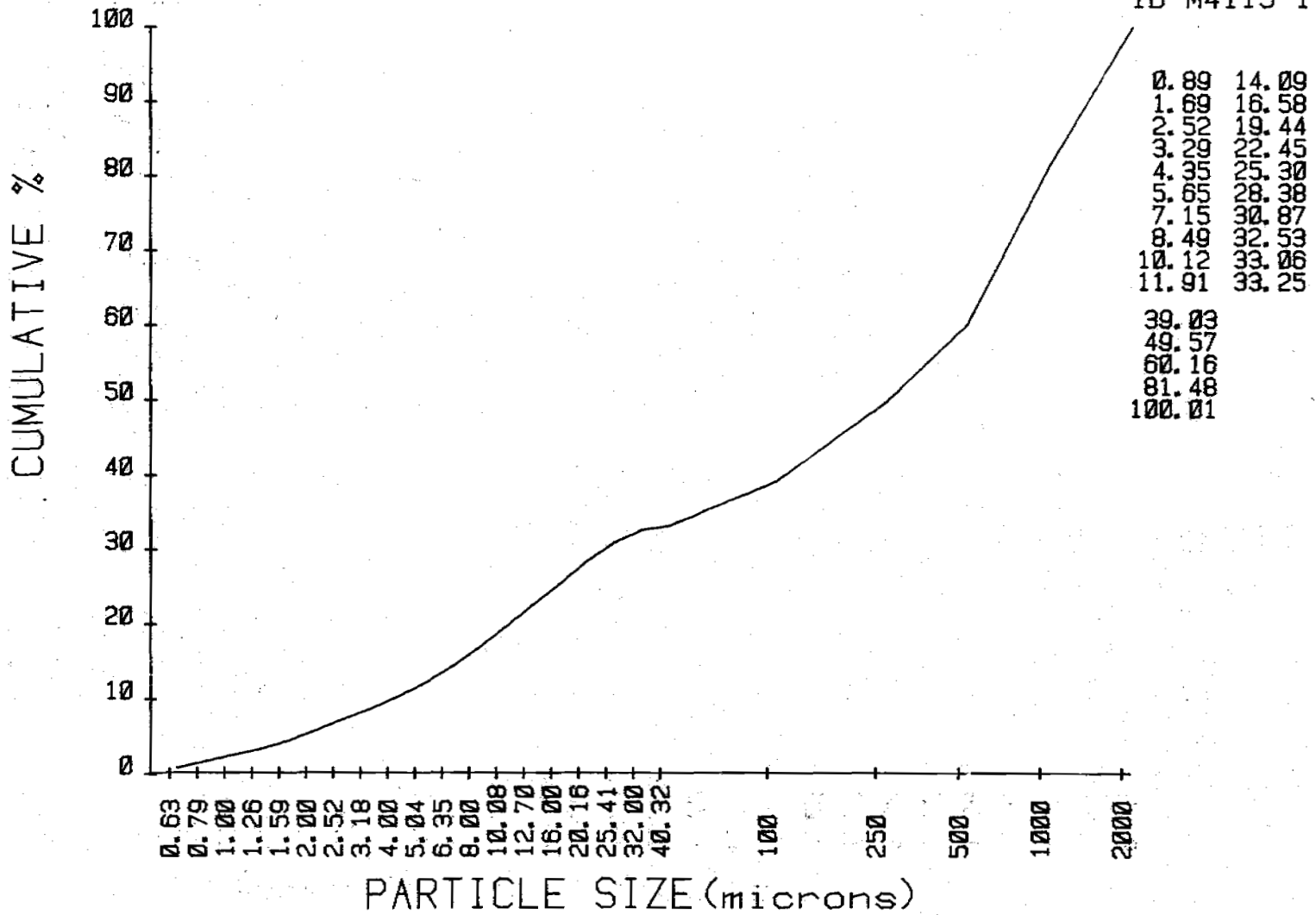
ID M4115-1



0.89	2.18
0.81	2.50
0.83	2.85
0.77	3.02
1.06	2.85
1.29	3.07
1.51	2.50
1.34	1.66
1.63	0.53
1.79	0.19
5.78	
10.54	
10.59	
21.32	
18.53	

CUMULATIVE CURVE SAND-SILT-CLAY

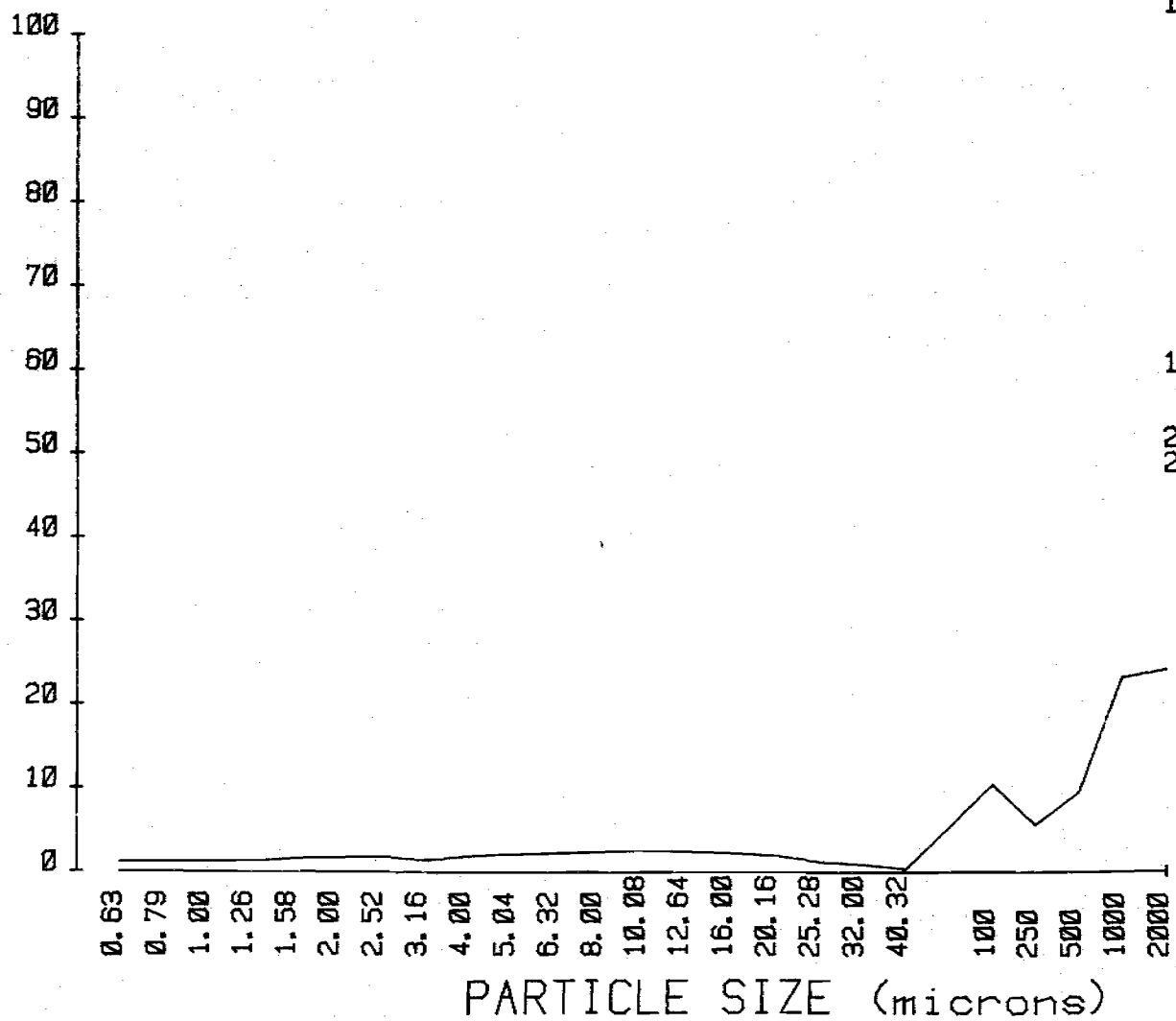
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PLOT SAND-SILT-CLAY

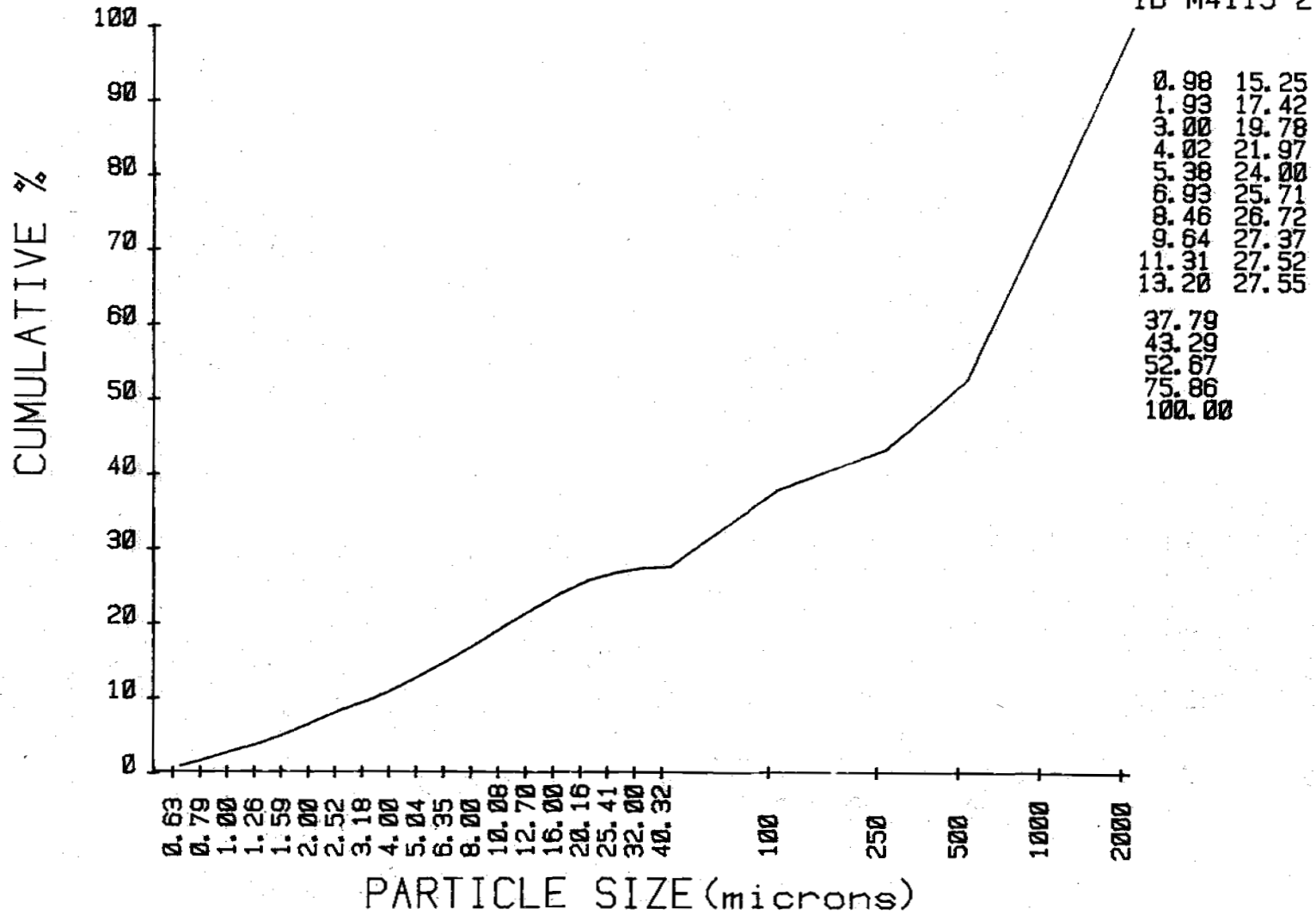
ID M4115-2



0.98	2.05
0.95	2.18
1.08	2.36
1.02	2.18
1.36	2.03
1.55	1.71
1.53	1.01
1.17	0.65
1.68	0.15
1.88	0.03
10.24	
5.50	
9.38	
23.19	
24.14	

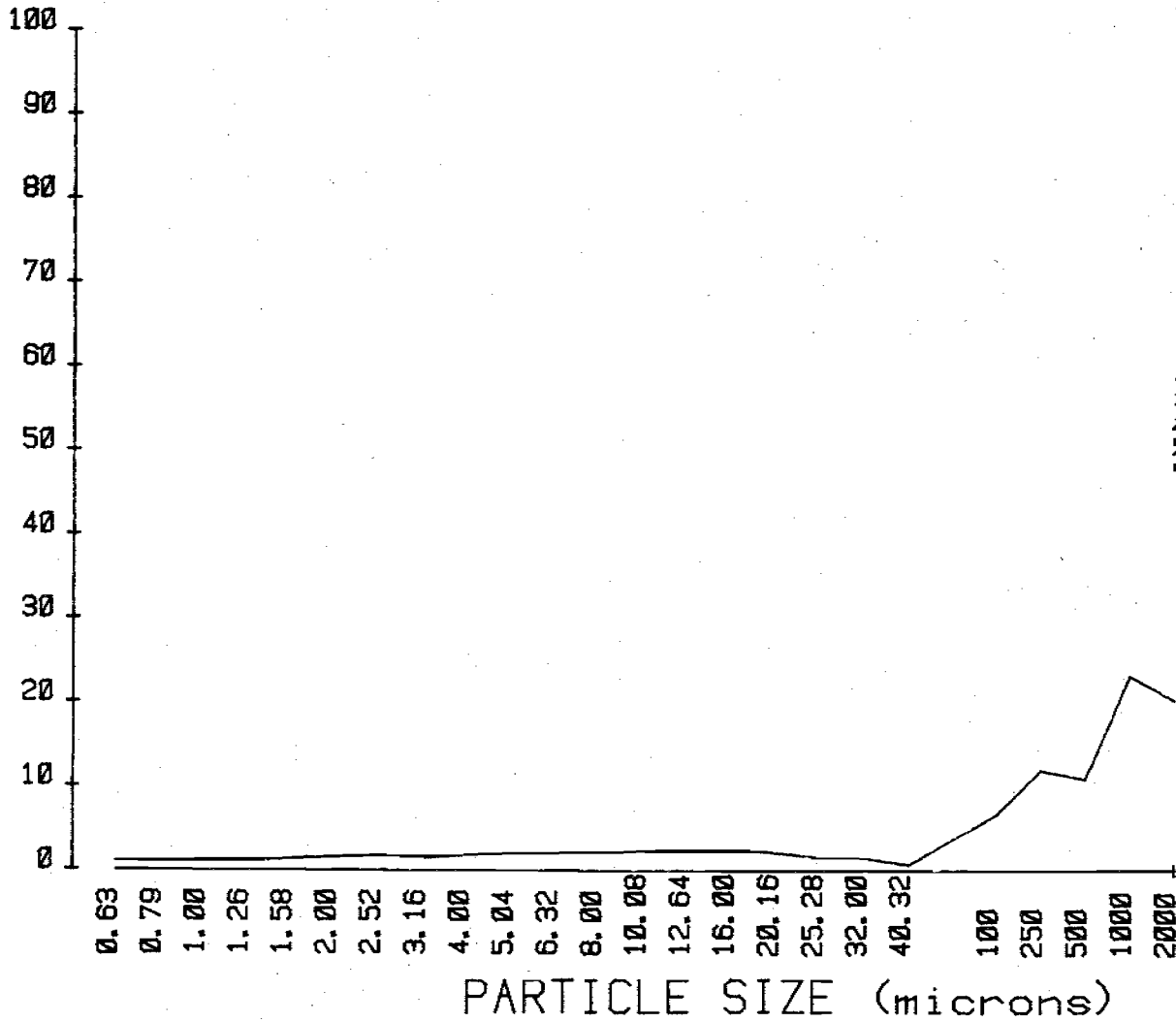
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4115-2



PLOT SAND-SILT-CLAY

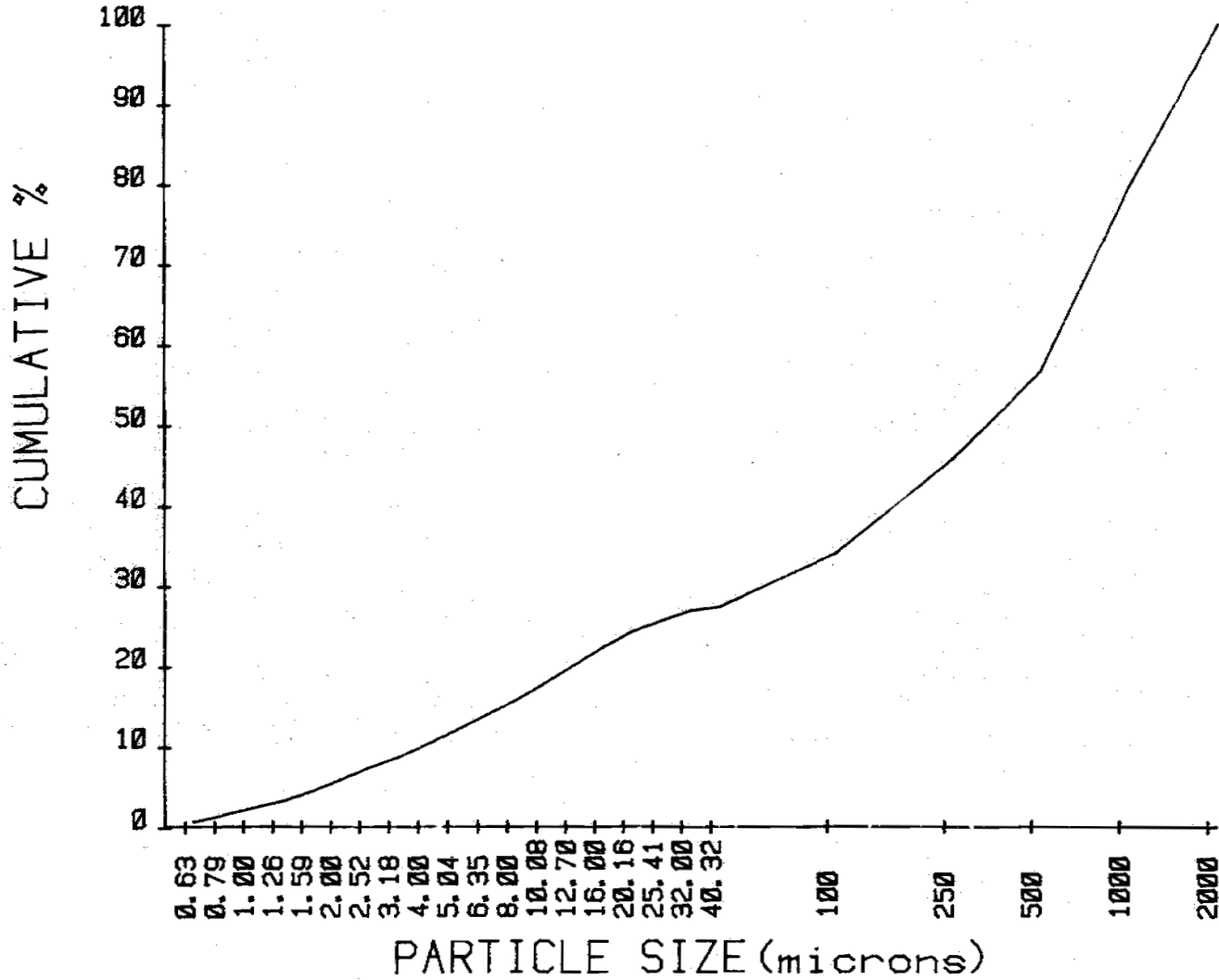
ID M4115-3



0.84	1.89
0.76	1.88
0.86	2.14
0.84	2.24
1.17	2.24
1.40	1.91
1.50	1.34
1.28	1.25
1.61	0.51
1.77	0.09
6.57	
11.79	
10.78	
23.07	
20.26	

CUMULATIVE CURVE SAND-SILT-CLAY

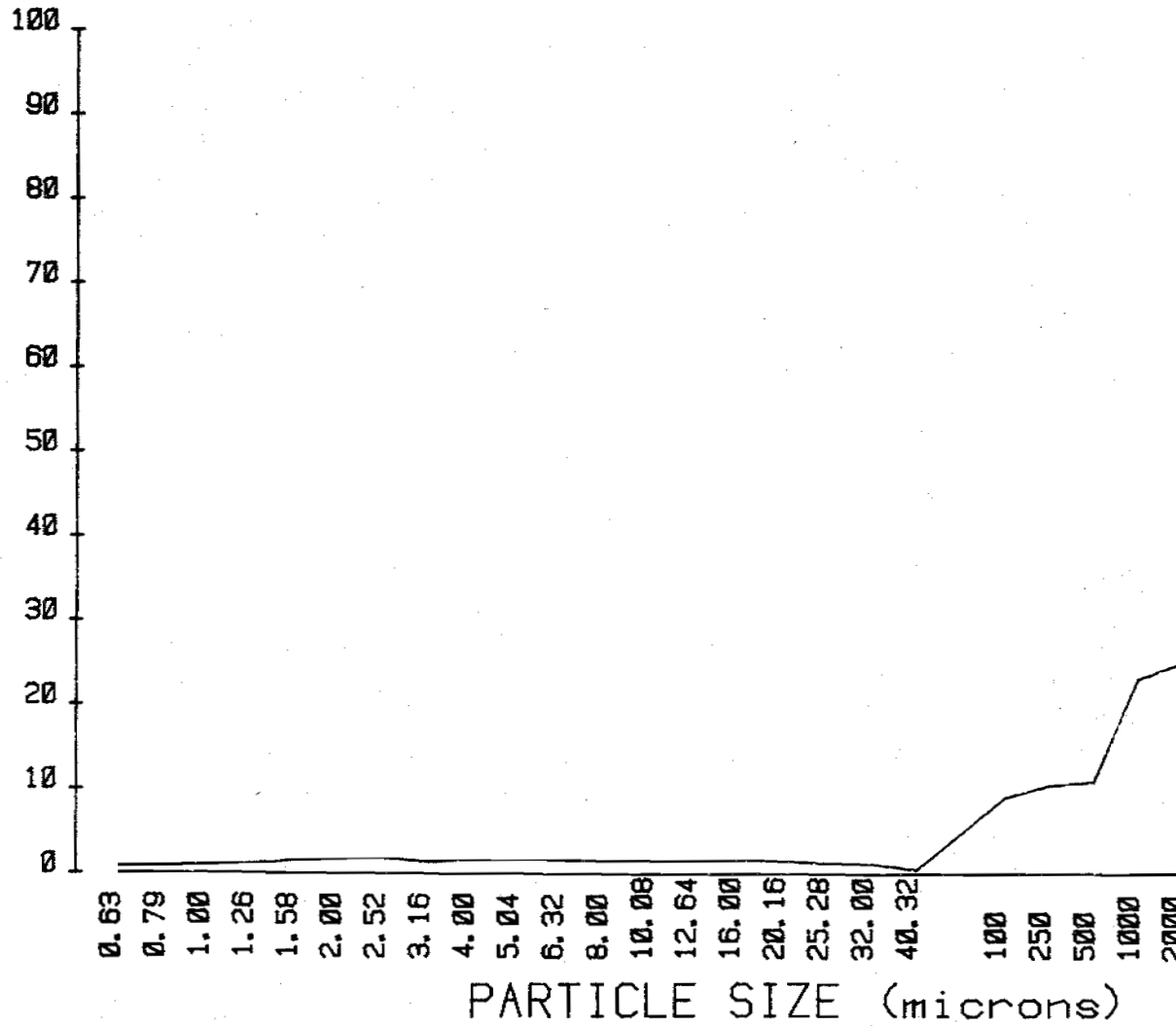
ID M4115-3



0.84	13.92
1.61	15.80
2.47	17.94
3.31	20.18
4.47	22.42
5.87	24.34
7.37	25.67
8.65	26.92
10.26	27.44
12.03	27.53
34.10	
45.89	
56.67	
79.74	
100.00	

PLOT SAND-SILT-CLAY

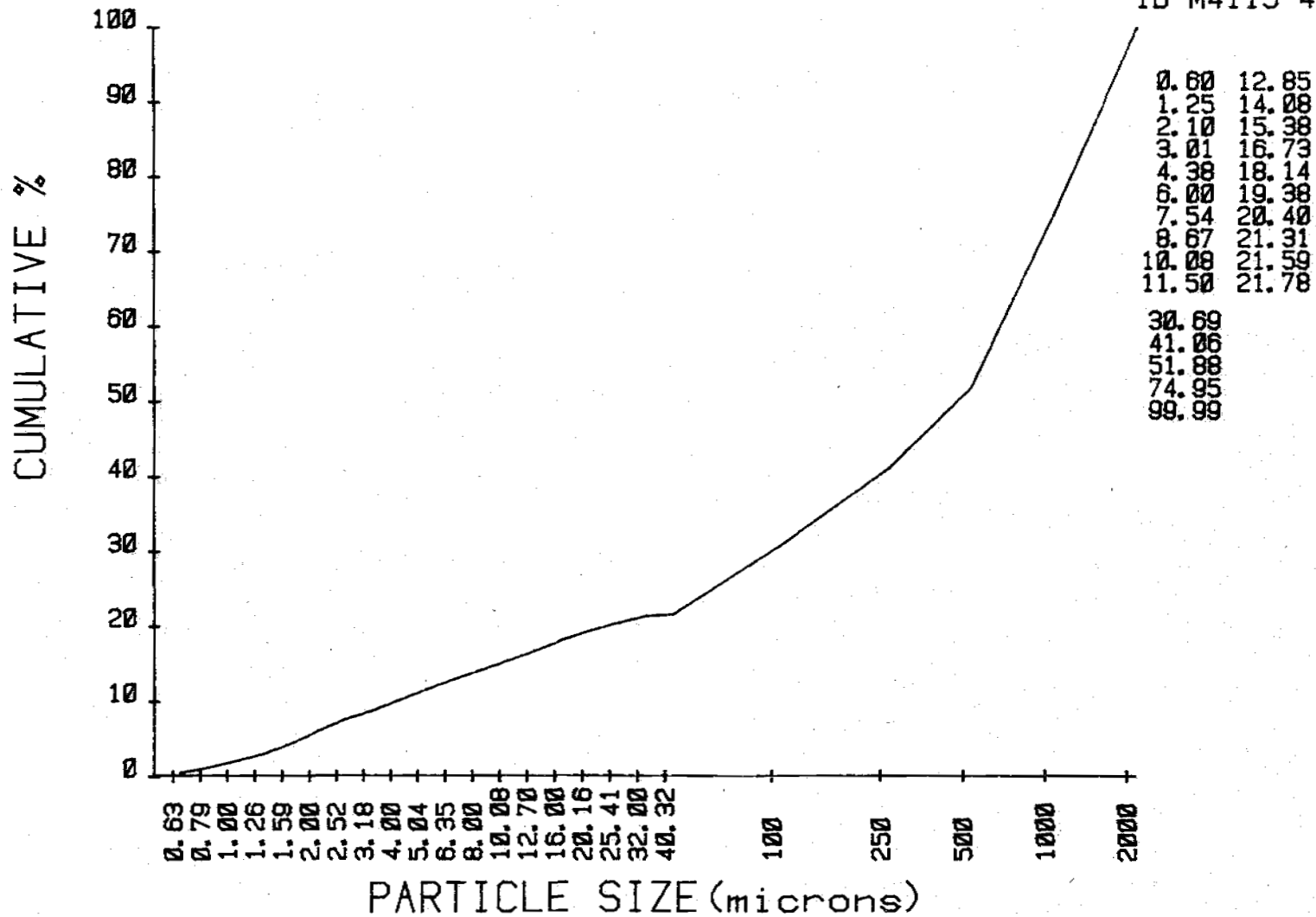
ID M4115-4



0.60	1.35
0.65	1.23
0.85	1.30
0.91	1.35
1.37	1.41
1.62	1.24
1.54	1.02
1.13	0.91
1.41	0.28
1.43	0.19
8.91	
10.37	
10.82	
23.07	
25.04	

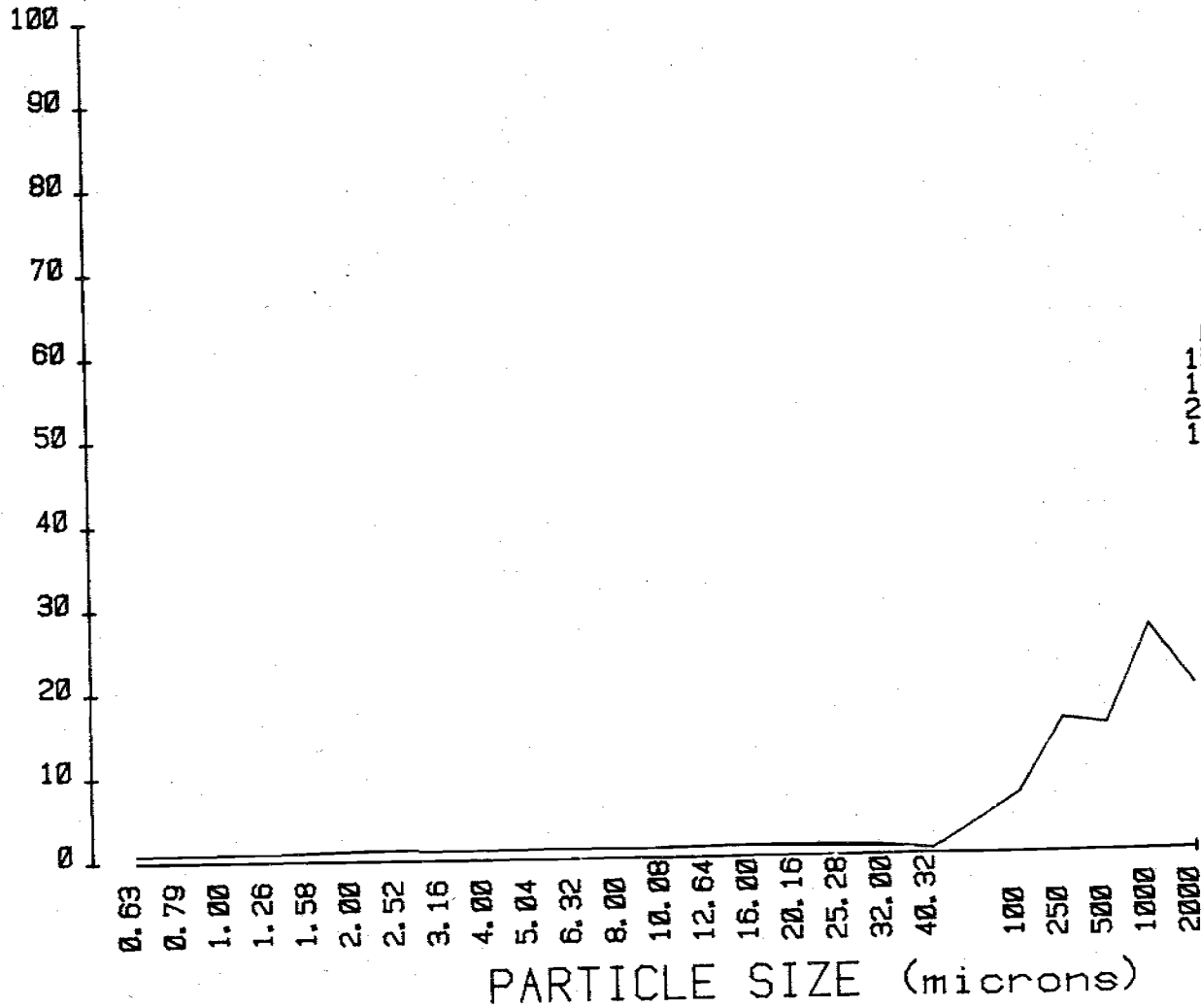
CUMULATIVE CURVE SAND-SILT-CLAY

ID M4115-4



PLOT SAND-SILT-CLAY

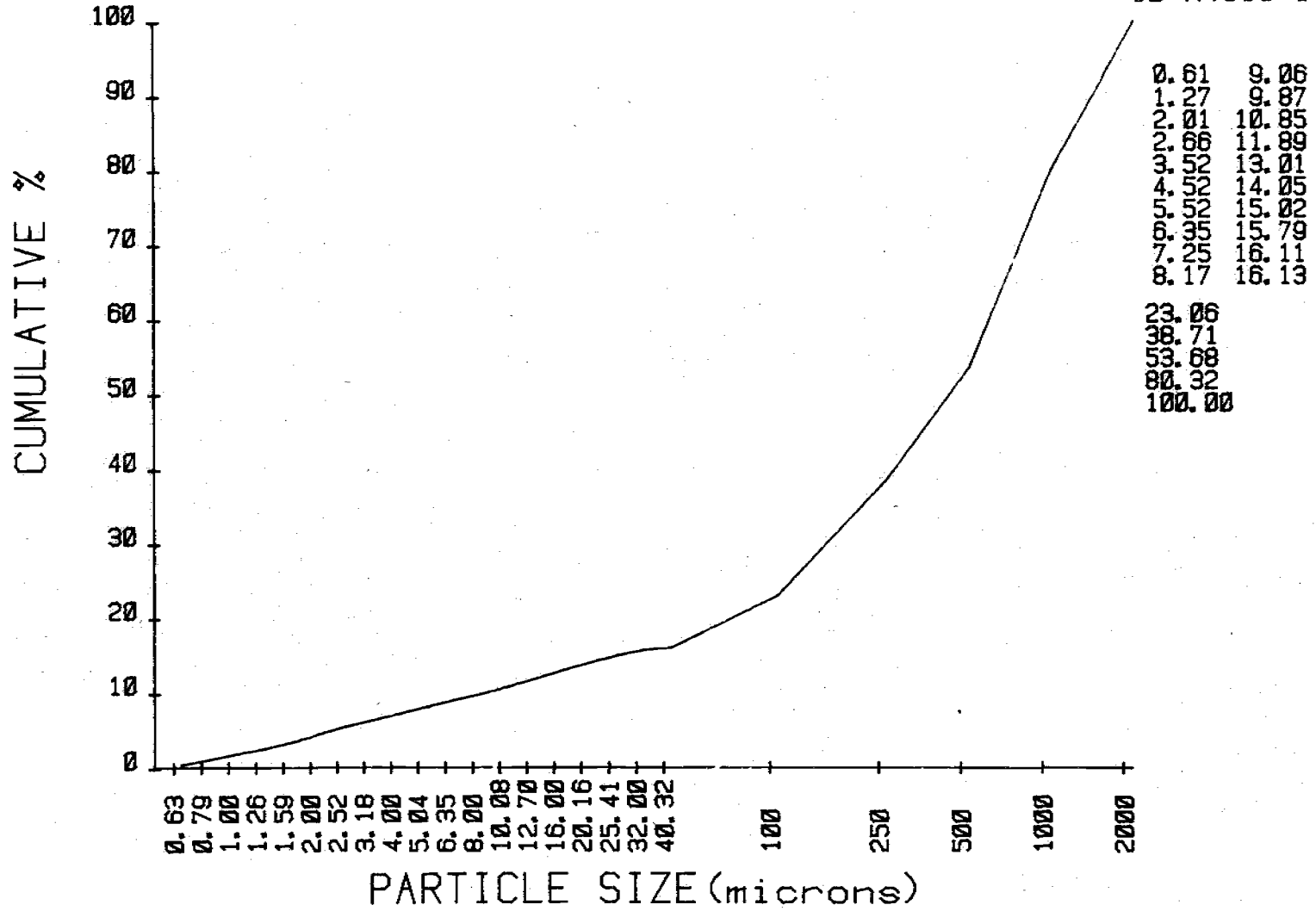
ID M4115-5



0.61	0.90
0.65	0.81
0.74	0.98
0.65	1.04
0.86	1.11
1.00	1.05
0.99	0.97
0.83	0.77
0.90	0.32
0.92	0.02
6.93	
15.65	
14.97	
26.64	
19.68	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M4115-5





# **CLEARWATER**



Unnamed Silt Loam 79-ID-18110 (860701R-3)

Classification: medial over loamy, mixed, frigid Andic Dystrachrept.

General Site Characteristics

Location: Clearwater County, Idaho: southwest 1/4, northeast 1/4 of section 20,  
T. 39N., R. 6E.

Forest: Clearwater National Forest

Area: Canyon Ranger District

Described By/Date: June 14, 1978, by Randy Moiser

Landform: 22

Habitat Type: western red cedar/Pamy

Formation Name:

Parent Rock/Material: volcanic ash over granite

Weathering:

Topography: upper 1/3 straight slope

Slope: 20 percent

Aspect: west-northwest

Elevation: 4120 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

0 8-0 centimeters (3-0 inches).

B2ir 0-43 centimeters (0-17 inches). Brown (10Y 4/3) moist; silt loam; moderate very fine granular structure; very friable, slightly sticky and nonplastic; slightly acid pH 6.3, noncalcareous; trace gravel by weight.

IIB2it 43-76 centimeters (17-30 inches). Brown (10YR 4/4) moist; loam; moderate medium subangular blocky structure; slightly sticky and slightly plastic; medium acid pH 6.0, noncalcareous; trace gravel by weight.

IIB22t 76+ centimeters (30+ inches). Yellowish brown (10YR 5/4) moist; no lab sample; silty clay loam; strong subangular blocky structure; friable, sticky and plastic; less than 10 percent coarse fragments.

Pedon: Unnamed Silt Loam 79-ID-18110 (060701R-3)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC $\times 10^3$ mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	0-0	NS	NS	NS	NS					
2	B2ir	0-43	6.3	0.15	94	3.4					
	IIB21t	43-76	6.0	0.11	60	2.7					
	IIB22t	76+	NS	NS	NS	NS					

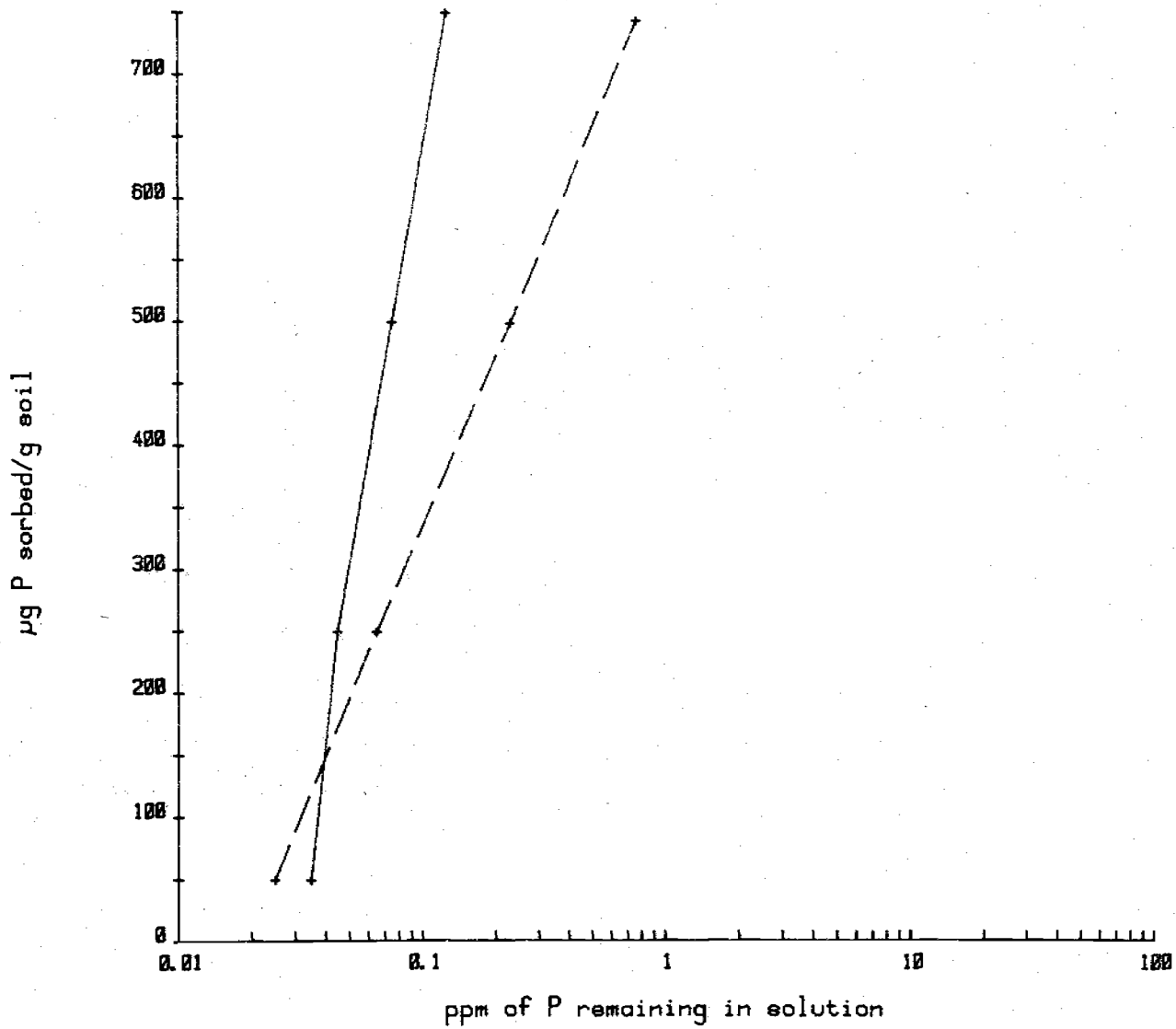
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation					Fraction		
	meq/100 gms						%		%		ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.1	1.0	0.1	0.7	19.5	25.7	26	5.54	3.22	0.224	14	1.00	10.9
	4.0	1.2	0.1	0.5	10.6	17.1	35	1.39	0.81	0.080	10	1.00	9.8
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run by the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-10-18110



µg/g soil	Soln ppm
————— B2ir	
50	0.04
250	0.05
499	0.08
749	0.13
- - - - - 11B21t	
50	0.03
249	0.07
498	0.23
742	0.76

Pedon: Unnamed Silt Loam 79-ID-18110 (860701R-3)

Date: July 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CM	%							%		
8-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
8-43	4.16	7.19	4.87	6.87	9.76	31.26	58.16	18.58	trace	Silt loam
43-76	9.85	12.85	8.83	9.51	18.58	49.64	40.82	18.34	trace	Loam
76+	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	g/cc		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Cled	Core	Bar	Bar			
CM	%			g/cc		%		%		
3-0						NS	NS	NS	NS	NS
8-43						51.5	21.7	NDNP	NS	NDNP
43-76						33.3	14.6	NP	NS	ND
76+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest -LIM

Analysis by: Anita Falen

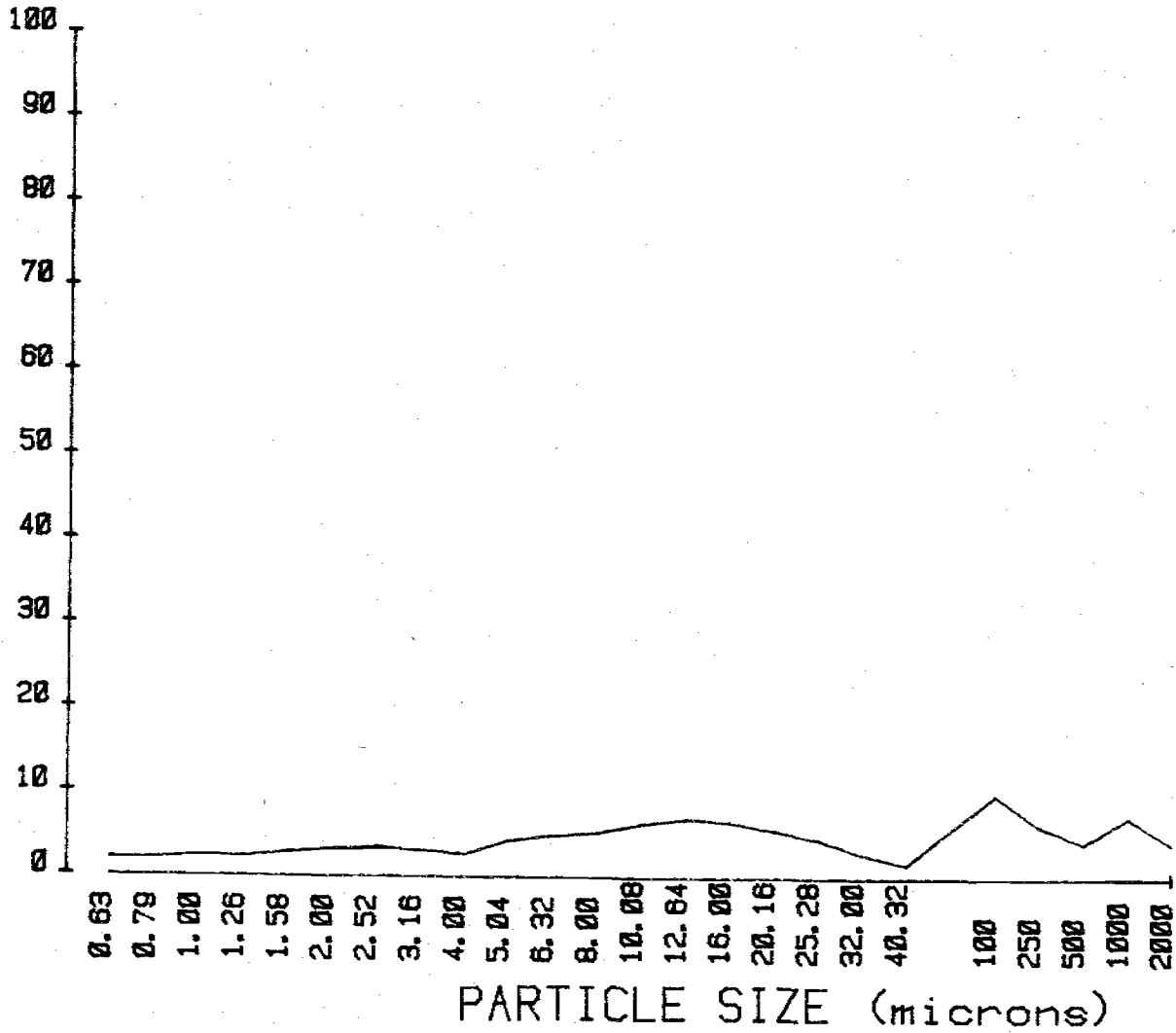
Date: September 1981

Identification		I18110-1	I18110-2		
Units		-----%			
TC (0.63-2.00)		10.58	10.34		
TSi (2.00-50)		58.16	40.02		
TS (50-2000)		21.26	49.64		
Clay	0.63-0.794	1.85	2.17		
	0.794-1.00	1.88	1.99		
	1.00-1.26	2.18	2.12		
	1.26-1.59	2.03	1.79		
	1.59-2.00	2.64	2.27		
Fine Silt	2.00-2.52	3.00	2.57		
	2.52-3.17	3.21	2.65		
	3.17-4.00	2.74	2.07		
	4.00-5.04	2.42	1.56		
Medium Silt	5.04-6.35	4.07	2.91		
	6.35-8.00	4.71	2.91		
	8.00-10.08	5.04	3.42		
	10.08-12.70	6.15	3.99		
	12.70-16.0	6.72	4.14		
	16.0-20.2	6.33	4.10		
Coarse Silt	20.2-25.4	5.37	4.10		
	25.4-32.0	4.36	3.12		
	32.0-40.3	2.57	1.97		
	40.3-50.8	1.38	0.58		
	50.8-64.0	0.07	0.06		
VFS (50-100)		9.76	10.20		
FS (100-250)		6.07	9.51		
MS (250-500)		4.07	8.03		
CoS (500-1000)		7.19	12.85		
VCoS (1000-2000)		4.16	9.05		
Greater than 2000		trace	trace		
Textural Class		SiL	L		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18110-1

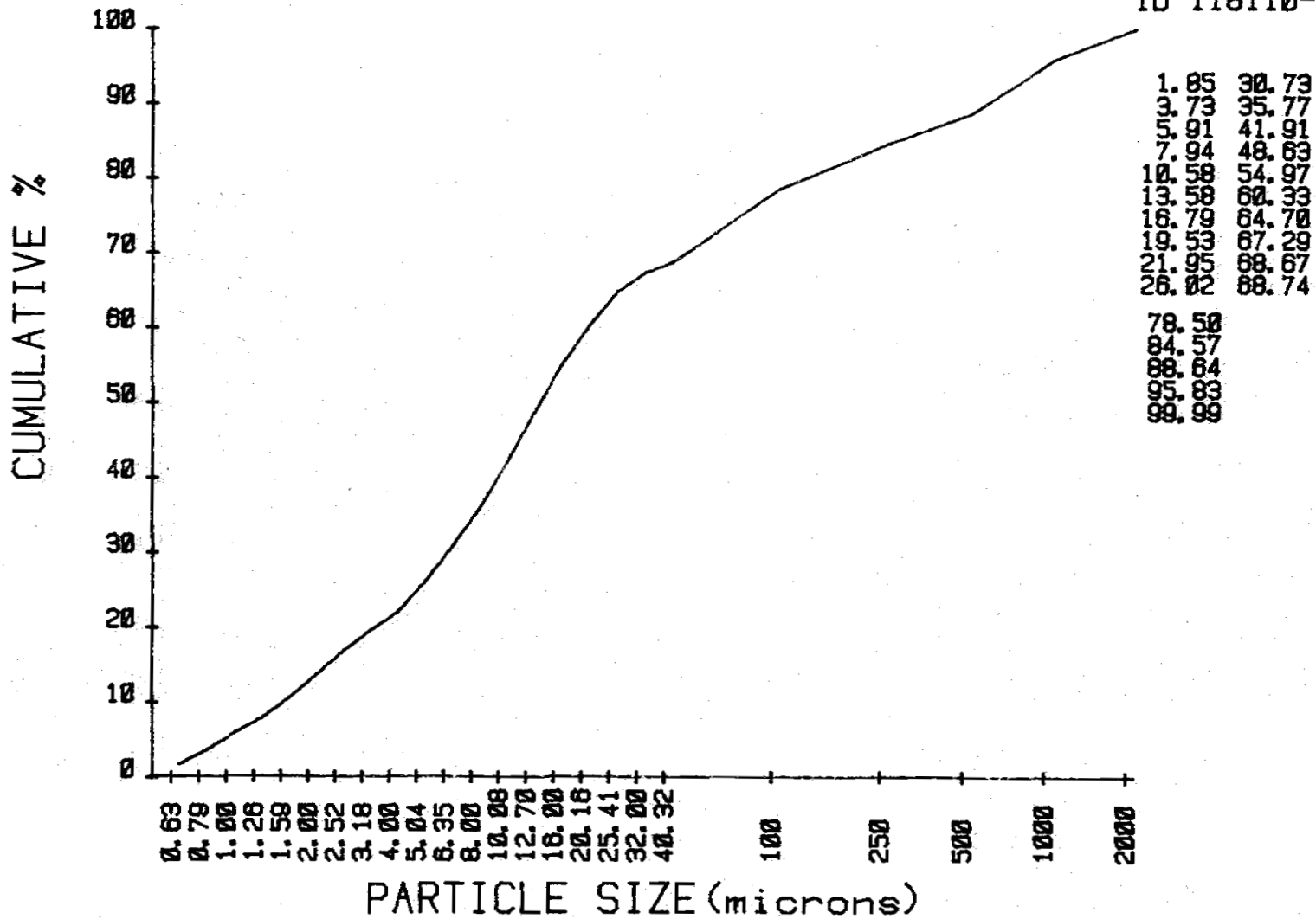


1.85	4.71
1.88	5.84
2.18	6.15
2.83	6.72
2.64	6.33
3.00	5.37
3.21	4.96
2.73	2.59
2.42	1.98
4.87	0.87
9.76	
6.87	
4.87	
7.19	
4.16	



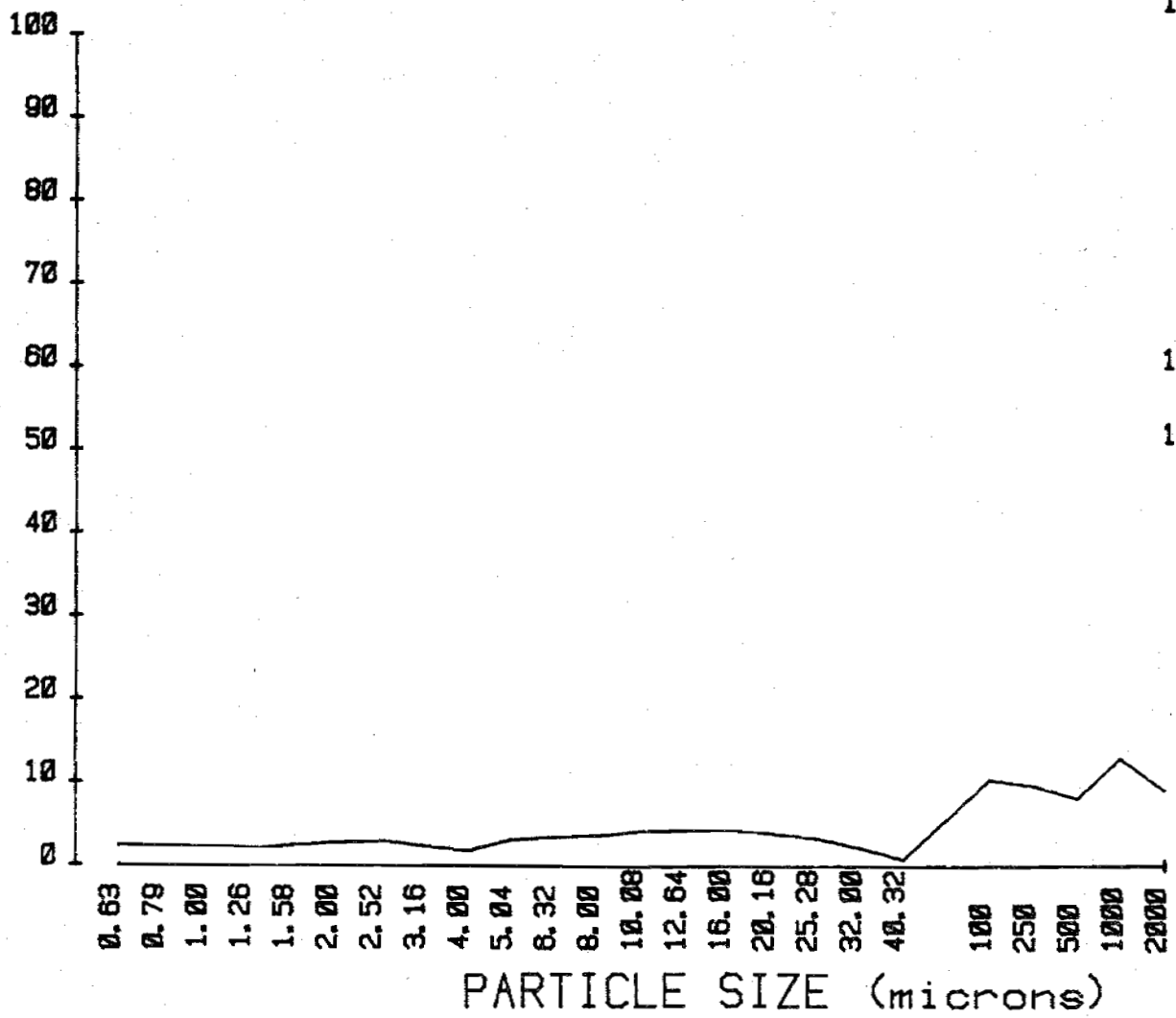
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18110-1



PLOT SAND-SILT-CLAY

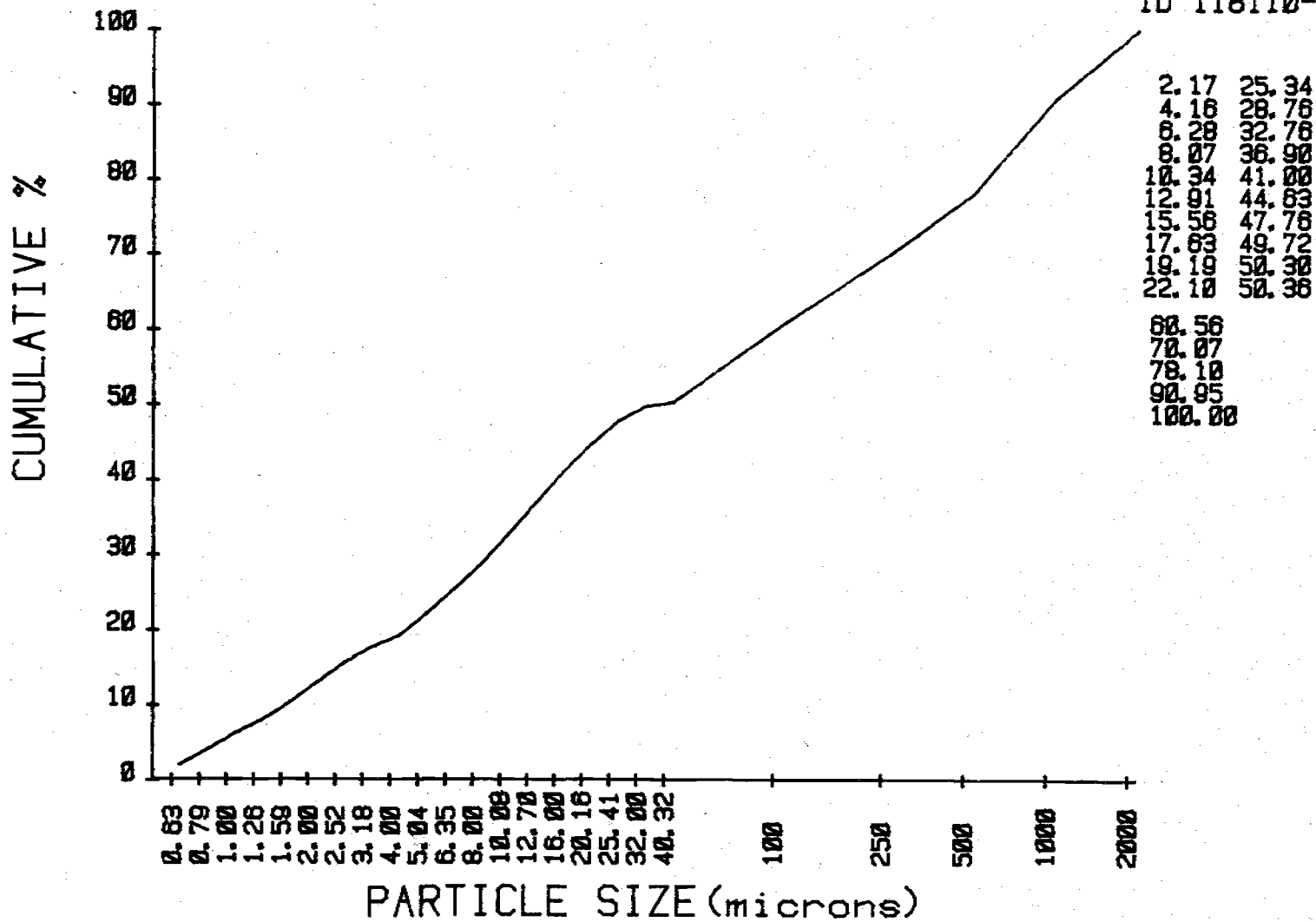
ID I18110-2



2.17	3.24
1.09	3.42
2.11	3.99
1.79	4.14
2.27	4.18
2.57	3.63
2.65	3.12
2.06	1.97
1.56	0.58
2.91	0.06
0.20	
0.51	
0.03	
0.03	
0.05	
0.05	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18110-2



Unnamed Silt Loam 79-ID-18111 (060601R-2)

Classification: medial over loamy, mixed, frigid Eutric Glossoberalf.

General Site Characteristics

Location: Clearwater County, Idaho: northeast 1/4, northwest 1/4 of section 23,  
T. 39N., R. 5E.

Forest: Clearwater National Forest

Area: Canyon Ranger District

Described By/Date: July 4, 1978, by Randy Moiser

Landform: 30

Habitat Type:

Formation Name:

Parent Rock/Material: volcanic ash over alluvium from granite Climate:

Weathering:

Precipitation:

Topography: toeslope

Erosion:

Slope: 15-20 percent

Infiltration:

Aspect: east-south-east

Permeability:

Elevation: 3670 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

O 1-0 centimeters (1/4-0 inches).

A1 0-13 centimeters (0-5 inches). Very dark brown (10YR 2/2) moist; silt loam; weak fine granular structure; friable, nonsticky and nonplastic; slightly acid pH 6.1, noncalcareous; trace gravel by weight.

B2ir 13-46 centimeters (5-8 inches). Dark brown (7.5YR 4/4) moist; silt loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; slightly acid pH 6.2, noncalcareous; trace gravel by weight.

IIB21t 46-99 centimeters (18-39 inches). Yellowish brown (10YR 5/4) moist; silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; medium acid pH 5.7, noncalcareous; no gravels.

IIB22t 99-152+ centimeters (39-60+ inches). Very pale brown (10YR 6/4) moist; no lab sample; clay loam; moderate medium subangular blocky structure; friable, sticky and plastic.

Pedon: Unnamed Silt Loam 79-ID-18111 (060601R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1 2 3	0	1- 0	NS	NS	NS	NS					
	A1	0- 13	6.1	0.19	100	2.0					
	B2ir	13- 46	6.2	0.16	100	1.2					
	IIB21†	46- 99	5.7	0.13	60	2.0					
	IIB22†	99-152+	NS	NS	NS	NS					

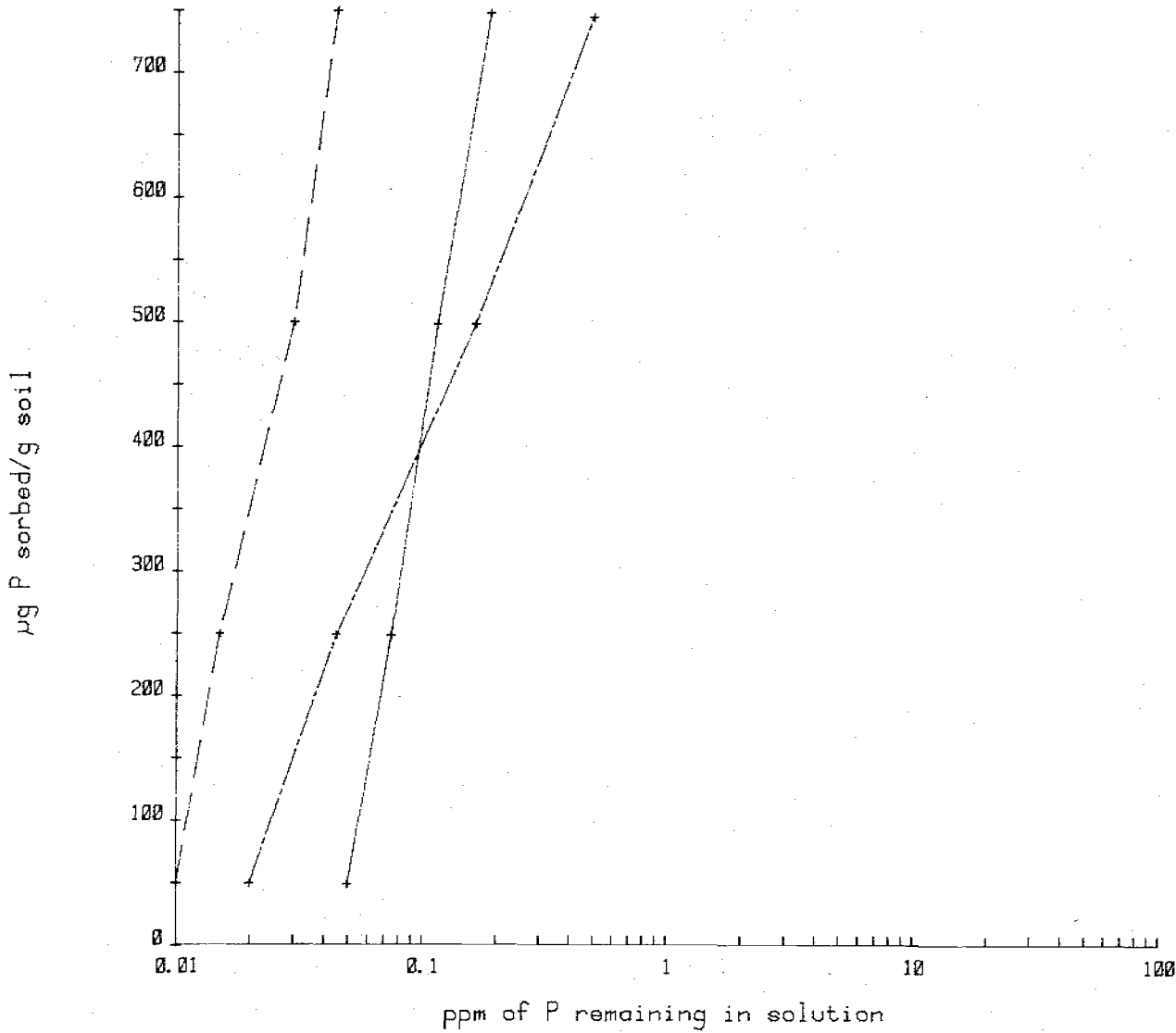
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1 2 3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6.0	1.6	0.1	1.0	19.9	26.1	30	7.71	4.48	0.202	16	1.00	10.3
	5.8	1.2	0.1	1.0	17.9	26.8	31	5.22	3.04	0.198	15	1.00	10.7
	3.9	1.1	0.1	0.6	11.5	18.6	33	1.39	0.81	0.072	11	1.00	9.7
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

### Phosphorus Isotherm

79-ID-18111



µg/g soil    Soln ppm

----- A1

50            0.05

249          0.08

499          0.12

748          0.19

----- B2ir

50            0.01

250          0.02

500          0.03

750          0.05

----- IIB21t

50            0.02

250          0.05

498          0.17

745          0.51

Pedon: Unnamed Silt Loam 79-ID-18111 (060601R-2)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.		
cm	Z								Z		
1- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 13	0.96	1.71	1.40	3.63	7.16	14.86	72.15	12.99	trace		Silt loam
13- 46	0.87	1.89	1.15	3.28	9.17	16.36	70.87	12.77	trace		Silt loam
46- 99	0.35	0.80	0.72	3.25	7.54	12.64	70.01	17.35	none		Silt loam
99-152+	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	Z			g/cc		Z		Z
1- 0					NS	NS	NS	NS
0- 13					61.0	23.5	NDMP	NDMP
13- 46					60.7	22.1	NDMP	NDMP
46- 99					39.1	19.0	32	NP
99-152+					NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest - LIM

Analysis by: Anita Falen

Date: September 1981

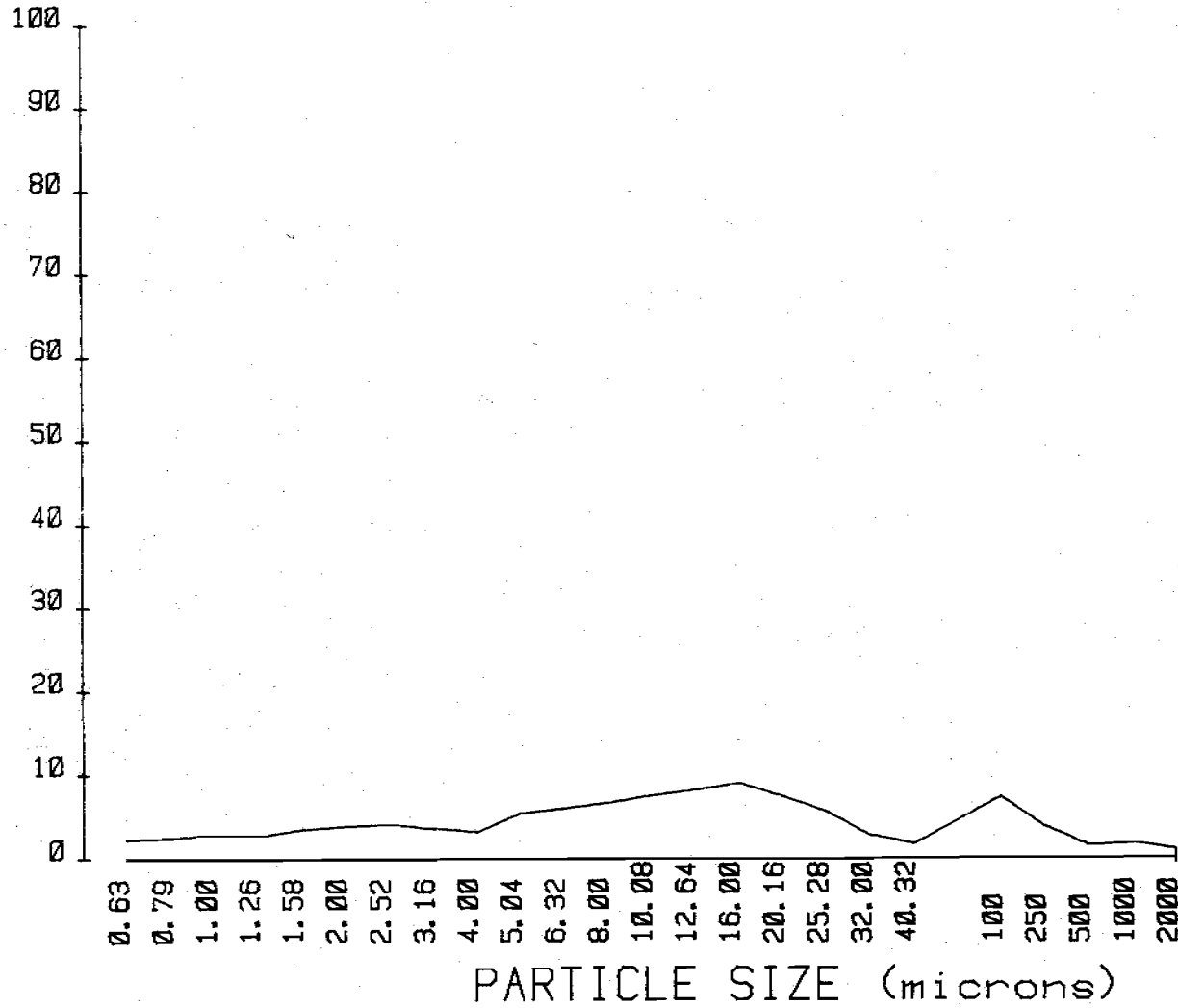
Identification		I18111-1	I18111-2	I18111-3	
Units		-----%			
TC (0.63-2.00)		12.99	12.77	17.35	
TSi (2.00-50)		72.15	70.87	70.01	
TS (50-2000)		14.86	16.36	12.64	
Clay	0.63-0.794	2.12	2.16	3.35	
	0.794-1.00	2.34	2.23	3.21	
	1.00-1.26	2.70	2.60	3.58	
	1.26-1.59	2.51	2.47	3.16	
	1.59-2.00	3.33	3.31	4.05	
Fine Silt	2.00-2.52	3.72	3.91	4.52	
	2.52-3.17	3.91	3.95	4.53	
	3.17-4.00	3.37	3.27	3.62	
	4.00-5.04	2.91	2.19	2.76	
Medium Silt	5.04-6.35	5.61	5.05	5.03	
	6.35-8.00	5.79	5.71	5.57	
	8.00-10.08	6.43	6.43	5.76	
	10.08-12.70	7.31	7.55	6.66	
	12.70-16.0	8.01	7.79	7.15	
	16.0-20.2	8.80	7.69	7.00	
Coarse Silt	20.2-25.4	7.19	6.83	7.01	
	25.4-32.0	5.39	5.61	5.48	
	32.0-40.3	2.55	3.44	2.65	
	40.3-50.8	1.47	1.36	2.19	
	50.8-64.0	0.14	0.09	0.09	
VFS (50-100)		7.16	9.17	7.54	
FS (100-250)		3.63	3.28	3.25	
MS (250-500)		1.40	1.15	0.72	
CoS (500-1000)		1.71	1.89	0.80	
VCoS (1000-2000)		0.96	0.87	0.35	
Greater than 2000		trace	trace	none	
Textural Class		SL	SL	SL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

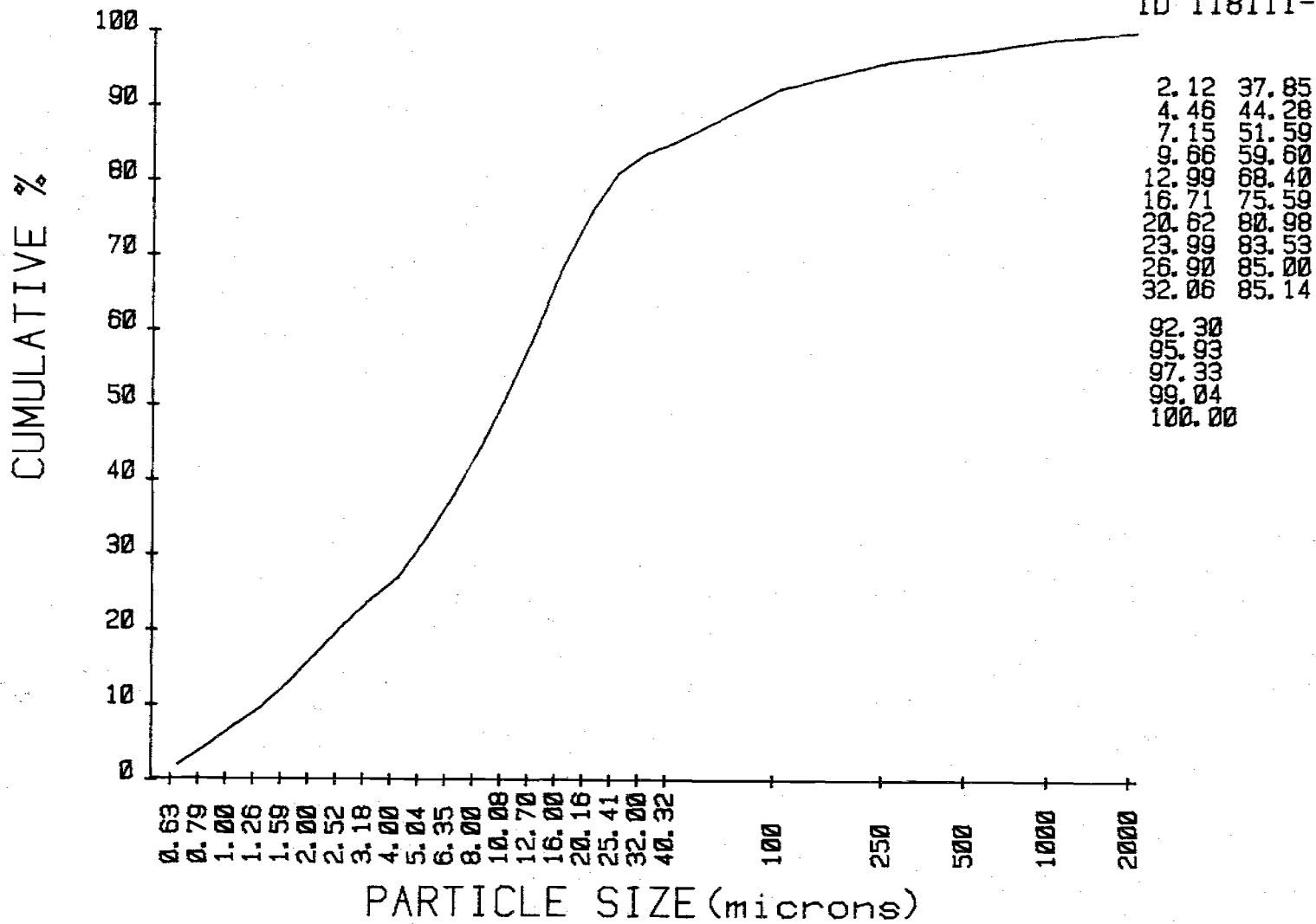
ID I18111-1



2.12	5.79
2.34	6.43
2.70	7.31
2.51	6.01
3.33	8.80
3.72	7.19
3.91	5.39
3.37	2.54
2.91	1.47
5.16	0.14
7.16	
3.63	
1.40	
1.71	
0.96	

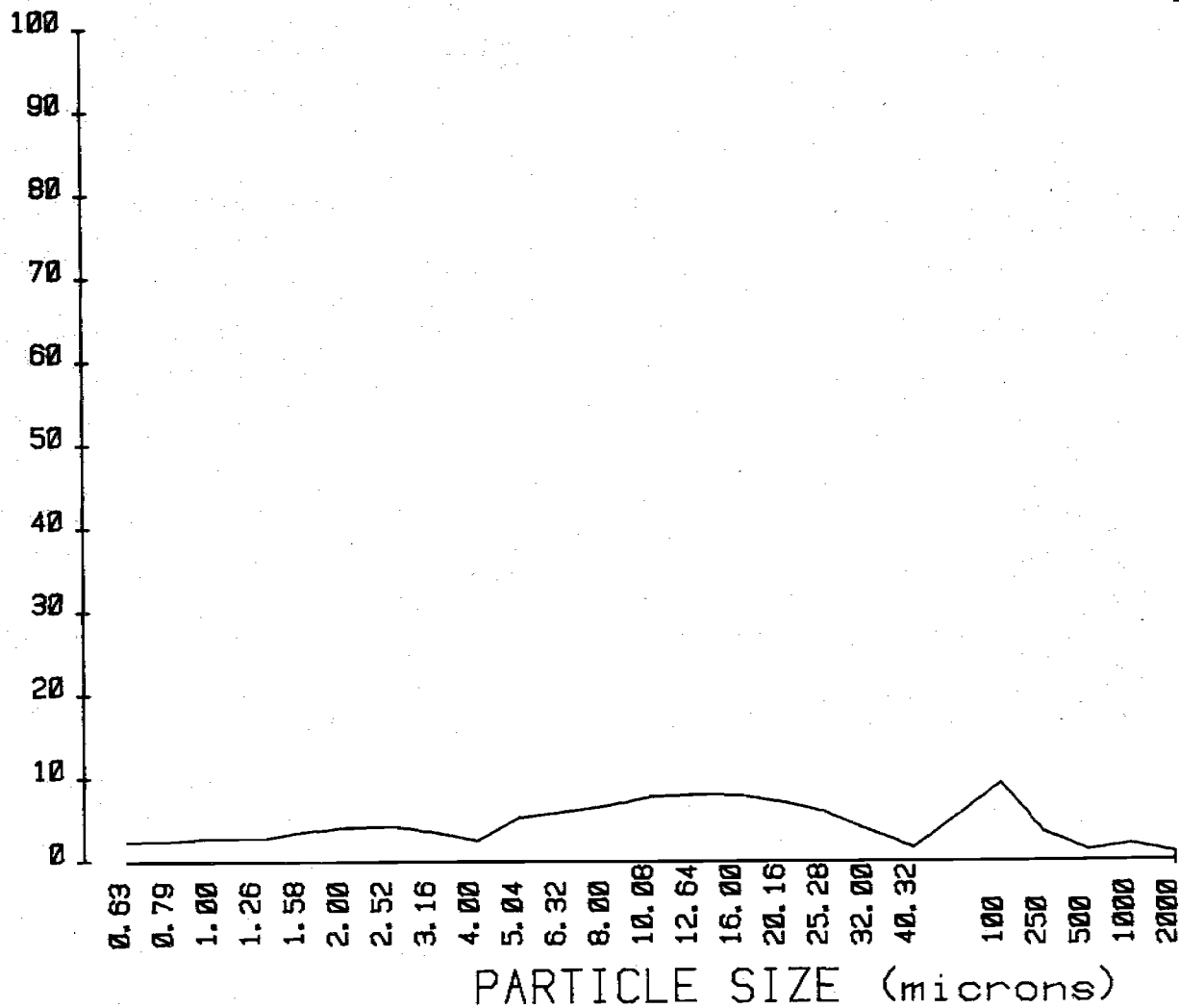
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18111-1



PLOT SAND-SILT-CLAY

ID I18111-2



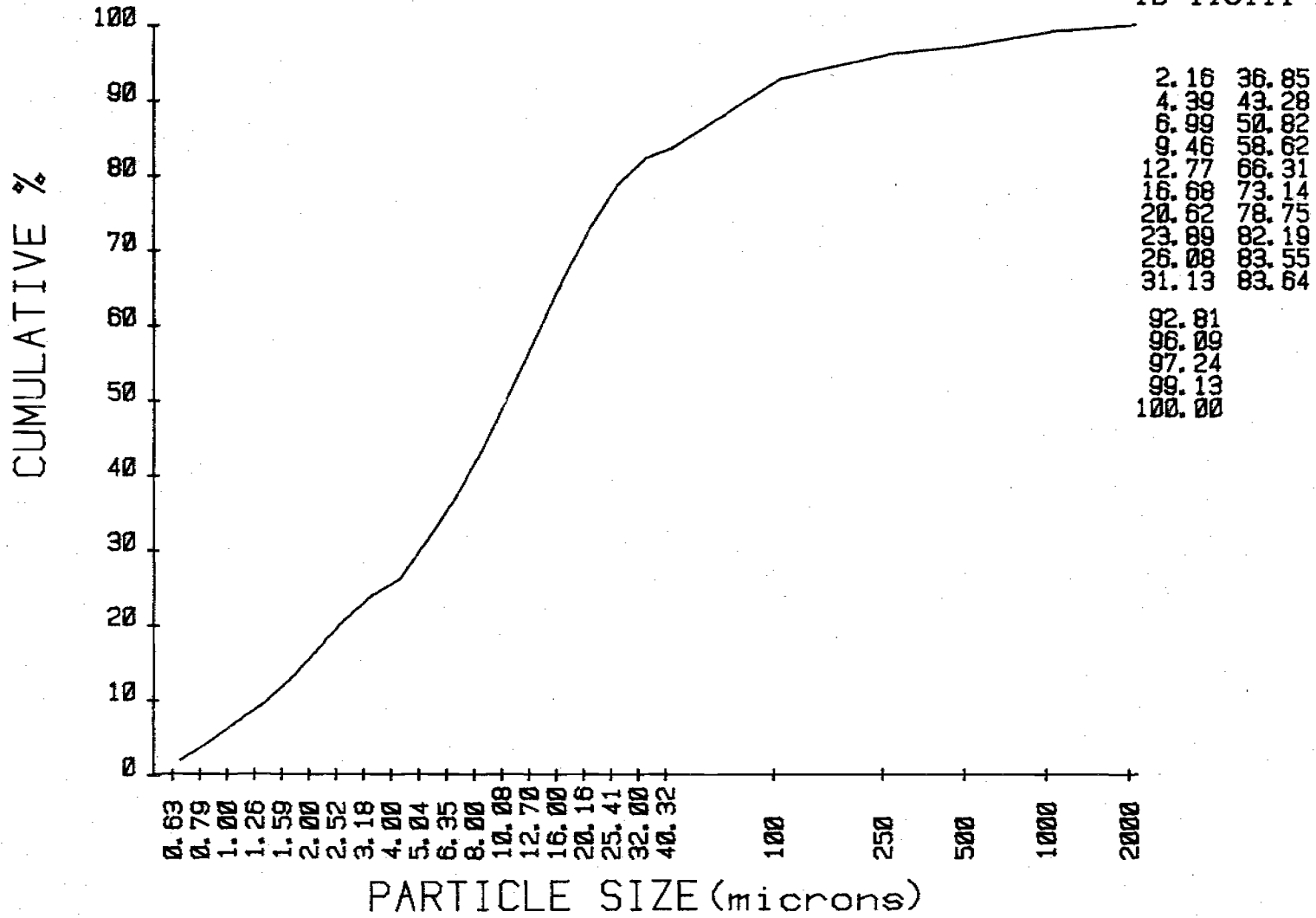
2.16	5.71
2.23	6.43
2.60	7.55
2.47	7.79
3.31	7.69
3.91	6.83
3.94	5.61
3.27	3.44
2.19	1.36
5.05	0.09
0.17	
3.28	
1.15	
1.89	
0.87	

240

x

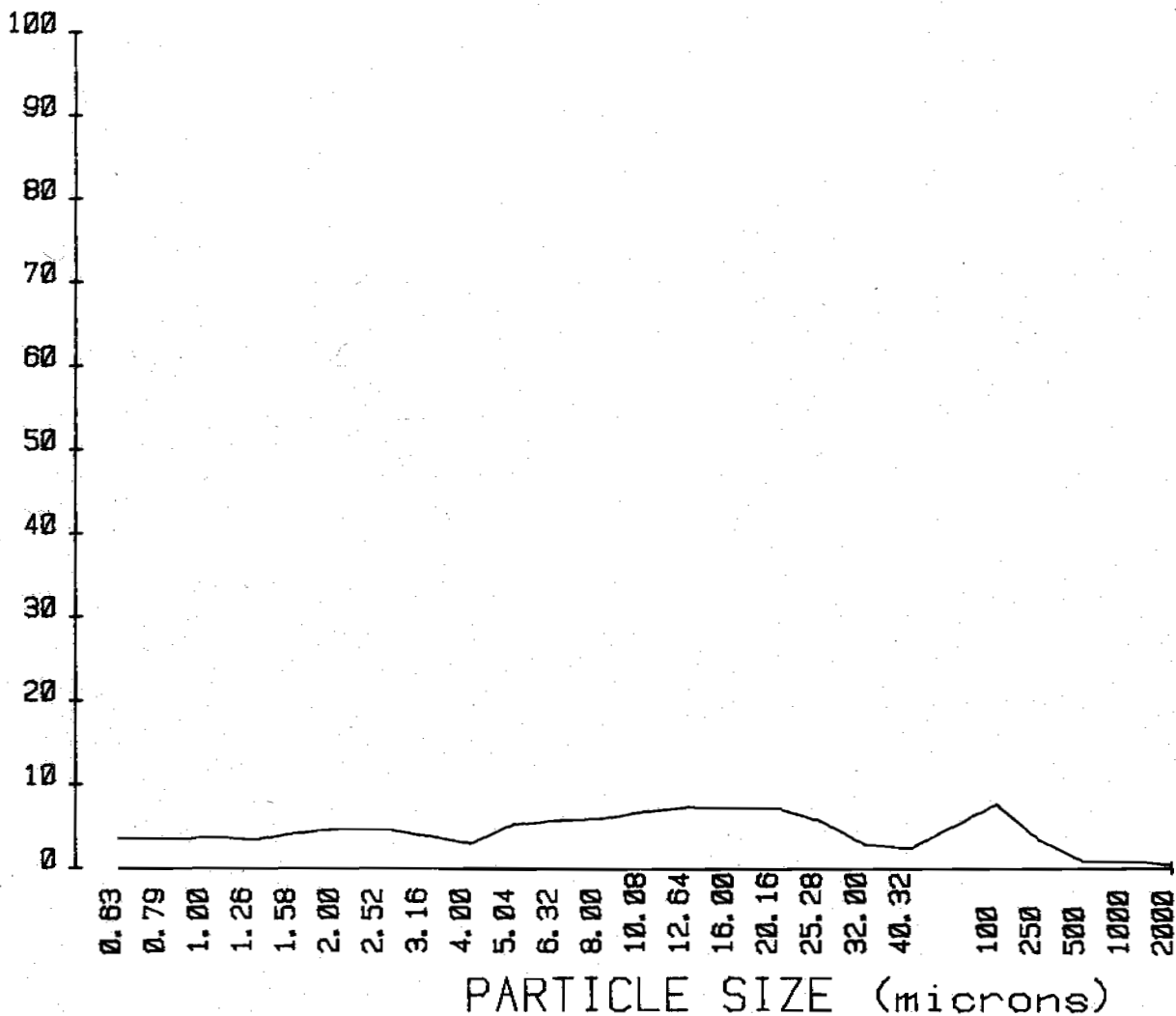
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18111-2



PLOT SAND-SILT-CLAY

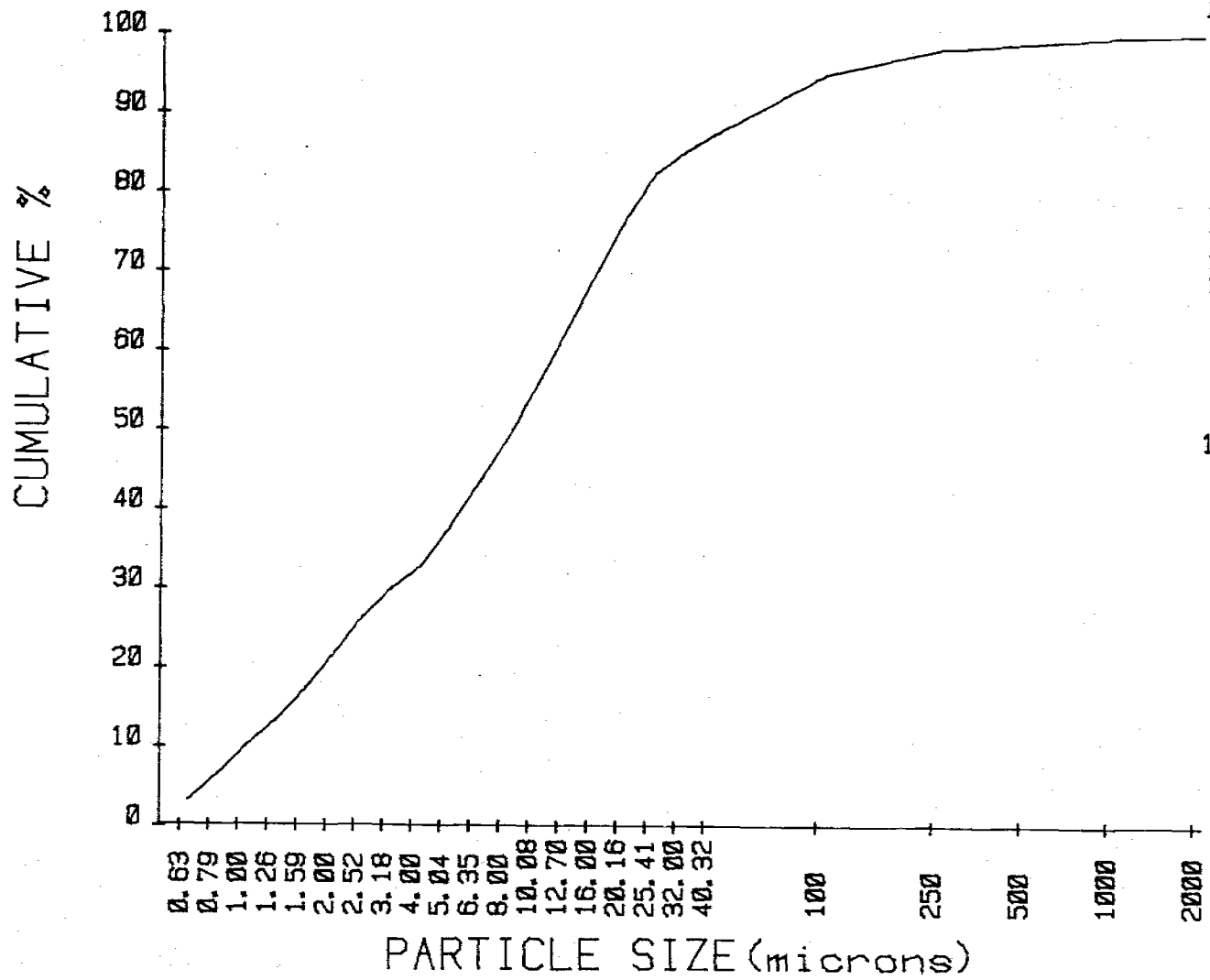
ID I18111-3



3.35	5.57
3.20	5.76
3.58	6.66
3.16	7.15
4.05	6.99
4.52	7.01
4.53	5.48
3.62	2.64
2.76	2.19
5.03	0.09
7.54	
3.25	
0.72	
0.80	
0.35	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18111-3



3.35	43.37
6.55	49.13
10.14	55.80
13.30	62.95
17.35	69.94
21.87	76.96
26.39	82.44
30.01	85.08
32.78	87.27
37.81	87.36
94.90	
98.15	
98.87	
99.67	
100.02	

Unnamed Gravelly Coarse Sandy Loam 79-ID-18112 (151101B-2)

Classification: coarse-loamy, mixed, frigid Pachic Haplumbrept.

General Site Characteristics

Location: Clearwater County, Idaho: southeast 1/4, northwest 1/4 of section 24,  
T. 35N., R. 7E.

Forest: Clearwater National Forest

Area: Lochsa Ranger District

Described By/Date: July 17, 1980, by Randy Moiser

Landform: 31

Habitat Type: broken fern with mountain alder in a subalpine fir h. t.

Formation Name:

Parent Rock/Material: granitic

Weathering:

Topography: lower 1/3 concave slope

Slope: 41 percent

Aspect: west-southwest

Elevation: 4800 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 1-0 centimeters (1/4-0 inches).

A1 0-43 centimeters (0-17 inches). Black (10YR 2/1) moist; gravelly coarse sandy loam; medium very fine granular structure; friable, nonsticky and nonplastic; medium acid pH 6.0, noncalcareous; 20 percent gravels by weight; mixed ash.

B2ir 43-48 centimeters (17-19 inches). No lab sample.

I1B3 48-84 centimeters (19-33 inches). Dark brown (10YR 3/3) moist; gravelly coarse sandy loam; very weak fine to medium subangular blocky structure; friable, nonsticky and nonplastic; slightly acid pH 6.2, noncalcareous; 17 percent gravels by weight.

I1C 84+ centimeters (33+ inches). Light reddish brown (2.5YR 6/2) moist; gravelly coarse sandy loam; massive structure; friable, nonsticky and nonplastic; strongly acid pH 5.4, noncalcareous; 26 percent gravels by weight.

Pedon: Unnamed Gravelly Coarse Sandy Loam 79-ID-18112 (151101B-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0 A1 B2ir	1-0 0-43 43-48	NS 6.0 NS	NS 0.25 NS	NS 74 NS	NS 1.1 NS					
2	IIB3	48-84	6.2	0.16	54	0.7					
3	IIC	84+	5.4	0.11	36	0.8					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%		%		ratio		
1	NS 9.0	NS 1.5	NS 0.1	NS 0.6	NS 11.9	NS 23.4	NS 48	NS 8.75	NS 5.09	NS 0.272	NS 19	NS 0.80	NS 9.3
2	NS 5.5	NS 0.8	NS 0.1	NS 0.7	NS 7.5	NS 17.3	NS 48	NS 2.06	NS 1.20	NS 0.113	NS 11	NS 0.83	NS 9.5
3	NS 9.4	NS 2.4	NS 0.1	NS 0.2	NS 3.7	NS 18.6	NS 77	NS 0.41	NS 0.24	NS 0.027	NS 9	NS 0.74	NS 8.0

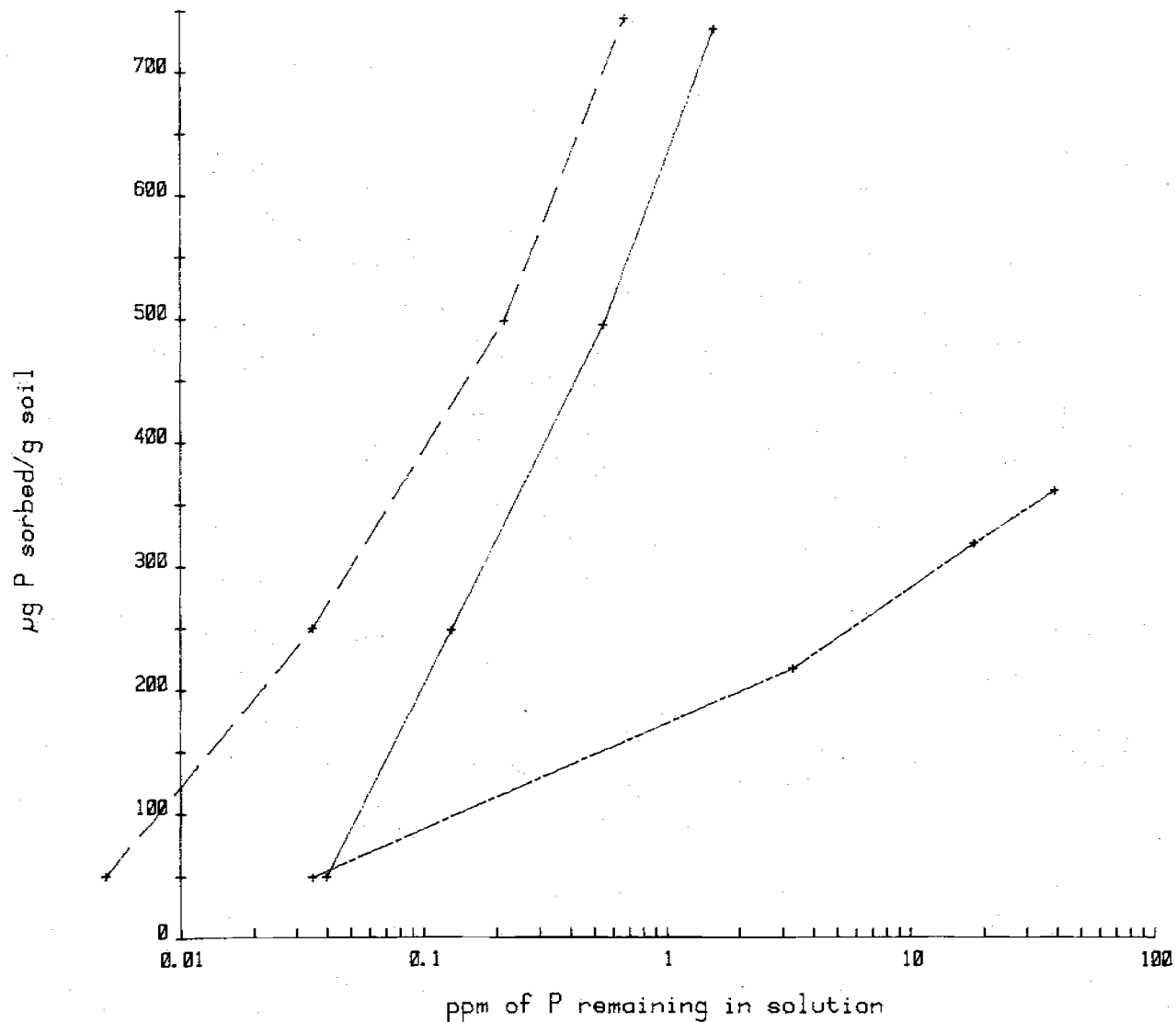
Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness



# Phosphorus Isotherm

79-ID-18112



µg/g soil	Soln ppm
----- A1	
50	0.04
249	0.13
495	0.55
734	1.56
----- I183	
50	0.01
250	0.04
498	0.22
743	0.67
----- IIC	
50	0.04
217	3.28
319	18.12
361	38.88

Pedon: Unnamed Gravelly Coarse Sandy Loam 79-ID-18112 (151101B-2)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
cm	-----X-----							-----X-----		
1-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-43	12.10	16.94	9.77	9.27	11.28	59.36	31.63	9.82	20	Gr. coarse sandy loam
43-48	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
48-84	11.16	17.64	10.55	14.16	9.31	62.82	27.26	9.92	17	Gr. coarse sandy loam
84+	11.30	19.62	12.30	12.34	18.91	74.47	20.09	5.44	26	Gr. coarse sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	-----X-----			-----g/cc-----		-----X-----		-----X-----	
1-0						NS	NS	NS	NS
0-43						29.0	14.5	NDNP	NDNP
43-48						NS	NS	NS	NS
48-84						19.1	9.5	NDNP	NDNP
84+						14.4	7.5	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

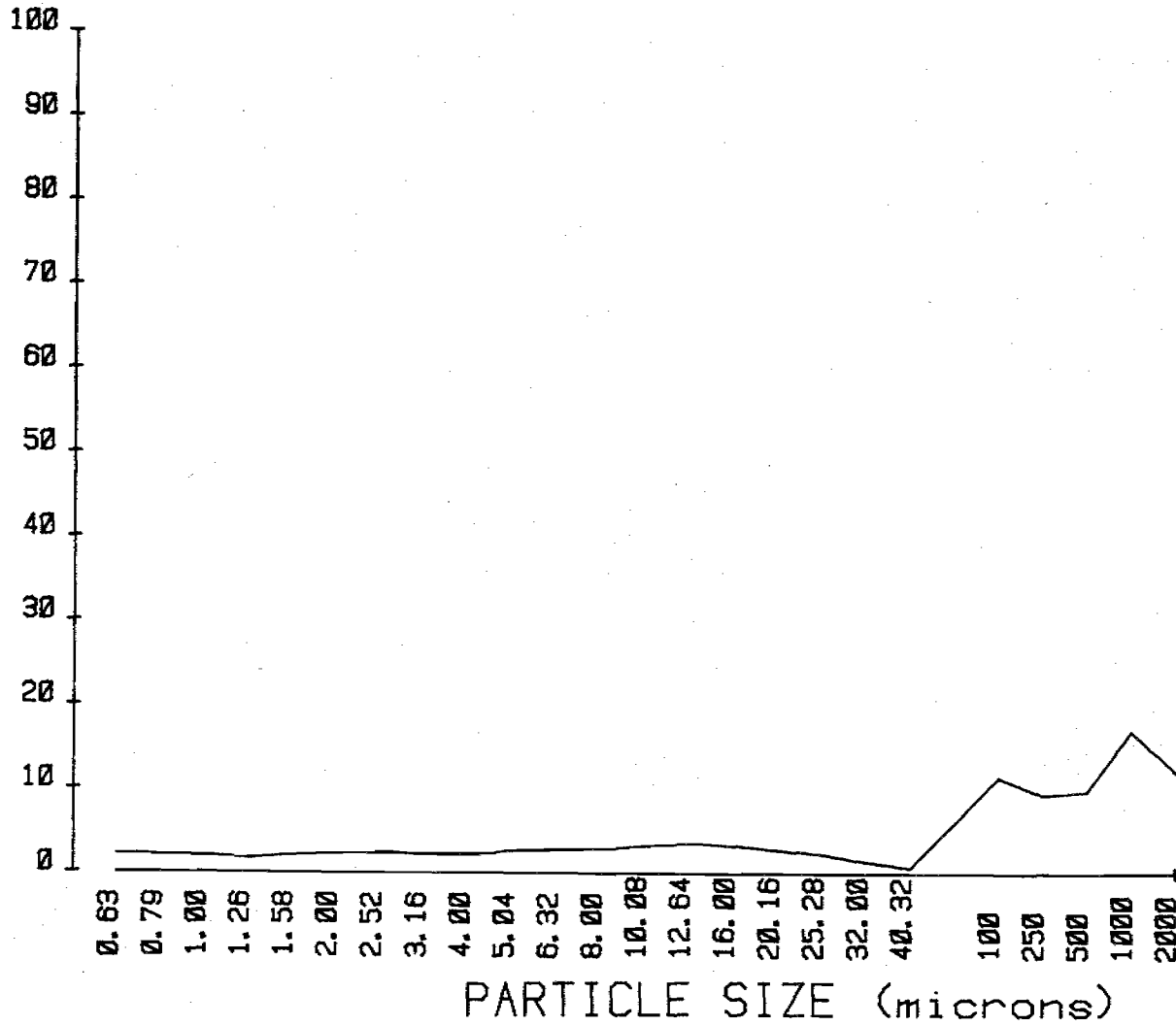
Date: September 1980

Identification		I18112-1	I18112-3	I18112-4	
Units		-----%			
TC (0.63-2.00)		9.02	9.92	5.44	
TSi (2.00-50)		31.63	27.26	20.09	
TS (50-2000)		59.36	62.82	74.47	
Clay	0.63-0.794	2.00	2.13	1.06	
	0.794-1.00	1.82	1.97	1.02	
	1.00-1.26	1.80	2.01	1.13	
	1.26-1.59	1.49	1.72	0.97	
	1.59-2.00	1.90	2.09	1.27	
Fine Silt	2.00-2.52	2.11	2.16	1.45	
	2.52-3.17	2.22	1.96	1.39	
	3.17-4.00	1.91	1.30	1.16	
	4.00-5.04	1.92	0.83	1.00	
Medium Silt	5.04-6.35	2.43	1.88	1.60	
	6.35-8.00	2.64	2.13	1.68	
	8.00-10.08	2.61	2.17	1.64	
	10.08-12.70	3.05	2.56	1.86	
	12.70-16.0	3.36	2.90	1.78	
	16.0-20.2	3.07	2.65	1.75	
Coarse Silt	20.2-25.4	2.55	2.47	1.69	
	25.4-32.0	2.08	2.18	1.47	
	32.0-40.3	1.16	1.48	0.80	
	40.3-50.8	0.49	0.55	0.59	
	50.8-64.0	0.04	0.05	0.24	
VFS (50-100)		11.28	9.31	18.91	
FS (100-250)		9.27	14.16	12.34	
MS (250-500)		9.77	10.55	12.30	
CoS (500-1000)		16.94	17.64	19.62	
VCoS (1000-2000)		12.10	11.16	11.30	
Greater than 2000		20	17	26	
Textural Class		Gr.CSL	Gr.CSL	Gr.CSL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

### PLOT SAND-SILT-CLAY

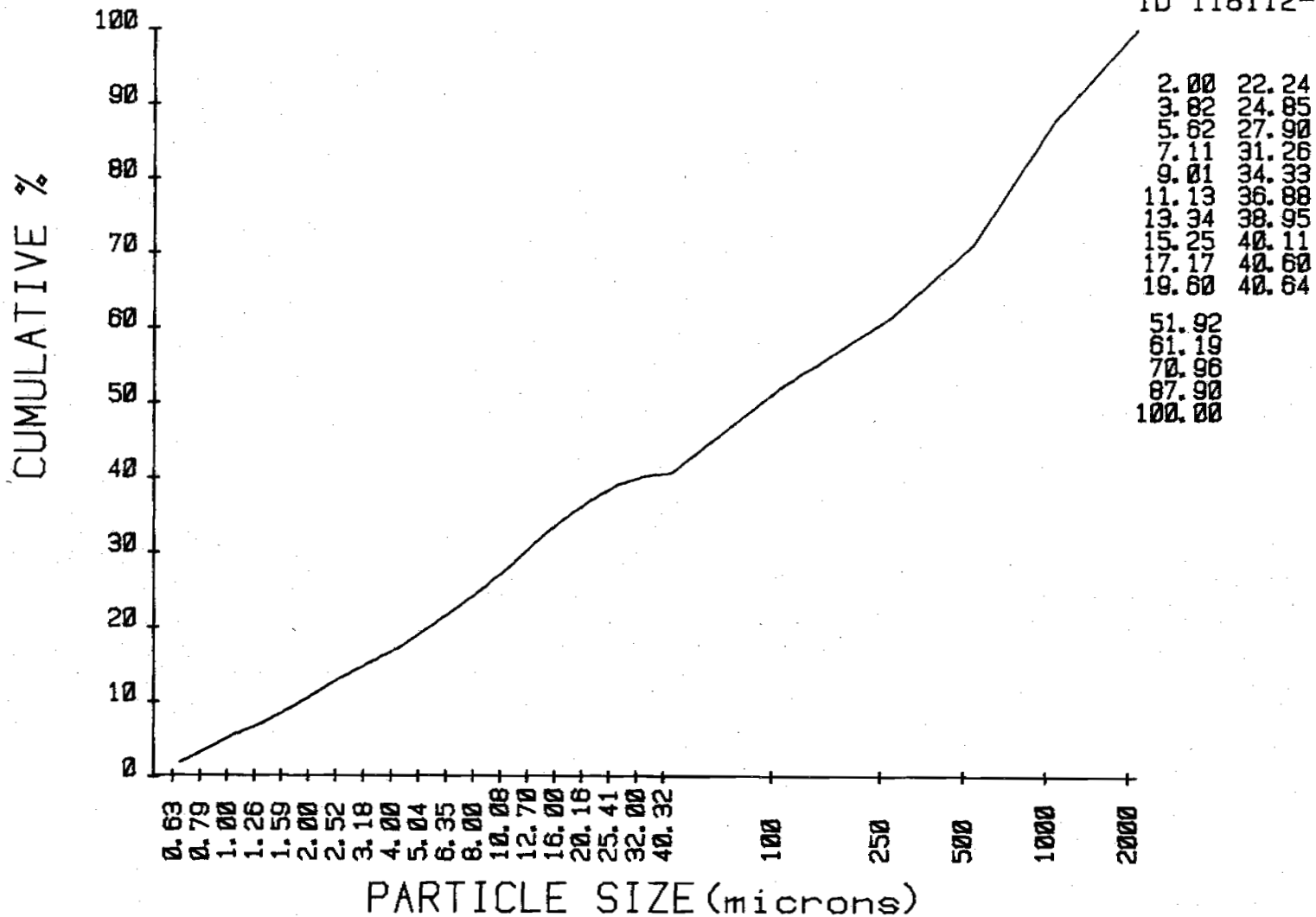
ID I18112-1



2.00	2.64
1.82	2.61
1.80	3.05
1.49	3.36
1.90	3.07
2.11	2.55
2.22	2.07
1.91	1.16
1.92	0.49
2.43	0.04
11.28	
9.27	
9.77	
15.94	
12.10	

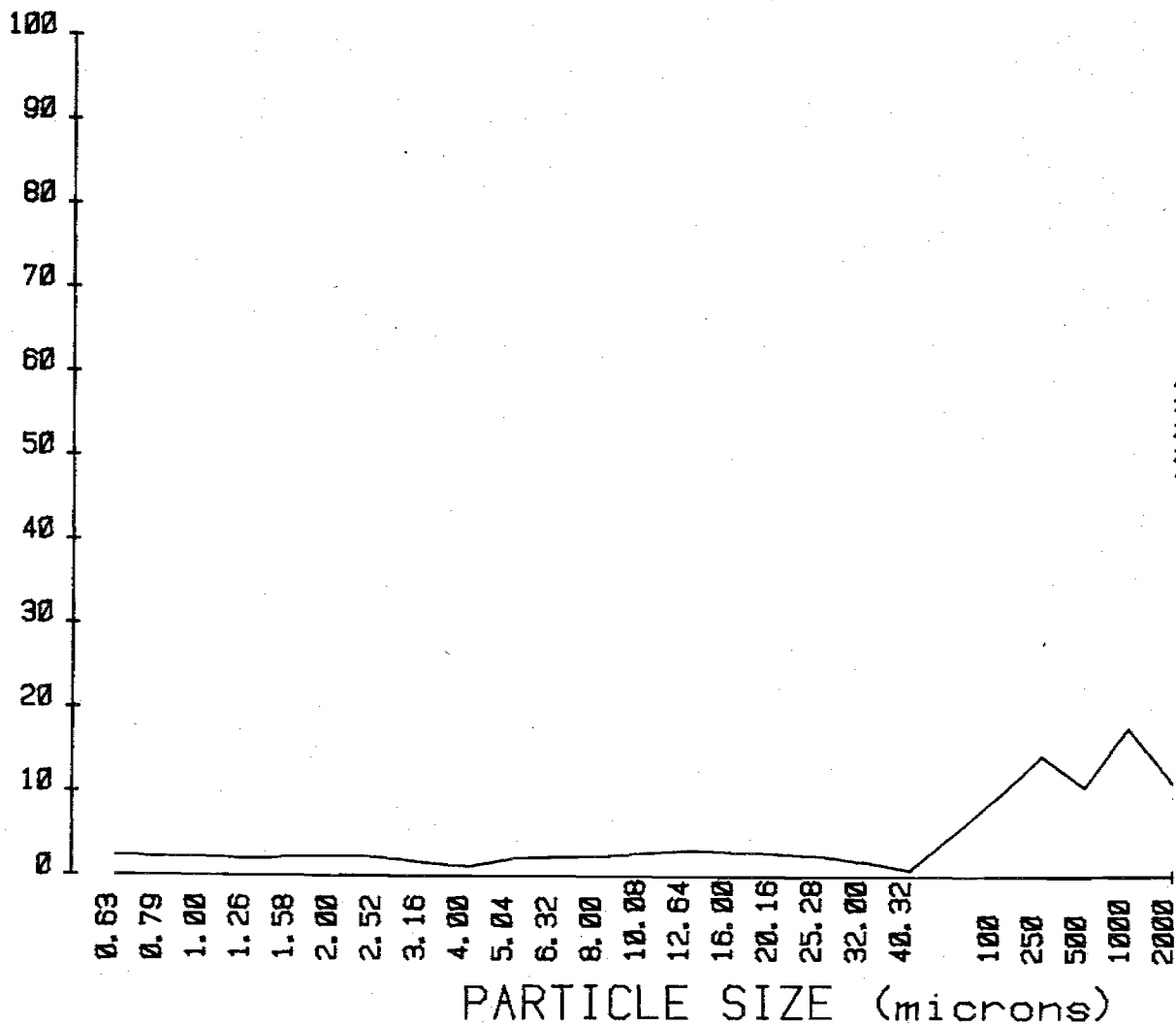
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18112-1



PLOT SAND-SILT-CLAY

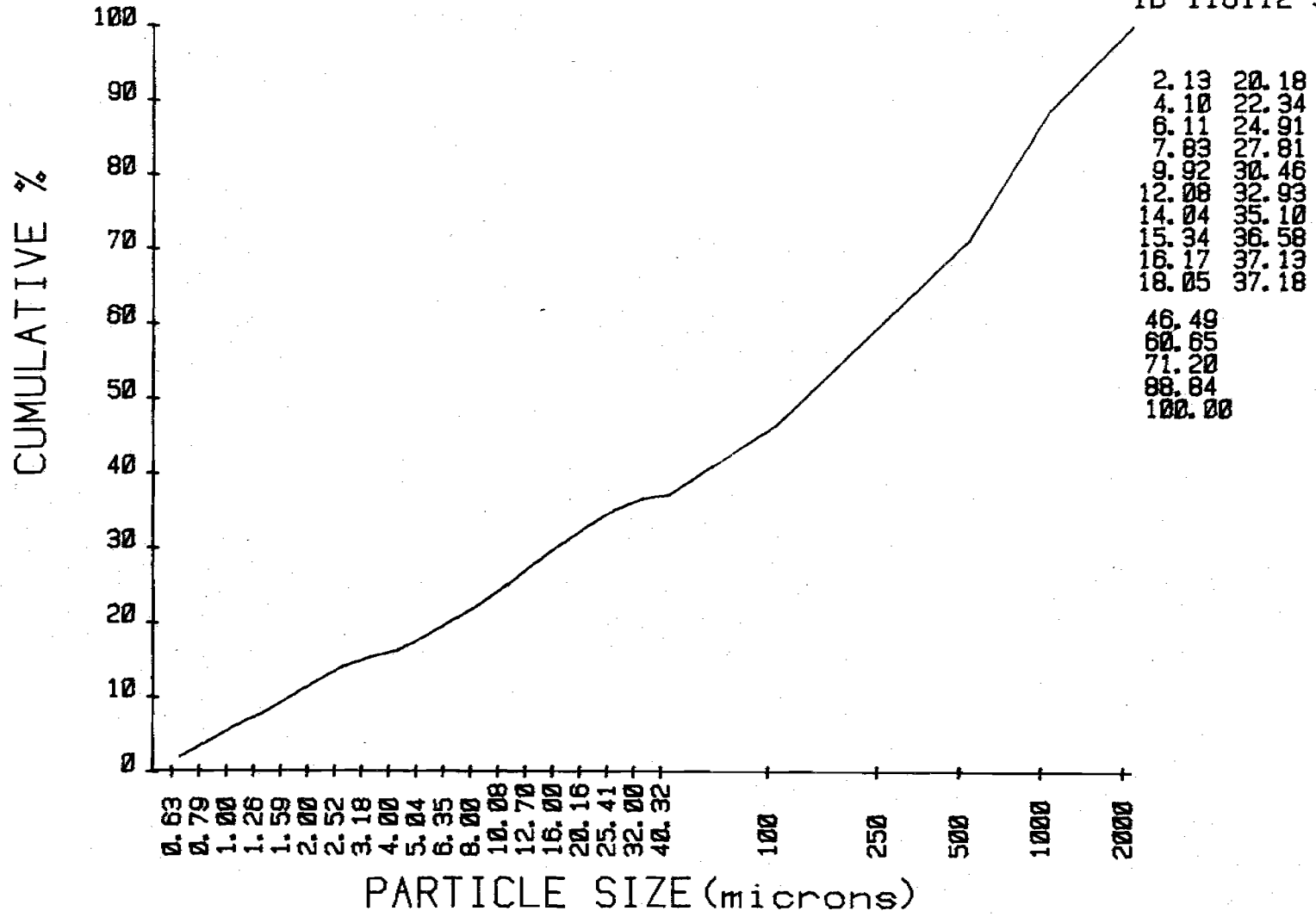
ID I18112-3



2.13	2.13
1.97	2.17
2.01	2.56
1.72	2.90
2.09	2.65
2.16	2.47
1.96	2.17
1.30	1.48
0.83	0.55
1.88	0.05
9.31	
14.16	
10.55	
17.64	
11.16	

CUMULATIVE CURVE SAND-SILT-CLAY

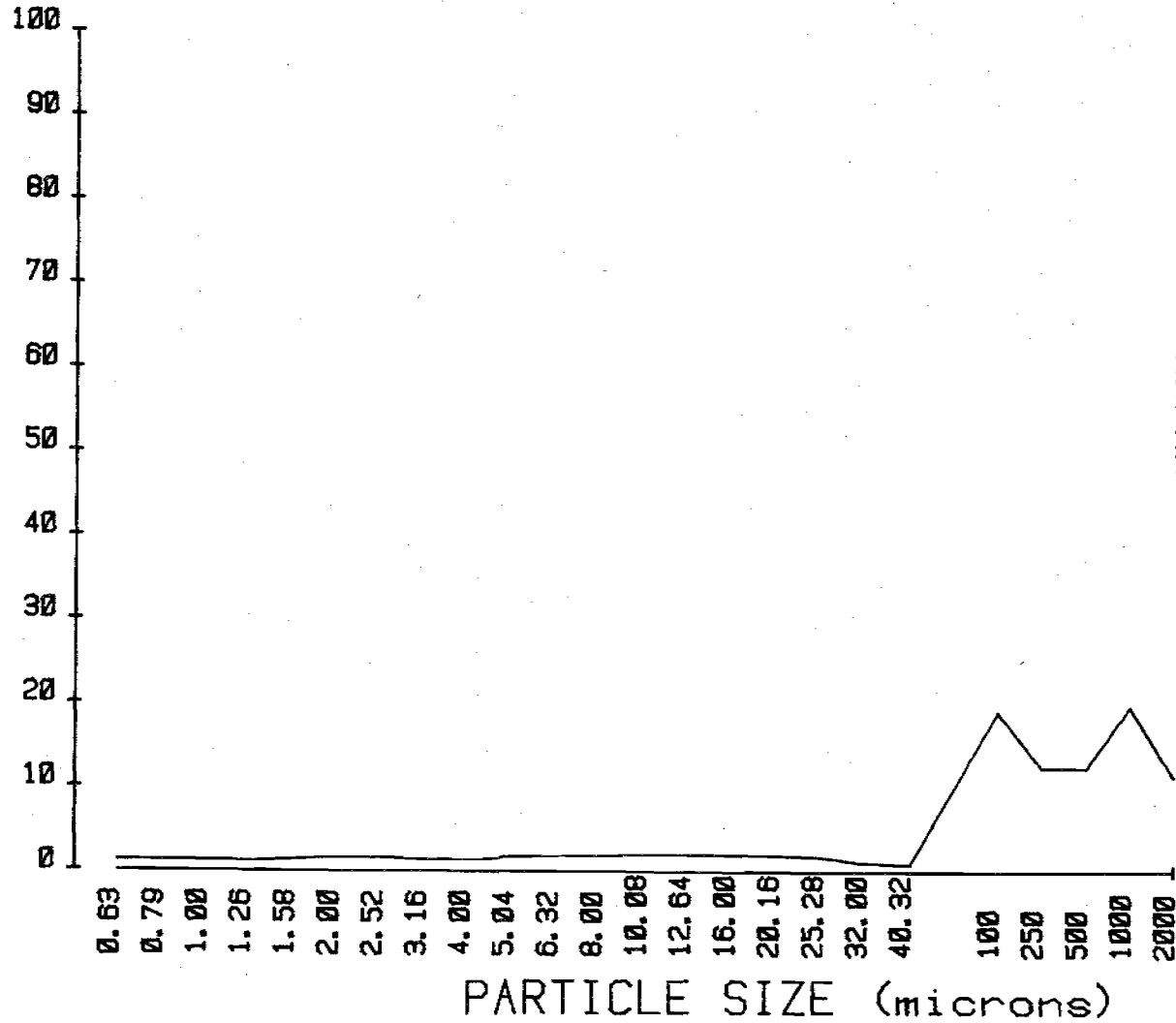
ID I18112-3



2.13	20.18
4.10	22.34
6.11	24.91
7.83	27.81
9.92	30.46
12.08	32.93
14.04	35.10
15.34	36.58
16.17	37.13
18.05	37.18
46.49	
60.65	
71.20	
88.84	
100.00	

PLOT SAND-SILT-CLAY

ID I18112-4

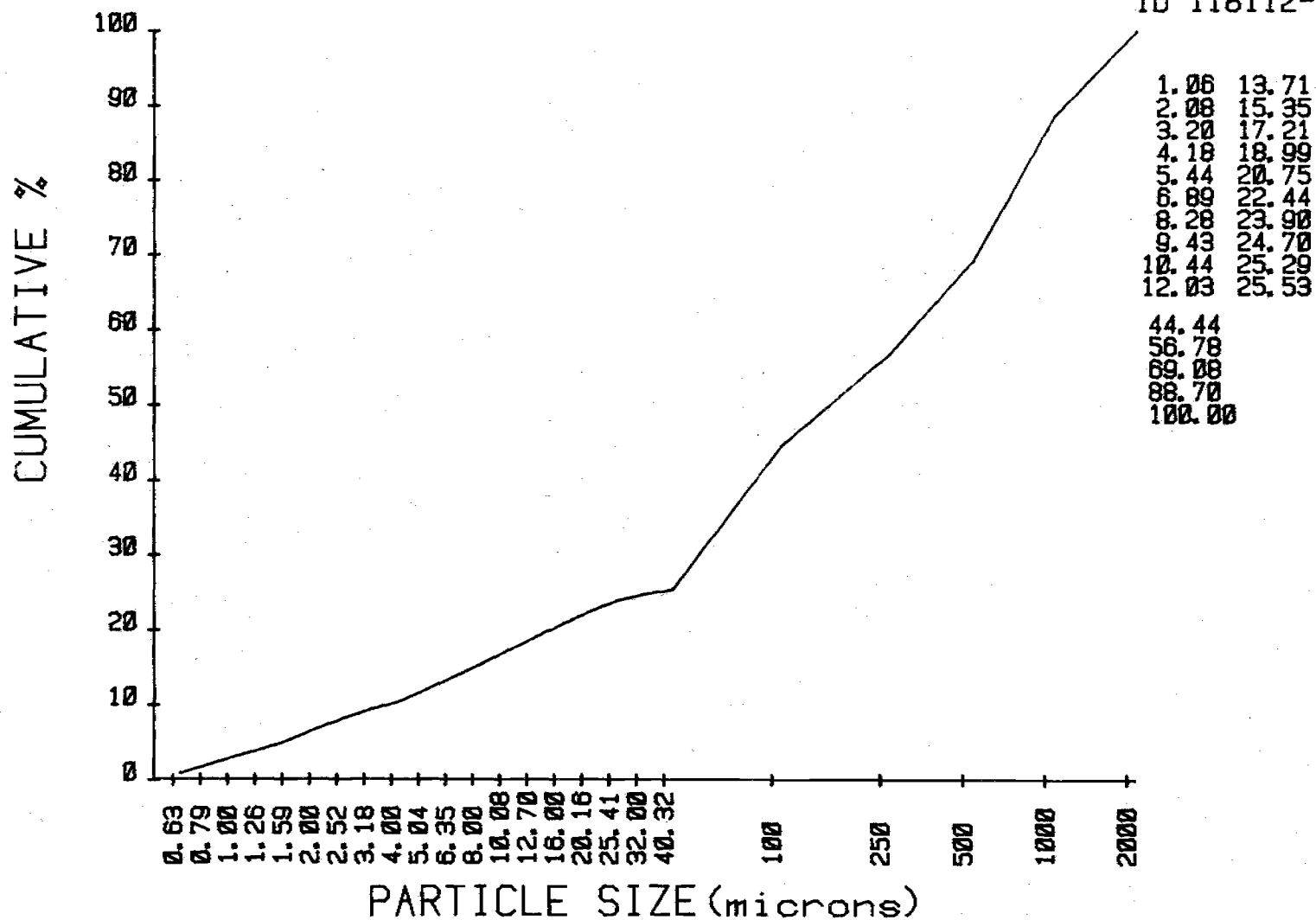


1.06	1.68
1.02	1.63
1.13	1.86
0.97	1.78
1.27	1.75
1.45	1.69
1.39	1.46
1.16	0.80
1.00	0.59
1.59	0.24
18.91	
12.34	
12.30	
19.62	
11.30	



CUMULATIVE CURVE SAND-SILT-CLAY

ID I18112-4



Unnamed Gravelly Silt Loam 79-ID-18113 (061401R-3)

Classification: medial over leamy Andic Cryobrupt.

General Site Characteristics

Location: Clearwater County, Idaho: northeast 1/4, northeast 1/4 of section 8,  
T. 39N., R. 13E.

Forest: Clearwater National Forest

Area: Kelly Creek Ranger District

Described By/Date: August 3, 1978, by Randy Moiser

Landform: trough wall

Habitat Type: subalpine fir/Xete h.t.

Formation Name:

Parent Rock/Material: belt metasediments

Weathering:

Topography: straight slope lower 1/3

Slope: 35 percent

Aspect: east-southeast

Elevation: 5080 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: excessively well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 0.5-0 centimeters (0.2-0 inches).

A1 0-5 centimeters (0-2 inches). Dark brown (10YR 2/2) moist; gravelly silt loam; moderate very fine granular structure; very friable, nonsticky and nonplastic; medium acid pH 5.6, noncalcareous; 33 percent gravels by weight.

B21r 5-38 centimeters (2-15 inches). Dark brown (10YR 3/3) moist; very gravelly silt loam; moderate fine granular structure; very friable, nonsticky and nonplastic; medium acid pH 5.7, noncalcareous; 60 percent gravels by weight.

IICr 38+ centimeters (15+ inches). Skeletal; no lab sample.

Pedon: Unnamed Gravelly Silt Loam 79-ID-18113 (061401R-3)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	0.5-0	NS	NS	NS	NS					
2	A1	0-5	5.6	0.30	125	1.9					
	B2ir	5-38	5.7	0.32	118	1.2					
	IICr	38+	NS	NS	NS	NS					

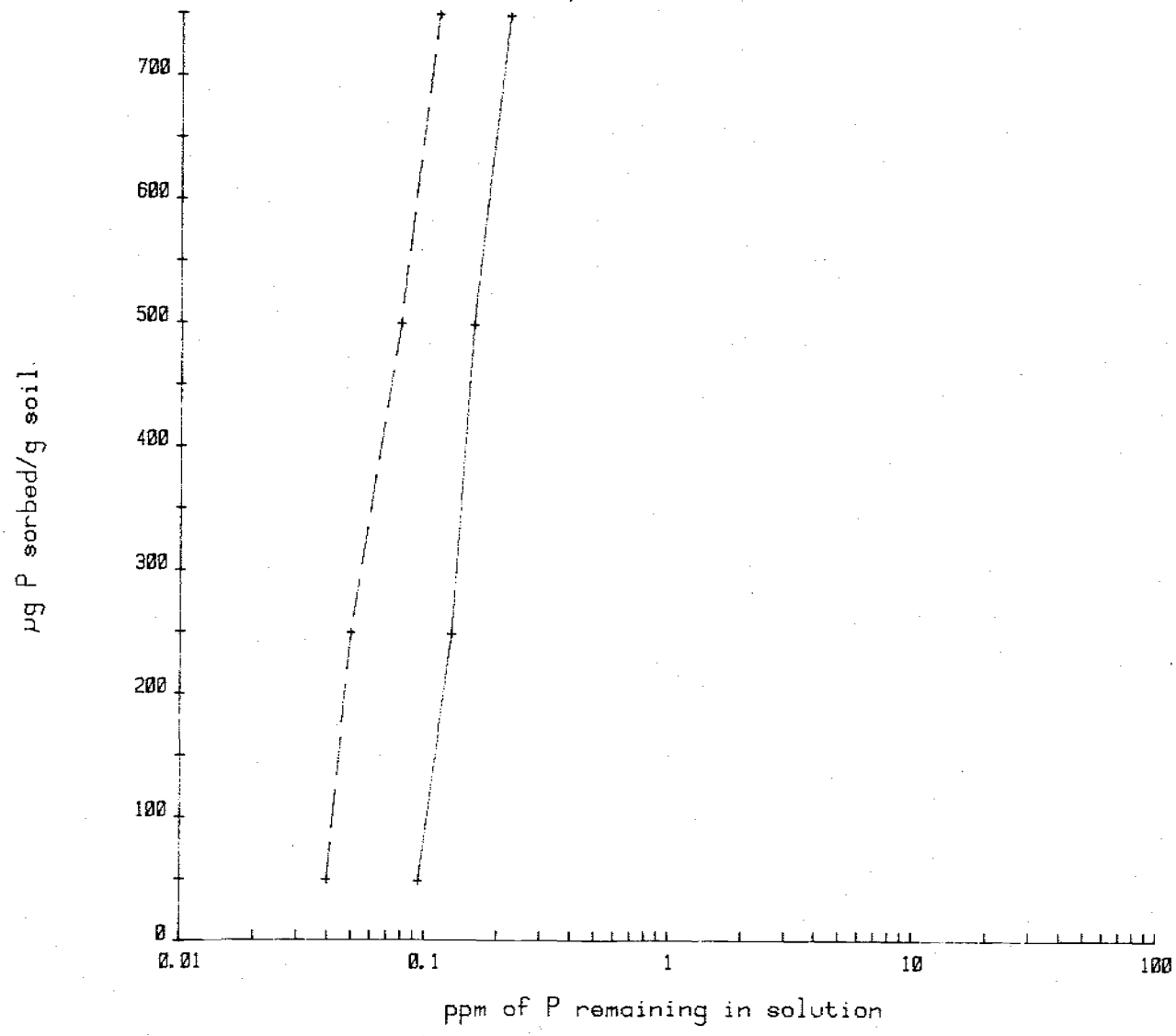
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	6.5	1.2	0.1	0.9	26.8	35.7	25	16.28	9.47	0.548	17	0.67	10.7
	5.6	0.7	0.1	0.9	24.6	32.4	23	10.74	6.25	0.332	19	0.40	10.8
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-ID-18113



µg/g soil	Soln ppm
----- A1	
49	0.10
249	0.13
498	0.16
748	0.23
----- B2ir	
50	0.04
250	0.05
499	0.08
749	0.12

Pedon: Unnamed Gravelly Silt Loam 79-ID-18113 (061401R-3)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.
cm	X							Z		
0.5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-5	1.09	2.31	1.80	4.86	10.77	20.83	72.70	6.47	33	Gr. silt loam
5-38	0.58	2.22	1.54	4.25	12.50	21.10	71.91	6.99	60	V.gr. silt loam
38+	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density	Water Content		Liquid	Plastic	Plastic Index
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	X			g/cc		X		Z	
0.5-0				NS	NS	NS	NS	NS	
0-5				62.2	23.3	NDNP	NDNP	NDNP	
5-38				57.8	22.1	NDNP	NDNP	NDNP	
38+				NS	NS	NS	NS	NS	

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

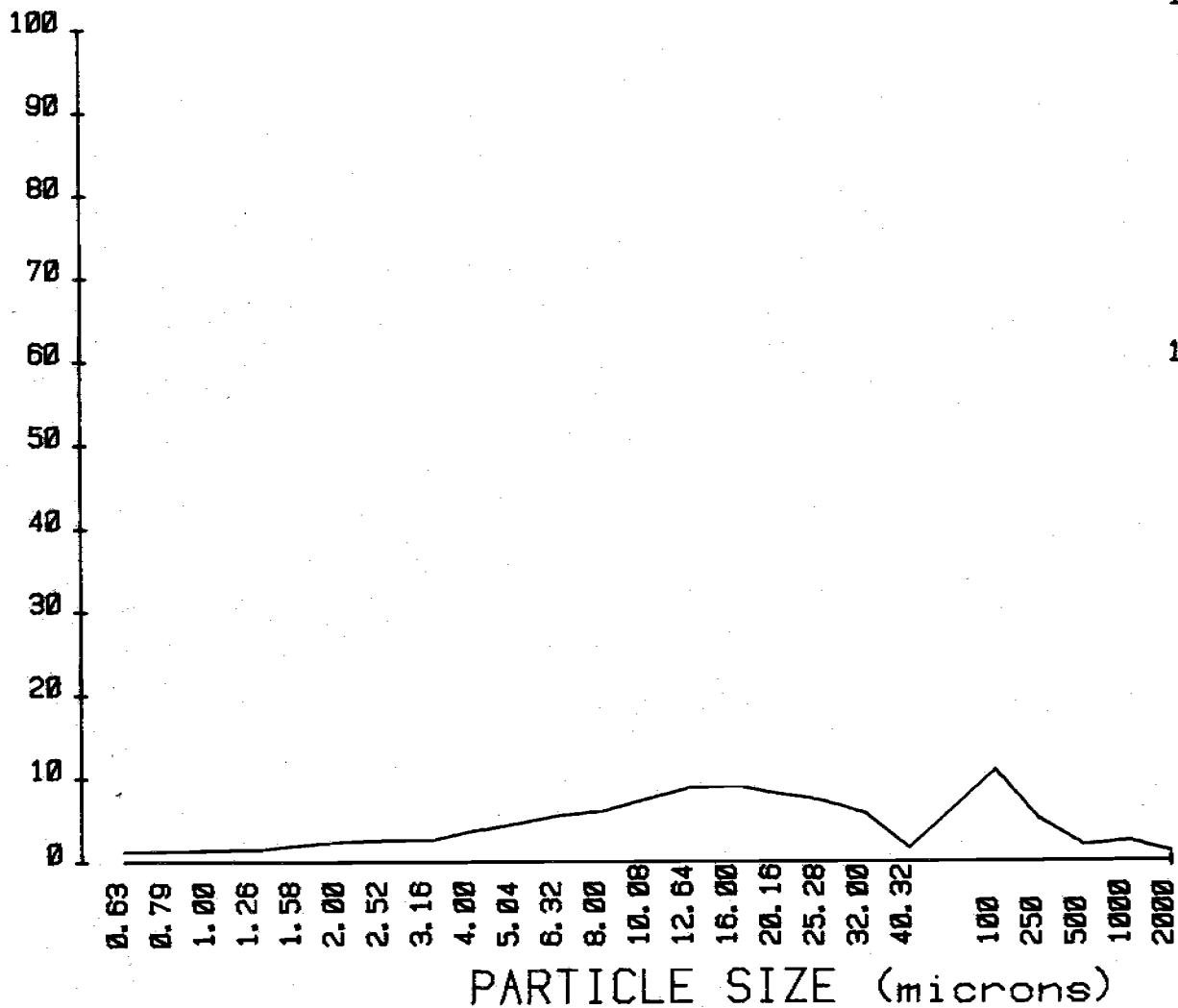
Date: September 1980

Identification		I18113-1	I18113-2		
Units		-----%			
TC (0.63-2.00)		6.47	6.99		
TSi (2.00-50)		72.70	71.91		
TS (50-2000)		20.83	21.10		
Clay	0.63-0.794	1.02	1.08		
	0.794-1.00	1.11	1.17		
	1.00-1.26	1.29	1.40		
	1.26-1.59	1.27	1.38		
	1.59-2.00	1.78	1.95		
Fine Silt	2.00-2.52	2.19	2.38		
	2.52-3.17	2.38	2.75		
	3.17-4.00	2.30	2.65		
	4.00-5.04	3.46	2.67		
Medium Silt	5.04-6.35	4.35	4.42		
	6.35-8.00	5.35	5.58		
	8.00-10.08	5.84	6.28		
	10.08-12.70	7.28	7.67		
	12.70-16.0	8.67	8.93		
Coarse Silt	16.0-20.2	8.83	8.63		
	20.2-25.4	7.85	8.02		
	25.4-32.0	7.10	5.77		
	32.0-40.3	5.58	4.51		
	40.3-50.8	1.44	1.47		
	50.8-64.0	0.09	0.16		
VFS (50-100)		10.77	12.50		
FS (100-250)		4.86	4.25		
MS (250-500)		1.80	1.54		
CoS (500-1000)		2.31	2.22		
VCoS (1000-2000)		1.09	0.58		
Greater than 2000		33	60		
Textural Class		Gr.SL	VGr.SL		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

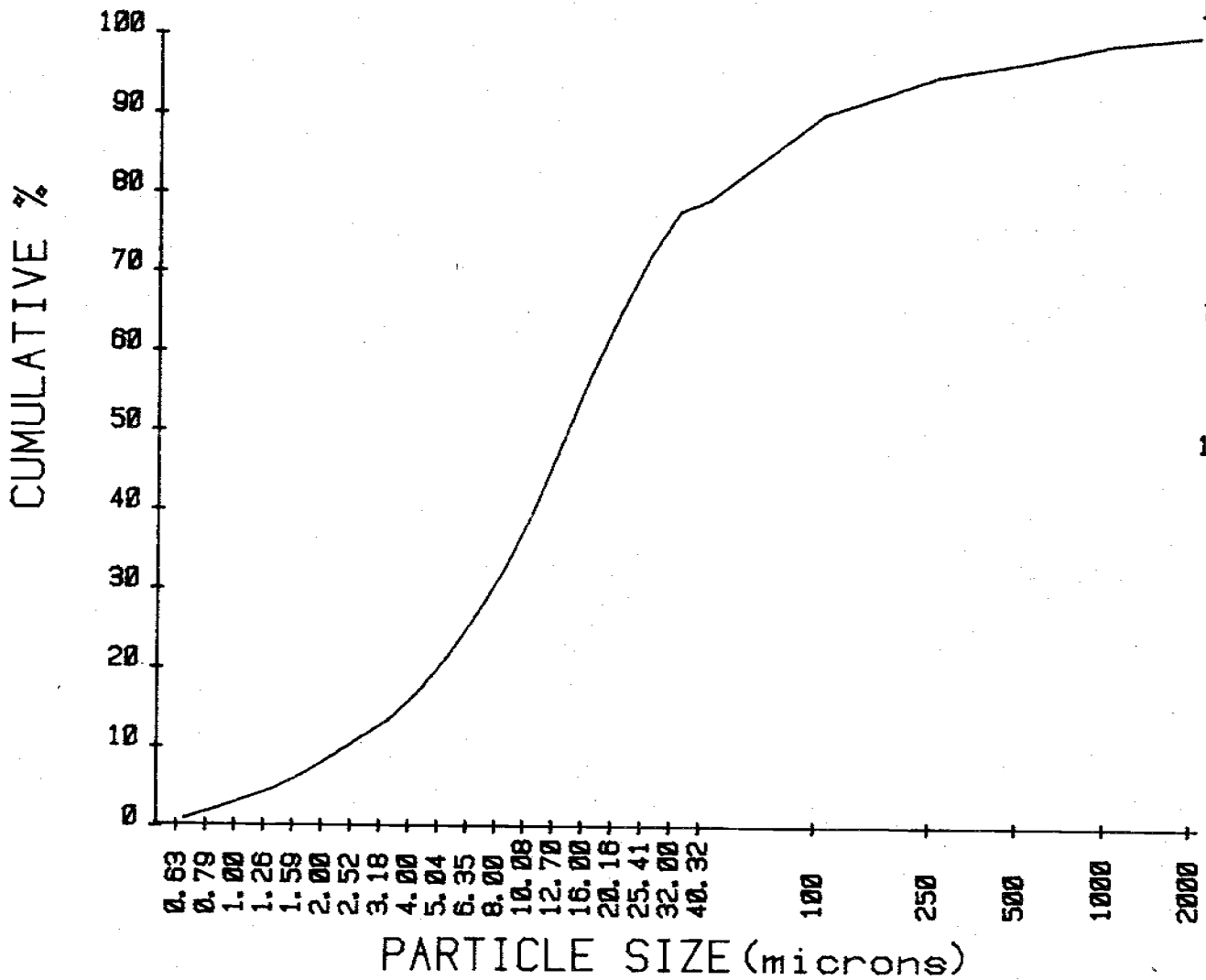
ID I18113-1



1.02	5.35
1.10	5.84
1.29	7.28
1.27	8.67
1.78	8.83
2.19	7.85
2.38	7.10
2.30	5.58
3.46	1.44
4.35	0.89
10.77	
4.86	
1.80	
2.31	
1.09	

CUMULATIVE CURVE SAND-SILT-CLAY

ID 118113-1

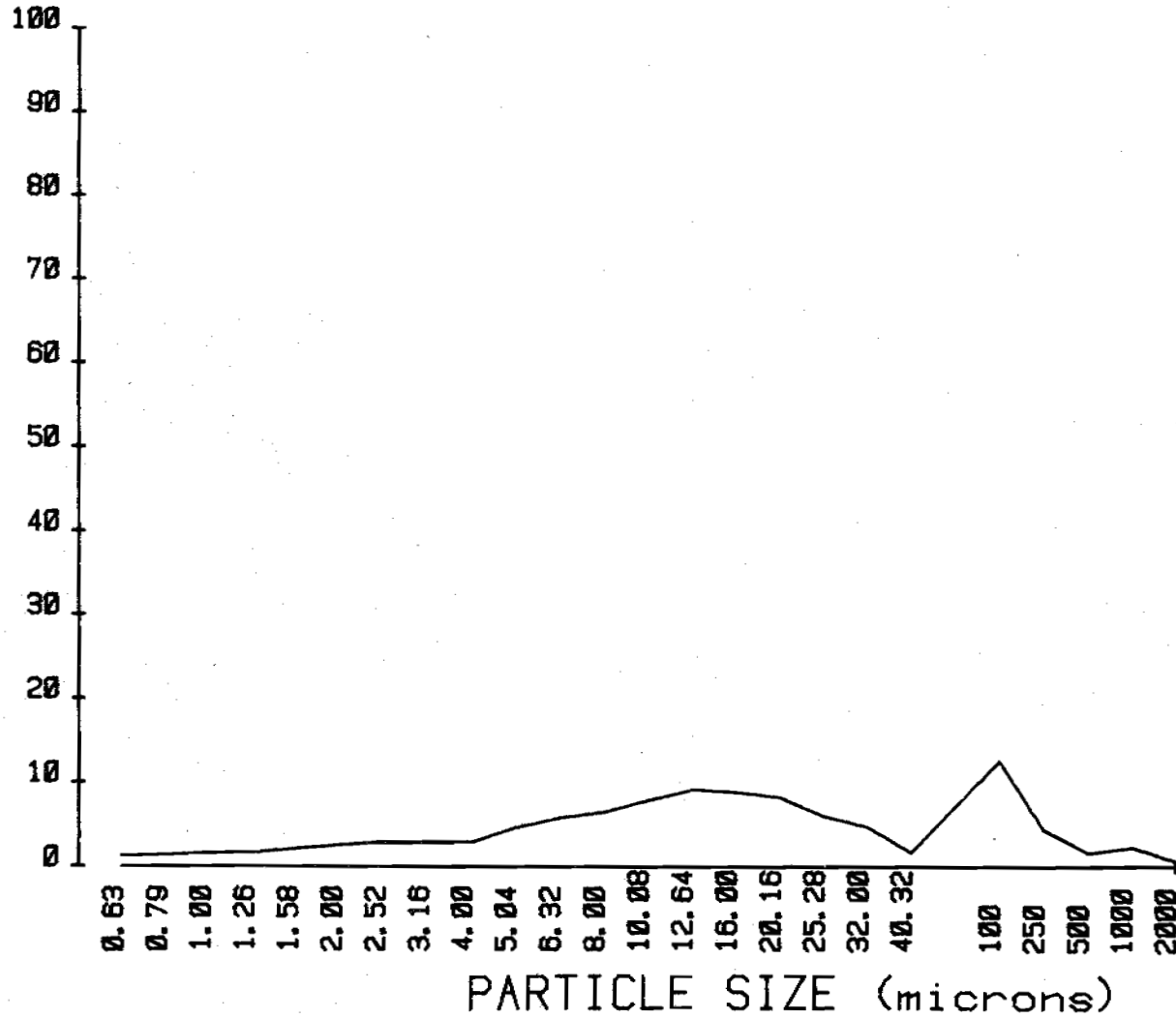


1.02	26.50
2.13	32.34
3.42	39.62
4.60	48.29
6.47	57.11
8.66	64.96
11.04	72.07
13.34	77.64
16.00	79.08
21.15	79.17
80.94	
94.80	
96.60	
98.91	
100.00	



PLOT SAND-SILT-CLAY

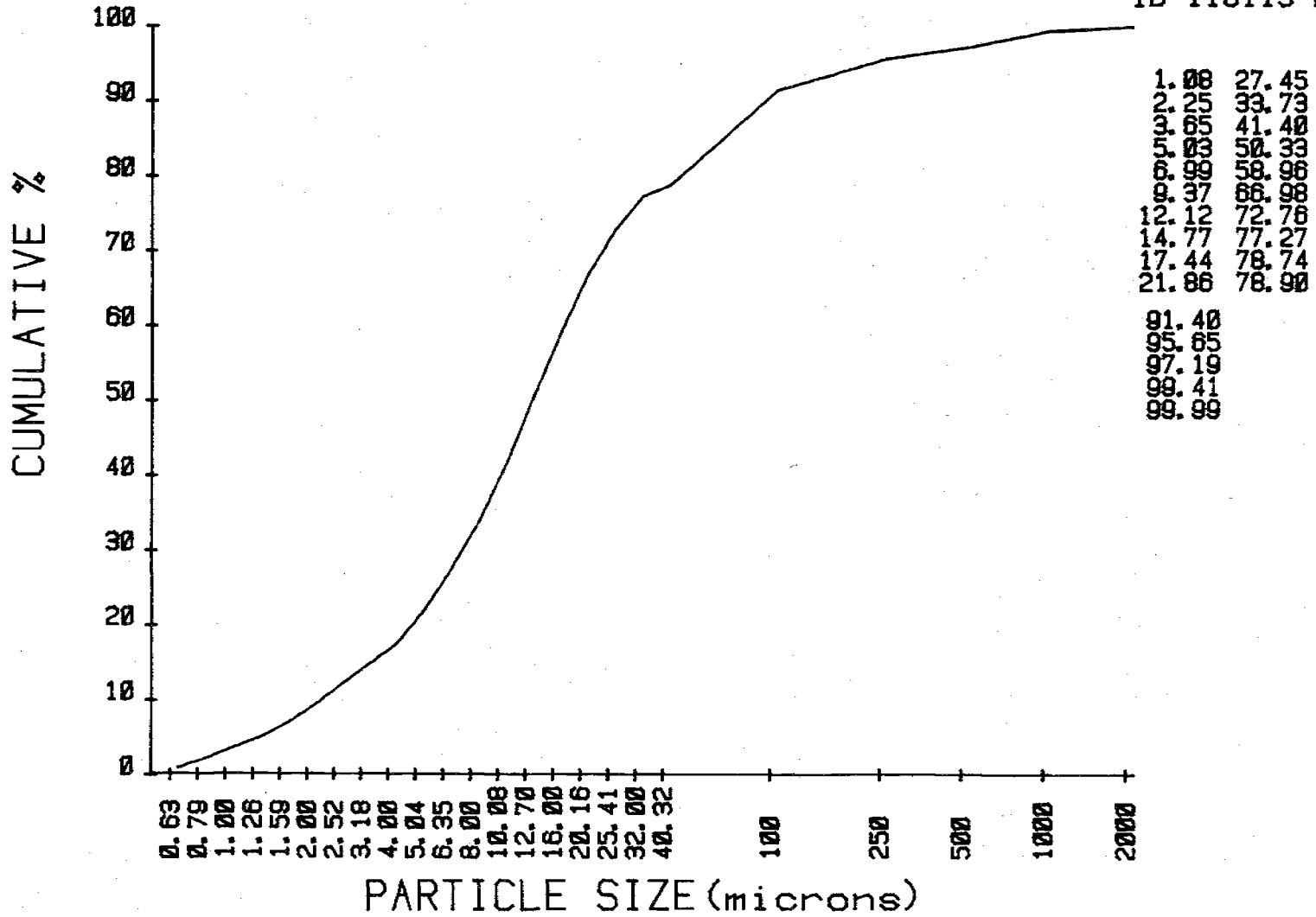
ID I18113-2



1.08	5.58
1.17	6.28
1.40	7.67
1.38	8.93
1.95	8.63
2.38	8.02
2.75	5.77
2.85	4.51
2.87	1.47
4.42	0.16
12.50	
4.25	
1.54	
2.22	
0.58	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18113-2



Unnamed Coarse Sandy Loam 79-ID-18114 (051301R-1)

Classification: coarse-loamy, mixed Typic Crymbrept.

General Site Characteristics

Location: Clearwater County, Idaho: northeast 1/4, northwest 1/4 of section 16,  
T. 38N., R. 12E.

Forest: Clearwater National Forest

Area: Kelly Creek Ranger District

Described By/Date: July 12, 1978, by Randy Moiser

Landform: 32

Habitat Type: lodgepole pine, old burn

Formation Name:

Parent Rock/Material: granitic

Weathering:

Topography: midslope

Slope: 30 percent

Aspect: south-west

Elevation: 5040 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-8 centimeters (2-8 inches).

A1 0-43 centimeters (0-17 inches). Very dark gray brown (10YR 3/2) moist; coarse sandy loam; medium fine granular structure; friable, nonsticky and nonplastic; very strongly acid pH 5.0, noncalcareous; trace gravels by weight.

B2 43-64 centimeters (17-25 inches). Dark brown (10YR 3/3) moist; gravelly coarse sandy loam; massive structure; very friable, nonsticky and nonplastic; medium acid pH 5.9, noncalcareous; 34 percent gravels by weight.

C 64+ centimeters (25+ inches). Light yellowish brown (2.5Y 6/4) moist; gravelly loamy coarse sand; massive structure; very friable, nonsticky and nonplastic; strongly acid pH 5.3, noncalcareous; 34 percent gravels by weight.

Pedon: Unnamed Coarse Sandy Loam 79-ID-18114 (051301R-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	5-0	NS	NS	NS	NS					
2	A1	0-43	5.0	0.27	76	5.9					
3	B2	43-64	5.9	0.13	45	1.2					
	C	64+	5.3	0.23	38	1.9					

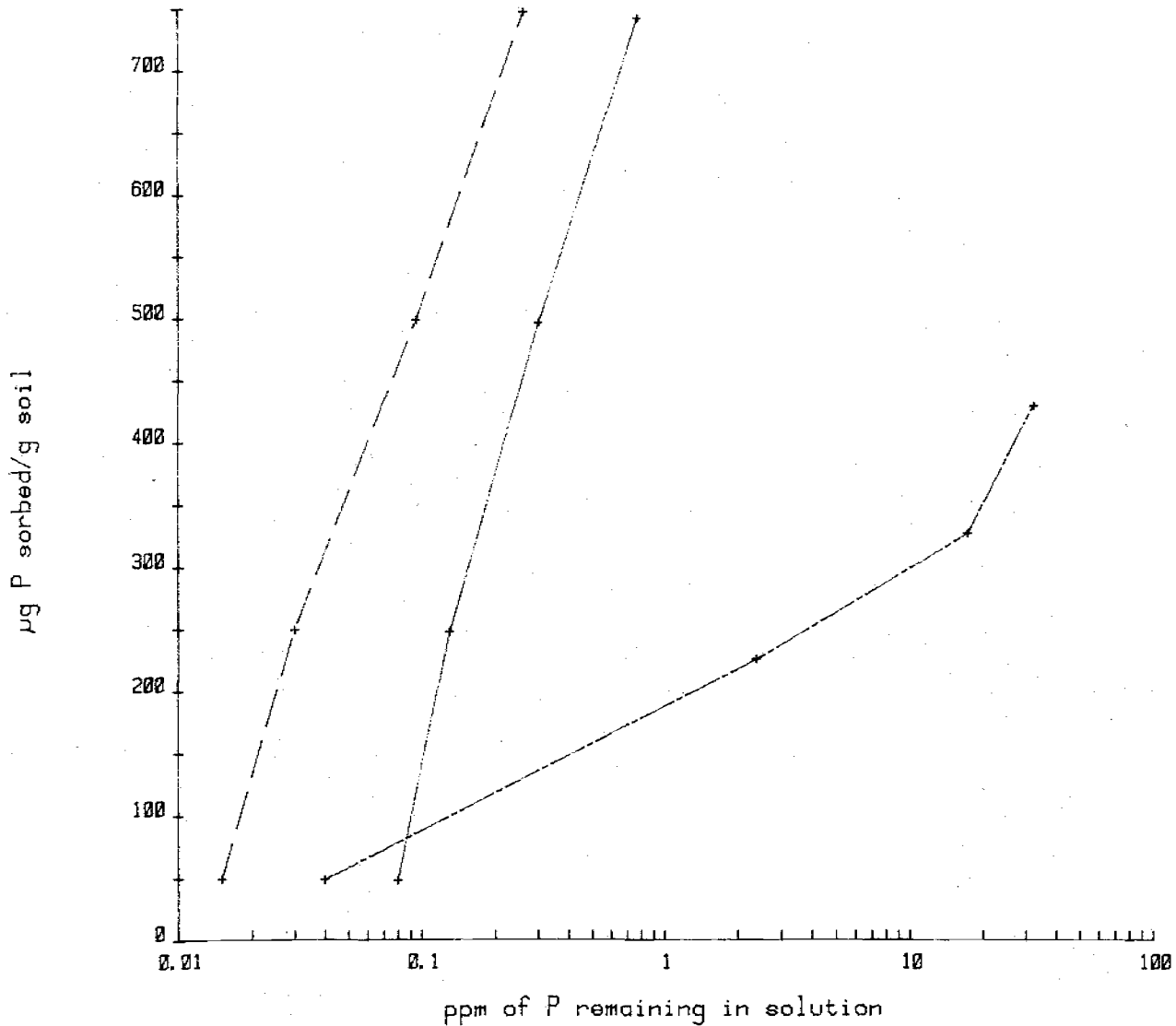
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.8	0.7	0.1	0.6	17.7	24.3	23	5.67	3.30	0.212	16	1.00	9.2
3	2.9	0.5	0.1	0.4	10.6	15.2	26	2.56	1.49	0.087	17	0.66	10.0
	4.6	0.8	0.1	0.3	3.7	10.4	61	0.50	0.29	0.026	11	0.66	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

### Phosphorus Isotherm

79-ID-18114



µg/g soil	Soln ppm
----- A1	
49	0.08
249	0.13
497	0.30
742	0.77
----- B2	
50	0.02
250	0.03
499	0.10
747	0.26
----- C	
50	0.04
226	2.38
329	17.20
430	32.00

Pedon: Unnamed Coarse Sandy Loam 79-ID-18114 (051301R-1)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	NS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.075	2-0.075	0.075-0.002	(0.002	wt.	vol.	
cm	X							X			
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-43	17.37	20.02	9.54	12.02	7.69	66.63	25.92	7.45	trace		Coarse sandy loam
43-64	15.40	22.10	10.45	12.71	7.62	68.28	24.08	7.64	34		Gr. coarse sandy loam
64+	9.05	20.09	14.70	21.11	12.43	77.38	19.80	2.82	34		Gr. loamy coarse sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	X			g/cc		X		X		
5-0						NS	NS	NS	NS	NS
0-43						22.8	12.8	NDNP	NDNP	NDNP
43-64						22.9	9.6	NDNP	NDNP	NDNP
64+						13.5	6.5	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

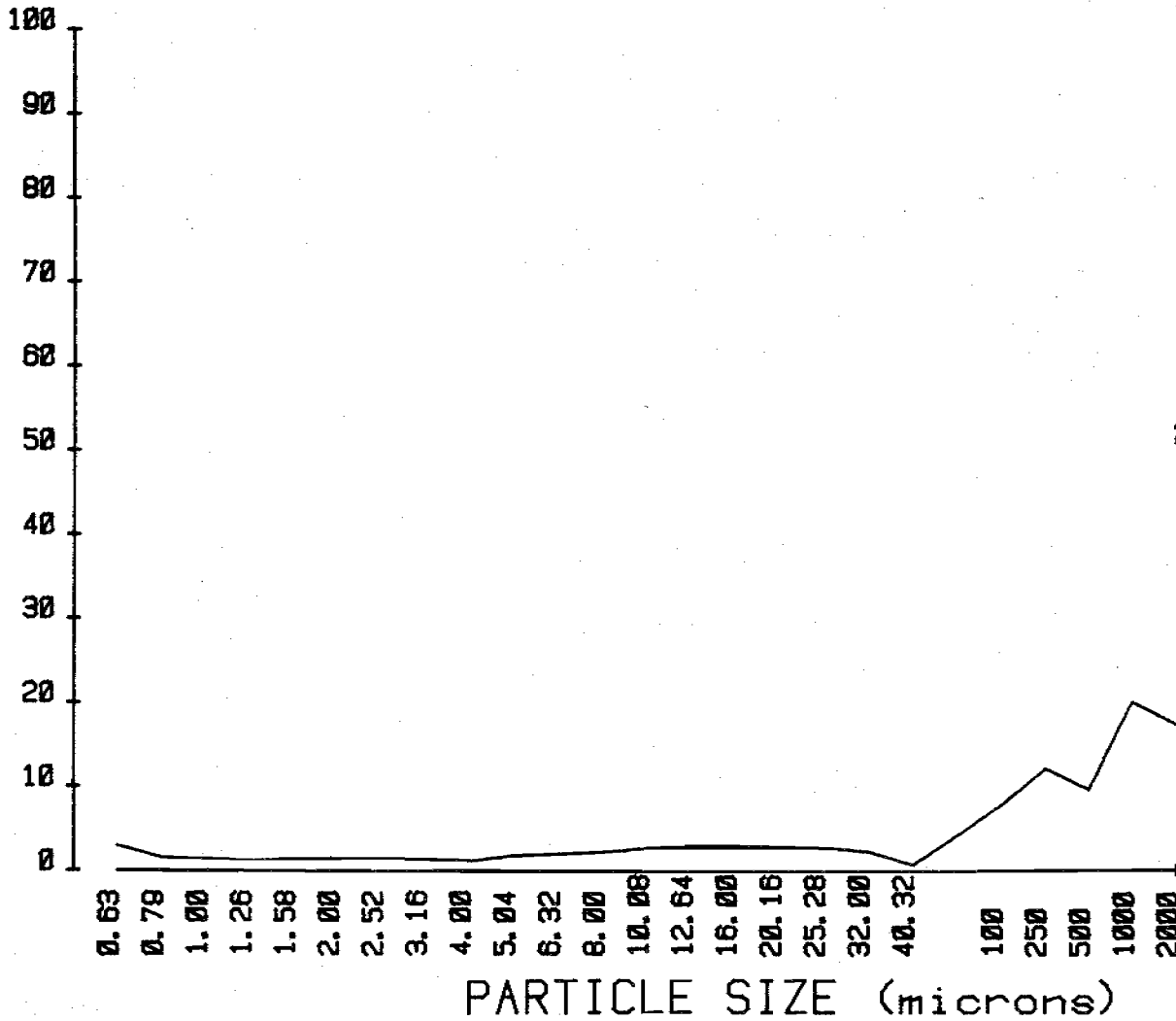
Date: September 1980

Identification		I18114-1	I18114-2	I18114-3	
Units		-----			%
TC (0.63-2.00)		7.45	7.64	2.82	
TSi (2.00-50)		25.92	24.08	19.80	
TS (50-2000)		66.63	68.28	77.38	
Clay	0.63-0.794	2.73	1.53	0.59	
	0.794-1.00	1.30	1.44	0.54	
	1.00-1.26	1.16	1.57	0.57	
	1.26-1.59	1.00	1.40	0.49	
	1.59-2.00	1.27	1.70	0.63	
Fine Silt	2.00-2.52	1.31	1.79	0.71	
	2.52-3.17	1.24	1.64	0.74	
	3.17-4.00	1.06	1.14	0.62	
	4.00-5.04	0.92	0.74	0.94	
Medium Silt	5.04-6.35	1.60	1.64	1.11	
	6.35-8.00	1.83	1.85	1.25	
	8.00-10.08	2.06	1.93	1.36	
	10.08-12.70	2.52	2.26	1.79	
	12.70-16.0	2.80	2.52	2.00	
	16.0-20.2	2.83	2.33	2.16	
Coarse Silt	20.2-25.4	2.62	2.13	2.10	
	25.4-32.0	2.50	1.97	2.22	
	32.0-40.3	2.08	1.55	1.77	
	40.3-50.8	0.52	0.57	0.85	
	50.8-64.0	0.03	0.04	0.18	
VFS (50-100)		7.69	7.62	12.43	
FS (100-250)		12.02	12.71	21.11	
MS (250-500)		9.54	10.45	14.70	
CoS (500-1000)		20.02	22.10	20.09	
VCoS (1000-2000)		17.37	15.40	9.05	
Greater than 2000		trace	34	34	
Textural Class		CSL	Gr. CSL	Gr. LCS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18114-1

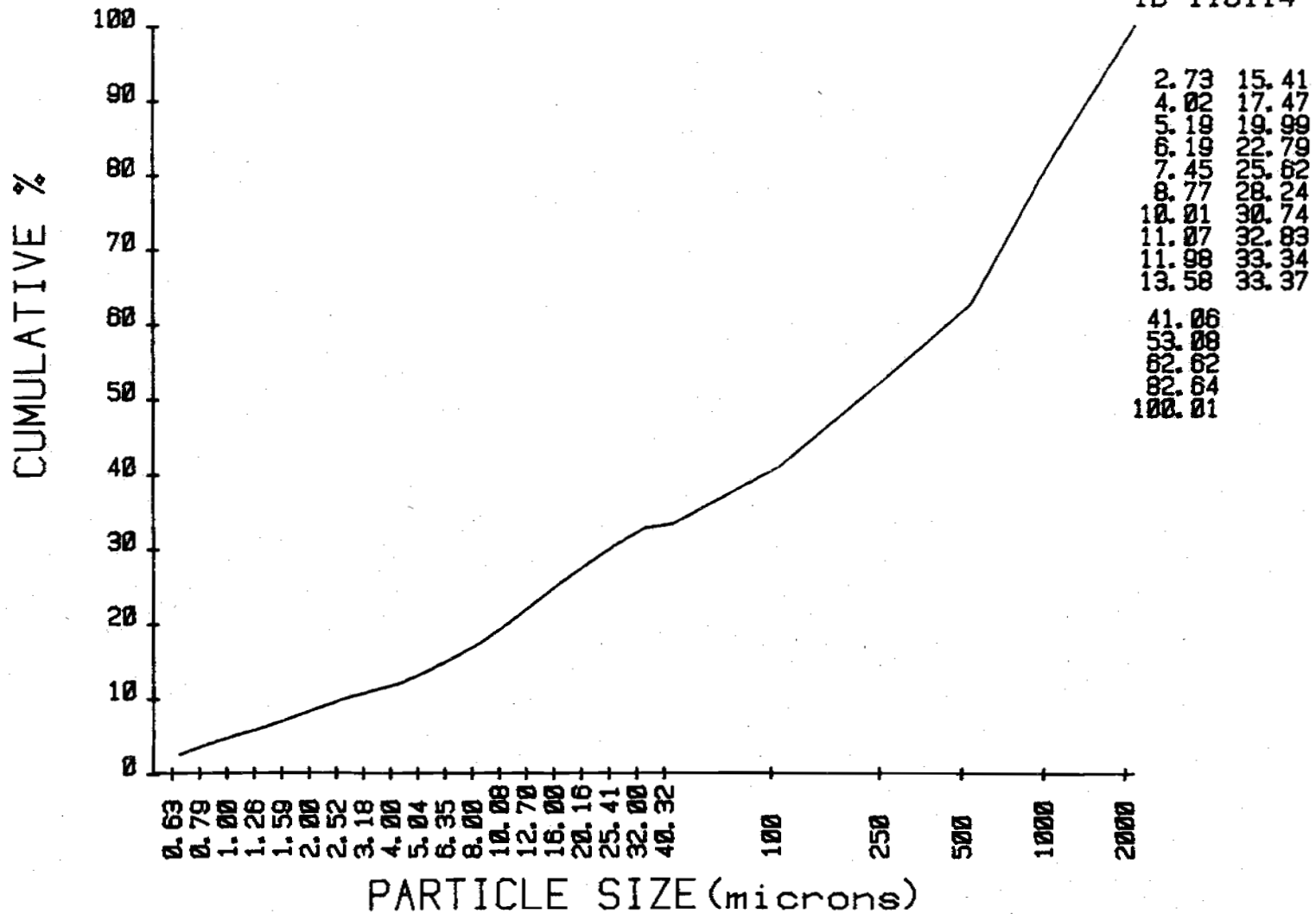


2.73	1.83
1.30	2.06
1.16	2.52
1.00	2.88
1.27	2.83
1.31	2.62
1.24	2.56
1.06	2.08
0.92	2.52
1.60	2.83
7.69	
12.02	
9.54	
20.02	
17.37	



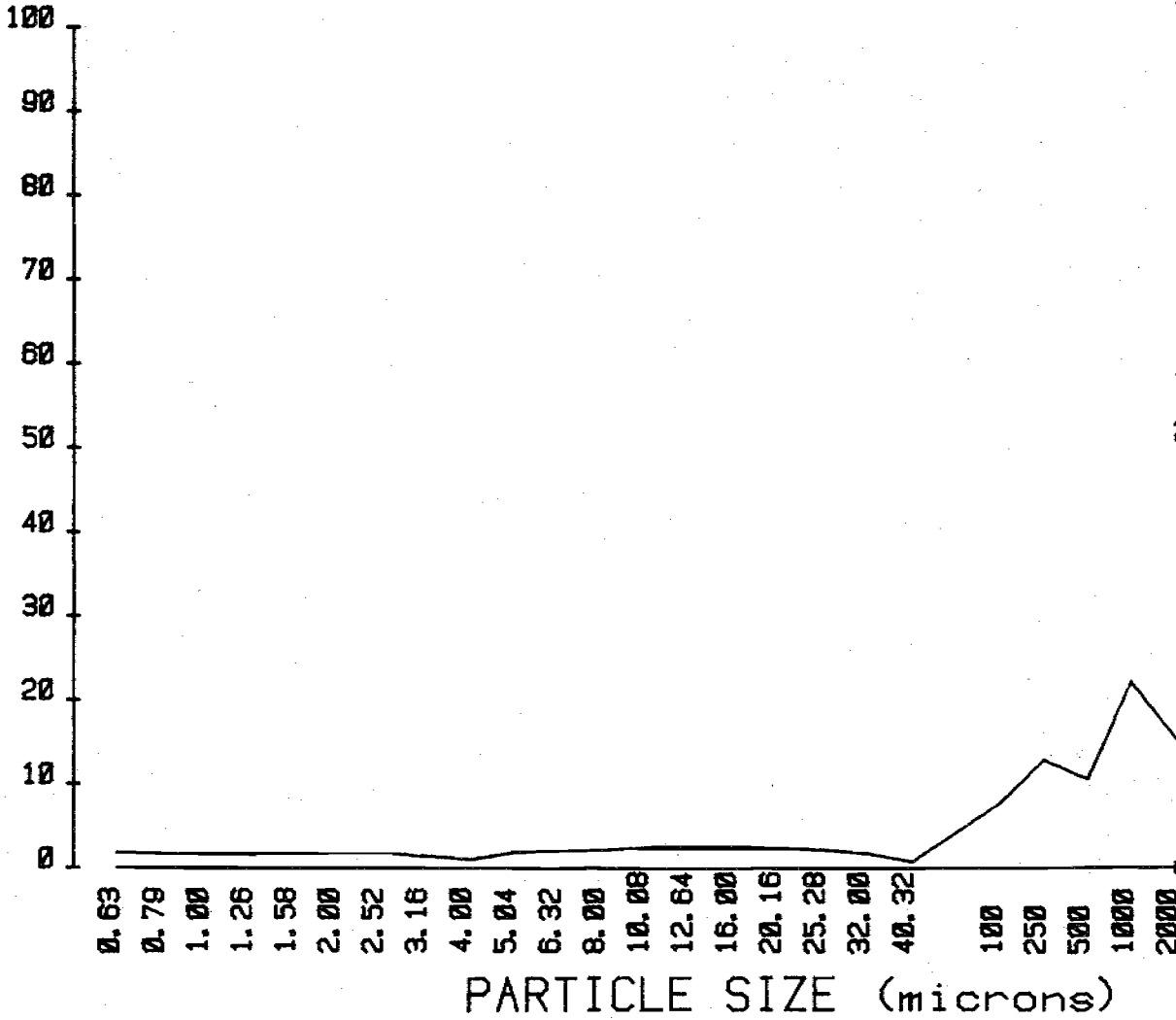
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18114-1



PLOT SAND-SILT-CLAY

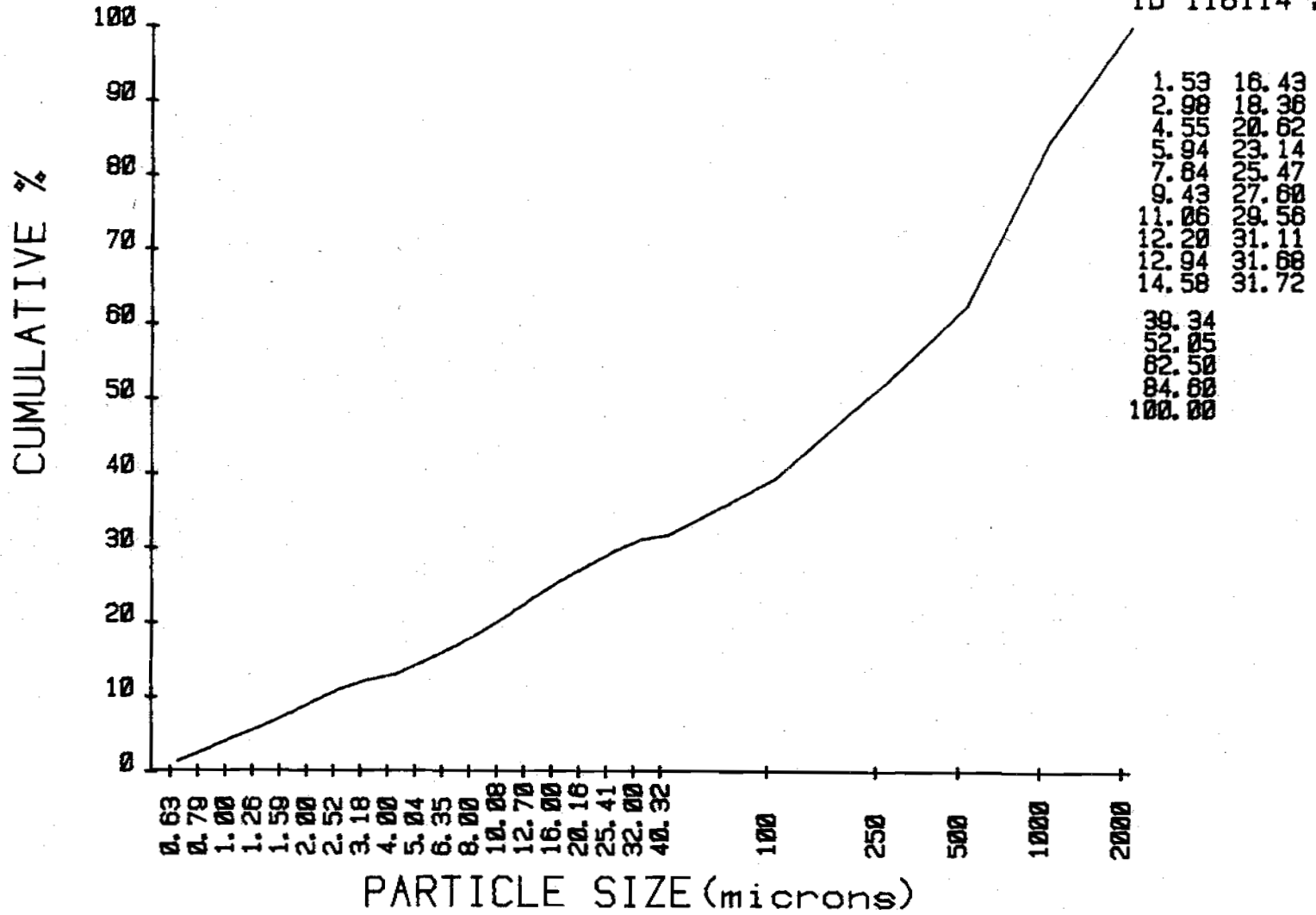
ID I18114-2



1.53	1.84
1.44	1.93
1.57	2.26
1.40	2.52
1.69	2.33
1.79	2.13
1.64	1.97
1.14	1.55
0.74	0.57
1.64	0.04
7.62	
12.71	
10.45	
22.10	
15.40	

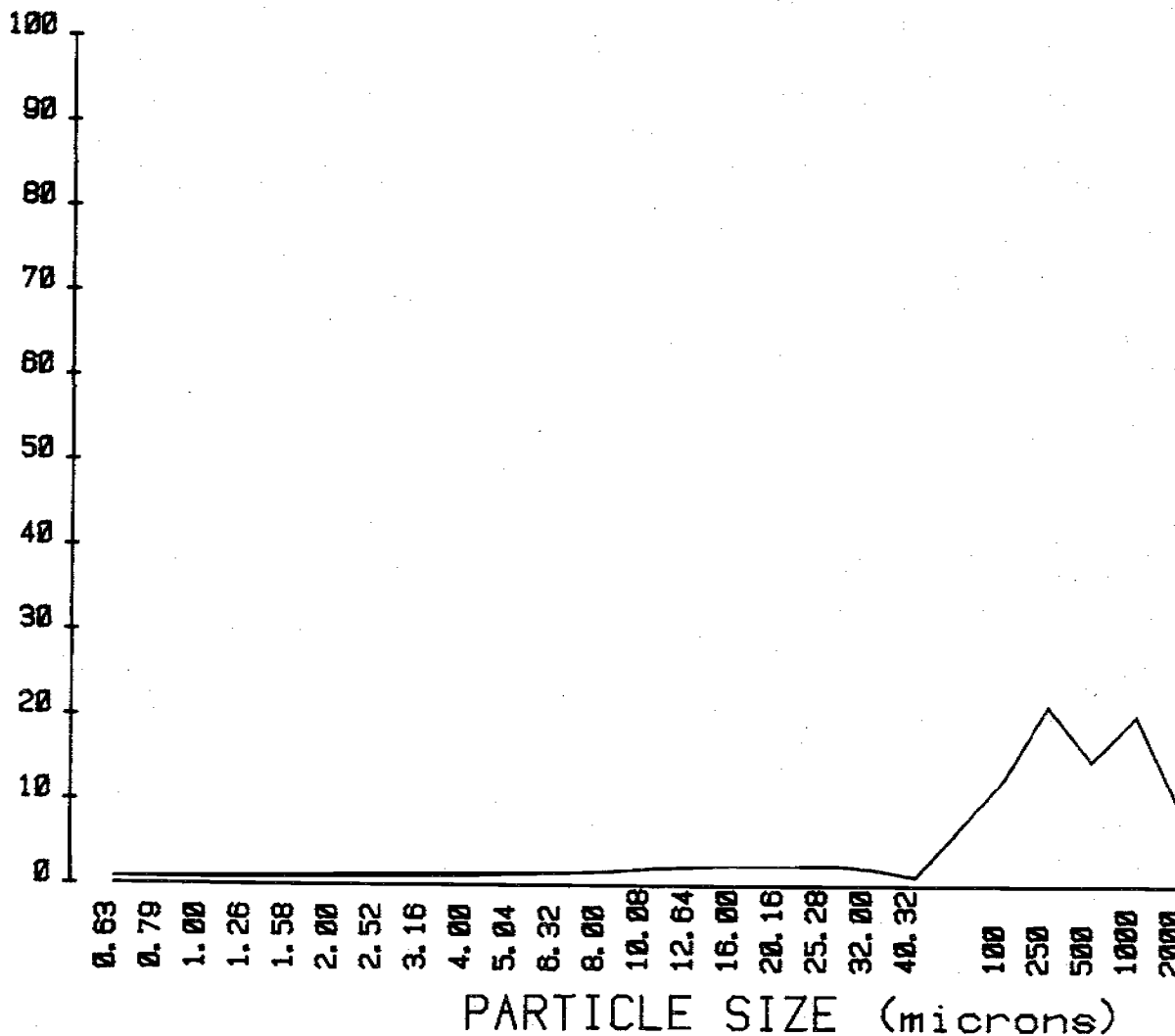
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18114-2



PLOT SAND-SILT-CLAY

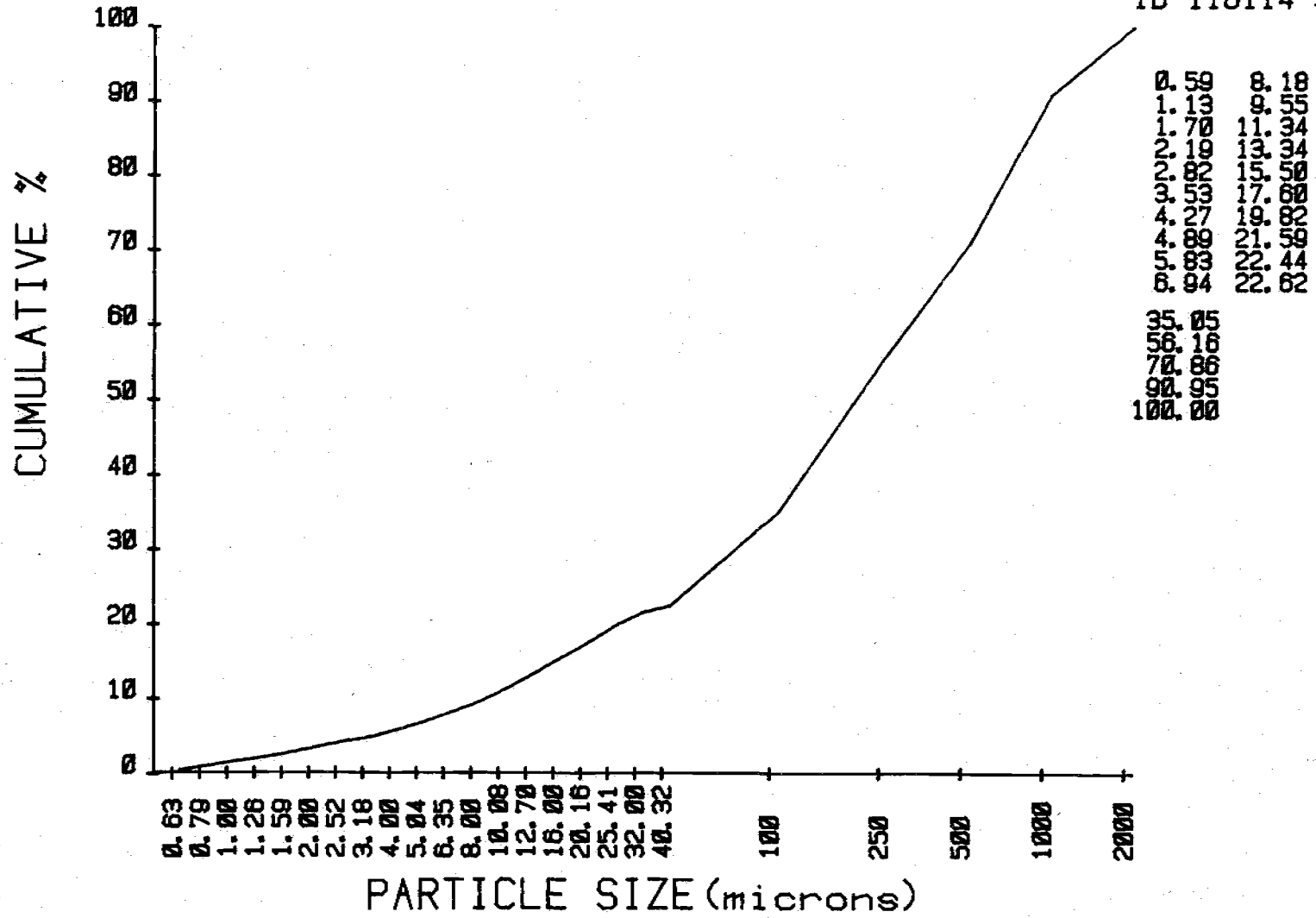
ID I18114-3



0.59	1.25
0.54	1.36
0.57	1.79
0.49	2.00
0.63	2.16
0.71	2.10
0.74	2.22
0.62	1.77
0.94	0.85
1.11	0.18
12.49	
21.11	
14.70	
20.09	
9.05	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18114-3



Unnamed Gravelly Loam 79-ID-18115 (171801B-3)

Classification: coarse-loamy, mixed, frigid Typic Dystrachrept.

General Site Characteristics

Location: Clearwater County, Idaho: northwest 1/4, southwest 1/4 of section 34,  
T. 37N., R. 14E.

Forest: Clearwater National Forest

Area: Powell Ranger District

Described By/Date: August 8, 1978, by Randy Moiser

Landform: 31

Habitat Type: western red cedar/Pany h.t.

Formation Name:

Parent Rock/Material: granitic

Weathering:

Topography: lower 1/3, straight slope

Slope: 50 percent

Aspect: east-northeast

Elevation: 4130 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 0.5-0 centimeters (1-0 inches).

A1 0-15 centimeters (0-6 inches). Dark yellowish brown (10YR 4/4) moist; gravelly loam; moderate very fine granular structure; very friable, nonsticky and nonplastic; strongly acid pH 5.2, noncalcareous; 32 percent gravels by weight.

B2ir 15-36 centimeters (6-14 inches). Dark yellowish brown (10YR 4/4) moist; gravelly loam; moderate very fine granular structure; very friable, nonsticky and nonplastic; strongly acid pH 5.3, noncalcareous; 28 percent gravels by weight.

IIB3 36-56 centimeters (14-22 inches). Yellowish brown (10YR 5/4) moist; gravelly loam; moderate fine subangular blocky structure; friable, slightly sticky and nonplastic; very strongly acid pH 5.0, noncalcareous; 21 percent gravels by weight.

IIC 56+ centimeters (22+ inches). No lab sample.

Peden: Unnamed Gravelly Loam 79-ID-18115 (171801B-3)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	0.5-0	NS	NS	NS	NS					
2	A1	0-15	5.2	0.28	52	4.9					
3	B2ir	15-36	5.3	0.28	55	5.0					
	IIR3	36-56	5.0	0.16	37	2.1					
	IIC	56+	NS	NS	NS	NS					

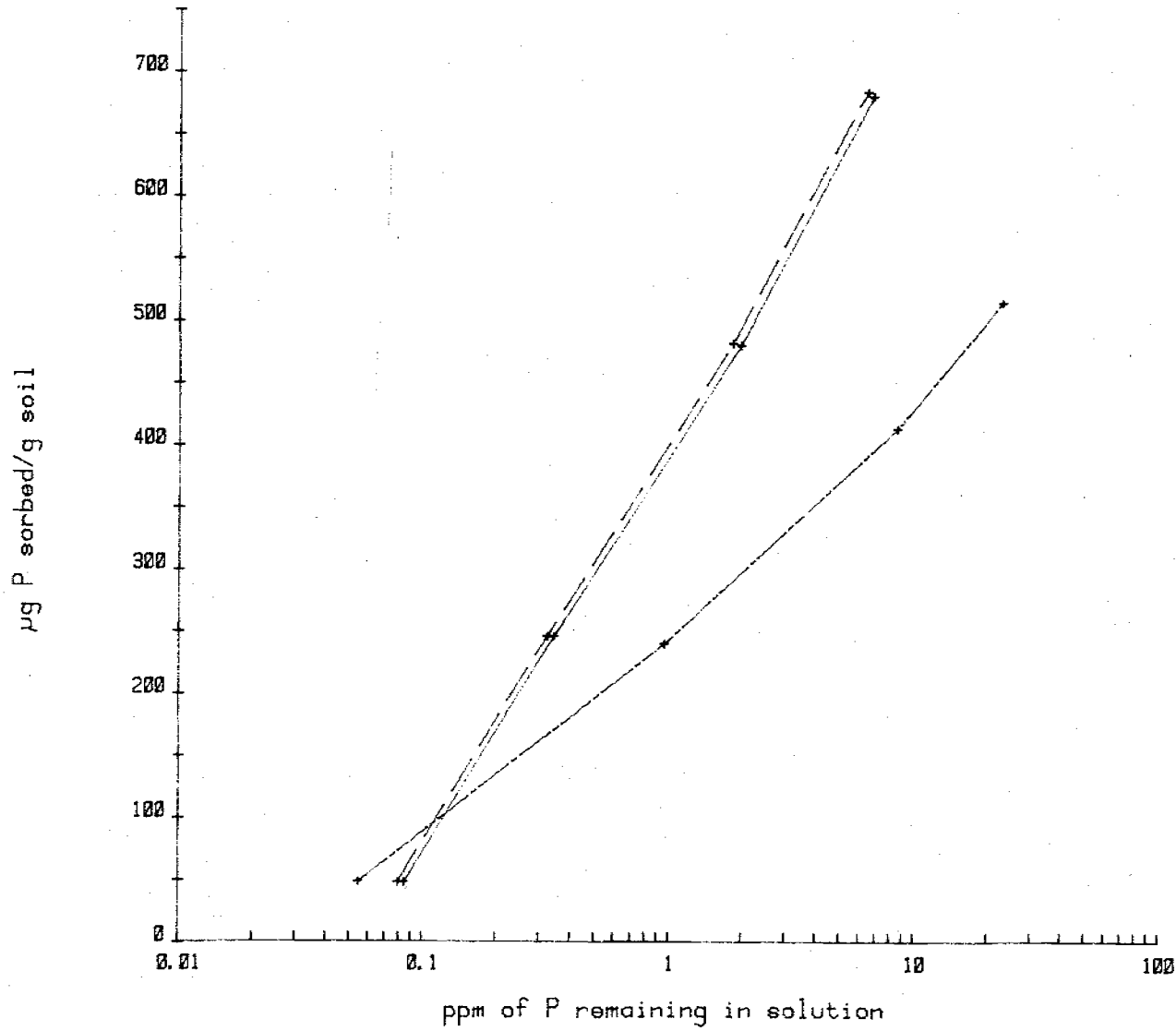
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	4.0	1.1	0.1	0.3	9.0	14.8	38	2.92	1.70	0.084	20	0.68	8.1
3	5.0	1.1	0.1	0.4	10.1	18.2	40	3.97	2.31	0.121	19	0.80	8.2
	2.9	1.5	0.1	0.2	5.7	10.4	45	0.88	0.51	0.042	12	0.79	8.0
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-10-18115



µg/g soil	Soln ppm	
----- A1		
49	0.09	
247	0.35	
480	2.00	
680	6.96	
----- B2ir		
49	0.08	
247	0.33	
482	1.85	
684	6.60	
----- I1B3		
49	0.06	
240	0.97	
413	8.68	
515	23.52	



Pedon: Unnamed Gravelly Loam 79-ID-18115 (171801B-3)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	Z							Z			
0.5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-15	3.68	8.34	6.61	14.39	12.37	45.39	43.87	10.74	32		Gr. loam
15-36	3.64	8.25	7.02	13.61	12.33	44.84	41.58	13.58	20		Gr. loam
36-56	2.85	7.95	6.71	13.92	12.32	43.75	47.71	8.54	21		Gr. loam
56+	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	Z			g/cc		Z		Z		
0.5-0						NS	NS	NS	NS	NS
0-15						23.4	9.7	NDMP	NDMP	NDMP
15-36						29.7	11.1	NDMP	NDMP	NDMP
36-56						19.9	7.5	NDMP	NDMP	NDMP
56+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

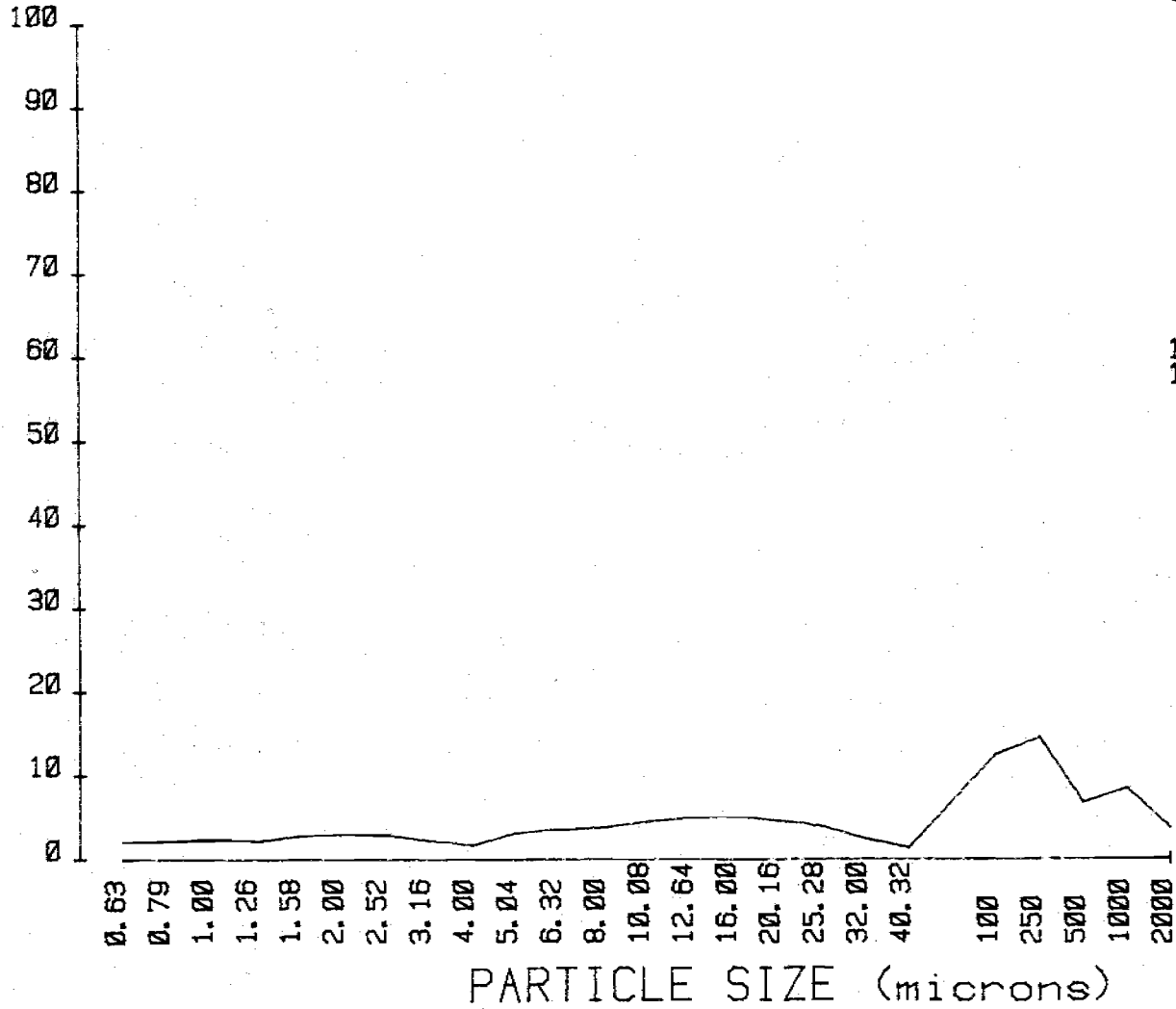
Date: September 1980

Identification		I18115-1	I18115-2	I18115-3	
Units		-----%			
TC (0.63-2.00)		10.74	13.58	8.54	
TSi (2.00-50)		43.87	41.58	47.71	
TS (50-2000)		45.39	44.84	43.75	
Clay	0.63-0.794	1.90	2.30	1.32	
	0.794-1.00	2.05	2.61	1.52	
	1.00-1.26	2.26	2.90	1.79	
	1.26-1.59	1.98	2.58	1.67	
	1.59-2.00	2.55	3.20	2.25	
Fine Silt	2.00-2.52	2.75	3.30	2.56	
	2.52-3.17	2.64	2.86	2.69	
	3.17-4.00	1.95	1.82	2.36	
	4.00-5.04	1.43	1.04	1.90	
Medium Silt	5.04-6.35	2.92	2.67	3.40	
	6.35-8.00	3.31	3.05	3.79	
	8.00-10.08	3.56	3.26	4.03	
	10.08-12.70	4.26	4.04	4.57	
	12.70-16.0	4.75	4.20	4.99	
	16.0-20.2	4.89	4.15	5.18	
Coarse Silt	20.2-25.4	4.35	3.92	4.74	
	25.4-32.0	3.68	3.56	3.52	
	32.0-40.3	2.20	1.93	3.07	
	40.3-50.8	1.11	1.19	0.64	
	50.8-64.0	0.06	0.60	0.26	
VFS (50-100)		12.37	12.33	12.32	
FS (100-250)		14.39	13.61	13.92	
MS (250-500)		6.61	7.02	6.71	
CoS (500-1000)		8.34	8.25	7.95	
VCoS (1000-2000)		3.68	3.64	2.85	
Greater than 2000		32	20	21	
Textural Class		Gr. Loam	Gr. Loam	Gr. Loam	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

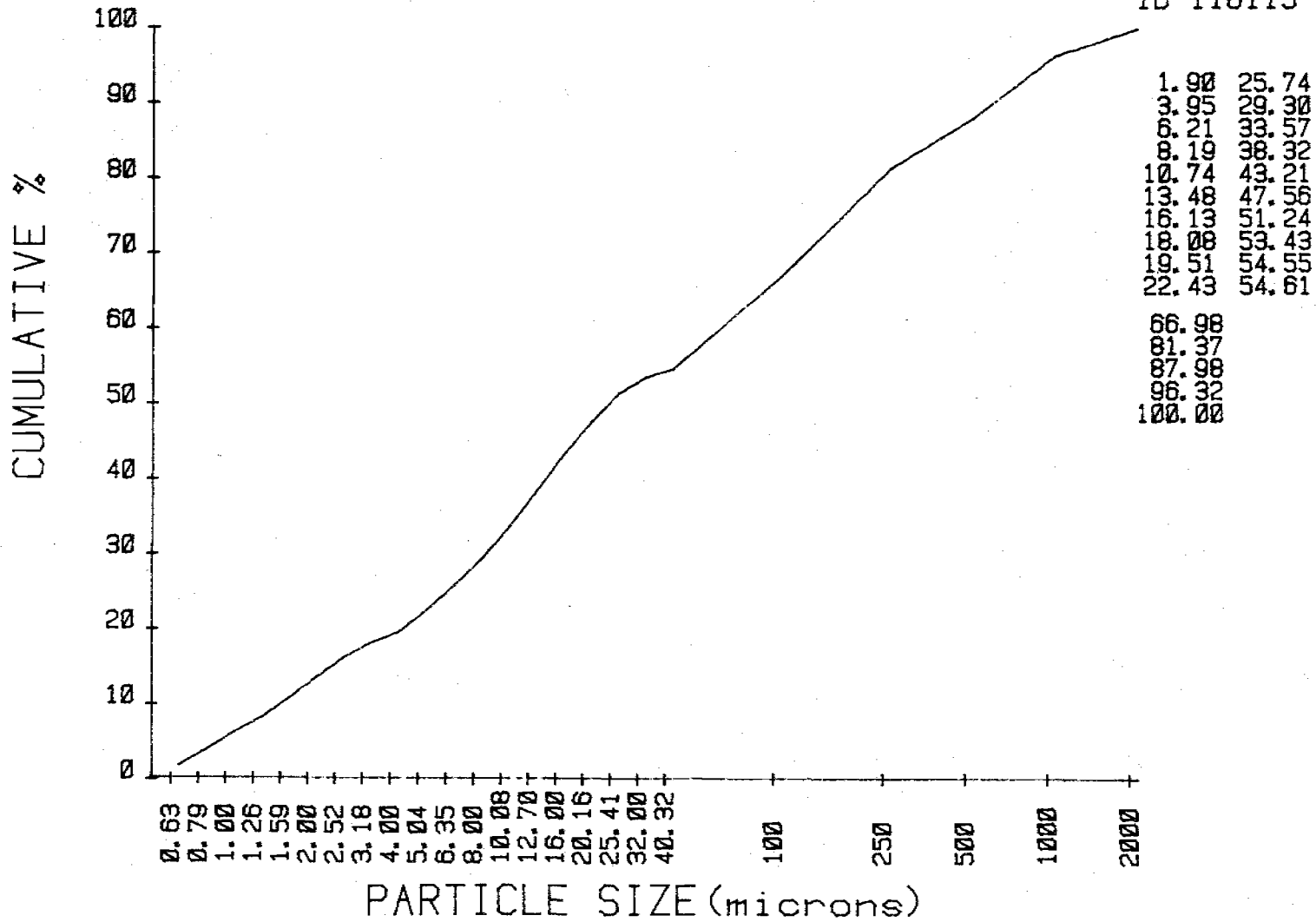
ID I18115-1



- 1.90 3.31
- 2.05 3.56
- 2.26 4.26
- 1.98 4.75
- 2.55 4.89
- 2.75 4.95
- 2.64 3.68
- 1.95 2.28
- 1.43 1.11
- 2.92 0.06
- 12.37
- 14.39
- 6.61
- 8.34
- 3.68

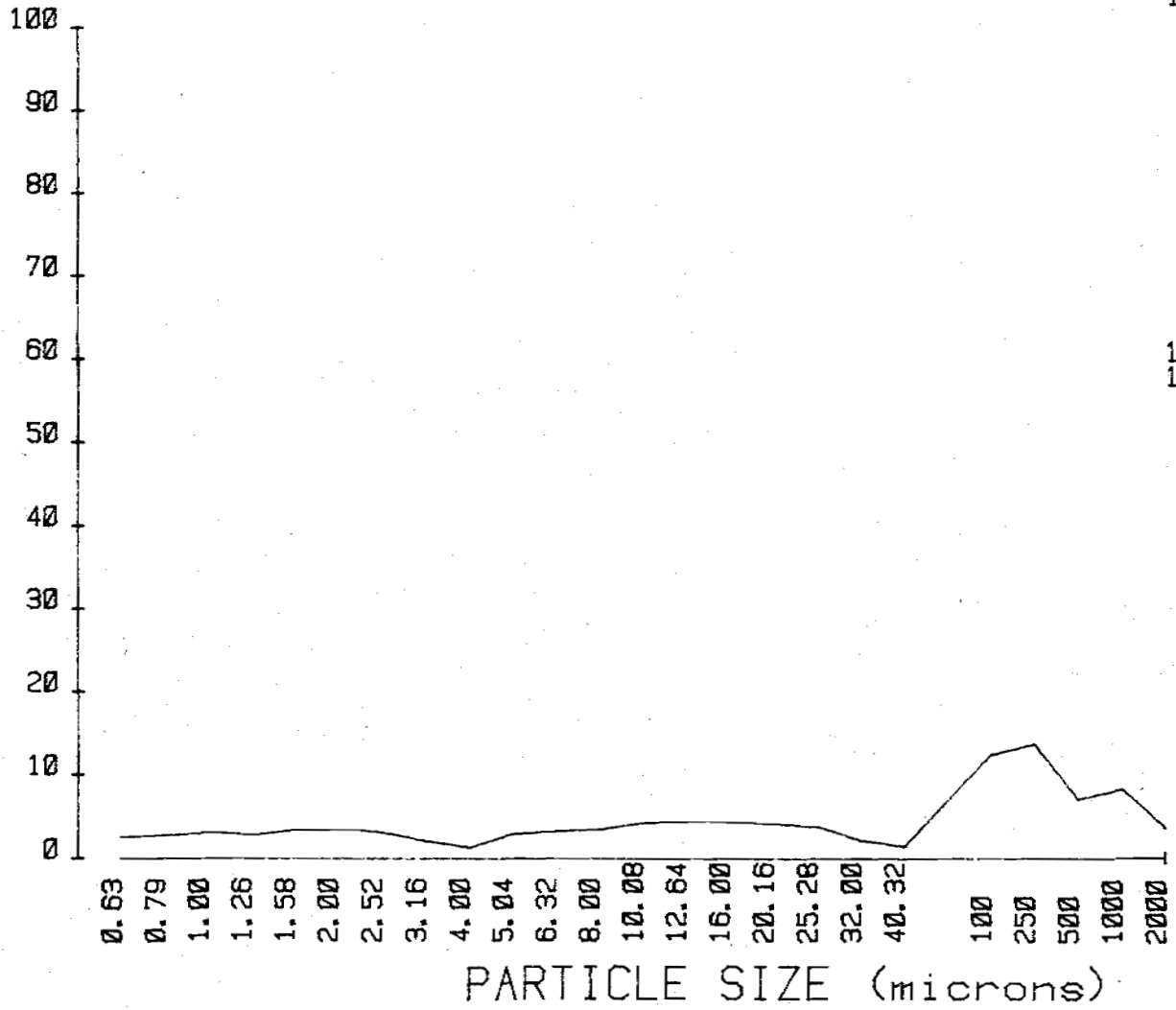
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18115-1



PLOT SAND-SILT-CLAY

ID I18115-2



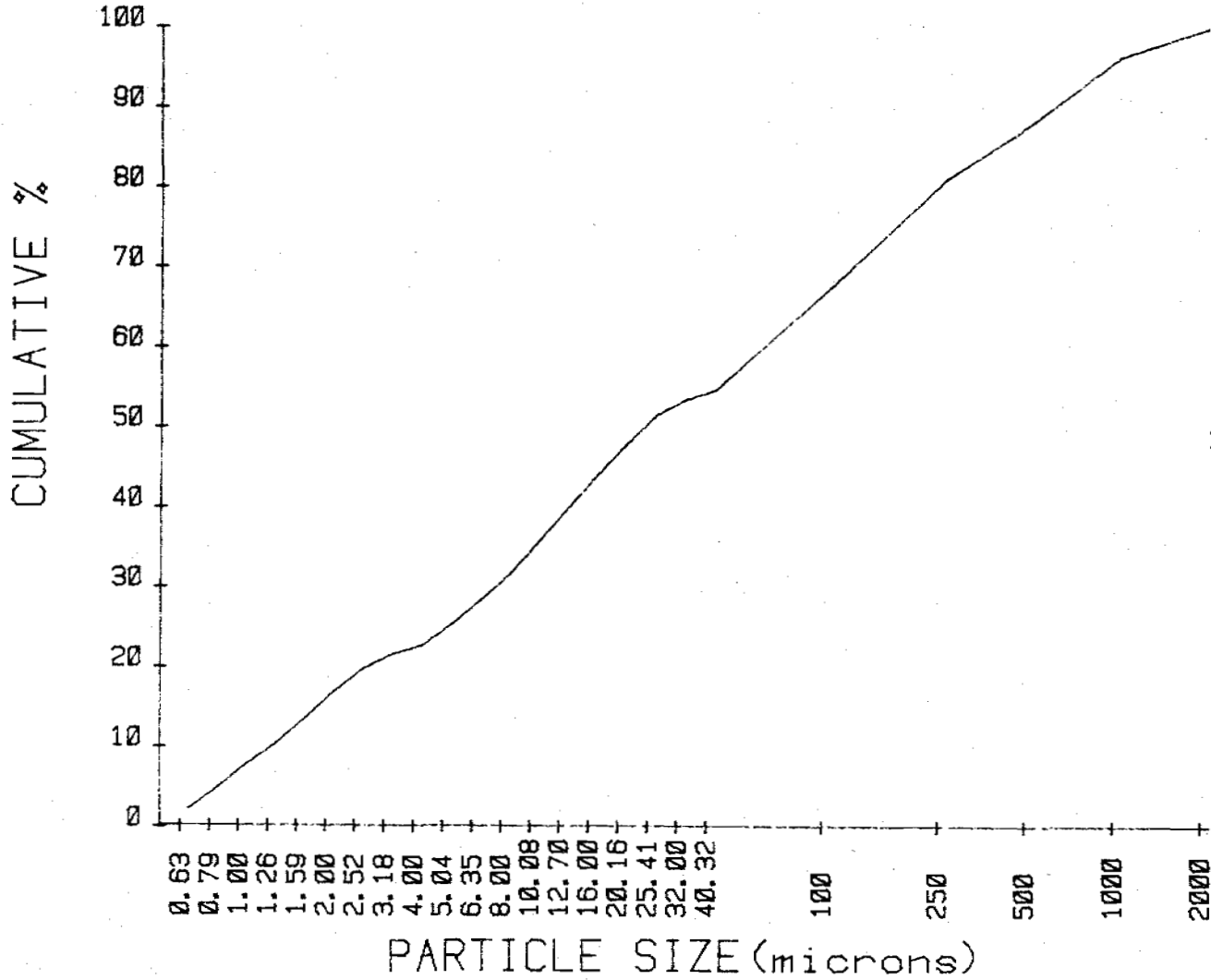
2.30	3.05
2.61	3.26
2.90	4.04
2.58	4.20
3.20	4.15
3.30	3.92
2.86	3.56
1.82	1.93
1.04	1.19
2.67	0.60
12.33	
13.61	
7.02	
8.25	
3.64	

282

x

CUMULATIVE CURVE SAND-SILT-CLAY

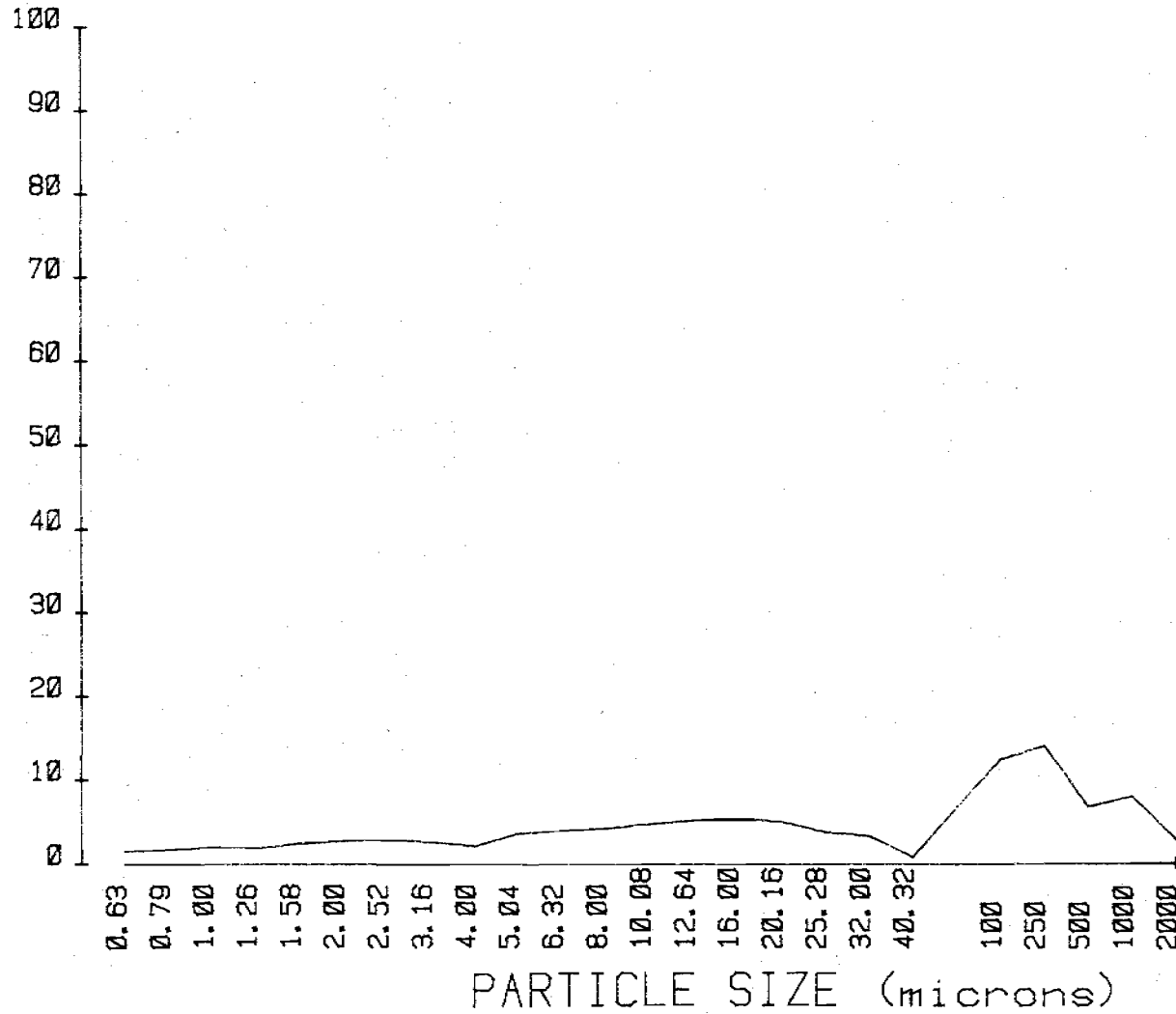
ID I18115-2



2.30	28.31
4.91	31.58
7.81	35.62
10.38	39.81
13.58	43.96
16.87	47.89
19.74	51.44
21.55	53.37
22.59	54.56
25.27	55.16
67.49	
81.10	
88.12	
96.37	
100.01	

PLOT SAND-SILT-CLAY

ID I18115-3



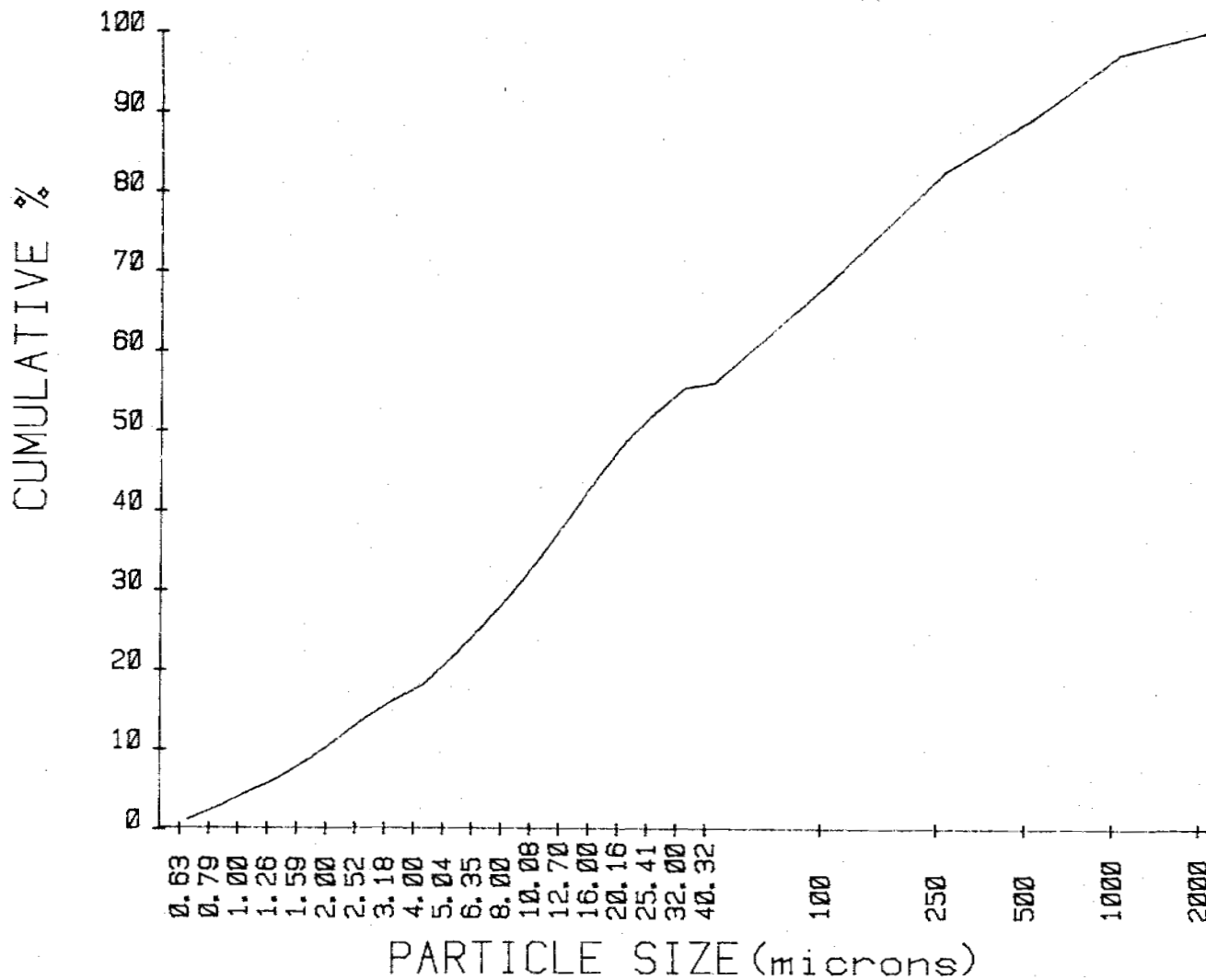
1.31	3.79
1.52	4.03
1.79	4.56
1.67	4.99
2.25	5.18
2.56	4.74
2.69	3.52
2.36	3.07
1.90	0.64
3.40	0.26
12.32	
13.92	
6.71	
7.95	
2.85	

78Z

z

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18115-3



1.31	25.25
2.89	29.28
4.62	33.84
6.29	38.83
8.54	44.01
11.10	48.76
13.79	52.28
16.15	55.35
18.05	55.99
21.45	56.25
68.57	
82.49	
89.20	
97.15	
100.00	



Unnamed Loam 79-ID-18116 (030701R-2)

Classification: medial over loamy, mixed, frigid Andic Dystrochrept.

General Site Characteristics

Location: Clearwater County, Idaho: northeast 1/4, northwest 1/4 of section 27,  
T. 36N., R 6E.

Forest: Clearwater National Forest

Area: Pierce Ranger District

Described By/Date: June 13, 1978, by Randy Moiser

Landform: 24

Habitat Type: western red cedar/Pony h.t.

Formation Name:

Parent Rock/Material: ash over weathered Batholith

Weathering:

Topography: upper 1/3, straight vertically,

Slope: 55 percent

Aspect: 250 degrees

Elevation: 3850 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 1-0 centimeters (1/4-0 inches).

A1 0-3 centimeters (0-1 inch). Very dark gray brown (10YR 3/2) moist; silt loam; moderate very fine granular structure; very friable, slightly sticky and nonplastic; no lab sample; less than 10 percent coarse fragments.

B2ir 3-38 centimeters (1-15 inches). Dark yellowish brown (10YR 4/4) moist; loam; weak fine granular structure; very friable, slightly sticky and nonplastic; medium acid pH 5.9, noncalcareous; 16 percent gravels by weight.

IIB2 38-104 centimeters (15-41 inches). Dark brown (10YR 3/3) moist; gravelly coarse sandy loam; weak subangular blocky structure; very friable, slightly sticky and nonplastic; strongly acid pH 6.1, noncalcareous; 21 percent gravels by weight.

IIC 104+ centimeters (41+ inches). Brown (10YR 4/3) moist; loamy coarse sand; massive structure; very friable; medium acid pH 5.9, noncalcareous; 15 percent gravels by weight.

Pedon: Unnamed Loam 79-ID-18116 (030701R-2)

Date: April 1980

Sample No.	Horizon	Depth	pH paste	EC#10 <sup>3</sup>	% Water at Saturation	Available P	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
		cm		mmhos/cm		ppm	%				
	0	1- 0	NS	NS	NS	NS					
	A1	0- 3	NS	NS	NS	NS					
1	B21r	3- 38	5.9	0.15	83	1.1					
2	IIB1	38-104	6.1	0.08	44	1.4					
3	IIC	104+	5.9	0.47	39	2.0					

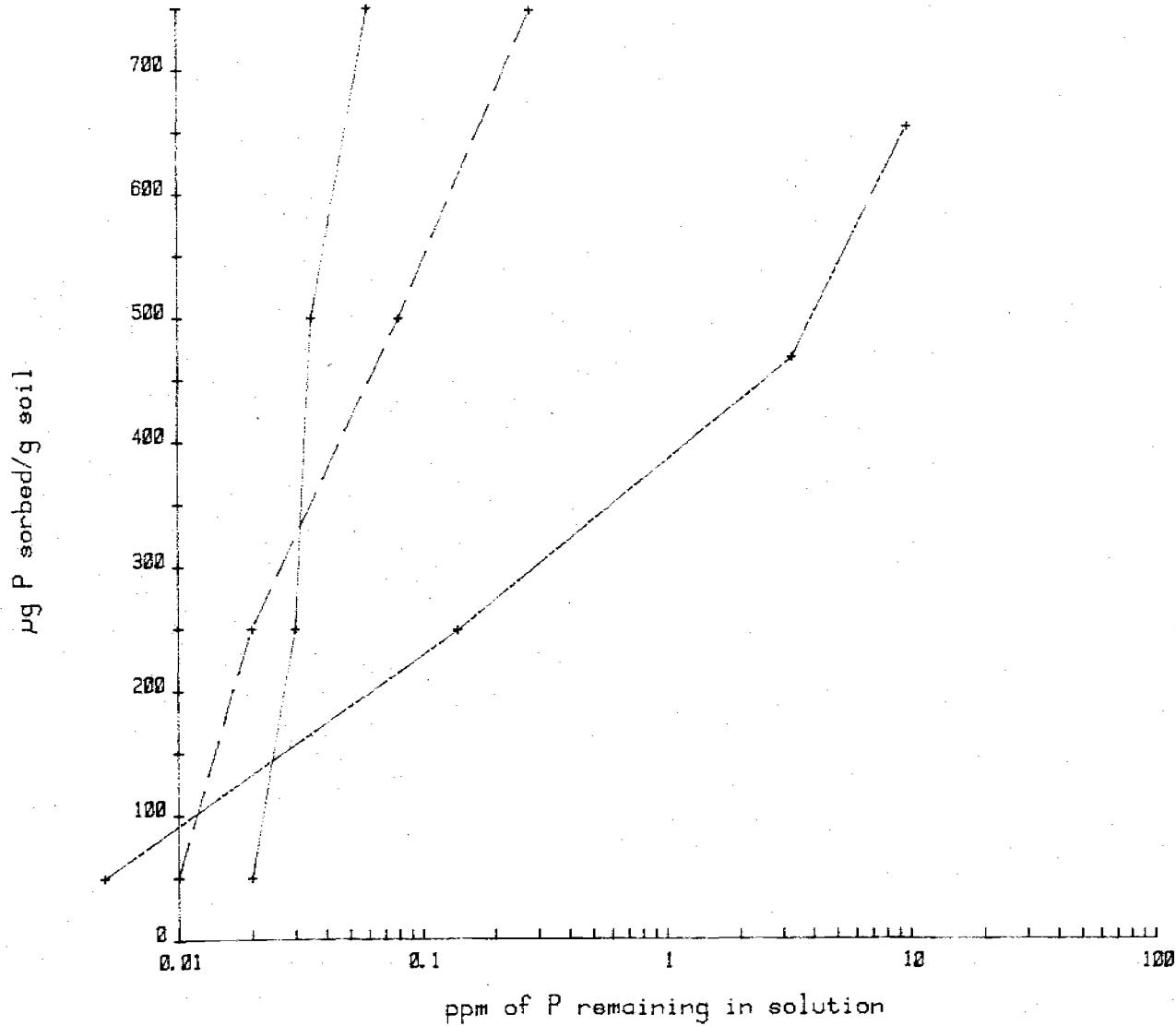
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
		meq/100 gms					%	%		ratio			
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	3.9	1.2	0.1	0.4	15.9	20.7	26	3.79	2.20	0.150	15	0.84	19.7
2	2.0	0.3	0.1	0.2	8.3	11.3	24	0.83	0.49	0.038	13	0.79	9.8
3	3.5	1.0	0.1	0.2	3.9	8.4	55	0.24	0.14	0.013	11	0.85	8.2

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-10-18116



µg/g soil	Soln ppm
----- B2ir	
50	0.02
250	0.03
500	0.04
749	0.06
----- IIB1	
50	0.01
250	0.02
499	0.08
747	0.28
----- IIC	
50	0.01
249	0.14
467	3.27
653	9.68

Pedon: Unnamed Loam 79-ID-18116 (030701R-2)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CM	%							%		
1-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-38	9.80	18.50	6.88	9.77	9.39	46.34	46.24	7.42	16	Loam
38-104	12.49	15.66	11.00	16.79	10.06	66.00	28.86	5.14	21	Gr. coarse sandy loam
104+	15.09	18.79	13.11	18.95	10.38	76.32	19.93	3.75	15	Loamy coarse sand

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
CM	%			g/cc		%		%
1-0				NS	NS	NS	NS	NS
0-3				NS	NS	NS	NS	NS
3-38				35.4	16.0	NDNP	NDNP	NDNP
38-104				23.3	8.9	NDNP	NDNP	NDNP
104+				14.4	4.9	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

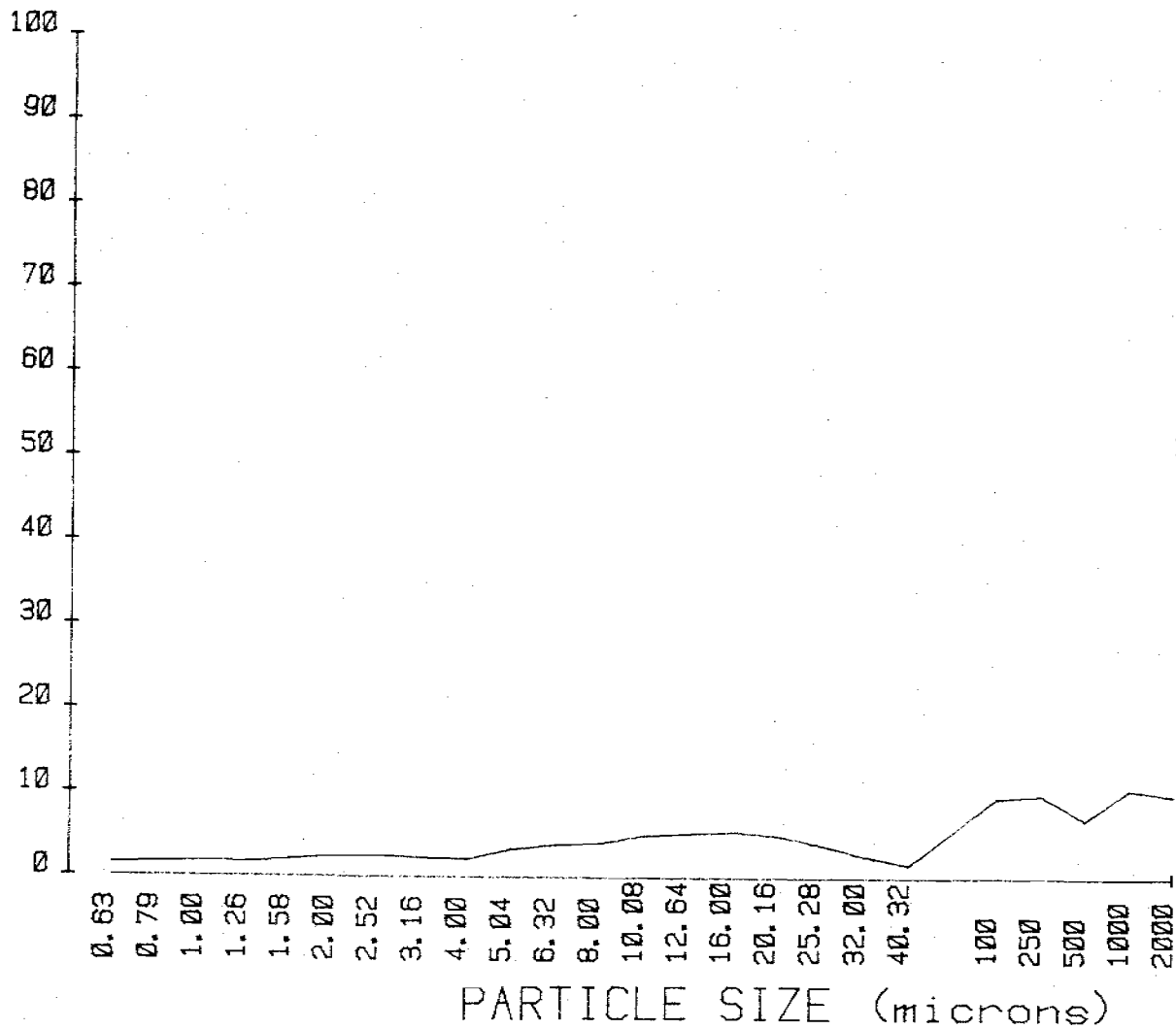
Identification		I18116-2	I18116-3	I18116-4	
Units		-----%			
TC (0.63-2.00)		7.42	5.14	3.75	
TSi (2.00-50)		46.24	28.86	19.93	
TS (50-2000)		46.34	66.00	76.32	
Clay	0.63-0.794	1.30	0.99	0.79	
	0.794-1.00	1.38	0.97	0.71	
	1.00-1.26	1.53	1.04	0.74	
	1.26-1.59	1.40	0.94	0.65	
	1.59-2.00	1.82	1.21	0.86	
Fine Silt	2.00-2.52	2.15	1.37	0.96	
	2.52-3.17	2.25	1.50	0.98	
	3.17-4.00	1.96	1.38	0.79	
	4.00-5.04	1.84	1.38	0.65	
Medium Silt	5.04-6.35	3.08	2.10	1.14	
	6.35-8.00	3.65	2.40	1.26	
	8.00-10.08	3.86	2.53	1.41	
	10.08-12.70	4.77	2.99	1.81	
	12.70-16.0	5.07	3.09	1.95	
	16.0-20.2	5.25	3.08	2.30	
Coarse Silt	20.2-25.4	4.81	2.69	2.23	
	25.4-32.0	3.75	1.83	2.16	
	32.0-40.3	2.36	2.02	1.76	
	40.3-50.8	1.37	0.45	0.41	
	50.8-64.0	0.08	0.05	0.12	
VFS (50-100)		9.39	10.06	10.38	
FS (100-250)		9.77	16.79	18.95	
MS (250-500)		6.88	11.00	13.11	
CoS (500-1000)		10.50	15.66	18.79	
VCoS (1000-2000)		9.80	12.49	15.09	
Greater than 2000		16	21	15	
Textural Class		LOAM	Gr.CSL	LCS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18116-2

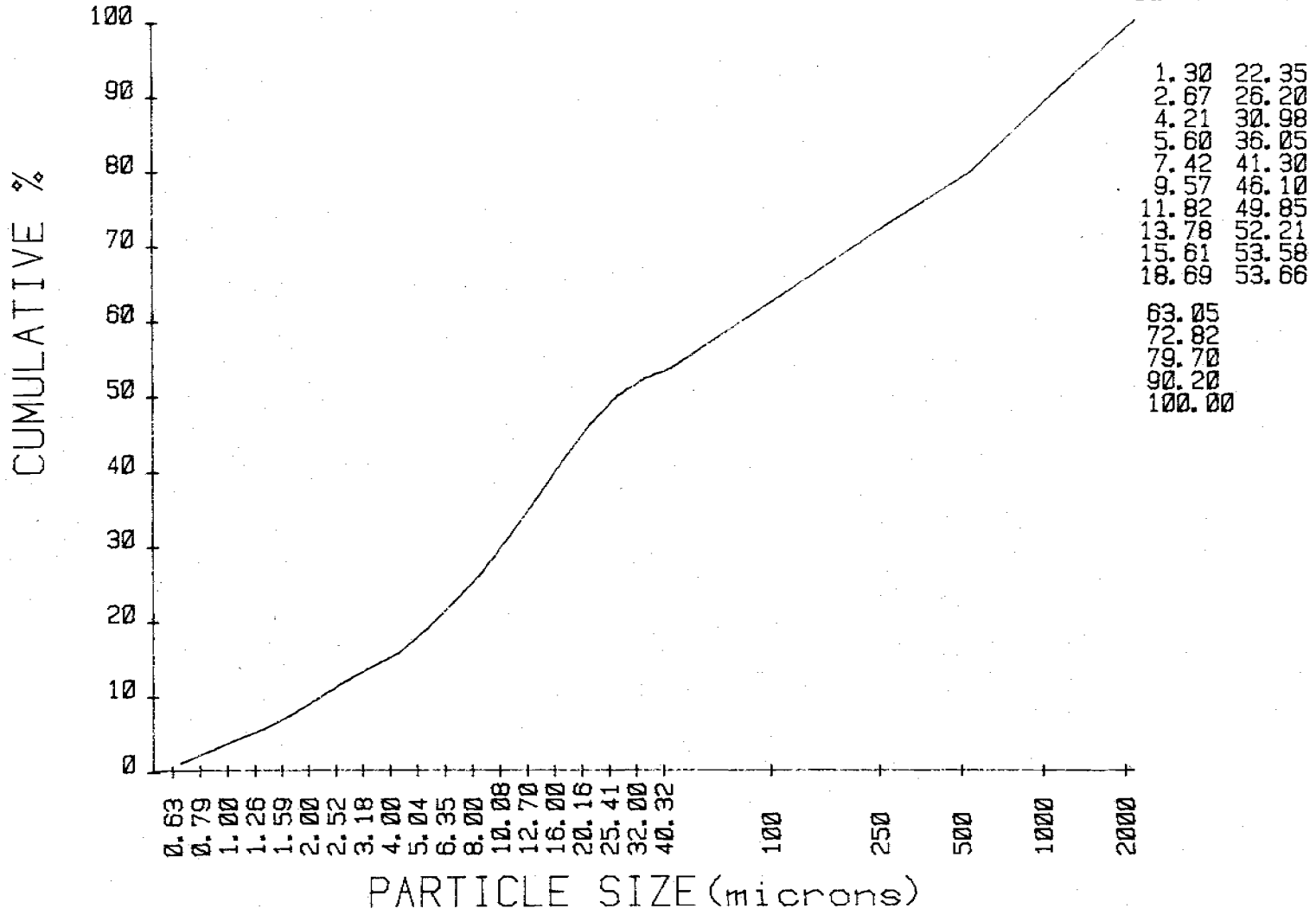
z



1.30	3.65
1.38	3.86
1.53	4.77
1.40	5.07
1.82	5.25
2.15	4.81
2.25	3.74
1.96	2.36
1.84	1.37
3.08	0.08
9.39	
9.77	
6.88	
10.50	
9.80	

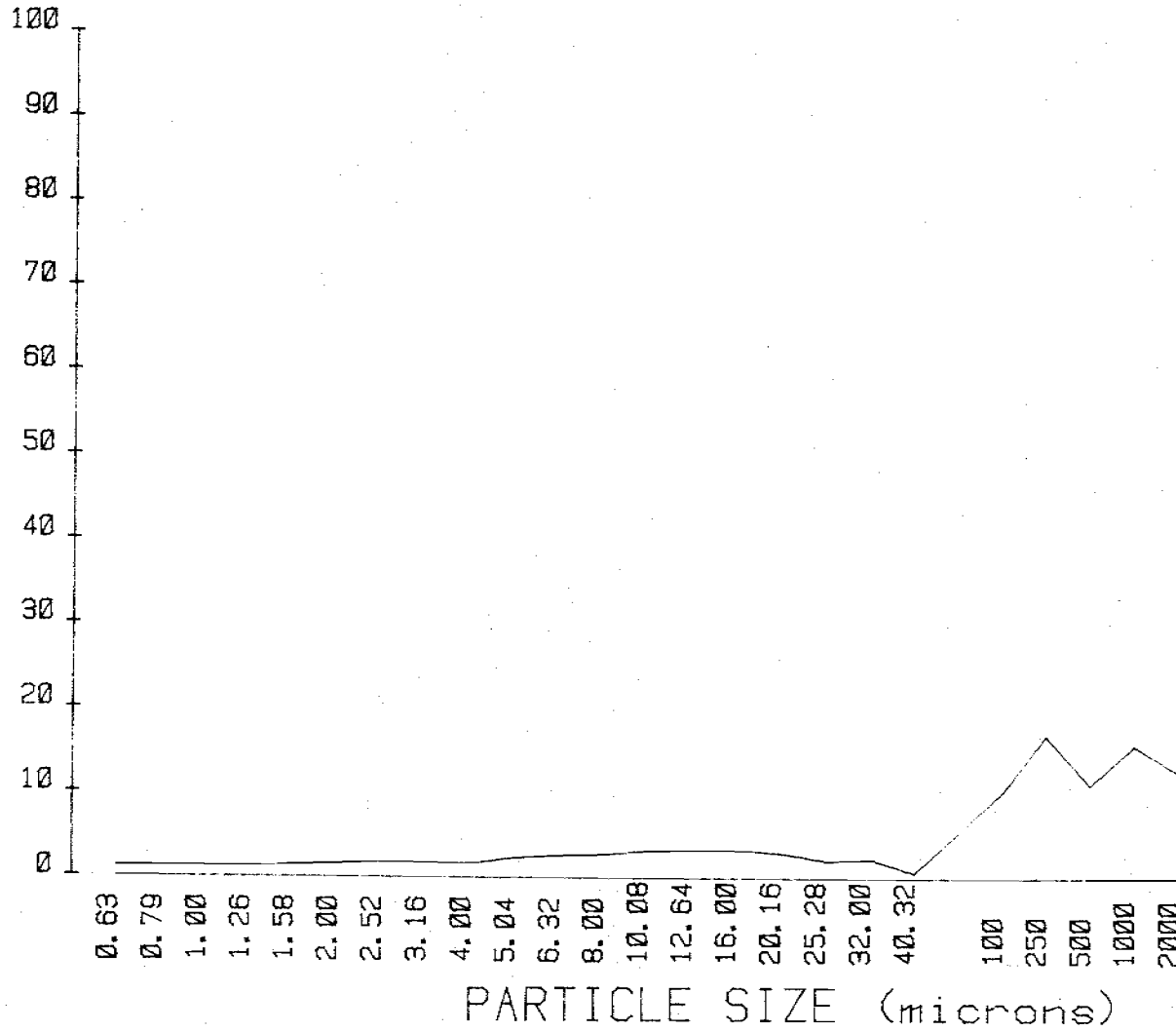
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18116-2



PLOT SAND-SILT-CLAY

ID I18116-3

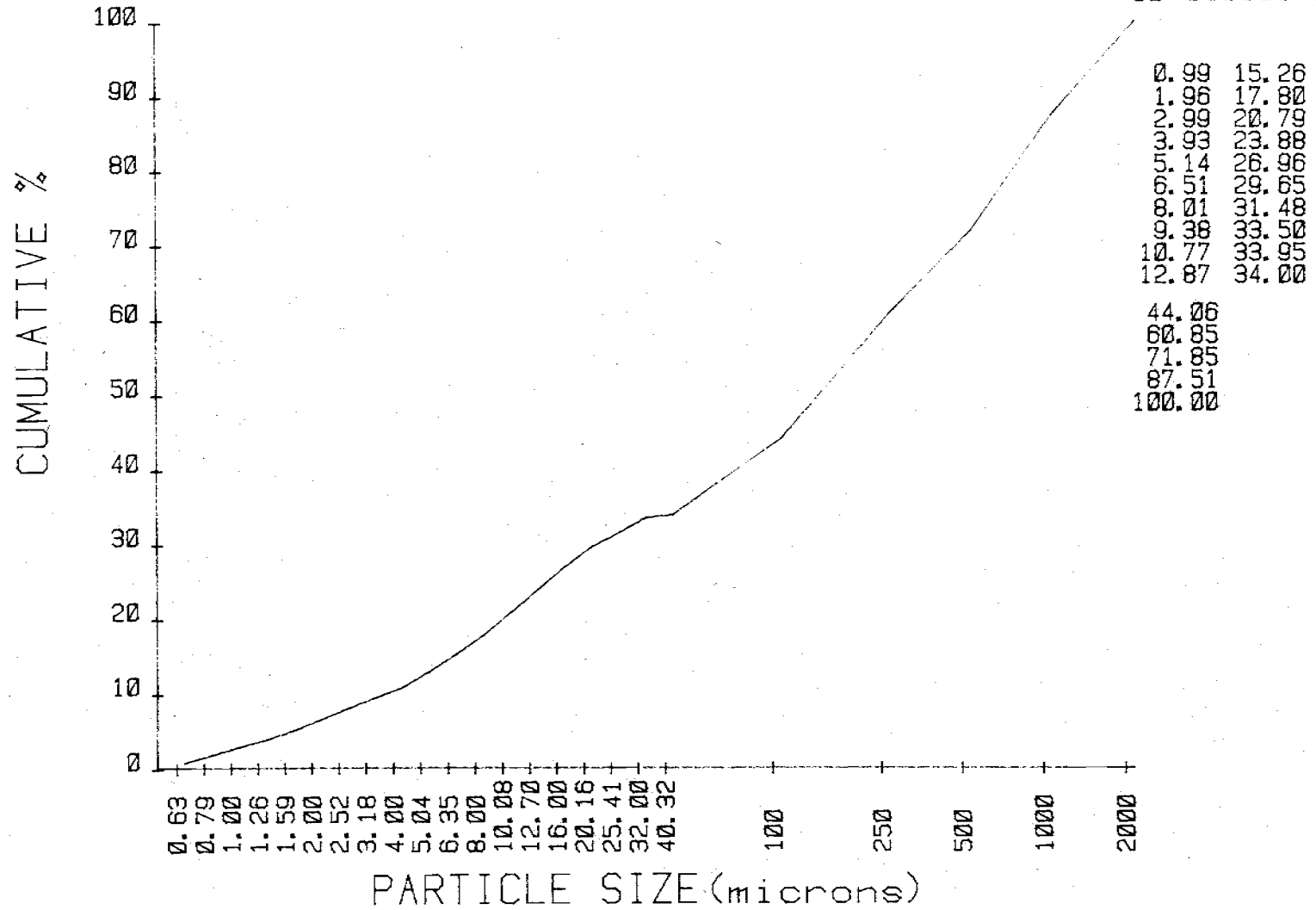


0.99	2.40
0.97	2.53
1.04	2.99
0.94	3.00
1.21	3.08
1.37	2.69
1.50	1.83
1.38	2.02
1.38	0.45
2.10	0.05
10.06	
16.79	
11.00	
15.66	
12.49	



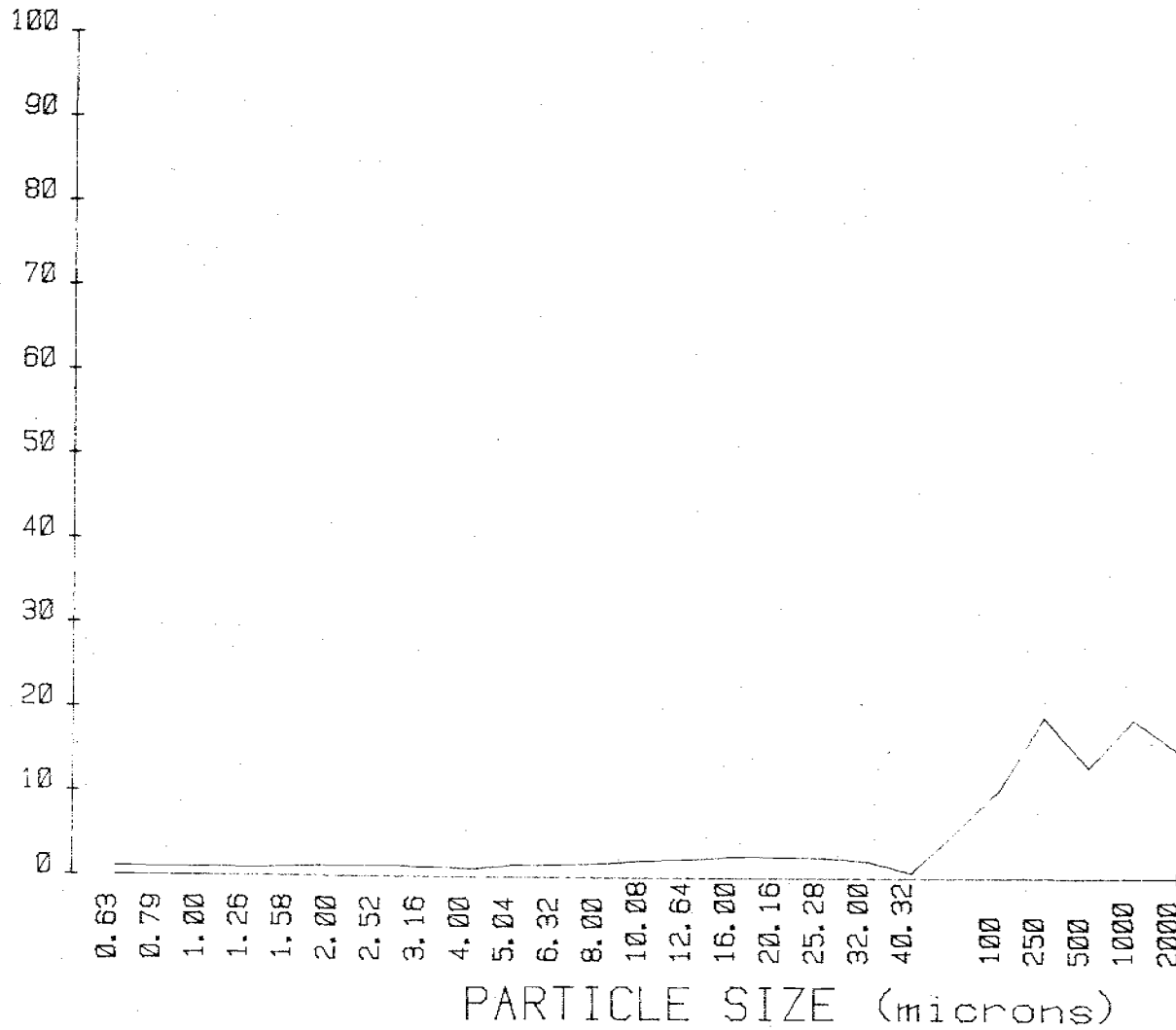
## CUMULATIVE CURVE SAND-SILT-CLAY

ID I18116-3



PLOT SAND-SILT-CLAY

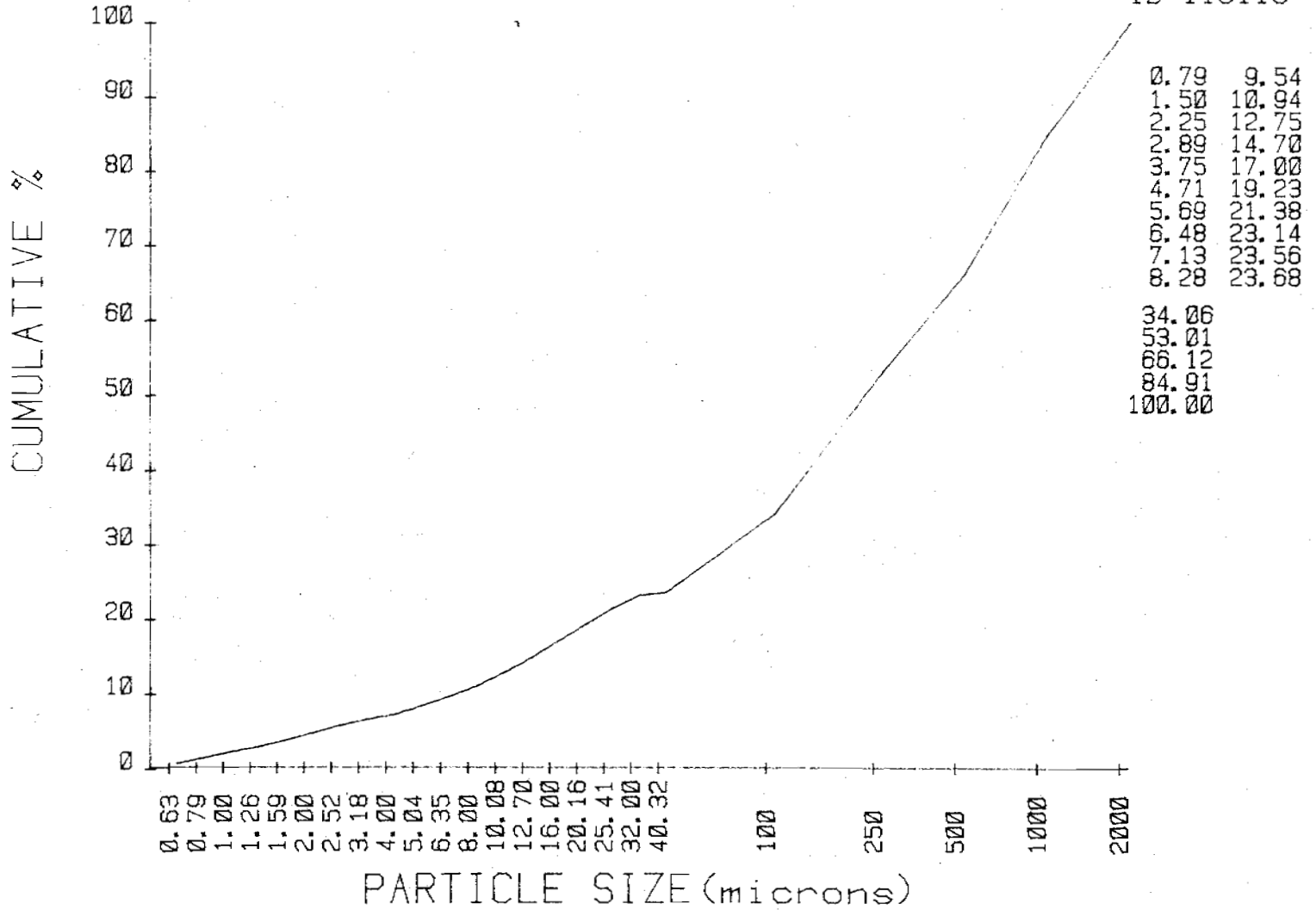
ID I18116-4



0.79	1.26
0.71	1.41
0.74	1.80
0.65	1.95
0.86	2.30
0.96	2.23
0.98	2.15
0.79	1.76
0.65	0.41
1.14	0.12
10.38	
18.95	
13.11	
18.79	
15.09	

### CUMULATIVE CURVE SAND-SILT-CLAY

ID I18116-4



Unnamed Silt Loam 79-ID-18117 (010303R-1)

Classification: coarse-loamy, mixed, frigid Dystric Eutochrept.

General Site Characteristics

Location: Clearwater County, Idaho: southeast 1/4, southwest 1/4 of section 27,  
T. 44N., R. 4W.

Forest: Clearwater National Forest

Area: Palouse Ranger District

Described By/Date: June 22, 1978, by Randy Moiser

Landform: 24

Habitat Type: western red cedar/Pony h.t.

Formation Name:

Parent Rock/Material: siltite

Weathering:

Topography: upper 1/3 of primary ridge

Slope: 20-25 percent

Aspect: north-northeast

Elevation: 3630 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 0-8 centimeters (3-0 inches).

B2ir 0-51 centimeters (0-20 inches). Dark yellowish brown (10YR 4/3) moist; silt loam; very weak fine granular structure; very friable, slightly sticky and nonplastic; slightly acid pH 6.5, noncalcareous; no gravels.

IIB21 51-61 centimeters (20-24 inches). Yellowish brown (10YR 5/4) moist; silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; slightly acid pH 6.2, noncalcareous; 16 percent gravels by weight.

IIB22 61-84 centimeters (24-33 inches). Light reddish brown (2.5YR 6/4) moist; gravelly silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; strongly acid pH 5.1, noncalcareous; 19 percent gravels by weight.

IIC 84+ centimeters (33+ inches). Light yellowish brown (10YR 6/4) moist; very gravelly silt loam; massive structure; friable; medium acid pH 6.0, noncalcareous; 67 percent gravels by weight.

Pedon: Unnamed Silt Loam 79-ID-18117 (010303R-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	0-0	NS	NS	NS	NS					
2	B2ir	0-51	6.5	0.15	87	5.9					
3	IIB21	51-61	6.2	0.12	45	1.3					
3	IIB22	61-84	5.1	0.09	45	0.4					
4	IIC	84+	6.0	0.14	43	2.0					

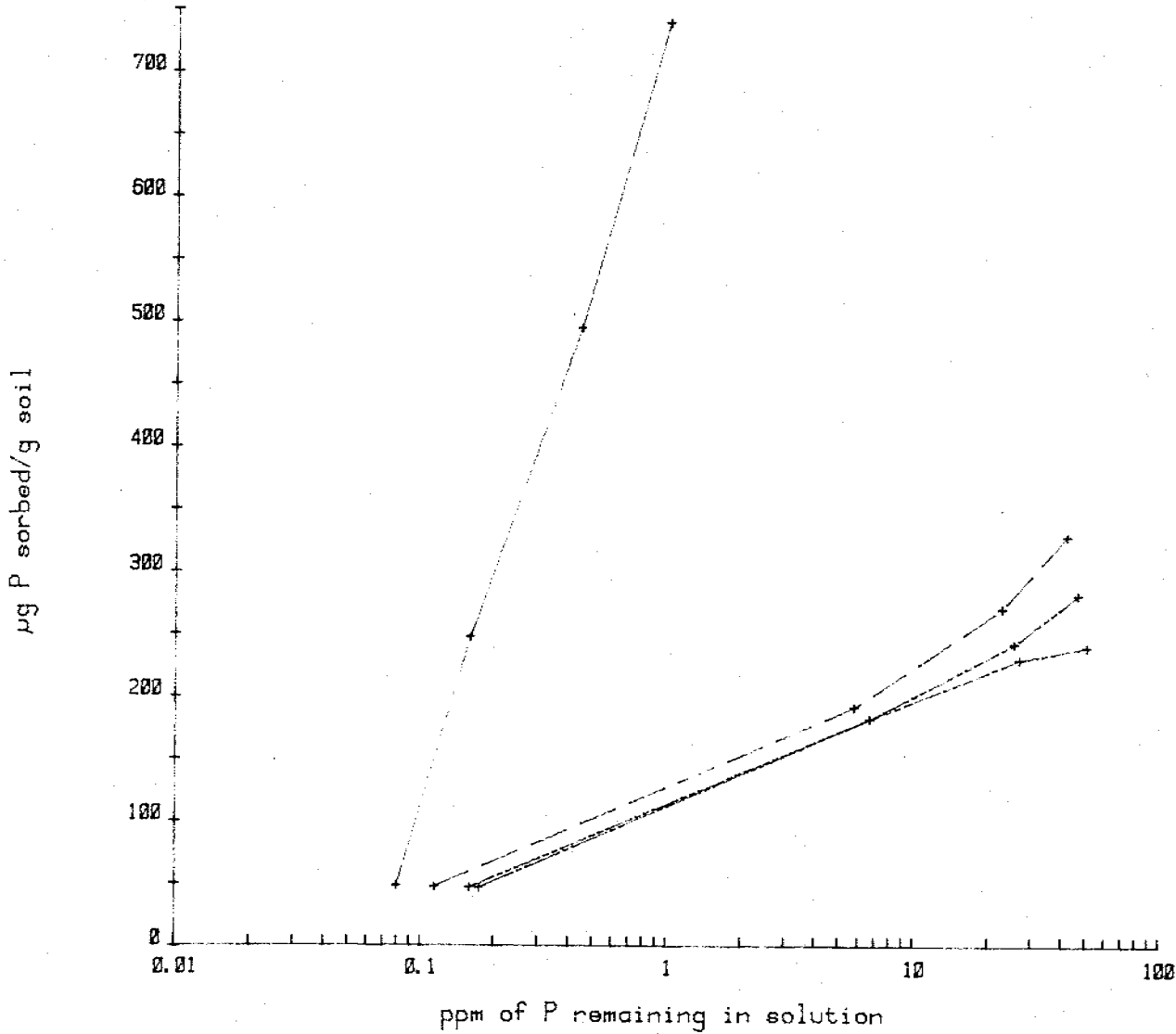
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms						%		%				
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	7.5	1.9	0.1	0.8	11.5	18.8	47	2.38	1.39	0.105	13	1.00	9.8
3	3.6	1.1	0.1	0.4	2.6	7.5	67	0.31	0.18	0.025	7	0.84	8.1
3	2.0	1.0	0.1	0.2	2.1	5.7	60	0.14	0.08	0.016	5	0.81	8.0
4	2.8	1.4	0.1	0.2	1.9	5.5	70	0.37	0.21	0.016	13	0.34	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-ID-18117



µg/g soil	Soln ppm
----- B21r	
49	0.08
248	0.16
496	0.45
740	1.02
----- I1B21	
49	0.12
192	5.80
271	22.88
329	42.88
----- I1B22	
48	0.18
183	6.72
230	26.96
240	50.96
----- I1C	
48	0.16
183	6.72
243	25.68
282	46.80

Pedon: Unnamed Silt Loam 79-ID-18117 (010303R-1)

Date: November 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
8-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-51	1.01	1.89	1.14	1.12	13.51	18.66	72.83	8.51	none		Silt loam
51-61	1.58	1.53	0.80	3.29	9.45	16.64	69.38	13.98	16		Silt loam
61-84	1.19	1.50	1.50	5.60	20.60	30.37	62.82	6.82	19		Gr. silt loam
84+	4.72	5.57	3.09	9.36	20.72	43.45	51.15	5.40	67		V.gr. silt loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
8-0						NS	NS	NS	NS	NS
0-51						43.5	11.7	NDNP	NDNP	NDNP
51-61						24.5	5.8	NDNP	NDNP	NDNP
61-84						23.2	5.5	23	NP	ND
84+						20.6	3.9	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

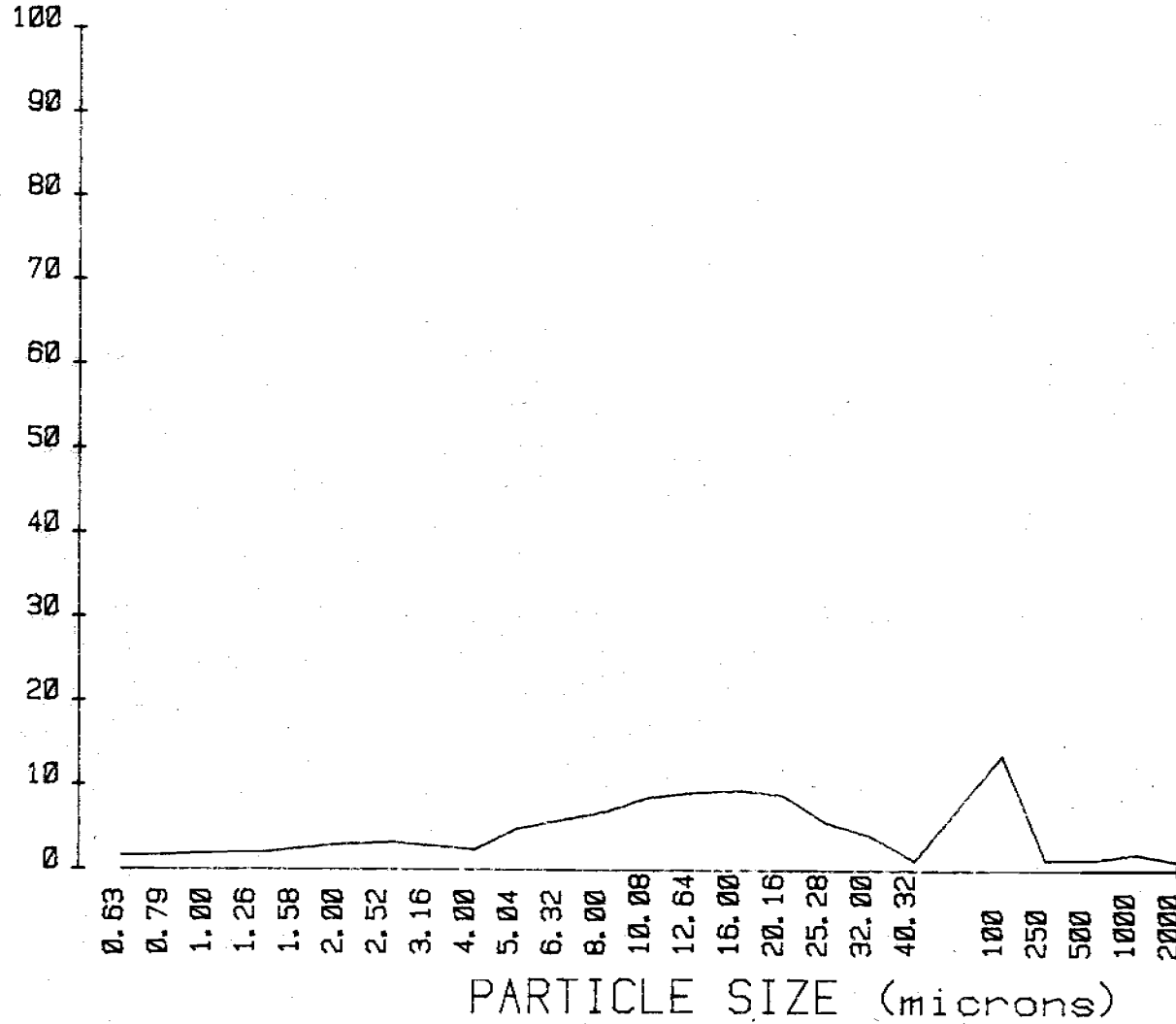
Identification	I18117-1	I18117-2	I18117-3	I18117-4	
Units	-----%				
TC (0.63-2.00)	8.51	13.98	6.82	5.40	
TSi (2.00-50)	72.83	69.38	62.82	51.15	
TS (50-2000)	18.66	16.64	30.37	43.45	
Clay	0.63-0.794	1.35	2.37	1.05	0.86
	0.794-1.00	1.51	2.42	1.05	0.88
	1.00-1.26	1.73	2.84	1.30	1.06
	1.26-1.59	1.67	2.73	1.35	1.04
	1.59-2.00	2.26	3.62	2.05	1.57
Fine Silt	2.00-2.52	2.75	4.14	2.77	2.06
	2.52-3.17	2.97	4.18	3.26	2.45
	3.17-4.00	2.53	3.24	2.61	2.23
	4.00-5.04	2.10	2.61	2.35	3.99
Medium Silt	5.04-6.35	4.64	5.54	4.60	5.25
	6.35-8.00	5.66	6.29	5.21	5.88
	8.00-10.08	6.65	6.53	5.00	5.79
	10.08-12.70	8.37	7.12	5.10	5.90
	12.70-16.0	8.97	7.57	4.67	5.31
	16.0-20.2	9.22	7.15	4.68	4.48
Coarse Silt	20.2-25.4	8.64	6.09	5.20	3.46
	25.4-32.0	5.40	4.33	5.68	2.52
	32.0-40.3	3.84	3.17	6.80	1.23
	40.3-50.8	0.97	1.31	4.79	0.52
	50.8-64.0	0.12	0.12	0.10	0.08
VFS (50-100)	13.51	9.45	20.60	20.72	
FS (100-250)	1.12	3.29	5.60	9.36	
MS (250-500)	1.14	0.80	1.50	3.09	
CoS (500-1000)	1.89	1.53	1.50	5.57	
VCoS (1000-2000)	1.01	1.58	1.19	4.72	
Greater than 2000	none	16	19	67	
Textural Class	SL	SL	Gr.SL	VGr.SL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

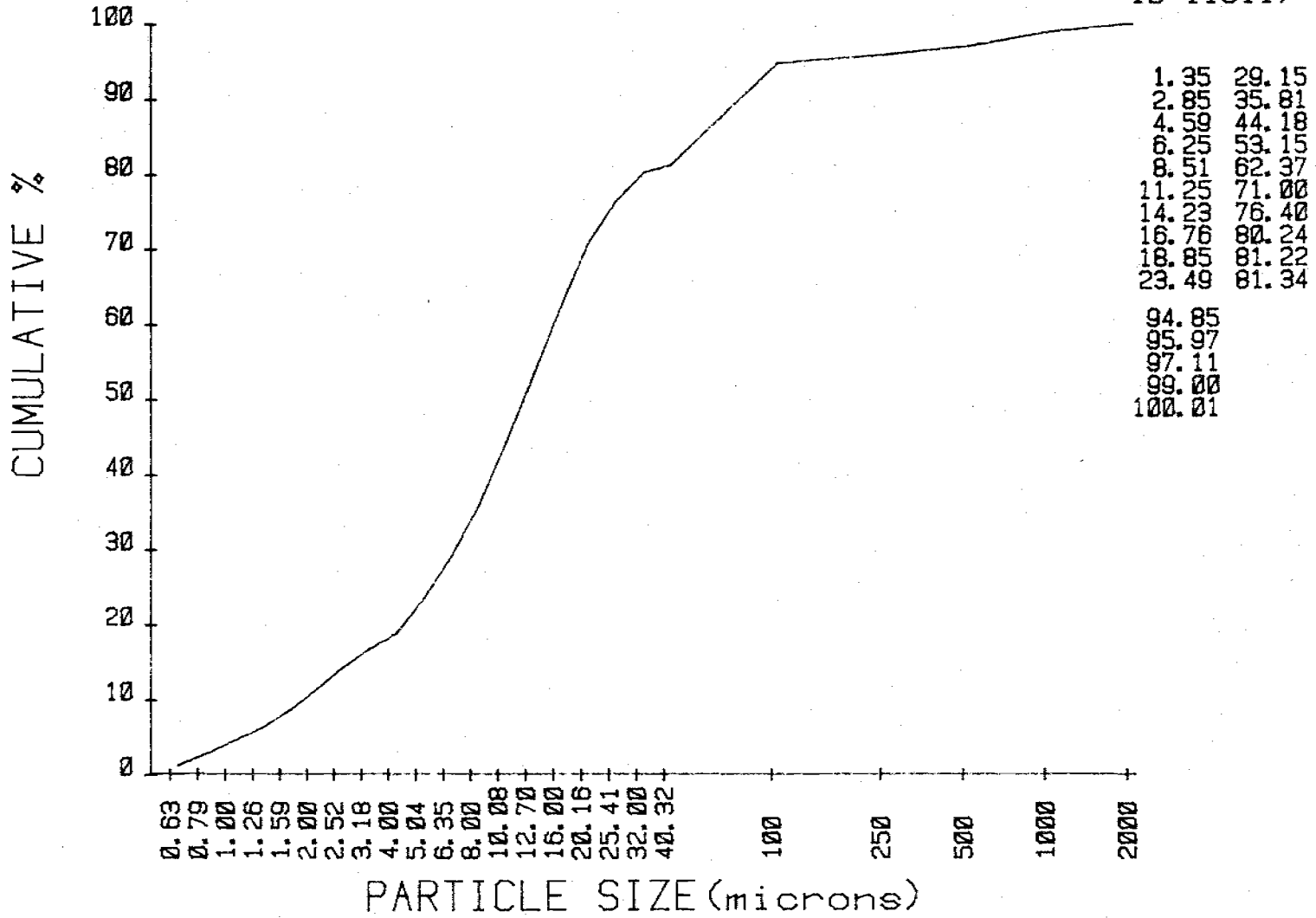
ID I18117-1



1.35	5.66
1.50	6.65
1.73	8.37
1.67	8.97
2.25	9.22
2.75	9.64
2.97	5.40
2.53	3.84
2.80	0.97
4.64	0.12
13.51	
1.12	
1.14	
1.89	
1.01	

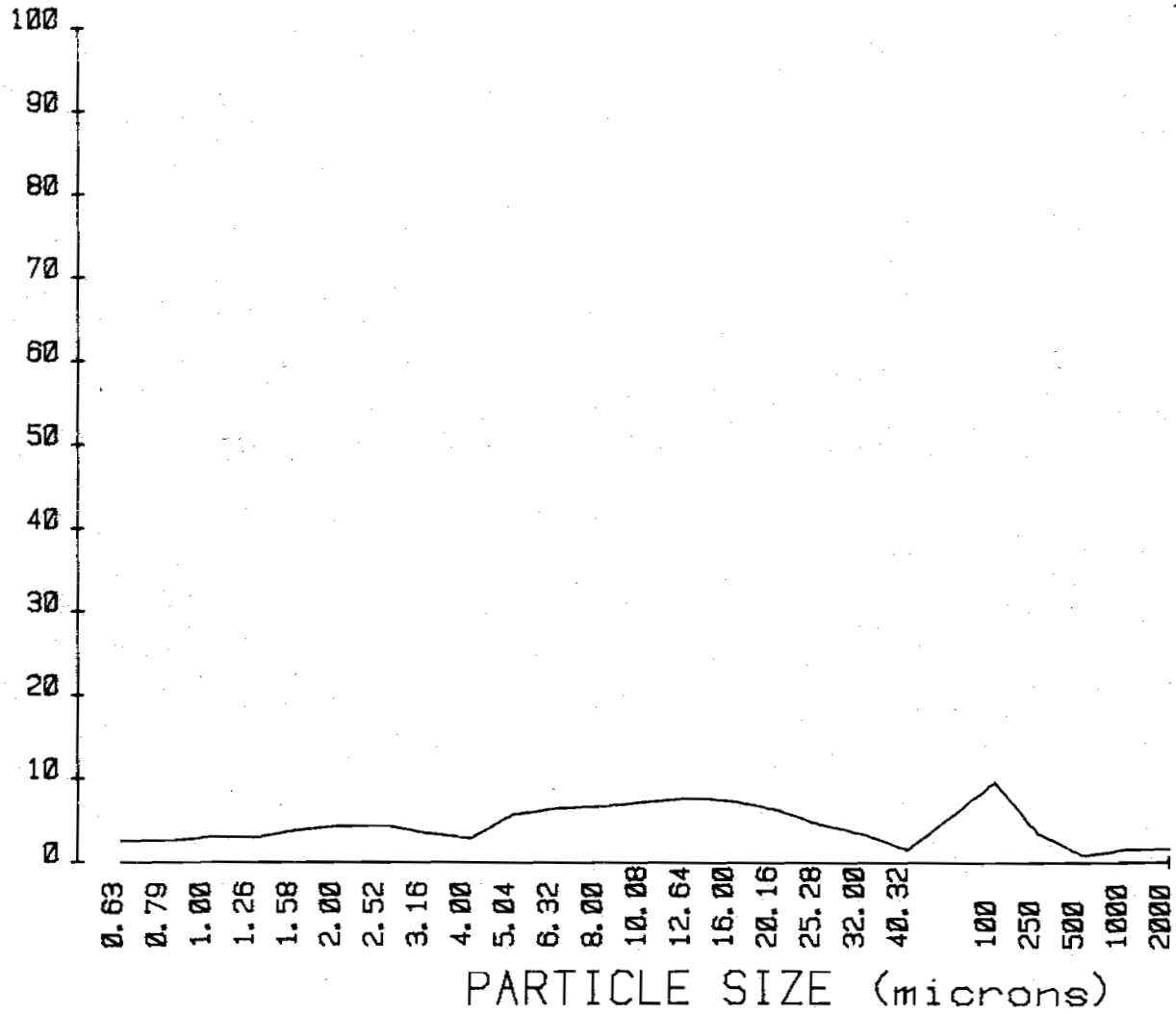
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18117-1



PLOT SAND-SILT-CLAY

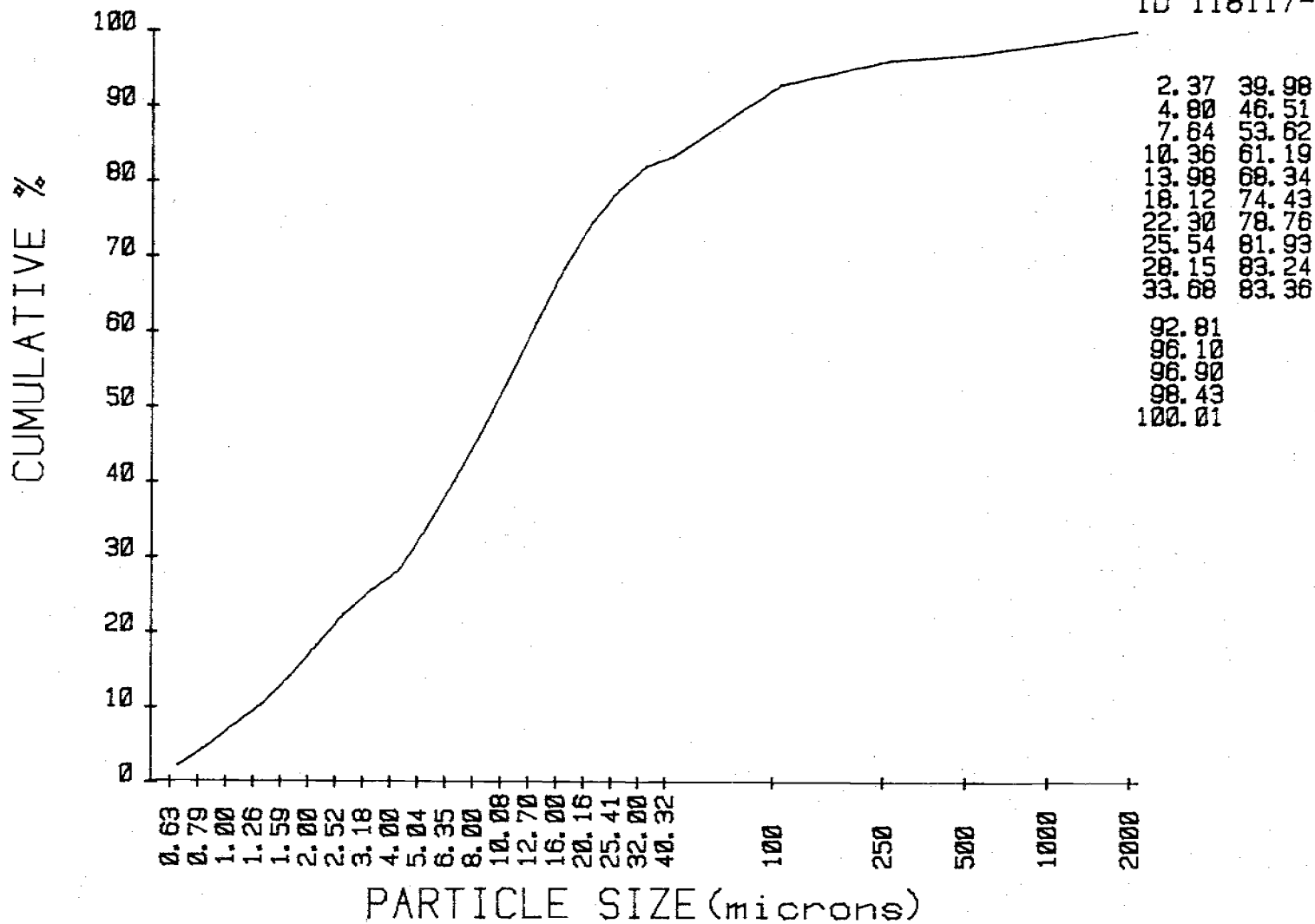
ID I18117-2



2.37	6.29
2.42	6.53
2.84	7.12
2.72	7.57
3.62	7.15
4.14	6.09
4.18	4.33
3.24	3.17
2.61	1.31
5.54	0.12
9.45	
3.29	
0.80	
1.53	
1.58	

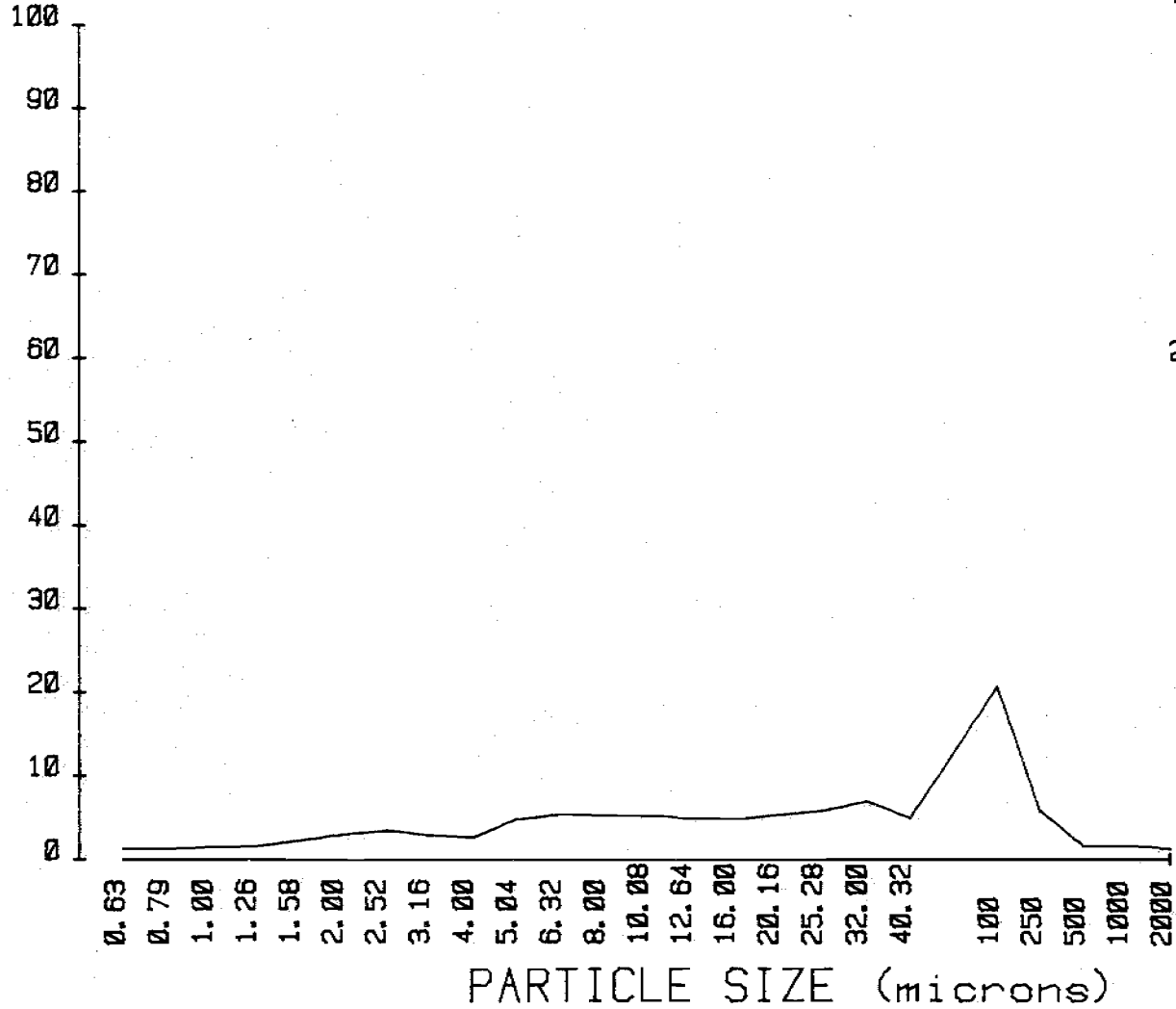
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18117-2



PLOT SAND-SILT-CLAY

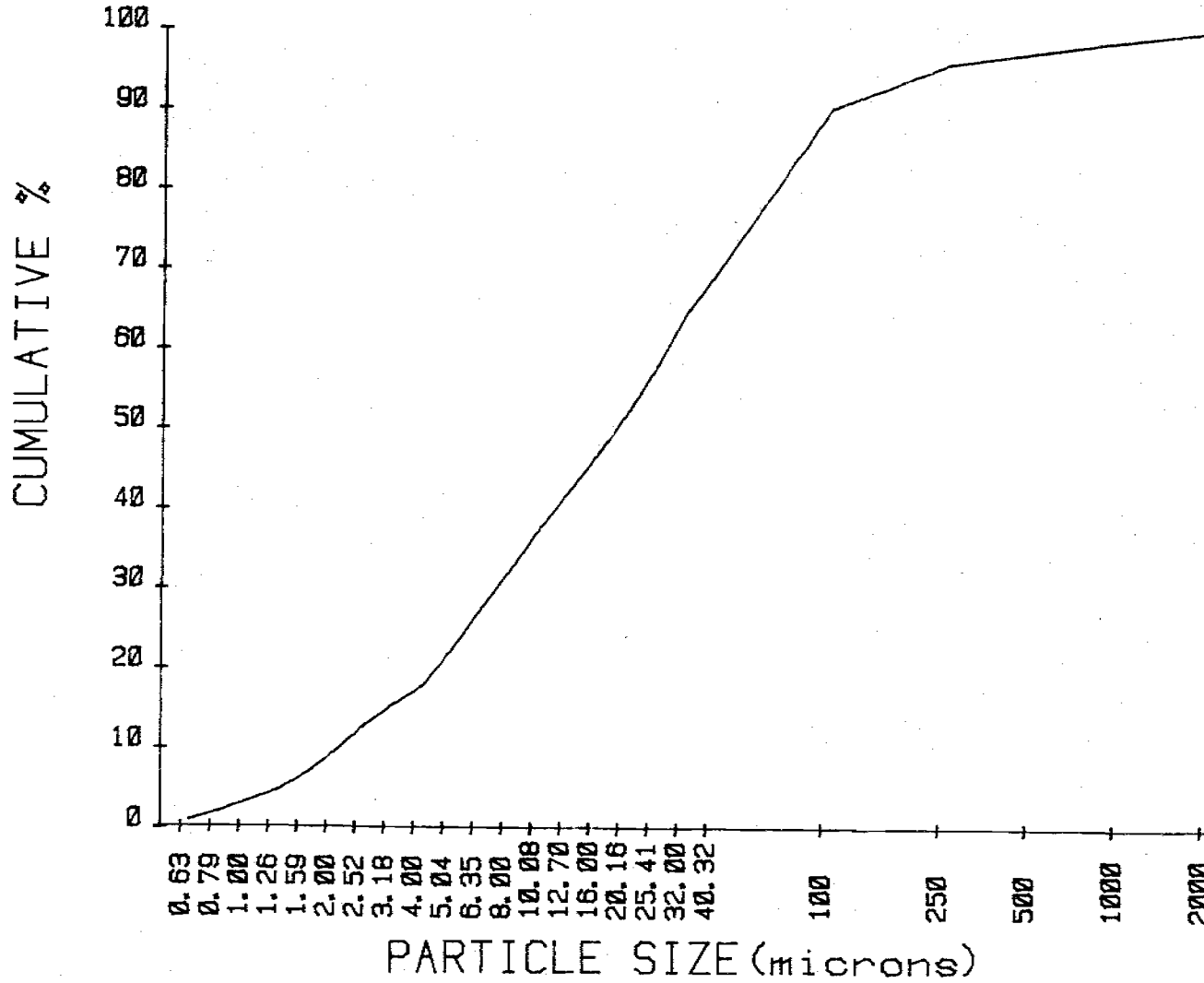
ID I18117-3



1.05	5.21
1.05	4.99
1.30	5.11
1.35	4.67
2.05	4.67
2.77	5.20
3.26	5.68
2.61	6.80
2.35	4.79
4.60	0.10
20.60	
5.60	
1.50	
1.50	
1.19	

### CUMULATIVE CURVE SAND-SILT-CLAY

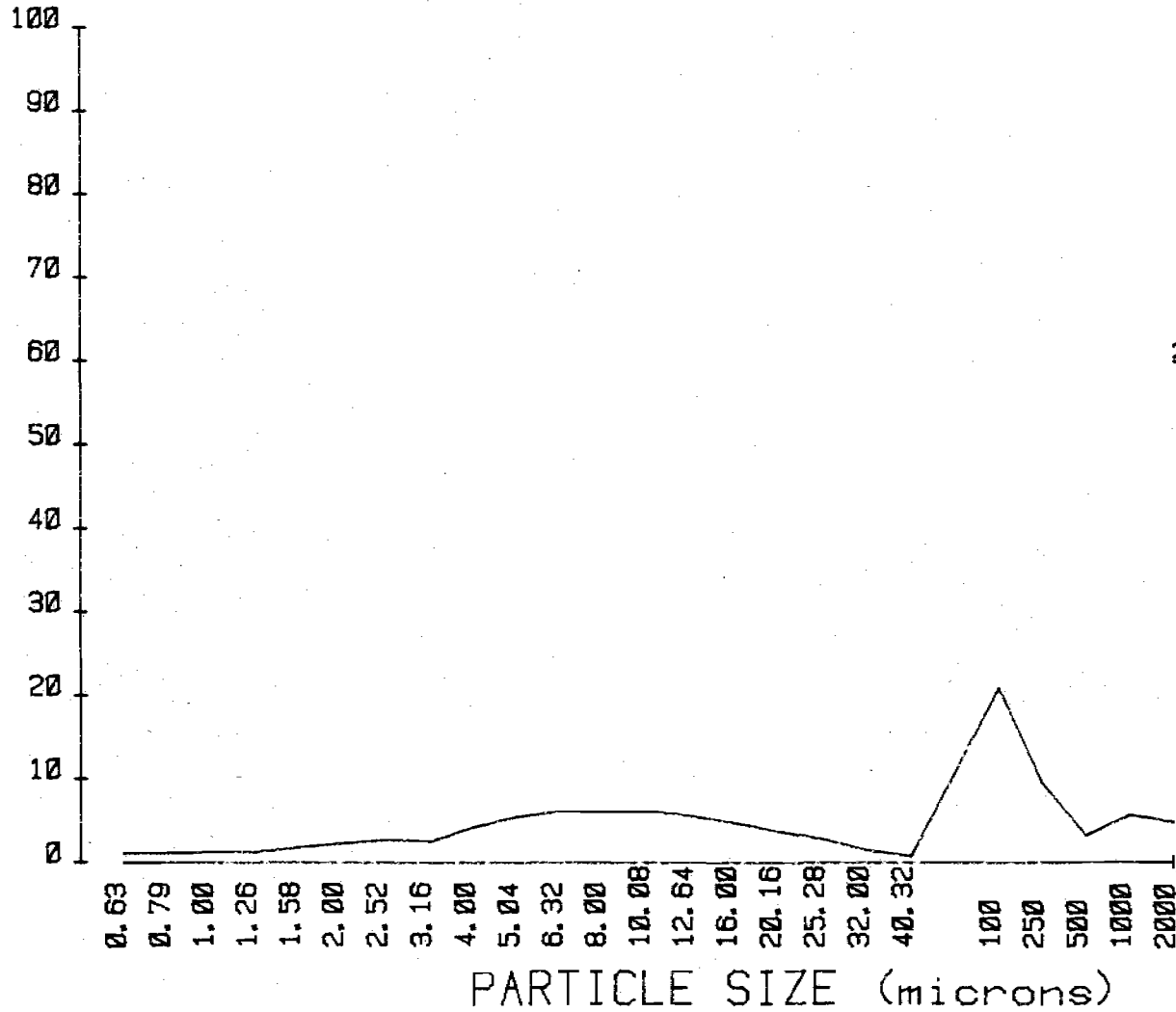
ID I18117-3



1.05	27.63
2.10	32.62
3.41	37.72
4.76	42.39
6.81	47.06
9.59	52.26
12.85	57.94
15.46	64.74
17.82	69.53
22.42	69.63
90.23	
95.83	
97.33	
98.63	
100.02	

# PLOT SAND-SILT-CLAY

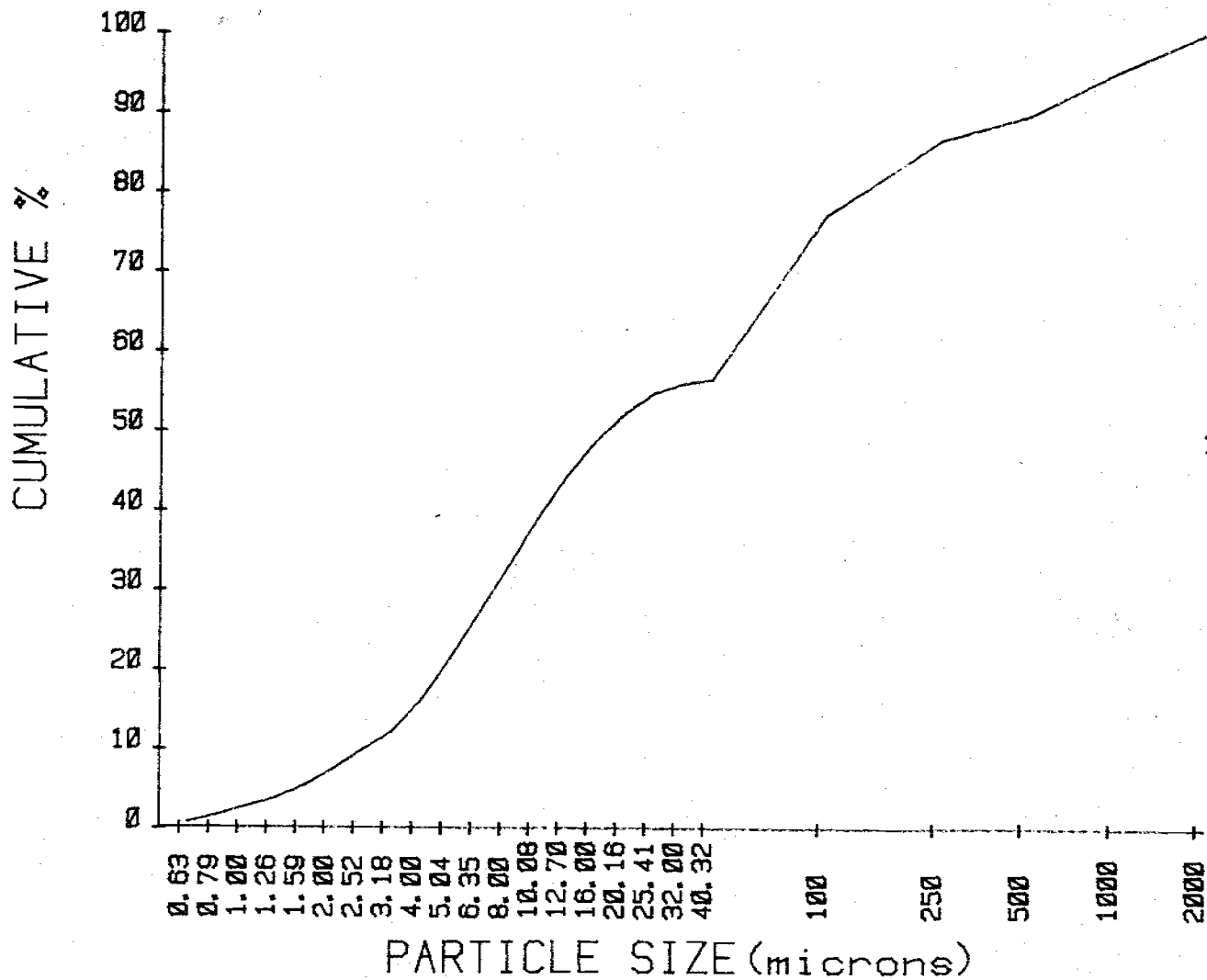
ID I18117-4



0.86	5.88
0.88	5.79
1.06	5.90
1.04	5.31
1.56	4.48
2.06	3.46
2.45	2.52
2.29	1.29
3.99	0.52
5.25	0.08
20.72	
9.36	
3.00	
5.57	
4.72	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18117-4



0.86	27.26
1.74	33.06
2.80	38.95
3.84	44.26
5.40	48.74
7.46	52.20
9.91	54.72
12.14	55.95
16.13	56.47
21.38	56.55
77.27	
86.63	
89.72	
95.29	
100.01	



Unnamed Silt Loam 79-ID-18118 (010303R-2)

Classification: coarse-loamy, mixed, frigid Dystric Eutochrept.

General Site Characteristics

Location: Clearwater County, Idaho: northwest 1/4, southwest 1/4 of section 27,  
T. 44N., R. 4W.

Forest: Clearwater National Forest

Area: Palouse Ranger District

Described By/Date: June 22, 1978, Randy Moiser

Landform: 24

Habitat Type: western red cedar/Pony h.t.

Formation Name:

Parent Rock/Material: siltite

Weathering:

Topography: upper 1/3 of convex slope

Slope: 10 percent

Aspect: north

Elevation: 3320 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 3-0 centimeters (1-0 inches).

A1 0-10 centimeters (0-4 inches). Dark brown (10YR 3/3) moist; silt loam; moderate very fine granular structure; very friable, nonsticky and nonplastic; no gravels; slightly acid pH 6.1, noncalcareous.

B2ir 10-46 centimeters (4-18 inches). Brown (10YR 4/3) moist; silt loam; weak medium subangular blocky structure; very friable, slightly sticky and slightly plastic; no gravels; slightly acid pH 6.3, noncalcareous.

IIB1 46-99 centimeters (18-39 inches). Yellowish brown (10YR 5/4) moist; silt; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; no gravels; medium acid pH 5.6, noncalcareous.

IIB2t 99-150 centimeters (39-60 inches). Yellowish brown (10YR 5/4) moist; no lab sample; silty clay loam; moderate medium subangular blocky structure; slightly sticky and plastic; 5-10 percent coarse fragments.

IIC 150+ centimeters (60+ inches). No lab sample.

Pedon: Unnamed Silt Loam 79-ID-18118 (010303R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
							%				
1	0	3- 0	NS	NS	NS	NS					
2	A1	0- 10	6.1	0.25	72	5.6					
3	B21r	10- 46	6.3*	0.06*	ND	5.5					
	IIB1	46- 99	5.6	0.09	48	2.5					
	IIB2t	99-150	NS	NS	NS	NS					
	IIC	150+	NS	NS	NS	NS					

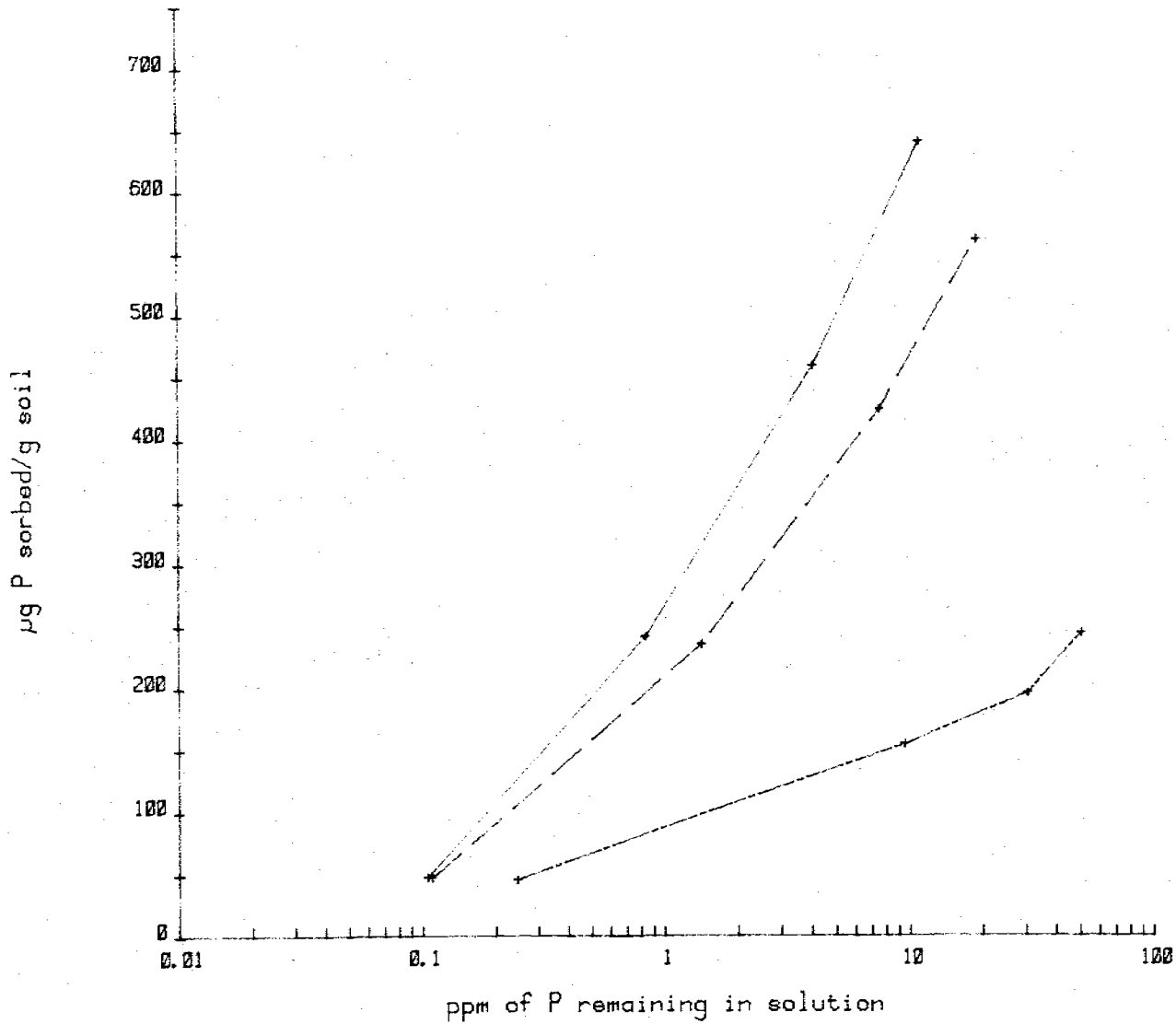
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%				ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	7.1	1.5	0.1	0.5	7.0	17.1	57	3.92	2.28	0.149	15	1.00	8.3
3	5.8	1.5	0.1	0.5	6.6	16.3	54	2.06	1.20	0.095	13	1.00	8.2
	3.4	1.5	0.1	0.2	2.8	7.5	65	0.23	0.13	0.019	7	1.00	8.0
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample  
 ND-not determined  
 \* run on 1:5 ratio

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-ID-18118



µg/g soil	Soln ppm
----- A1	
49	0.11
242	0.84
460	4.05
641	10.94
----- B2ir	
49	0.11
236	1.43
425	7.54
561	18.88
----- IIB1	
48	0.25
155	9.48
196	30.40
244	50.56

Pedon: Unnamed Silt Loam 79-ID-18118 (010303R-2)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.		
cm	X								X		
3- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 10	1.74	1.50	0.92	3.17	6.92	14.24	73.75	12.01	none		Silt loam
10- 46	0.77	1.39	1.00	2.05	8.25	13.46	74.82	11.72	none		Silt loam
46- 99	0.30	1.09	0.97	1.46	7.53	11.34	81.26	7.40	none		Silt
99-150	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS
150+	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
cm	X			g/cc		X		
3- 0						NS	NS	NS
0- 10						38.3	11.7	NDNP
10- 46						36.6	10.5	NDNP
46- 99						25.7	5.8	NDNP
99-150						NS	NS	NS
150+						NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

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Project: Clearwater Nayional Forest-LIM

Analysis by: Anita Falen

Date: September 1980

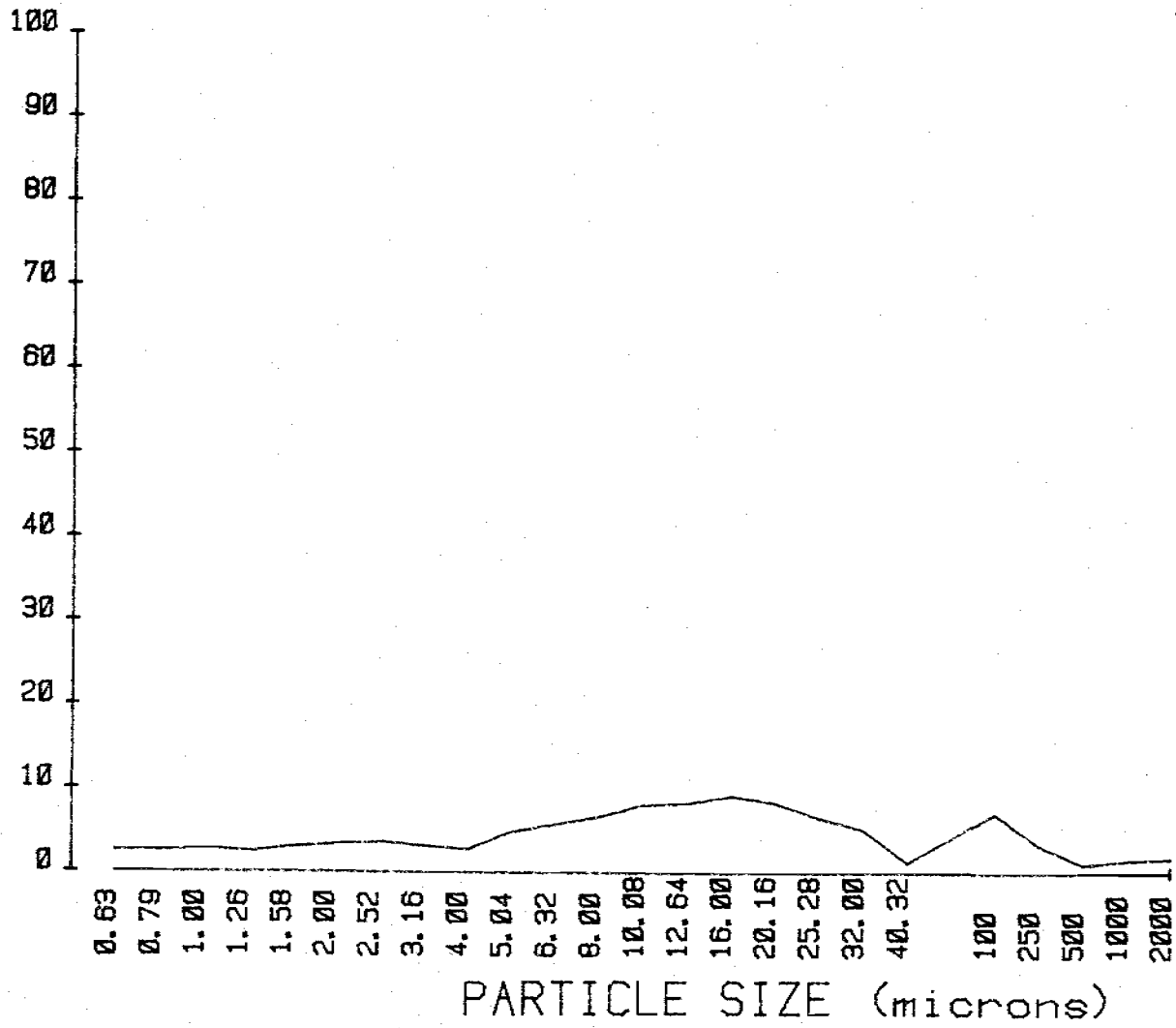
Identification		I18118-1	I18118-2	I18118-3	
Units		-----%			
TC (0.63-2.00)		12.01	11.72	7.40	
TSi (2.00-50)		73.75	74.82	81.26	
TS (50-2000)		14.24	13.46	11.34	
Clay	0.63-0.794	2.28	2.28	1.23	
	0.794-1.00	2.31	2.25	1.30	
	1.00-1.26	2.51	2.40	1.52	
	1.26-1.59	2.18	2.13	1.42	
	1.59-2.00	2.73	2.67	1.93	
Fine Silt	2.00-2.52	3.07	3.05	2.35	
	2.52-3.17	3.34	3.27	2.59	
	3.17-4.00	2.86	3.20	2.17	
	4.00-5.04	2.46	4.29	1.81	
Medium Silt	5.04-6.35	4.62	5.26	3.85	
	6.35-8.00	5.54	6.34	4.79	
	8.00-10.08	6.46	6.86	5.58	
	10.08-12.70	7.87	8.49	7.61	
	12.70-16.0	8.07	8.94	9.69	
	16.0-20.2	8.94	9.12	11.68	
Coarse Silt	20.2-25.4	8.10	7.56	10.73	
	25.4-32.0	6.34	4.74	9.11	
	32.0-40.3	4.95	2.71	6.65	
	40.3-50.8	1.02	0.87	2.55	
	50.8-64.0	0.13	0.11	0.12	
VFS (50-100)		6.92	8.25	7.53	
FS (100-250)		3.17	2.05	1.46	
MS (250-500)		0.92	1.00	0.97	
CoS (500-1000)		1.50	1.39	1.09	
VCoS (1000-2000)		1.74	0.77	0.30	
Greater than 2000		none	none	none	
Textural Class		SL	SL	Silt	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18118-1

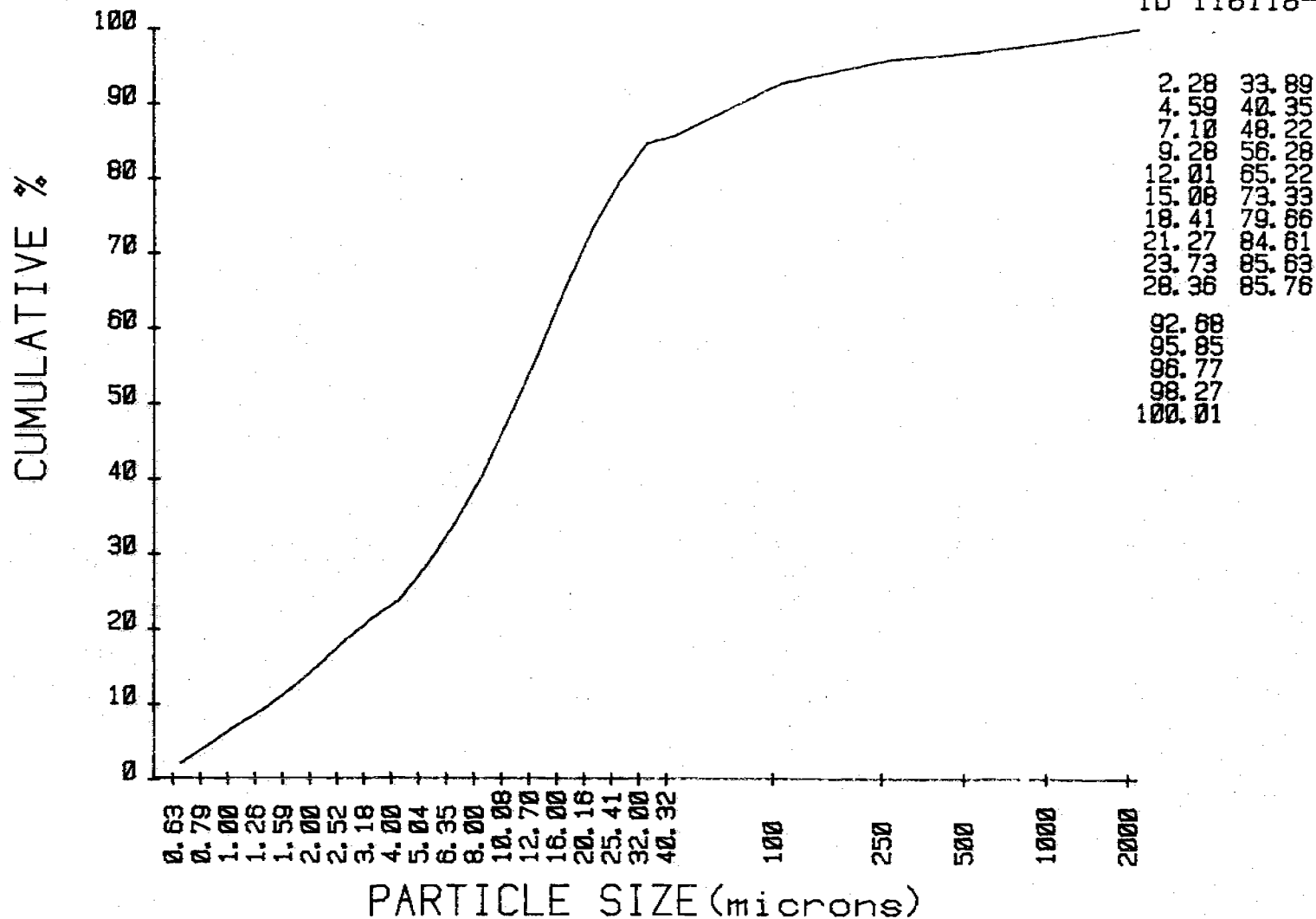
x



2.28	5.53
2.31	6.46
2.51	7.86
2.18	8.07
2.73	8.94
3.07	8.10
3.33	6.34
2.86	4.95
2.46	1.02
4.62	0.13
6.92	
3.17	
0.92	
1.50	
1.74	

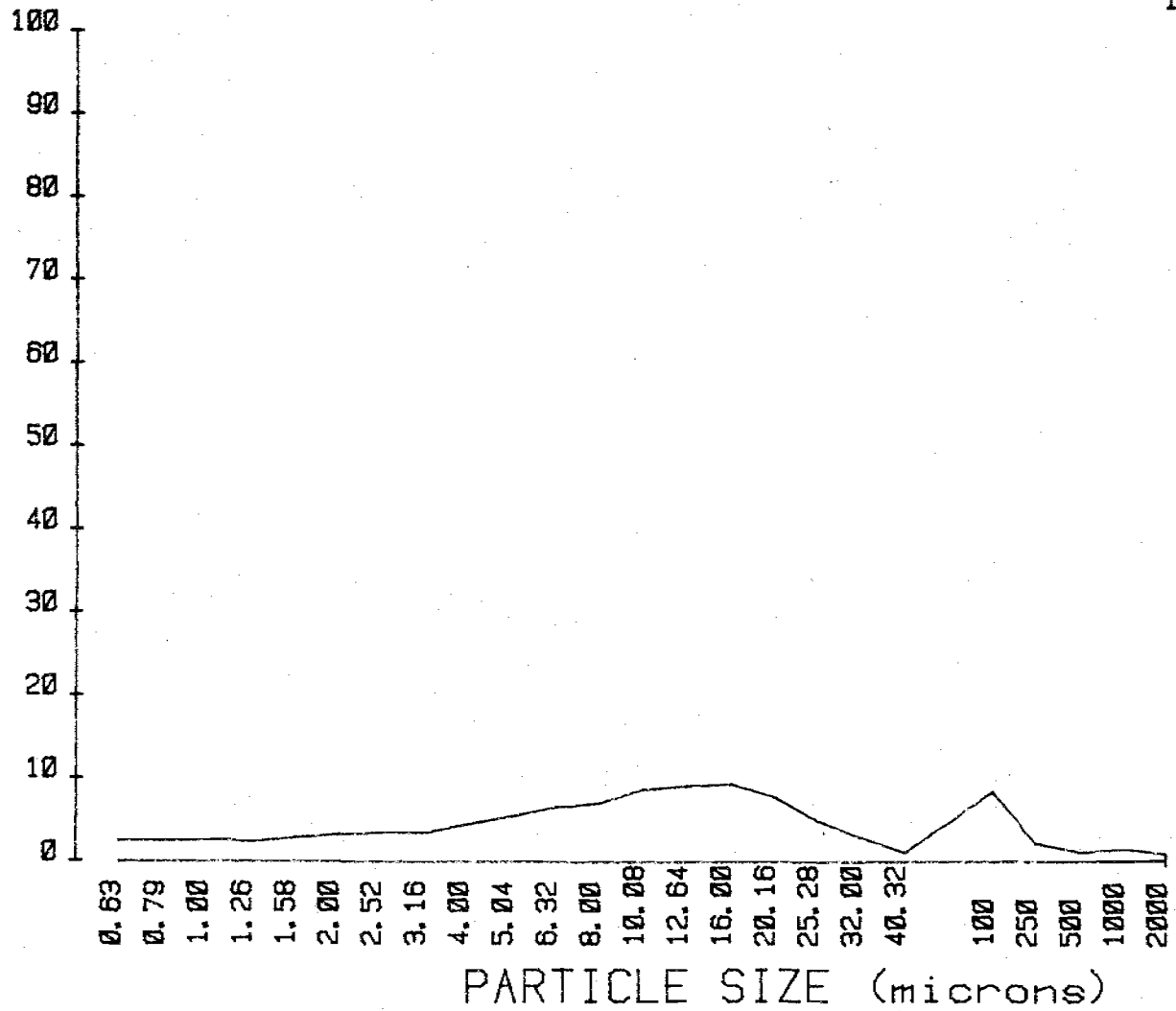
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18118-1



PLOT SAND-SILT-CLAY

ID I18118-2

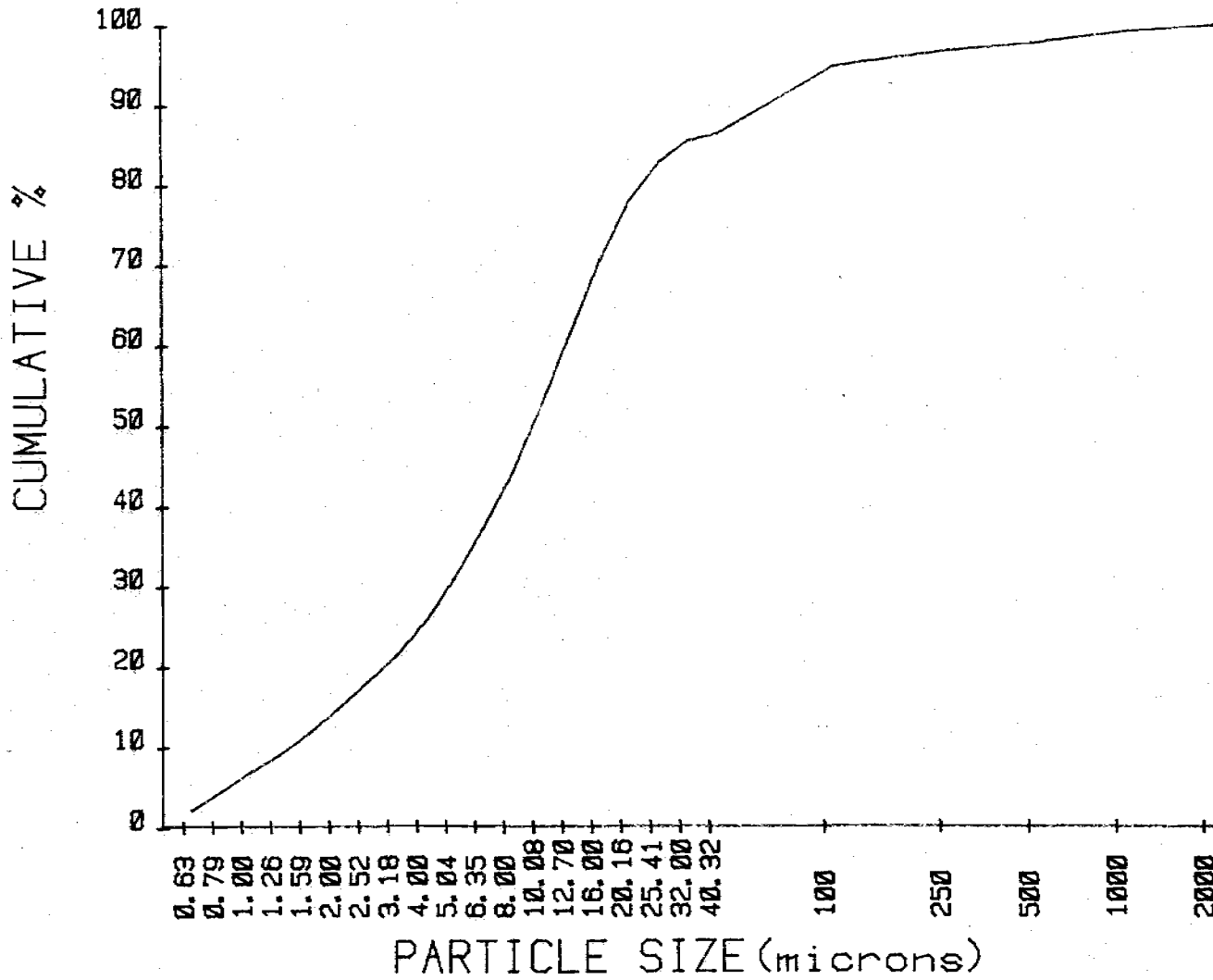


2.28	6.34
2.25	6.86
2.40	8.49
2.13	8.94
2.67	9.12
3.05	7.56
3.27	4.74
3.20	2.71
4.29	0.87
5.26	0.11
8.25	
2.05	
1.00	
1.99	
0.77	



CUMULATIVE CURVE SAND-SILT-CLAY

ID I18118-2

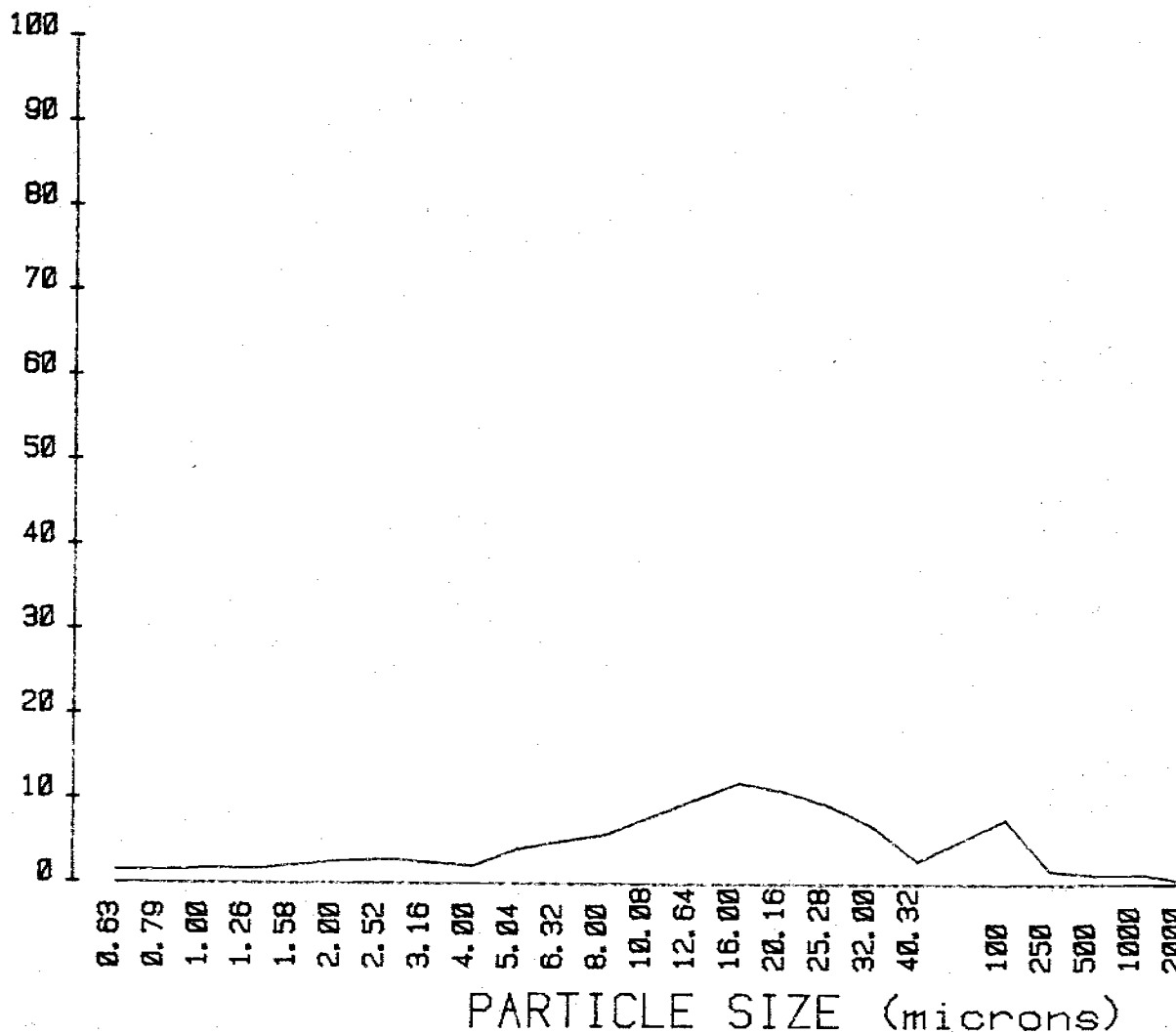


2.28	37.13
4.52	43.99
6.92	52.48
9.05	61.42
11.72	70.54
14.77	78.10
18.04	82.84
21.24	85.56
25.53	86.43
30.79	86.54
94.79	
96.84	
97.84	
99.23	
100.00	

# PLOT SAND-SILT-CLAY

ID I18118-3

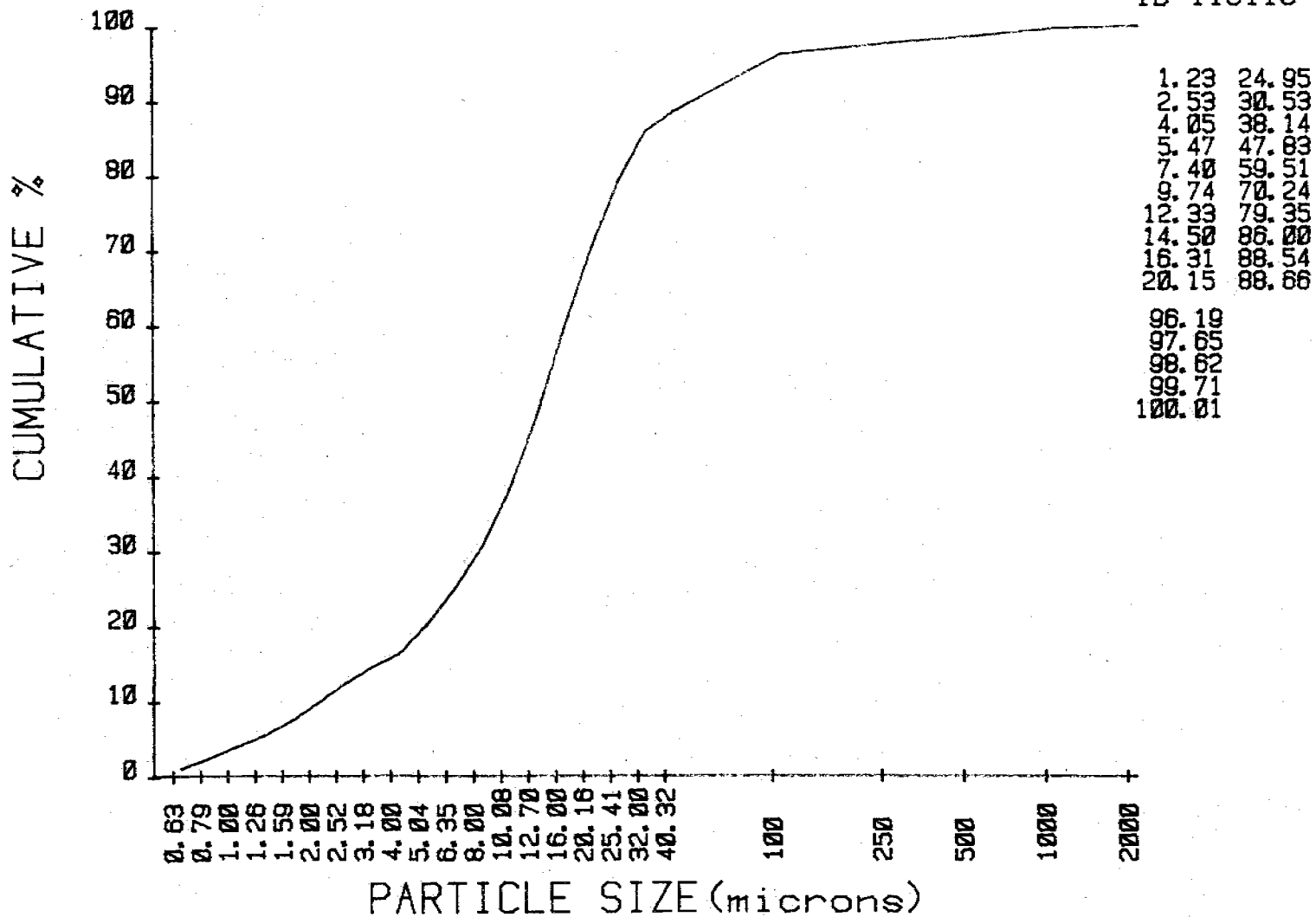
%



1.23	4.79
1.30	5.58
1.52	7.61
1.42	9.69
1.93	11.68
2.95	10.73
2.58	9.11
2.17	6.65
1.81	2.54
3.85	0.12
7.53	
1.46	
0.97	
1.09	
0.30	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18118-3



Unnamed Coarse Sandy Loam 79-ID-18119 (141001A-1)

Classification: sandy, mixed, frigid Typic Dystrachrept.

General Site Characteristics

Location: Clearwater County, Idaho: southwest 1/4, northwest 1/4 of section 16,  
T. 34N., R. 6E.

Forest: Clearwater National Forest

Area:

Described By/Date: June 12, 1978, by Dale Wilson

Landform: 24

Habitat Type: western red cedar/Pamy h.t.

Formation Name:

Parent Rock/Material: weathered gneiss & some mica schist

Weathering:

Topography: lower 1/3, straight vert., compd. laterally

Slope: 40-50 percent

Aspect: northeast 50 degrees

Elevation: 3230 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-0 centimeters (2-0 inches).

A1 0-10 centimeters (0-4 inches). Very dark gray (10YR 3/2) moist; coarse sandy loam; very fine granular structure; very friable, nonsticky and nonplastic; strongly acid pH 5.4, noncalcareous; 11 percent gravels by weight.

B2 10-41 centimeters (4-16 inches). Dark brown (10YR 3/3) moist; loamy coarse sand; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; some mixed ash; medium acid pH 5.6, noncalcareous; 13 percent gravels by weight.

C1 41-91 centimeters (16-36 inches). No lab sample.

C2 91+ centimeters (36+ inches). Brown (10YR 4/3) moist; loamy coarse sand; massive structure; very friable; medium acid pH 5.6, noncalcareous; 13 percent gravels by weight.

Pedon: Unnamed Coarse Sandy Loam 79-ID-18119 (141001A-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0 A1	5-0 0-10	NS 5.4	NS 0.09	NS 53	NS 10.4					
2	B2 C1	10-41 41-91	5.6 NS	0.06 NS	45 NS	3.9 NS					
3	C2	91+	5.6	0.05	42	4.1					

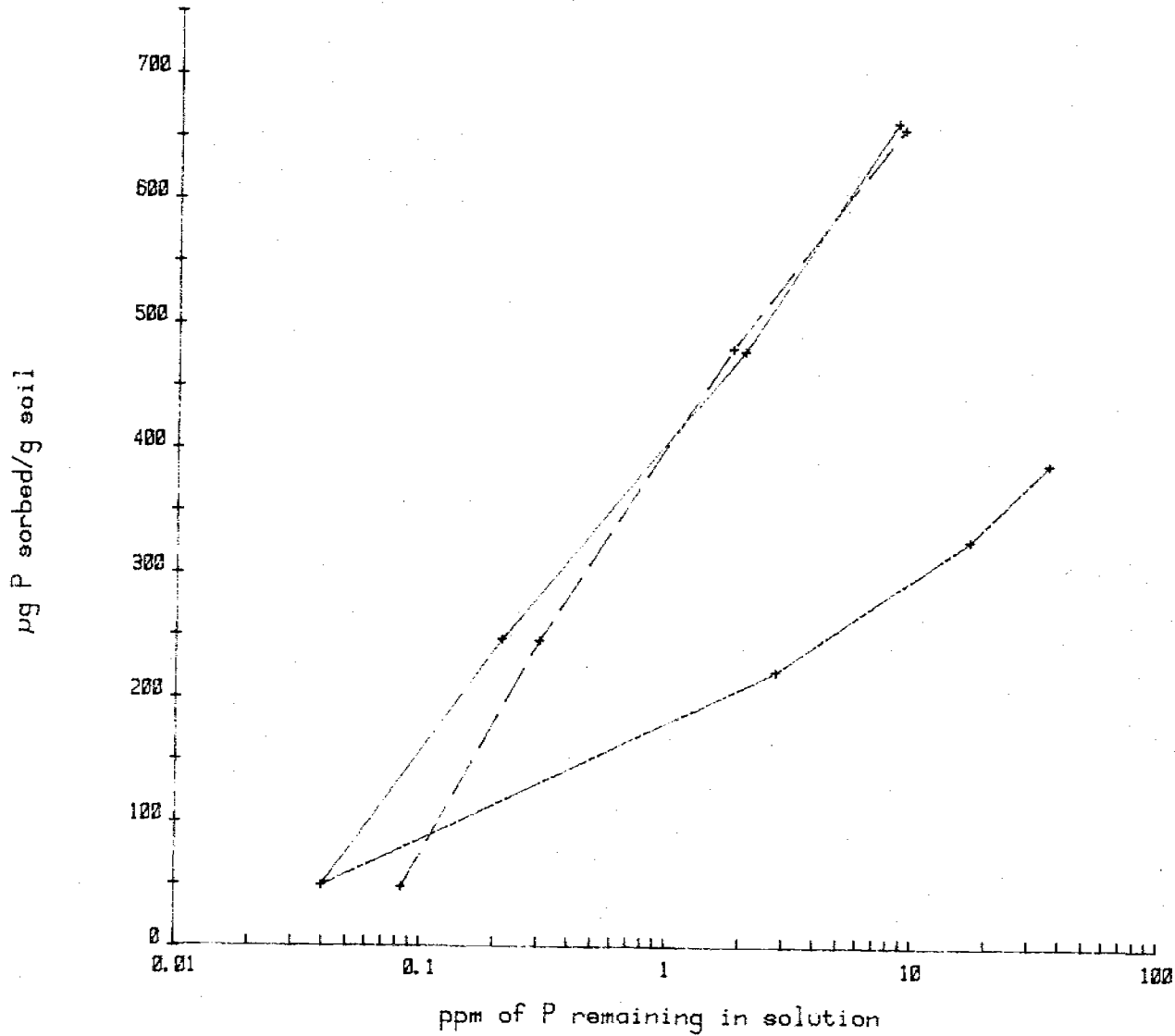
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	----- neq/100 gms -----						%	----- % -----			ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.0	1.3	0.1	0.4	9.9	13.0	33	1.67	0.97	0.082	12	0.89	8.2
	2.0	0.7	0.1	0.3	5.5	8.8	35	0.69	0.40	0.038	11	0.87	8.3
3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3.5	1.2	0.1	0.2	3.5	8.6	58	0.28	0.16	0.020	8	0.87	8.0

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-10-18119



µg/g soil	Soln ppm	
----- A1		
50	0.04	
248	0.22	
479	2.07	
664	8.64	
----- B2		
49	0.09	
247	0.31	
482	1.85	
658	9.20	
----- C2		
50	0.04	
222	2.00	
328	17.20	
389	36.08	

Pedon: Unnamed Coarse Sandy Loam 79-ID-18119 (141001A-1)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	X								X		
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
0-10	14.57	21.05	12.69	17.78	7.21	73.31	21.47	5.22	11		Coarse sandy loam
10-41	18.40	23.01	13.61	16.21	7.94	79.17	17.94	2.89	13		Loamy coarse sand
41-91	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS
91+	25.10	22.96	12.38	14.79	6.68	81.91	14.94	3.15	13		Loamy coarse sand

Depth	Silt Size Distribution (mm)				Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod Core	Bar	Bar			
cm	X				g/cc	X		X	
5-0					NS	NS	NS	NS	NS
0-10					19.9	7.2	NDNP	NDNP	NDNP
0-10					19.9	7.2	NDNP	NDNP	NDNP
10-41					16.5	5.1	NDNP	NDNP	NDNP
41-91					NS	NS	NS	NS	NS
91+					12.9	4.1	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method.  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

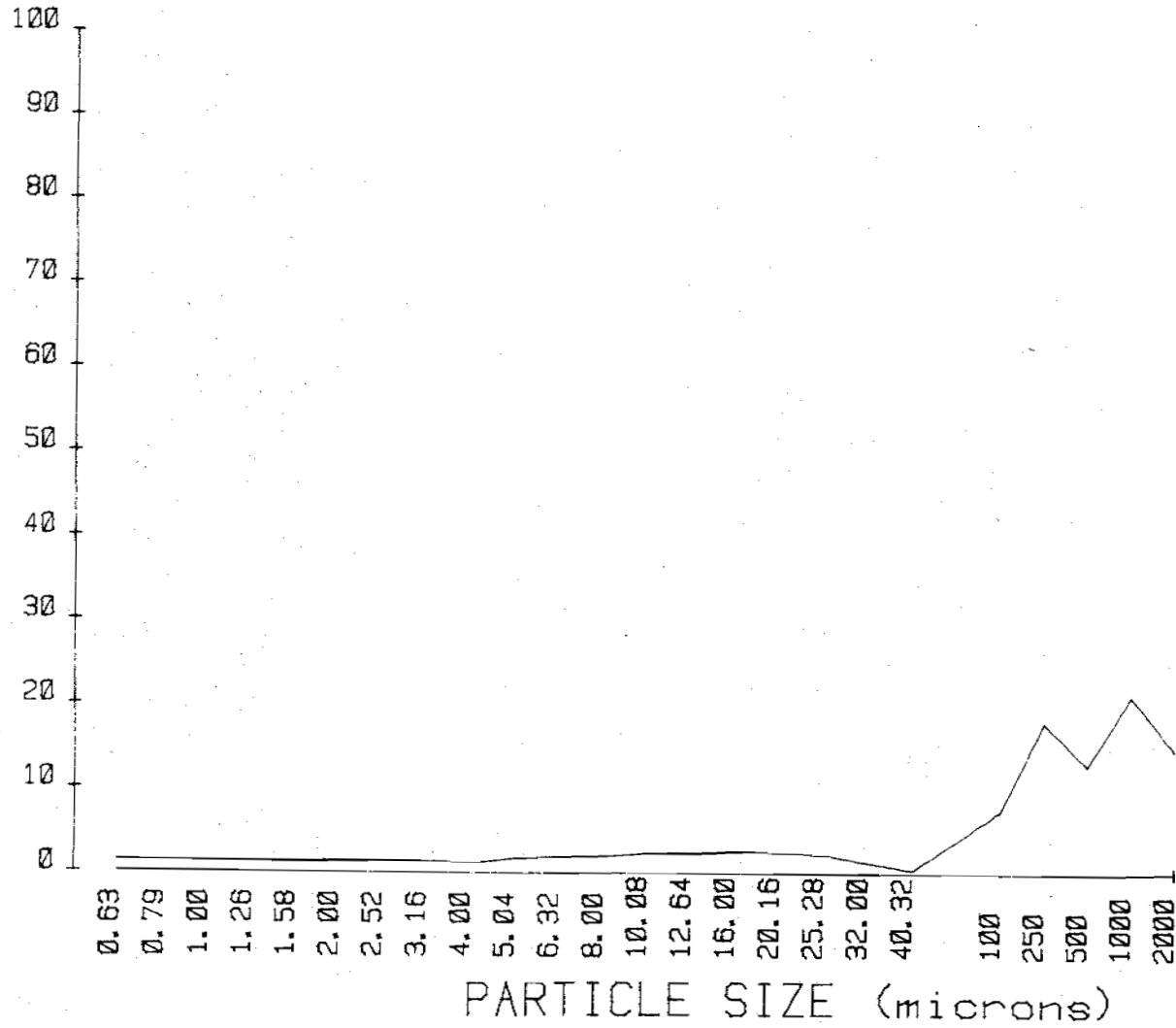
Identification		I18119-1	I18119-2	I18119-3	
Units		-----%			
TC (0.63-2.00)		5.22	2.89	3.15	
TSi (2.00-50)		21.47	17.94	14.94	
TS (50-2000)		73.31	79.17	81.91	
Clay	0.63-0.794	1.16	0.52	0.60	
	0.794-1.00	1.06	0.54	0.60	
	1.00-1.26	1.02	0.59	0.65	
	1.26-1.59	0.87	0.54	0.58	
	1.59-2.00	1.10	0.70	0.73	
Fine Silt	2.00-2.52	1.22	0.84	0.85	
	2.52-3.17	1.24	0.87	0.84	
	3.17-4.00	1.04	0.71	0.67	
	4.00-5.04	0.88	0.62	0.57	
Medium Silt	5.04-6.35	1.47	1.10	1.03	
	6.35-8.00	1.72	1.29	1.15	
	8.00-10.08	1.76	1.36	1.13	
	10.08-12.70	2.15	1.73	1.45	
	12.70-16.0	2.27	1.87	1.57	
	16.0-20.2	2.43	2.04	1.67	
Coarse Silt	20.2-25.4	2.17	2.04	1.47	
	25.4-32.0	1.94	1.75	1.42	
	32.0-40.3	1.01	1.53	0.70	
	40.3-50.8	0.15	0.17	0.31	
	50.8-64.0	0.03	0.03	0.10	
VFS (50-100)		7.21	7.94	6.68	
FS (100-250)		17.78	16.21	14.79	
MS (250-500)		12.69	13.61	12.38	
CoS (500-1000)		21.05	23.01	22.96	
VCoS (1000-2000)		14.57	18.40	25.10	
Greater than 2000		11	13	13	
Textural Class		CSL	LCS	LCS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

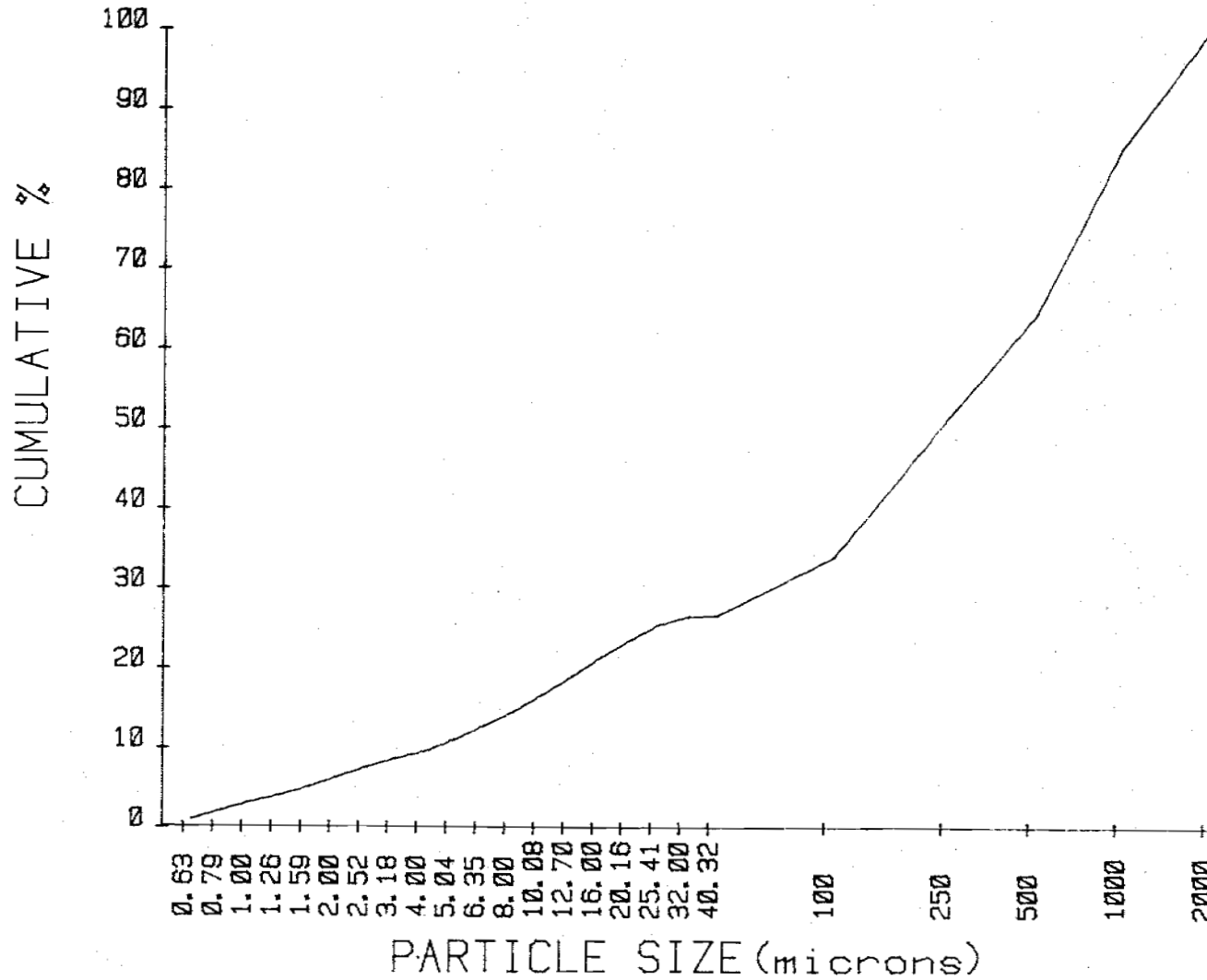
ID I18119-1



1.16	1.72
1.06	1.76
1.02	2.15
0.87	2.27
1.10	2.43
1.22	2.17
1.24	1.94
1.04	1.01
0.88	0.14
1.47	0.03
7.21	
17.78	
12.69	
21.05	
14.57	

### CUMULATIVE CURVE SAND-SILT-CLAY

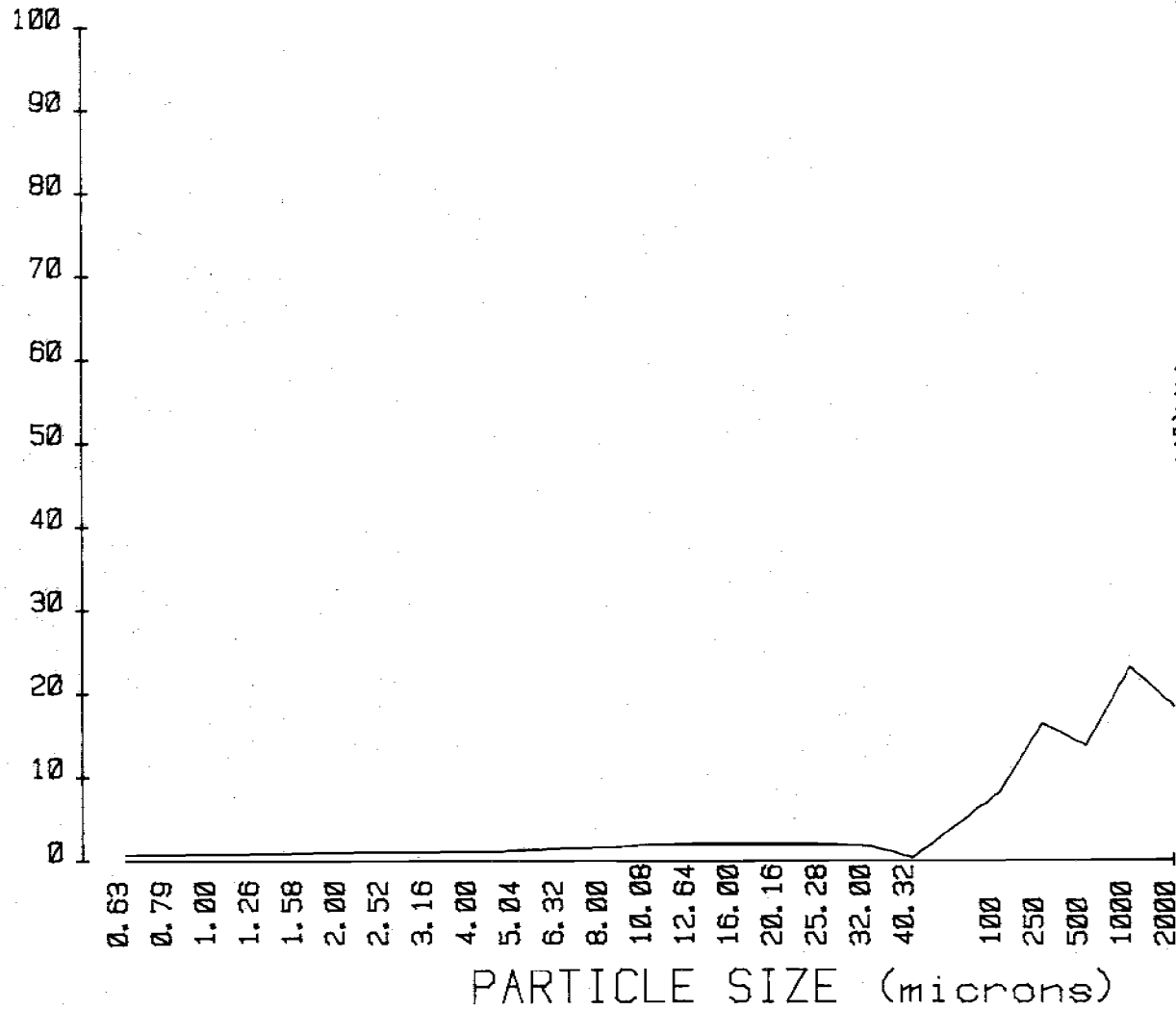
ID I18119-1



1.16	12.79
2.22	14.55
3.25	16.70
4.12	18.97
5.22	21.40
6.44	23.57
7.68	25.51
8.72	26.52
9.59	26.66
11.07	26.69
33.90	
51.68	
64.37	
85.42	
99.99	

PLOT SAND-SILT-CLAY

ID I18119-2

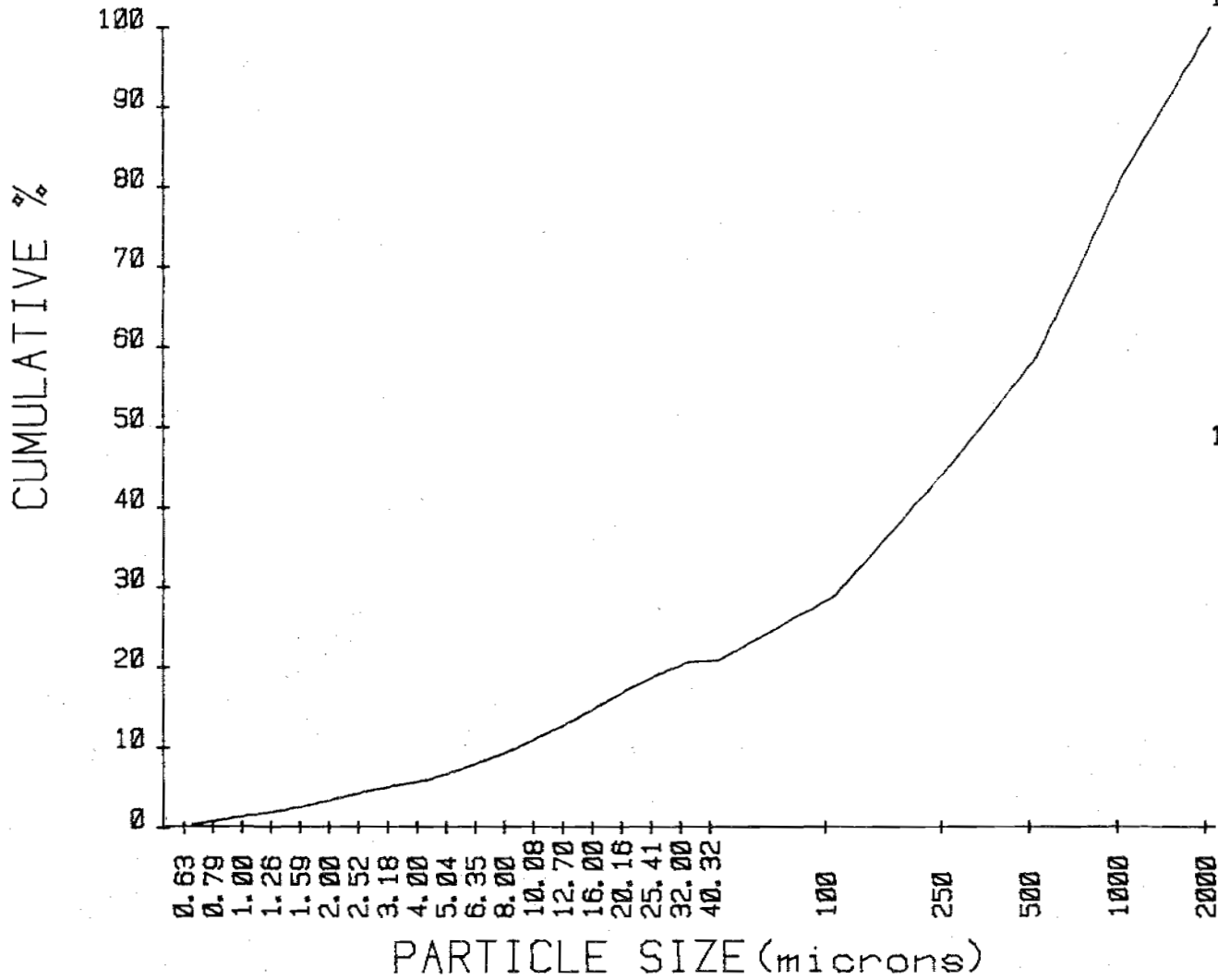


0.52	1.29
0.54	1.36
0.59	1.73
0.54	1.87
0.70	2.04
0.84	2.04
0.87	1.74
0.71	1.52
0.62	0.17
1.10	0.03
7.94	
16.21	
13.61	
23.01	
18.40	

328

CUMULATIVE CURVE SAND-SILT-CLAY

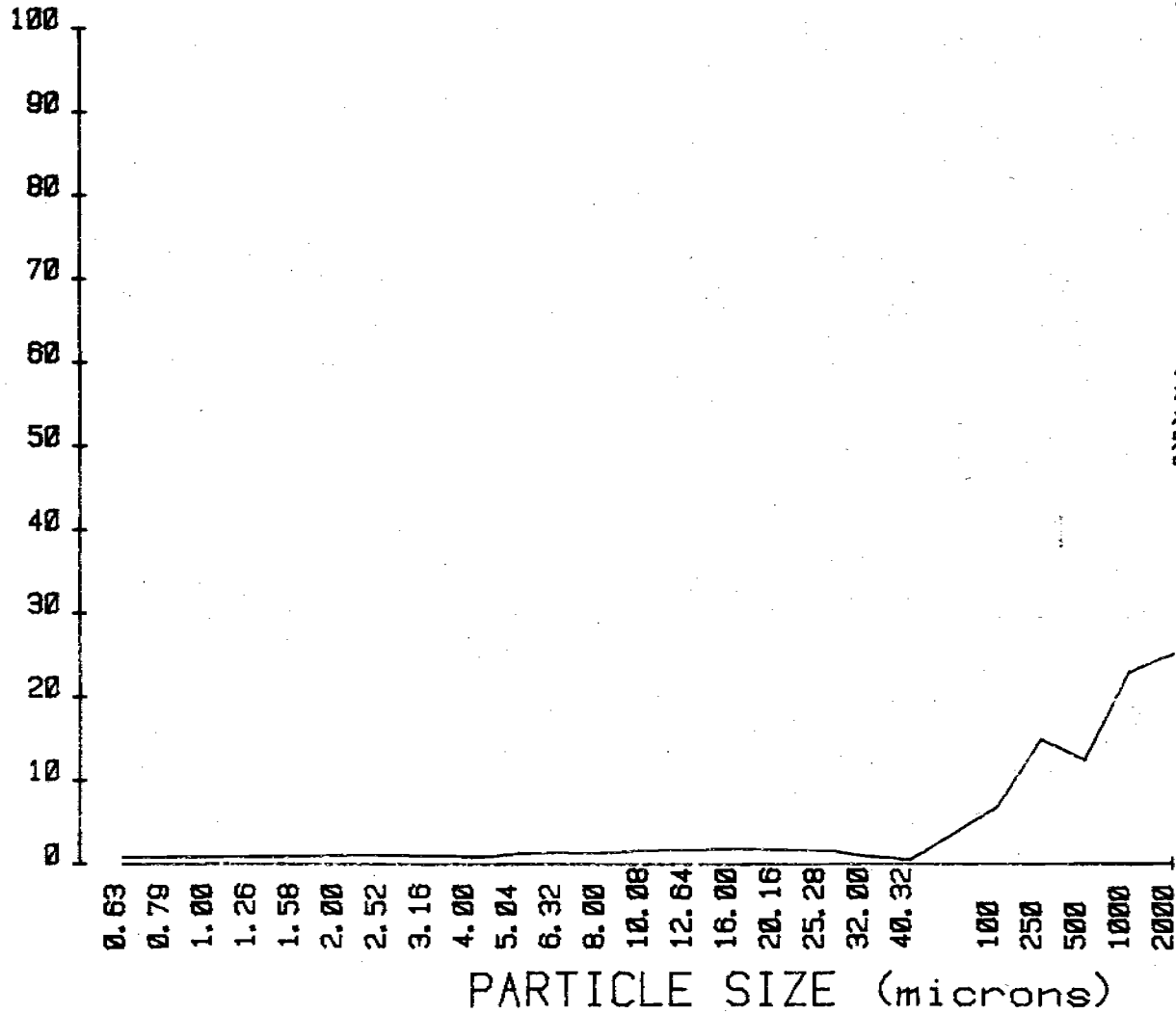
ID I18119-2



0.52	8.32
1.06	9.68
1.65	11.41
2.19	13.28
2.89	15.32
3.73	17.36
4.60	19.10
5.31	20.63
5.93	20.80
7.03	20.83
28.77	
44.98	
58.59	
81.60	
100.00	

PLOT SAND-SILT-CLAY

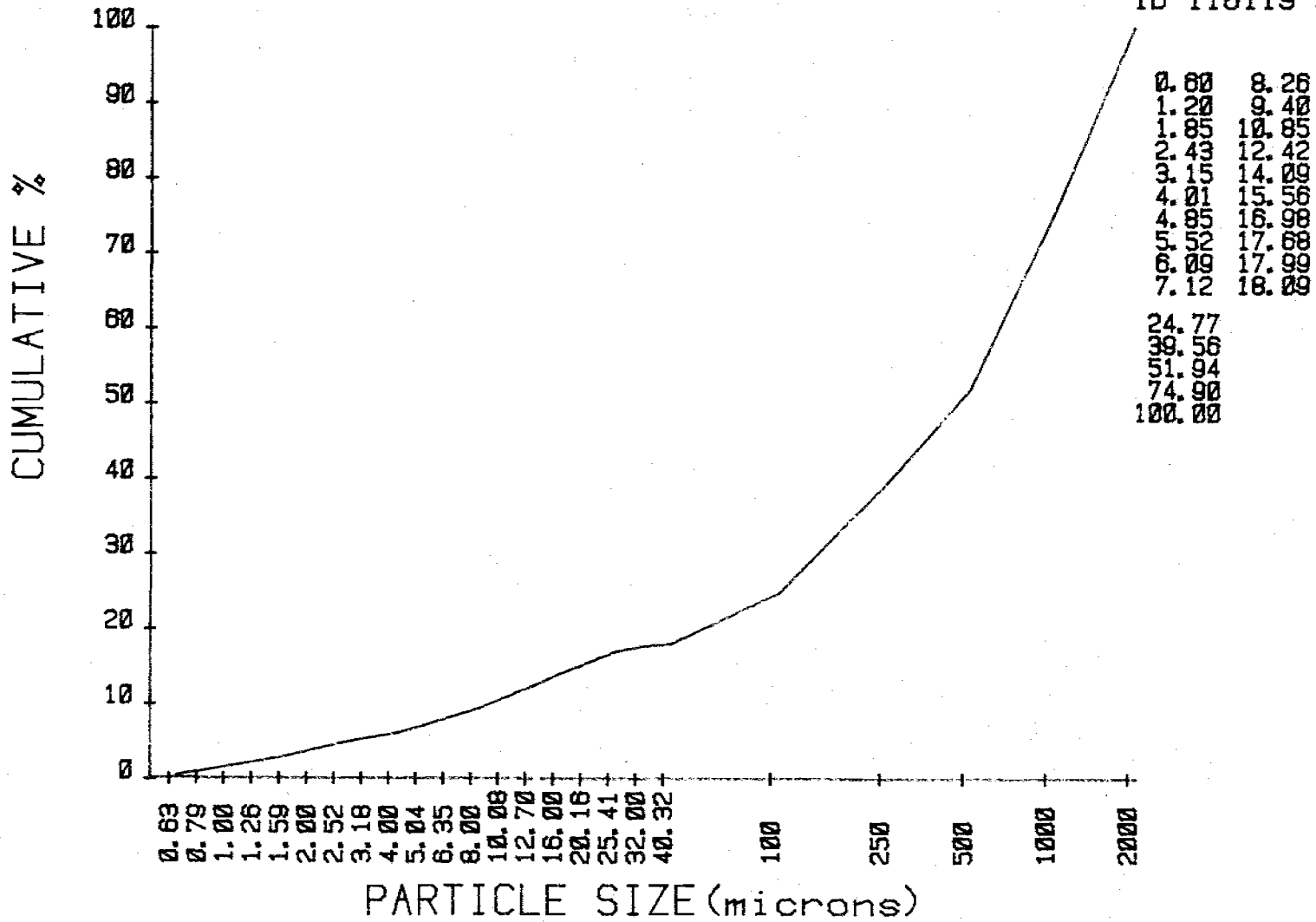
ID I18119-3



0.60	1.15
0.60	1.13
0.65	1.45
0.58	1.57
0.73	1.67
0.85	1.47
0.84	1.42
0.67	0.70
0.57	0.31
1.03	0.10
6.88	
14.79	
12.38	
22.96	
25.18	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18119-3



Unnamed Silt Loam 79-ID-18120 (070201R-1)

Classification: coarse-loamy, mixed, frigid Dystric Eutochrept.

General Site Characteristics

Location: Clearwater County, Idaho: southwest 1/4, southwest 1/4 of section 12,  
T. 40N., R. 1E.

Forest: Clearwater National Forest

Area: Palouse District

Described By/Date: June 22, 1978, by Randy Moiser

Landform: 24

Habitat Type: western red cedar/Pamy h.t.

Formation Name:

Parent Rock/Material: siltite

Weathering:

Topography: upper 1/3 of convex slope

Slope: 10 percent

Aspect: north

Elevation: 3320 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 4-0 centimeters (1.5-0 inches).

A1 0-10 centimeters (0-4 inches). Dark brown (10YR 3/4) moist; silt loam; moderate fine granular structure; very friable, nonsticky and nonplastic; slightly acid pH 6.3, noncalcareous; trace gravels.

B2ir 10-46 centimeters (4-18 inches). Dark brown (10YR 4/4) moist; silt loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; slightly acid pH 6.4, noncalcareous; trace gravels.

I1B2 46-74 centimeters (18-29 inches). Yellowish brown (10YR 5/4) moist; fine sandy loam; massive structure; very friable, slightly sticky and nonplastic; slightly acid pH 6.4, noncalcareous; trace gravels.

I1C 74+ centimeters (29+ inches). Light yellowish brown (2.5YR 6/4) moist; very gravelly fine sandy loam; massive structure; loose; slightly acid pH 6.3, noncalcareous; 51 percent gravels by weight.

Pedon: Unnamed Silt Loam 79-ID-18120 (070201R-1)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0	4-0	NS	NS	NS	NS					
2	A1	0-10	6.3	0.29	77	3.7					
3	B2ir	10-46	6.4	0.28	63	2.0					
4	IIB2	46-74	6.4	0.22	36	0.8					
	IIC	74+	6.3	0.22	46	1.1					

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms												
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	7.0	1.7	0.1	1.1	10.8	19.0	48	3.60	2.09	0.150	14	1.00	9.7
3	6.6	1.5	0.1	0.9	9.0	16.8	50	2.32	1.35	0.102	13	1.00	9.7
4	4.5	1.1	0.1	0.3	1.9	8.6	76	0.32	0.19	0.024	8	1.00	8.0
	6.0	2.0	0.1	0.3	2.6	11.6	76	0.39	0.23	0.016	14	0.49	8.0

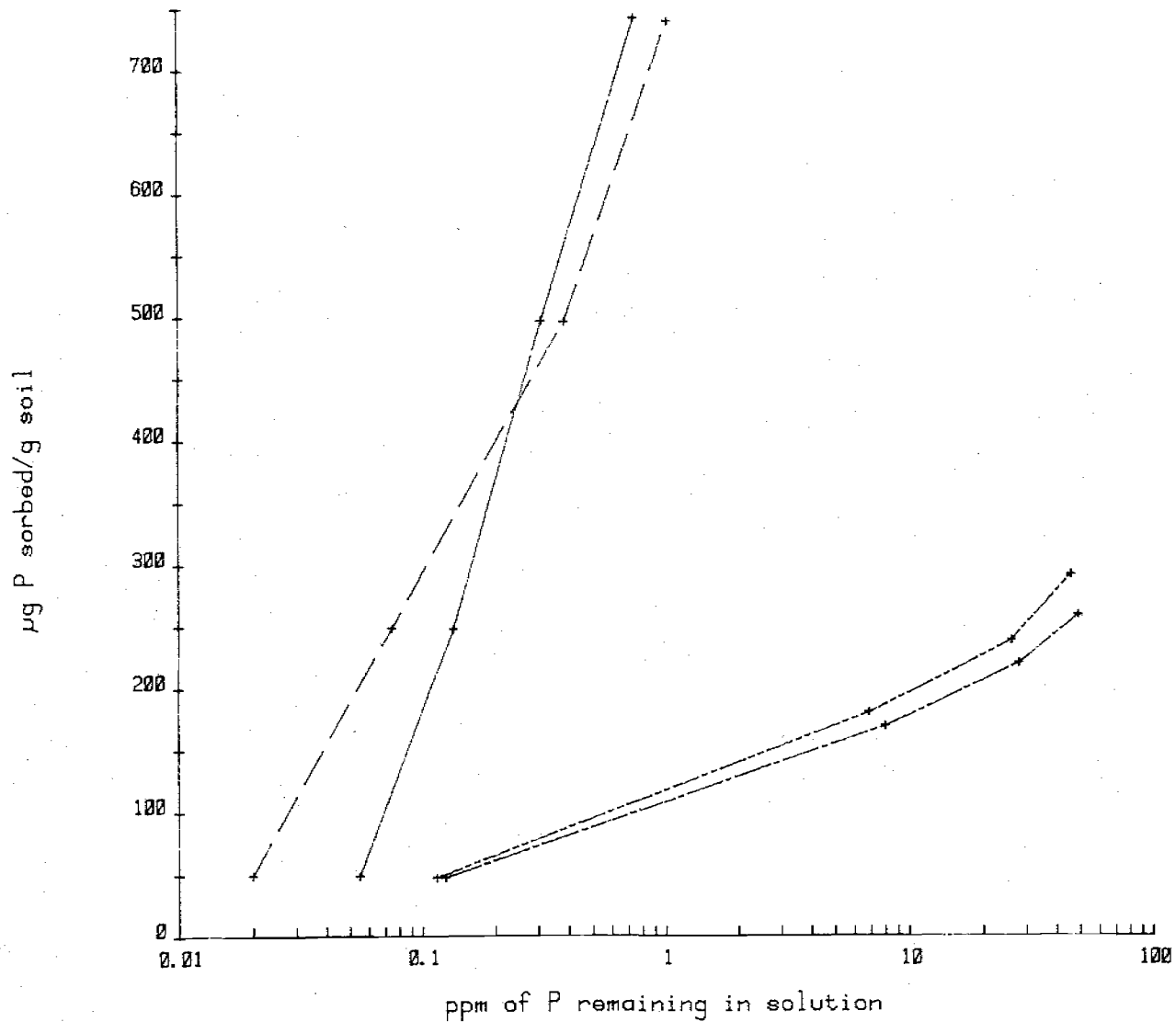
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness



### Phosphorus Isotherm

79-ID-18120



µg/g soil	Soln ppm
----- A1	
49	0.06
249	0.14
497	0.31
743	0.75
----- B2ir	
50	0.02
249	0.08
496	0.39
740	1.02
----- IIB2	
49	0.13
170	0.02
221	27.92
260	49.04
----- IIC	
49	0.12
181	6.90
239	26.08
292	45.76

Pedon: Unnamed Silt Loam 79-ID-18120 (070201R-1)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%								%		
4-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-10	1.61	4.47	5.51	2.21	17.35	31.15	58.82	10.03	trace		Silt loam
10-46	1.24	5.27	7.55	13.12	10.10	37.28	51.59	11.13	trace		Silt loam
46-74	1.77	8.06	13.58	22.99	12.59	58.99	34.75	6.26	trace		Fine sandy loam
74+	4.17	11.17	11.22	23.40	15.99	65.95	28.47	5.59	Si		V.gr. fine sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod Core	Bar	Bar			
cm	%			g/cc	%		%		
4-0					NS	NS	NS	NS	NS
0-10					41.2	11.9	NDNP	NDNP	NDNP
10-46					35.1	9.9	NDNP	NDNP	NDNP
46-74					17.2	8.7	NDNP	NDNP	NDNP
74+					19.0	11.4	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

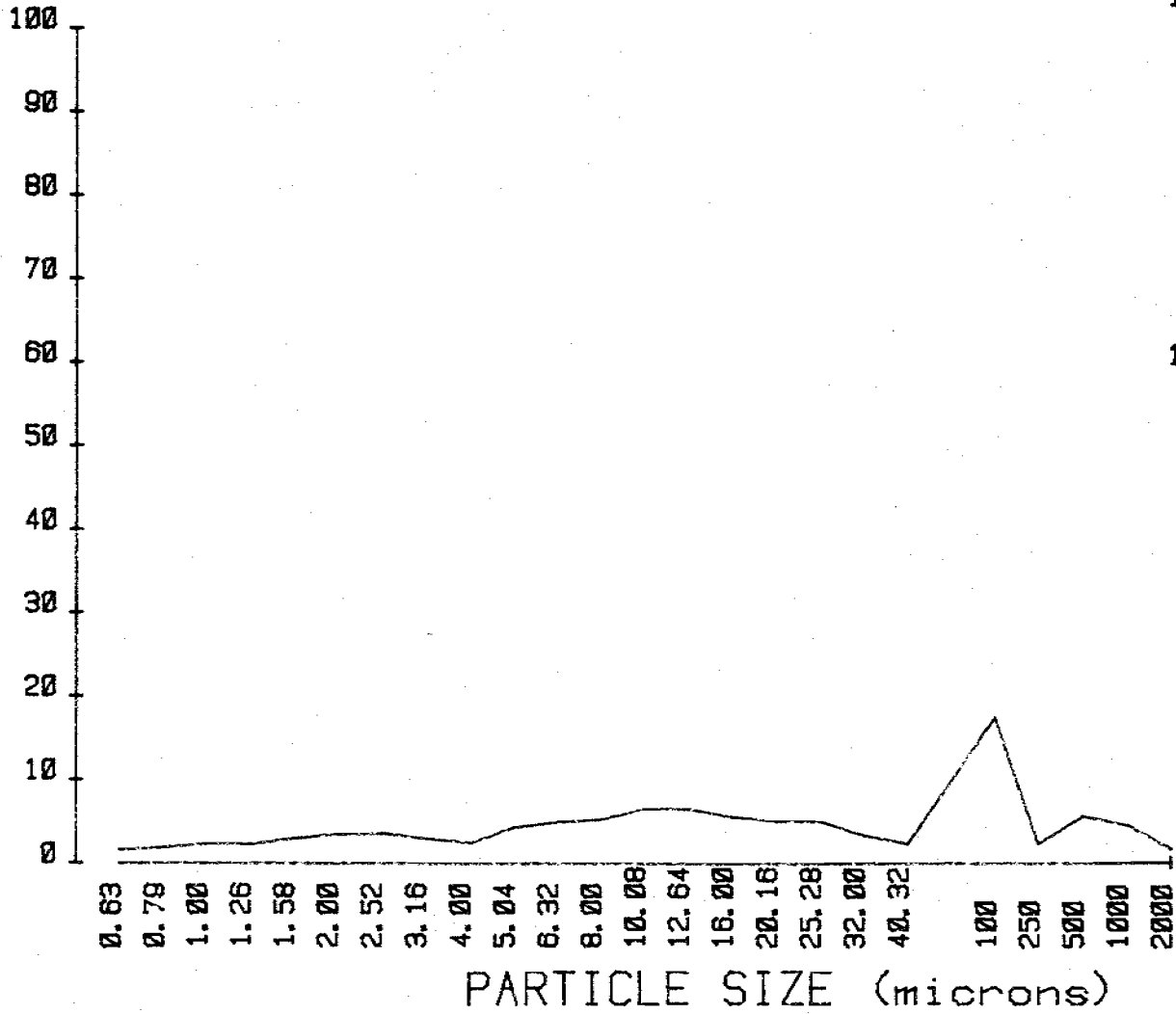
Identification		I18120-1	I18120-2	I18120-3	I18120-4
Units		-----%			
TC (0.63-2.00)		10.03	11.13	6.26	5.59
TSi (2.00-50)		58.82	51.59	34.75	28.47
TS (50-2000)		31.15	37.28	58.99	65.95
Clay	0.63-0.794	1.39	1.95	1.17	1.09
	0.794-1.00	1.70	2.05	1.13	1.01
	1.00-1.26	2.13	2.32	1.26	1.11
	1.26-1.59	2.06	2.11	1.16	1.01
	1.59-2.00	2.77	2.70	1.54	1.38
Fine Silt	2.00-2.52	3.25	3.07	1.82	1.65
	2.52-3.17	3.34	3.03	1.78	1.73
	3.17-4.00	2.68	2.38	1.42	1.41
	4.00-5.04	2.17	1.88	1.20	1.15
Medium Silt	5.04-6.35	4.08	3.61	2.51	2.05
	6.35-8.00	4.77	4.19	3.00	2.21
	8.00-10.08	5.07	4.63	3.23	2.26
	10.08-12.70	6.32	5.78	3.69	2.53
	12.70-16.0	6.26	5.75	3.88	2.72
	16.0-20.2	5.34	5.78	3.80	2.64
Coarse Silt	20.2-25.4	4.85	5.04	3.64	2.72
	25.4-32.0	4.82	3.88	2.62	2.21
	32.0-40.3	3.15	2.04	1.62	1.90
	40.3-50.8	2.12	0.47	0.49	1.26
	50.8-64.0	0.59	0.06	0.06	0.04
VFS (50-100)		17.35	10.10	12.59	15.99
FS (100-250)		2.21	13.12	22.99	23.40
MS (250-500)		5.51	7.55	13.58	11.22
CoS (500-1000)		4.47	5.27	8.06	11.17
VCoS (1000-2000)		1.61	1.24	1.77	4.17
Greater than 2000		trace	trace	trace	51
Textural Class		SL	SL	FSL	V.Gr.FSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18120-1

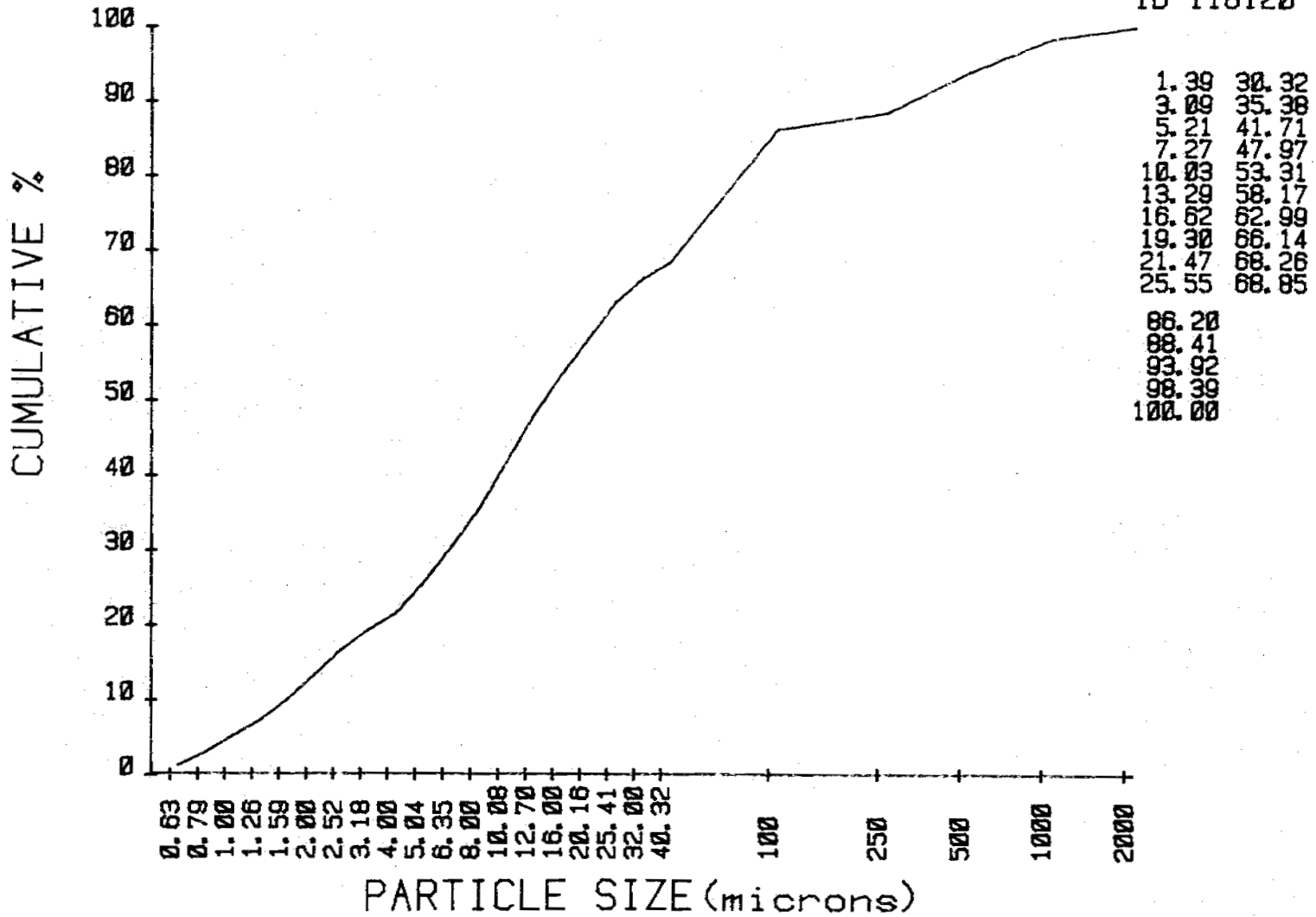
x



1.39	4.77
1.70	5.07
2.13	6.32
2.66	8.00
3.25	10.00
3.94	12.64
4.82	16.00
5.95	20.00
7.36	25.28
9.07	32.00
11.22	40.32
13.90	100
17.35	250
21.61	500
26.88	1000
33.44	2000
41.57	
51.51	
63.89	
79.83	
99.75	

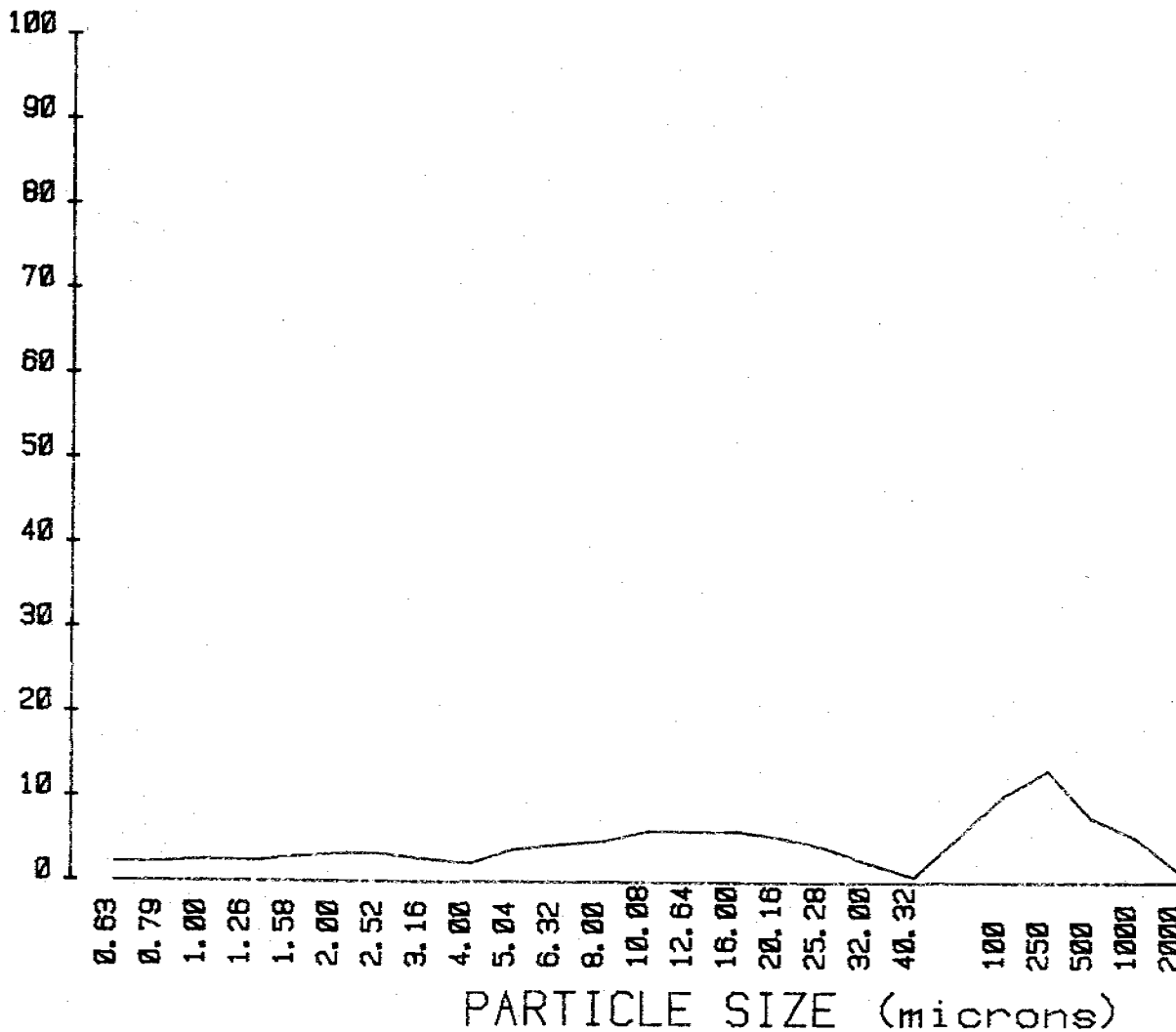
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18120-1



PLOT SAND-SILT-CLAY

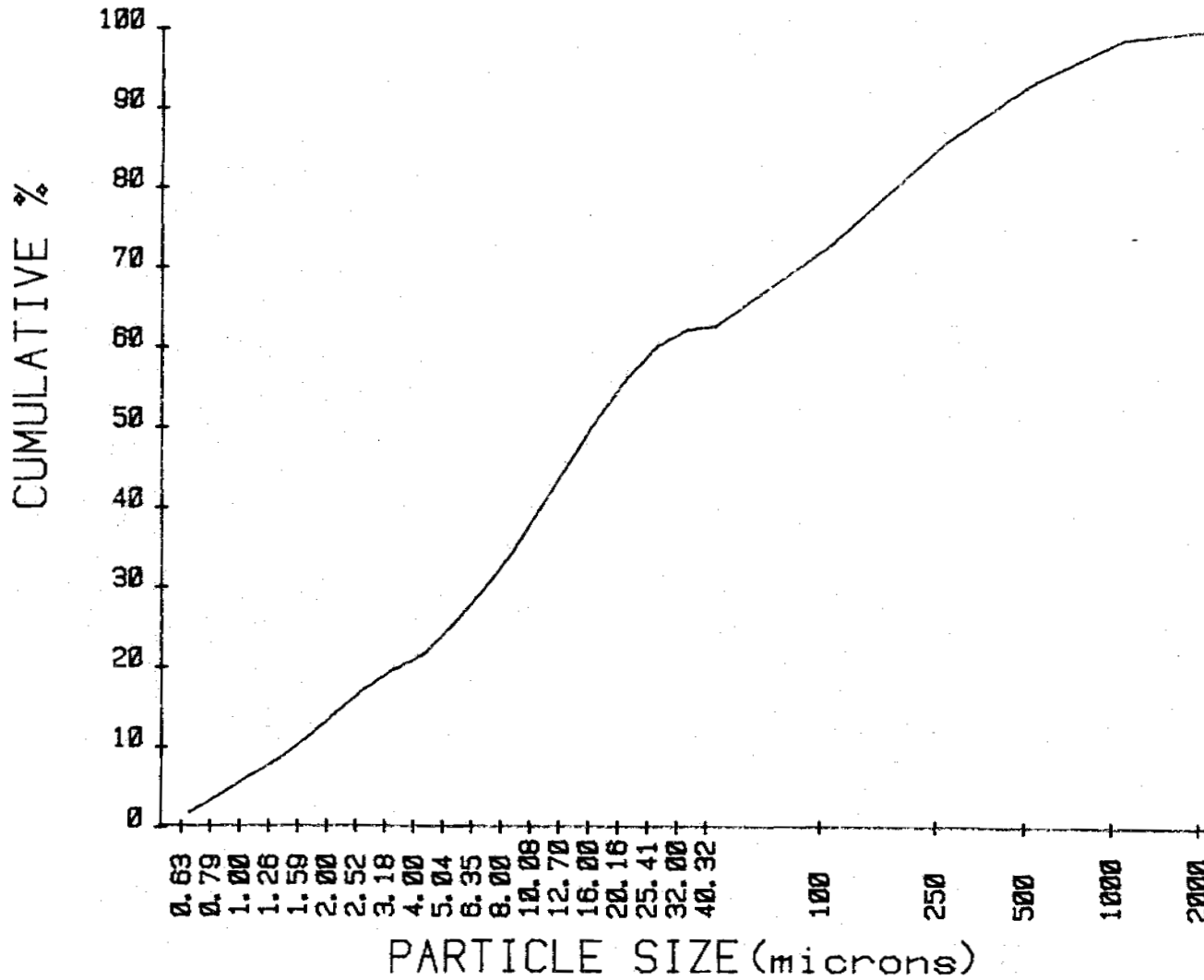
ID I18120-2



1.95	4.18
2.05	4.63
2.32	5.78
2.11	5.74
2.70	5.78
3.07	5.03
2.02	3.88
2.38	2.04
1.88	0.47
2.61	0.06
10.10	
13.12	
7.55	
5.27	
1.24	

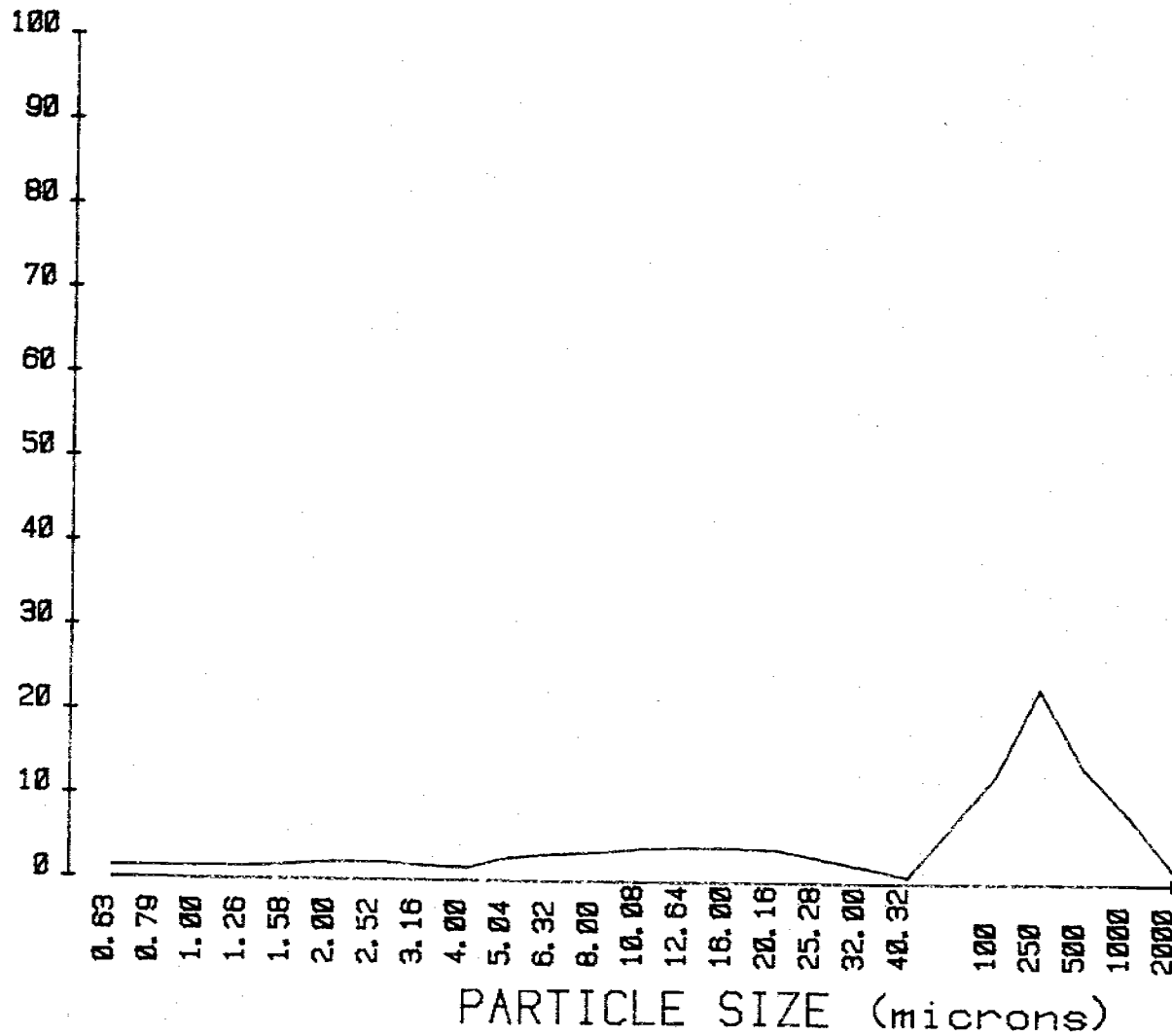
### CUMULATIVE CURVE SAND-SILT-CLAY

ID I18120-2



PLOT SAND-SILT-CLAY

ID I18120-3



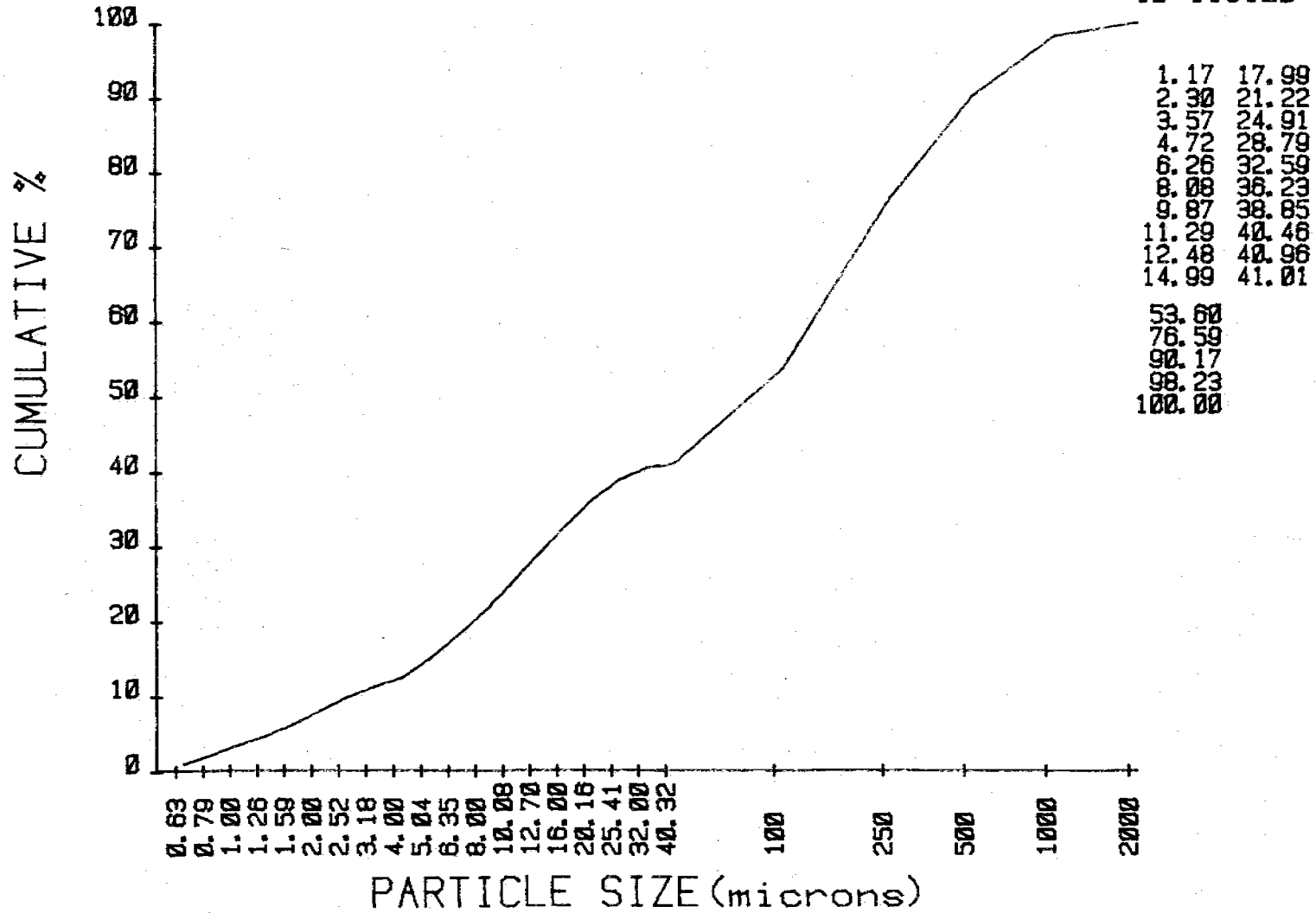
1.17	3.00
1.13	2.23
1.26	0.68
1.16	0.88
1.54	0.80
1.82	0.64
1.78	0.81
1.42	0.62
1.28	0.49
2.51	0.05
12.58	
22.99	
13.58	
8.86	
1.77	

341



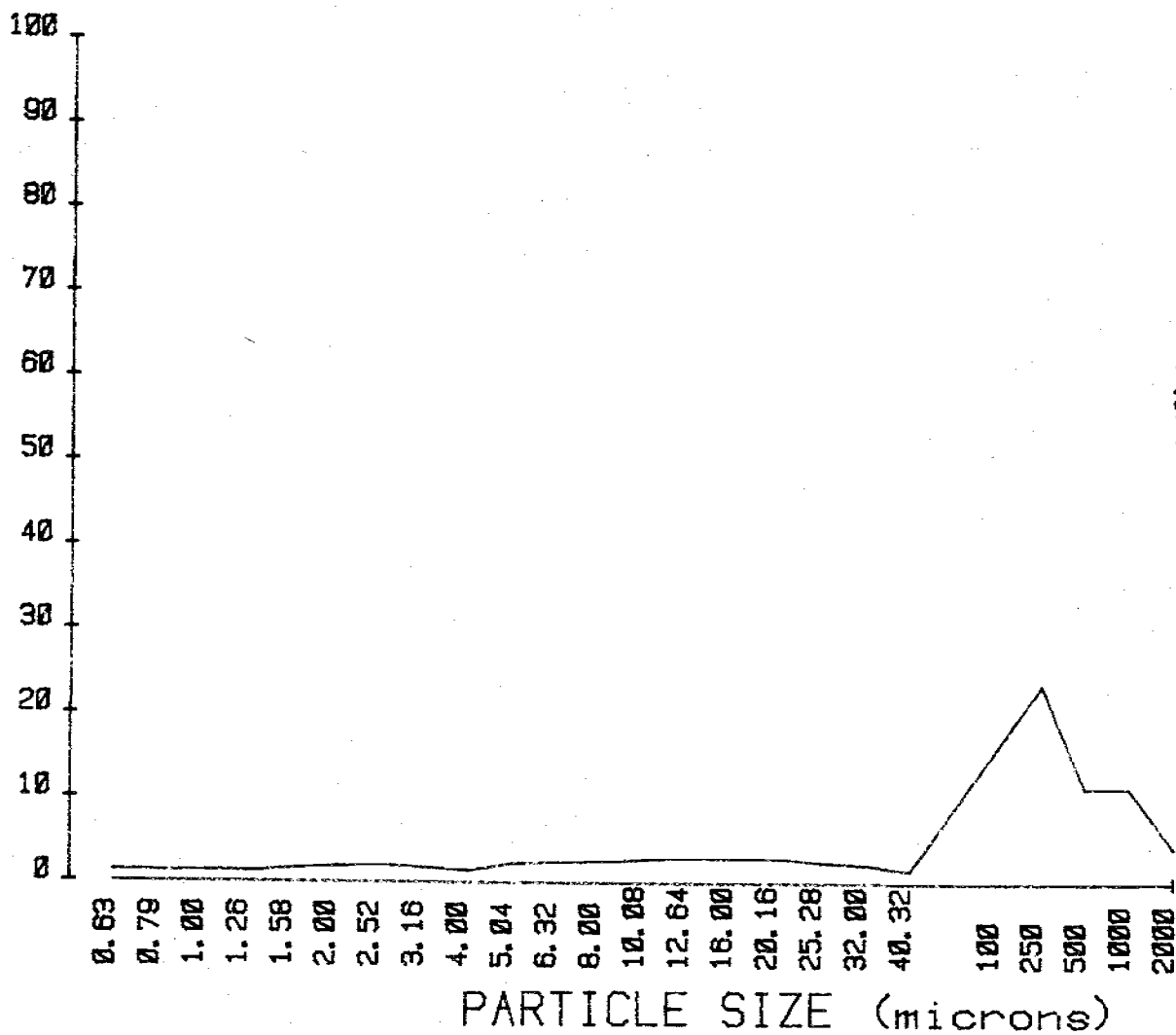
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18120-3



PLOT SAND-SILT-CLAY

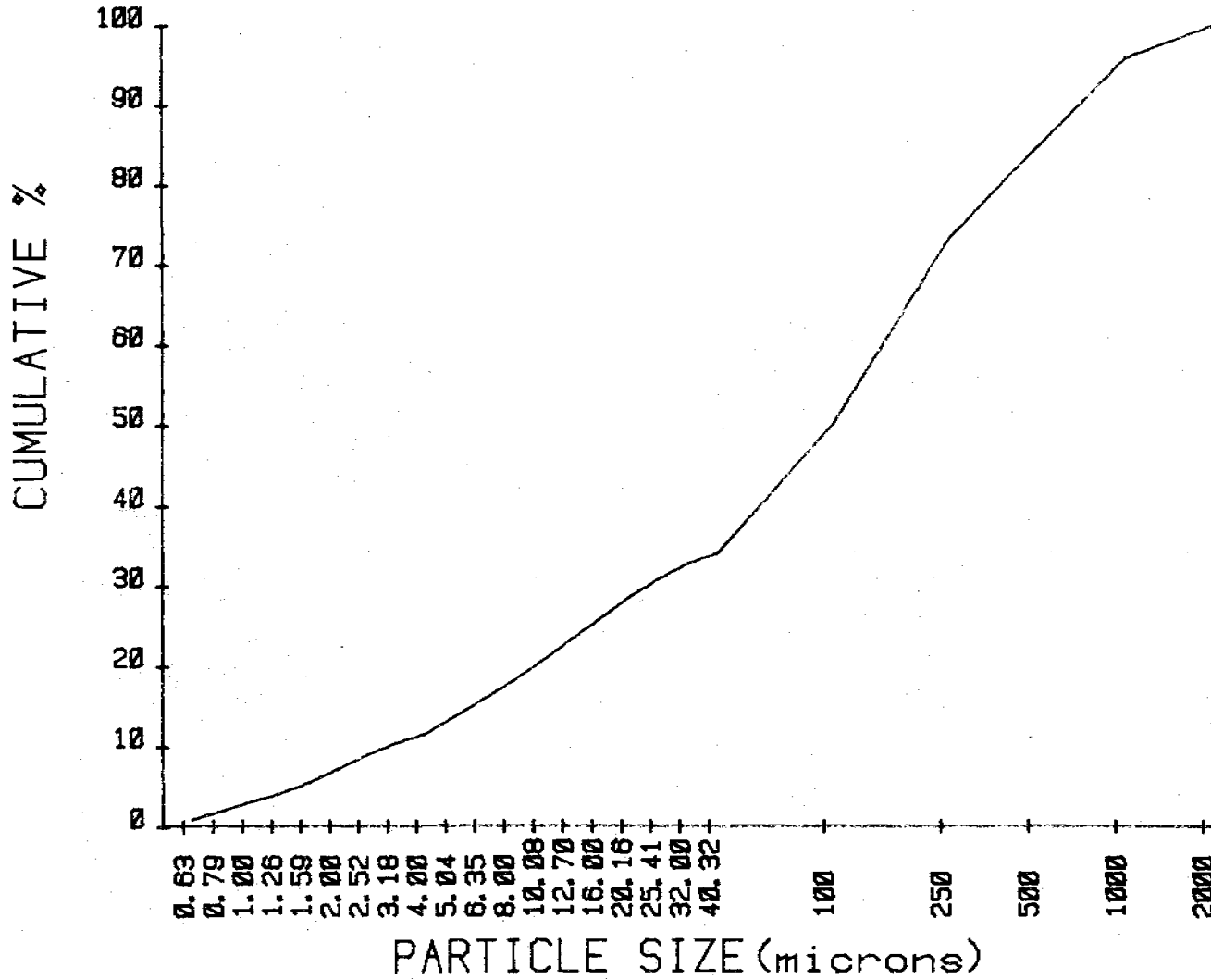
ID I18120-4



1.09	2.20
1.01	2.26
1.11	2.53
1.00	2.72
1.38	2.64
1.65	2.72
1.73	2.20
1.41	1.90
1.15	1.26
2.05	0.03
15.00	
23.40	
11.22	
11.17	
4.17	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18120-4



1.00	15.78
2.10	18.04
3.20	20.57
4.21	23.29
5.58	25.93
7.23	28.65
8.96	30.85
10.98	32.76
11.53	34.02
13.58	34.85
50.04	
73.44	
84.66	
95.83	
100.00	

Unnamed Silt Loam 79-ID-18121 (040701R-1)

Classification: medial over loamy, mixed, frigid Typic Eutroboralfs.

General Site Characteristics

Location: Clearwater County, Idaho; southwest 1/4, northeast 1/4 of section 17,  
T. 40N., R. 1E.

Forest: Clearwater National Forest

Area: Palouse Ranger District

Described By/Date: June 21, 1978, by Randy Moiser

Landform: 21

Habitat Type: western red cedar/Pamy h.t.

Formation Name:

Parent Rock/Material: granitic

Weathering:

Topography: gentle rolling

Slope: 15 percent

Aspect: south-southeast

Elevation: 2965 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 1-0 centimeters (0.5-0 inches).

B21r 0-38 centimeters (0-15 inches). Brown (10YR 3/4) moist; silt loam; weak fine granular structure; slightly sticky and nonplastic; slightly acid pH 6.2, noncalcareous; no gravels.

IIB2t 38-71 centimeters (15-28 inches). Yellowish brown (10YR 5/4) moist; silt loam; moderate medium subangular blocky structure; friable, slightly sticky and plastic; slightly acid pH 6.3, noncalcareous; no gravels.

IIC 71-130 centimeters (28-50 inches). Yellow (10YR 8/6) moist; gravelly sandy clay loam; massive structure; loose; very strongly acid pH 5.0, noncalcareous; 35 percent gravels by weight.

Pedon: Unnamed Silt Loam 79-ID-18121 (040701R-1)

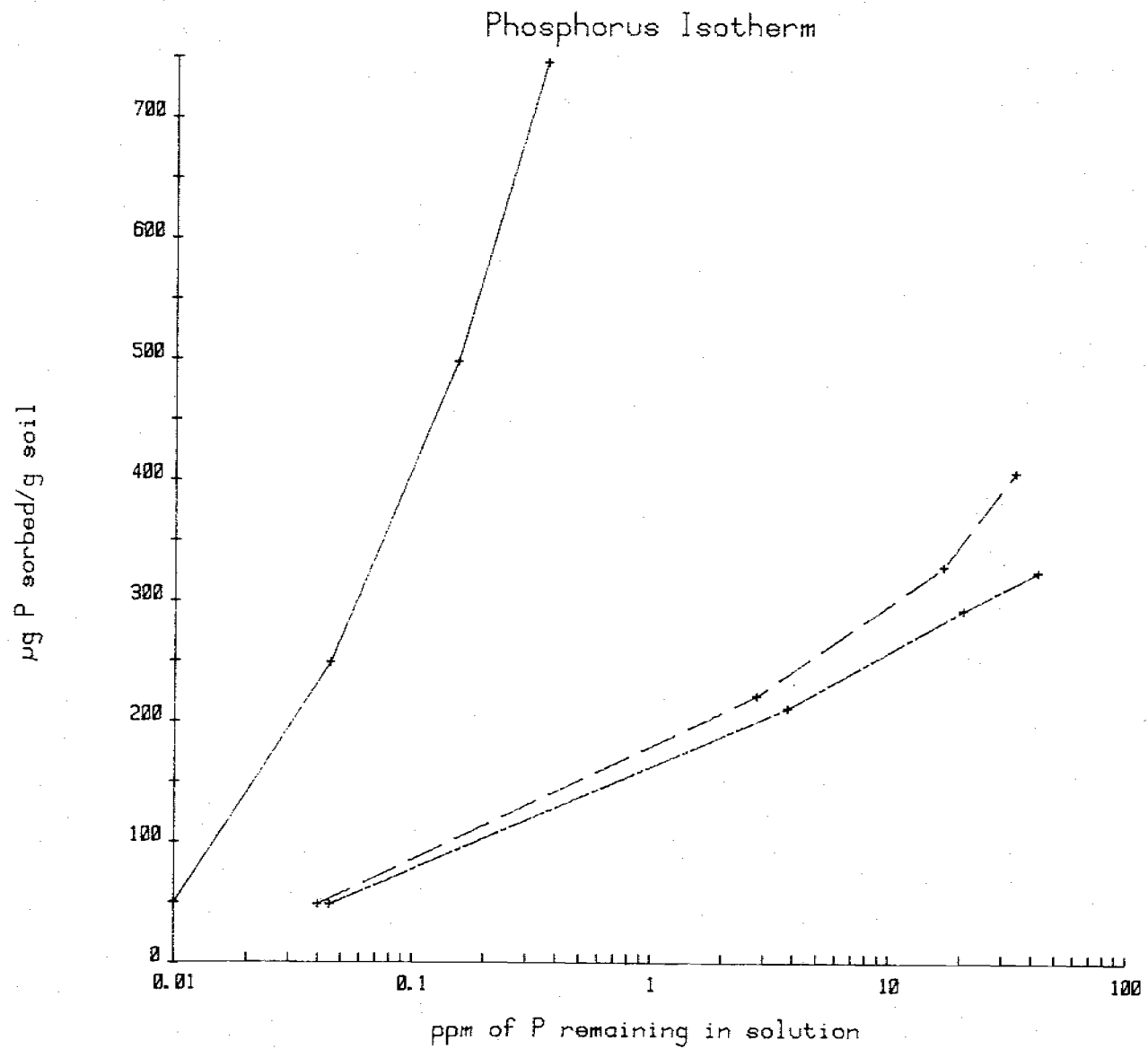
Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC $\times 10^3$ mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	0 R2ir	1- 0 0- 38	NS 6.2	NS 0.15	NS 86	NS 1.4					
2	IIB2†	38- 71	6.3	0.12	44	0.8					
3	IIC	71-130	5.0	0.08	54	0.5					

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.4	1.2	0.1	0.7	11.0	19.3	40	2.64	1.54	0.127	12	1.00	9.9
3	4.0	1.3	0.1	0.4	3.0	8.4	66	0.68	0.35	0.029	12	1.00	8.2
	3.3	2.6	0.1	0.2	2.3	9.5	73	0.17	0.10	0.007	14	0.65	8.0

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS- no sample

Analysis by: Zelda Fadness



79-ID-18121

µg/g soil	Soln ppm
————— B2ir	
50	0.01
250	0.05
498	0.16
746	0.37
————— IIB2t	
50	0.04
222	2.81
330	17.04
408	34.24
- - - - - IIC	
50	0.05
212	3.80
294	20.64
325	42.48

Pedon: Unnamed Silt Loam 79-ID-18121 (040701R-1)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%								%		
1- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 38	0.78	3.57	2.92	5.99	11.37	24.62	69.41	5.97	none		Silt loam
38- 71	1.55	4.45	3.57	6.06	8.30	23.95	61.39	14.66	none		Silt loam
71-130	16.57	11.27	4.14	1.07	13.26	46.31	26.88	26.81	35		Gr. sandy clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
1- 0						NS	NS	NS	NS	NS
0-38						43.3	17.7	NDNP	NDNP	NDNP
38-71						24.0	11.8	NDNP	NDNP	NDNP
71+						22.3	18.8	30	24	6

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

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PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

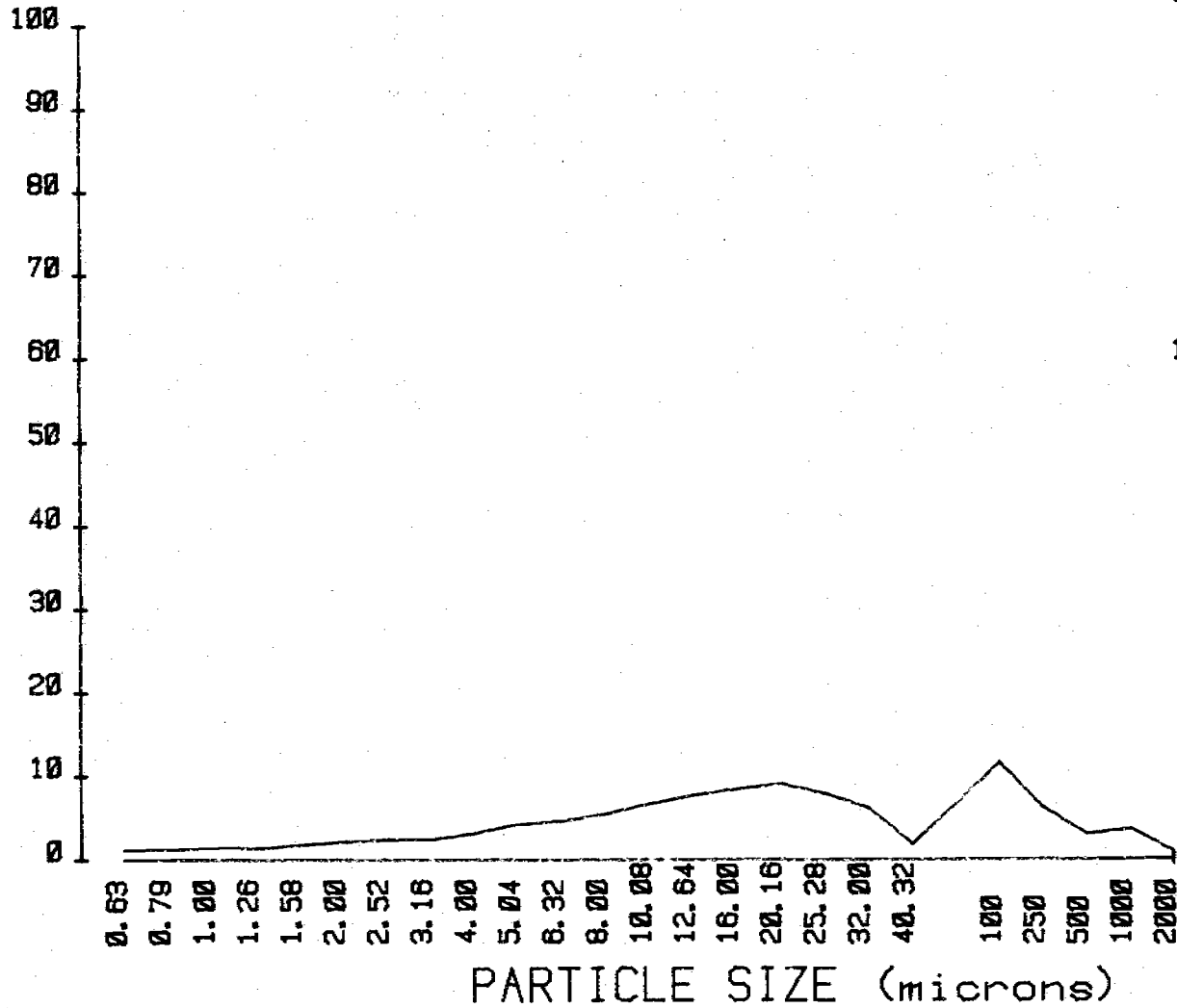
Identification	I18121-1	I18121-2	I18121-3	
Units	-----%			
TC (0.63-2.00)	5.97	14.66	26.81	
TSi (2.00-50)	69.41	61.39	26.88	
TS (50-2000)	24.62	23.95	46.31	
Clay	0.63-0.794	0.96	2.58	4.96
	0.794-1.00	1.04	2.64	5.19
	1.00-1.26	1.21	3.03	5.79
	1.26-1.59	1.18	2.75	4.96
	1.59-2.00	1.58	3.66	5.92
Fine Silt	2.00-2.52	1.95	4.09	5.46
	2.52-3.17	2.18	3.97	3.99
	3.17-4.00	2.18	2.72	2.09
	4.00-5.04	2.93	1.93	0.88
Medium Silt	5.04-6.35	4.04	4.10	2.43
	6.35-8.00	4.46	4.65	2.40
	8.00-10.08	5.27	4.93	2.24
	10.08-12.70	6.48	5.77	2.16
	12.70-16.0	7.46	6.53	1.91
	16.0-20.2	8.22	7.07	1.58
Coarse Silt	20.2-25.4	8.82	5.86	1.03
	25.4-32.0	7.68	5.28	0.50
	32.0-40.3	5.97	2.97	0.16
	40.3-50.8	1.67	1.20	0.04
	50.8-64.0	0.12	0.33	0.04
VFS (50-100)	11.37	8.30	13.26	
FS (100-250)	5.99	6.06	1.07	
MS (250-500)	2.92	3.57	4.14	
CoS (500-1000)	3.57	4.45	11.27	
VCoS (1000-2000)	0.78	1.55	16.57	
Greater than 2000	none	none	35	
Textural Class	SL	SL	Gr.SCL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

ID I18121-1

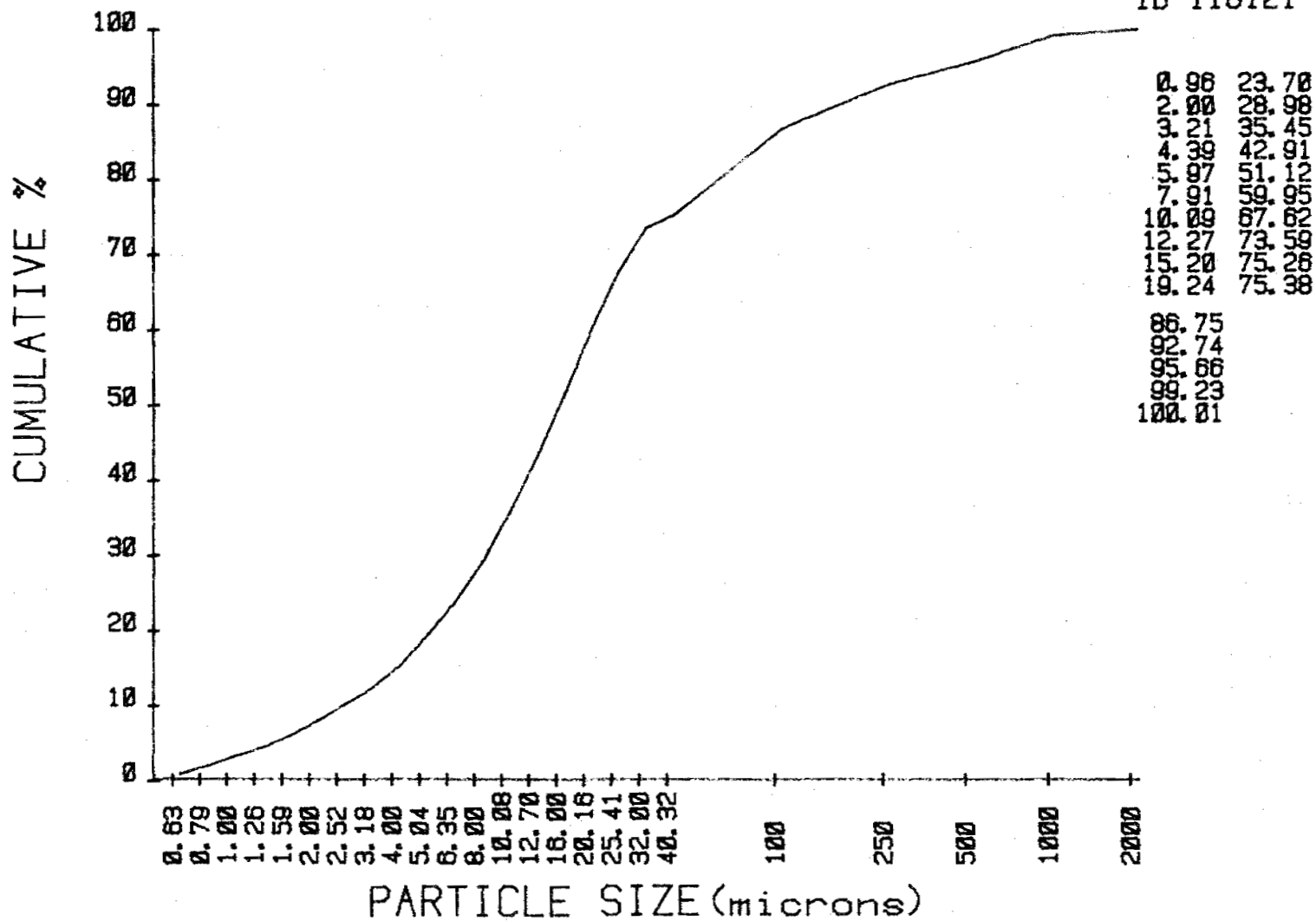


0.96	4.46
1.04	5.27
1.21	6.47
1.18	7.46
1.58	8.22
1.94	8.82
2.18	7.67
2.18	5.97
2.92	1.67
4.04	0.12
11.37	
5.99	
2.92	
2.92	
5.57	
8.78	

350

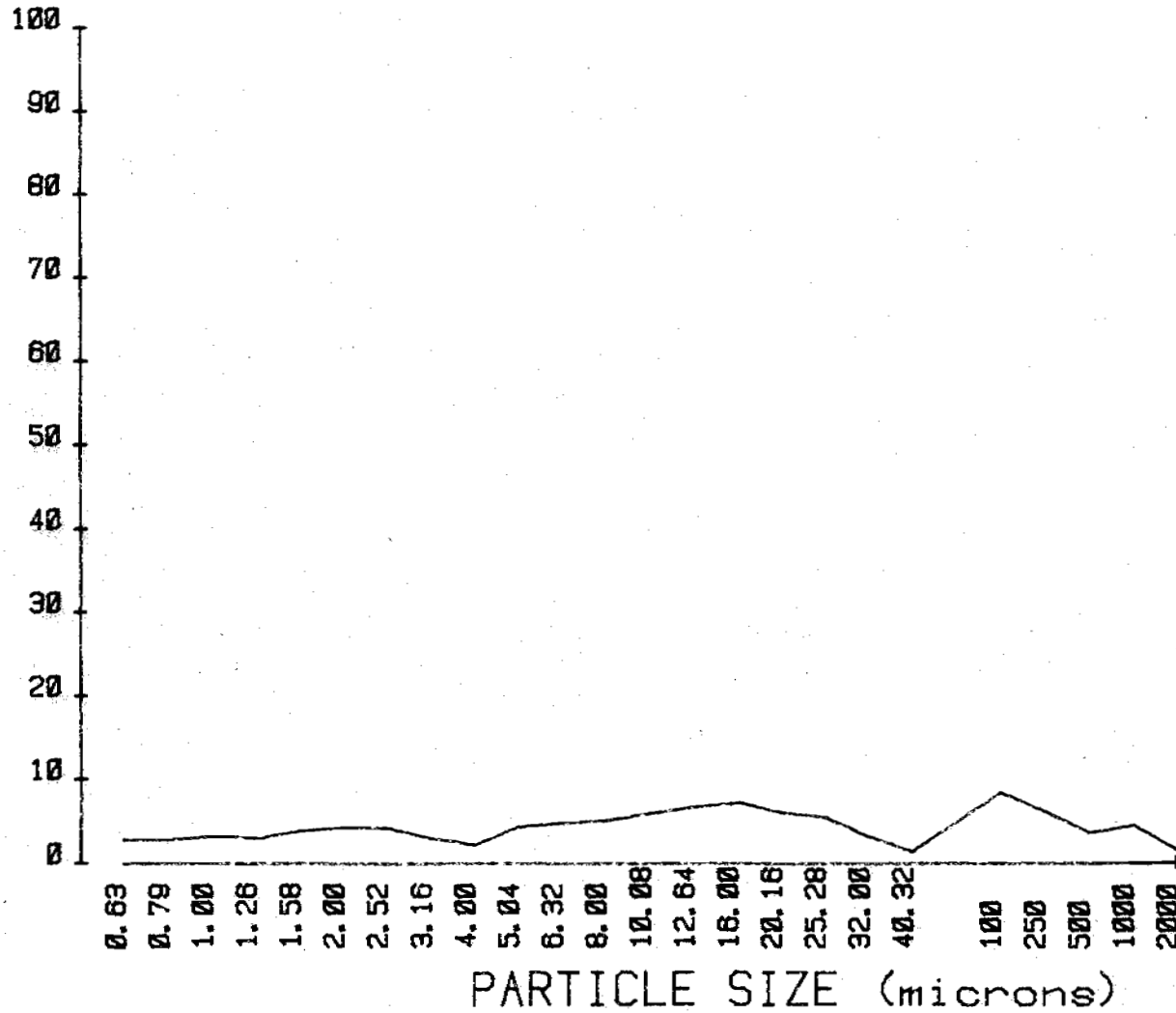
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18121-1



PLOT SAND-SILT-CLAY

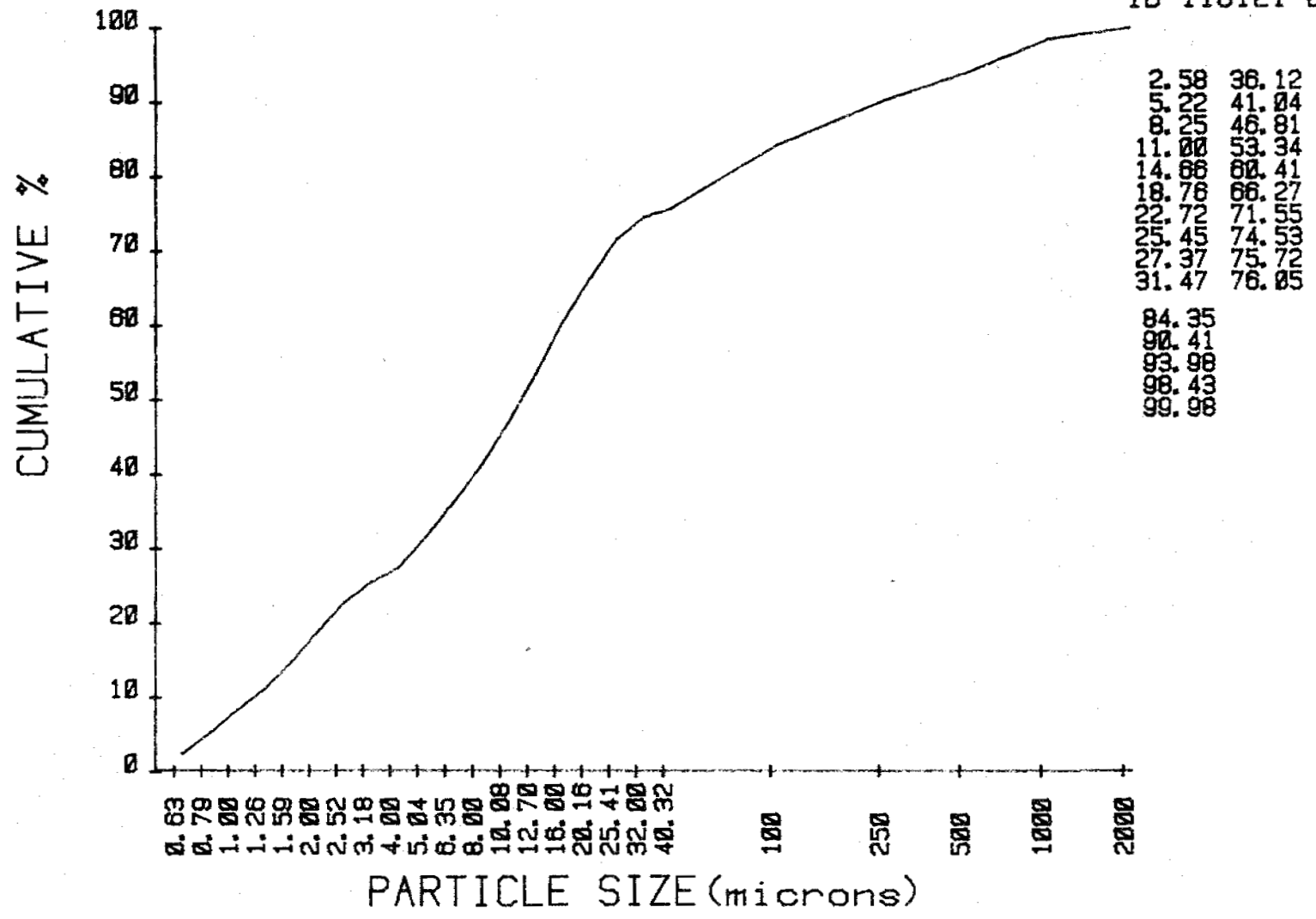
ID I18121-2



2.58	4.65
2.64	4.93
3.03	5.77
2.75	6.52
3.66	7.07
4.09	5.88
3.97	5.28
2.72	2.97
1.92	1.20
4.10	0.33
8.30	
6.06	
3.57	
4.45	
1.55	

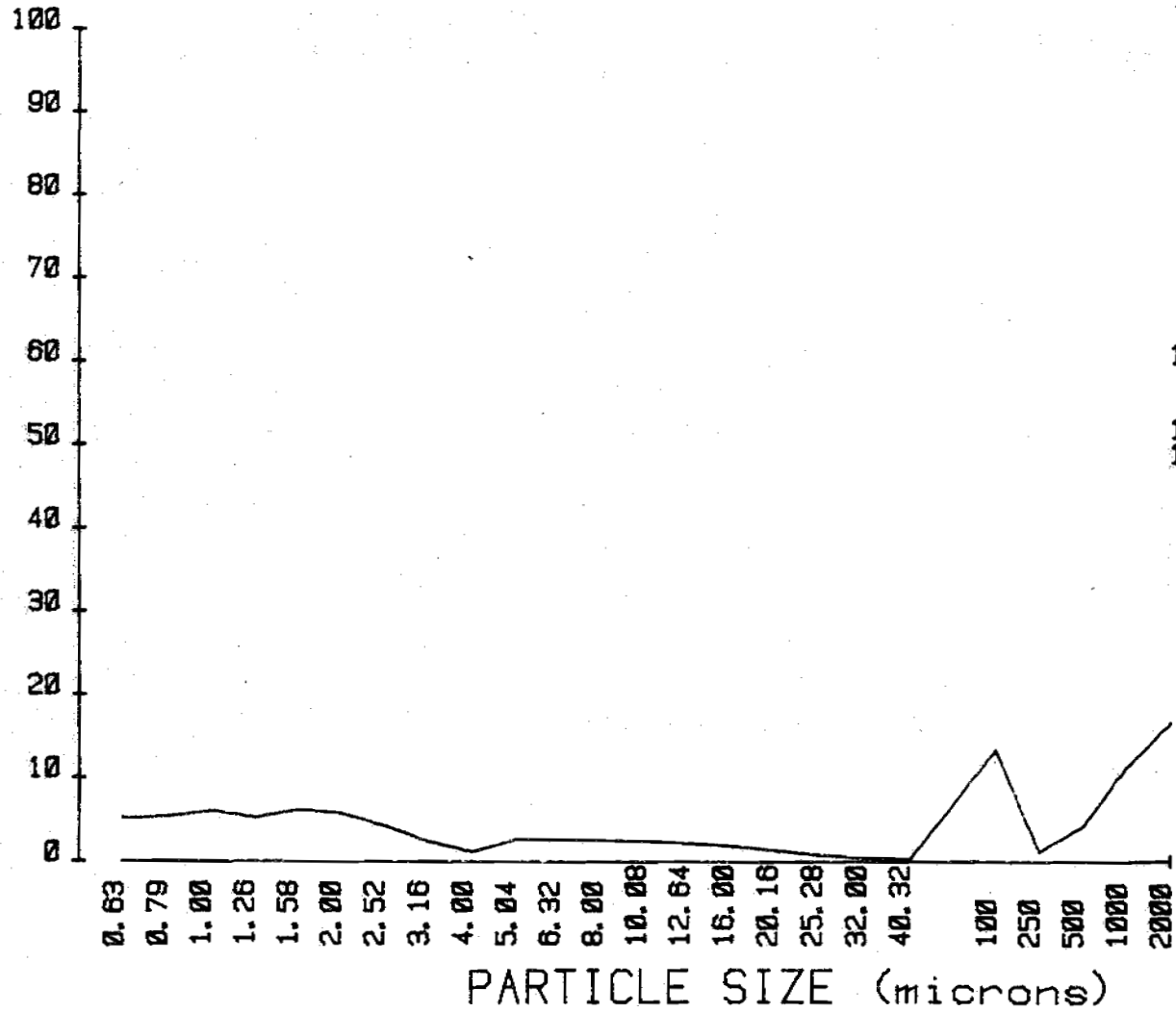
CUMULATIVE CURVE SAND-SILT-CLAY

ID I18121-2



PLOT SAND-SILT-CLAY

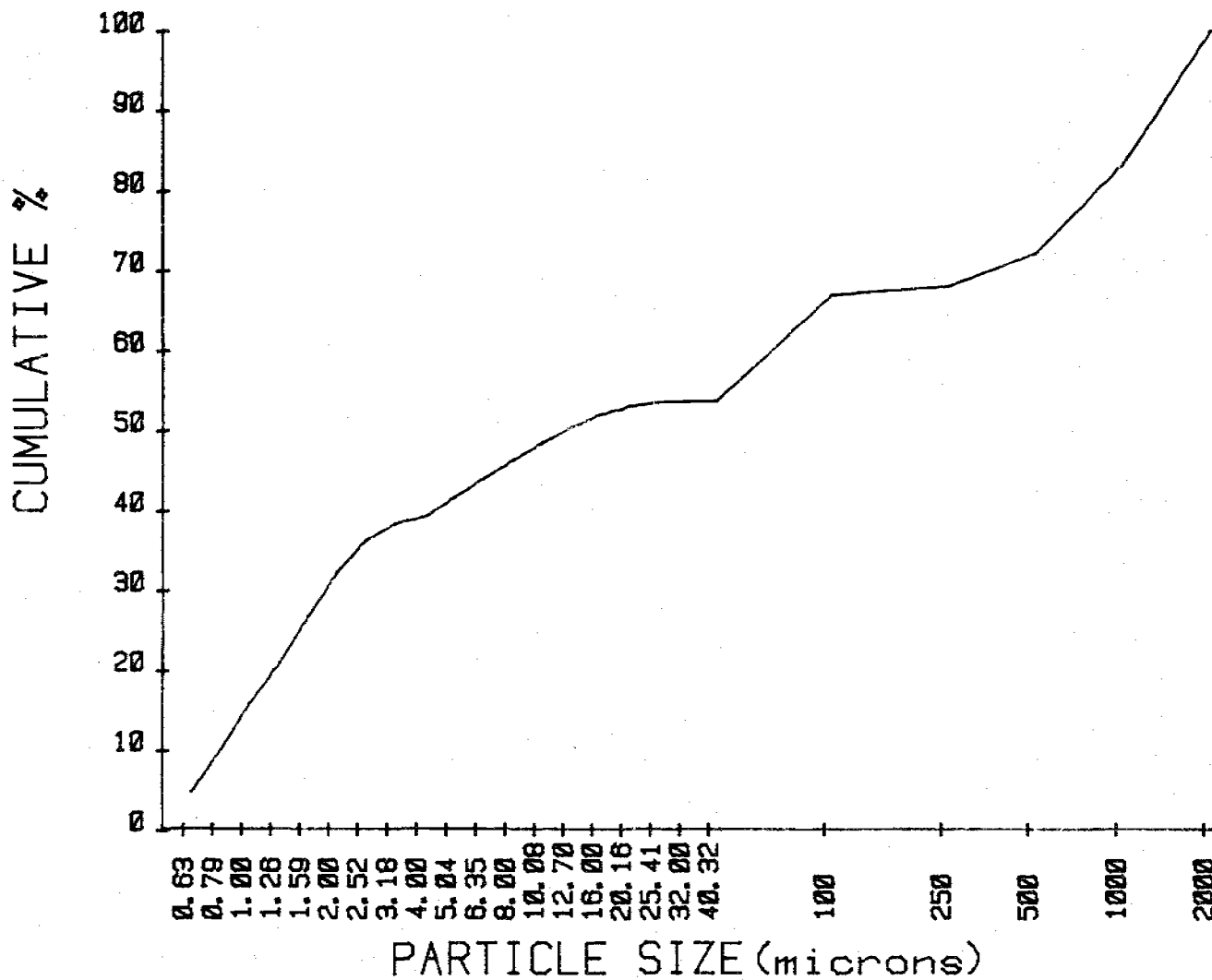
ID I18121-3



4.96	2.39
5.19	2.24
5.70	2.16
4.96	1.91
5.92	1.58
5.46	1.82
3.99	0.50
2.88	0.16
0.88	0.04
2.42	0.04
13.26	
1.07	
4.14	
11.27	
16.57	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I18121-3



4.96	44.04
10.15	46.28
15.94	48.45
20.00	50.38
26.91	51.93
32.27	52.96
36.26	53.45
38.34	53.62
38.23	53.65
41.65	53.69
66.95	
68.02	
72.16	
83.43	
88.00	

Unnamed Gravelly Silt Loam 79-ID-18122 (081301R-2)

Classification: medial over loamy, mixed Entic Cryandept.

General Site Characteristics

Location: Clearwater County, Idaho: southwest 1/4, southwest 1/4 of section 18,  
T. 41N., R. 12E.

Forest: Clearwater National Forest

Area: Kelly Creek Ranger District

Described By/Date: July 18, 1978, by Randy Moiser

Landform: 33

Habitat Type: subalpine fir/Wefe h.t.

Formation Name:

Parent Rock/Material: belt (Siltite?)

Weathering:

Topography: upper 1/3 of convex slope, ridgepoint

Slope: 30 percent

Aspect: north

Elevation: 5930 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 0.5-0 centimeters (0.2-0 inches).

A1 0-3 centimeters (0-1 inches). Very dark brown (10YR 2/2) moist; gravelly silt loam; moderate very fine granular structure; friable, nonsticky and nonplastic; very strongly acid pH 4.9, noncalcareous; 20 percent gravels by weight.

B2ir 3-25 centimeters (1-10 inches). Brown (10YR 3/4) moist; gravelly silt loam; weak fine granular structure; friable, nonsticky and nonplastic; very strongly acid pH 4.8, noncalcareous; 49 percent gravels by weight.

IIC 25-56 centimeters (10-22 inches). Yellowish brown (10YR 5/4) moist; very gravelly silt loam; massive structure; loose, nonsticky and nonplastic; very strongly acid pH 4.8, noncalcareous; 62 percent gravels by weight.

Pedon: Unnamed Gravelly Silt Loam 79-ID-18122 (081301R-2)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> <sub>10</sub> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
	0	0.5- 0	NS	NS	NS	NS					
1	A1	0- 3	4.9	0.11	86	3.3					
2	B2ir	3-25	4.8	0.09	83	1.2					
3	IIC	25-56	4.8	0.08	46	1.2					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H		Saturation						
	meq/100 gms						%		%		ratio		
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	2.9	1.1	0.1	0.6	18.8	22.1	20	12.82	7.45	0.314	24	0.80	8.6
2	0.6	0.7	0.1	0.3	19.3	21.4	8	4.85	2.82	0.135	21	0.51	12.0
3	0.6	0.4	0.1	0.1	9.5	11.6	11	1.10	0.64	0.050	13	0.38	9.5

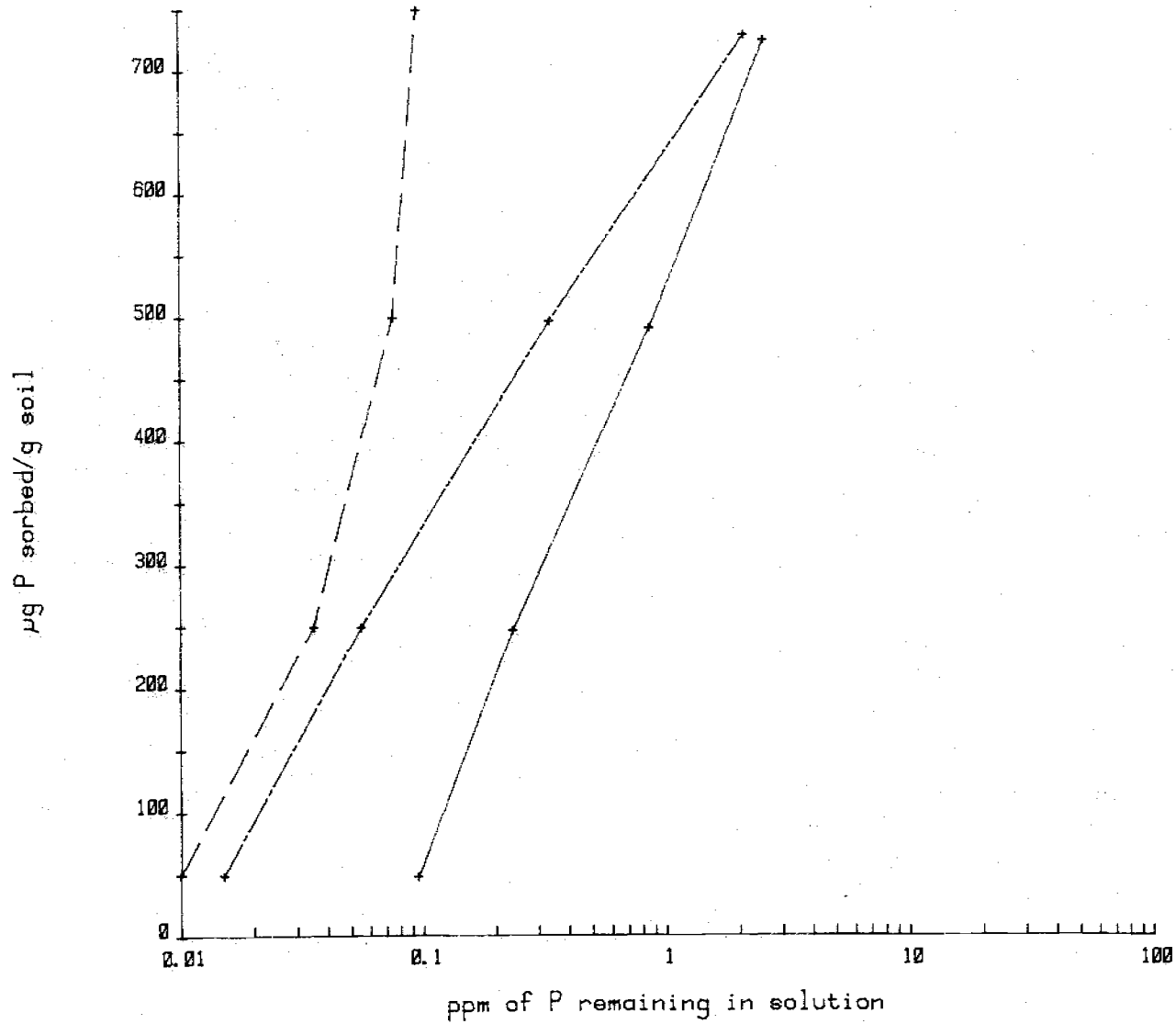
Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness



## Phosphorus Isotherm

79-ID-18122



Pedon: Unnamed Gravelly Silt Loam 79-ID-18122 (081301R-2)

Date: November 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	X								X		
0.5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-3	1.68	2.00	1.87	7.22	16.41	29.10	65.13	5.77	20		Gr. silt loam
3-25	0.43	1.36	1.44	6.15	18.74	28.12	66.80	5.08	49		Gr. silt loam
25-56	2.46	3.74	2.64	8.92	23.13	40.89	55.03	4.08	62		V.gr. silt loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Cled	Core	Bar	Bar	
cm	X			g/cc		X		X
0.5-0						NS	NS	NS
0-3						43.8	16.5	NDNP
3-25						36.2	14.5	NDNP
25-56						18.9	6.2	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

Project: Clearwater National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

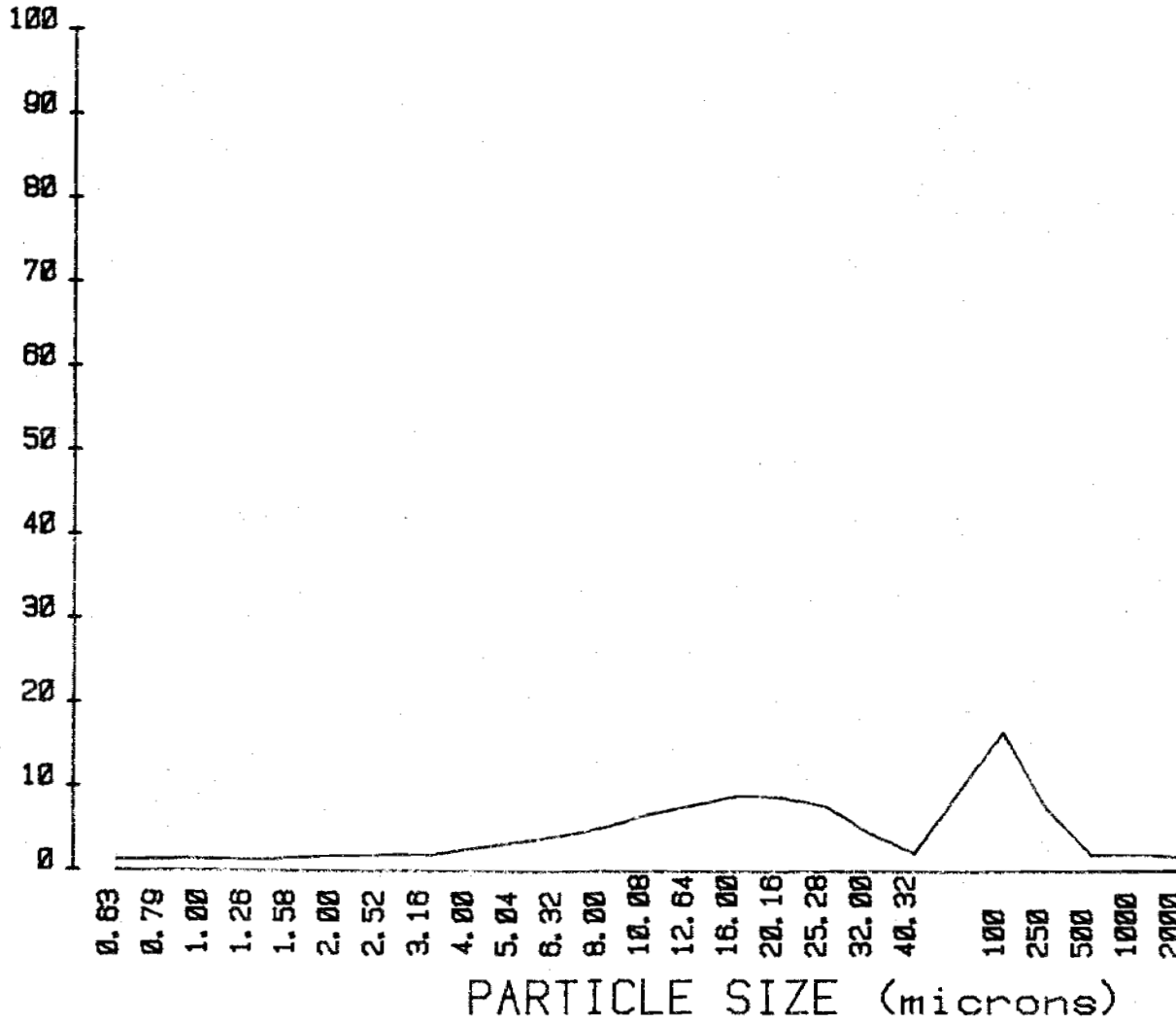
Identification		I18122-1	I18122-2	I18122-3	
Units		-----%			
TC (0.63-2.00)		5.77	5.08	4.08	
TSi (2.00-50)		65.13	66.80	55.03	
TS (50-2000)		29.10	28.12	40.89	
Clay	0.63-0.794	1.07	0.87	0.89	
	0.794-1.00	1.15	0.96	0.81	
	1.00-1.26	1.16	1.03	0.79	
	1.26-1.59	1.03	0.95	0.69	
	1.59-2.00	1.36	1.27	0.91	
Fine Silt	2.00-2.52	1.60	1.46	1.03	
	2.52-3.17	1.73	1.62	1.15	
	3.17-4.00	1.68	1.54	1.15	
	4.00-5.04	2.51	2.40	1.02	
Medium Silt	5.04-6.35	3.23	3.27	2.34	
	6.35-8.00	4.04	4.13	3.05	
	8.00-10.08	4.98	5.02	3.83	
	10.08-12.70	6.58	6.75	5.17	
	12.70-16.0	7.65	7.87	6.57	
	16.0-20.2	8.75	8.98	7.18	
Coarse Silt	20.2-25.4	8.58	9.62	8.41	
	25.4-32.0	7.49	6.96	7.75	
	32.0-40.3	4.27	5.33	4.97	
	40.3-50.8	1.98	1.75	1.32	
	50.8-64.0	0.06	0.11	0.09	
VFS (50-100)		16.41	18.74	23.13	
FS (100-250)		7.22	6.15	8.92	
MS (250-500)		1.87	1.44	3.74	
CoS (500-1000)		2.00	1.36	3.74	
VCoS (1000-2000)		1.60	0.43	2.46	
Greater than 2000		20	49	62	
Textural Class		Gr. SL	Gr. SL	V.Gr. SL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I18122-1

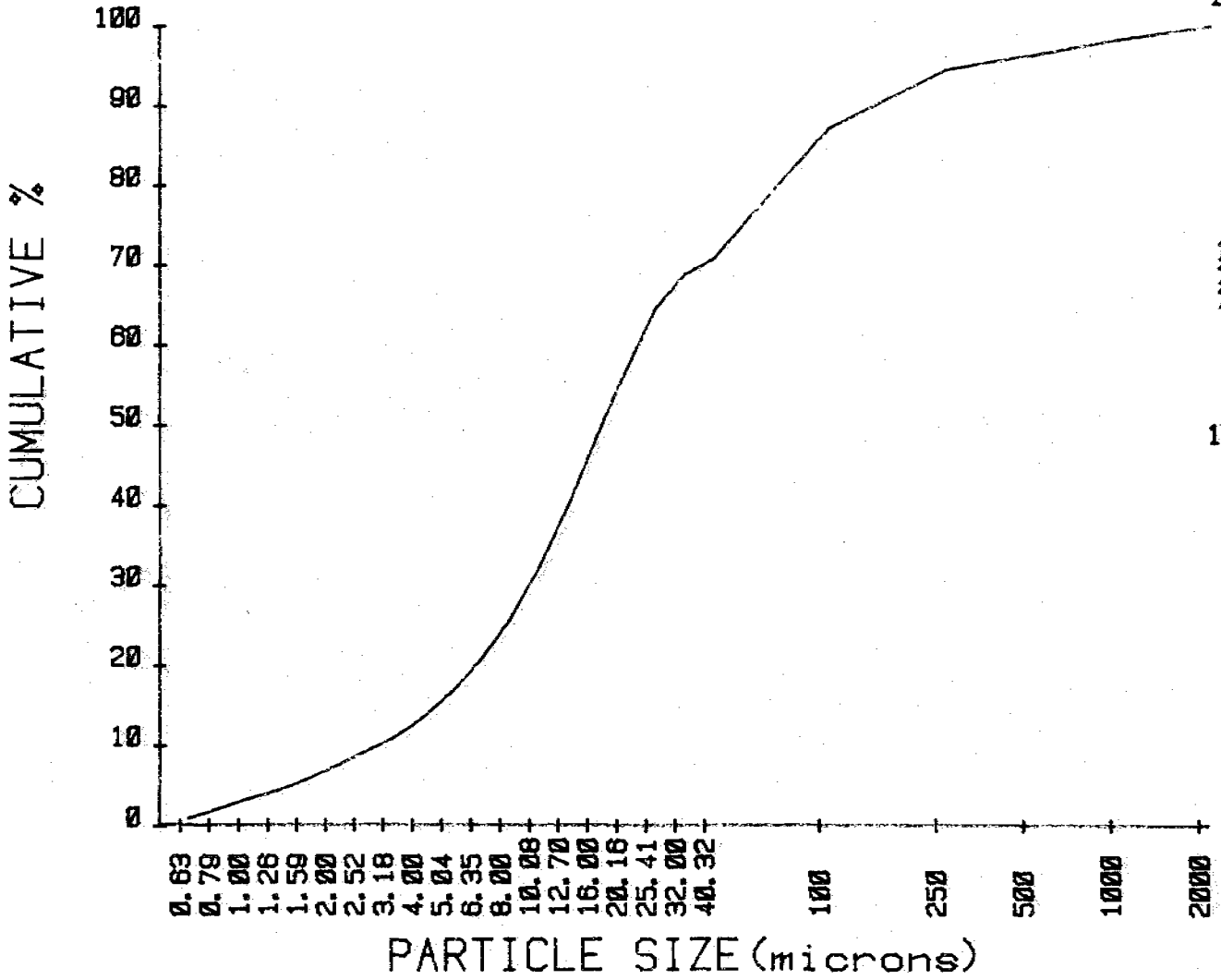
x



1.07	4.04
1.15	4.98
1.16	6.58
1.03	7.65
1.36	8.75
1.60	8.58
1.73	7.49
1.68	4.26
2.51	1.98
3.23	0.06
16.41	
7.22	
1.87	
2.00	
1.60	

CUMULATIVE CURVE SAND-SILT-CLAY

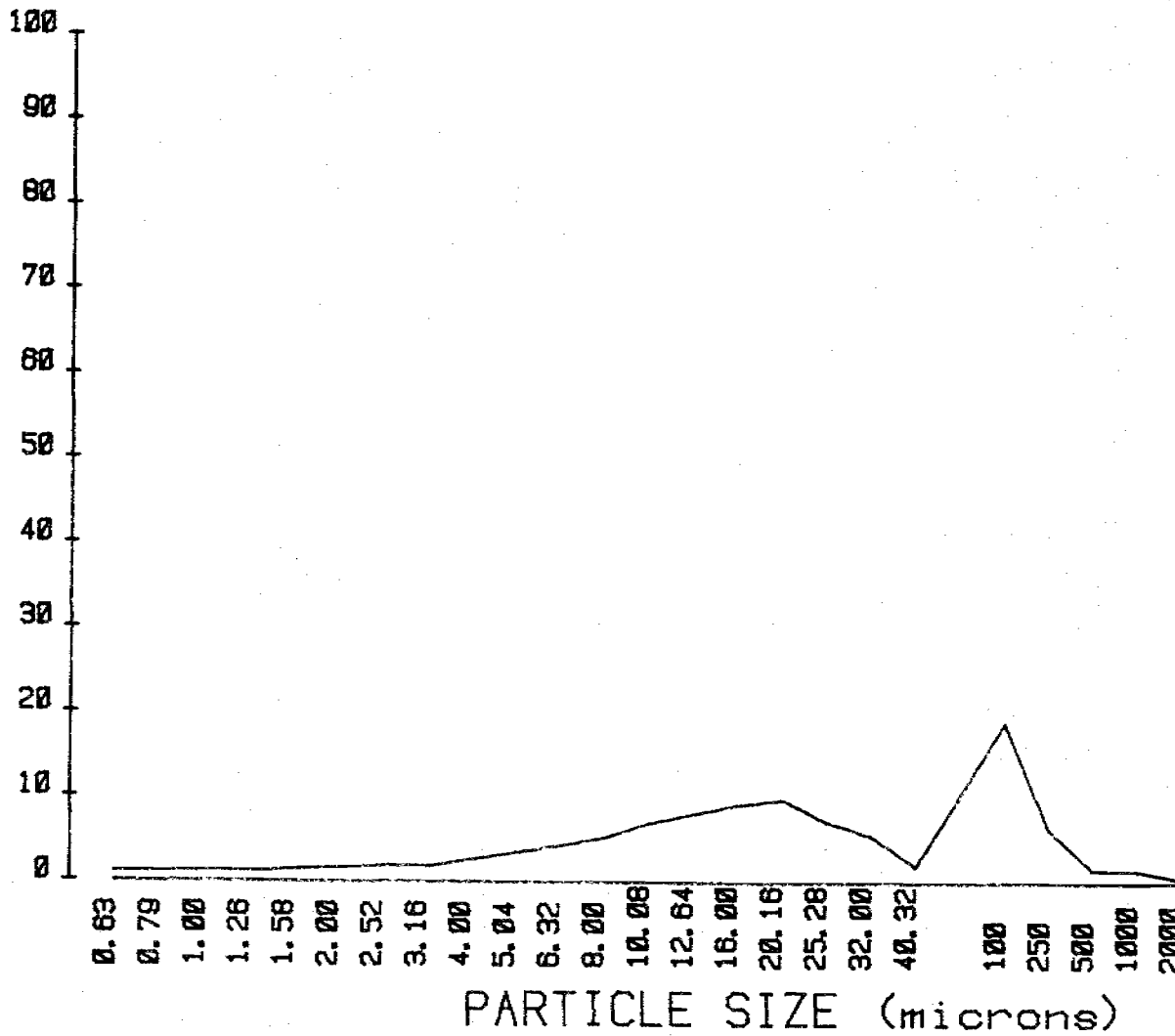
ID I18122-1



1.07	20.55
2.22	25.54
3.38	32.12
4.41	39.77
5.77	48.52
7.37	57.10
9.10	64.59
10.78	68.86
13.28	70.84
16.51	70.90
87.31	
94.53	
96.40	
98.40	
100.00	

PLOT SAND-SILT-CLAY

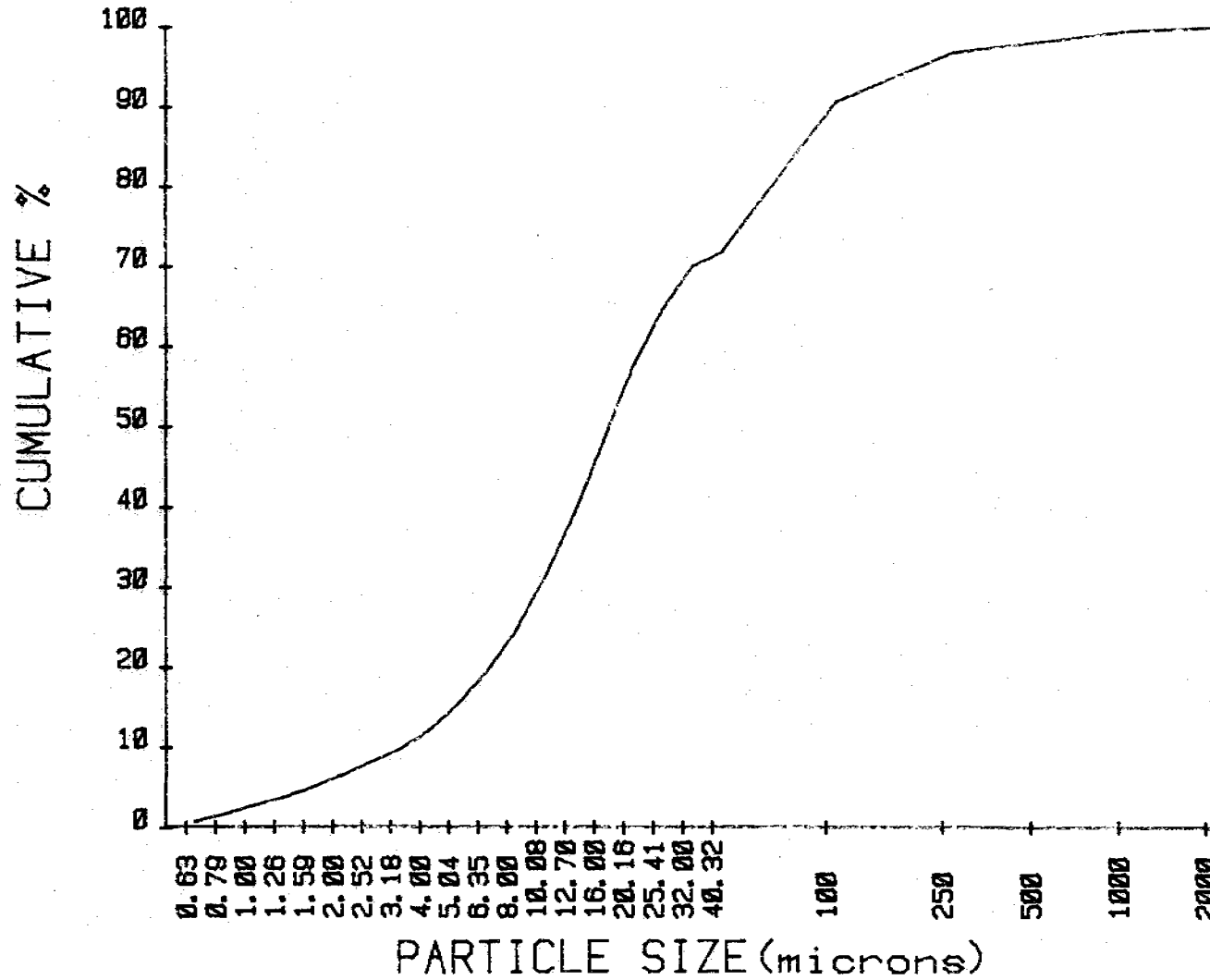
ID I18122-2



0.87	4.13
0.96	5.01
1.03	6.75
0.95	7.87
1.27	8.98
1.46	9.62
1.62	6.96
1.54	5.33
2.40	1.75
3.27	0.11
18.74	
6.15	
1.44	
1.36	
0.43	

CUMULATIVE CURVE SAND-SILT-CLAY

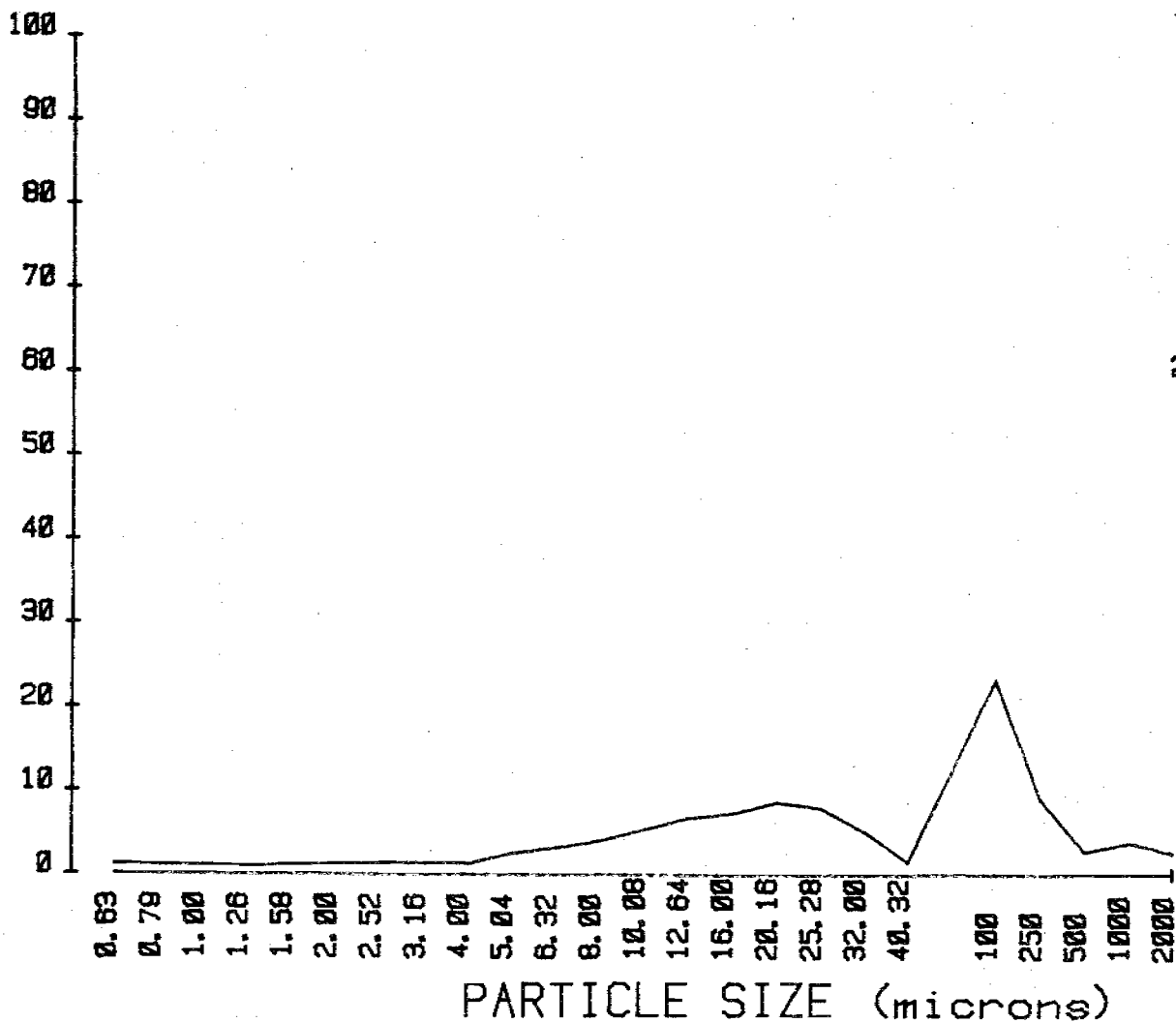
ID I18122-2



0.87	19.49
1.83	24.51
2.85	31.25
3.81	39.13
5.08	48.11
6.54	57.79
8.16	64.69
9.68	70.02
12.08	71.77
15.36	71.88
90.62	
96.77	
98.21	
99.57	
100.00	

PLOT SAND-SILT-CLAY

ID I18122-3

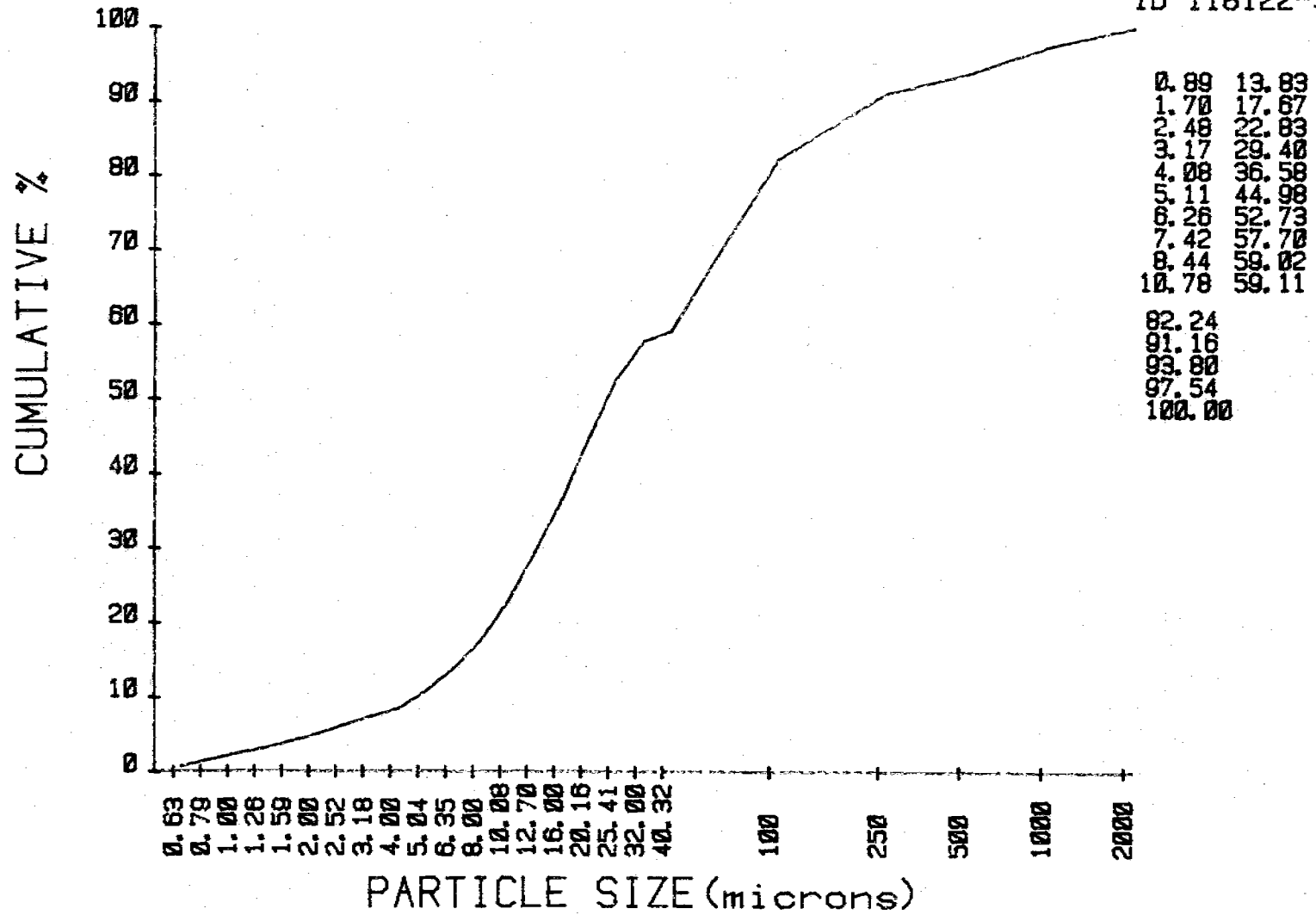


0.80	3.05
0.81	3.83
0.79	5.18
0.89	6.57
0.91	7.18
1.03	8.41
1.15	7.75
1.15	4.97
1.02	1.31
2.34	0.80
23.13	
8.82	
2.64	
3.74	
2.46	



## CUMULATIVE CURVE SAND-SILT-CLAY

ID I18122-3



# CLUSTER



Unnamed Silt Loam 79-MT-0601 (080701R-1)

Classification: fine loamy, mixed, frigid Mollic Entroboralf.

General Site Characteristics

Location: Carter County, Montana: section 34, T. 2S., R. 61E.  
Forest: Custer National Forest  
Area: Long Pines, Camp Crook  
Described By/Date: Donald Holzer, June 5, 1979  
Landform: Dissected mountain  
Habitat Type: Pinus ponderosa/forbes  
Formation Name:  
Parent Rock/Material: Calcareous siltstone, limestone Climate:  
Weathering: Precipitation:  
Topography: Erosion:  
Slope: 30 percent Infiltration:  
Aspect: 45 degree Permeability:  
Elevation: 3960 feet Storage:  
Soil Depth: Drainage: well  
Eff. Rooting Depth: Air Temp:  
Litter Type: pine needles, twigs Soil Temp at 20 inches:  
Surface Rock: Salt/Alkal:

Remarks:

Pedon Description

- 02 3.5-2.5 centimeters (1.5-1.0 inches). Pine needles and twig litter.
- 01 2.5-0 centimeters (1-0 inches). Decomposed organic mat.
- A1 0-18 centimeters (0-7 inches). Grayish brown ((10YR 5/2) gravelly loamy sand, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to coarse granular structure; soft, very friable, slightly sticky and nonplastic; common roots; mildly alkaline pH 7.6, noncalcareous; 17 percent gravel by weight; abrupt smooth boundary.
- B1t 18-33 centimeters (7-13 inches). Pale brown (10YR 6/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure parting to medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; common roots; neutral pH 6.8, noncalcareous; 15 percent gravel by weight; clear wavy boundary.

79-MT-0601 (cont.)

B2t 33-70 centimeters (13-28 inches). Very pale brown (10YR 7/3) sandy loam, yellowish brown (10YR 5/4) moist; moderate coarse prismatic structure parting to coarse subangular blocky structure; soft, friable, slightly sticky and nonplastic; few roots; mildly alkaline pH 7.4, noncalcareous; 6 percent gravel by weight; gradual wavy boundary.

C1ca 70-118 centimeters (28-47 inches). Light gray (10YR 7/2) sandy loam, pale brown (10YR 6/3) moist; moderate coarse subangular blocky structure parting to medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; few roots; moderately alkaline pH 7.9, violently effervescent; 9 percent gravel by weight; gradual wavy boundary.

C2ca 118-155 centimeters (47-62 inches). Light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; moderate medium subangular blocky structure; strong thin platy structure inherent from parent material; firm, slightly sticky and nonplastic; moderately alkaline pH 8.1, violently effervescent; 7 percent gravel by weight.

Pedon: Unnamed Gravelly Loamy Sand 79-MT-0601 (080701R-1)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions								
							Ca	Mg	Na	K	CO <sub>3</sub> <sup>3</sup>	HCO <sub>3</sub> <sup>3</sup>	Cl	SO <sub>4</sub> <sup>4</sup>	
							meq/1000 gms								
	02	3.5-2.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01	2.5- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	A1	0- 18	8.1	7.6	0.49	59	2.9	0.7	0.4	0.1	0.0	2.7	0.1	0.6	
2	B1t	18- 33	7.3	6.8	0.32	62	1.1	1.3	0.2	0.1	0.0	1.5	0.1	0.5	
3	B2t	33- 70	7.6	7.4	0.33	62	1.3	1.2	0.1	0.1	0.0	1.9	0.1	0.5	
4	C1ca	70-118	8.4	7.9	0.33	68	1.7	1.1	0.1	0.1	0.0	1.8	0.1	0.5	
5	C2ca	118-155	8.7	8.1	0.40	73	2.3	1.8	0.2	0.2	0.0	2.7	0.4	0.5	

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Sample No.	Exchangeable Ions				CEC	ESP	DM	DC	N	C/N	Gypsum	CaCO <sub>3</sub> <sup>3</sup> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	%	ratio	%	%	ppm					
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	10.0	1.5	0.6	0.2	18.2	3	3.44	2.00	0.162	12	nil	4.6	0.83	5.8
2	15.9	11.2	0.2	3.5	45.5	0	0.81	0.47	0.040	12	nil	nil	0.85	2.2
3	14.9	5.6	0.3	4.2	47.0	1	0.74	0.43	0.026	17	nil	nil	0.94	2.4
4	20.8	4.6	0.2	4.9	50.5	0	0.96	0.56	0.037	15	nil	8.2	0.91	3.0
5	17.8	5.3	0.4	5.9	50.5	1	1.03	0.60	0.045	13	nil	20.8	0.92	1.4

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Loamy Sand 79-MT-0601 (080701R-1)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
cm	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
3.5-2.5						NS	NS	NS	NS	NS
2.5- 0						NS	NS	NS	NS	NS
0- 18						82.39	10.88	7.52	17	Gr. loamy sand
18- 33						51.71	23.37	24.93	15	Sandy clay loam
33- 70						55.40	31.88	12.72	6	Sandy loam
70-118						55.50	30.19	14.31	9	Sandy loam
118-155						37.90	41.53	20.57	7	Loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
cm	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
3.5-2.5						NS	NS	NS	NS	NS
2.5- 0						NS	NS	NS	NS	NS
0- 18						16.1	18.3	NDNP	NDNP	NDNP
18- 33						36.6	18.3	42	NP	ND
33- 70						32.5	15.0	NDNP	NDNP	NDNP
70-118						33.3	15.4	NDNP	NDNP	NDNP
118-155						45.1	19.2	46	NP	ND

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Loam 79-MT-0602 (080701R-2)

Classification: coarse-loamy, mixed, frigid Mollic Eutroboralf.

General Site Characteristics

Location: Carter County, Montana: section 34, T. 2S., R. 61E.

Forest: Custer National Forest

Area: Long Pines, Camp Crook

Described By/Date: Donald Holzer, June 5, 1979

Landform: Dissected mountain slope

Habitat Type: Pinus ponderosa/forbes

Formation Name:

Parent Rock/Material: olive sandstone

Weathering:

Topography:

Slope: 5 percent

Aspect: 225 degrees

Elevation: 3940 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock: 7 percent

Climate:

Precipitation:

Erosion: slight

Infiltration:

Permeability:

Storage:

Drainage: well

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A1 0-20 centimeters (0-8 inches). Grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to coarse granular structure; soft, very friable, slightly sticky and nonplastic; common roots; slightly acid pH 6.1, noncalcareous; 7 percent channery; abrupt wavy boundary.

B2t 20-38 centimeters (8-15 inches). Light gray (10YR 7/1) sandy loam, brown (10YR 5/3) moist; strong coarse subangular blocky structure parting to medium subangular blocky structure, strong thick platy structure inherent from parent rocks; soft, very friable, slightly sticky and nonplastic; slightly acid pH 6.3, noncalcareous; 6 percent gravel by weight; clear wavy boundary.

B3t 38-90 centimeters (15-36 inches). Light gray (5Y 7/2) sandy loam, pale green (5G 6/2) moist; moderate medium subangular blocky structure, moderate thick platy structure inherent from parent material; soft, very friable, slightly sticky and nonplastic; neutral pH 6.6, noncalcareous; clear wavy boundary.

C 90-158 centimeters (36-63 inches). Light gray (5Y 7/2) sand, light olive gray (5Y 6/2) moist; massive structure; thick platy structure inherent from parent material; very firm, firm, nonsticky and nonplastic; moderately alkaline pH 8.0, noncalcareous.



Pedon: Unnamed Sandy Loam 79-MT-0602 (080701R-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
							meq/1000 gms							
1	A1	0-20	6.6	6.1	0.39	50	1.2	0.5	0.1	0.6	0.0	1.2	0.2	0.5
2	B2t	20-38	6.7	6.3	0.29	42	0.7	0.4	0.1	0.3	0.0	0.9	0.2	0.5
3	B3t	38-90	7.1	6.6	0.25	40	0.6	0.3	0.2	0.2	0.0	0.8	0.2	0.5
4	C	90-158	8.1	8.0	0.35	41	1.0	0.4	0.2	0.2	0.0	1.1	0.1	0.5

Sample No.	Exchangeable Ions				CEC	ESP	DM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	%	ratio	%	%	ppm					
1	7.3	1.5	0.1	2.7	16.0	1	1.80	1.05	0.087	12	nil	nil	1.00	0.6
2	7.3	1.6	0.1	2.8	14.8	1	0.73	0.42	0.035	12	nil	nil	0.94	1.0
3	8.2	1.7	0.1	1.5	14.3	1	0.39	0.23	0.018	13	nil	nil	1.00	0.3
4	2.3	0.4	0.1	0.7	6.1	2	0.21	0.12	0.008	15	nil	3.1	1.00	0.5

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-0602 (080701R-2)

Date: December 1988

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
0-20							75.67	14.11	10.23	none	Sandy loam
20-38							77.48	9.26	13.26	6	Sandy loam
38-90							75.06	5.97	18.97	none	Sandy loam
90-158							89.26	5.70	5.04	none	Sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Hor	Bar			
cm	%			g/cc		%		%		
0-20						12.7	6.2	NDNP	NDNP	NDNP
20-38						11.0	6.5	NDNP	NDNP	NDNP
38-90						15.6	9.1	NDNP	NDNP	NDNP
90-158						7.4	4.1	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

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# DEERLODGE



Unnamed Gravelly Sandy Loam 79-MT-2202 (070401R-2)

Classification: coarse-loamy, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Jefferson County, Montana; northeast 1/4 of section 28, T. 6N., R. 5W.

Forest: Deerlodge National Forest

Area: Galena Gulch

Described By/Date: July 11, 1978, by Houlton and Wallace

Landform:

Habitat Type: Douglas fir/pinegrass

Formation Name:

Parent Rock/Material: granitic residuum

Weathering:

Topography: mod. steep, mod. dissected sideslope

Slope: 28 percent

Aspect: east

Elevation: 1926 m (6320 ft)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

Ah 0-67 centimeters (0-26 inches). Brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; slightly acid pH 6.2, noncalcareous; 18 percent gravels by weight; gradual irregular boundary.

Bs 67-130+ centimeters (26-51 inches). Yellowish brown (10YR 5.5/4) gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; neutral pH 6.8, noncalcareous; 26 percent gravel by weight.

Pedon: Unnamed Gravelly Sandy Loam 79-MT-2202 (070401R-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> <sub>10</sub> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-67	6.2	0.33	41	11.6				
2	Bs	67-130+	6.8	0.29	40	15.0				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
1	7.9	0.7	0.1	0.7	4.2	12.0	67	1.50	0.87	0.053	16	0.82	8.2
2	6.7	0.9	0.1	0.5	2.2	10.9	79	0.58	0.34	0.024	14	0.64	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Sandy Loam 79-MT-2202 (070401R-2)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes	
	VCS	CS	NS	FS	VFS	TS	TSI	TC	>2 mm			
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.		
cm	%							%				
0-67							72.56	15.31	12.14	18		Gr. sandy loam
67-130+							75.84	11.96	12.20	26		Gr. sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-67						17.1	8.5	28	NP	ND
67-130+						12.7	7.1	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

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Unnamed Gravelly Loam 79-MT-2203 (050501R-2)

Classification: coarse-loamy, mixed Argic Pachic Cryoboroll.

General Site Characteristics

Location: Jefferson County, Montana: northeast 1/4 of section 2, T. 4N., R. 4W.  
Forest: Deerlodge National Forest  
Area: Little Whitetail Park  
Described By/Date: August 21, 1978, by Houlton and Wallace  
Landform:  
Habitat Type: grass  
Formation Name:  
Parent Rock/Material:  
Weathering:  
Topography: gently sloping basin  
Slope: 9 percent  
Aspect: west  
Elevation: 2115 m (6940 ft)  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Erosion:  
Infiltration:  
Permeability:  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

Ah 0-25 centimeters (0-10 inches). Very dark gray (10YR 3/1) gravelly loam, very dark gray (10YR 2.5/1) moist; single grained; loose, very friable, sticky and plastic; strongly acid pH 5.5, noncalcareous; 35 percent gravel by weight; clear smooth boundary.

Bs 25-60+ centimeters (10-24 inches). Brownish yellow (10YR 6/6) gravelly loam, dark yellowish brown (10YR 3.5/4) moist; massive structure; hard, friable, slightly sticky and plastic; slightly acid pH 6.1, noncalcareous; 39 percent gravel by weight.



Pedon: Unnamed Gravelly Loam 79-MT-2203 (050501R-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC#10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-25	5.5	0.42	80	1.4				
2	Bs	25-60+	6.1	0.35	48	0.6				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%		%		ratio		
1	11.5	2.3	0.2	1.0	13.4	28.4	53	9.71	5.64	0.400	14	0.65	8.2
2	10.5	2.8	0.1	0.7	4.5	23.2	76	1.04	0.60	0.056	11	0.61	8.4

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Loam 79-MT-2203 (050501R-2)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
0-25	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		Gr. loam
25-60+										Gr. loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Mei	Fsi	Clod	Core	1/3 Bar	15 Bar	Limit	Limit	Index
0-25	0.05-0.02	0.02-0.005	0.005-0.002			30.9	17.0	60	38	22
25-60+						23.1	12.8	39	17	22

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

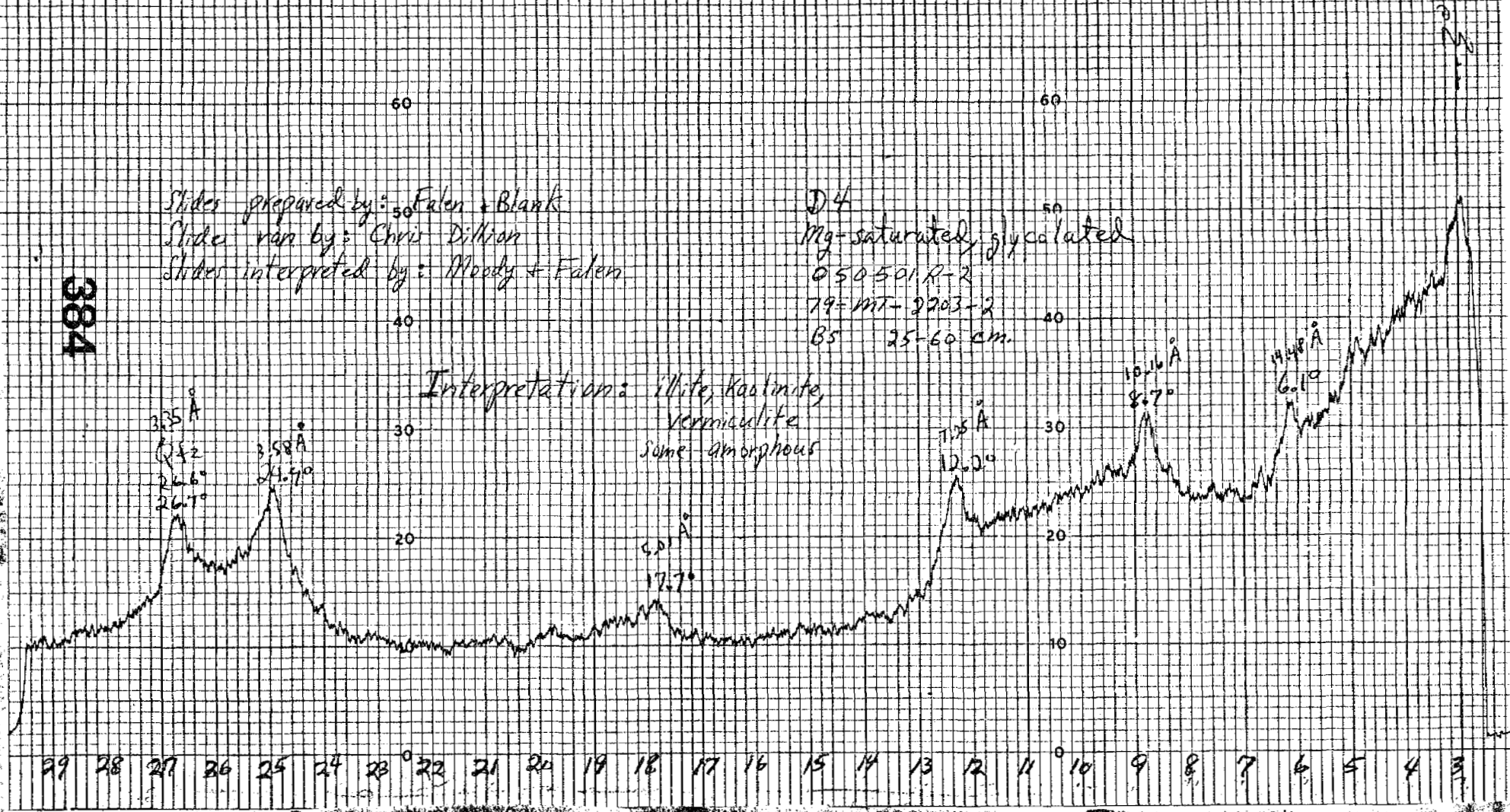
D4  
Mg-saturated, glycolated  
050501 R-2  
79-MT-2203-2  
B5 25-60 cm

Slides prepared by: Falen and Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody and Falen

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody + Falen

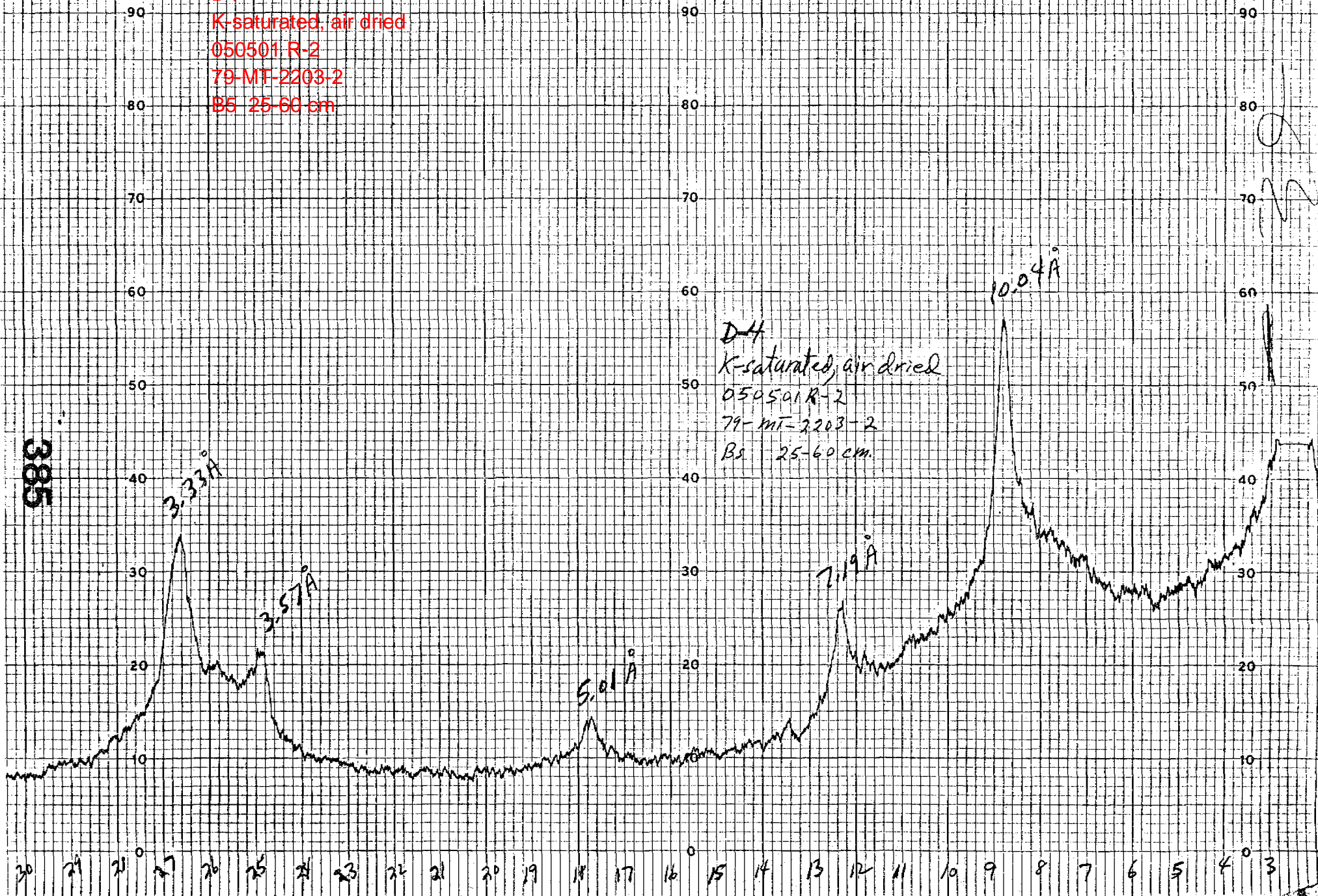
D4  
Mg-saturated, glycolated  
050501 R-2  
79-MT-2203-2  
B5 25-60 cm.

Interpretation: illite, kaolinite,  
vermiculite  
some amorphous





D4  
K-saturated, air dried  
050501 R-2  
79-MT-2203-2  
Bs 25-60 cm



D4  
K-saturated, heated 500 degrees C  
050501 R-2  
79-MT-2203-2  
B5 25-60 cm

386  
986

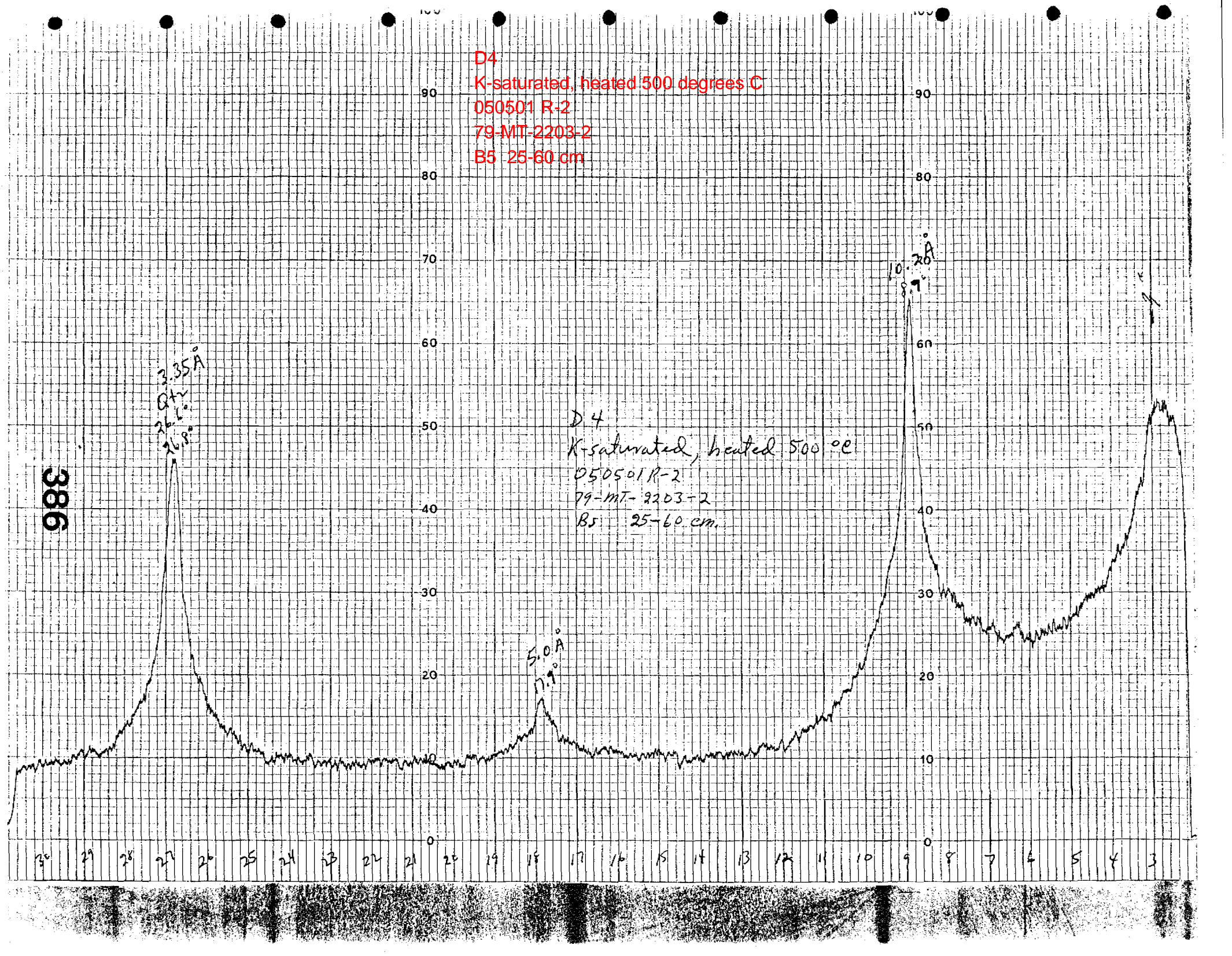
3.35 Å  
Q<sub>1</sub>  
26.6°  
26.8°

D4  
K-saturated, heated 500 °C  
050501 R-2  
79-MT-2203-2  
B5 25-60 cm.

5.0 Å  
17.1°

10.2 Å  
8.7°

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3



Unnamed Very Gravelly Loam 79-MT-2284 (850501R-1)

Classification: loamy-skeletal, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Jefferson County, Montana: northeast 1/4 of section 2, T. 4N., R. 4W.

Forest: Deerlodge National Forest

Area: Little Whitetail Park

Described By/Date: August 21, 1978, by Houlton and Wallace

Landform:

Habitat Type: bunchgrass

Formation Name:

Parent Rock/Material:

Weathering:

Topography: gently sloping upland

Slope: 10 percent

Aspect: southwest

Elevation: 2219 m (7280 ft)

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

Ah 0-22 centimeters (0-9 inches). Dark brown (10YR 3/3) very gravelly loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure; loose, slightly sticky and slightly plastic; medium acid pH 5.7, noncalcareous; 50 percent gravel by weight; gradual smooth boundary.

Bs 22-78 centimeters (9-31 inches). Light yellowish brown (10YR 6/4) very gravelly loam, dark brown (10YR 4/3) moist; single grained; loose, slightly sticky and nonplastic; slightly acid pH 6.4, noncalcareous; 66 percent gravel by weight.



Pedon: Unnamed Very Gravelly Loam 79-MT-2204 (050501R-1)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	----- % -----							----- % -----		
0-22						50.28	30.84	18.88	50	V.gr. loam
22-78+						52.83	31.15	16.01	66	V.gr. sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index	
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	----- % -----			----- g/cc -----		----- % -----		----- % -----	
0-22						26.7	15.9	NDNP	NDNP
22-78+						17.0	10.5	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Pedon: Unnamed Very Gravelly Loom 79-MT-2204 (050501R-1)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-22	5.7	0.39	89	1.9				
2	Bs	22-78+	6.4	0.55	43	1.3				

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Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	DM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%	%			ratio		
1	10.4	1.7	0.1	1.4	9.4	26.1	59	8.84	5.14	0.379	14	0.50	8.2
2	9.5	1.5	0.2	0.8	4.5	20.2	73	2.04	1.18	0.105	11	0.34	8.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



Unnamed Loamy Sand 79-MT-2205 (070601R-3)

Classification: loamy-skeletal, mixed Typic Cryochrept.

General Site Characteristics

Location: Jefferson County, Montana: northwest 1/4 of section 15, T.6N., R.3W.

Forest: Deerlodge National Forest

Area: Elkhorn

Described By/Date: June 30, 1978, by Haulton and Wallace

Landform:

Habitat Type: Douglas fir/pinegrass

Formation Name:

Parent Rock/Material: volcanic material over granitic bedrock Climate:

Weathering:

Precipitation:

Topography: mod. steep concave slope

Erosion:

Slope: 38 percent

Infiltration:

Aspect: northwest

Permeability:

Elevation: 1884 m (6180 ft)

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

Ah 0-11 centimeters (0-4 inches). Dark gray brown (10YR 5/2) loamy sand, very dark gray brown (10YR 3/2) moist; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; strongly acid pH 5.5, noncalcareous; 10 percent gravel by weight; gradual smooth boundary.

A&B 11-62 centimeters (4-24 inches). Gray brown (10YR 5.5/2.5) sand, dark gray brown (10YR 4/2) moist; single grained; friable, nonsticky and nonplastic; strongly acid pH 5.5, noncalcareous; 14 percent gravels by weight; gradual wavy boundary.

Bs 62-85 centimeters (24-34 inches). Pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; medium acid pH 5.6, noncalcareous; 50 percent gravel by weight; gradual wavy boundary.

IIC 85-115 centimeters (34-45 inches). Light olive (2.5Y 5/4) gravelly sand, olive brown (2.5Y 4/4) moist; loose, nonsticky and nonplastic; medium acid pH 6.0, noncalcareous; 26 percent gravel by weight.

Pedon: Unnamed Loamy Sand 79-MT-2205 (070601R-3)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mahos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	Ah	0-11	5.5	0.22	45	6.6				
2	A&B	11-62	5.5	0.15	40	6.6				
3	Bs	62-85	5.6	0.22	39	6.4				
4	2C	85-115+	6.0	0.18	33	5.2				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
meq/100 gms							%	%		ratio			
1	4.3	0.7	0.1	0.4	3.3	8.0	62	1.16	0.67	0.044	15	0.90	8.0
2	4.4	1.1	0.1	0.2	2.5	6.4	70	0.39	0.23	0.021	11	0.86	8.0
3	6.2	1.5	0.1	0.3	2.9	9.1	74	0.44	0.26	0.018	14	0.50	8.1
4	5.0	1.1	0.7	0.2	2.0	6.3	78	0.18	0.11	0.014	8	0.74	8.0

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Loamy Sand 79-MT-2205 (070601R-3)

Date: January 1981

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm			
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.		
cm	%								%			
0-11						84.42	11.61	3.97	10			Loamy sand
11-62						86.56	10.47	2.97	14			Sand
62-85						77.92	13.81	8.27	50			V.gr. sandy loam
85-115+						91.89	4.50	3.62	26			Gr. sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	1S	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	g/cc		%		%		
cm	%			g/cc		%		%		
0-11						10.7	4.9	NDNP	NDNP	NDNP
11-62						8.4	3.9	NDNP	NDNP	NDNP
62-85						12.3	5.8	NDNP	NDNP	NDNP
85-115+						5.6	3.4	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Clay Loam 79-MT-1201 (060401B-3)

Classification: loamy-skeletal, carbonatic Cryic Rendoll.

General Site Characteristics

Location: Deerlodge County, Montana: southwest 1/4 of section 22, T.5N., R.12W.  
Forest: Deerlodge National Forest  
Area: Olson Gulch  
Described By/Date: September 21, 1978, by Houlton and Wallace  
Landform:  
Habitat Type: Douglas fir/common juniper  
Formation Name:  
Parent Rock/Material: limestone residuum and colluvium  
Climate:  
Weathering: Precipitation:  
Topography: gently sloping to mod. steep, mod. dissected sideslopes Erosion:  
Slope: 25 percent Infiltration:  
Aspect: north-northeast Permeability:  
Elevation: 1817 m (5960 ft) Storage:  
Soil Depth: Drainage:  
Eff. Rooting Depth: Air Temp:  
Litter Type: Soil Temp at 20 inches:  
Surface Rock: Salt/Alkal:

Remarks:

Pedon Description

Ah1 0-7 centimeters (0-3 inches). Very dark gray (10YR 3.5/1) gravelly clay loam, very dark gray (10YR 3/1) moist; weak medium granular structure; slightly hard, friable, very sticky and very plastic; neutral pH 7.3, calcareous; 20 percent gravel by weight; clear wavy boundary.

Ah2 7-46 centimeters (3-18 inches). Dark gray (10YR 4.5/1) very gravelly clay loam, very dark gray brown (10YR 3/2) moist; massive structure; soft, very friable, slightly sticky and slightly plastic; mildly alkaline pH 7.6, calcareous; 68 percent gravel by weight; diffuse wavy boundary.

Cca 46-120 centimeters (18-47 inches). Light gray (10YR 7/2) gravelly sandy clay loam, gray brown (10YR 5.5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly alkaline pH 8.5, calcareous; 23 percent gravel by weight.

Pedon: Unnamed Gravelly Clay Loam 79-MT-1201 (060402B-3)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
							meq/1000 gms							
1	Ah1	0-7	7.6	7.3	0.92	94	9.0	2.8	0.5	0.8	0.0	6.7	2.5	0.6
2	Ah2	7-46	7.8	7.6	0.78	100	8.2	1.4	0.4	0.2	0.0	5.7	1.8	0.5
3	Cca	46-120	8.5	7.9	0.64	69	4.1	0.8	0.3	0.2	0.0	3.1	1.1	0.6

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	% %		ratio	%	%	ppm				
1	18.7	3.3	0.1	1.4	37.9	0	8.21	4.77	0.320	15	nil	10.1	0.80	12.3
2	19.9	2.0	0.1	0.5	41.2	0	8.58	4.99	0.250	20	nil	35.6	0.31	10.5
3	13.4	1.3	0.1	0.3	25.4	0	2.39	1.39	0.073	19	nil	63.8	0.77	4.7

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Clay Loam 79-MT-1201 (060401B-3)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
0- 7						33.03	34.79	32.18	20	Gr. clay loam
7- 46						36.06	31.08	32.86	68	V.gr. clay loam
46-120						49.82	21.33	28.86	23	Gr. sandy clay loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod Core	bar	Bar			
cm	%			g/cc	%		%		
0- 7					37.5	20.3	IS	IS	IS
7- 46					47.1	25.9	IS	IS	IS
46-120					37.1	22.0	IS	IS	IS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen  
 IS-insufficient sample

Analysis by: Debbie Hall

Unnamed Gravelly Sandy Loam 79-MT-2004 (050301R-2)

Classification: fine-clayey, mixed Typic Cryoboralf.

General Site Characteristics

Location: Granite County, Montana: northeast 1/4 of section 19, T.6N., R.16W.  
Forest: Deerlodge National Forest  
Area: Coal Creek  
Described By/Date: September 19, 1978, by Houlton and Wallace  
Landform:  
Habitat Type: Subalpine fir/menziesia  
Formation Name:  
Parent Rock/Material: glacial drift  
Weathering:  
Topography: gently sloping, undulating, undissected sideslopes Erosion:  
Slope: 7 percent  
Aspect: north  
Elevation: 1951 m (6400 ft)  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Infiltration:  
Permeability:  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

- H 7-0 centimeters (3-0 inches). Litter and decomposed needles and twigs.
- Ah 0-10 centimeters (0-4 inches). Light brownish gray (10YR 6.5/2) gravelly sandy loam, very dark grayish brown (10YR 3.5/2) moist; weak fine and medium granular structure; soft, very friable, sticky and slightly plastic; very strongly acid pH 4.6, noncalcareous; 29 percent gravels by weight; gradual smooth boundary.
- E 10-26 centimeters (4-10 inches). Light gray (10YR 7/1.5) gravelly sandy loam, gray (10YR 5.5/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; very strongly acid pH 4.7, noncalcareous; 40 percent gravels by weight; clear wavy boundary.
- Bt 26-45+ centimeters (10-18 inches). Very pale brown (10YR 7/4) gravelly clay, pale brown (10YR 6/3) moist; moderate coarse angular blocky structure; extremely hard, firm, sticky and very plastic; extremely acid pH 4.3, noncalcareous; 20 percent gravels by weight.

Pedon: Unnamed Gravelly Sandy Loam 79-MT-2004 (050301R-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	H	7-0	NS	NS	NS	NS				
2	Ah	0-10	4.6	0.46	56	1.4				
3	E	10-26	4.7	0.29	54	0.7				
3	Bt	26-45+	4.3	0.27	60	0.6				

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Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H		Saturation						
	----- meq/100 gms -----						%		%		ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.5	1.3	0.2	0.5	8.5	13.8	39	2.18	1.27	0.070	18	0.71	8.2
3	2.8	1.0	0.1	0.4	4.7	8.9	48	0.67	0.39	0.033	12	0.60	8.1
3	9.3	5.1	0.2	0.7	9.1	29.3	63	1.05	0.61	0.043	14	0.80	8.2

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS=no sample

Analysis by: Zelda Fadness



Pedon: Unnamed Gravelly Sandy Loam 79-MT-2004 (050301R-2)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
7-0							NS	NS	NS	NS	
0-10							54.84	31.97	13.20	29	Gr. sandy loam
10-26							60.50	25.71	13.78	40	Gr. sandy loam
26-45+							28.45	19.72	51.83	20	Gr. clay

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core g/cc	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	IS	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	%				%		%		
7-0					NS	NS	NS	NS	NS
0-10					24.1	10.2	IS	IS	IS
10-26					17.4	8.2	IS	IS	IS
26-45+					36.0	22.3	52	6	46

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 IS-insufficient sample  
 Water content-Anita Falen

Analysis by: Debbie Hall

# FLATHEAD

Samples Identification for Soil Characterization Lab Projects

Project Leader and/or Agency: Flathead National Forest-LIM

Date: December 1980

Code No.	Agency # and/or project label	U of I # and/or Coulter Counter ID #
FH 1-3	140601B-2	79-MT-1501 (M1501-1-3)
FH 4-6	060602B-2	79-MT-1502 (M1502-1-3)
FH 7-9	081101B-2	79-MT-1503 (M1503-2-4)
FH 10-13	100501B-2	79-MT-1504 (M1504-1-4)
FH 14-17	1108020-2	79-MT-1505 (M1505-2-5)
FH 18-21	1006010-3	79-MT-1506 (M1506-2-6)
FH 22-25	1108010-2	79-MT-1507 (M1507-1-4)
FH 26-29	100501B-3	79-MT-1508 (M1508-2-5)
FH 30-34	160501B-1	79-MT-1509

Unnamed Very Gravelly Coarse Sandy Loam 79-MT-1501 (140601B-2)

Classification: loamy-skeletal, mixed Dystric Cryochrepts.

General Site Characteristics

Location: Flathead County, Montana: section 26, T. 34N., R. 22W.  
Forest: Flathead National Forest  
Area:  
Described By/Date:  
Landform: 76  
Habitat Type: (Abies lasiocarpa)/(Clintonia uniflora-Xerophyllum tenax)  
Formation Name:  
Parent Rock/Material: Purcell lava  
Weathering:  
Topography:  
Slope: 53 percent  
Aspect:  
Elevation: 4600 feet MSL  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Erosion:  
Infiltration:  
Permeability:  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

O 5-0 centimeters (2-0 inches). Organic duff.

B2ir 0-48 centimeters (0-19 inches). Dark brown (10YR 4/3) moist; very gravelly coarse sandy loam; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 5.7, noncalcareous; many fine, common medium roots; 61 percent gravels by weight; clear wavy boundary.

IIB3 48-70 centimeters (19-28 inches). Grayish brown (10YR 5/2) moist; very gravelly coarse sandy loam; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 6.0, noncalcareous; common fine and medium roots; 63 percent gravels by weight; clear wavy boundary.

IIC 70-108+ centimeters (28-43+ inches). Brown (10YR 5/3) moist; very gravelly loamy coarse sand; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 5.9, noncalcareous; few fine roots; 59 percent gravels by weight.

Pedon: Unnamed Very Gravelly Coarse Sandy Loam 79-MT-1501 (140601B-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	0	5- 0	NS	NS	NS	NS				
2	B2ir	0- 48	5.7	0.16	58	1.4				
3	IIB3	48- 70	6.0	0.11	46	1.3				
3	IIC	70-108+	5.9	0.14	29	1.3				

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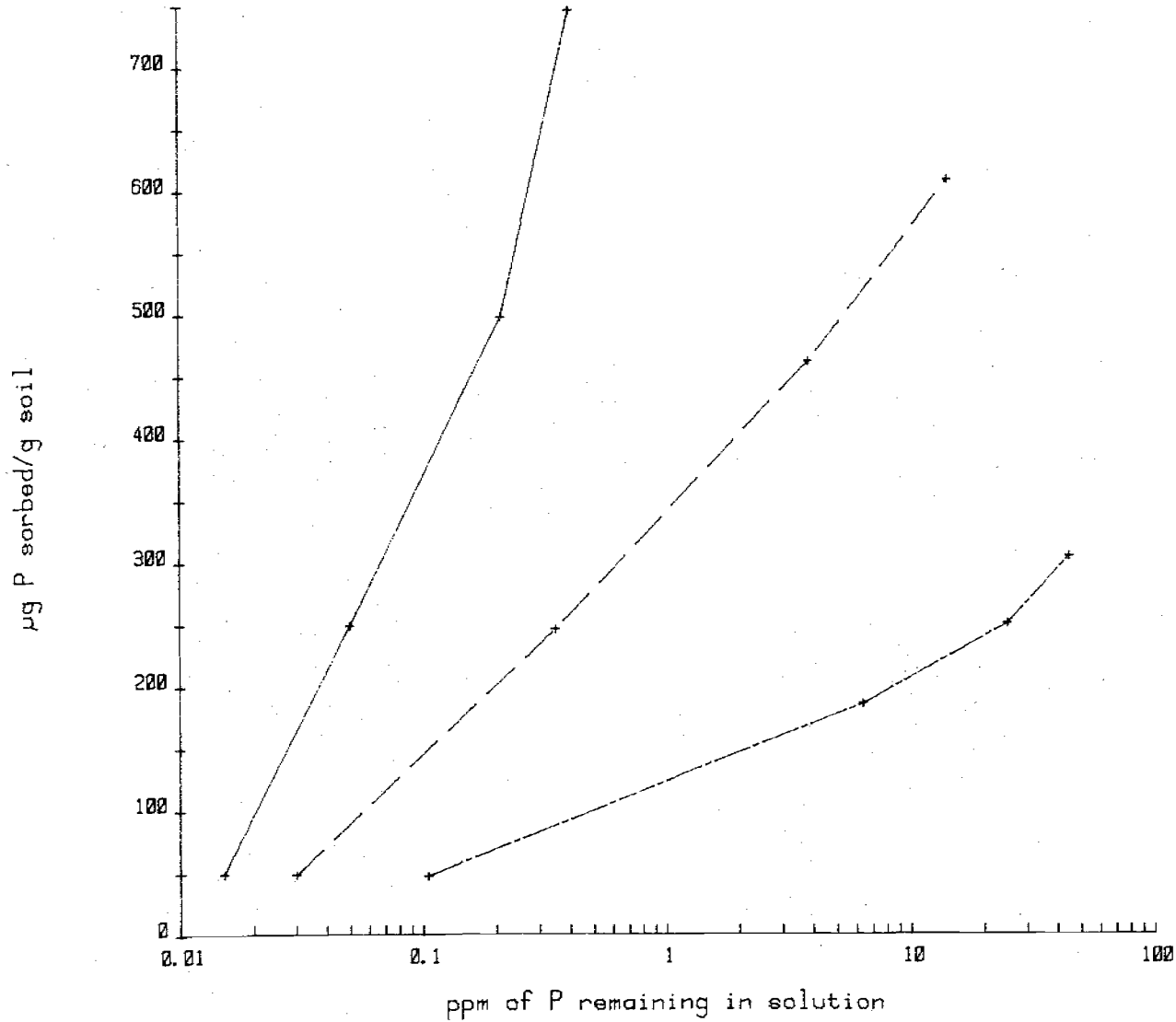
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH			
	Ca	Mg	Na	K	H		Saturation					Fraction				
													meq/100 gms	%	%	ratio
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			
2	6.7	1.0	0.1	0.4	14.0	17.5	37	3.26	1.89	0.110	17	0.39	9.5			
3	5.0	1.1	0.1	0.2	4.5	9.2	59	0.78	0.45	0.030	15	0.37	8.0			
3	6.0	1.0	0.1	0.1	2.7	8.1	72	0.51	0.29	0.012	24	0.41	7.8			

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

### Phosphorus Isotherm

79-MT-1501



µg/g soil	Soln ppm
----- B21r	
50	0.02
250	0.05
498	0.21
746	0.40
----- I1B3	
50	0.03
247	0.35
462	3.84
608	14.16
----- I1C	
49	0.11
186	6.36
251	24.92
305	44.48

Pedon: Unnamed Very Gravelly Coarse Sandy Loam 79-MT-1501 (140601B-2)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
5- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
0- 48	13.57	14.45	7.56	8.15	8.33	52.07	42.94	4.99	61		V.gr. coarse sandy loam
48- 70	21.90	23.68	11.48	9.66	5.71	72.44	23.22	4.34	63		V.gr. coarse sandy loam
70-108+	23.71	23.18	14.73	14.44	6.14	82.19	13.56	4.25	59		V.gr. loamy coarse sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
5- 0						NS	NS	NS	NS	NS
0- 48						42.3	11.5	NDNP	NDNP	NDNP
48- 70						14.3	6.6	NDNP	NDNP	NDNP
70-108+						10.1	5.7	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

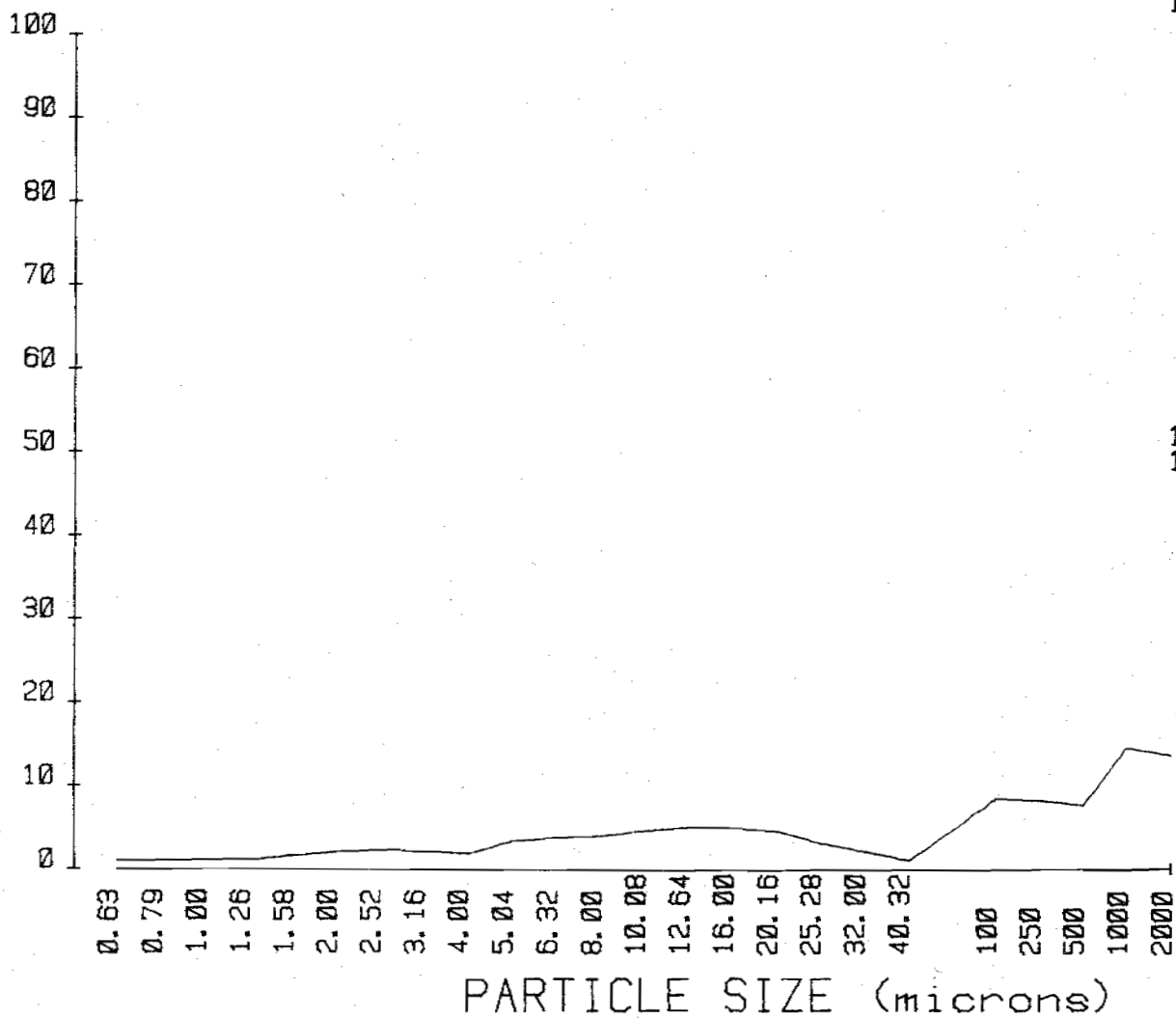
Identification		M1501-1	M1501-2	M1501-3	
Units		-----%			
TC (0.63-2.00)		4.99	4.34	4.25	
TSi (2.00-50)		42.94	23.22	13.56	
TS (50-2000)		52.07	72.44	82.19	
Clay	0.63-0.794	0.80	0.68	0.65	
	0.794-1.00	0.77	0.70	0.71	
	1.00-1.26	0.95	0.88	0.90	
	1.26-1.59	0.99	0.87	0.87	
	1.59-2.00	1.49	1.22	1.12	
Fine Silt	2.00-2.52	1.94	1.52	1.19	
	2.52-3.17	2.13	1.67	1.07	
	3.17-4.00	1.91	1.44	0.86	
	4.00-5.04	1.66	1.24	1.09	
Medium Silt	5.04-6.35	3.21	1.96	1.13	
	6.35-8.00	3.65	2.10	1.10	
	8.00-10.08	3.92	2.04	1.00	
	10.08-12.70	4.52	2.26	1.11	
	12.70-16.0	4.94	2.18	1.12	
	16.0-20.2	4.77	2.04	1.12	
Coarse Silt	20.2-25.4	4.43	1.73	0.99	
	25.4-32.0	2.96	1.08	0.87	
	32.0-40.3	1.94	1.00	0.50	
	40.3-50.8	0.89	0.87	0.25	
	50.8-64.0	0.09	0.08	0.17	
VFS (50-100)		8.33	5.71	6.14	
FS (100-250)		8.15	9.66	14.44	
MS (250-500)		7.56	11.48	14.73	
CoS (500-1000)		14.45	23.68	23.18	
VCoS (1000-2000)		13.57	21.90	23.71	
Greater than 2000		61	63	59	
Textural Class		V.GR. CoSL	V. Gr. CoSL	V. GR. ICoS	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



## PLOT SAND-SILT-CLAY

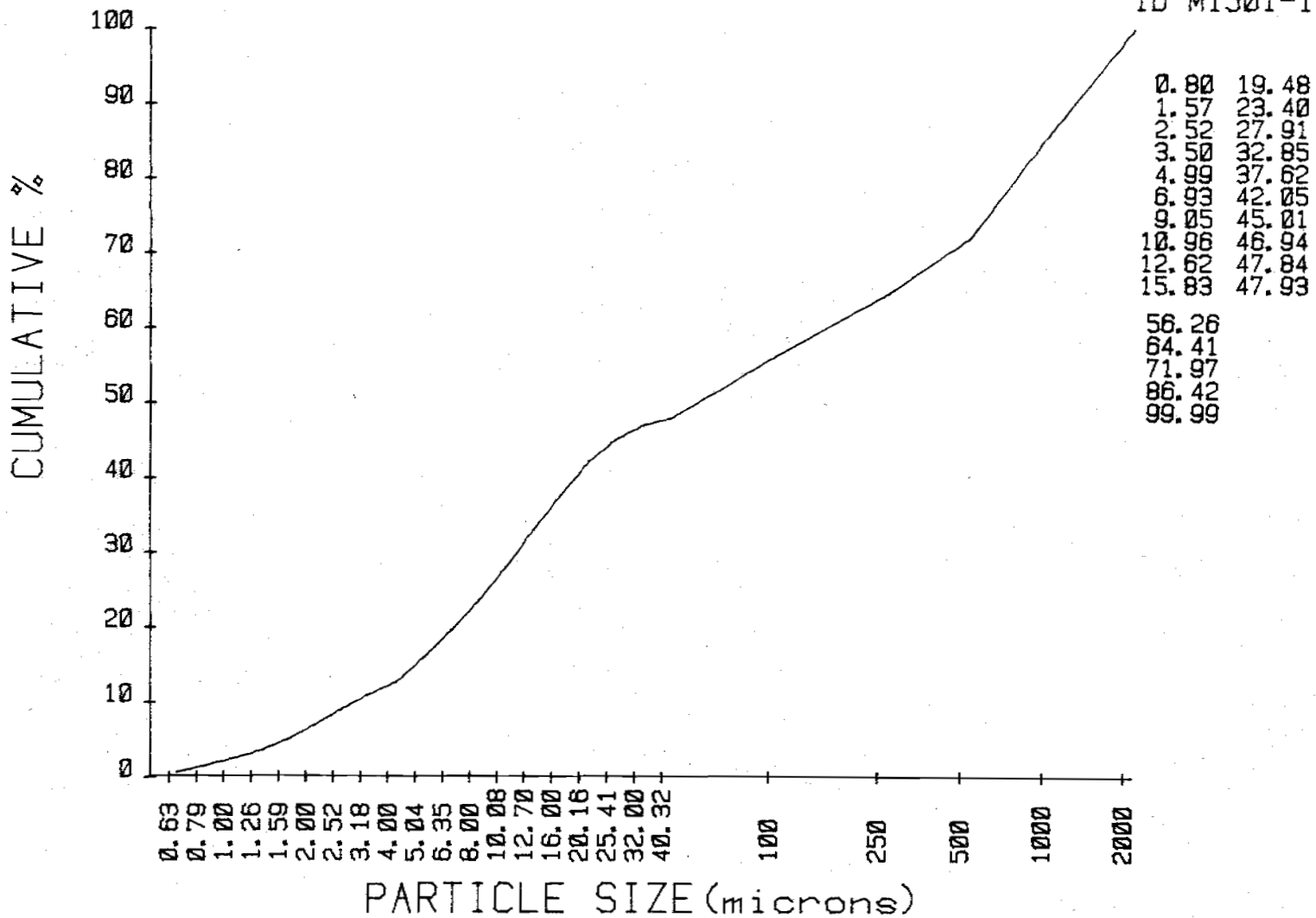
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0.80	3.65
0.77	3.92
0.95	4.52
0.99	4.94
1.49	4.77
1.94	4.43
2.13	2.96
1.91	1.94
1.66	0.89
3.21	0.09
8.33	
8.15	
7.56	
14.45	
13.57	

CUMULATIVE CURVE SAND-SILT-CLAY

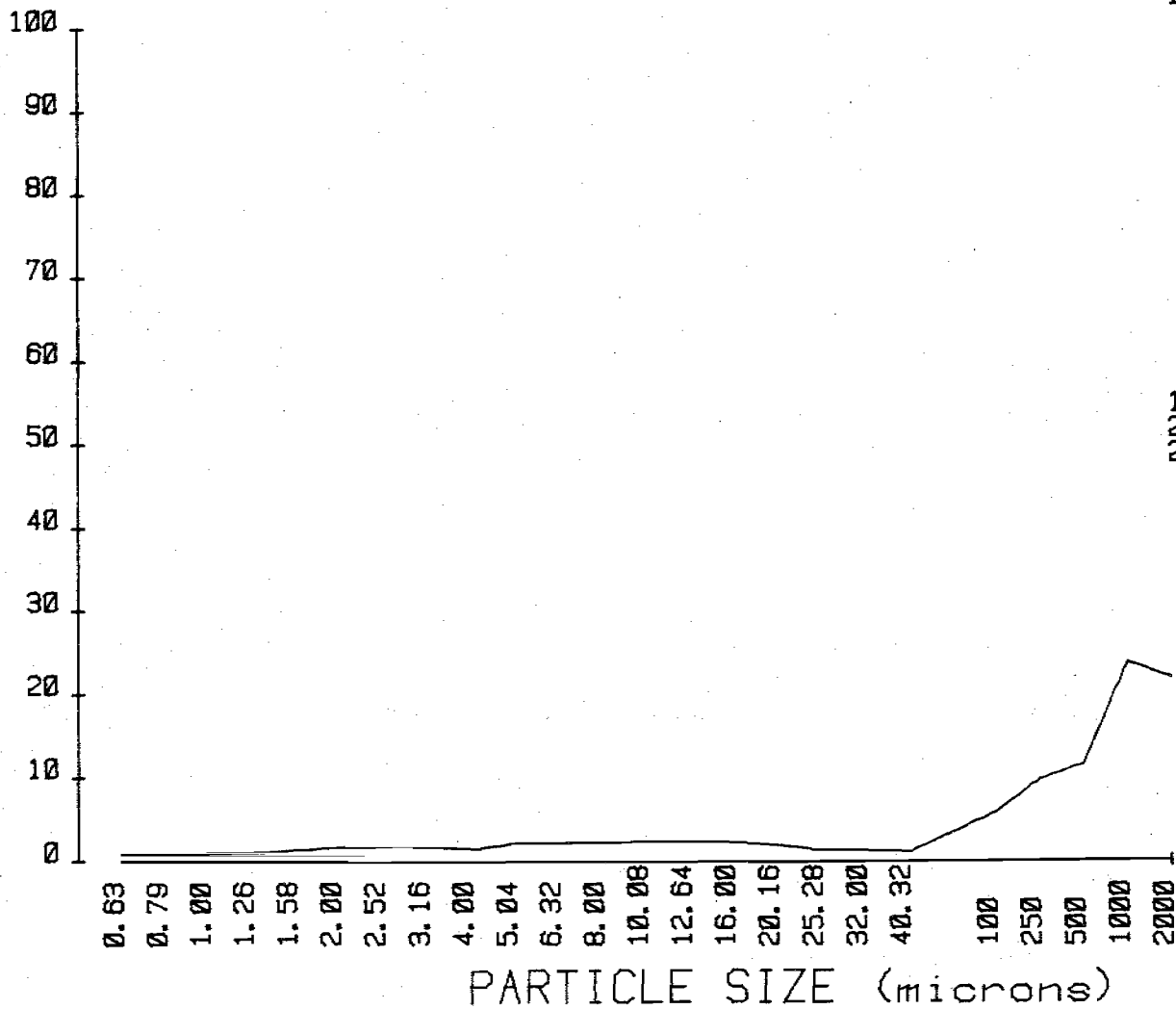
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PLOT SAND-SILT-CLAY

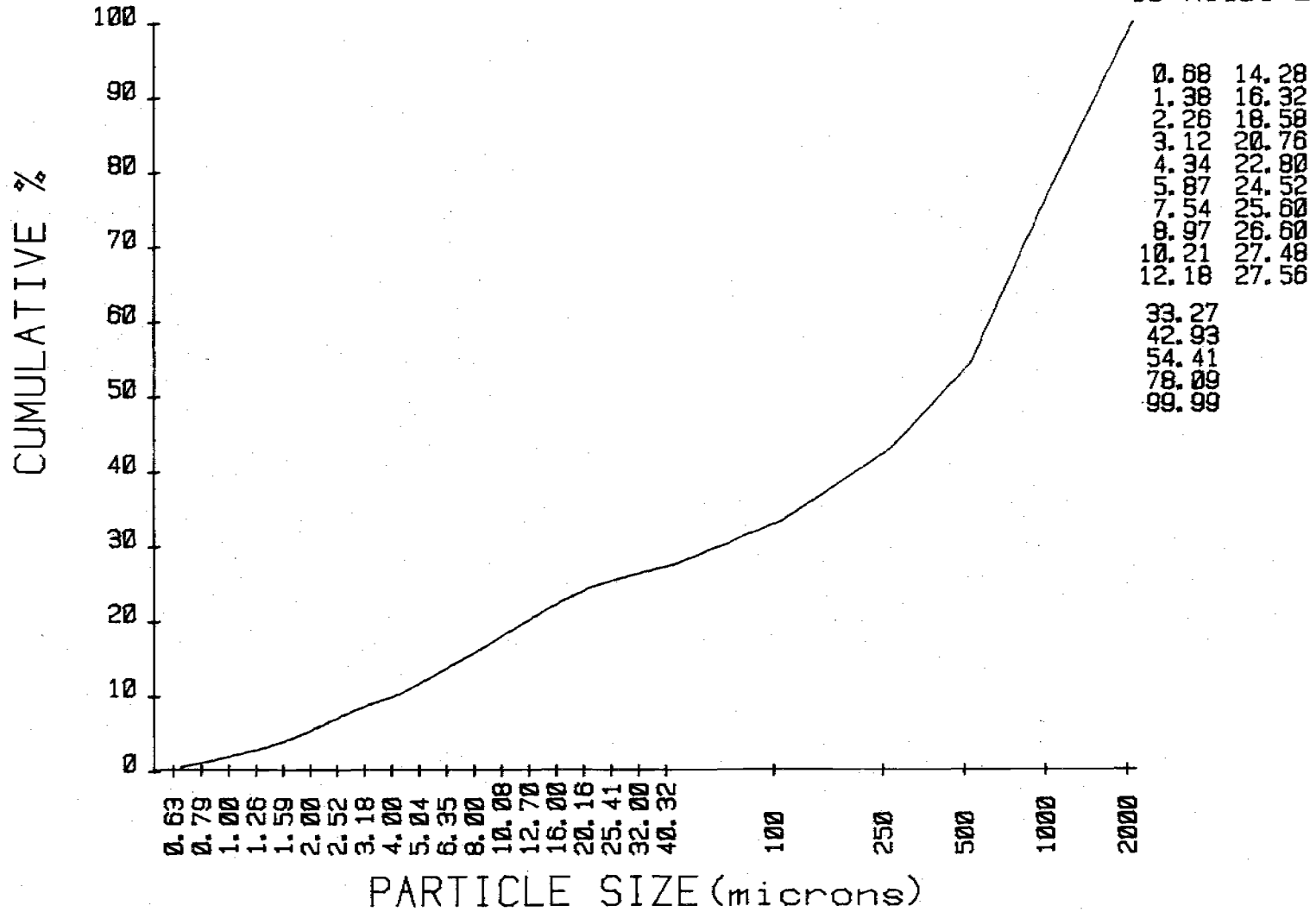
ID M1501-2



0.68	2.10
0.70	2.04
0.88	2.26
0.87	2.18
1.22	2.04
1.52	1.72
1.67	1.08
1.44	1.00
1.24	0.87
1.96	0.08
5.71	
9.66	
11.48	
23.68	
21.90	

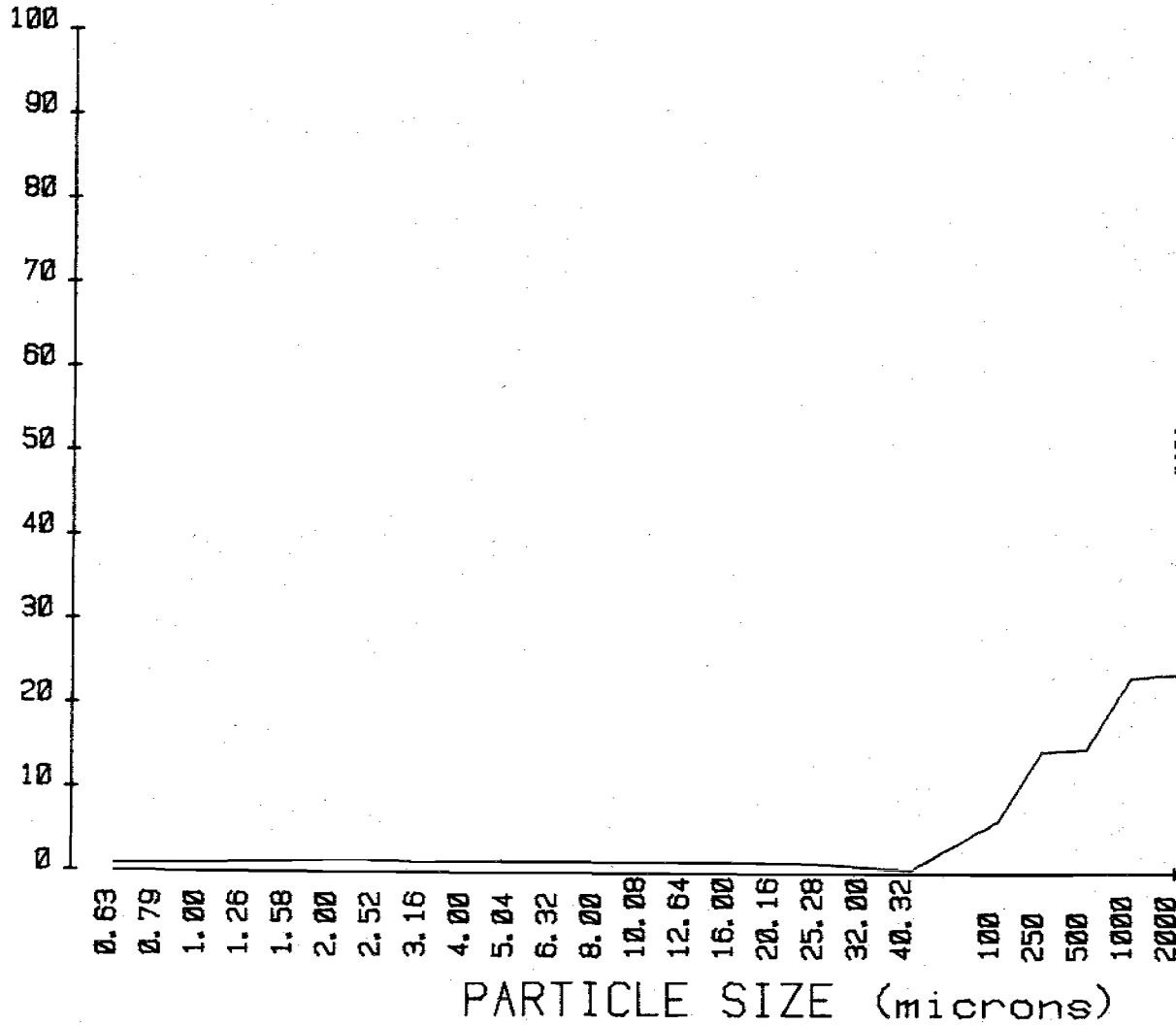
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1501-2



PLOT SAND-SILT-CLAY

ID M1501-3



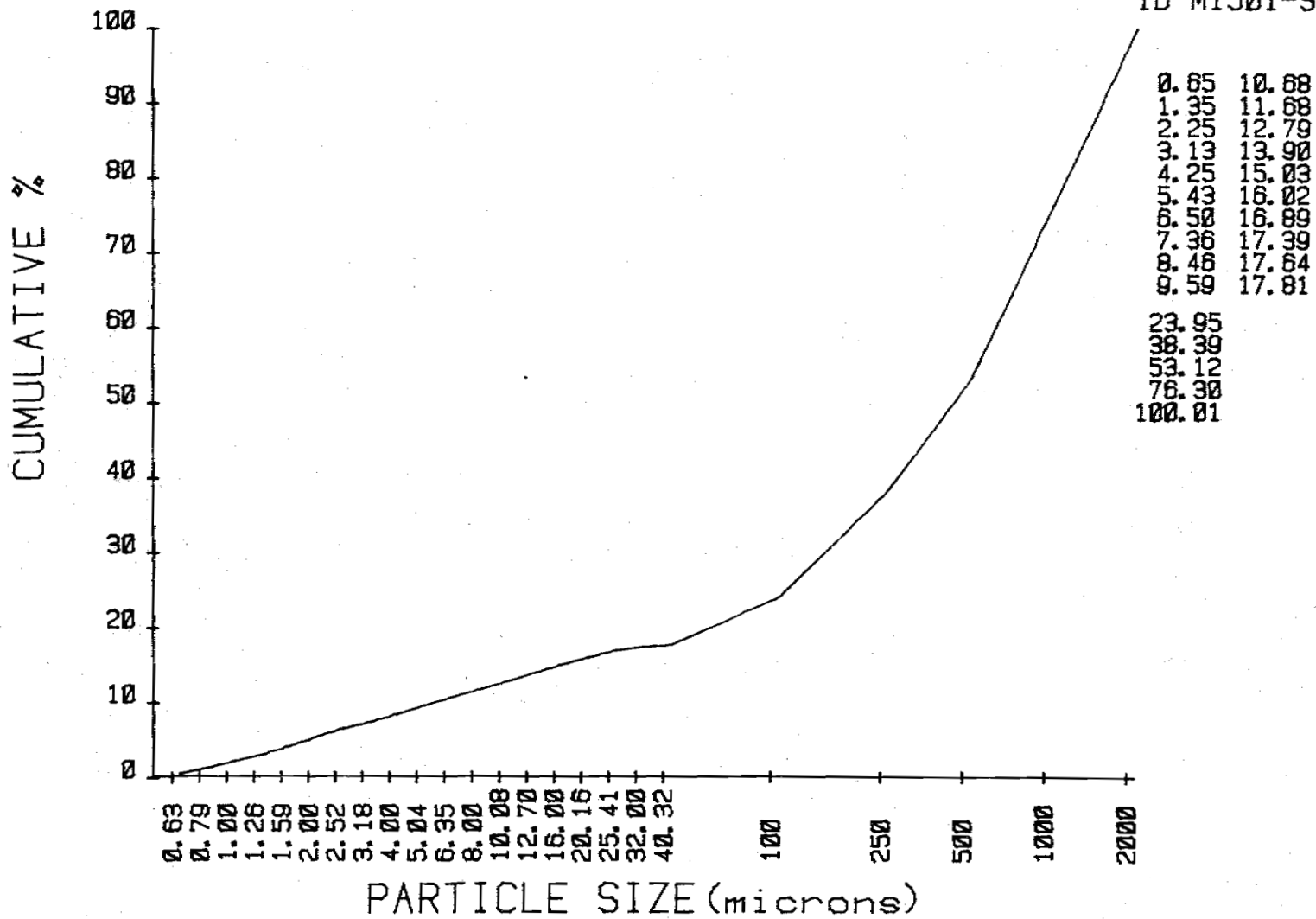
0.65	1.10
0.71	1.00
0.90	1.11
0.87	1.12
1.12	1.12
1.19	0.99
1.07	0.87
0.86	0.50
1.09	0.25
1.13	0.17
6.14	
14.44	
14.73	
23.18	
23.71	

017

%

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1501-3



Unnamed Silt Loam 79-MT-1502 (060602B-2)

Classification: medial over loamy, mixed Andic Cryochrept.

General Site Characteristics

Location: Flathead County, Montana: section 31, T. 26N., R. 22W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 57D-7

Habitat Type: (Abies lasiocarpa)/ (Menziesia ferruginea)

Formation Name:

Parent Rock/Material: Ravalli quartzite

Weathering:

Topography:

Slope: 8 percent

Aspect:

Elevation: 5360 feet MSL

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 4-0 centimeters (2-0 inches). Organic duff.

B2ir 0-27 centimeters (0-11 inches). Brown (7.5YR 4/4) moist; silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common fine, medium and coarse roots; medium acid pH 5.8, noncalcareous; 13 percent gravels by weight; clear wavy boundary.

IIC1 27-54 centimeters (11-21 inches). Light brownish gray (10YR 6/2) moist; gravelly silt loam; massive structure; very friable, nonsticky and nonplastic; slightly acid pH 6.4, noncalcareous; 19 percent gravels by weight; few fine roots; microscope observations show this to be PM and not A2 material; clear wavy boundary.

IIC2 54-85+ centimeters (21-34+ inches). Light brownish gray (10YR 6/2) moist; gravelly silt loam; massive structure; very friable, nonsticky and nonplastic; slightly acid pH 6.2, noncalcareous; 33 percent gravels by weight; few fine roots.

Pedon: Unnamed Silt Loam 79-MT-1502 (860602B-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0	4-8	NS	NS	NS	NS				
2	B2ir	0-27	5.8	0.13	87	1.1				
3	IIC1	27-54	6.4	0.07	37	0.7				
	IIC2	54-85+	6.2	0.11	34	0.7				

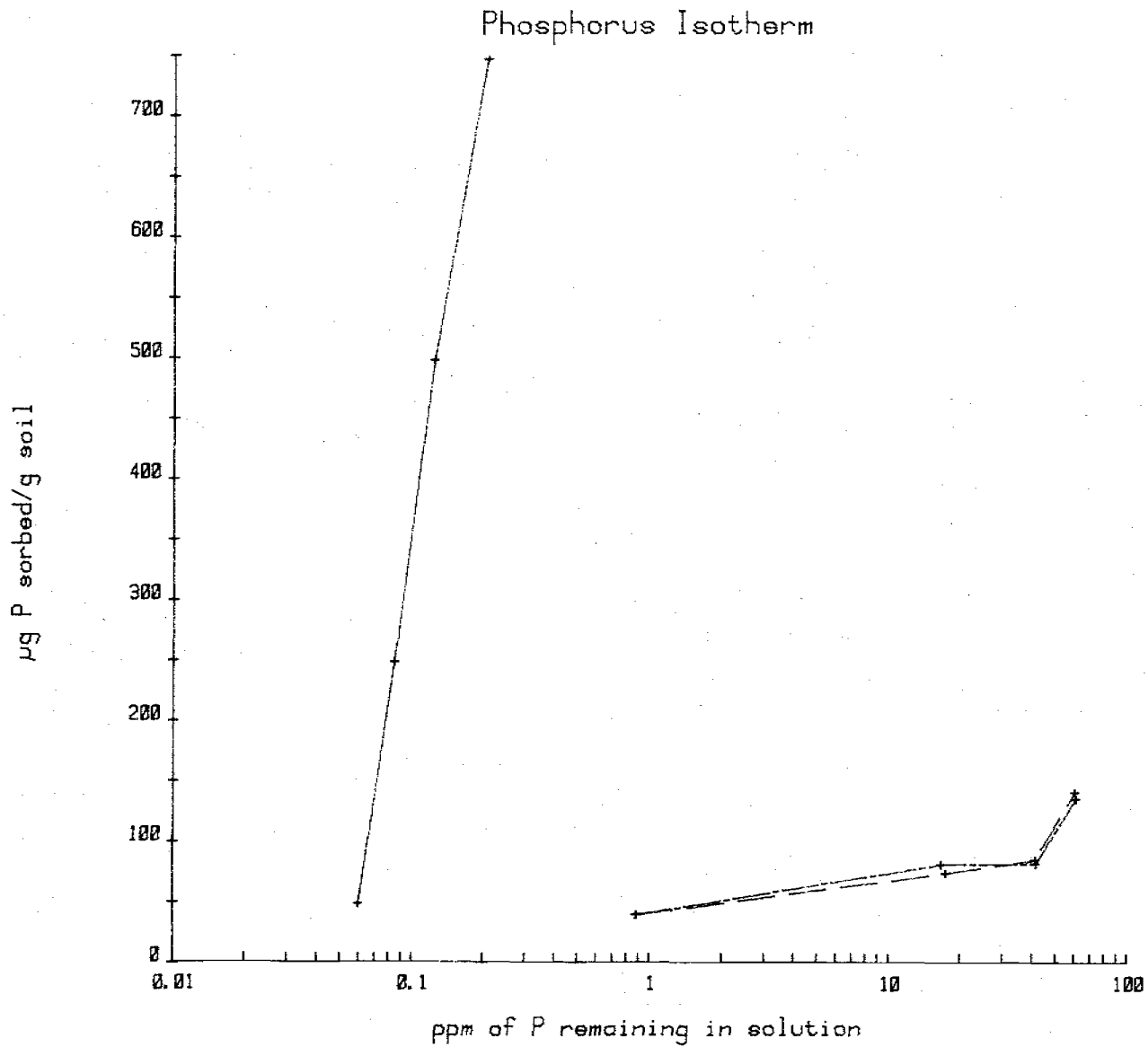
Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	11.4	0.7	0.1	0.4	16.5	17.9	43	3.01	1.75	0.096	18	0.87	9.8
3	4.5	1.0	0.1	0.1	1.6	5.3	78	0.15	0.09	0.005	18	0.81	7.8
	12.8	0.9	0.1	0.1	1.6	4.3	90	0.26	0.15	0.006	25	0.67	7.8

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

413





79-WT-1502

µg/g soil	Soln ppm
----- B2ir	
49	0.06
249	0.09
499	0.13
748	0.21
----- IIC1	
41	0.89
75	17.52
86	41.44
142	60.90
----- IIC2	
41	0.89
82	16.80
82	41.76
136	61.36

Pedon: Unnamed Silt Loam 79-MT-1502 (060602B-2)

Date: December 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	NS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%								%		
4-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-27	3.64	4.75	2.23	4.44	14.77	29.83	68.19	1.99	13		Silt loam
27-54	10.94	7.31	3.45	5.25	9.23	36.18	61.09	2.73	19		Gr. silt loam
54-85+	9.75	10.89	3.90	6.35	10.81	41.69	55.26	3.05	33		Gr. silt loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
4-0						NS	NS	NS	NS	NS
0-27						42.3	12.2	NDNP	NDNP	NDNP
27-54						21.0	3.2	NDNP	NDNP	NDNP
54-85+						20.4	3.1	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

415

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and DEBBIE

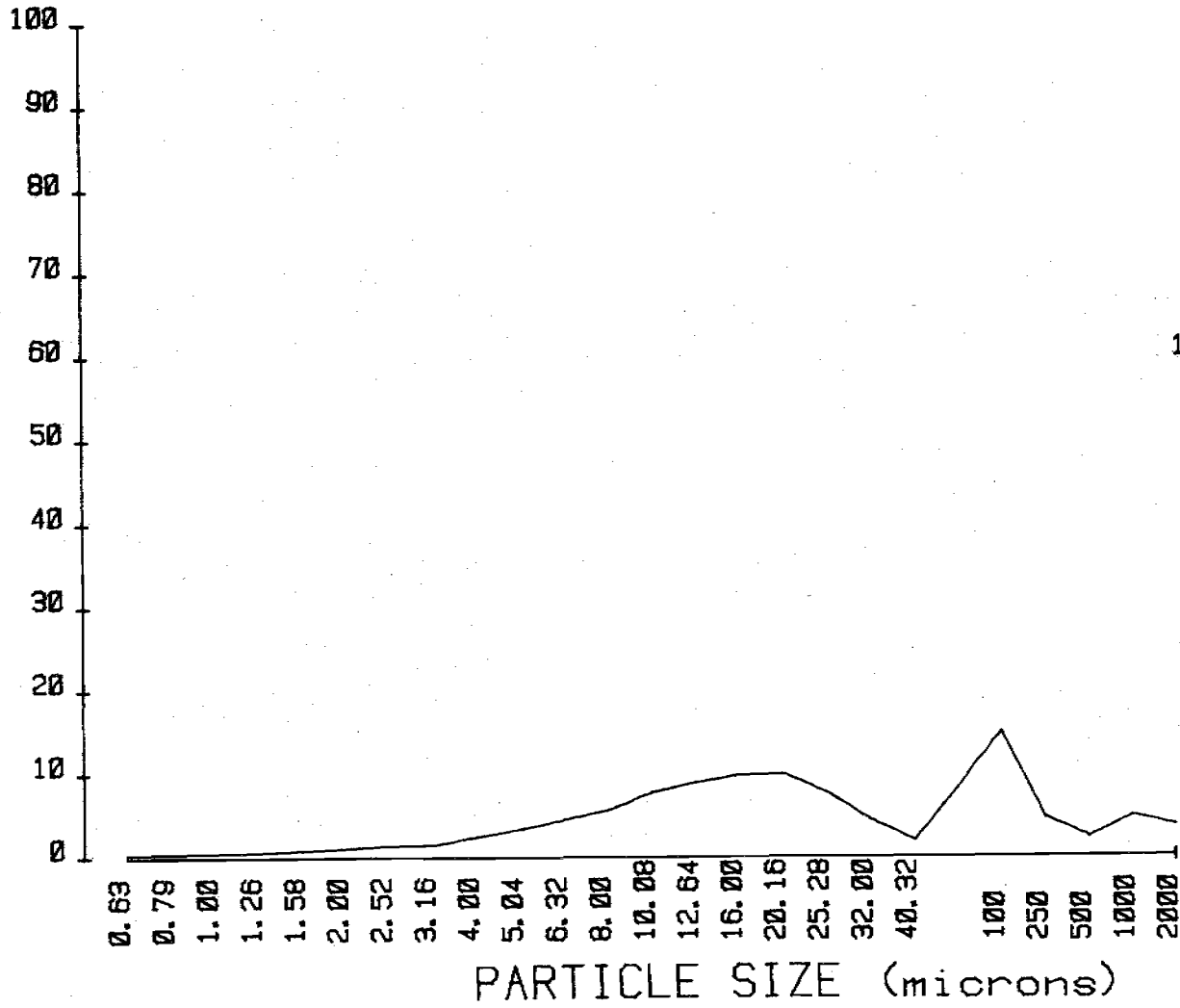
Date: January 1981

Identification	M1502-1	M1502-2	M1502-3	
Units	-----%			
TC (0.63-2.00)	1.99	2.73	3.05	
TSi (2.00-50)	68.19	61.09	55.26	
TS (50-2000)	29.83	36.18	41.69	
Clay	0.63-0.794	0.22	0.46	0.56
	0.794-1.00	0.28	0.40	0.39
	1.00-1.26	0.38	0.50	0.52
	1.26-1.59	0.43	0.53	0.58
	1.59-2.00	0.68	0.86	0.99
Fine Silt	2.00-2.52	0.93	1.31	1.49
	2.52-3.17	1.19	1.77	1.96
	3.17-4.00	1.27	1.89	1.97
	4.00-5.04	2.26	1.96	2.00
Medium Silt	5.04-6.35	3.18	4.11	4.03
	6.35-8.00	4.32	5.17	4.84
	8.00-10.08	5.46	5.63	5.23
	10.08-12.70	7.57	6.58	5.73
	12.70-16.0	8.73	6.95	6.20
	16.0-20.2	9.67	6.89	6.33
Coarse Silt	20.2-25.4	9.72	6.84	5.88
	25.4-32.0	7.44	6.13	4.69
	32.0-40.3	4.19	3.82	3.53
	40.3-50.8	1.75	1.95	1.19
	50.8-64.0	0.51	0.10	0.18
VFS (50-100)	14.77	9.23	19.81	
FS (100-250)	4.44	5.25	6.35	
MS (250-500)	2.23	3.45	3.90	
CoS (500-1000)	4.75	7.31	10.89	
VCoS (1000-2000)	3.64	10.94	9.75	
Greater than 2000	13	19	33	
Textural Class	Silt loam	Gr. Silt loam	Gr. Sil	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

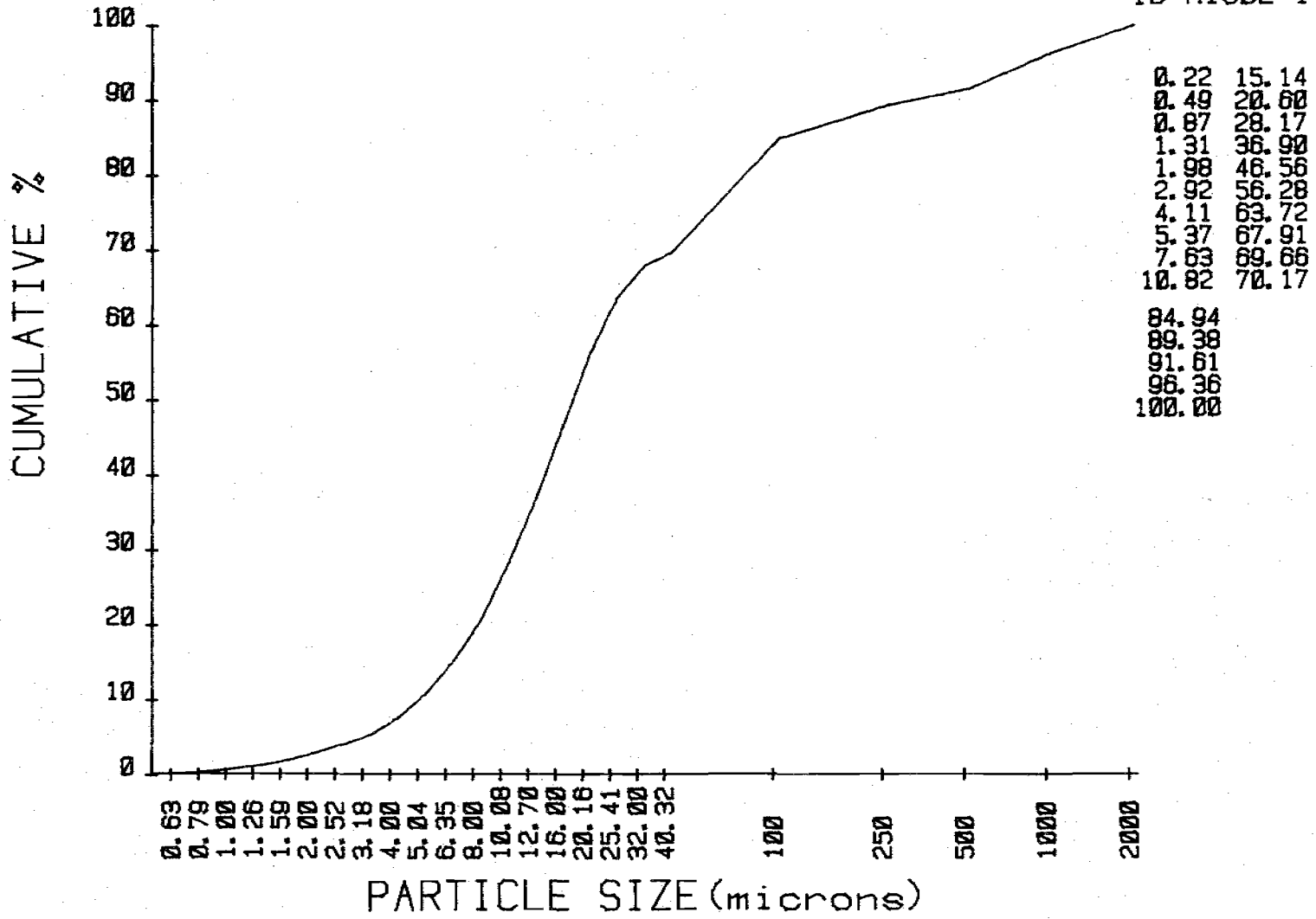
ID M1502-1



0.22	4.32
0.28	5.46
0.38	7.57
0.43	8.73
0.68	9.67
0.93	9.72
1.19	7.44
1.27	4.19
2.26	1.75
3.18	0.51
14.77	
4.44	
2.23	
4.75	
3.64	

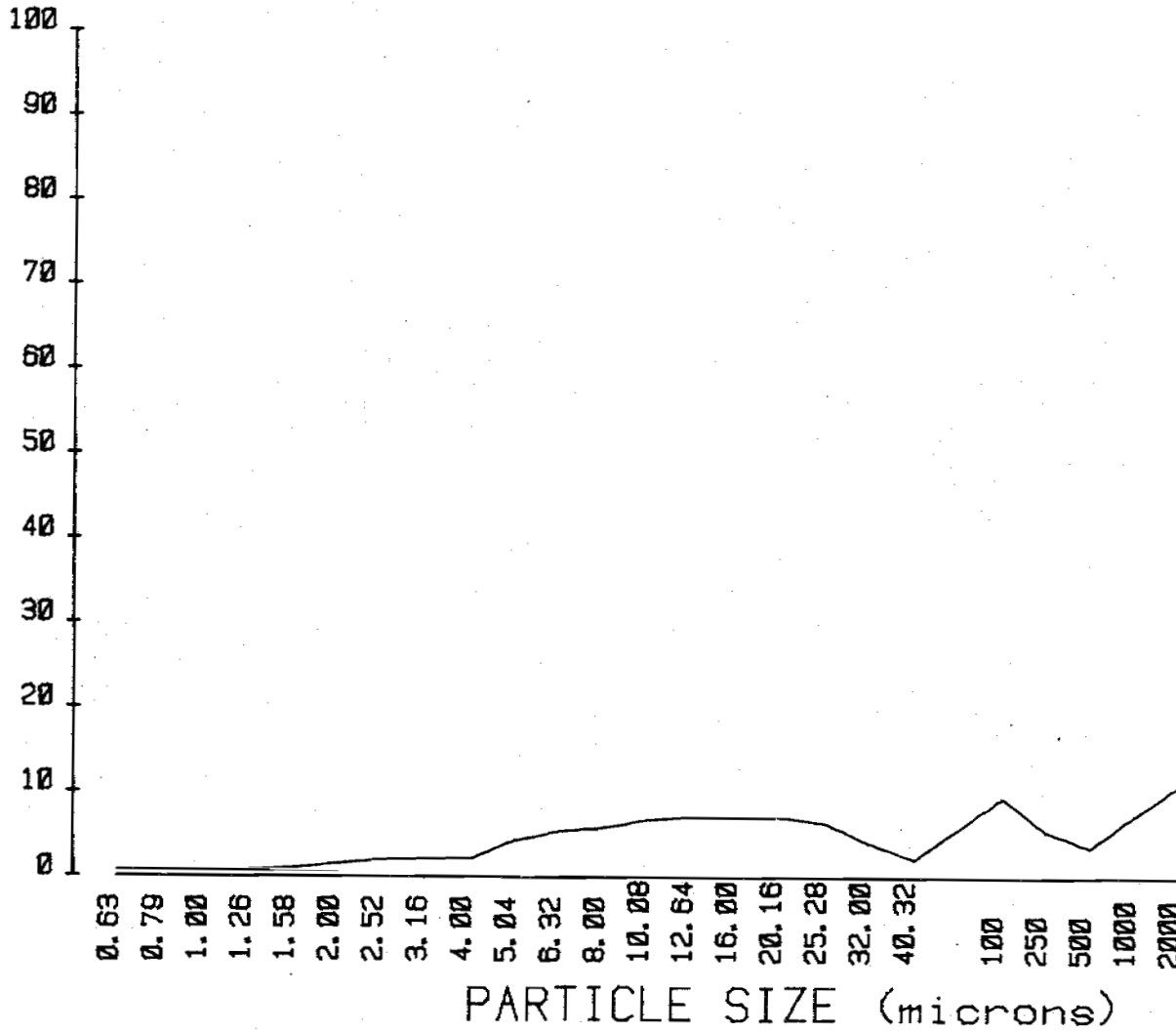
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1502-1



PLOT SAND-SILT-CLAY

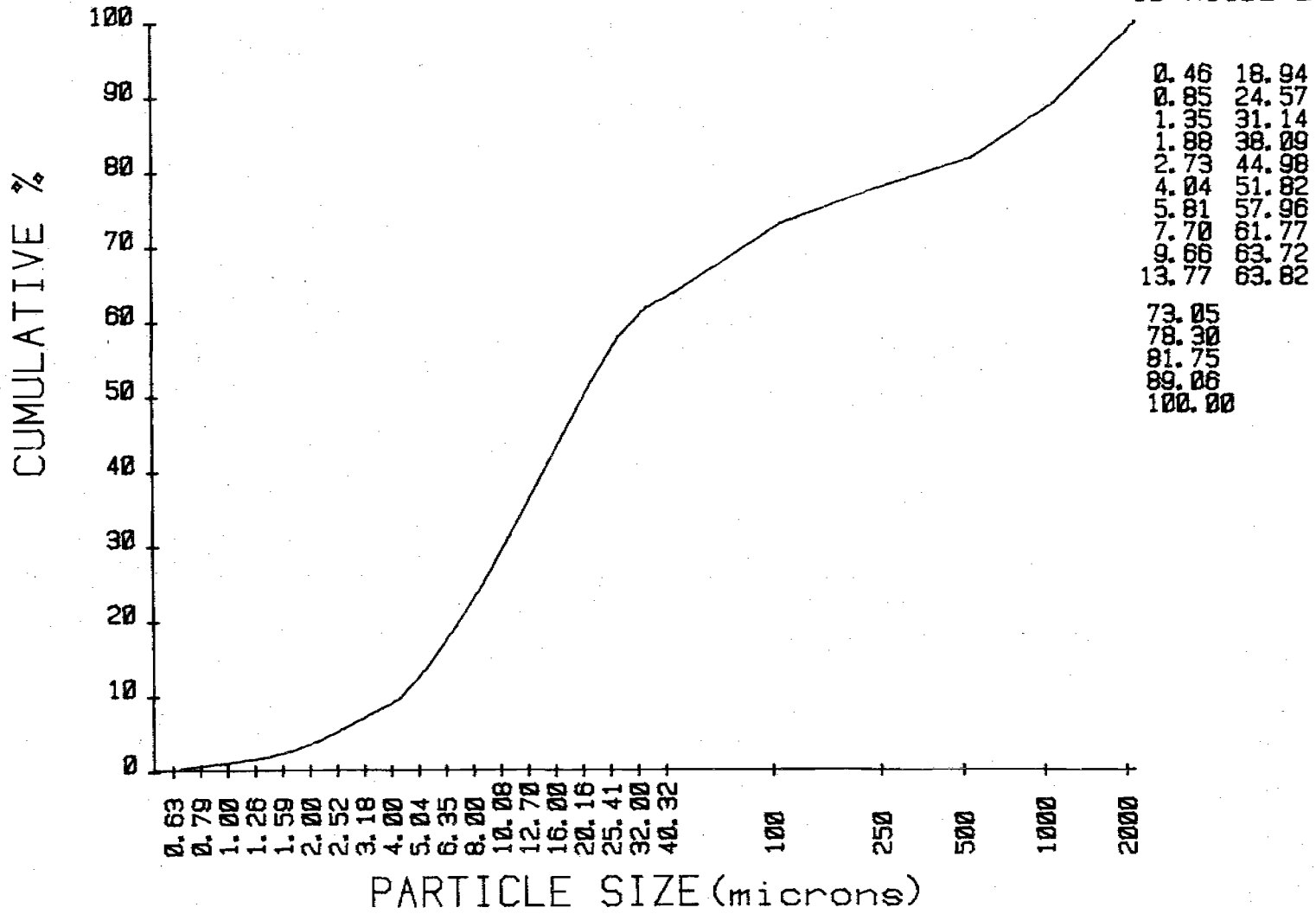
ID M1502-2



0.46	5.17
0.40	5.63
0.50	6.58
0.53	6.95
0.85	6.89
1.31	6.84
1.77	6.13
1.89	3.82
1.96	1.94
4.11	0.10
9.23	
5.25	
3.45	
7.31	
10.94	

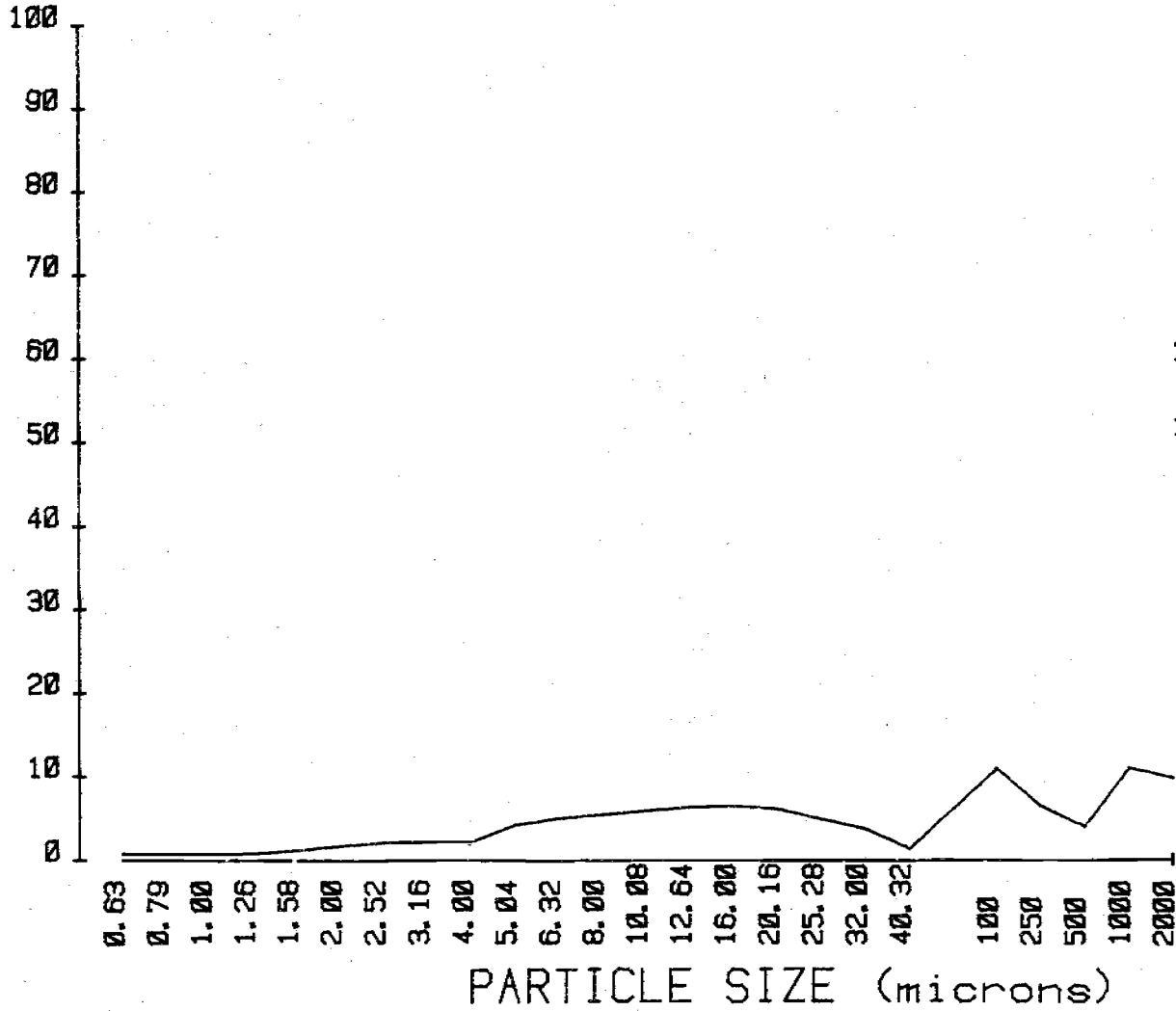
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1502-2



PLOT SAND-SILT-CLAY

ID M1502-3

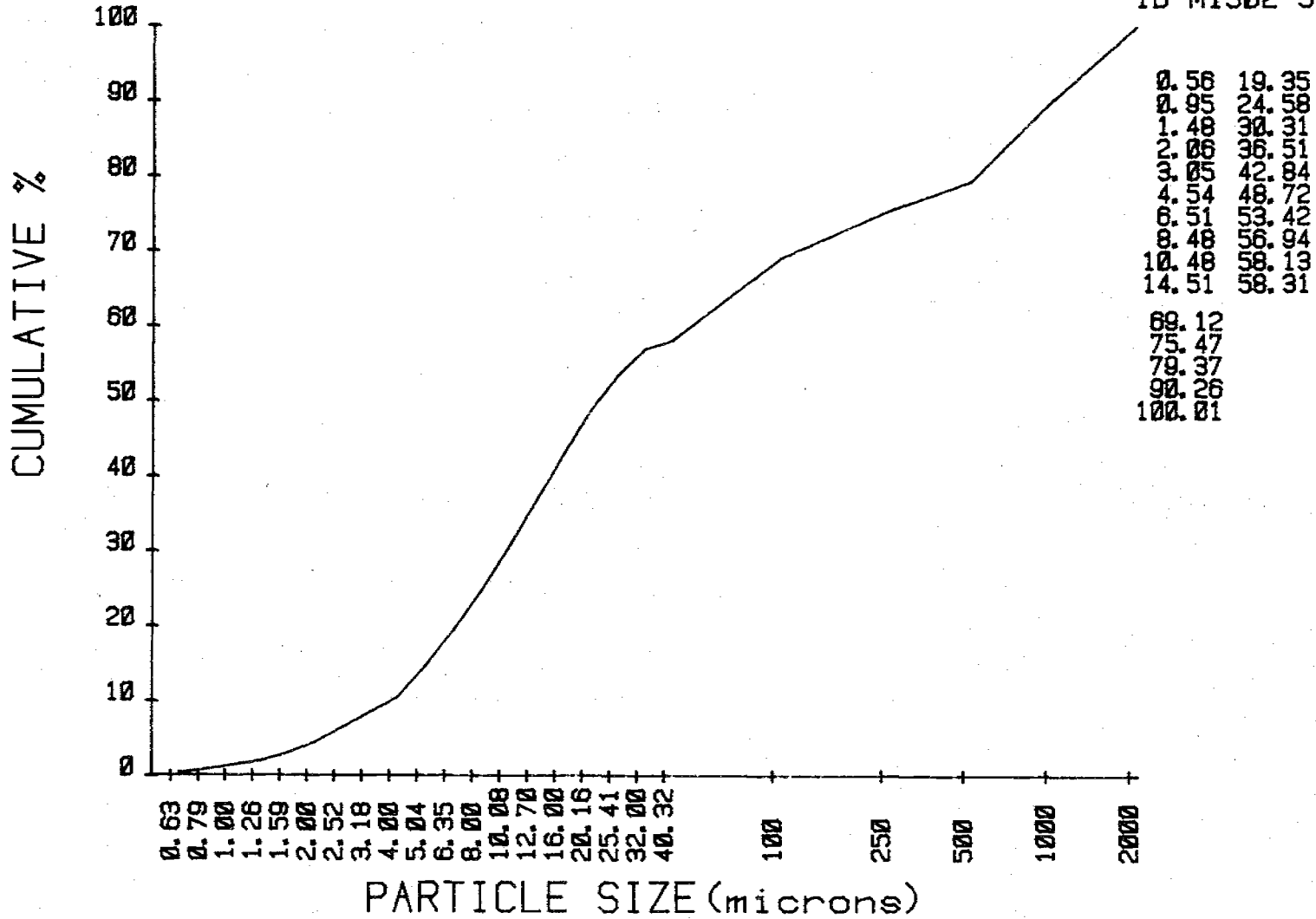


0.56	4.84
0.30	5.23
0.52	5.73
0.58	6.20
0.90	6.33
1.40	5.88
1.96	4.69
1.97	3.52
2.00	1.19
4.03	0.18
10.81	
6.35	
3.90	
10.00	
9.75	



CUMULATIVE CURVE SAND-SILT-CLAY

ID M1502-3



Slides prepared by: Falen and Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody and Falen

FH6  
Mg-saturated, glycolated  
060602 B-2  
79-MT-1502-3  
HC2 54-85 cm

80  
60  
40  
20  
0  
30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

90  
80  
70  
60  
50  
40  
30  
20  
10  
0  
30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3

3.35 Å  
26.6°  
26.8° 33°

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

Interpretation: illite,  
Kaolinite,  
Vermiculite  
mixed Vermiculite/  
Chlorite

FH6  
Mg-saturated, glycolated  
060602 B-2  
79-MT-1502-3  
HC2 54-85 cm

10.16 Å  
8.7°

14.72 Å  
6°

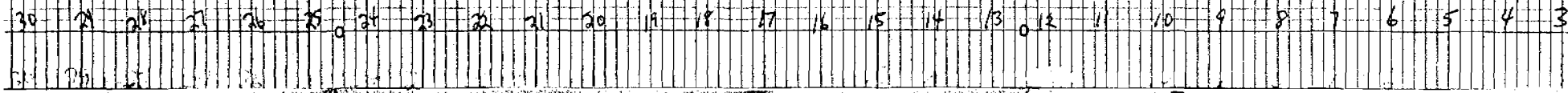
3.59 Å  
24.8°

4.8 Å  
18.5°

5.00 Å  
17.6°

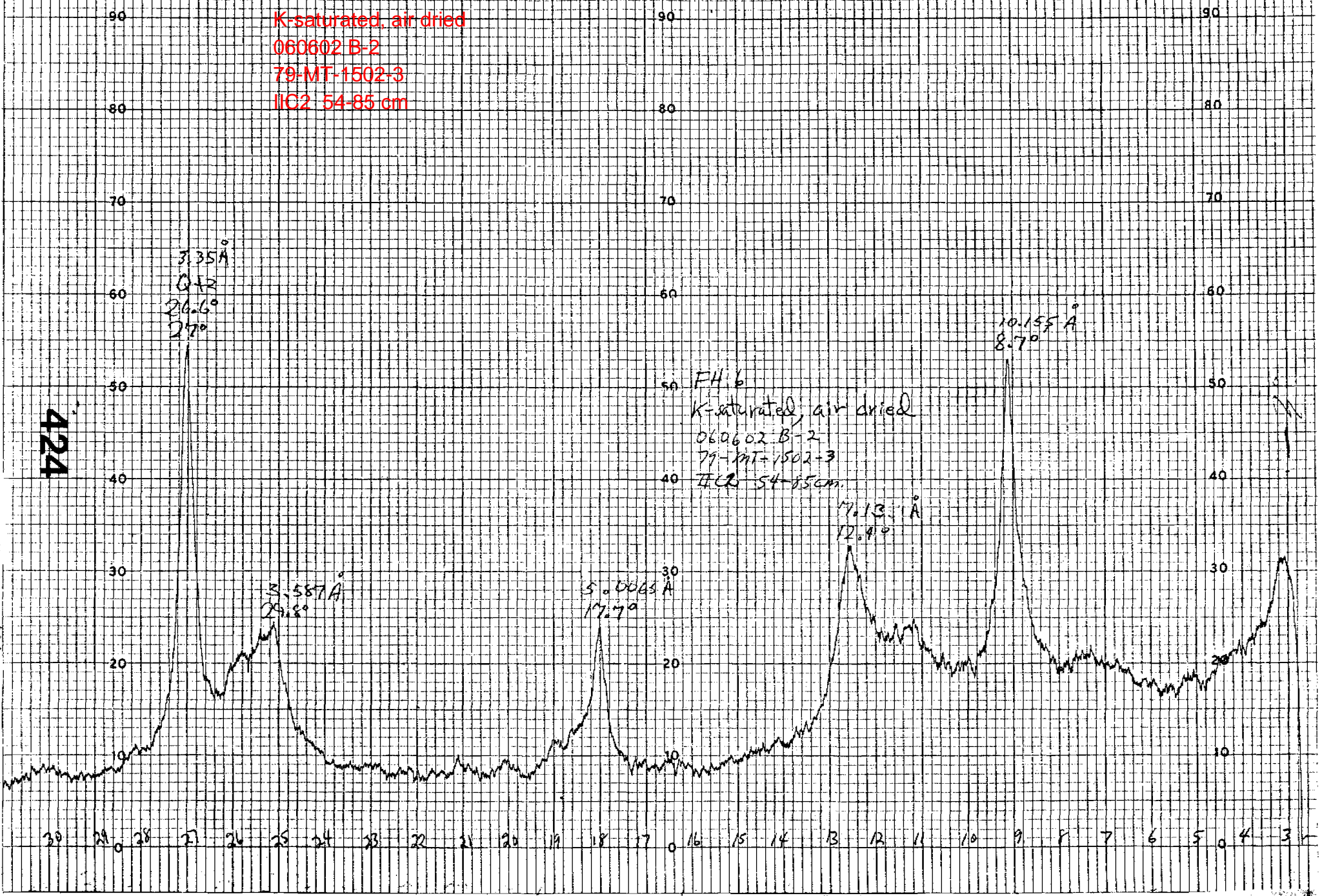
7.78 Å  
12.2°

423



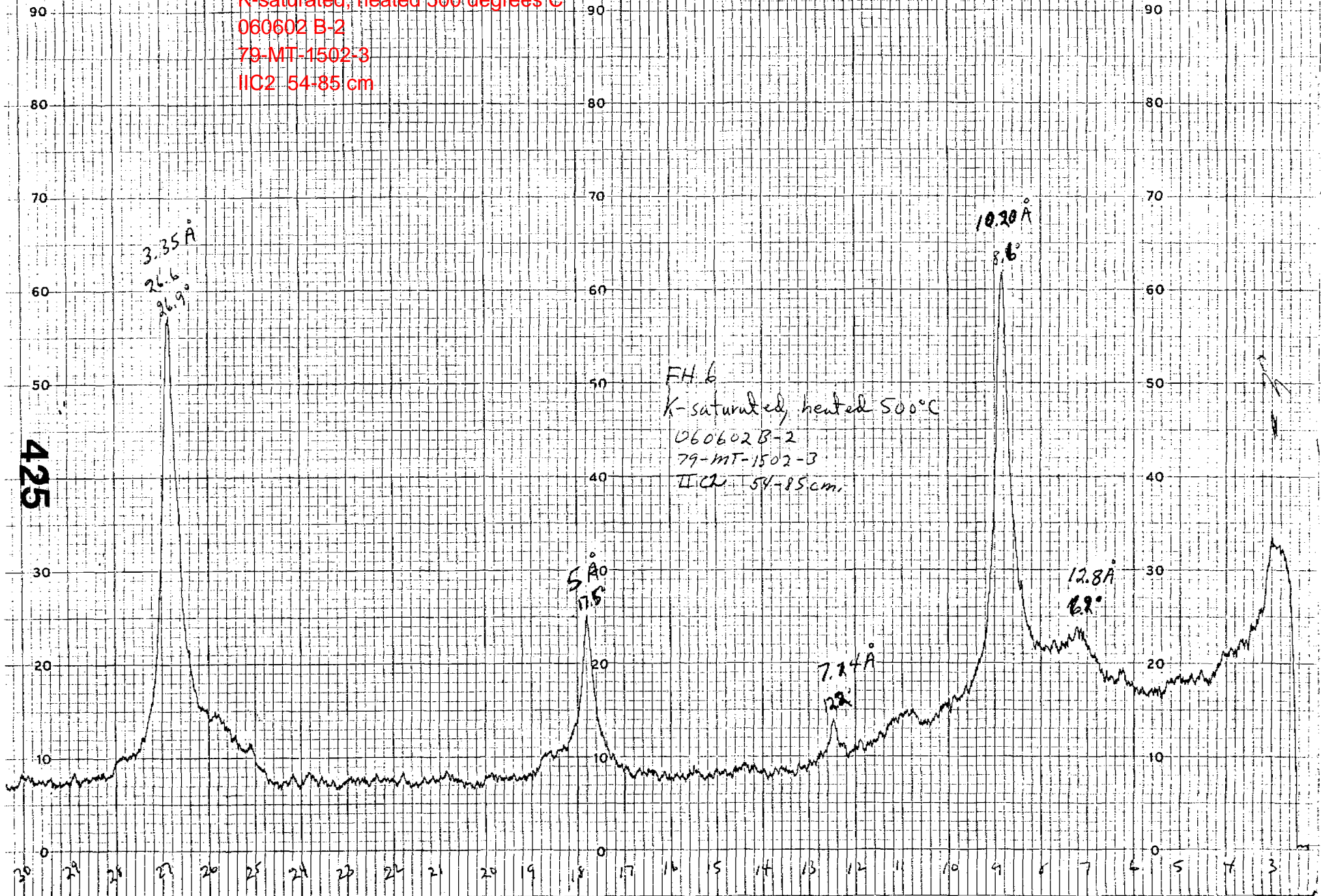
FH6  
K-saturated, air dried  
060602 B-2  
79-MT-1502-3  
ILC2 54-85 cm

424





FH6  
K-saturated, heated 500 degrees C  
060602 B-2  
79-MT-1502-3  
LIC2 54-85 cm



Unnamed Very Gravelly Sandy Loam 79-MT-1503 (081101B-2)

Classification: medial over leamy-skeletal Andic Cryochrepts.

General Site Characteristics

Location: Flathead County, Montana: section 11, T. 28N., R. 17W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 56-9

Habitat Type: (Abies lasiocarpa)/(Clintonia uniflora-Xerophyllum tenax)

Formation Name:

Parent Rock/Material: Grinnell argillite

Weathering:

Topography:

Slope: 45 percent

Aspect:

Elevation: 5400 feet MSL

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-0 centimeters (2-0 inches). Organic duff.

A1 0-20 centimeters (0-8 inches). Very dark grayish brown (10YR 3/2) moist; no lab sample; silt loam; weak fine granular structure; friable, nonsticky and nonplastic; medium acid pH 6.0, noncalcareous; 10 percent coarse fragments by volume; common fine and medium roots; clear smooth boundary.

B2ir 20-42 centimeters (8-17 inches). Brown (7.5YR 4/4) moist; very gravelly sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; strongly acid pH 5.1, noncalcareous; 57 percent gravels by weight; common fine and medium roots; clear smooth boundary.

IIC1 42-68 centimeters (17-27 inches). Brown (7.5YR 5/2) moist; very gravelly coarse sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; strongly acid pH 5.1, noncalcareous; 56 percent gravels by weight; common fine roots; microscope observations show this to be PH and not A2 material; clear wavy boundary.

79-MT-1583 (cont.)

IIC2 68-94+ centimeters (27-37 inches). Brown (7.5YR 5/2) moist; very gravelly coarse sandy loam; massive structure; friable, nonsticky and nonplastic; strongly acid pH 5.1, noncalcareous; 56 percent gravels by weight; few fine roots.

Pedon: Unnamed Very Gravelly Sandy Loam 79-NI-1503 (081101B-2)

Date: July 1980

Sample No.	Horizon	Depth	pH paste	ECx10 <sup>3</sup>	% Water at Saturation	Available P	Sesquioxides		
							Di-Citrate Fe	Extract Al	Pyrophosphate Extract Al
		cm		mhos/cm		ppm			%
1	0	5-0	NS	NS	NS	NS			
2	A1	0-20	NS	NS	NS	NS			
3	B2ir	20-42	5.1	0.16	66	1.3			
	IIC1	42-68	5.1	0.10	26	0.7			
	IIC2	68-94+	5.1	0.09	30	0.7			

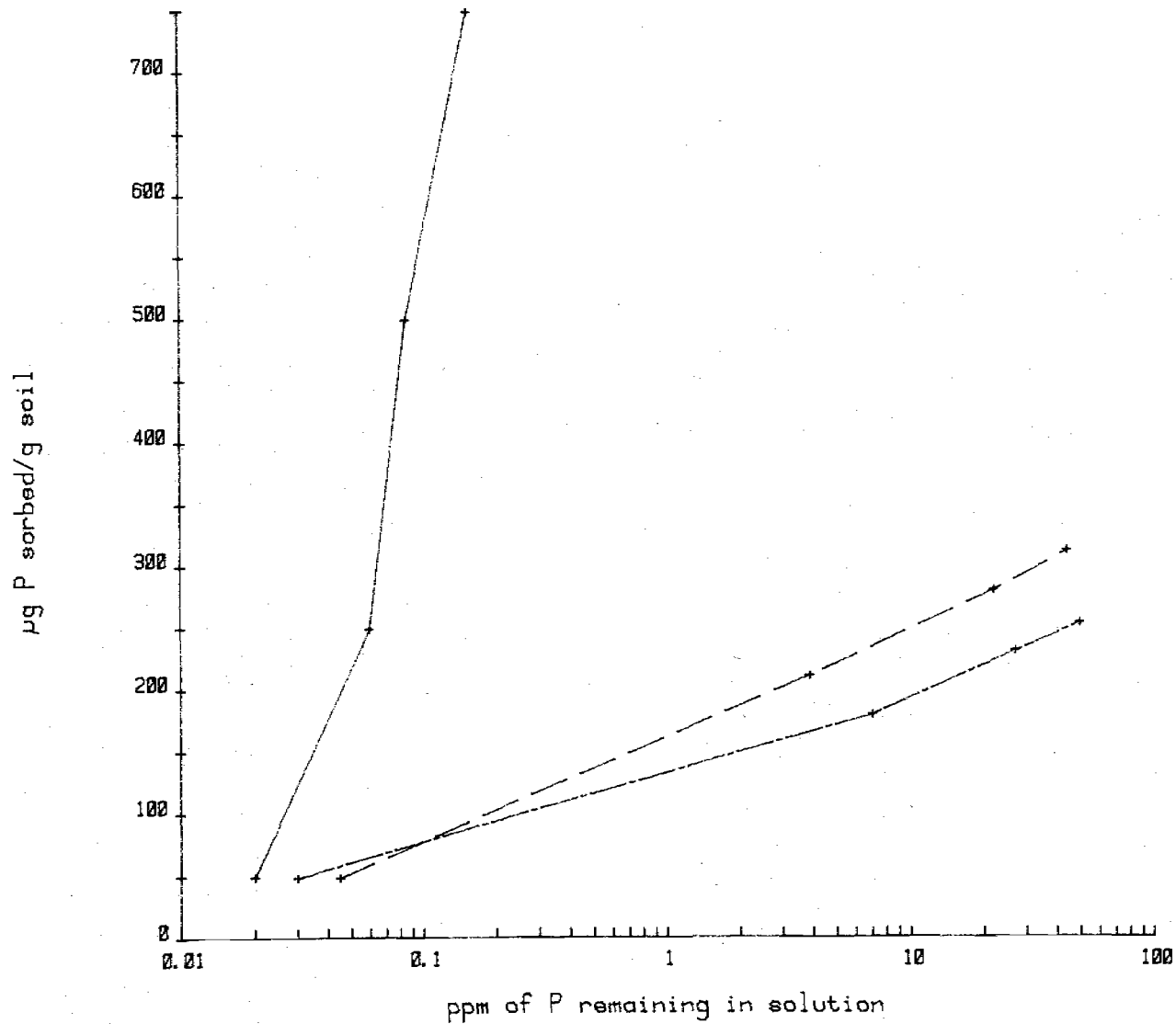
Sample No.	Exchangeable Ions			Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	K									
	meq/100 gms					%						
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.7	0.5	0.3	15.8	15.3	29	4.67	2.72	0.115	24	0.43	9.8
3	2.7	0.5	0.1	2.5	4.2	58	0.40	0.23	0.016	14	0.44	7.9
	7.7	0.5	0.1	1.8	3.3	82	0.29	0.17	0.009	19	0.44	7.8

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zeida Fadness

## Phosphorus Isotherm

79-MT-1503



μg/g soil	Soln ppm
----- B2ir	
50	0.02
249	0.06
499	0.09
749	0.16
----- IIC1	
50	0.05
211	3.86
281	21.92
312	43.76
----- IIC2	
50	0.03
180	7.00
232	26.84
254	49.60



Pedon: Unnamed Very Gravelly Sandy Loam 79-MT-1503 (081101B-2)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-20	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
20-42	9.76	13.16	8.65	11.20	9.95	52.72	44.92	2.37	57	V.gr. sandy loam
42-68	18.12	19.74	12.77	10.78	5.93	67.33	25.13	7.54	56	V.gr. coarse sandy loam
68-94+	18.00	20.33	11.02	8.99	4.32	62.66	29.73	7.61	56	V.gr. coarse sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
5-0						NS	NS	NS	NS	NS
0-20						NS	NS	NS	NS	NS
20-42						25.6	10.4	NDNP	NDNP	NDNP
42-68						11.8	3.9	NDNP	NDNP	NDNP
68-94+						13.0	4.4	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

430

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest -LIM

Analysis by: Anita and Debbie

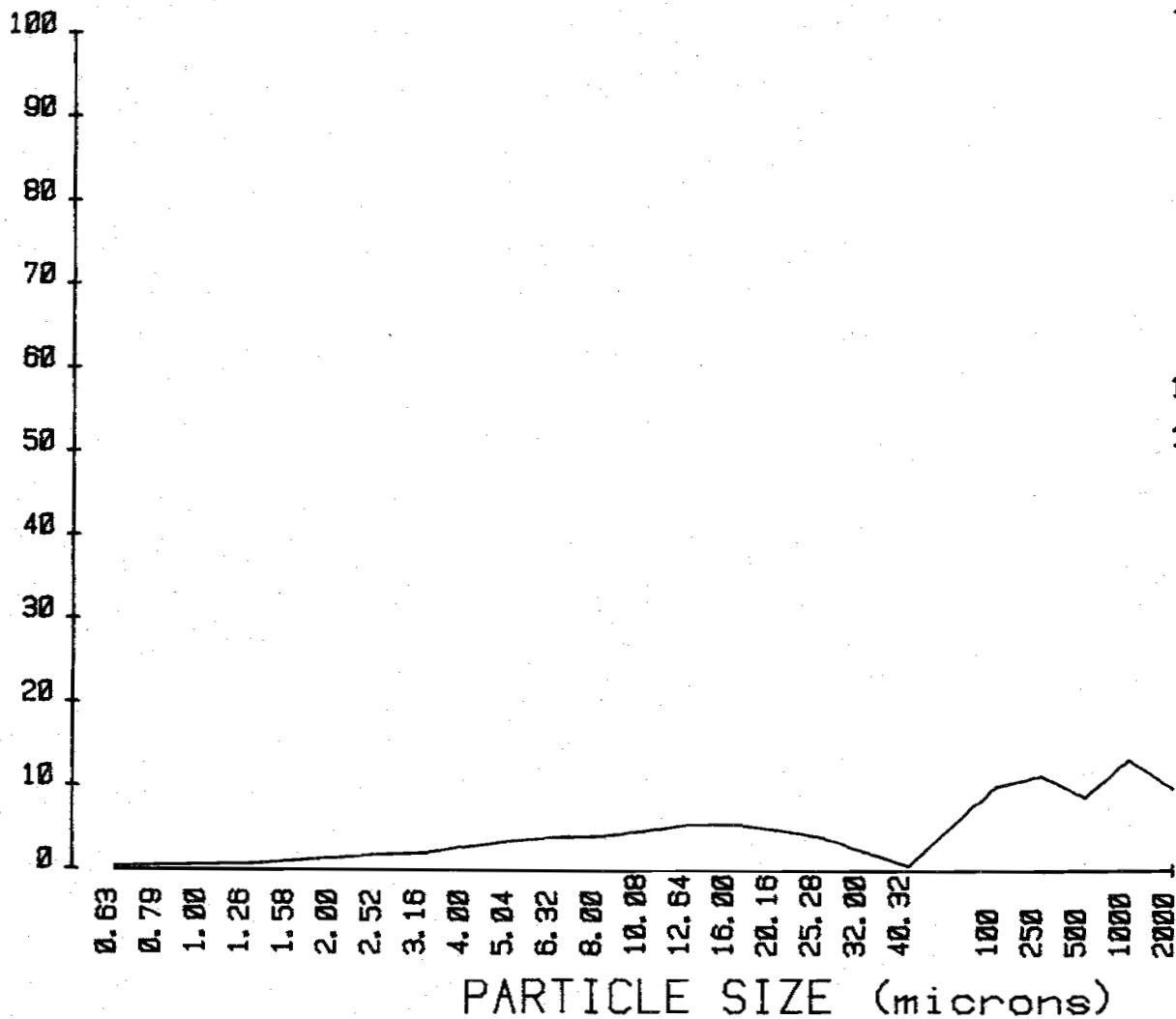
Date: January 1981

Identification		M1503-2	M1503-3	M1503-4	
Units		-----			%
TC (0.63-2.00)		2.37	7.54	7.61	
TSi (2.00-50)		44.92	25.13	29.73	
TS (50-2000)		52.72	67.33	62.66	
Clay	0.63-0.794	0.23	1.13	0.99	
	0.794-1.00	0.30	1.20	1.16	
	1.00-1.26	0.44	1.52	1.52	
	1.26-1.59	0.52	1.52	1.60	
	1.59-2.00	0.88	2.18	2.34	
Fine Silt	2.00-2.52	1.31	2.70	2.88	
	2.52-3.17	1.71	2.76	3.04	
	3.17-4.00	1.87	2.19	2.50	
	4.00-5.04	2.67	1.66	2.03	
Medium Silt	5.04-6.35	3.34	2.88	3.15	
	6.35-8.00	3.80	2.75	3.14	
	8.00-10.08	3.95	2.34	2.62	
	10.08-12.70	4.59	2.29	2.79	
	12.70-16.0	5.29	1.95	2.57	
	16.0-20.2	5.35	1.39	2.00	
Coarse Silt	20.2-25.4	4.68	0.88	1.64	
	25.4-32.0	3.82	0.60	0.86	
	32.0-40.3	2.10	0.21	0.32	
	40.3-50.8	0.39	0.13	0.16	
	50.8-64.0	0.08	0.40	0.04	
VFS (50-100)		9.95	5.93	4.32	
FS (100-250)		11.20	10.78	8.99	
MS (250-500)		8.65	12.77	11.02	
CoS (500-1000)		13.16	19.74	20.33	
VCoS (1000-2000)		9.76	18.12	18.00	
Greater than 2000		57	56	56	
Textural Class		V. gr. SL	V. gr. CoSL	V. gr. CoSL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M1503-2

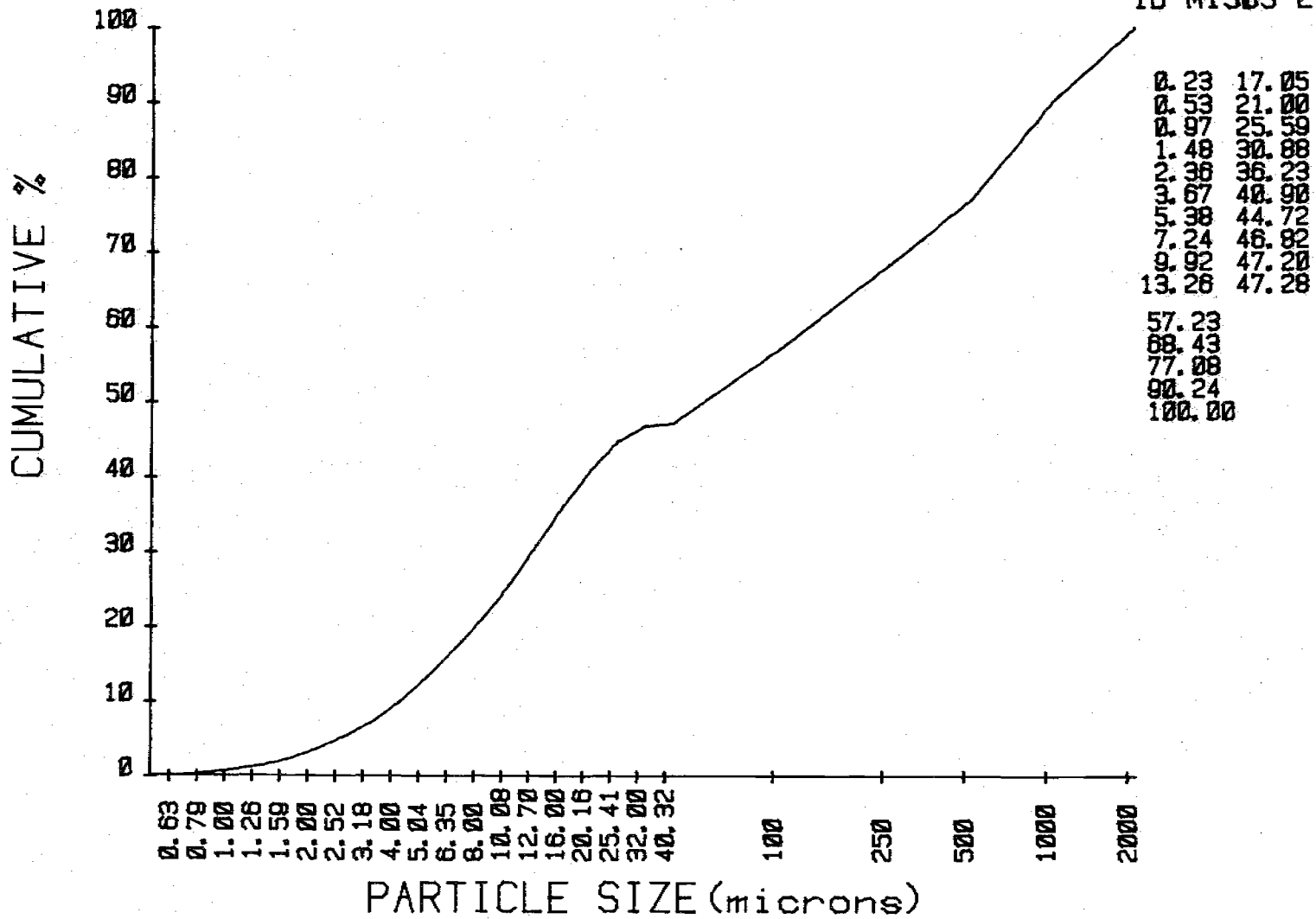


0.29	3.79
0.30	3.95
0.44	4.59
0.52	5.29
0.68	5.35
1.31	4.67
1.70	3.82
1.87	2.10
2.67	0.38
3.34	0.08
9.95	
11.20	
8.65	
13.16	
9.76	

432

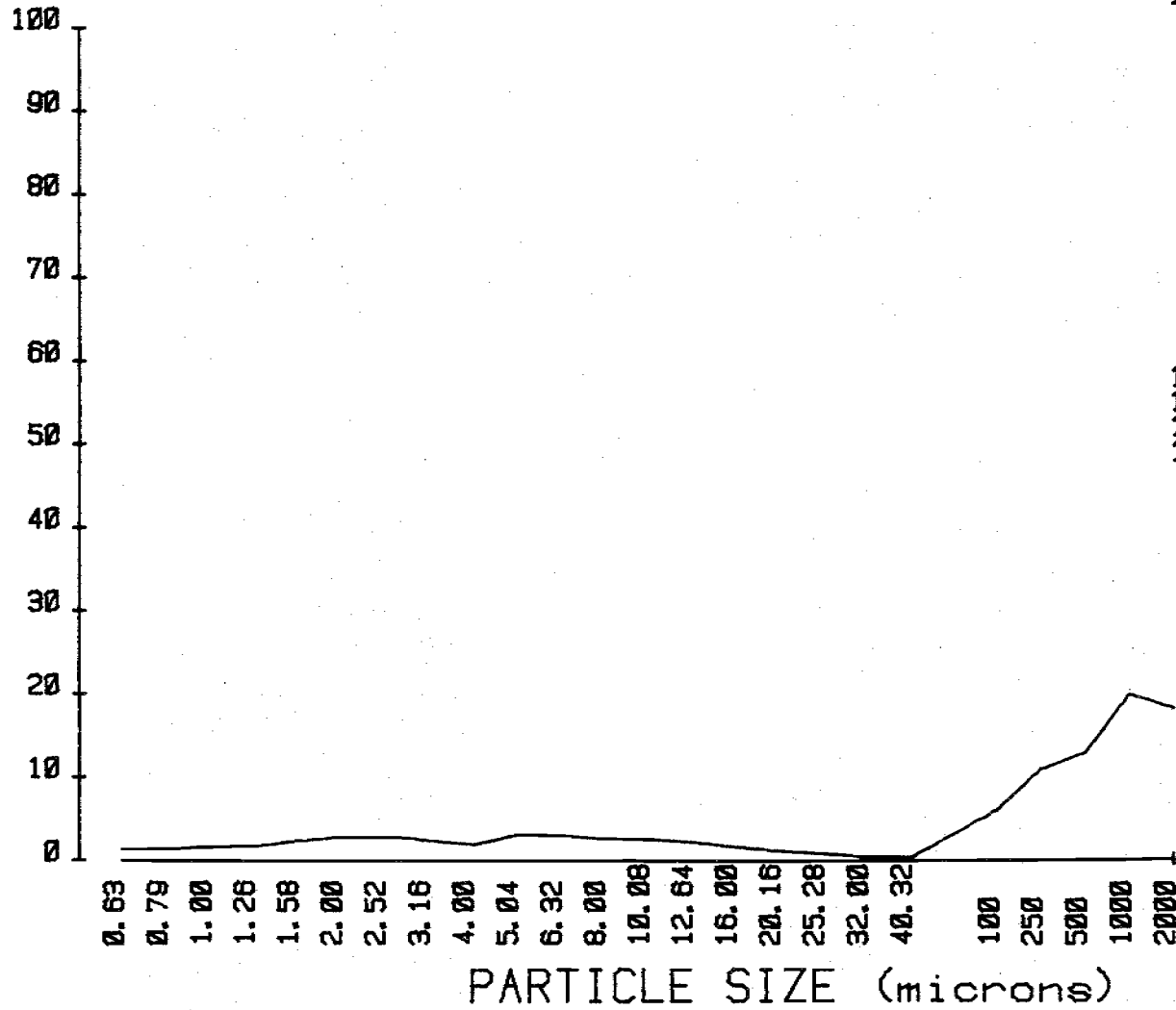
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1503-2



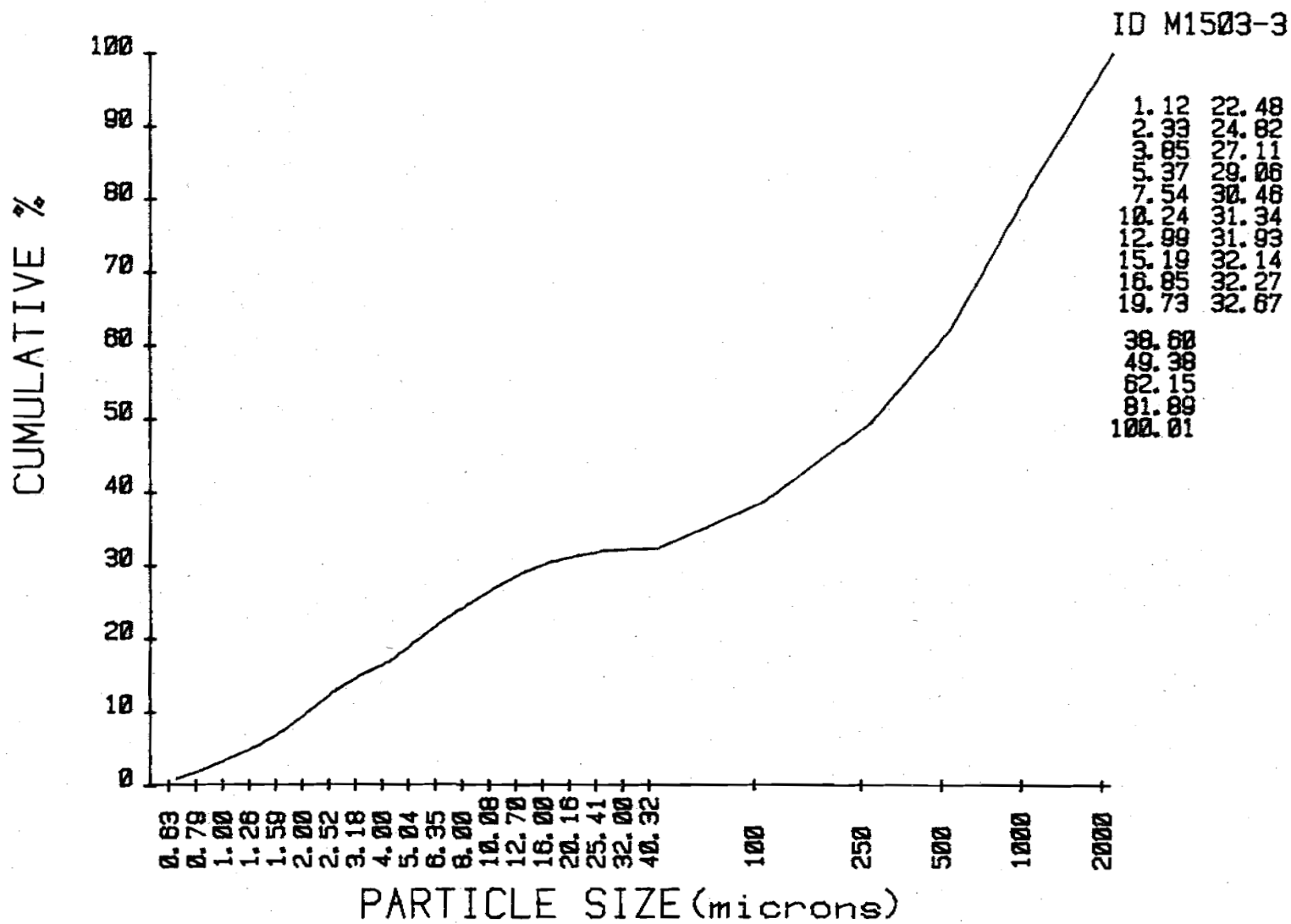
PLOT SAND-SILT-CLAY

ID M1503-3



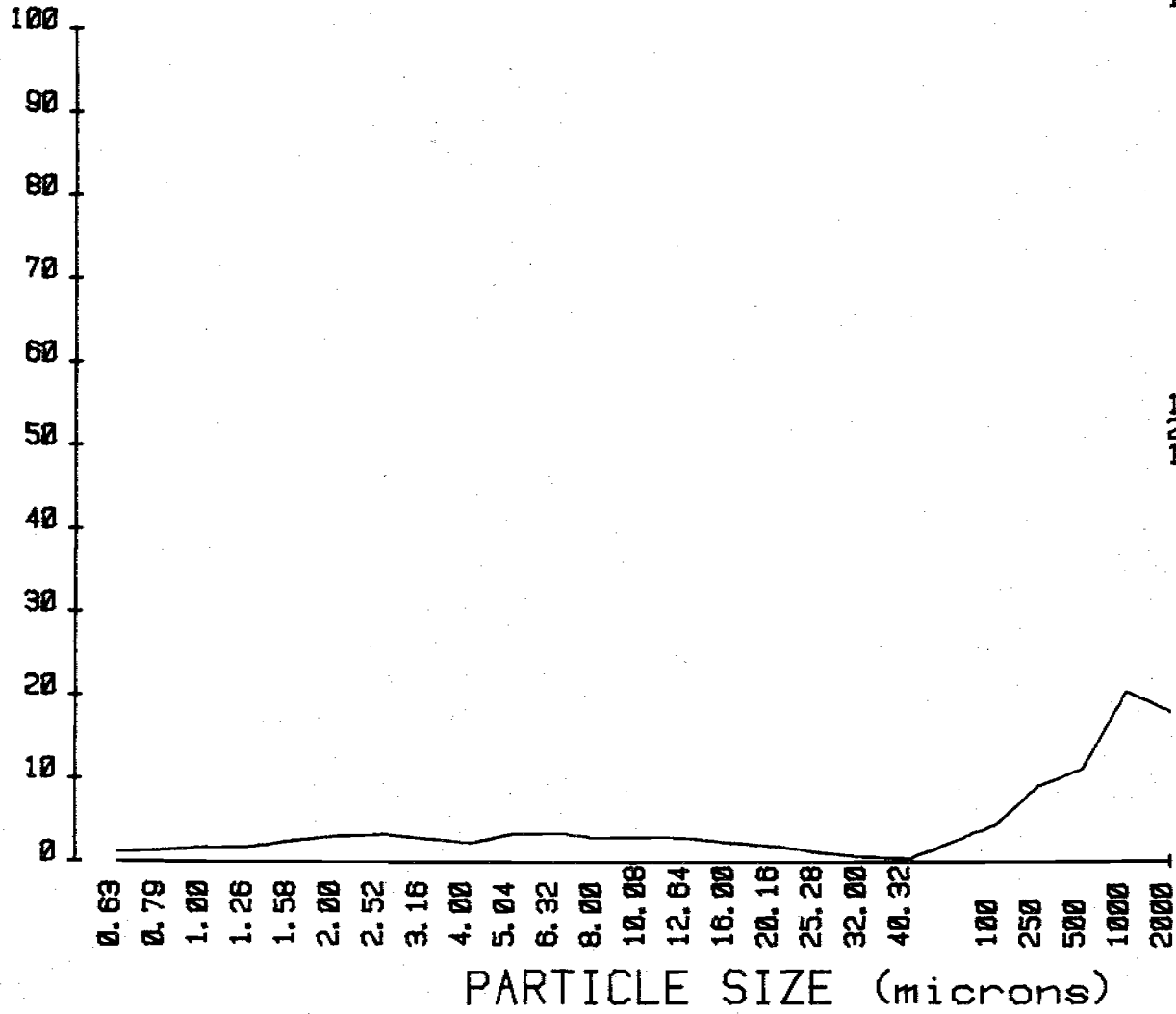
1.12	2.75
1.20	2.34
1.52	2.29
1.52	1.95
2.18	1.39
2.69	0.88
2.76	0.60
2.19	0.21
1.66	0.13
2.88	0.40
5.93	
10.78	
12.77	
19.74	
18.12	

## CUMULATIVE CURVE SAND-SILT-CLAY



PLOT SAND-SILT-CLAY

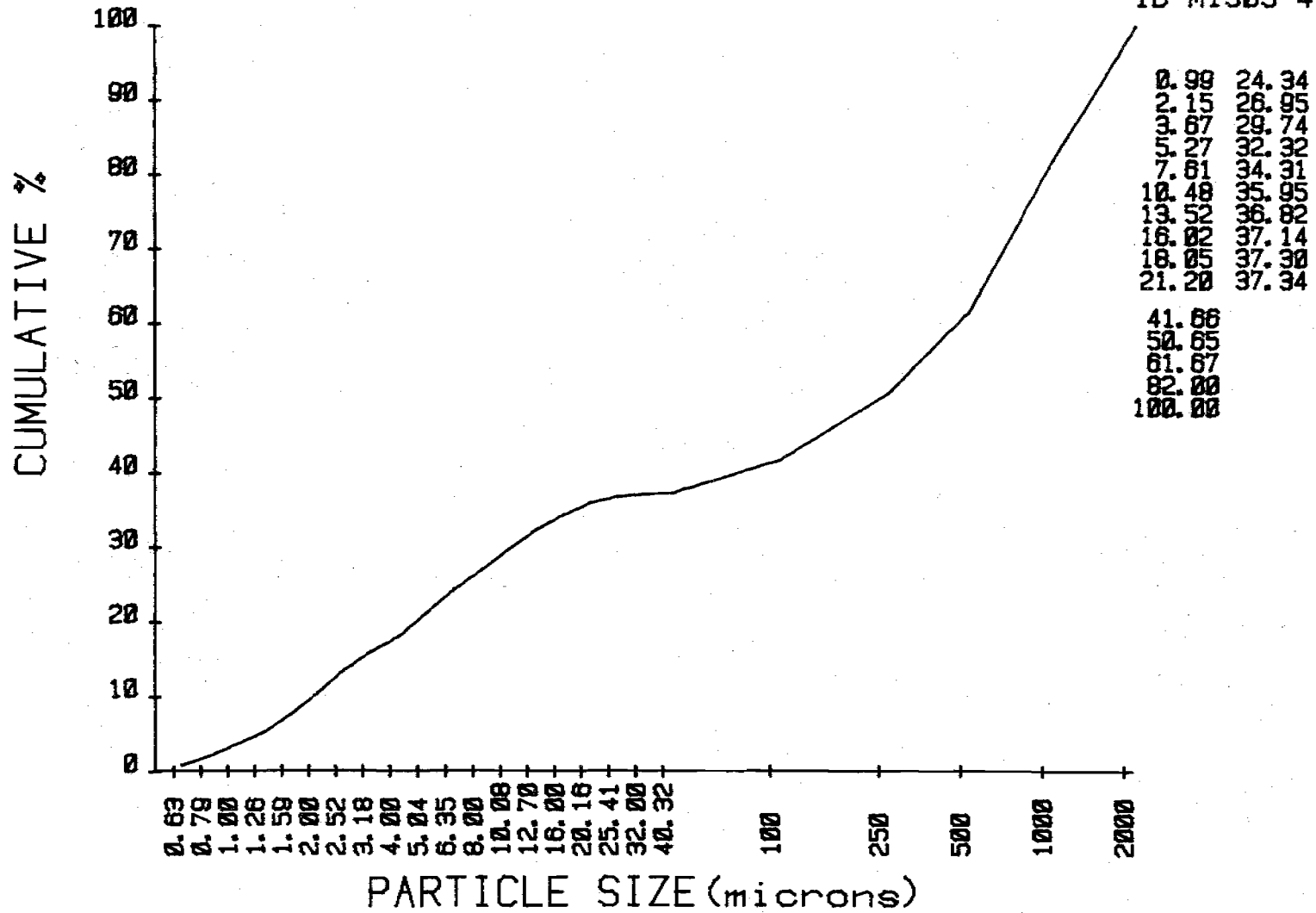
ID M1503-4



0.99	3.14
1.16	2.62
1.52	2.79
1.60	2.57
2.34	2.00
2.68	1.64
3.04	0.86
2.58	0.32
2.03	0.15
3.15	0.04
4.32	
0.00	
11.02	
20.33	
18.00	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1503-4





Unnamed Gravelly Silt Loam 79-MT-1504 (100501B-2)

Classification: loamy-skeletal, mixed Dystric Cryochrept.

General Site Characteristics

Location: Flathead County, Montana: section 10, T. 30N., R. 23W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 57A-7

Habitat Type: (*Pseudotsuga menziesii*)/(*Symphoricarpos alba-Castille rustica*)

Formation Name:

Parent Rock/Material: Siyeh limestone

Weathering:

Topography:

Slope: 12 percent

Aspect:

Elevation: 4080 feet MSL

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-0 centimeters (2-0 inches). Organic duff.

A1 0-15 centimeters (0-6 inches). Dark brown (10YR 4/3) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; slightly acid pH 6.1, noncalcareous; 30 percent gravels by weight; common fine, few medium and coarse roots; clear smooth boundary.

B2ir 15-32 centimeters (6-13 inches). Brown (7.5YR 4/4) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; slightly acid pH 6.2, noncalcareous; 37 percent gravels by weight; common fine, few medium and coarse roots; clear smooth boundary.

IIC1 32-56 centimeters (13-22 inches). Brown (10YR 5/3) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; slightly acid pH 6.1, noncalcareous; 51 percent gravels by weight; clear smooth boundary.

79-MT-1504 (cont.)

IIC2 56-73 centimeters (22-29 inches). Pale brown (10YR 6/3) moist; very gravelly loam; weak medium granular structure; friable, nonsticky and nonplastic; slightly acid pH 6.1, noncalcareous; 51 percent gravels by weight; clear smooth boundary.

IIC3 73-94+ centimeters (29-37+ inches). Yellowish brown (10YR 5/4) moist; very gravelly loam; massive structure; friable, nonsticky and nonplastic; no lab sample; pH 6.8; 70 percent coarse fragments by volume.

Pedon: Unnamed Gravelly Silt Loam 79-MT-1504 (100501B-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	0	5-0	NS	NS	NS	NS				
2	A1	0-15	6.1	0.30	62	5.3				
3	R2ir	15-32	6.2	0.21	60	2.7				
4	IIC1	32-56	6.1	0.18	34	1.2				
	IIC2	56-73	6.1	0.22	32	1.1				
	IIC3	73-94+	NS	NS	NS	NS				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil	NaF pH			
	Ca	Mg	Na	K	H							Fraction				
													meq/100 gms	%	%	
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			
2	14.7	2.2	0.1	0.5	9.4	23.6	65	3.98	2.31	0.087	27	0.70	8.1			
3	14.5	2.5	0.1	0.4	8.9	19.5	66	2.24	1.30	0.064	20	0.63	8.7			
4	7.5	1.7	0.1	0.2	3.1	12.6	75	0.82	0.48	0.031	15	0.49	7.8			
	10.0	2.5	0.1	0.2	2.9	13.7	82	0.82	0.48	0.025	19	0.49	7.8			
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			

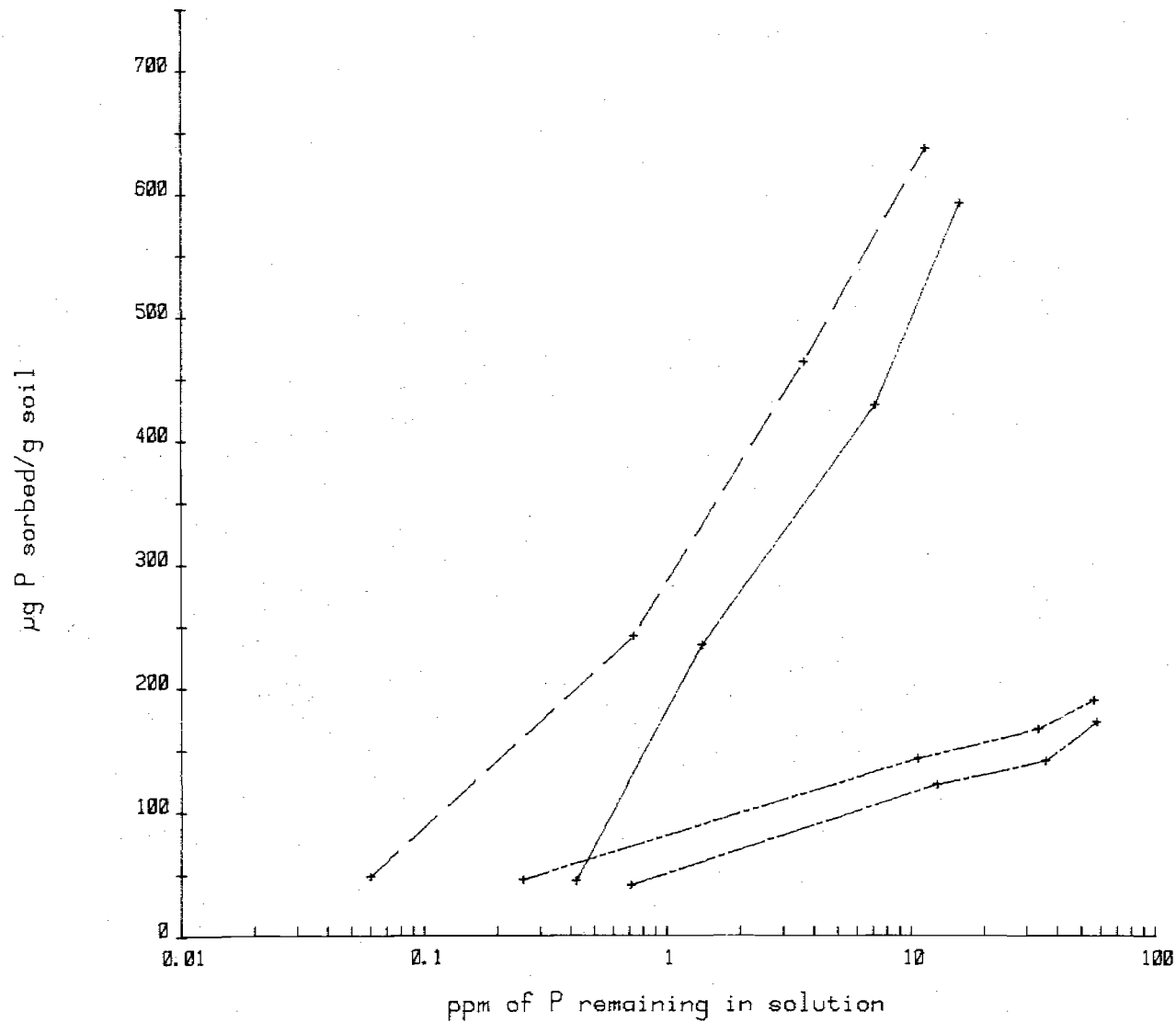
Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-1504

177



µg/g soil	Soln ppm
----- A1	
46	0.42
236	1.39
429	7.08
593	15.68
----- B2ir	
49	0.06
243	0.73
464	3.61
637	11.28
----- IIC1	
43	0.71
123	12.72
142	35.84
173	57.68
----- IIC2	
47	0.26
144	12.64
167	33.28
191	55.92

Pedon: Unnamed Gravelly Silt Loam 79-MT-1504 (100501K-2)

Date: December 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
CM	%								%		
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-15	5.97	4.53	2.66	5.79	10.55	29.49	59.24	11.27	30		Gr. silt loam
15-32	4.30	4.83	2.93	6.20	13.16	31.42	59.73	8.85	37		Gr. silt loam
32-56	8.83	7.79	4.83	9.72	10.10	41.27	44.08	14.65	51		V.gr. loam
56-73	8.06	8.00	5.13	10.53	9.50	41.23	44.75	14.02	51		V.gr. loam
73-94+	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
CM	%			g/cc		%		%		
5-0						NS	NS	NS	NS	NS
0-15						39.8	14.2	NDNP	NDNP	NDNP
15-32						40.2	11.8	NDNP	NDNP	NDNP
32-56						20.6	5.4	NDNP	NDNP	NDNP
56-73						20.5	6.3	NDNP	NDNP	NDNP
73-94+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

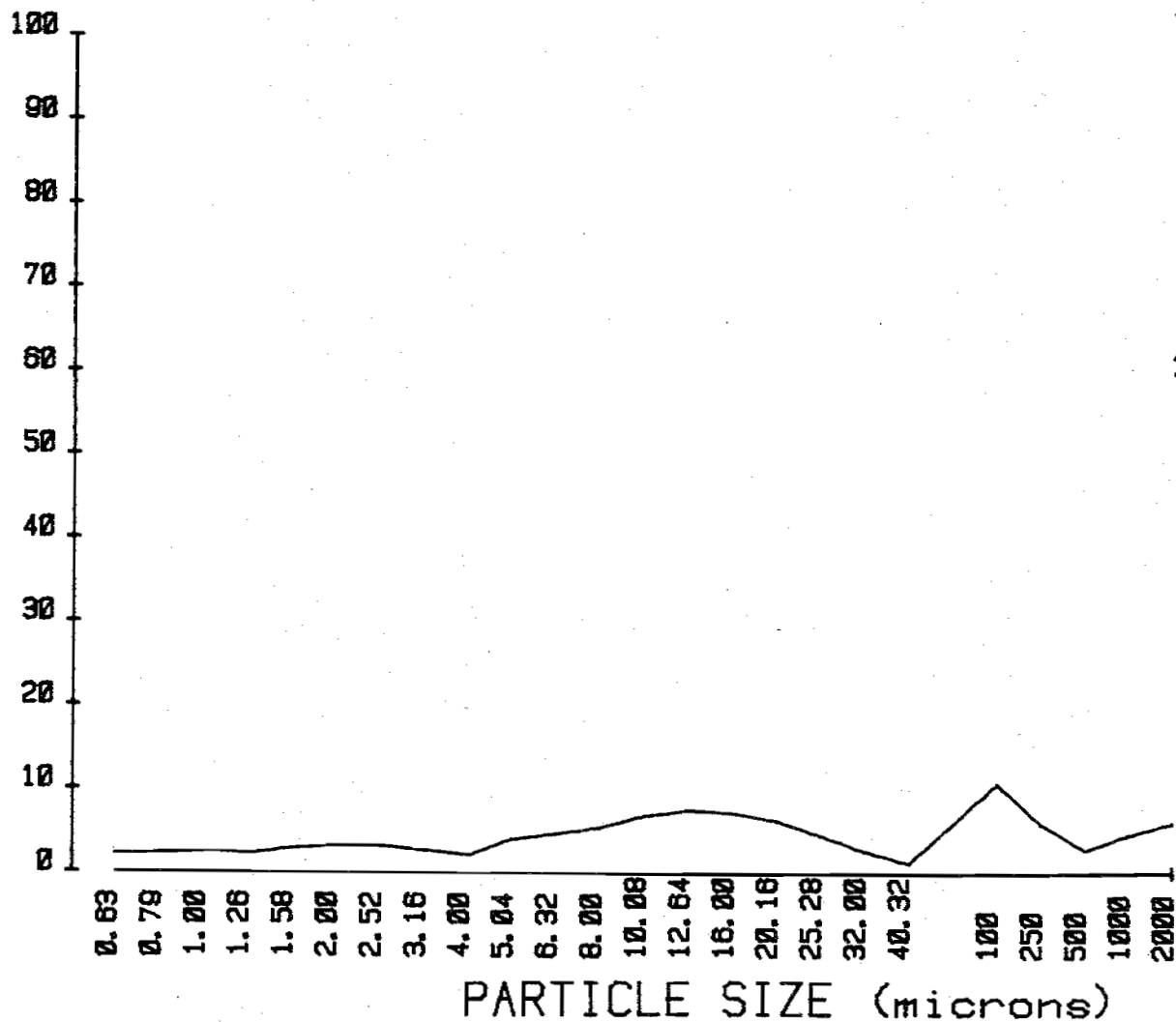
Date: January 1981

Identification		M1504-1	M1504-2	M1504-3	M1504-4
Units		-----%			
TC (0.63-2.00)		11.27	8.85	14.65	14.02
TSi (2.00-50)		59.24	59.73	44.08	44.75
TS (50-2000)		29.49	31.42	41.27	41.23
Clay	0.63-0.794	2.06	1.38	2.32	2.35
	0.794-1.00	2.15	1.54	2.45	2.49
	1.00-1.26	2.30	1.84	2.94	2.81
	1.26-1.59	2.05	1.73	2.91	2.66
	1.59-2.00	2.71	2.36	4.04	3.70
Fine Silt	2.00-2.52	3.05	2.83	4.66	4.40
	2.52-3.17	2.97	2.98	4.40	4.25
	3.17-4.00	2.41	2.51	2.85	2.95
	4.00-5.04	1.93	1.78	1.63	1.74
Medium Silt	5.04-6.35	3.86	4.15	3.85	3.95
	6.35-8.00	4.52	4.73	4.00	4.13
	8.00-10.08	5.27	5.35	3.99	3.99
	10.08-12.70	6.69	6.61	4.39	4.39
	12.70-16.0	7.33	6.99	4.12	4.17
	16.0-20.2	6.97	7.16	3.32	3.89
Coarse Silt	20.2-25.4	6.04	6.46	2.80	2.91
	25.4-32.0	4.32	3.97	1.97	2.04
	32.0-40.3	2.43	2.80	1.15	1.01
	40.3-50.8	1.01	0.92	0.87	0.89
	50.8-64.0	0.45	0.50	0.07	0.05
VFS (50-100)		10.55	13.16	10.10	9.50
FS (100-250)		5.79	6.20	9.72	10.53
MS (250-500)		2.66	2.93	4.83	5.13
CoS (500-1000)		4.53	4.83	7.79	8.00
VCoS (1000-2000)		5.97	4.30	8.83	8.06
Greater than 2000		30	37	51	51
Textural Class		Gr. SiL	Gr. SiL	V. gr. SiL	V. gr. L

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M1504-1



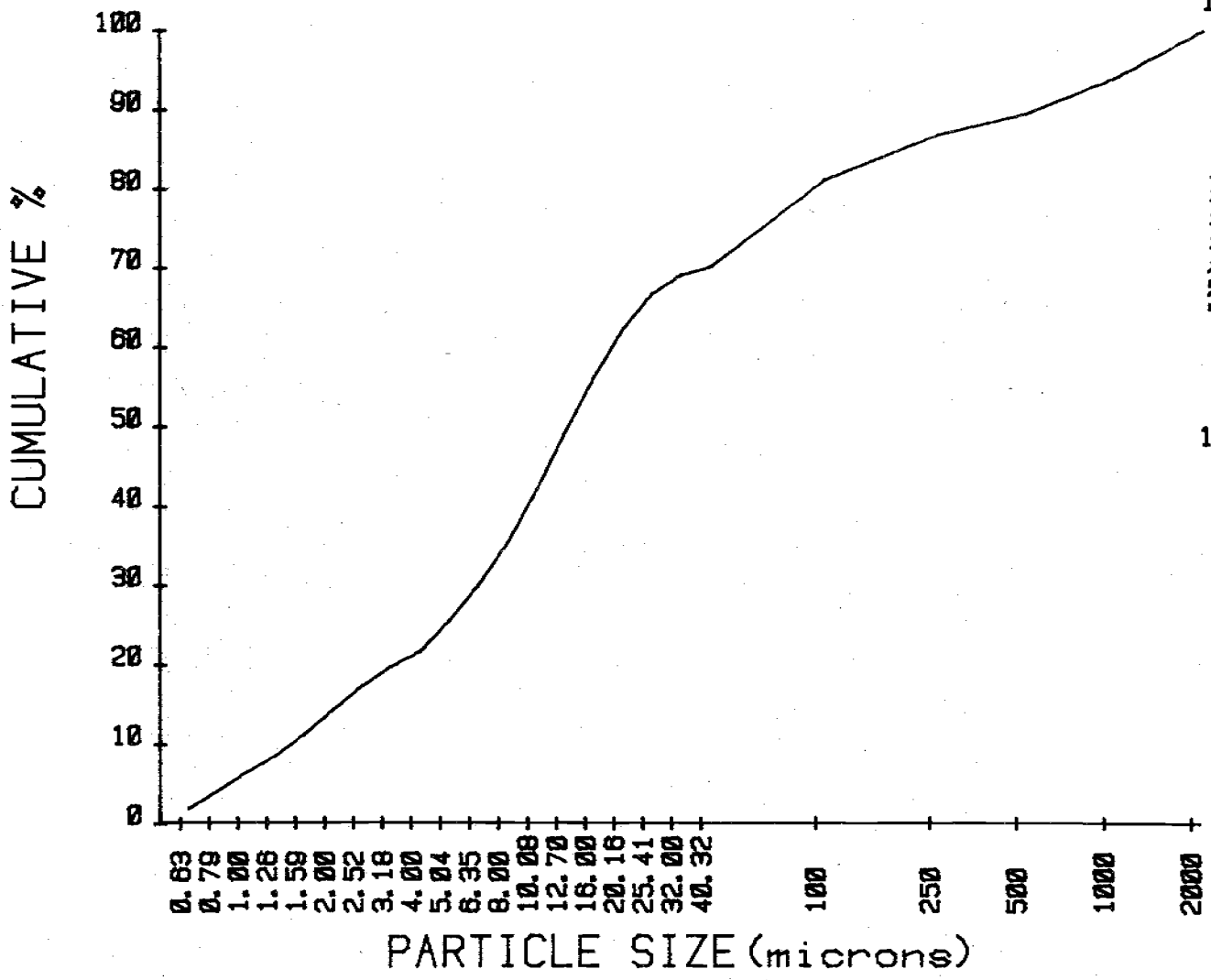
2.06	4.52
2.15	5.27
2.30	6.69
2.45	7.33
2.71	6.96
2.85	6.04
2.97	4.32
2.41	2.43
1.92	1.01
3.86	0.45
10.55	
5.79	
2.66	
4.53	
5.97	

777

x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1504-1



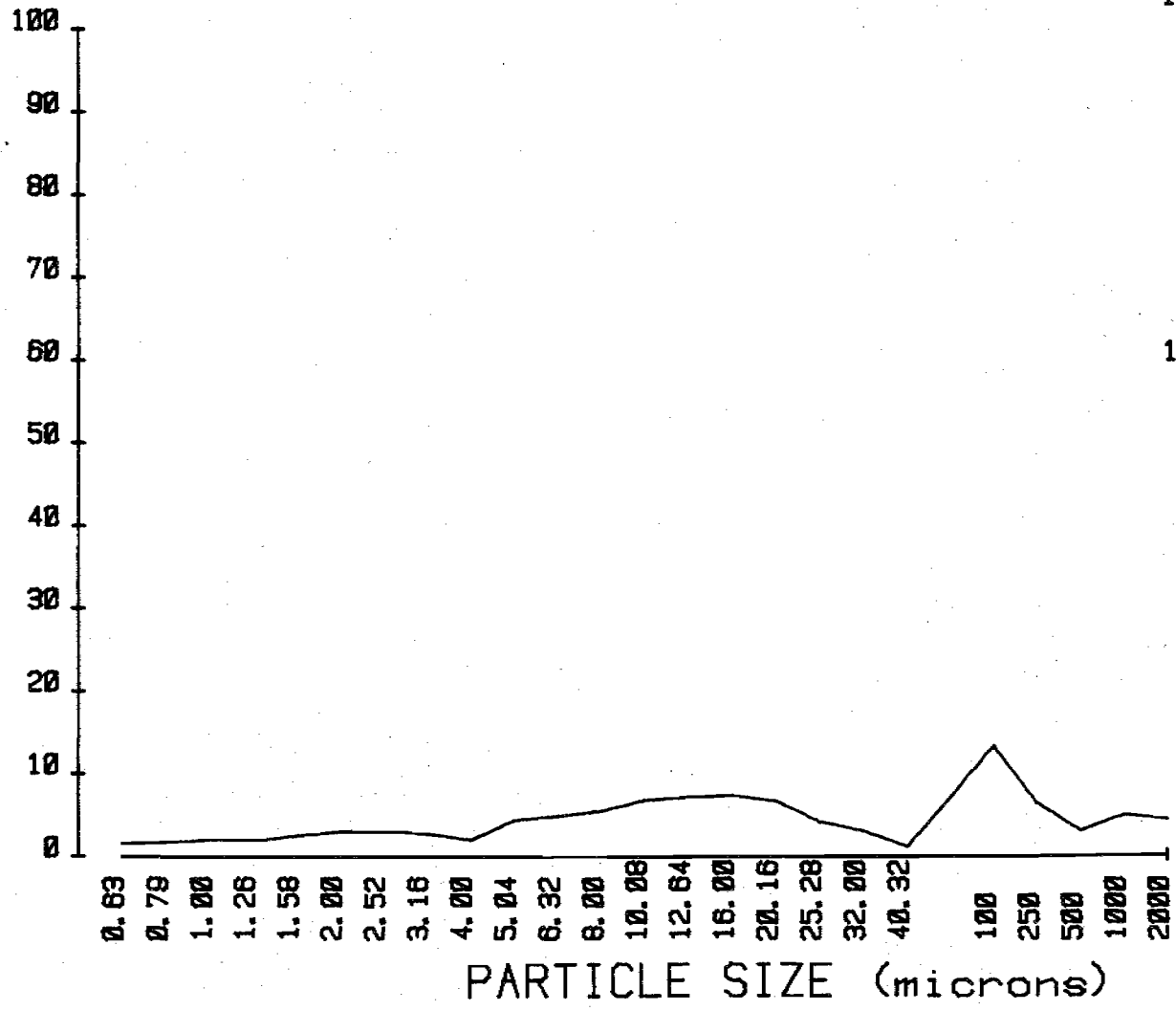
2.00	30.81
4.21	35.28
6.51	41.97
8.56	49.30
11.27	56.26
14.32	62.30
17.29	66.62
19.70	69.05
21.63	70.86
25.48	70.51
81.06	
86.85	
89.51	
94.04	
100.01	

445



PLOT SAND-SILT-CLAY

ID M1504-2

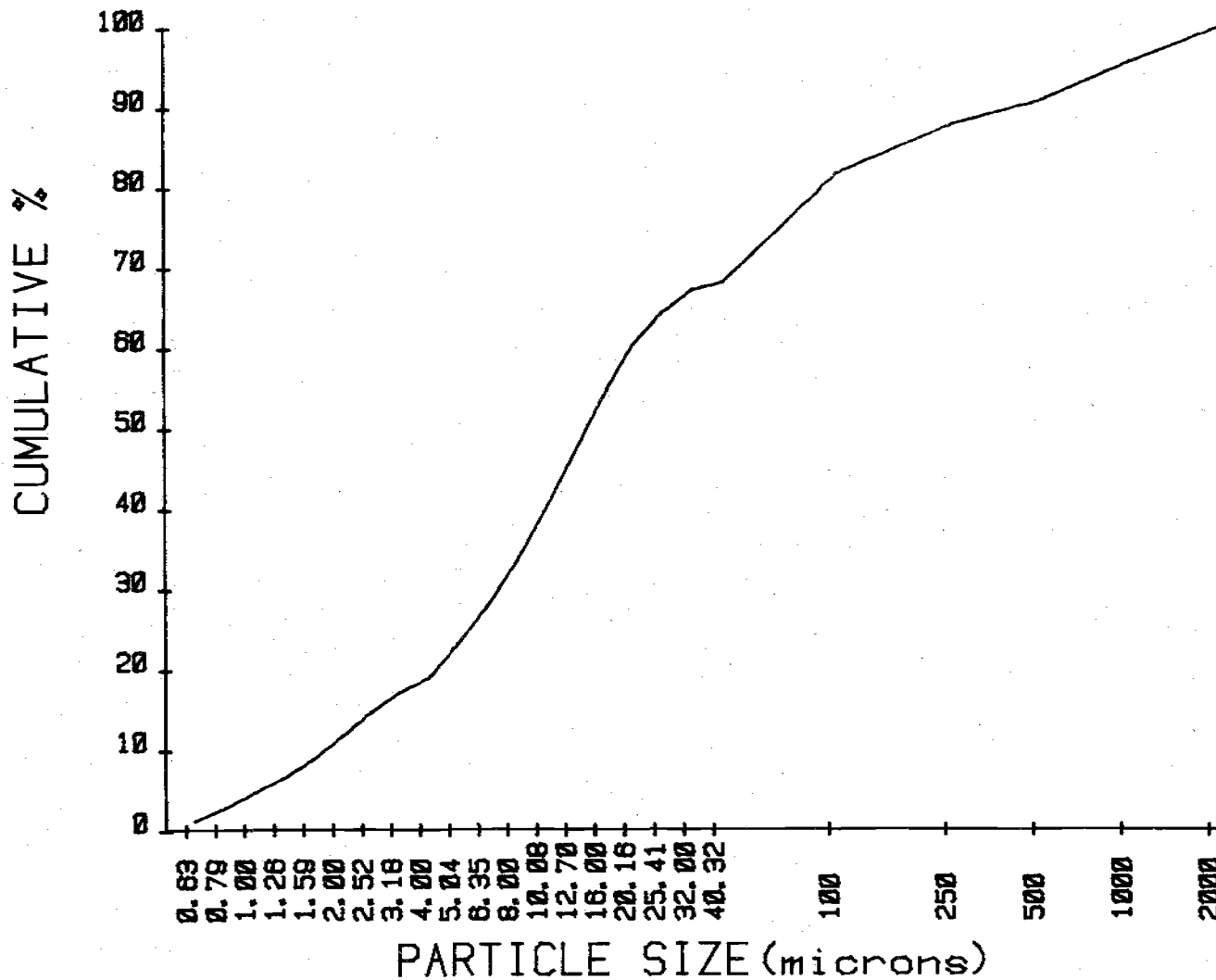


1.38	4.73
1.54	5.35
1.84	6.61
1.73	6.99
2.36	7.16
2.83	6.46
2.98	3.97
2.50	2.80
1.78	0.92
4.15	0.58
13.16	
6.20	
2.93	
4.83	
4.38	

977

CUMULATIVE CURVE SAND-SILT-CLAY

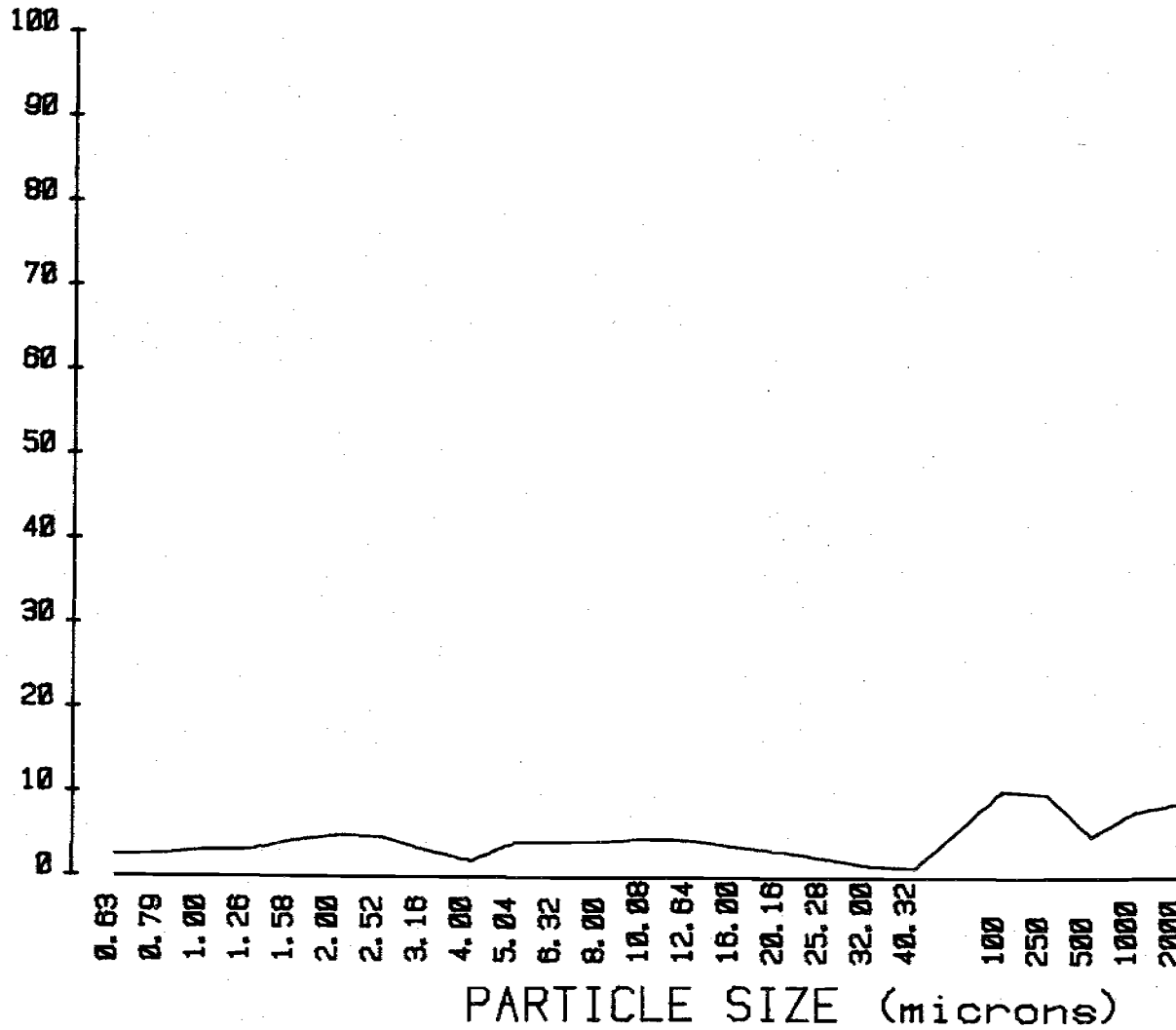
ID M1504-2



1.38	27.83
2.92	33.18
4.78	39.78
6.49	46.77
8.65	53.93
11.69	60.39
14.67	64.36
17.17	67.16
18.95	68.08
23.10	68.58
81.74	
87.94	
90.87	
95.70	
100.00	

PLOT SAND-SILT-CLAY

ID M1504-3

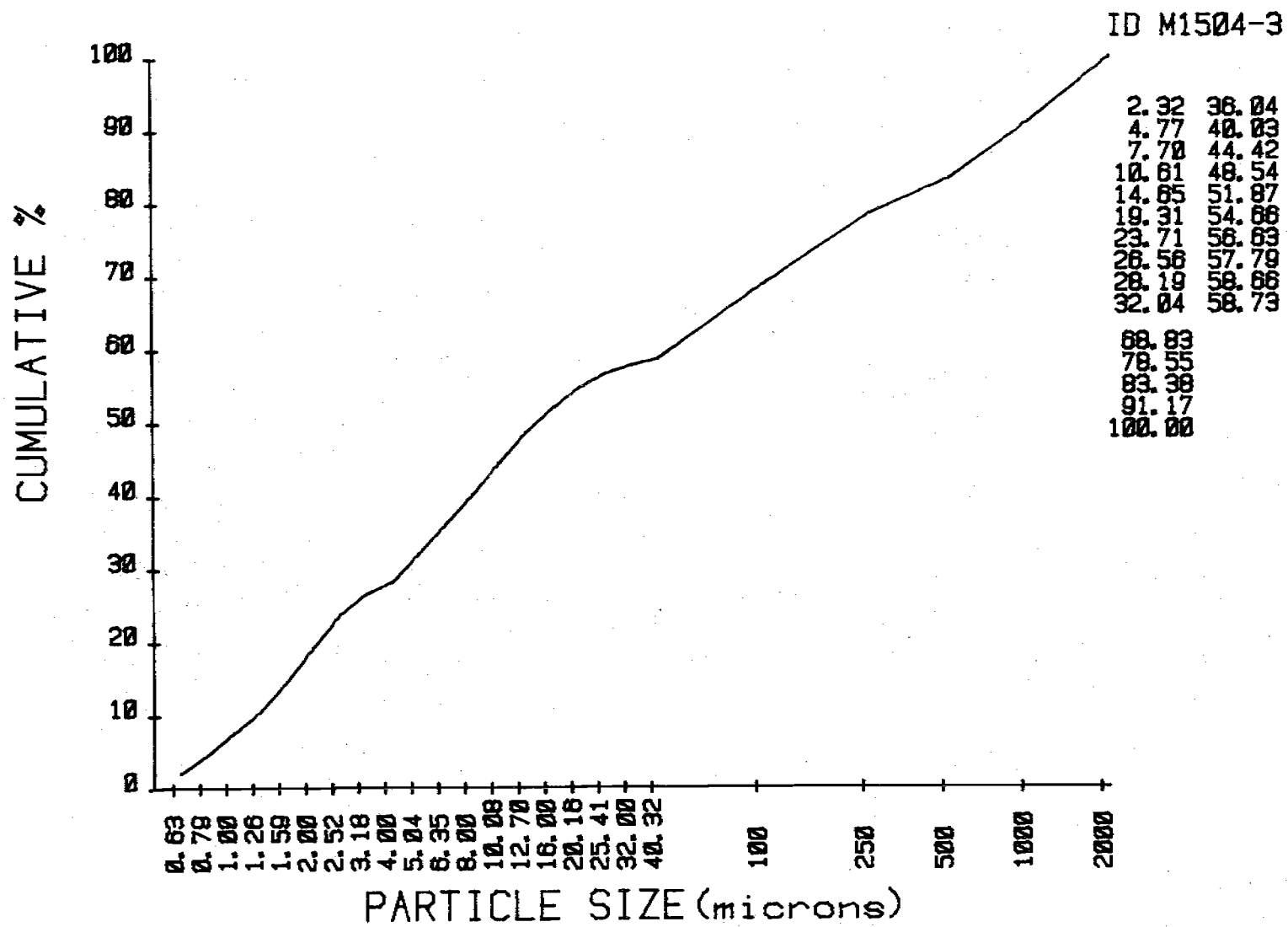


2.32	4.00
2.45	3.99
2.94	4.39
2.91	4.12
4.04	3.32
4.66	2.80
4.40	1.97
2.65	1.15
1.63	0.87
3.65	0.07
10.10	
9.72	
4.83	
7.79	
8.83	

877

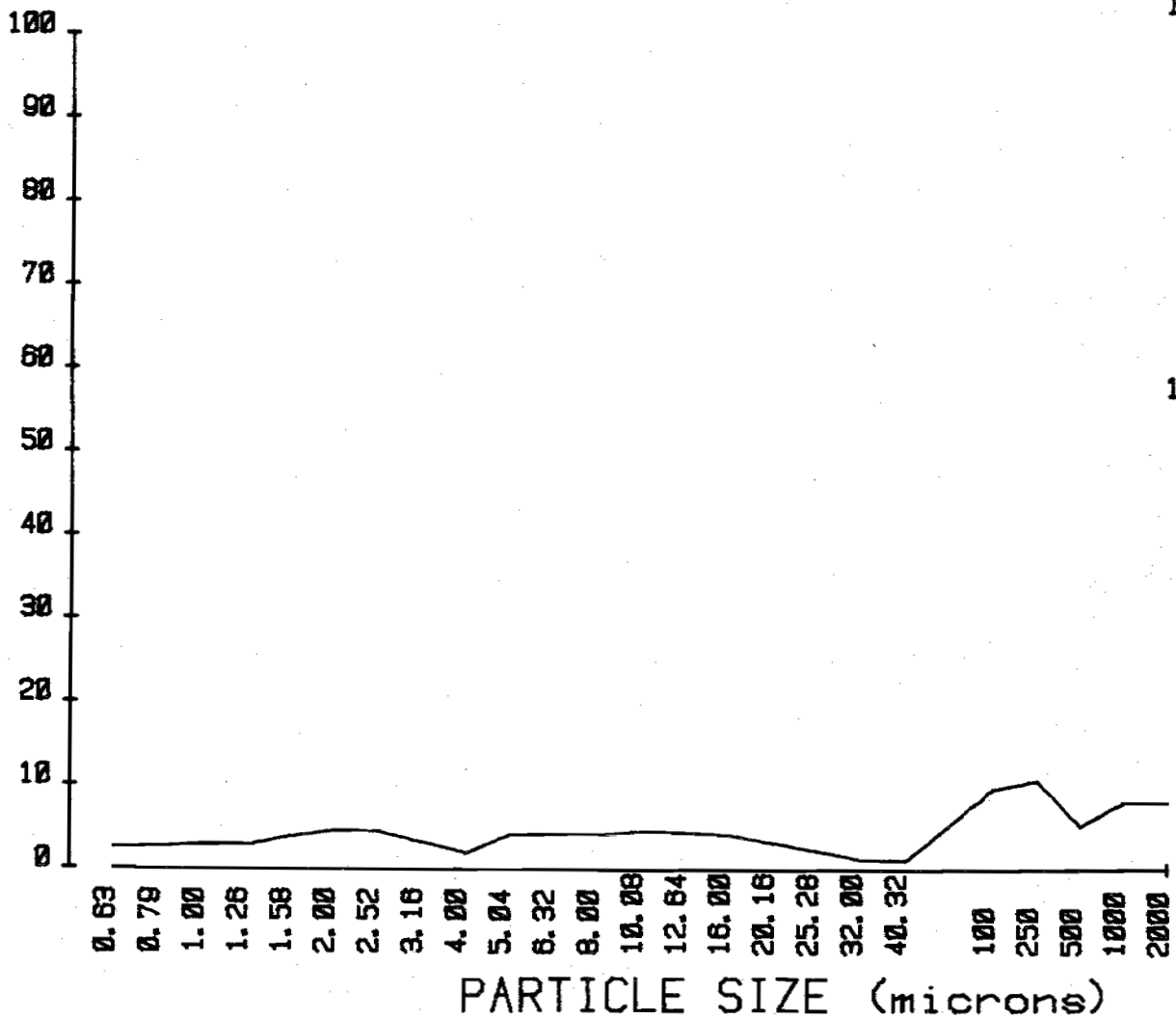
x

## CUMULATIVE CURVE SAND-SILT-CLAY



PLOT SAND-SILT-CLAY

ID M1504-4

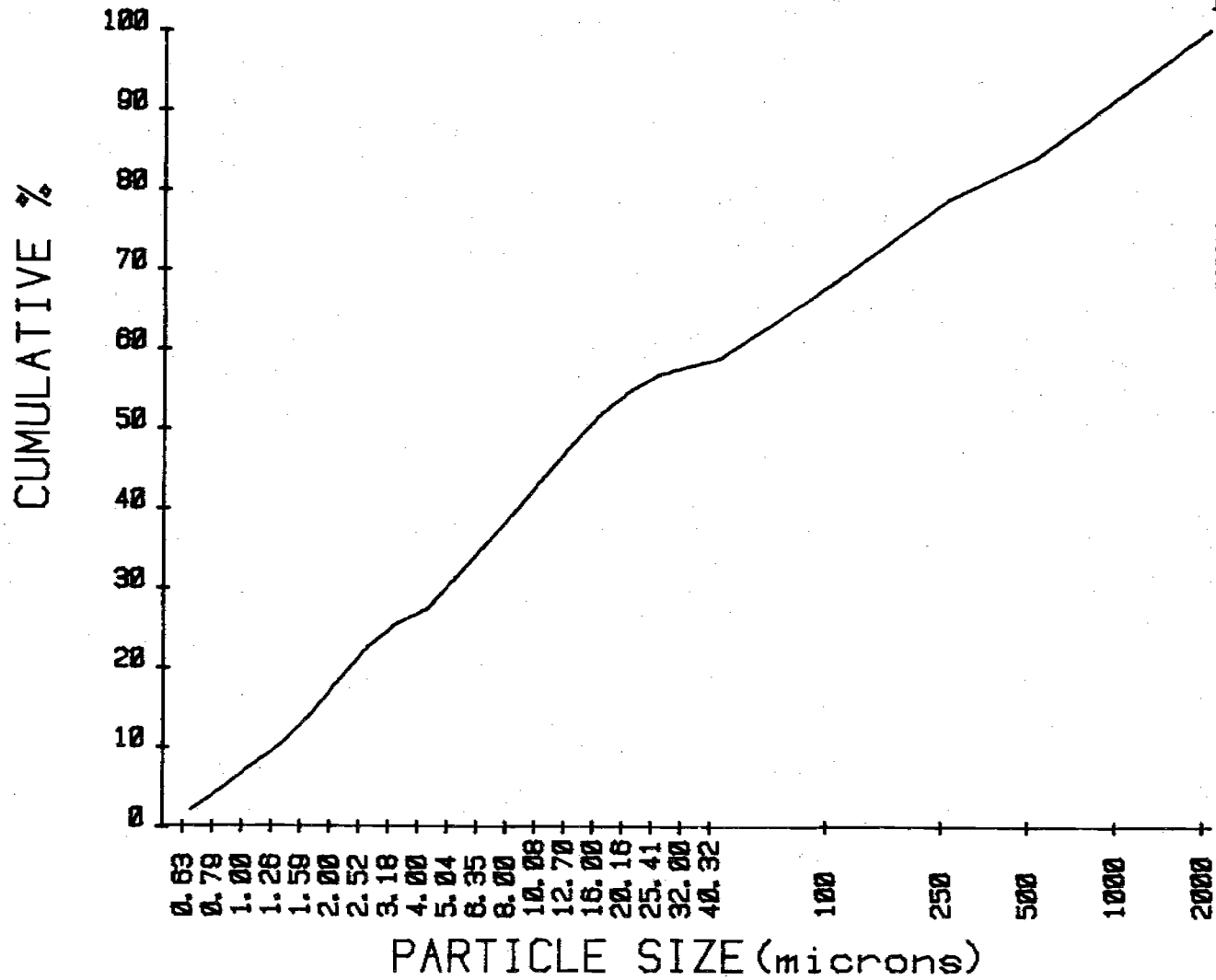


2.35	4.13
2.40	3.99
2.81	4.39
2.66	4.17
3.70	3.89
4.40	2.91
4.25	2.04
2.95	1.01
1.74	0.80
3.95	0.05
9.50	
10.53	
5.13	
8.00	
8.06	

450

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1504-4



2.35	35.43
4.84	38.42
7.65	43.81
10.32	47.98
14.82	51.87
18.42	54.77
22.66	56.81
25.82	57.82
27.35	58.72
31.31	58.77
68.27	
78.80	
83.93	
81.93	
89.99	

Unnamed Gravelly Silt Loam 79-MT-1505 (1108020-2)

Classification: medial over loamy, mixed, frigid Andic Dystrochrept.

General Site Characteristics

Location: Flathead County, Montana: section 25, T. 31N., R. 20W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 22A-7

Habitat Type: western red cedar (*Thuja plicata*)/Queencup beadlelily (*Clintonia uniflora*)

Formation Name:

Parent Rock/Material: Siyeh limestone

Weathering:

Topography:

Slope: 17 percent

Aspect:

Elevation: 4400 feet MSL

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 7-8 centimeters (3-8 inches). Organic duff, litter.

A2 0-5 centimeters (0-2 inches). Light brownish gray (10YR 6/2) moist; silt loam; weak fine granular structure; friable, nonsticky and nonplastic; no lab sample; pH 6.3; 3 percent coarse fragments by volume; common fine and medium roots; abrupt wavy boundary.

B2ir 5-22 centimeters (2-9 inches). Brown (7.5YR 4/4) moist; gravelly silt loam; weak fine granular structure; friable, nonsticky and nonplastic; medium acid pH 5.7, noncalcareous; 36 percent gravels by weight; common fine and medium roots; clear smooth boundary.

IIB3 22-35 centimeters (9-14 inches). Brown (10YR 4/3) moist; gravelly loam; weak fine granular structure; friable, nonsticky and nonplastic; medium acid pH 5.5, noncalcareous; 42 percent gravels by weight; common fine and few medium roots; clear wavy boundary.

79-MT-1505 (cont.)

IIC1 35-63 centimeters (14-25 inches). Yellowish brown (10YR 5/4) moist; gravelly loam; weak fine granular structure; friable, nonsticky and nonplastic; strongly acid pH 5.4, noncalcareous; 34 percent gravels by weight; few fine roots; clear wavy boundary.

IIC2 63-103+ centimeters (25-41 inches). Brown (10YR 4/3) moist; gravelly loam; weak medium granular structure; friable, slightly sticky and nonplastic; slightly acid pH 6.3, noncalcareous; 26 percent gravels by weight; few fine roots; few thin clay films on ped faces.



Pedon: Unnamed Gravelly Silt Loam 79-MT-1505 (1108020-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions								
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	
							meq/1000 gms								
1	0	7-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	A2	0-5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	B2ir	5-22	5.7	5.7	0.20	57	1.1	0.4	0.2	0.1	0.0	0.7	0.3	0.5	0.5
3	IIR3	22-35	5.6	5.5	0.17	34	0.3	0.1	0.2	0.0	0.0	0.4	0.1	0.5	0.5
3	IIC1	35-63	5.5	5.4	0.09	31	0.3	0.1	0.1	0.0	0.0	0.3	0.1	0.5	0.5
4	IIC2	63-103+	6.3	6.3	0.16	37	0.3	0.1	0.1	0.0	0.0	0.4	0.1	0.5	0.5

454

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms					%	%			ratio	%	%	ppm		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	2.9	5.3	0.1	0.3	14.1	1	2.67	1.55	0.079	20	nil	nil	0.64	1.6
3	1.9	0.3	0.1	0.1	7.7	1	0.88	0.51	0.034	15	nil	nil	0.64	1.3
3	2.0	0.7	0.1	0.1	4.8	2	0.28	0.16	0.017	9	nil	nil	0.66	0.7
4	5.0	1.1	0.1	0.1	6.9	1	0.42	0.24	0.021	11	nil	nil	0.74	0.3

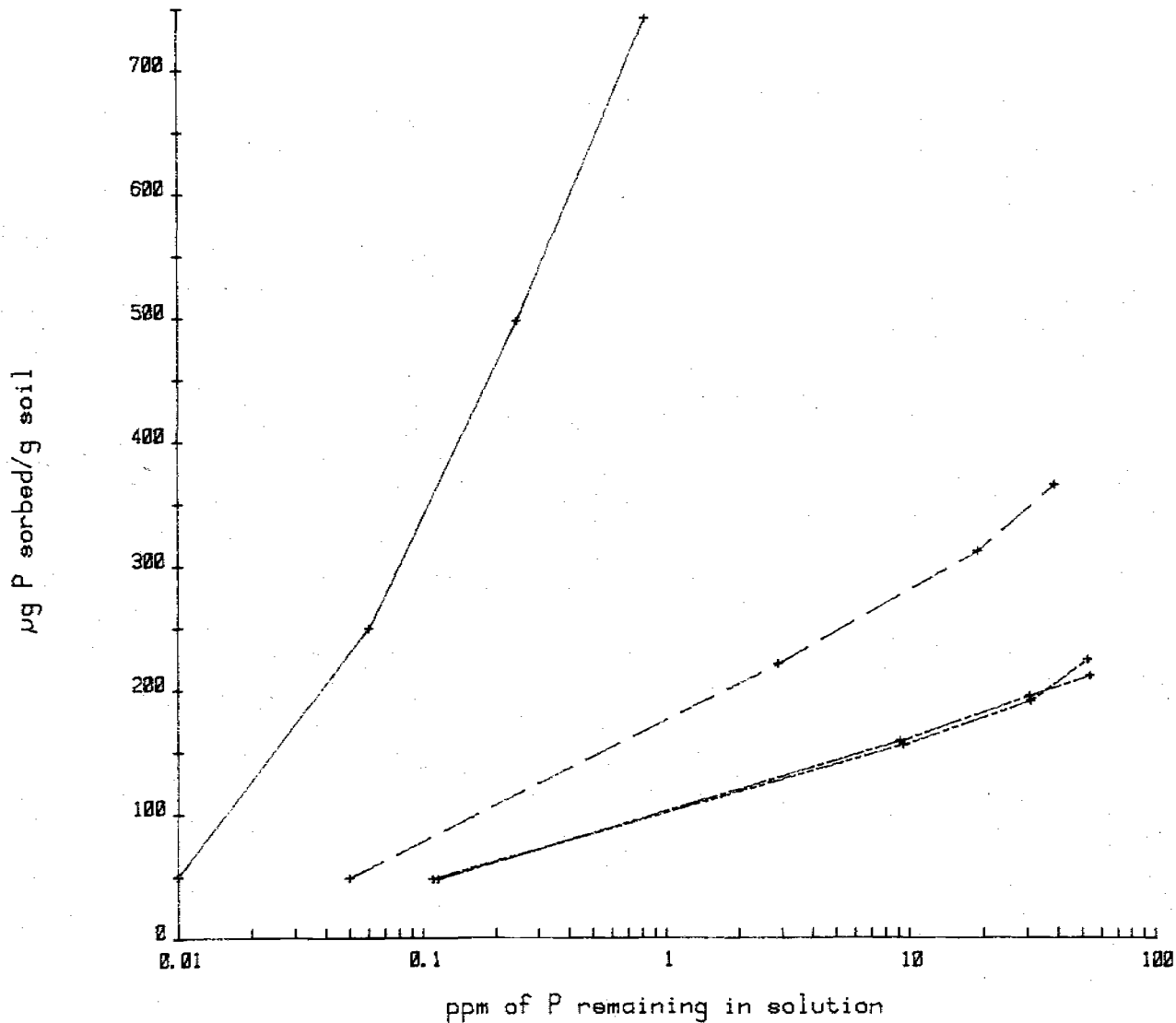
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

455

### Phosphorus Isotherm

79-MT-1505



µg/g soil	Soln ppm
----- 82ir	
50	0.01
249	0.06
498	0.25
742	0.82
----- 11B3	
50	0.05
221	2.90
312	18.00
365	38.48
----- IIC1	
49	0.12
159	9.12
195	30.48
212	53.84
----- IIC2	
49	0.11
156	9.44
191	30.00
224	52.56

Pedon: Unnamed Gravelly Silt Loam 79-MT-1505 (1108020-2)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
7- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
5- 22	3.38	5.16	3.75	6.97	12.44	31.70	69.94	7.36	36	Gr. silt loam
22- 35	6.64	7.66	4.81	8.73	12.82	40.66	49.02	10.33	42	Gr. loam
35- 63	7.32	7.79	6.17	9.24	11.57	42.88	44.08	13.84	34	Gr. loam
63-103+	5.29	6.85	4.69	7.94	9.59	34.36	53.43	12.21	26	Gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc		%		%	
7- 0					NS	NS	NS	NS	NS
0- 5					NS	NS	NS	NS	NS
5- 22					29.6	7.0	NDNP	NDNP	NDNP
22- 35					19.7	3.8	NDNP	NDNP	NDNP
35- 63					17.5	3.8	NDNP	NDNP	NDNP
63-103+					21.3	5.3	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

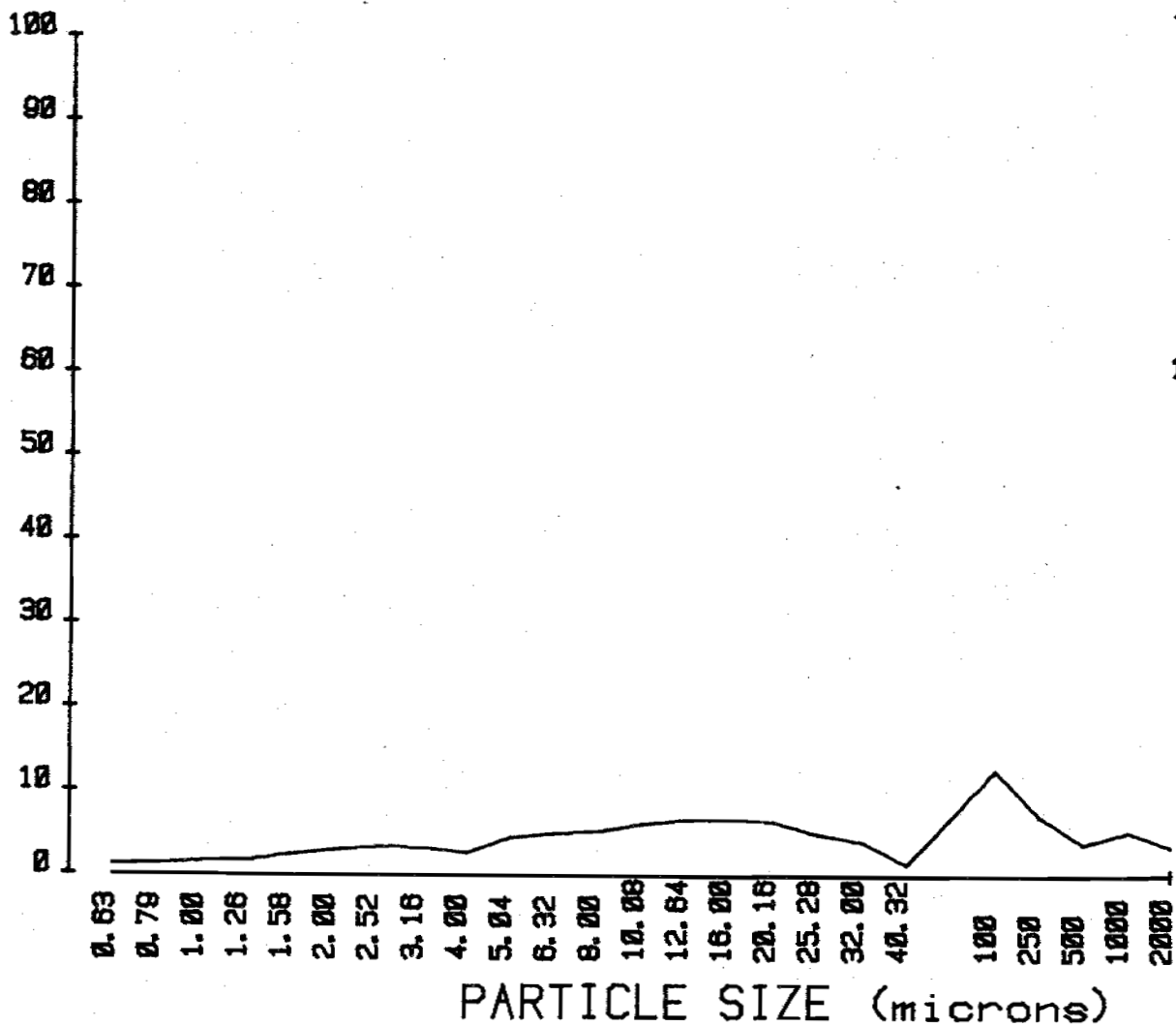
Date: January 1981

Identification	M1505-2	M1505-3	M1505-4	M1505-5	
Units	-----%				
TC (0.63-2.00)	7.36	10.33	13.84	12.21	
TSi (2.00-50)	60.94	49.02	44.08	53.43	
TS (50-2000)	31.70	40.66	42.08	34.36	
Clay	0.63-0.794	1.02	1.59	2.03	1.82
	0.794-1.00	1.16	1.63	2.09	1.78
	1.00-1.26	1.47	2.05	2.63	2.30
	1.26-1.59	1.48	2.11	2.82	2.46
	1.59-2.00	2.24	3.15	4.27	3.85
Fine Silt	2.00-2.52	2.82	3.89	5.15	4.99
	2.52-3.17	3.24	3.92	4.94	5.47
	3.17-4.00	2.94	3.02	3.16	4.22
	4.00-5.04	2.45	1.80	1.43	2.56
Medium Silt	5.04-6.35	4.35	3.90	3.89	5.21
	6.35-8.00	4.88	3.99	3.78	5.03
	8.00-10.08	5.08	3.85	3.56	4.68
	10.08-12.70	5.97	4.30	3.85	4.48
	12.70-16.0	6.49	4.41	3.90	4.80
	16.0-20.2	6.59	4.31	3.46	4.16
Coarse Silt	20.2-25.4	6.18	4.24	3.23	3.40
	25.4-32.0	4.72	3.51	1.85	2.27
	32.0-40.3	3.82	2.44	1.63	1.68
	40.3-50.8	1.21	1.40	0.20	0.39
	50.8-64.0	0.21	0.06	0.07	0.09
VFS (50-100)	12.44	12.82	11.57	9.59	
FS (100-250)	6.97	8.73	9.24	7.94	
MS (250-500)	3.75	4.81	6.17	4.69	
CoS (500-1000)	5.16	7.66	7.79	6.85	
VCoS (1000-2000)	3.38	6.64	7.32	5.29	
Greater than 2000	36	42	34	26	
Textural Class	Gr. SIL	Gr. loam	Gr. loam	Gr. SIL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M1505-2

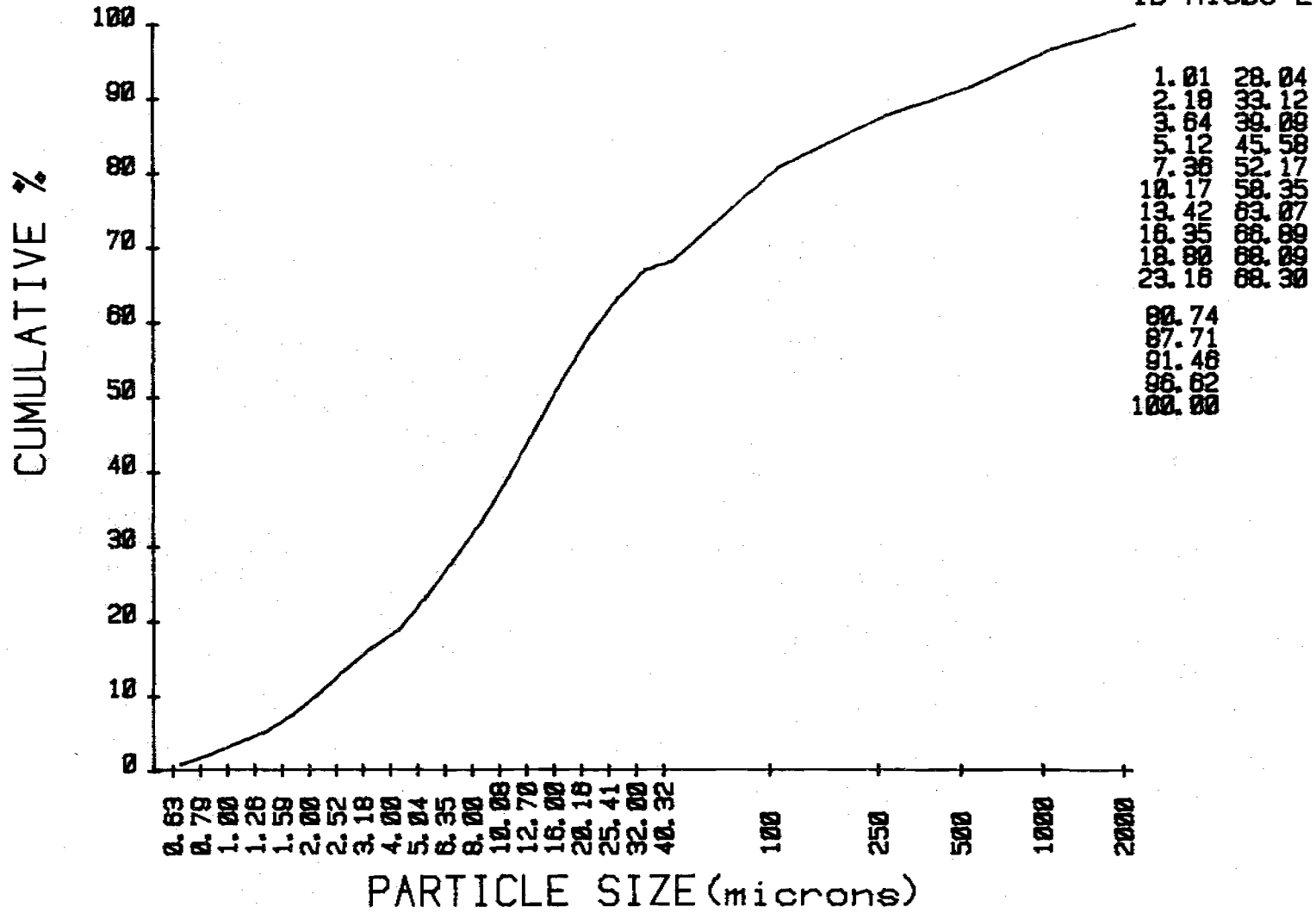


458

Z

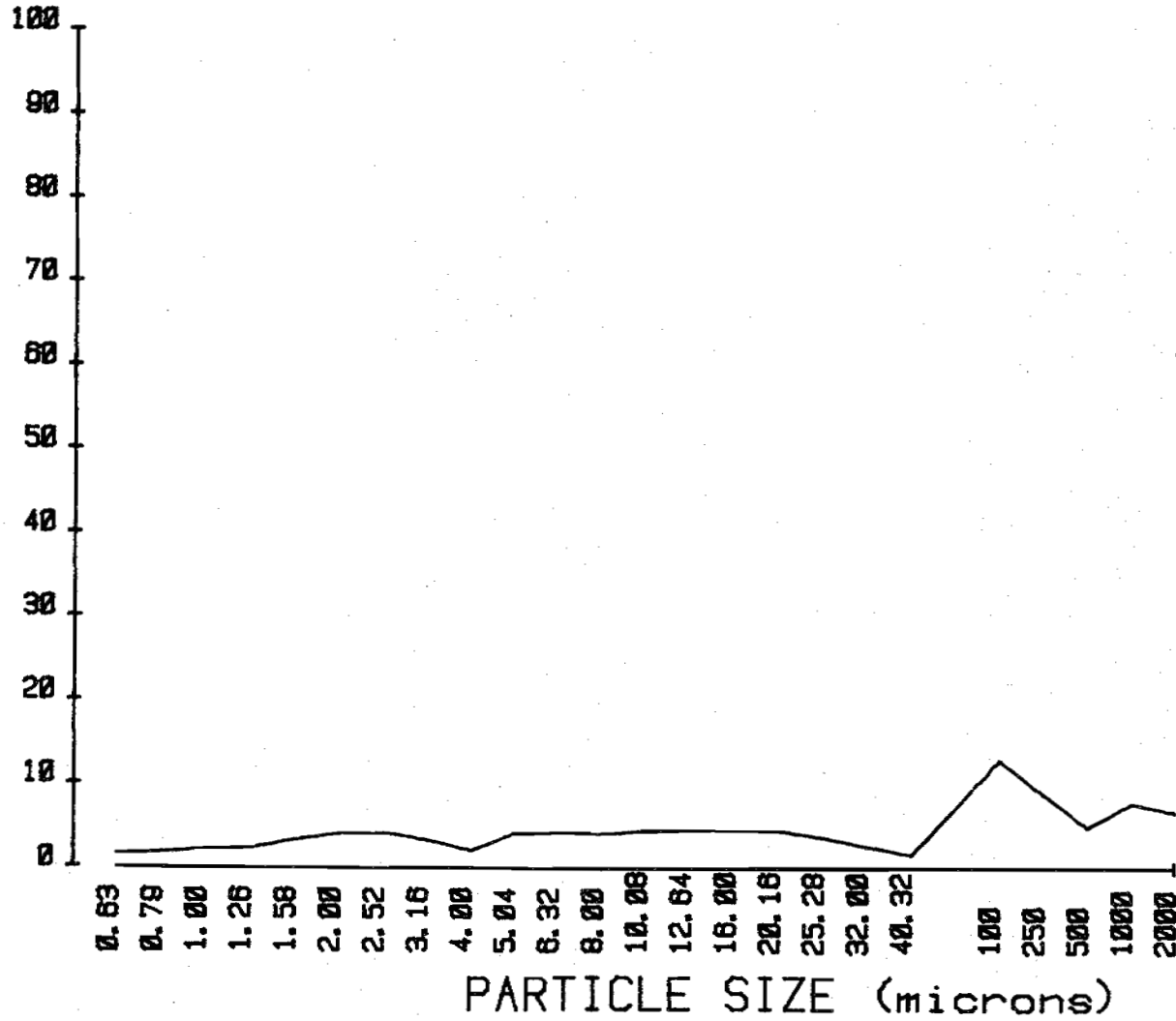
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1505-2



PLOT SAND-SILT-CLAY

ID M1505-3



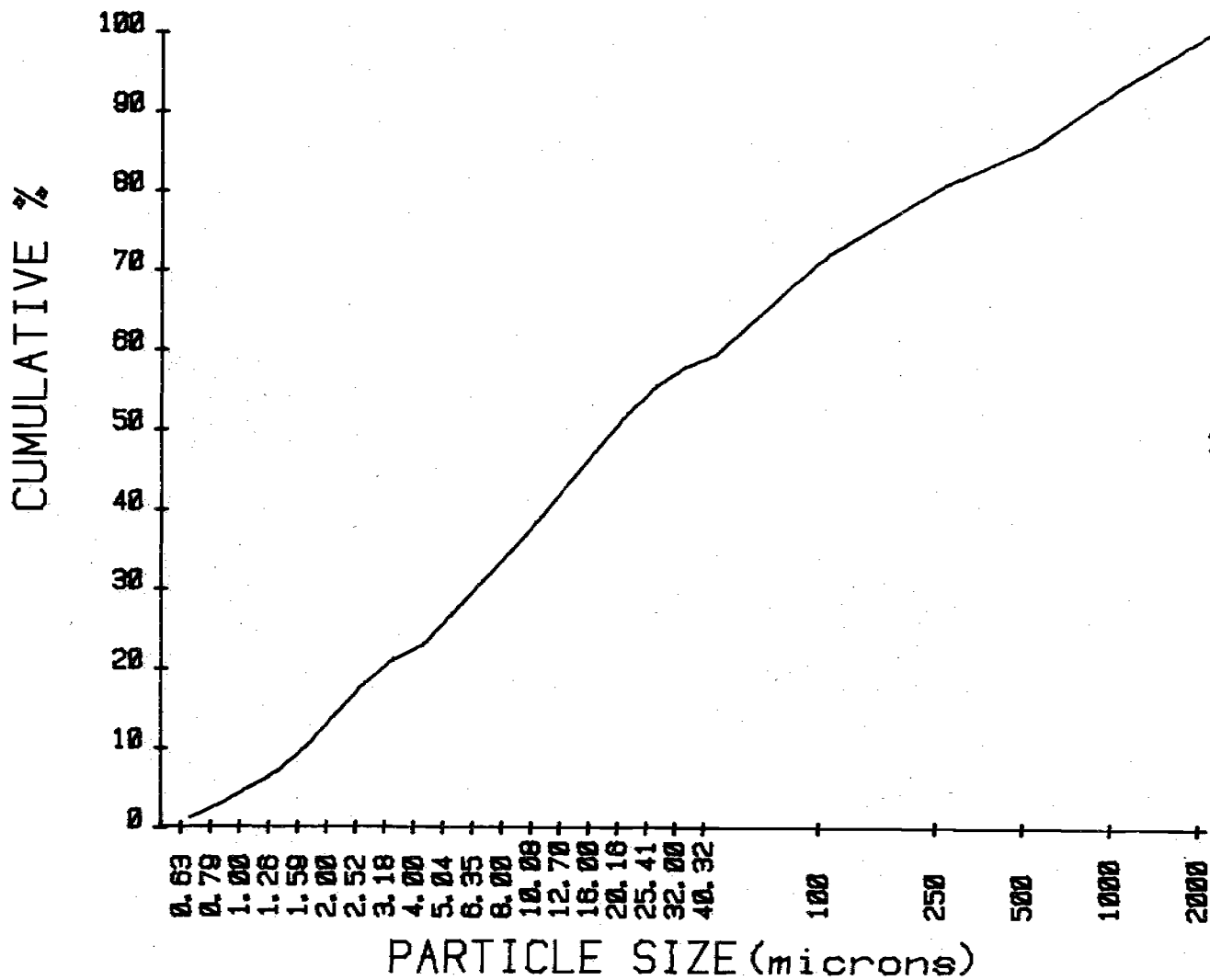
1.30	3.99
1.63	3.85
2.05	4.30
2.11	4.41
3.15	4.31
3.86	4.24
3.92	3.51
3.82	2.44
1.88	1.48
3.98	0.86
12.82	
8.73	
4.81	
7.66	
6.64	

097

x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1505-3

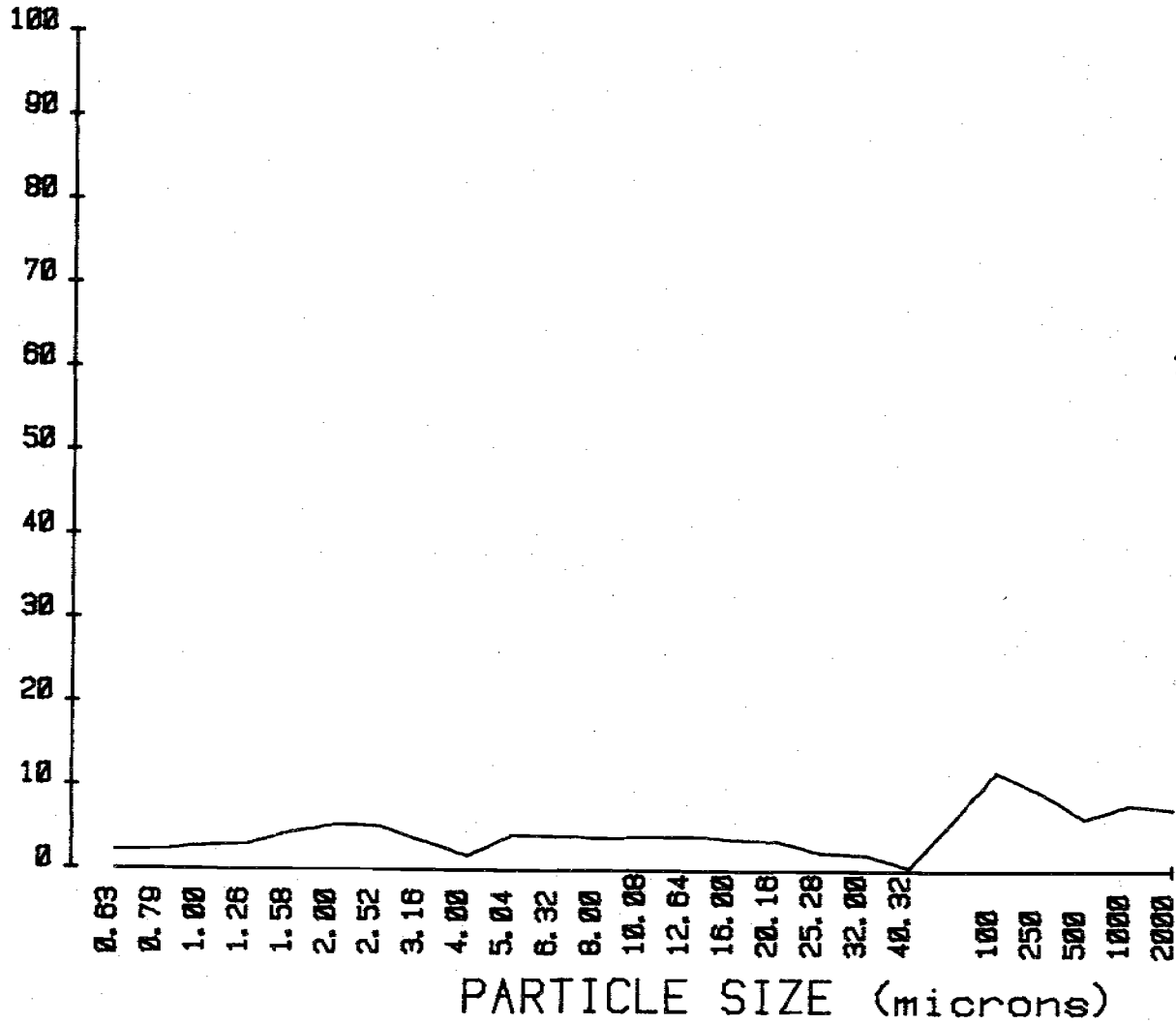


1.39	30.84
3.02	34.68
5.07	38.99
7.16	43.39
10.33	47.70
14.21	51.94
18.13	55.44
21.15	57.88
22.95	59.28
26.85	59.34
72.16	
80.89	
85.78	
93.36	
100.00	



PLOT SAND-SILT-CLAY

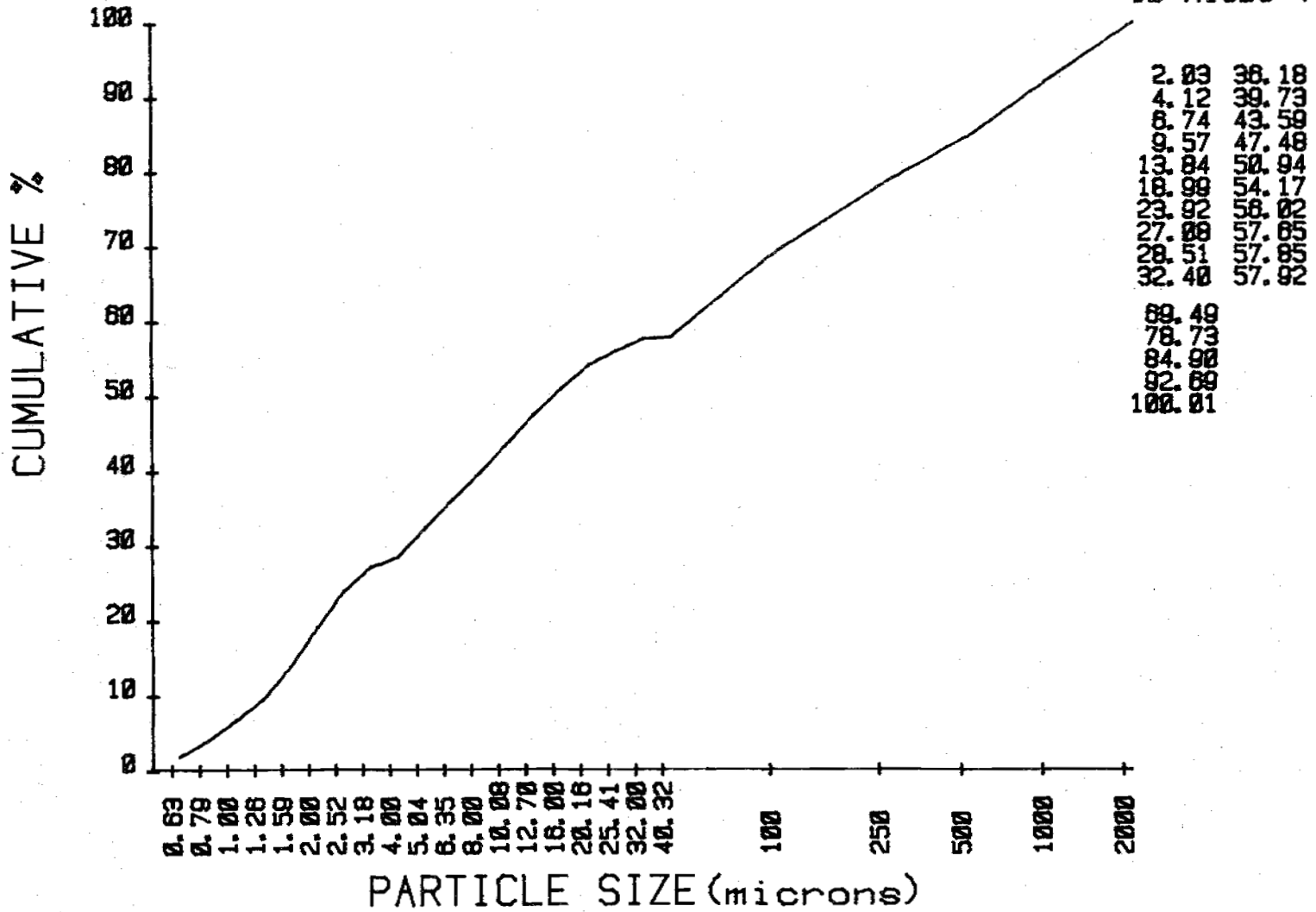
ID M1505-4



2.83	3.78
2.89	3.56
2.63	3.55
2.82	3.90
4.27	3.46
5.15	3.23
4.94	3.05
3.16	1.83
1.43	0.20
3.88	0.07
11.57	
9.24	
8.17	
7.79	
7.32	

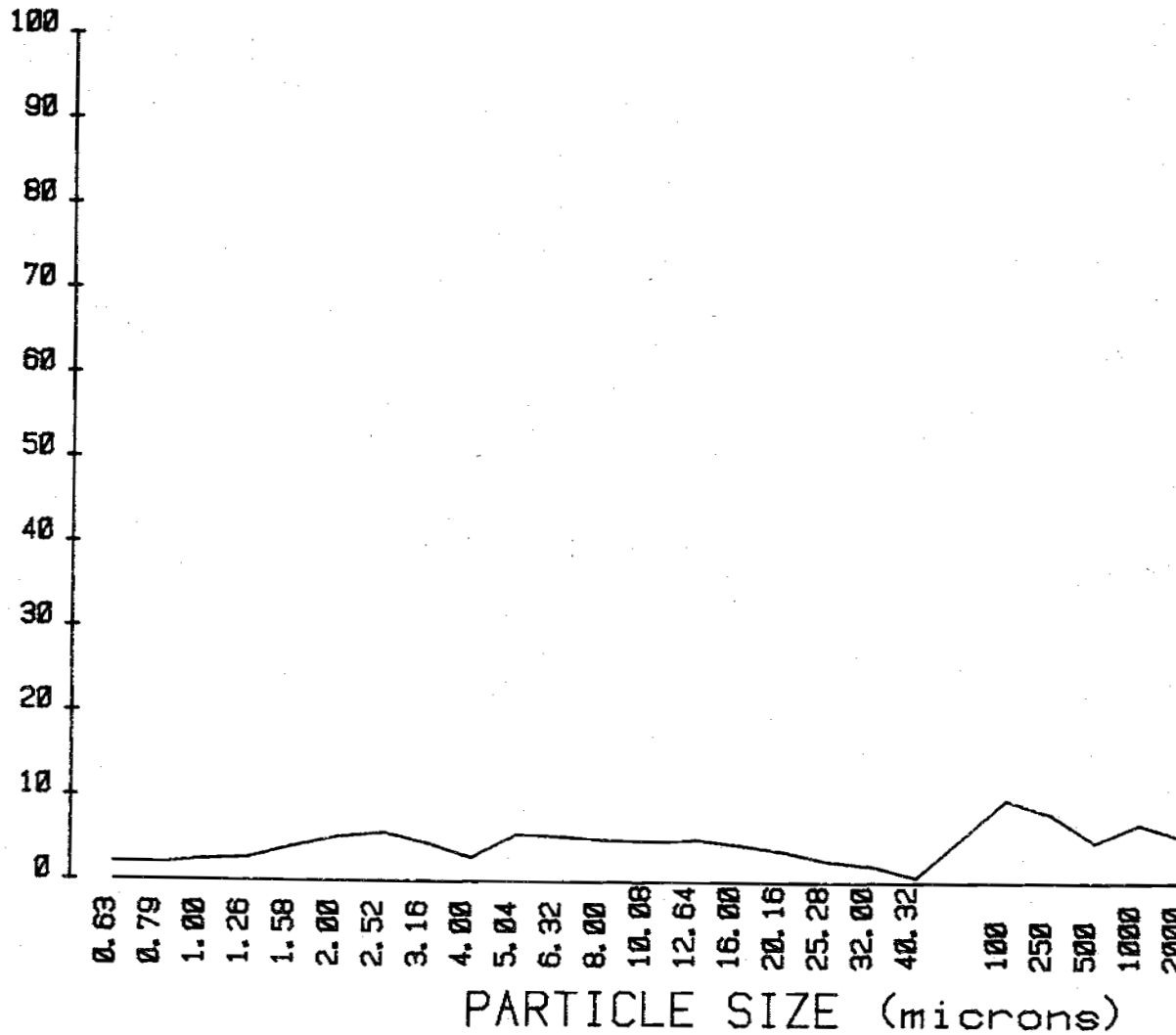
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1505-4



PLOT SAND-SILT-CLAY

ID M1505-5



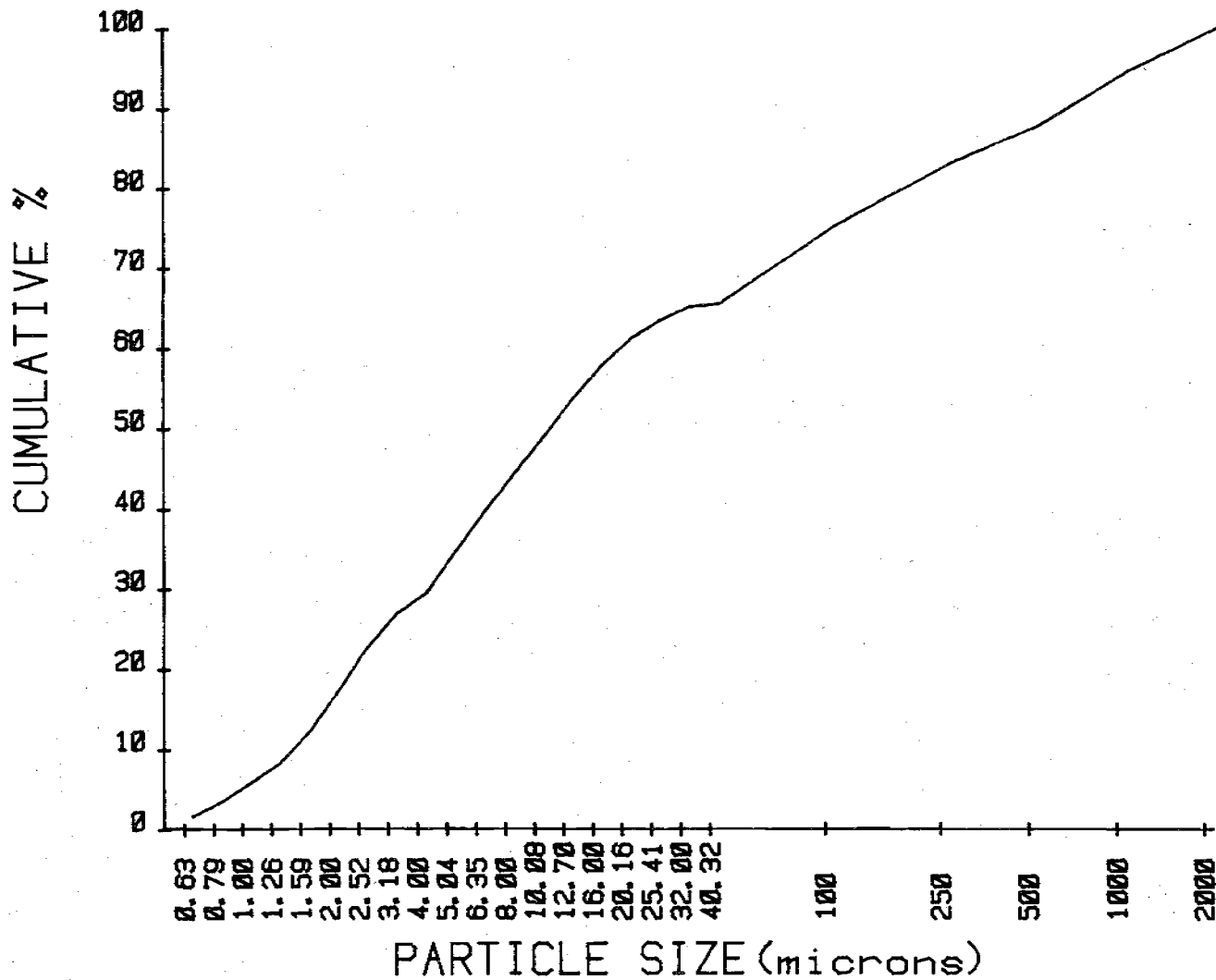
1.82	5.03
1.78	4.68
2.30	4.48
2.46	4.80
3.85	4.16
4.99	3.39
5.47	2.27
4.22	1.68
2.56	0.38
5.21	0.00
9.59	
7.94	
4.89	
6.85	
5.29	

464

x

### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1505-5



1.82	39.69
3.60	44.37
5.91	48.85
8.36	53.65
12.21	57.82
17.20	61.21
22.67	63.48
26.89	65.16
29.45	65.55
34.66	65.84
75.23	
83.17	
87.86	
94.71	
100.00	

Slides prepared by: Falen and Blank

FH17

Slides run by: Chris Dillion

Mg-saturated, glycolated

1108070-2

Slides interpreted by: Moody and Falen

79-MT-1505-5

HC2 63-103 cm

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillion  
Slides interpreted by: Moody + Falen

466

33.5 Å  
26.2°  
26.6°  
26.9°

34.0 Å  
24.7°

Interpretations: illite,  
montmorillonite,  
Kalinite,  
Vermiculite  
mixed Chlorite-  
vermiculite

FH17

Mg-saturated, glycolated

1108070-2

79-MT-1505-5

HC2 63-103 cm

17.9 Å  
16.5°  
16.8°

5.01 Å  
17.7°

7.35 Å  
60°

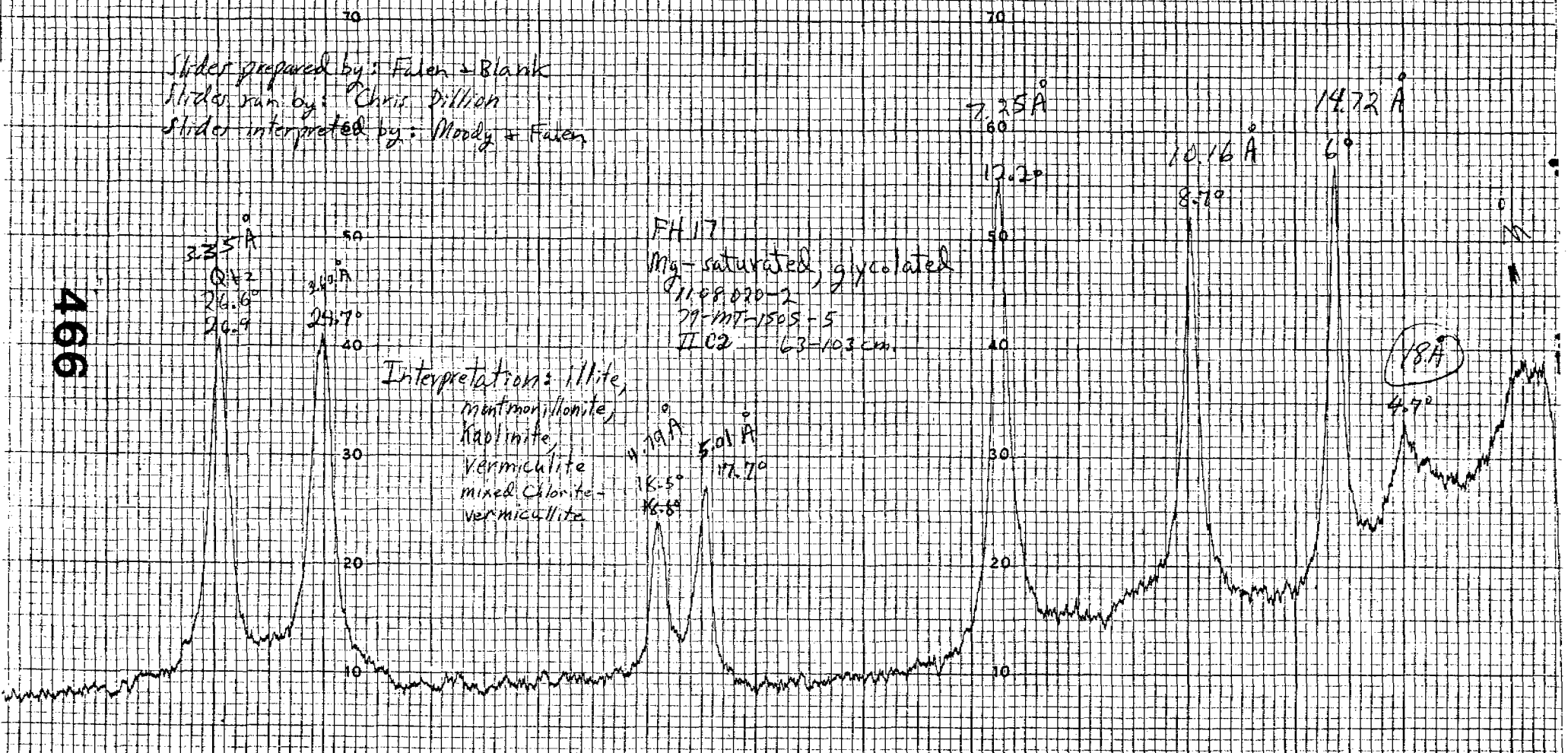
17.2°

10.16 Å  
8.7°

14.72 Å  
6°

18 Å  
4.7°

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3





467

FH17

K-saturated, air dried

1108020-2

79-MT-1505-5

IIC2 63-103 cm

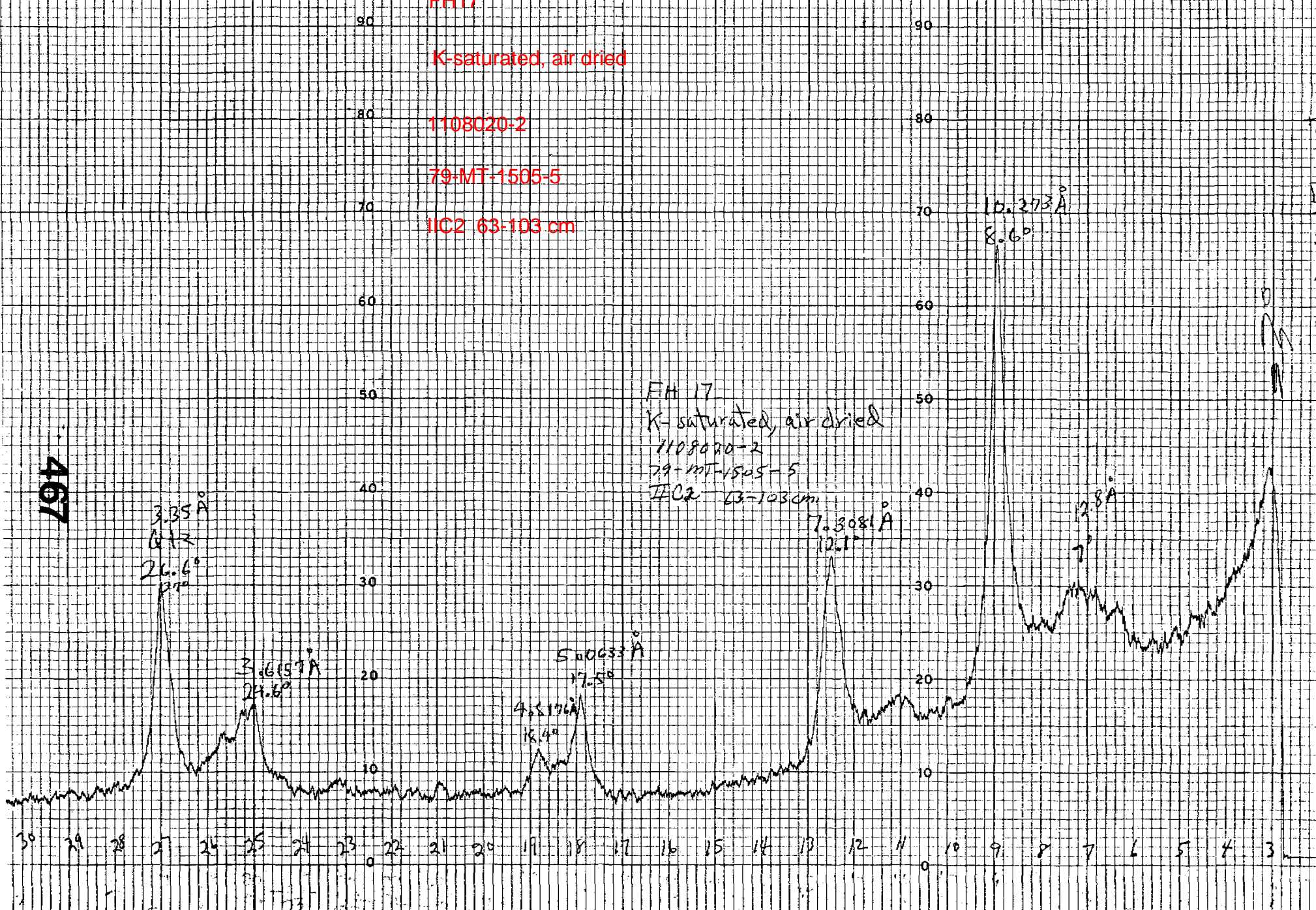
FH 17

K-saturated, air dried

1108020-2

79-MT-1505-5

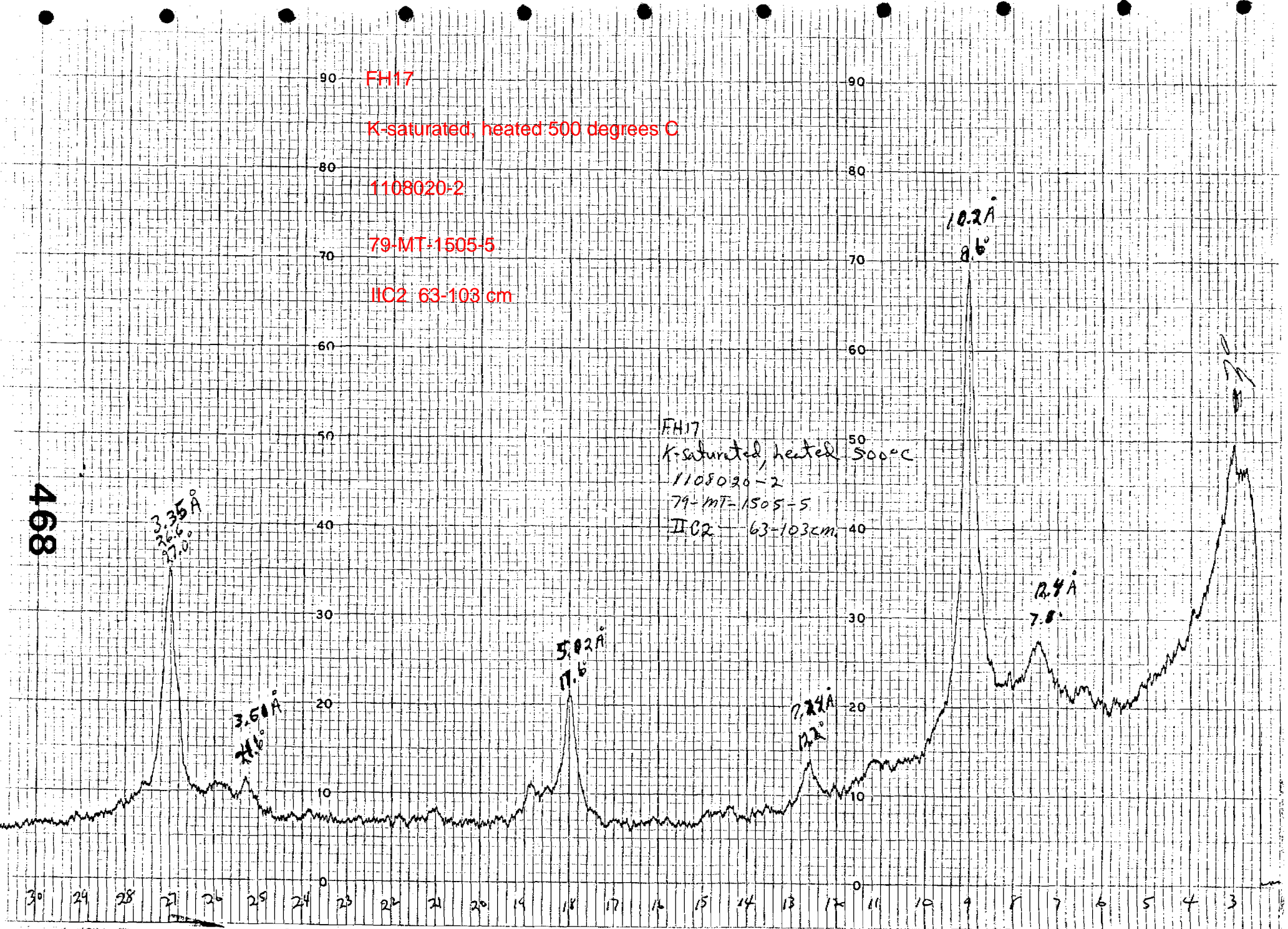
IIC2 63-103 cm



468

FH17  
K-saturated, heated 500 degrees C  
1108020-2  
79-MT-1505-5  
IIC2 63-103 cm

FH17  
K-saturated, heated 500°C  
1108020-2  
79-MT-1505-5  
IIC2 63-103 cm



Unnamed Gravelly Silt Loam 79-MT-1506 (1006010-3)

Classification: loamy-skeletal, mixed Andeptic Cryoboralf.

General Site Characteristics

Location: Flathead County, Montana: section 28, T. 25N., R. 18W.  
Forest: Flathead National Forest  
Area:  
Described By/Date:  
Landform: 26A-B  
Habitat Type: (Abies grandis)/(Clintonia uniflora-Xerophyllum tenax)  
Formation Name:  
Parent Rock/Material: Siyeh limestone  
Weathering:  
Topography:  
Slope: 36 percent  
Aspect:  
Elevation: 3280 feet MSL  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Erosion:  
Infiltration:  
Permeability:  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

- O 5-0 centimeters (2-0 inches). Organic duff.
- A2 0-3 centimeters (0-1 inches). Yellowish brown (10YR 5/4) moist; no lab sample; gravelly silt loam; weak fine granular structure; friable, nonsticky and nonplastic; pH 4.5; 15 percent coarse fragments by volume; common fine and medium roots; clear wavy boundary.
- B2ir 3-20 centimeters (1-8 inches). Brown (7.5YR 4/4) moist; gravelly silt loam; weak fine granular structure; friable, nonsticky and nonplastic; medium acid pH 5.9, noncalcareous; 37 percent gravels by weight; common fine and medium roots; clear wavy boundary.
- IIA2b 20-41 centimeters (8-14 inches). Pale brown (10YR 6/3) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; neutral pH 6.8, noncalcareous; 39 percent gravels by weight; few fine roots; clear smooth boundary.



79-MT-1506 (cont.)

IIA&Bb 41-53 centimeters (16-21 inches). Light yellowish brown (10YR 6/4) and light olive brown (2.5YR 5/4) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; neutral pH 7.2, noncalcareous; 45 percent gravels by weight; few fine roots; clear smooth boundary.

IIB2tb 53-91 centimeters (21-36 inches). Dark grayish brown (2.5YR 4/2) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; mildly alkaline pH 7.7, slightly effervescent; 37 percent gravels by weight; few thin clay films on ped faces; clear wavy boundary.

IICcab 91+ centimeters (36+ inches). Light olive brown (2.5YR 5/4) moist; gravelly loam; massive structure; friable, slightly sticky and slightly plastic; mildly alkaline pH 7.8, strongly effervescent; 33 percent gravels by weight.

Remarks: Unweathered sediments are included in the IIA&Bb, IIB2tb, and IICcab horizons.

Pedon: Unnamed Gravelly Silt Loam 79-MT-1506 (1006010-3)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mahos/cm	% Water at Saturation	Soluble Ions								
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	
							meq/1000 gms								
	0		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	A2		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	B2ir		5.8	5.9	0.20	61	0.7	0.3	0.2	0.1	0.0	0.6	0.2	0.5	
2	IIA2b		6.9	6.8	0.22	46	0.7	0.2	0.1	0.0	0.0	0.7	0.1	0.5	
3	IIA&Bb		7.8	7.2	0.31	46	1.1	0.3	0.1	0.1	0.0	1.1	0.1	0.5	
4	IIB2tb		8.2	7.7	0.32	42	1.1	0.3	0.1	0.1	0.0	1.2	0.1	0.5	
5	IICcab		8.3	7.8	0.36	37	0.9	0.2	0.1	0.0	0.0	1.2	0.1	0.5	

471

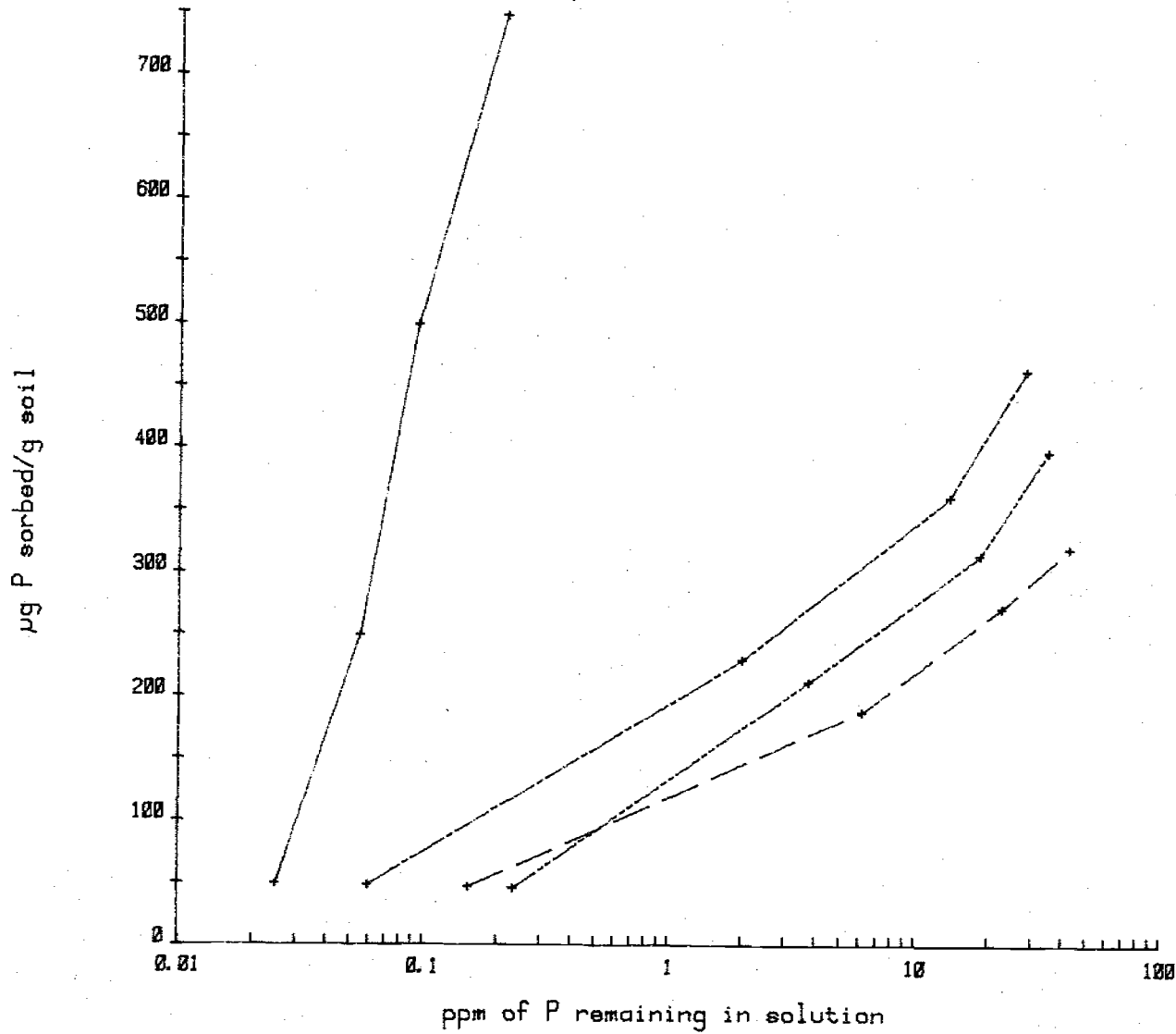
Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	%	%	ratio	%	%	ppm				
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	4.7	1.4	0.1	0.5	22.1	0	2.40	1.40	0.086	6	nil	nil	0.63	2.1
2	11.6	2.3	0.1	0.3	19.3	1	0.68	0.39	0.037	11	nil	nil	0.61	0.8
3	11.9	1.8	0.1	0.3	20.4	0	0.83	0.48	0.036	13	nil	nil	0.55	2.9
4	6.8	0.9	0.1	0.2	11.6	0	0.53	0.31	0.024	13	nil	3.1	0.63	4.4
5	4.8	0.4	0.1	0.2	9.0	0	0.53	0.31	0.030	10	nil	12.8	0.67	4.6

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

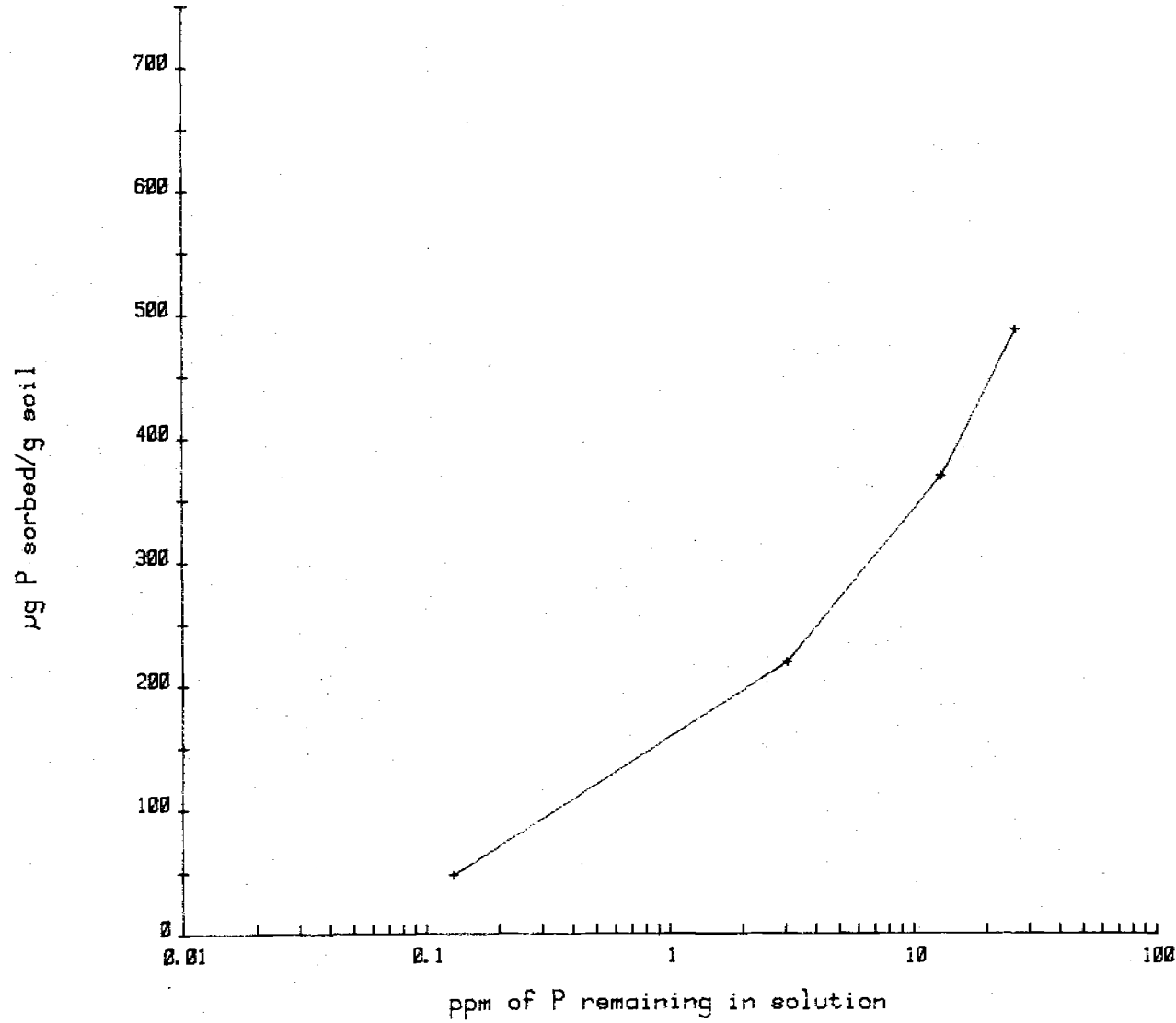
79-WT-1506



µg/g soil	SoIn ppm
----- B2ir	
50	0.03
249	0.06
499	0.10
748	0.22
----- IIA2b	
48	0.16
188	6.16
272	22.00
320	43.04
----- IIA&Bb	
48	0.06
238	2.02
361	13.92
463	28.72
----- IIB2tb	
48	0.24
212	3.77
314	18.56
397	35.28

# Phosphorus Isotherm

79-MT-1506



µg/g soil	Soln ppm
49	0.13
219	3.06
370	13.04
488	26.24

473

Pedon: Unnamed Gravelly Silt Loam 79-MT-1506 (1006010-3)

Date: December 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.		
CM	-----X-----								-----X-----		
5-10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
10-15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
15-21	7.04	8.64	4.66	6.15	11.06	37.54	57.88	4.58	37	37	Gr. silt loam
21-24	3.12	2.80	1.96	6.04	7.02	20.93	57.65	21.43	39	39	Gr. silt loam
24-31	4.30	3.74	1.99	3.17	5.17	18.35	59.95	21.70	45	45	Gr. silt loam
31-36	10.22	9.49	4.16	5.16	5.19	34.20	50.07	15.73	37	37	Gr. silt loam
36+	6.91	7.93	4.43	5.92	5.58	30.75	49.24	20.01	33	33	Gr. loam

Depth	Silt Size Distribution (mm)			Bulk Density	Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Clod	Core	Bar	Bar	
CM	-----X-----			g/cc	-----X-----		-----X-----		
2-0					NS	NS	NS	NS	NS
0-1					NS	NS	NS	NS	NS
1-8					36.1	10.2	NDNP	NDNP	NDNP
8-16					27.1	9.0	26	NP	ND
16-21					29.7	10.2	33	NP	ND
21-36					26.6	6.6	26	NP	ND
36+					23.5	6.4	26	NP	ND

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

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PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M1506-2	M1506-3	M1506-4	M1506-5
Units		-----%			
TC (0.63-2.00)		4.58	21.43	21.70	15.73
TSi (2.00-50)		57.88	57.65	59.95	50.07
TS (50-2000)		37.54	20.93	18.35	34.20
Clay	0.63-0.794	0.63	3.84	3.57	2.48
	0.794-1.00	0.71	3.76	3.72	2.58
	1.00-1.26	0.90	4.19	4.32	3.22
	1.26-1.59	0.94	4.03	4.20	3.11
	1.59-2.00	1.40	5.61	5.89	4.44
Fine Silt	2.00-2.52	1.89	6.64	7.07	5.63
	2.52-3.17	2.42	6.20	7.04	5.87
	3.17-4.00	2.42	4.13	4.85	4.35
	4.00-5.04	2.36	2.04	2.43	2.42
Medium Silt	5.04-6.35	4.04	5.32	6.21	5.54
	6.35-8.00	4.79	5.15	6.05	5.29
	8.00-10.08	5.27	4.81	5.41	4.87
	10.08-12.70	6.29	5.12	5.29	4.73
	12.70-16.0	6.29	5.03	4.48	3.84
	16.0-20.2	5.92	4.75	3.76	2.90
Coarse Silt	20.2-25.4	6.04	3.97	2.63	2.14
	25.4-32.0	5.02	2.68	2.15	1.48
	32.0-40.3	3.22	1.37	1.45	0.41
	40.3-50.8	1.83	0.34	0.89	0.51
	50.8-64.0	0.10	0.11	0.24	0.09
VFS (50-100)		11.06	7.02	5.17	5.19
FS (100-250)		6.15	6.04	3.17	5.16
MS (250-500)		4.66	1.96	1.99	4.16
CoS (500-1000)		8.64	2.80	3.74	9.49
VCoS (1000-2000)		7.04	3.12	4.30	10.22
Greater than 2000		37	39	45	37
Textural Class		Gr. Sil	Gr. Sil	Gr. Sil	Gr. Sil

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

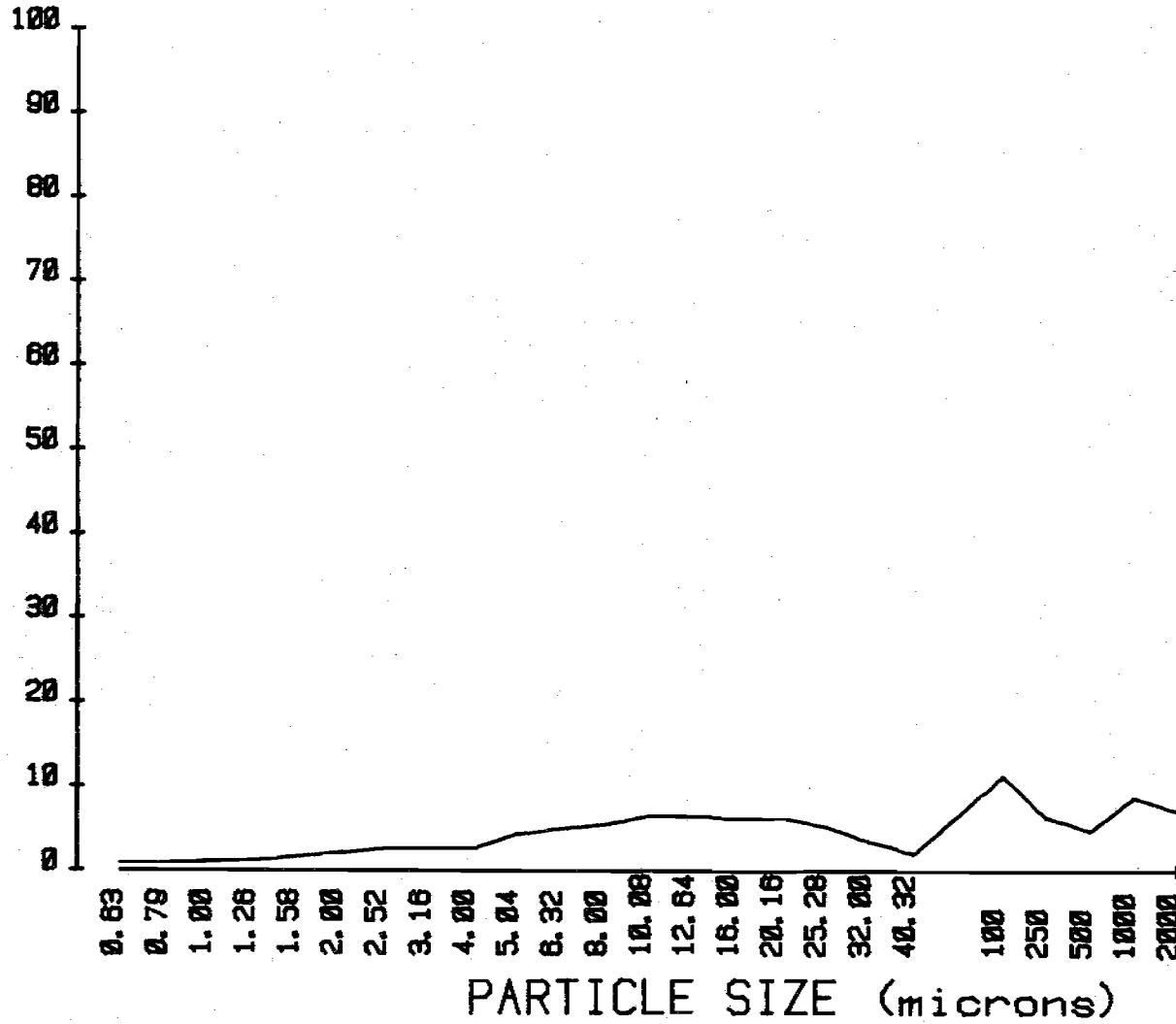
Date: January 1981

Identification		M1506-6		
Units		-----%		
TC (0.63-2.00)		20.01		
TSi (2.00-50)		49.24		
TS (50-2000)		30.75		
Clay	0.63-0.794	3.34		
	0.794-1.00	3.38		
	1.00-1.26	4.03		
	1.26-1.59	3.90		
	1.59-2.00	5.35		
Fine Silt	2.00-2.52	6.06		
	2.52-3.17	5.73		
	3.17-4.00	4.05		
	4.00-5.04	2.59		
Medium Silt	5.04-6.35	4.66		
	6.35-8.00	4.15		
	8.00-10.08	3.98		
	10.08-12.70	3.65		
	12.70-16.0	3.55		
	16.0-20.2	3.00		
Coarse Silt	20.2-25.4	3.41		
	25.4-32.0	2.64		
	32.0-40.3	1.13		
	40.3-50.8	0.58		
	50.8-64.0	0.06		
VFS (50-100)		5.58		
FS (100-250)		5.92		
MS (250-500)		4.43		
CoS (500-1000)		7.93		
VCoS (1000-2000)		6.91		
Greater than 2000		33		
Textural Class		Gr. Loam		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M1506-2



0.63	4.79
0.71	5.27
0.90	6.28
0.94	6.29
1.40	5.92
1.60	6.84
2.42	5.82
2.41	3.21
2.36	1.83
4.04	0.10
11.06	
6.15	
4.67	
8.64	
7.04	

477

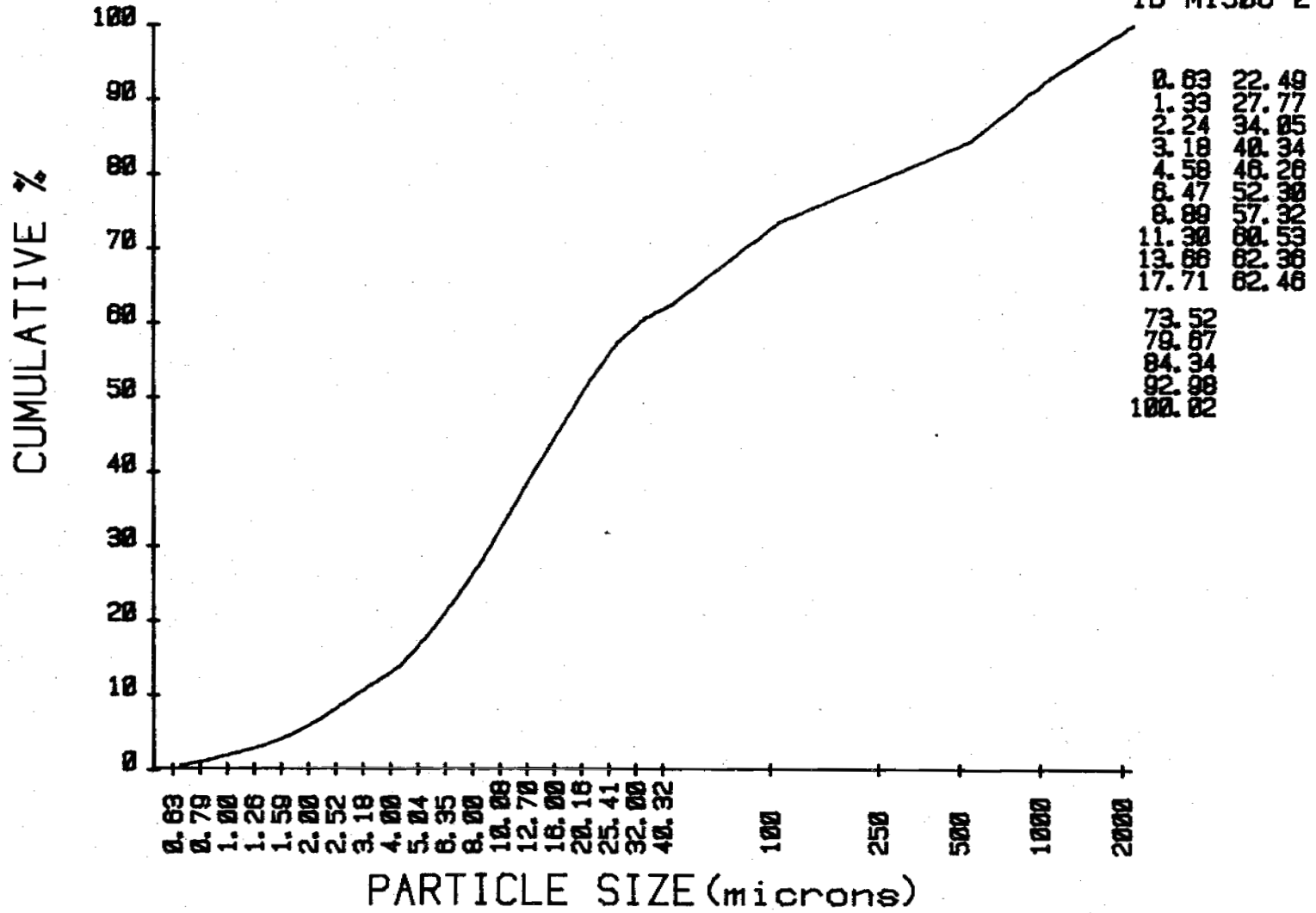
x

PARTICLE SIZE (microns)



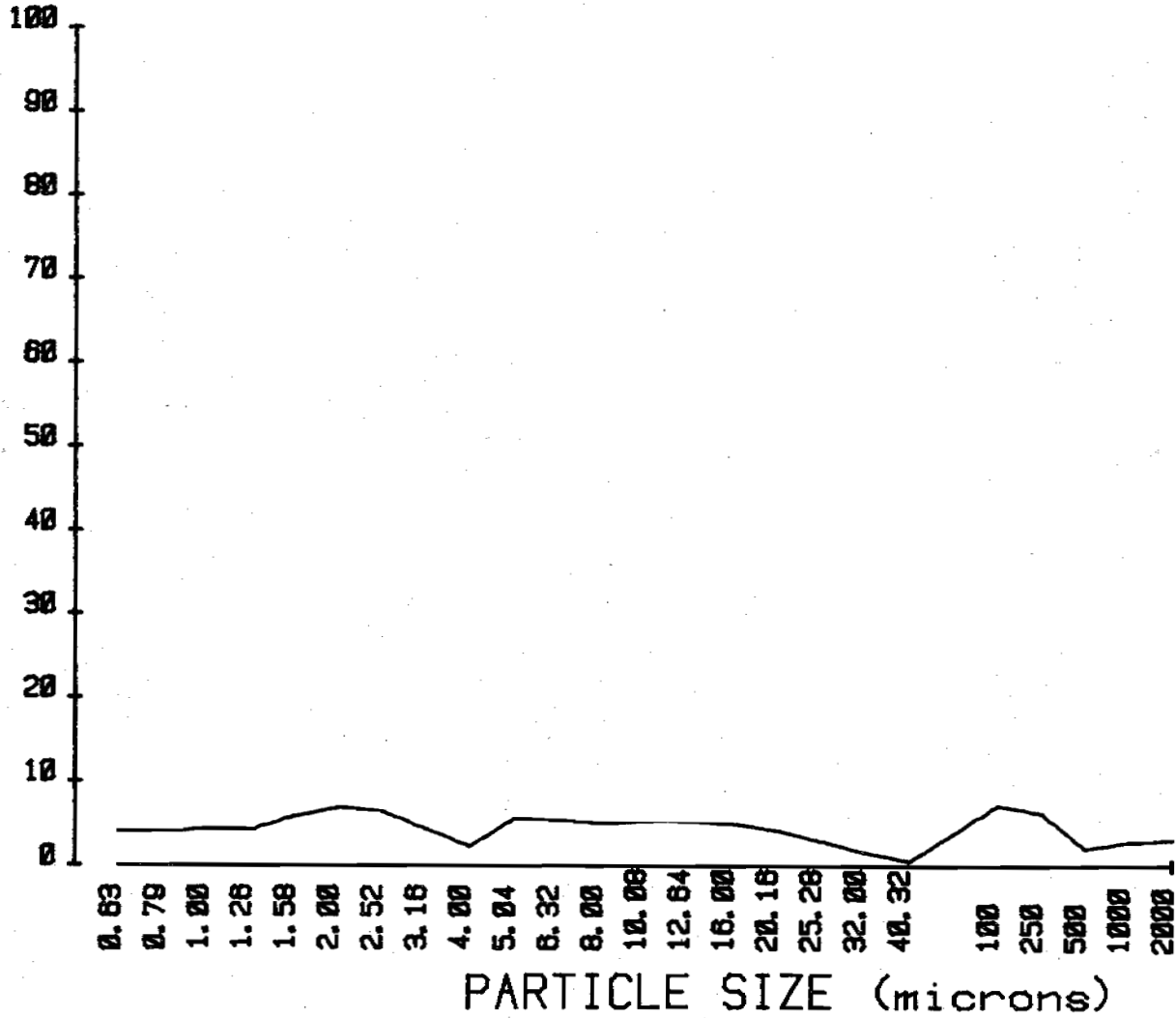
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1506-2



PLOT SAND-SILT-CLAY

ID M1506-3



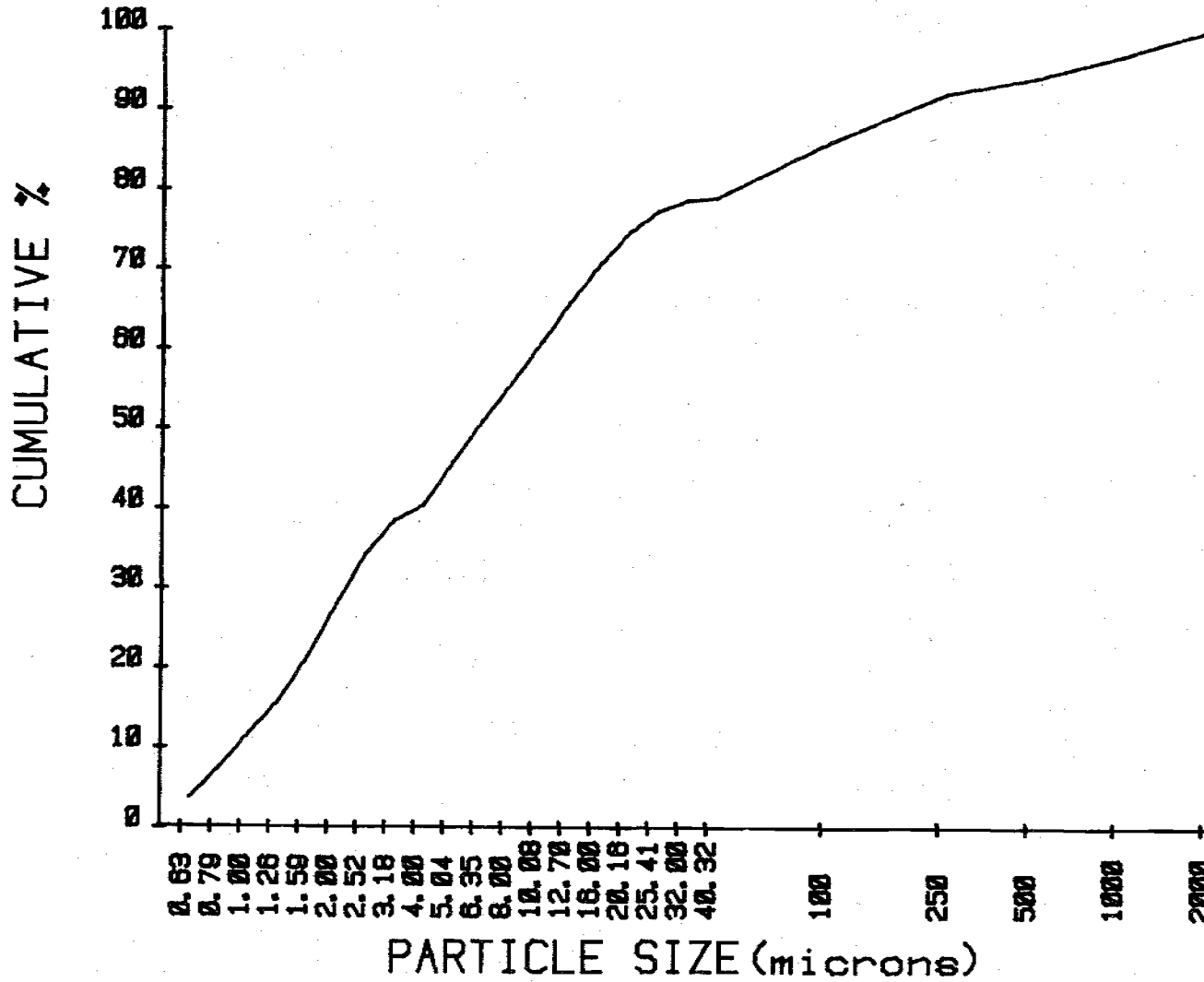
3.83	5.15
3.76	4.81
4.19	5.12
4.83	5.83
5.61	4.74
6.84	3.97
8.28	2.88
4.19	1.37
2.84	0.34
5.31	0.11
7.02	
8.04	
1.96	
2.88	
3.12	

6/7

x

### CUMULATIVE CURVE SAND-SILT-CLAY

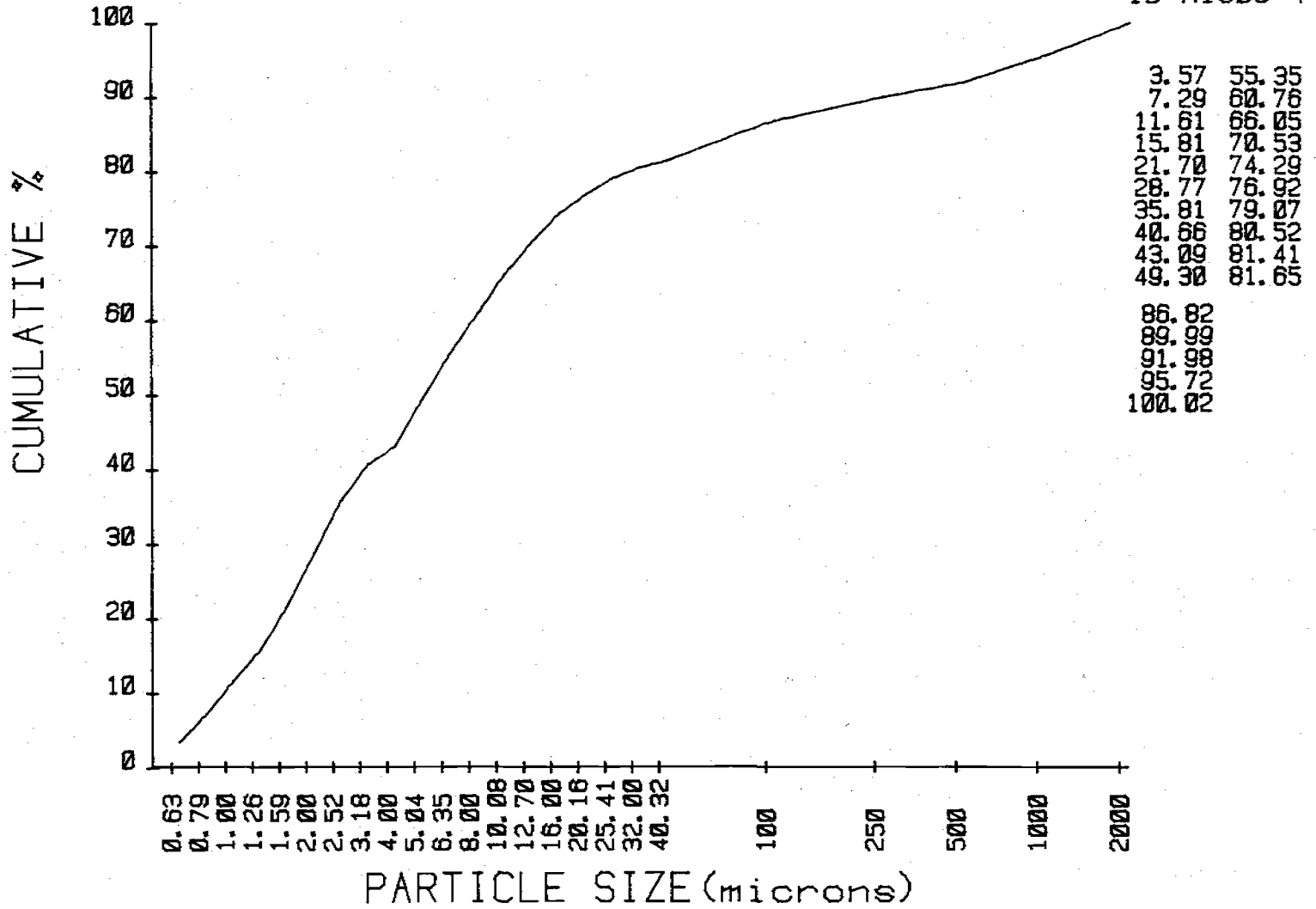
ID M1506-3



3.83	50.90
7.59	55.71
11.79	60.83
15.82	65.87
21.43	70.81
28.07	74.58
34.26	77.26
39.48	78.82
48.44	78.98
45.75	79.87
86.89	
92.13	
94.89	
96.89	
100.01	

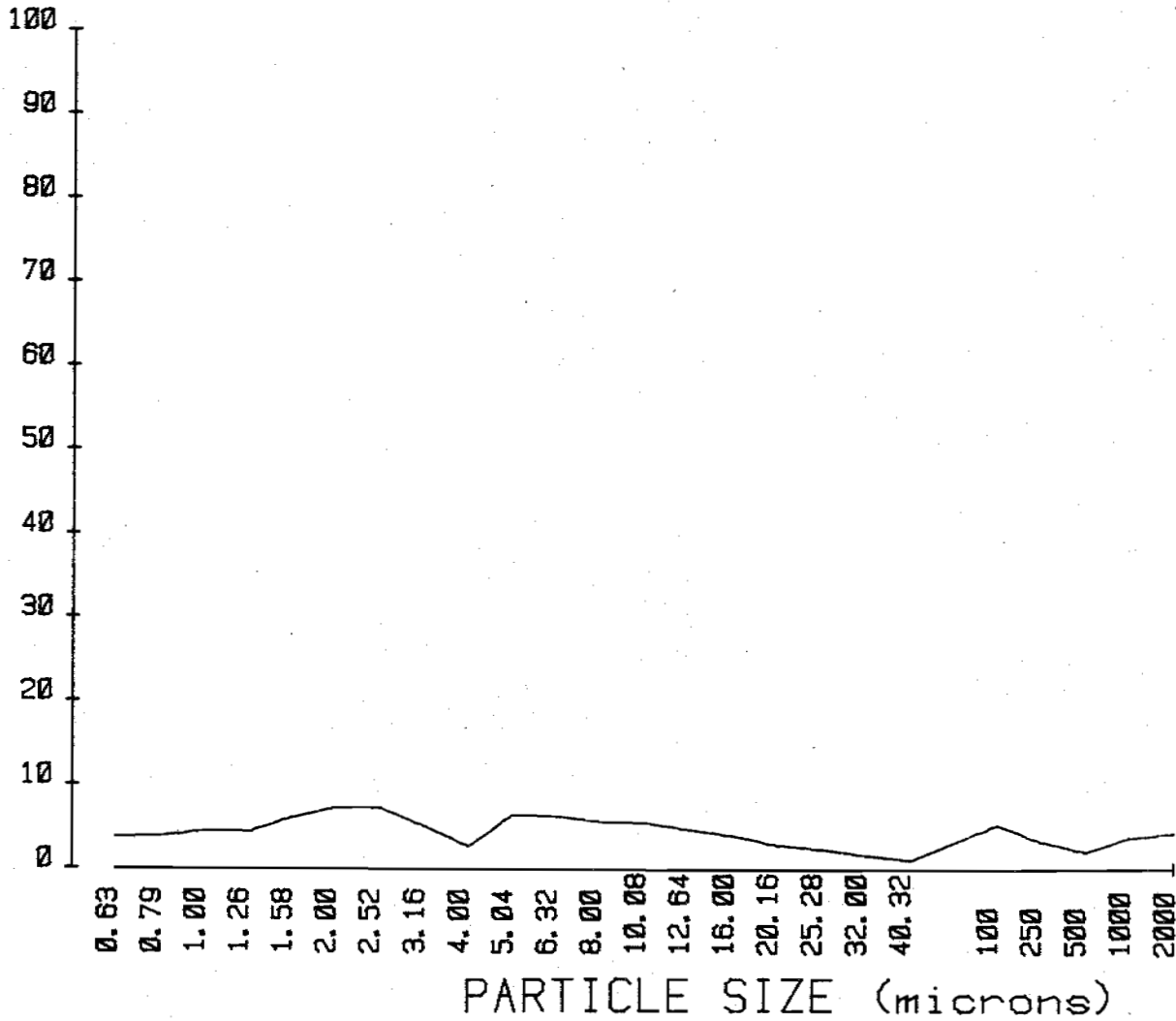
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1506-4



PLOT SAND-SILT-CLAY

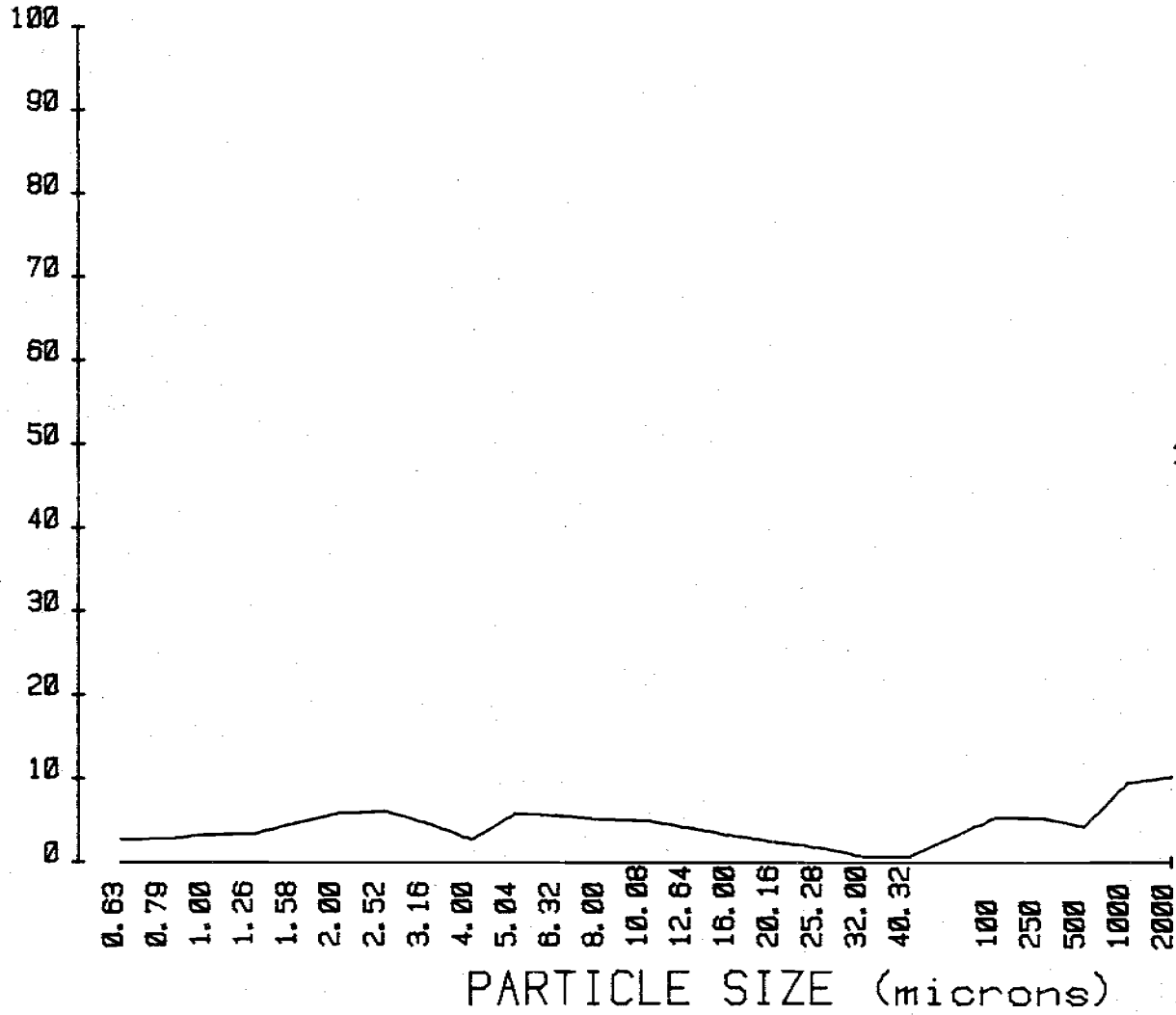
ID M1506-4



3.57	6.05
3.72	5.41
4.32	5.29
4.20	4.48
5.89	3.76
7.07	2.63
7.04	2.15
4.85	1.45
2.43	0.89
6.21	0.24
5.17	
3.17	
1.99	
3.74	
4.30	

PLOT SAND-SILT-CLAY

ID M1506-5

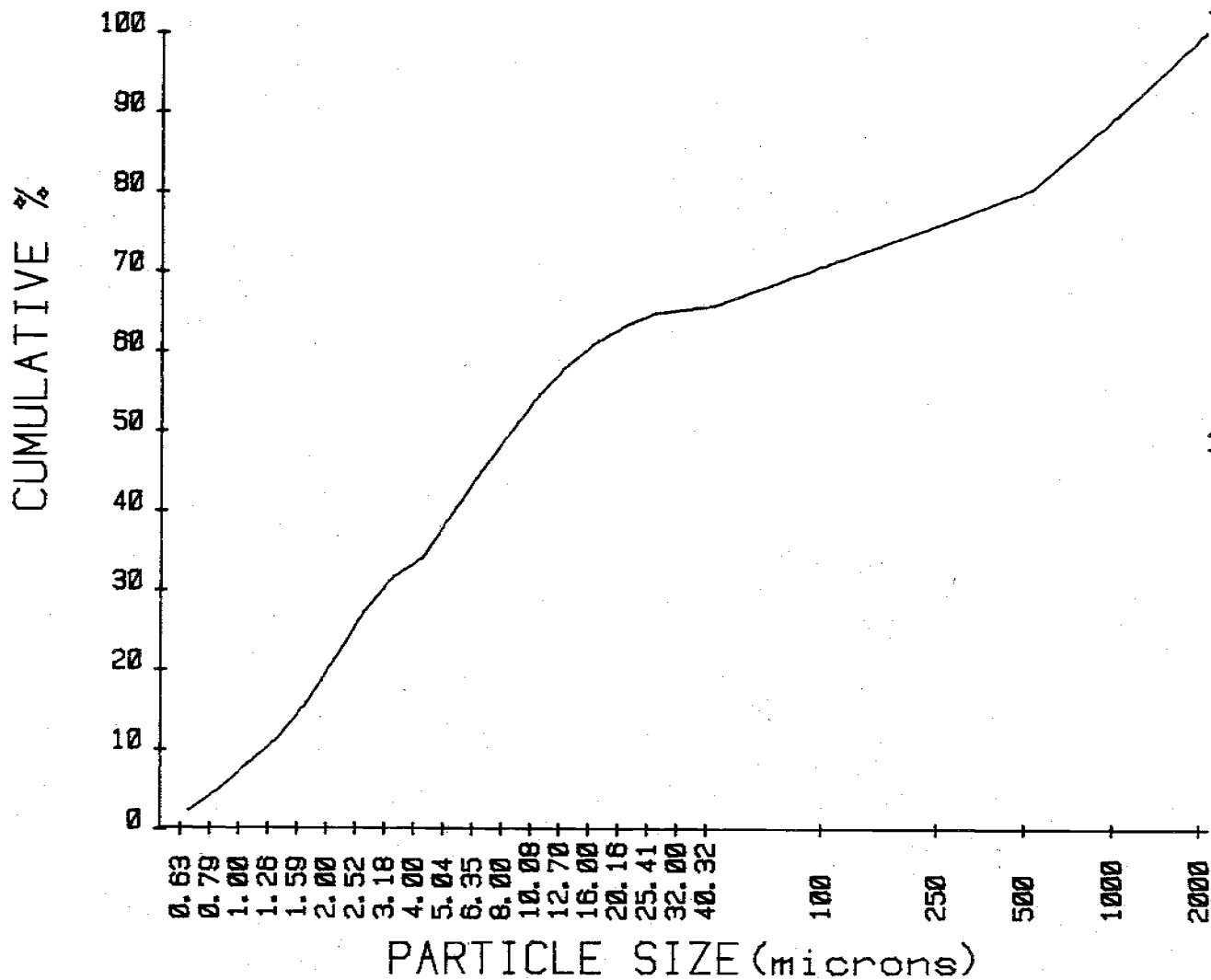


2.48	5.29
2.58	4.87
3.12	4.73
3.11	3.84
4.44	2.90
5.63	2.14
5.87	1.47
4.35	0.41
2.42	0.51
5.54	0.09
5.19	
5.16	
4.16	
9.49	
10.22	

483

CUMULATIVE CURVE SAND-SILT-CLAY

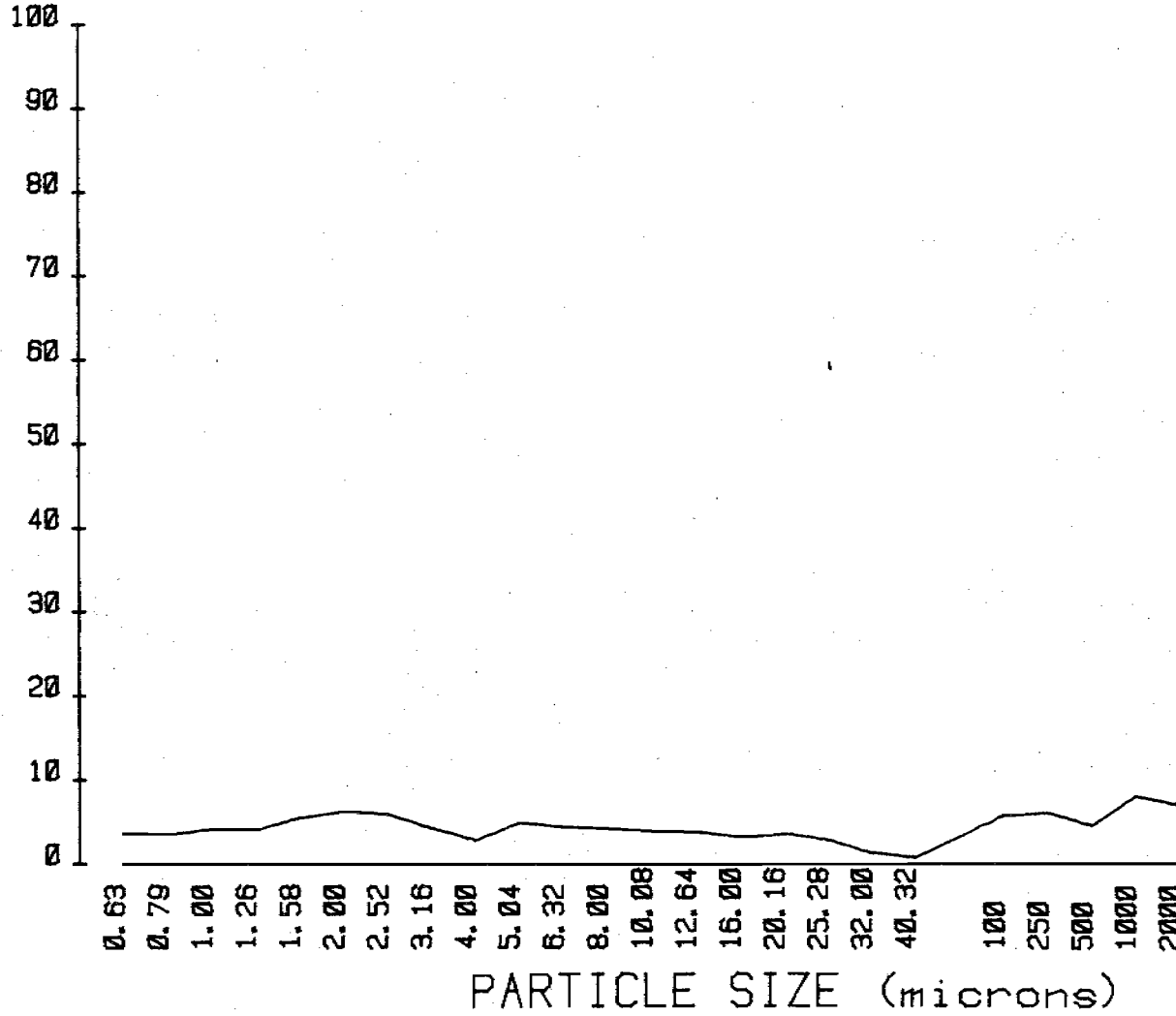
ID M1506-5



2.48	44.83
5.06	49.70
8.18	54.44
11.29	58.28
15.73	61.18
21.36	63.32
27.23	64.80
31.58	65.21
34.80	65.71
39.54	65.80
70.99	
76.15	
80.31	
89.80	
100.02	

PLOT SAND-SILT-CLAY

ID M1506-6



3.34	4.15
3.38	3.98
4.03	3.65
3.89	3.55
5.35	2.90
6.06	3.41
5.73	2.64
4.05	1.13
2.58	0.58
4.66	0.06
5.58	
5.92	
4.43	
7.93	
6.91	

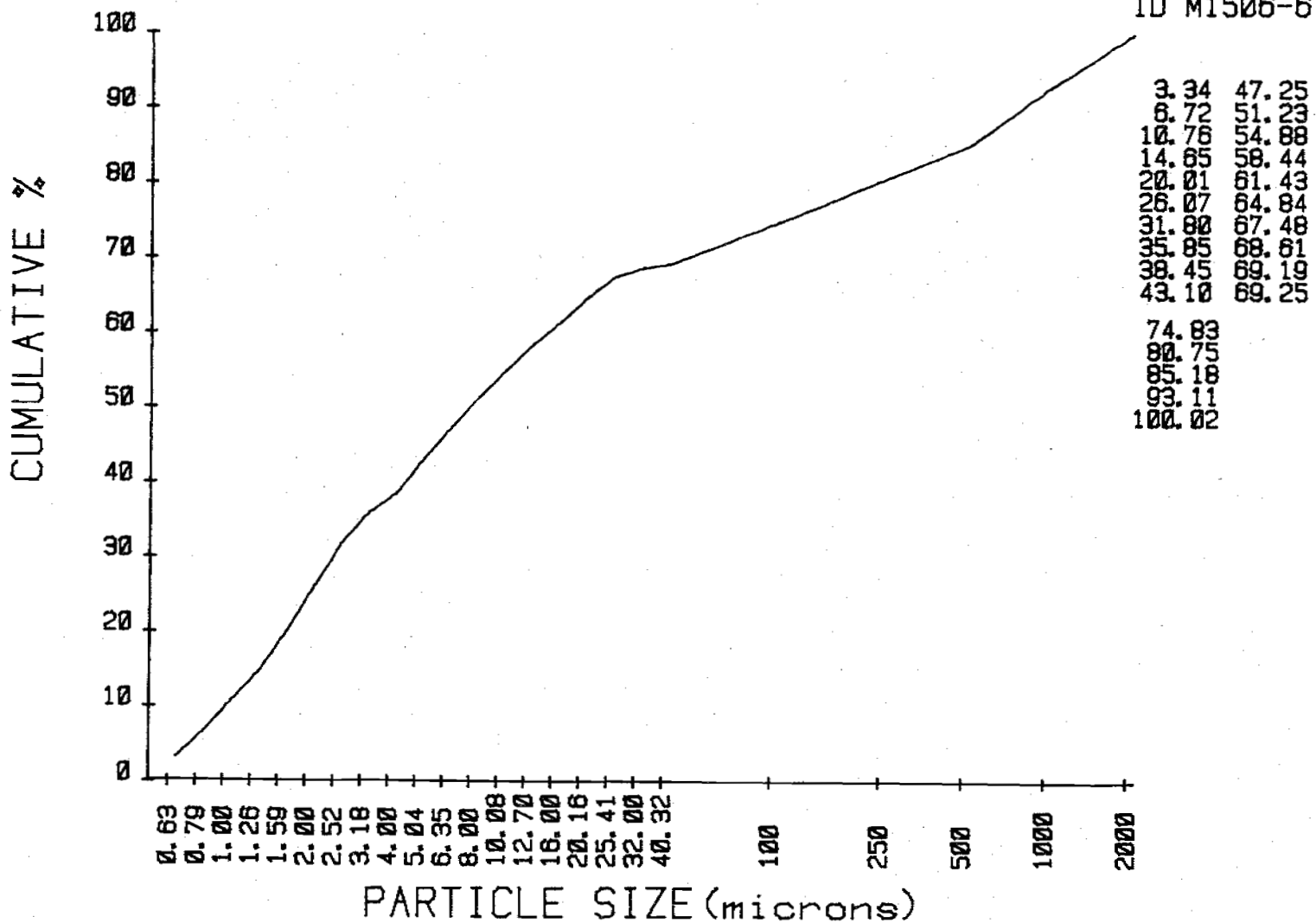
485

x



CUMULATIVE CURVE SAND-SILT-CLAY

ID M1506-6



Unnamed Gravelly Silt Loam 79-MT-1507 (1108010-2)

Classification: medial over loamy-skeletal, mixed Andeptic Cryoboralf.

General Site Characteristics

Location: Flathead County, Montana: section 18, T. 31N., R. 19W.  
Forest: Flathead National Forest  
Area:  
Described By/Date:  
Landform: 26B-7  
Habitat Type: (Thuja plicata)/Clintonia uniflora-Arabis nuttallii  
Formation Name:  
Parent Rock/Material: Piegan argillite  
Weathering:  
Topography:  
Slope: 0 percent  
Aspect:  
Elevation: 3300 feet MSL  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type:  
Surface Rock:

Climate:  
Precipitation:  
Erosion:  
Infiltration:  
Permeability:  
Storage:  
Drainage:  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

O 9-0 centimeters (4-0 inches). Organic duff, litter.

B2ir 0-24 centimeters (0-9 inches). Brown (7.5YR 4/4) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 6.0, noncalcareous; 31 percent gravels by weight; common fine and few medium roots; clear wavy boundary.

IIA2b 24-53 centimeters (9-21 inches). Brown (10YR 5/3) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; medium acid pH 5.8, noncalcareous; 41 percent gravels by weight; few fine roots; clear smooth boundary.

IIB2tb 53-77 centimeters (21-30 inches). Dark brown (10YR 4/3) moist; gravelly silt loam; moderate medium subangular blocky structure; slightly firm, slightly sticky and slightly plastic; neutral pH 7.3, noncalcareous; 36 percent gravels by weight; few thin clay films on ped faces; clear smooth boundary.

79-MT-1507 (cont.)

IIB3tb 77-107+ centimeters (30-42 inches). Dark brown (10YR 4/3) moist; gravelly silt loam; massive structure; firm, slightly sticky and slightly plastic; moderately alkaline pH 8.0, calcareous; 34 percent gravels by weight; few thin clay films on ped faces.

Pedon: Unnamed Gravelly Silt Loam 79-MT-1507 (1108010-2)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	0 B2ir	9- 0 0- 24	NS 6.0	NS 0.21	NS 54	NS 4.8				
2	I1A2b	24- 53	5.8	0.10	35	1.8				
3	I1B2tb	53- 77	7.3	0.30	32	1.4				
4	I1B3tb	77-107+	8.0	0.22	37	1.6				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH			
	Ca	Mg	Na	K	H		Saturation					Fraction				
													meq/100 gms	%	%	ratio
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			
	6.3	1.2	0.1	0.3	12.9	16.8	38	2.87	1.67	0.088	19	0.69	9.4			
2	3.8	1.3	0.1	0.1	2.7	5.9	66	0.41	0.24	0.016	15	0.59	7.8			
3	9.2	2.7	0.1	0.2	0.7	8.5	95	0.25	0.15	0.010	15	0.64	7.8			
4	11.9	1.8	0.1	0.1	0.7	6.1	95	0.16	0.09	0.006	15	0.66	8.6			

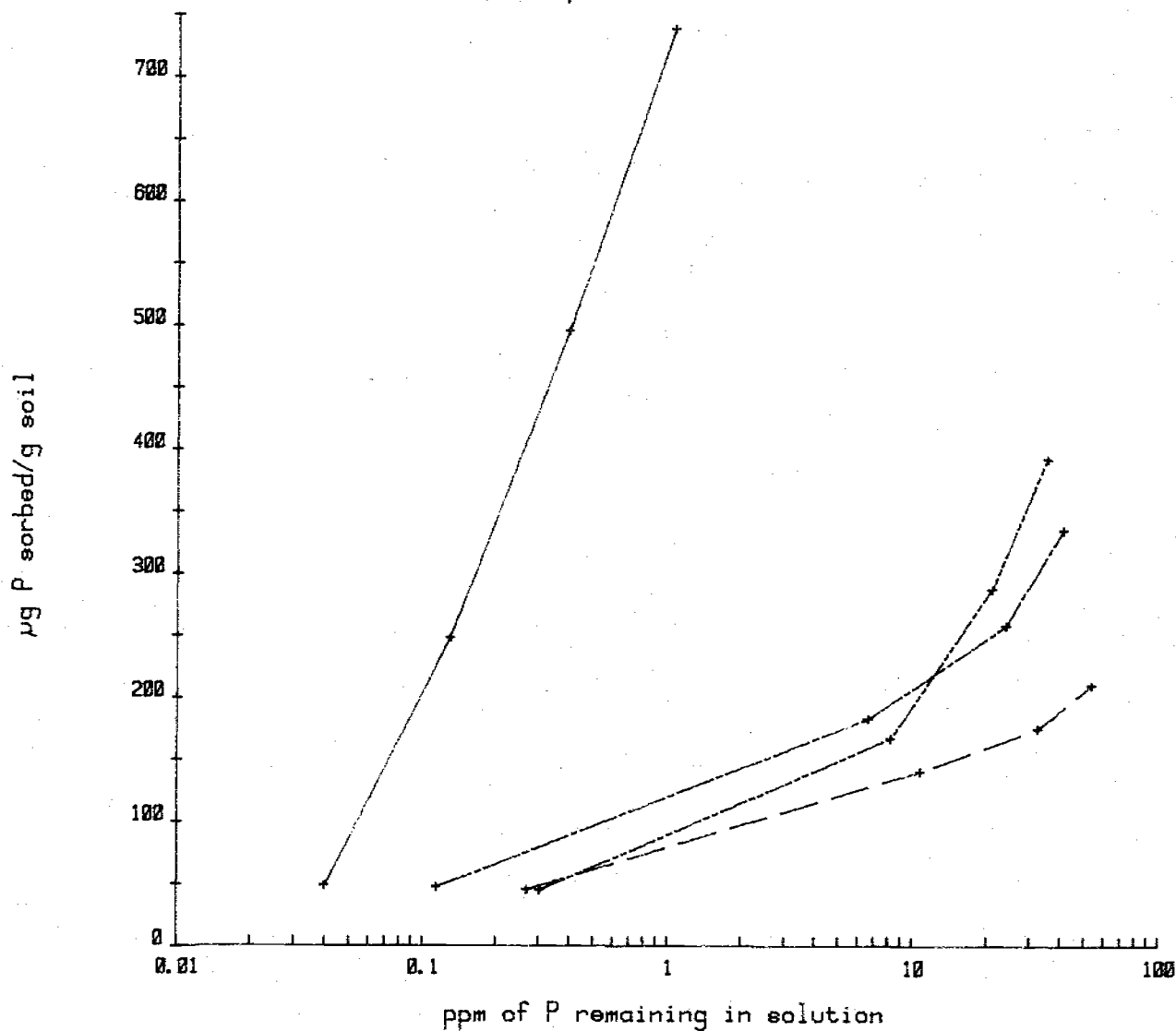
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

490

### Phosphorus Isotherm

79-MT-1507



µg/g soil    Soln ppm

————— B2ir

50            0.04

249          0.13

496          0.40

739          1.00

————— IIA2b

47            0.27

141          10.00

175          32.48

211          53.92

————— IIB2tb

49            0.12

184          6.84

258          24.16

336          41.44

————— IIB3tb

47            0.31

168          8.24

288          21.20

392          35.76

Pedon: Unnamed Gravelly Silt Loam 79-MT-1507 (1108010-2)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
9- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 24	1.74	4.35	3.57	6.34	9.58	25.56	63.17	11.27	31	Gr. silt loam
24- 53	4.48	5.56	4.47	7.72	10.34	32.57	54.71	12.72	41	Gr. silt loam
53- 77	4.56	5.30	4.46	7.41	9.77	31.50	51.15	17.35	36	Gr. silt loam
77-107+	5.98	6.03	4.28	7.31	8.62	32.22	50.57	17.21	34	Gr. silt loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density		1/3	15	Limit	
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	Index	
cm	%			g/cc		%		%	
9- 0						NS	NS	NS	NS
0- 24						34.0	7.5	NDNP	NDNP
24- 53						19.9	3.3	NDNP	NDNP
53- 77						21.5	7.0	20	4
77-107+						19.3	10.3	20	12

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

1691

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

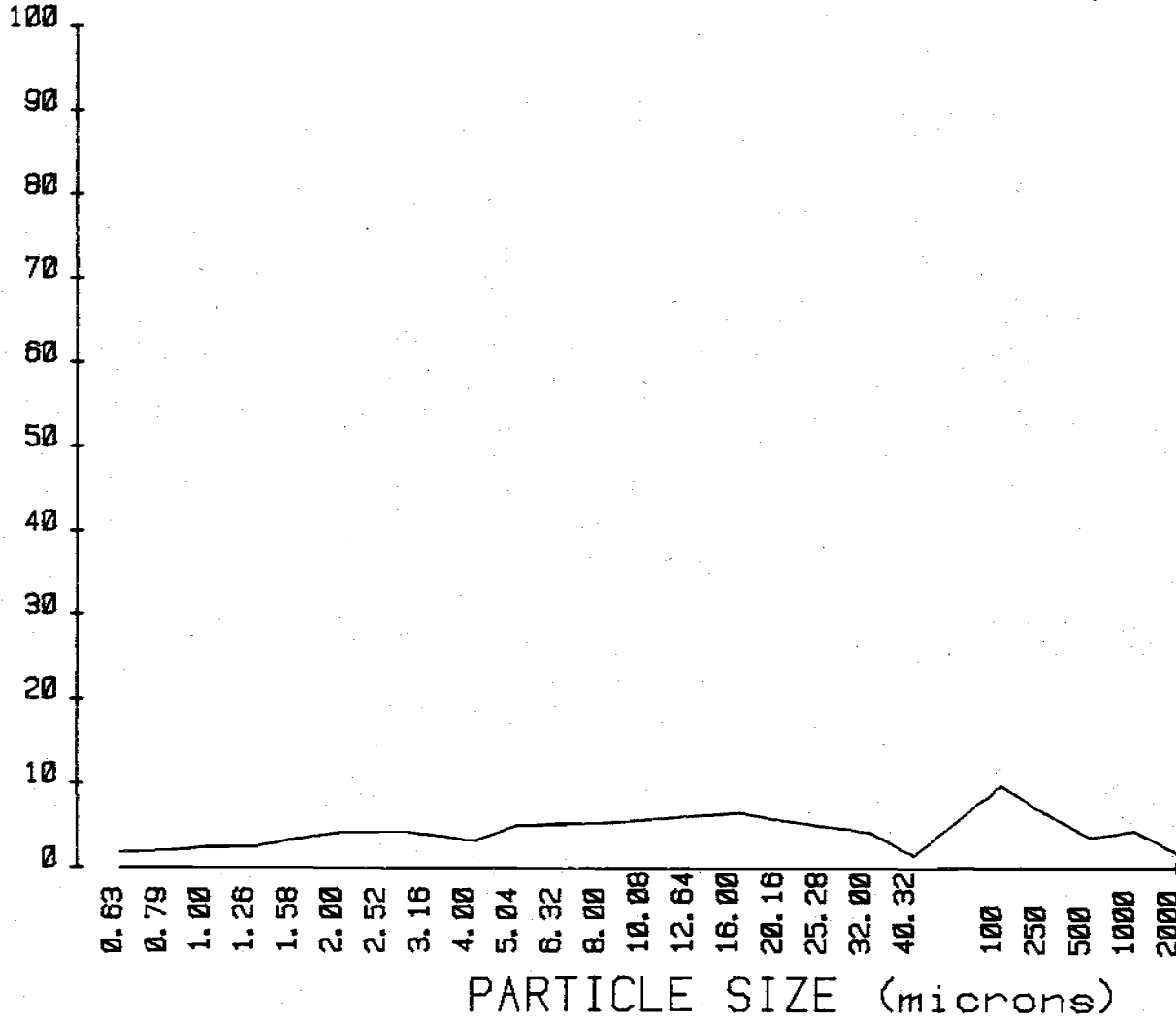
Date: January 1981

Identification		M1507-1	M1507-2	M1507-3	M1507-4
Units		-----%			
TC (0.63-2.00)		11.27	12.72	17.35	17.21
TSi (2.00-50)		63.17	54.71	51.15	50.57
TS (50-2000)		25.56	32.57	31.50	32.22
Clay	0.63-0.794	1.65	1.85	3.00	3.00
	0.794-1.00	1.83	1.97	2.95	2.87
	1.00-1.26	2.29	2.47	3.40	3.36
	1.26-1.59	2.29	2.59	3.35	3.33
	1.59-2.00	3.22	3.84	4.64	4.64
Fine Silt	2.00-2.52	3.95	4.75	5.49	5.79
	2.52-3.17	4.17	4.98	5.21	6.00
	3.17-4.00	3.59	3.70	3.48	4.24
	4.00-5.04	2.87	1.99	1.70	1.95
Medium Silt	5.04-6.35	4.76	4.99	4.35	4.87
	6.35-8.00	5.04	5.02	4.28	4.70
	8.00-10.08	5.10	4.80	4.05	4.43
	10.08-12.70	5.56	5.42	4.23	4.72
	12.70-16.0	6.00	4.80	4.18	4.28
	16.0-20.2	6.36	4.56	4.31	3.89
Coarse Silt	20.2-25.4	5.42	3.89	3.89	2.51
	25.4-32.0	4.69	3.27	2.83	1.15
	32.0-40.3	4.00	1.91	1.98	1.26
	40.3-50.8	1.27	0.55	0.82	0.74
	50.8-64.0	0.39	0.07	0.33	0.06
VFS (50-100)		9.58	10.34	9.77	8.62
FS (100-250)		6.34	7.72	7.41	7.31
MS (250-500)		3.57	4.47	4.46	4.28
CoS (500-1000)		4.35	5.56	5.30	6.03
VCoS (1000-2000)		1.74	4.48	4.56	5.98
Greater than 2000		31	41	36	34
Textural Class		Gr. SiL	Gr. SiL	Gr. SiL	Gr. SiL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M1507-1



1.65	5.04
1.83	5.10
2.26	5.56
2.29	6.00
3.22	6.36
3.95	5.42
4.17	4.69
3.59	4.00
2.87	1.27
4.76	0.39
0.58	
0.34	
3.57	
4.35	
1.74	

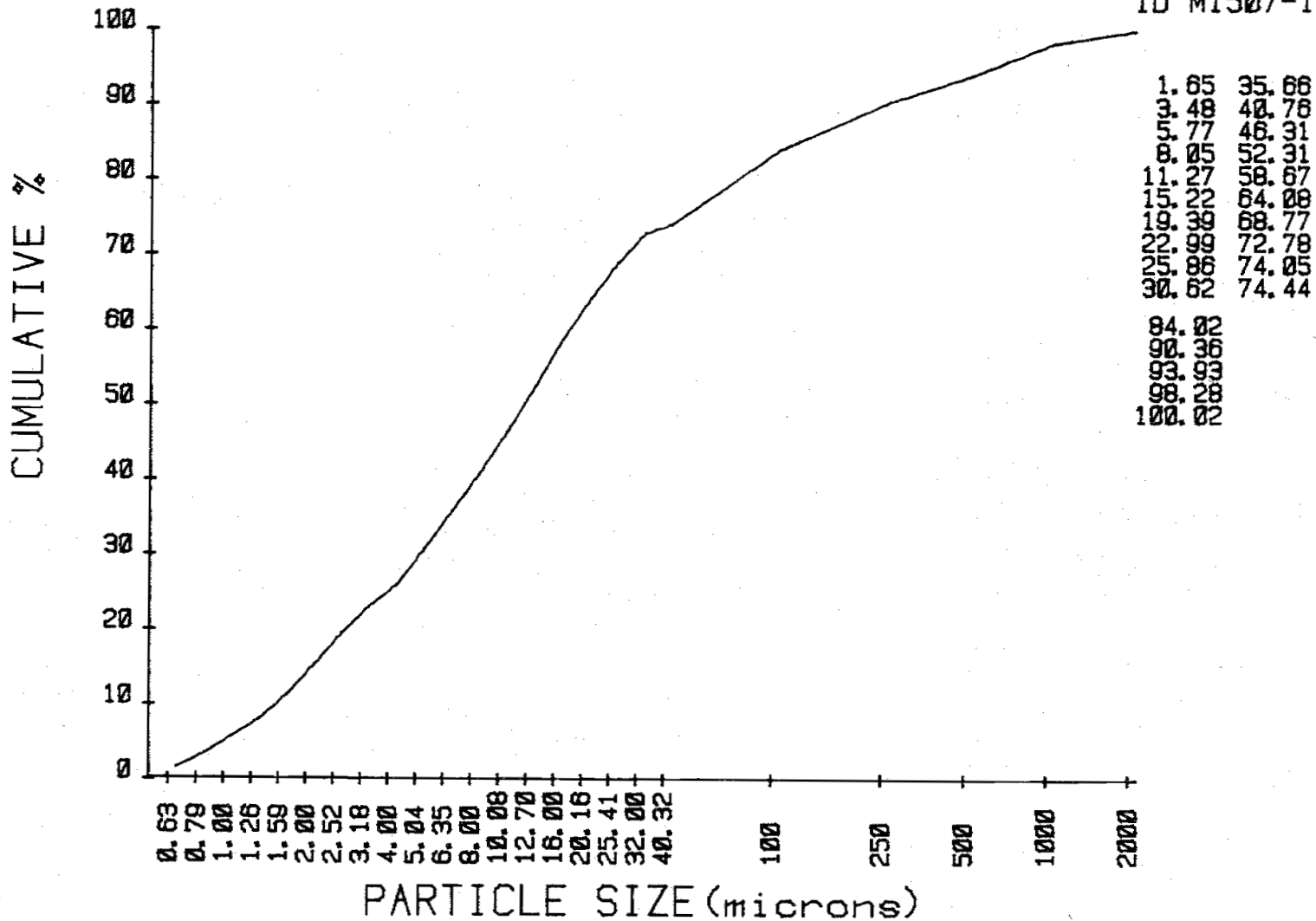
493

x



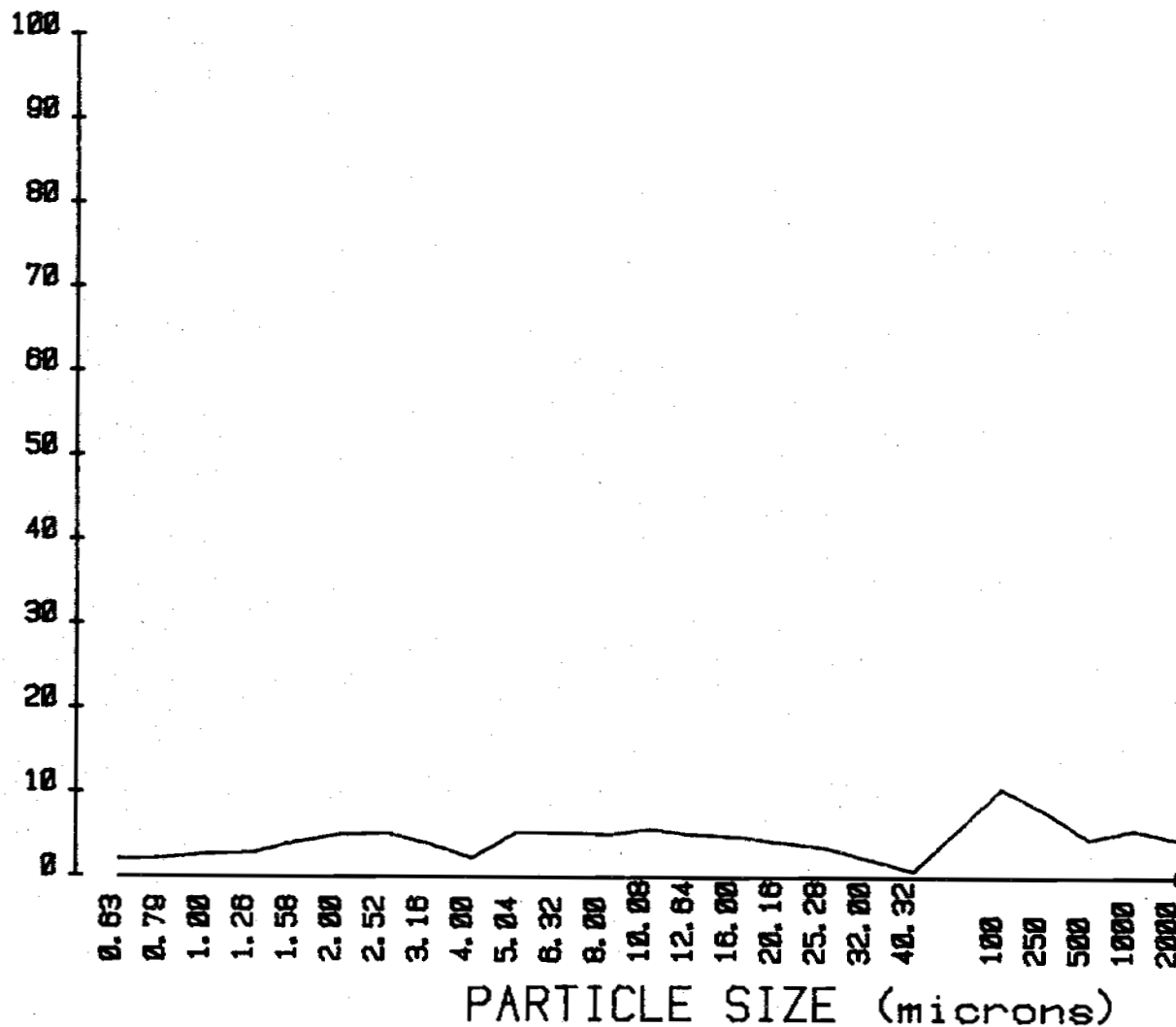
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1507-1



PLOT SAND-SILT-CLAY

ID M1507-2



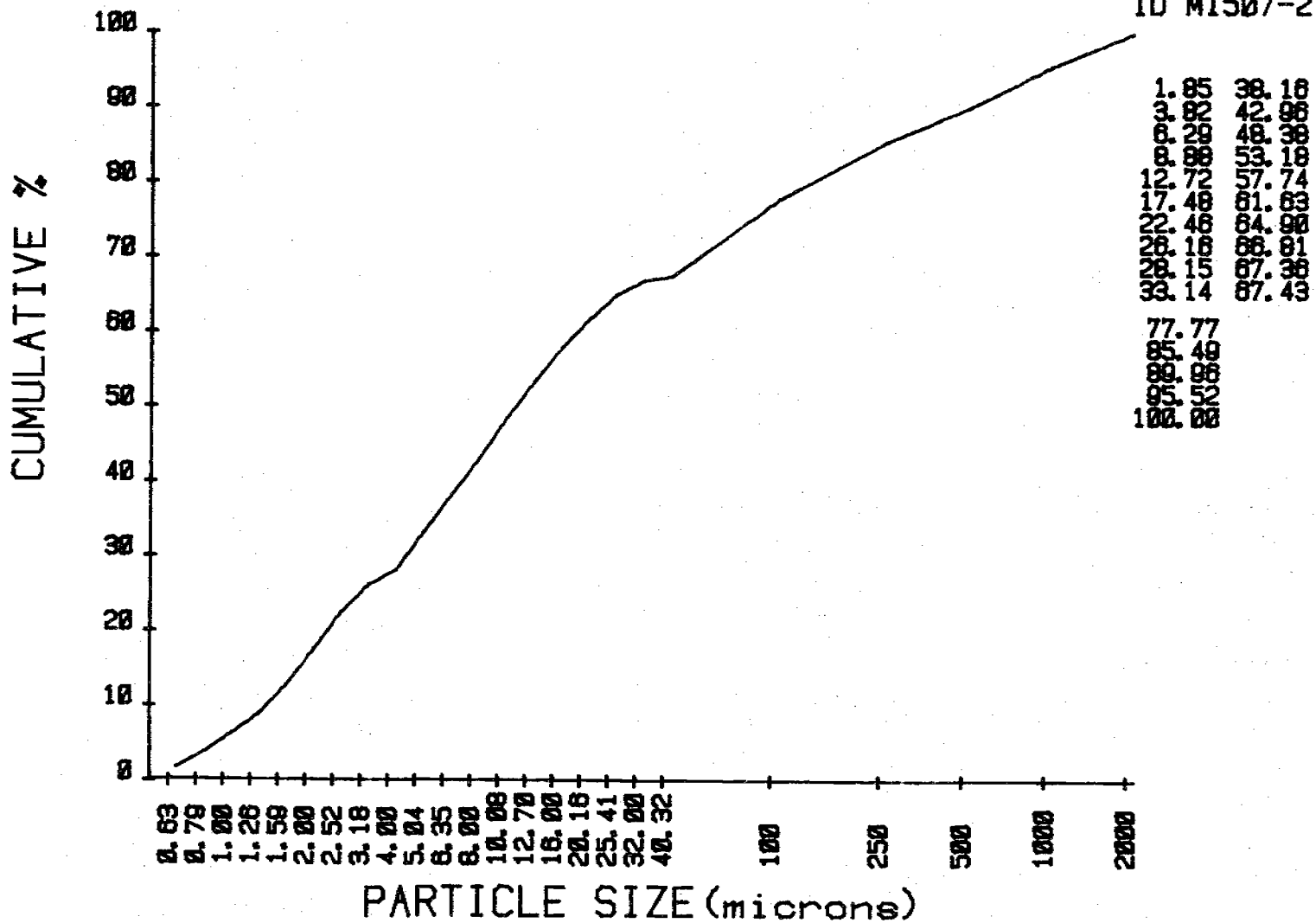
1.85	5.02
1.97	4.80
2.47	5.42
2.59	4.80
3.04	4.56
4.75	3.80
4.98	3.27
3.70	1.91
1.99	0.55
4.89	0.07
10.34	
7.72	
4.47	
5.58	
4.48	

495

x

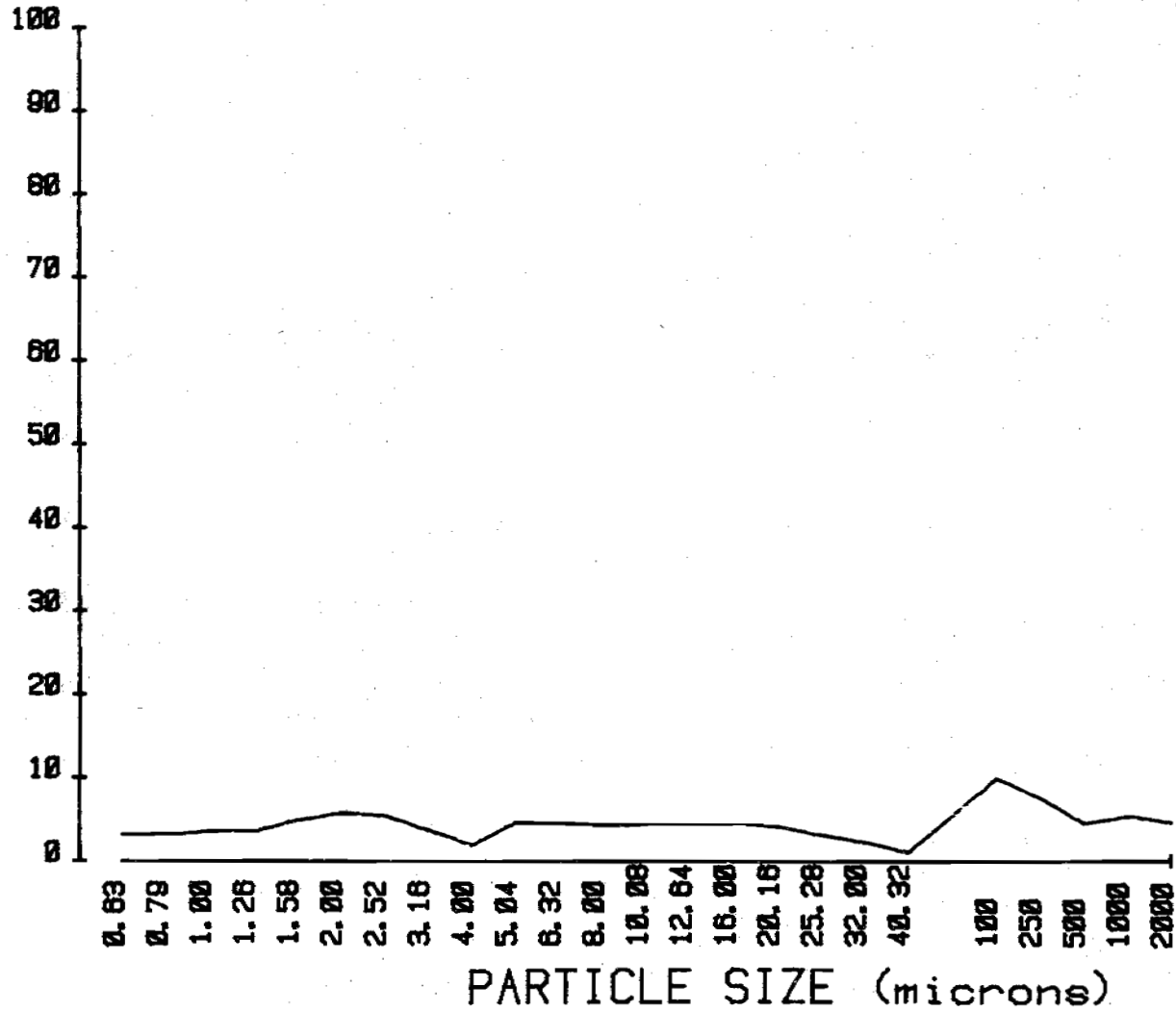
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1507-2



PLOT SAND-SILT-CLAY

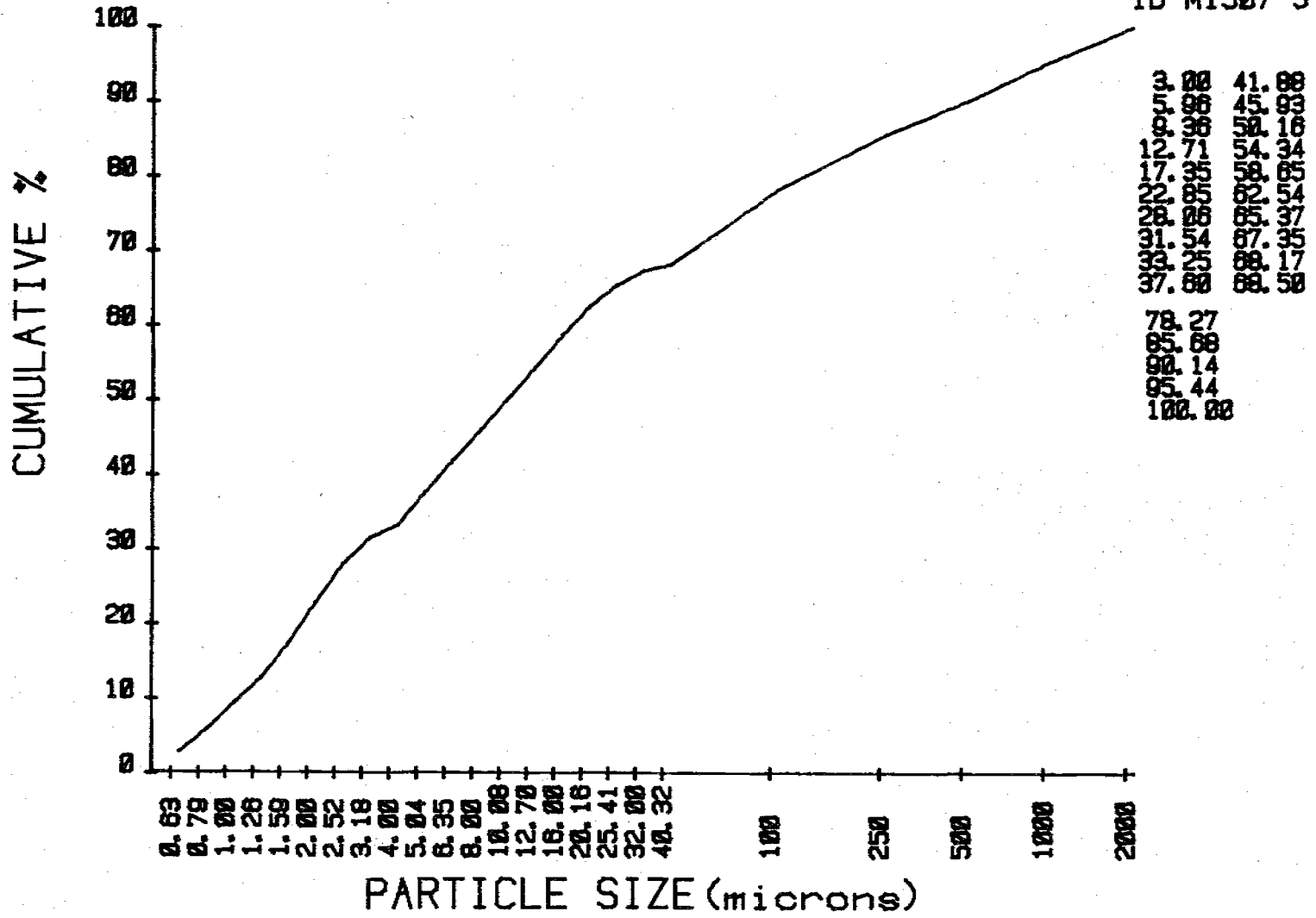
ID M1507-3



3.00	4.28
2.05	4.05
3.40	4.23
3.35	4.18
4.84	4.31
5.49	3.89
5.21	2.83
3.48	1.87
1.70	0.82
4.35	0.33
8.77	
7.41	
4.48	
5.38	
4.58	

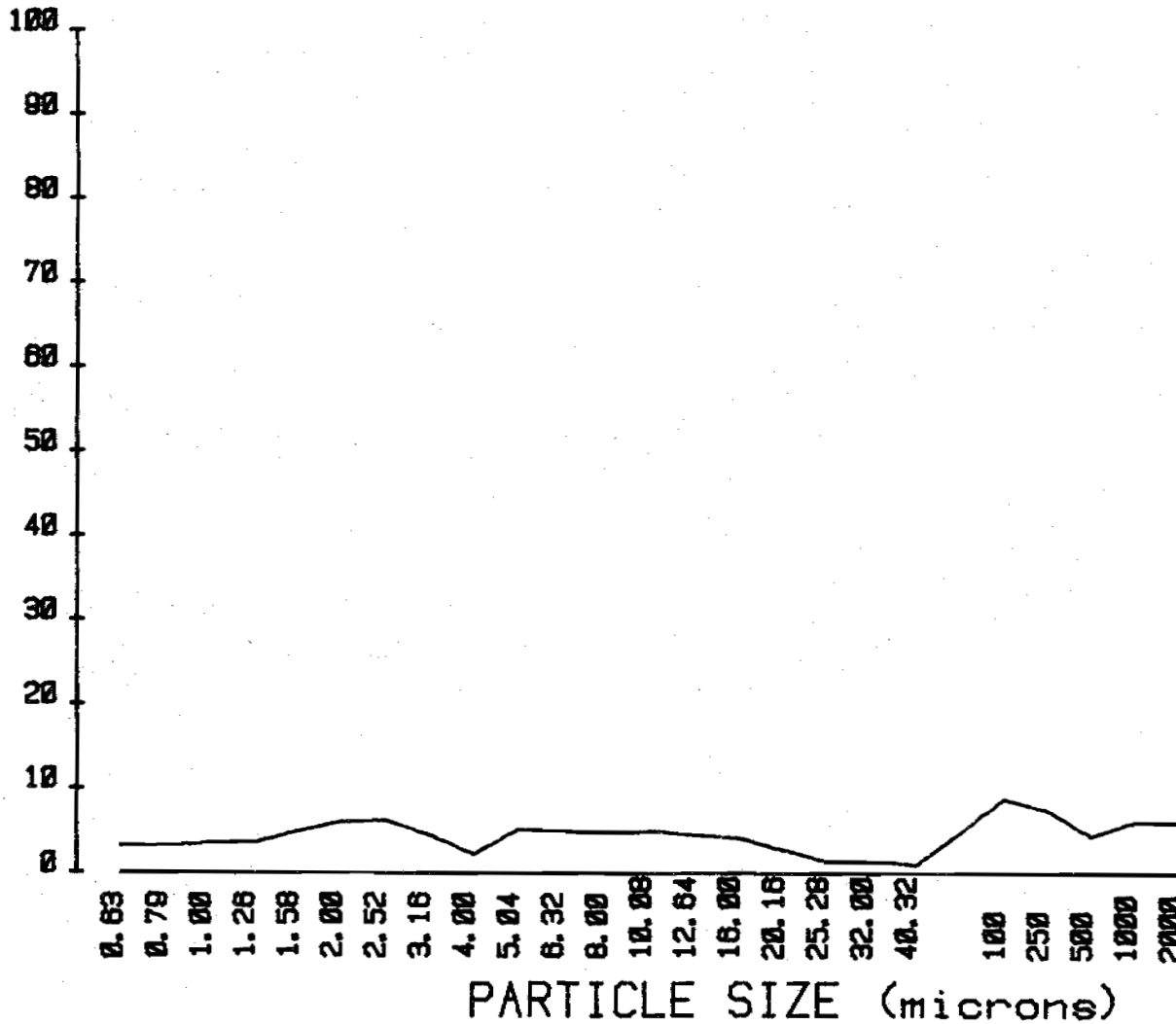
CUMULATIVE CURVE SAND-SILT-CLAY

ID M1507-3



PLOT SAND-SILT-CLAY

ID M1507-4



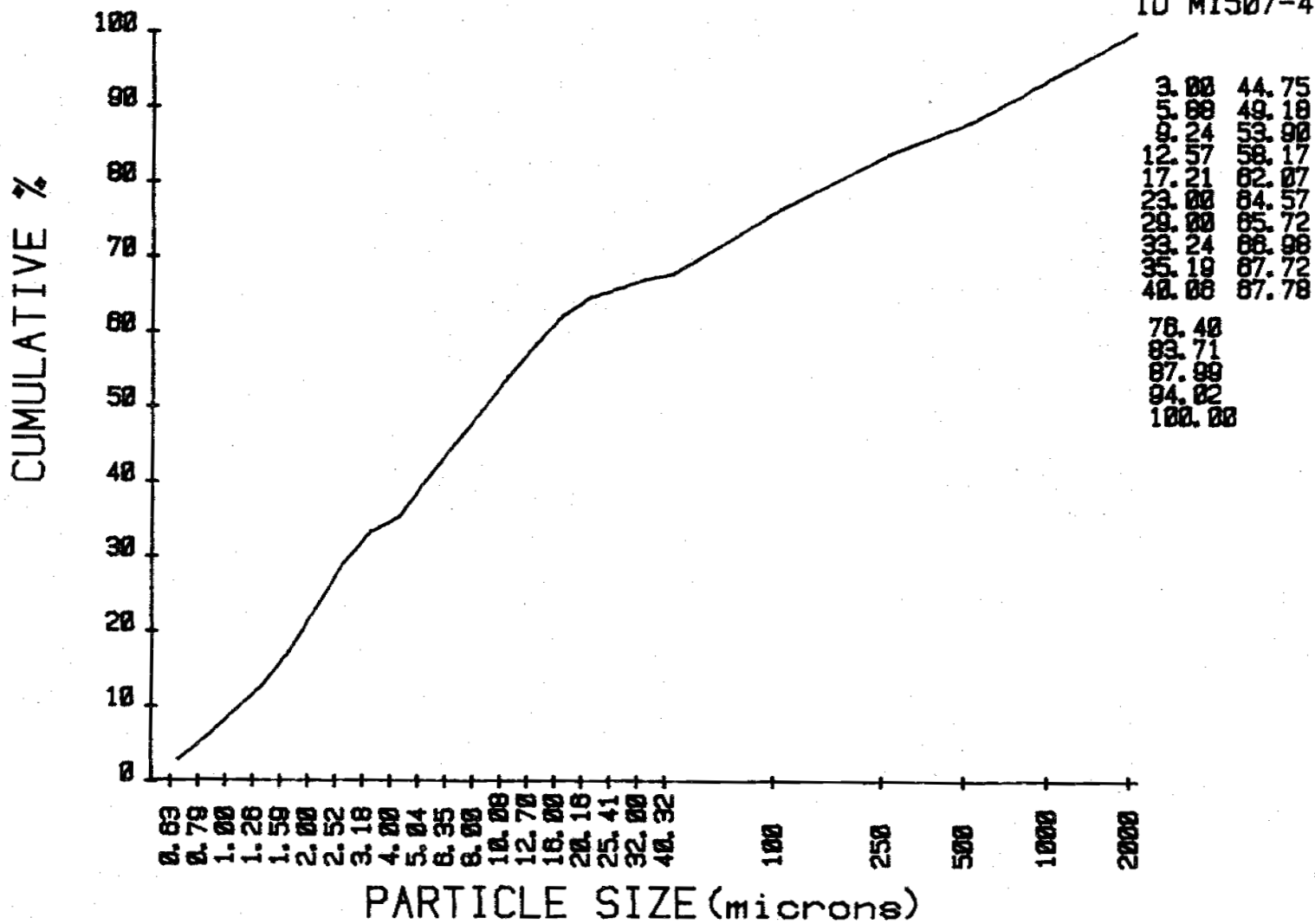
3.00	4.89
2.87	4.49
3.36	4.72
3.39	4.27
4.84	3.89
5.79	2.51
8.00	1.15
4.24	1.26
1.95	0.74
4.87	0.08
8.82	
7.91	
4.28	
8.83	
5.98	

667

x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M1507-4



500

Unnamed Gravelly Silt Loam 79-MT-1508 (1005018-2)

Classification: medial over loamy-skeletal, mixed Andeptic Cryoboralf.

General Site Characteristics

Location: Flathead County, Montana: section 10, T. 30N., R. 23W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 57A-7

Habitat Type: (Abies lasiocarpa)/(Vaccinium caespitosum)

Formation Name:

Parent Rock/Material: Siyeh limestone

Weathering:

Topography:

Slope: 10 percent

Aspect:

Elevation: 3850 feet MSL

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

O 5-8 centimeters (2-3 inches). Organic duff.

A2 0-6 centimeters (0-2 inches). Brown (10YR 4/3) moist; silt loam; weak medium granular structure; friable, nonsticky and nonplastic; no lab sample; pH 6.3; 5 percent coarse fragments by volume; common fine, few medium roots; abrupt wavy boundary.

B2ir 6-27 centimeters (2-11 inches). Dark yellowish brown (10YR 4/4) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 5.9, noncalcareous; 30 percent gravels by weight; common fine, few medium and coarse roots; clear wavy boundary.

IIA2b 27-52 centimeters (11-21 inches). Pale brown (10YR 6/3) moist; gravelly silt loam; weak medium granular structure; friable, nonsticky and nonplastic; medium acid pH 5.8, noncalcareous; 31 percent gravels by weight; common fine, few medium roots; clear smooth boundary.



79-MT-1508 (cont.)

IIB2tb 52-73 centimeters (21-29 inches). Brown (10YR 5/3) moist; gravelly silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; slightly acid pH 6.4, noncalcareous; 31 percent gravels by weight; few thin clay films on ped faces; clear smooth boundary.

IIB3b 73-86+ centimeters (29-34+ inches). Yellowish brown (10YR 5/4) moist; gravelly loam; massive structure; friable, nonsticky and nonplastic; slightly acid pH 6.5, noncalcareous; 35 percent gravels by weight; few fine roots.

Pedon: Unnamed Gravelly Silt Loam 79-MT-1508 (100501B-3)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions								
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	
							meq/1000 gms								
	0	5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	A2	0-6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	B2ir	6-27	6.0	5.9	0.31	66	1.3	0.5	0.2	0.3	0.0	1.3	0.2	0.6	0.6
2	IIA2b	27-52	5.9	5.8	0.21	39	0.4	0.3	0.2	0.0	0.0	0.2	0.1	0.5	0.5
3	IIIB2tb	52-73	6.8	6.4	0.27	49	0.9	0.5	0.2	0.0	0.0	0.8	0.1	0.5	0.5
4	IIIB3b	73-86+	7.0	6.5	0.27	40	0.9	0.4	0.2	0.0	0.0	0.8	0.1	0.5	0.5

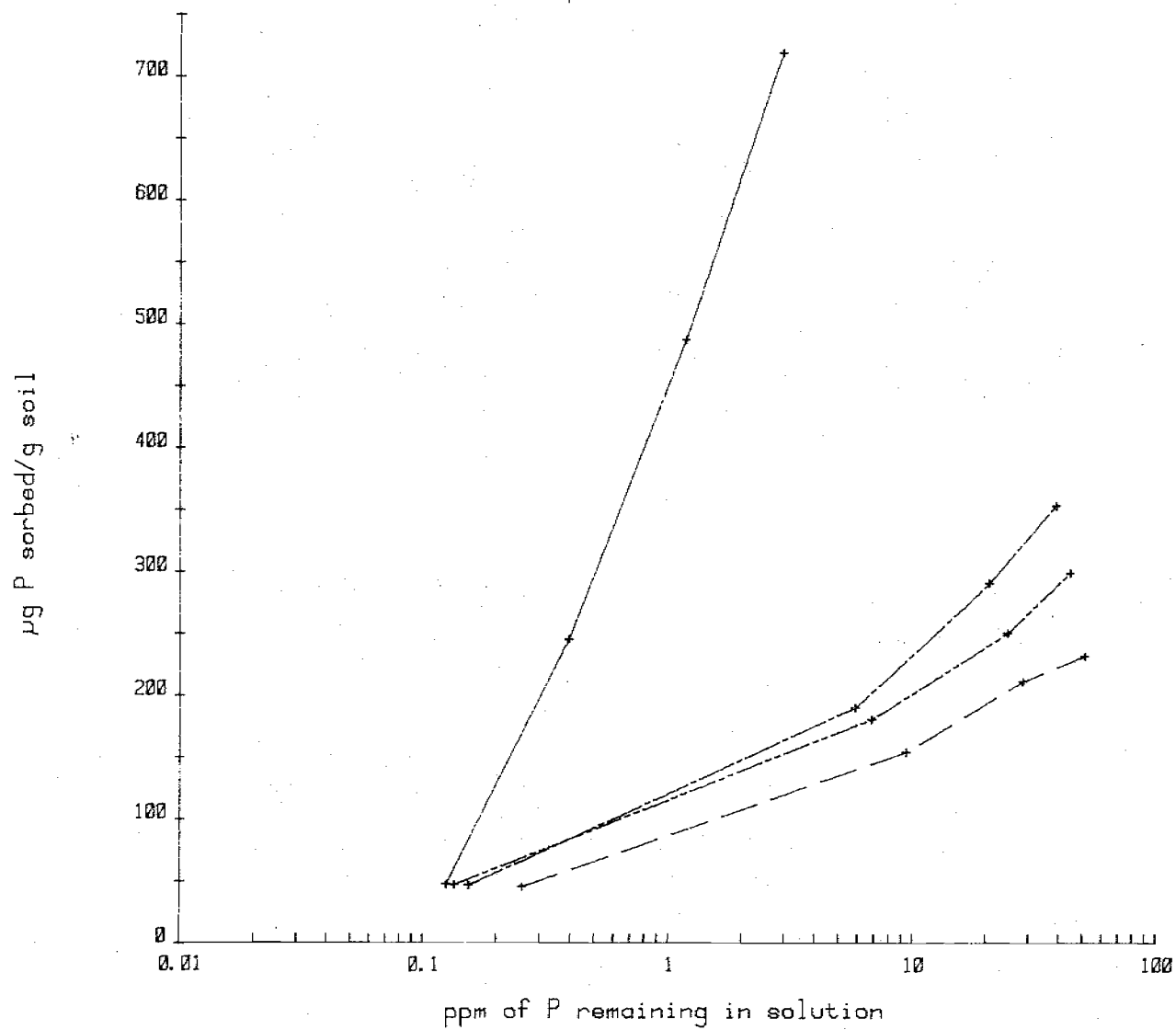
Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
							%				ppm			
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	6.1	1.8	0.1	1.0	19.4	1	3.49	2.83	0.082	24	nil	nil	0.70	9.5
2	5.2	2.0	0.1	0.2	12.1	1	0.77	0.45	0.029	16	nil	nil	0.69	2.1
3	9.7	2.0	0.1	0.4	21.6	0	1.05	0.61	0.038	16	nil	nil	0.69	0.9
4	8.7	2.9	0.1	0.3	16.0	1	0.60	0.35	0.021	17	nil	nil	0.65	1.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

## Phosphorus Isotherm

79-MT-1508



µg/g soil Soln ppm

————— B21r

49 0.13

246 0.40

488 1.20

720 3.04

- - - - - IIA2b

47 0.26

155 9.52

212 28.00

232 51.76

- · - · - IIB2tb

48 0.16

191 5.92

291 20.88

354 39.60

- - - - - IIB3b

49 0.14

181 6.88

251 24.88

300 45.04

Pedon: Unnamed Gravelly Silt Loam 79-MT-1508 (100501B-3)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
cm	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
	%							%		
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
6-27	4.02	4.21	2.48	5.18	11.28	27.09	66.59	6.32	30	Gr. silt loam
27-52	7.68	5.90	3.31	6.19	8.17	31.25	57.90	10.86	31	Gr. silt loam
52-73	6.35	5.35	3.60	6.50	6.12	31.51	56.21	15.87	31	Gr. silt loam
73-86+	11.82	8.84	5.16	10.16	8.88	44.86	41.95	13.20	35	Gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
cm	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
	%			g/cc		%		%
5-0						NS	NS	NS
0-6						NS	NS	NS
6-27						36.7	13.5	NDNP
27-52						24.1	9.3	NDNP
52-73						26.9	13.6	32
73-86+						23.0	10.4	24
								12
								NP
								ND

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

505

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Flathead National Forest-LIM

Analysis by: Anita and Debbie

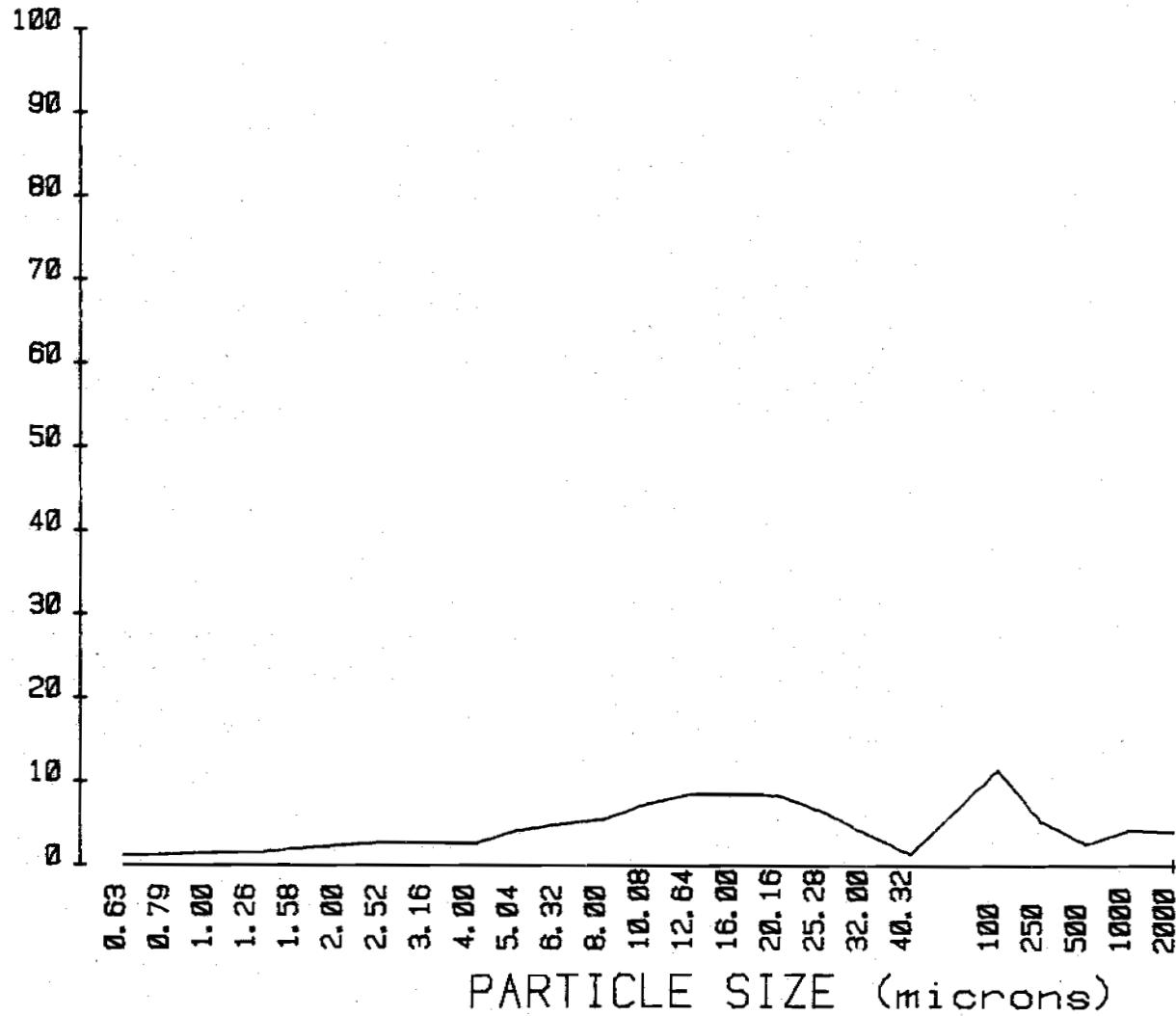
Date: January 1981

Identification		M1508-2	M1508-3	M1508-4	M1508-5
Units		-----%			
TC (0.63-2.00)		6.32	10.86	15.87	13.20
TSi (2.00-50)		66.59	57.90	56.21	41.95
TS (50-2000)		27.09	31.25	27.92	44.86
Clay	0.63-0.794	0.94	1.63	3.04	2.33
	0.794-1.00	1.09	1.74	2.67	2.23
	1.00-1.26	1.28	2.12	3.06	2.53
	1.26-1.59	1.25	2.17	2.96	2.51
	1.59-2.00	1.75	3.20	4.14	3.60
Fine Silt	2.00-2.52	2.20	4.15	5.08	4.38
	2.52-3.17	2.56	4.56	5.34	4.42
	3.17-4.00	2.42	3.58	3.88	3.13
	4.00-5.04	2.34	2.14	2.24	1.76
Medium Silt	5.04-6.35	3.93	4.96	5.12	4.01
	6.35-8.00	4.73	5.07	5.14	3.93
	8.00-10.08	5.31	5.04	4.73	2.05
	10.08-12.70	7.18	5.58	5.20	3.98
	12.70-16.0	8.34	5.73	5.06	3.93
	16.0-20.2	8.50	5.34	4.87	3.40
Coarse Silt	20.2-25.4	8.08	4.96	4.62	2.76
	25.4-32.0	6.16	3.27	2.82	1.59
	32.0-40.3	3.56	2.30	1.61	0.76
	40.3-50.8	1.17	1.19	0.40	0.12
	50.8-64.0	0.11	0.04	0.10	0.06
VFS (50-100)		11.28	8.17	6.12	8.88
FS (100-250)		5.10	6.19	6.50	10.16
MS (250-500)		2.48	3.31	3.50	5.16
CoS (500-1000)		4.21	5.90	5.35	8.84
VCoS (1000-2000)		4.02	7.68	6.35	11.82
Greater than 2000		30	31	31	35
Textural Class		Gr. SiL	Gr. SiL	Gr. SiL	Gr. loam

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

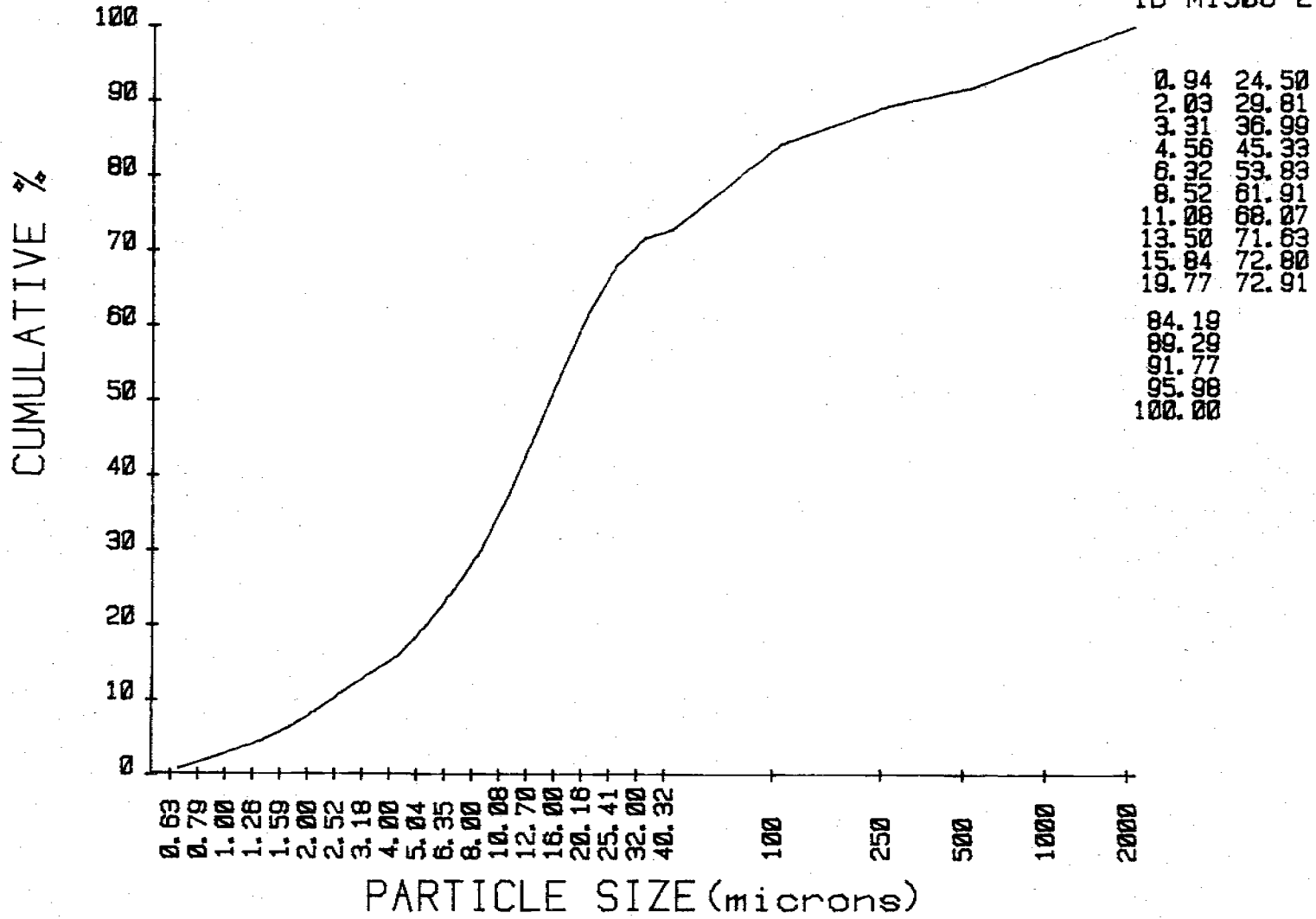
ID M1508-2



0.94	4.73
1.09	5.31
1.28	7.18
1.25	8.34
1.75	8.50
2.20	8.08
2.56	6.18
2.42	3.56
2.34	1.17
3.93	0.11
11.28	
5.10	
2.48	
4.21	
4.02	

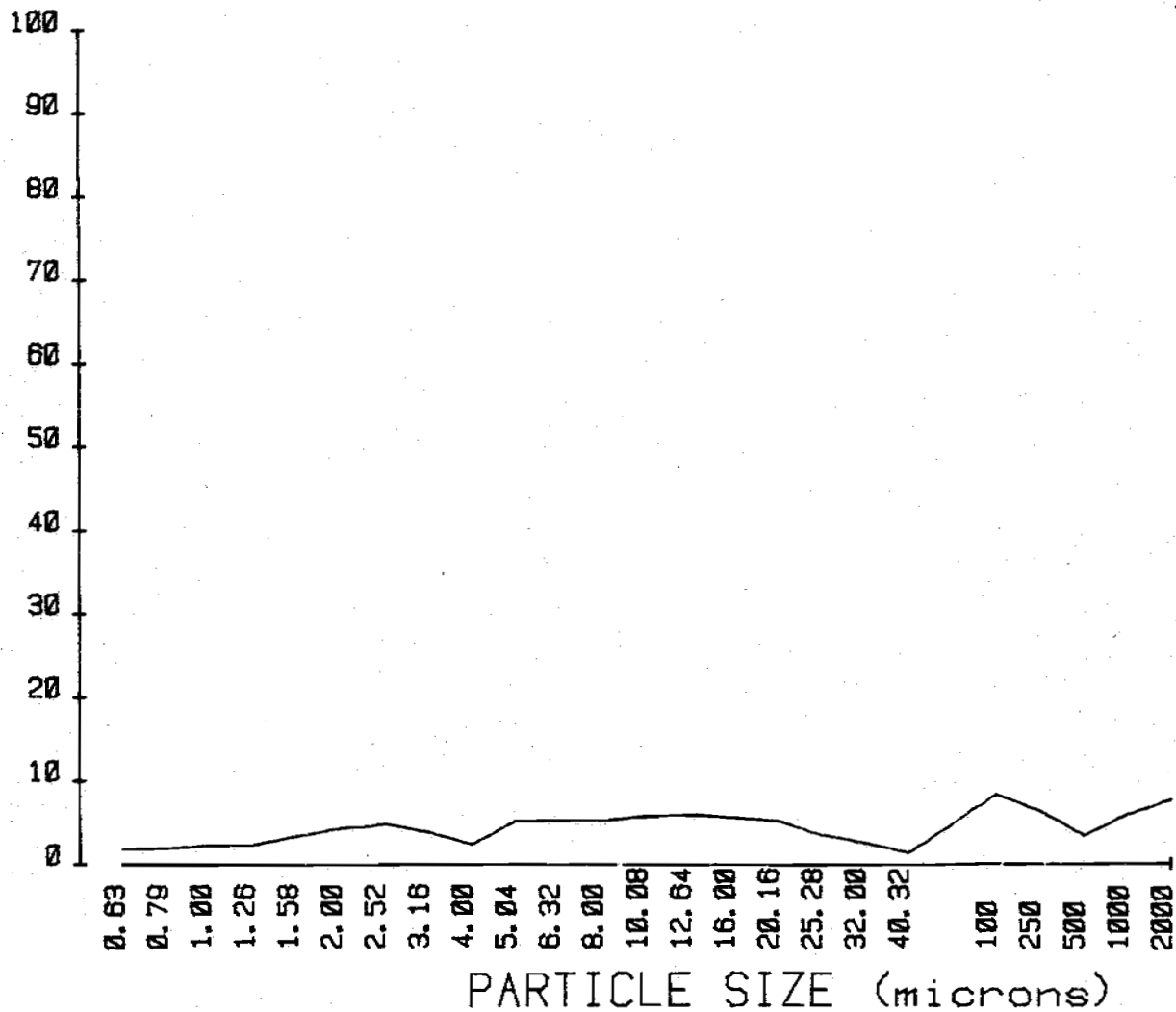
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1508-2



PLOT SAND-SILT-CLAY

ID M1508-3



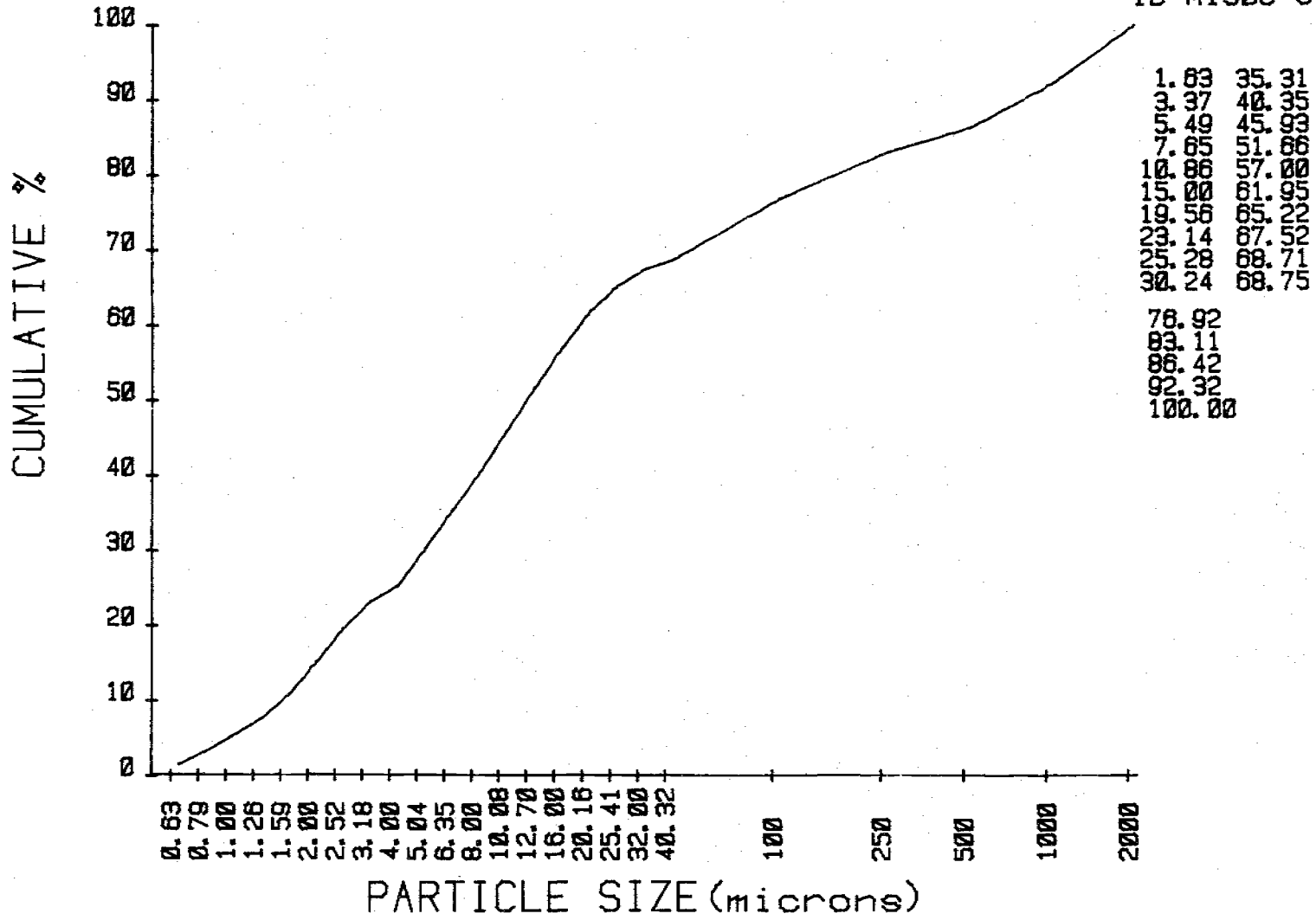
1.63	5.07
1.74	5.04
2.11	5.58
2.17	5.73
3.20	5.34
4.15	4.96
4.56	3.27
3.58	2.30
2.14	1.19
4.96	0.04
8.17	
8.19	
3.31	
5.90	
7.88	

605



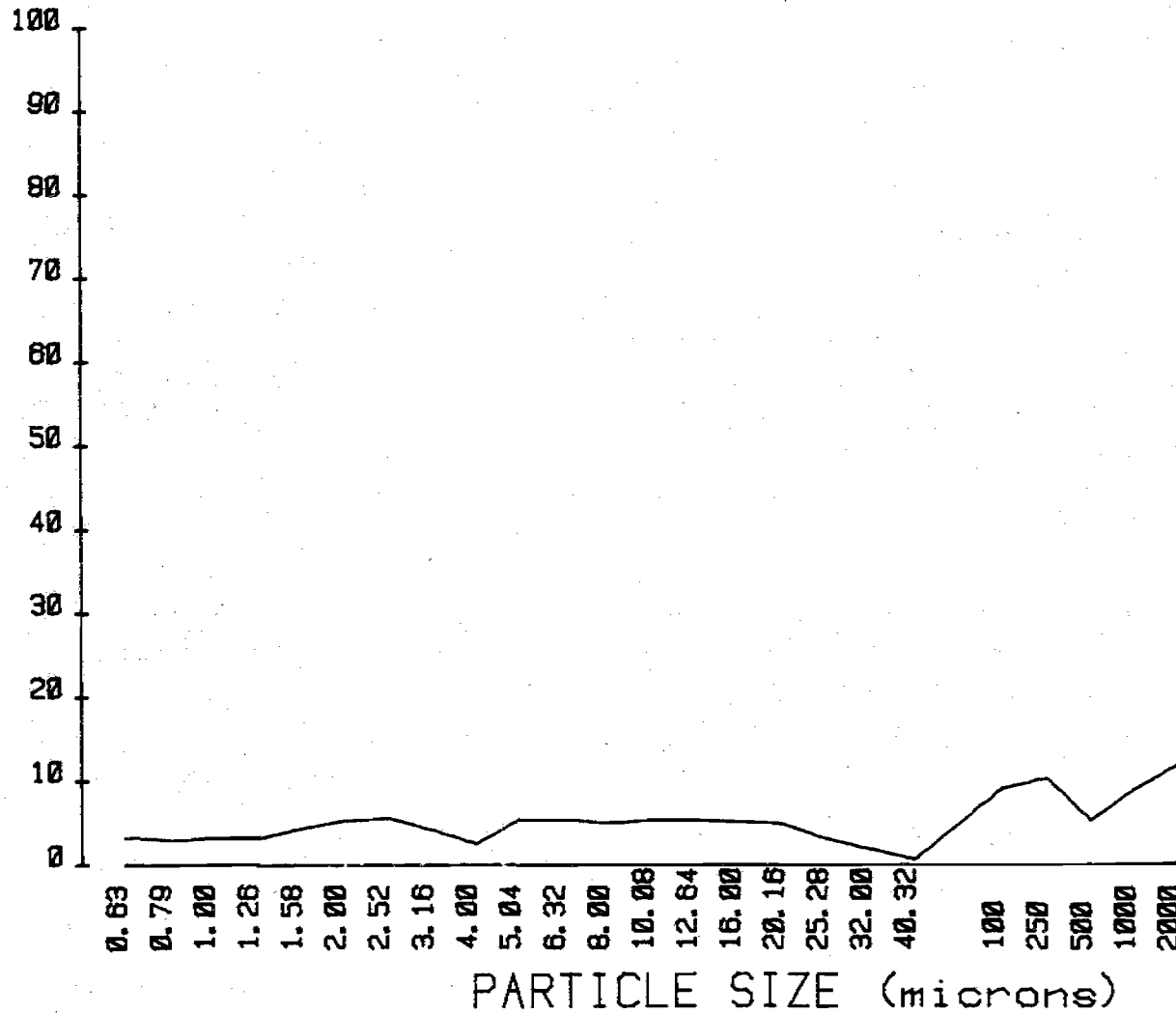
### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1508-3



PLOT SAND-SILT-CLAY

ID M1508-4



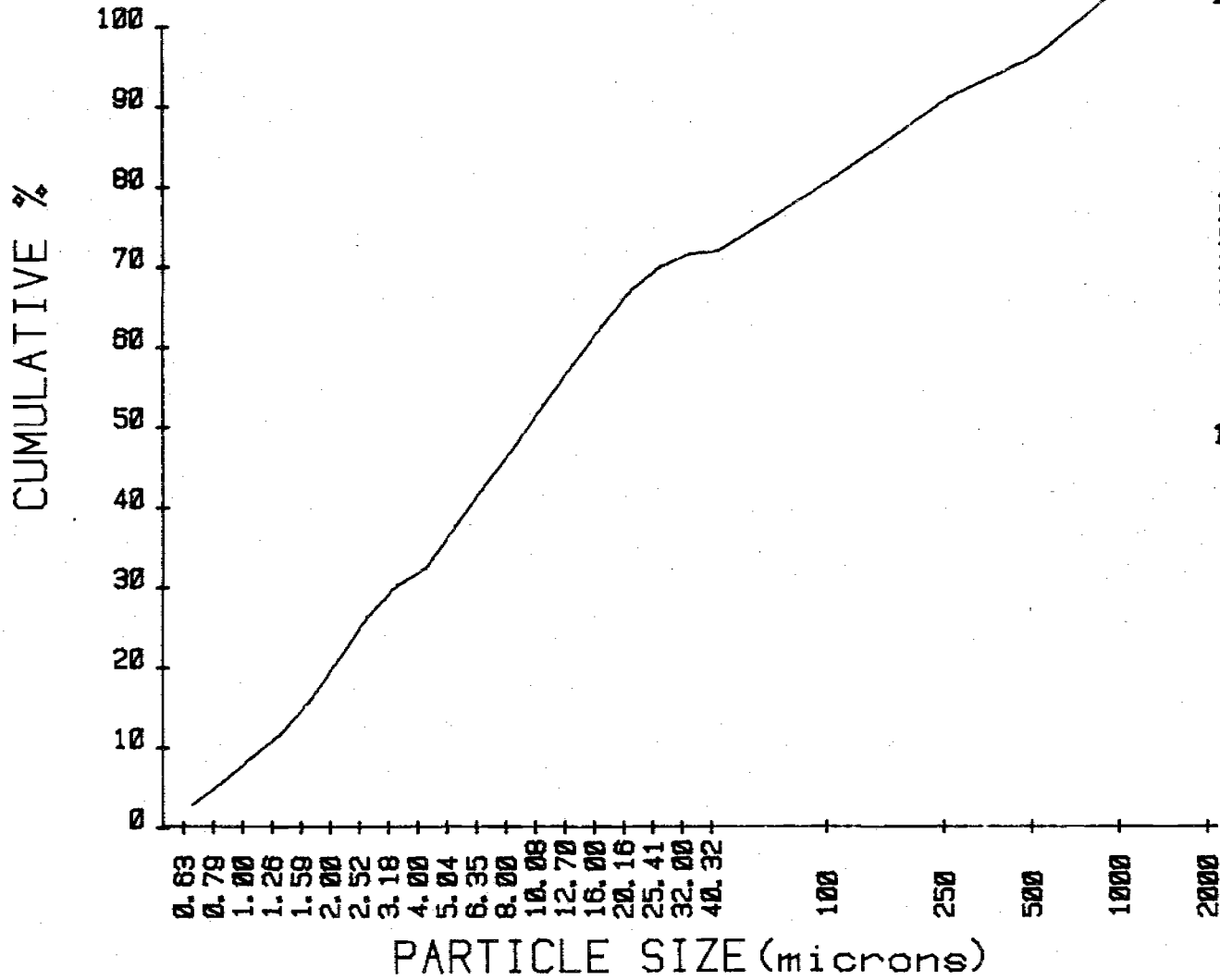
3.04	0.84	5.14
3.16	0.87	4.79
3.25	0.86	5.20
3.34	0.96	5.06
3.44	1.14	4.87
3.54	0.88	4.82
3.64	0.34	2.84
3.74	0.88	1.60
3.84	0.24	0.40
3.94	0.12	0.10
4.04	0.88	
4.14	0.16	
4.24	0.16	
4.34	0.84	
4.44	11.82	

SIL

x

### CUMULATIVE CURVE SAND-SILT-CLAY

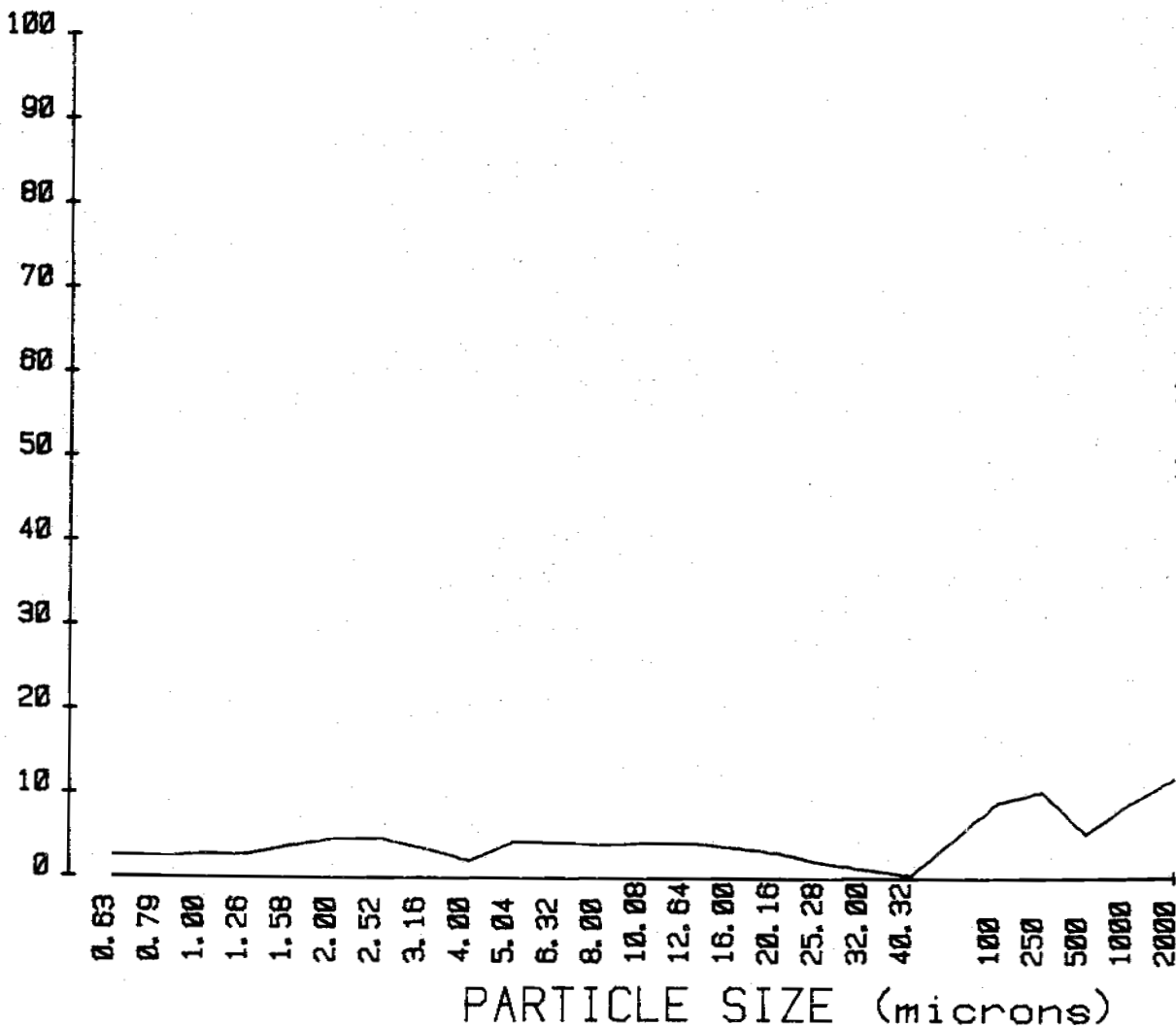
ID M1508-4



3.04	42.66
5.71	47.39
8.77	52.59
11.73	57.65
15.87	62.52
20.95	67.14
26.29	69.98
30.17	71.59
32.40	71.98
37.52	72.08
80.96	
91.12	
95.28	
105.12	
116.94	

# PLOT SAND-SILT-CLAY

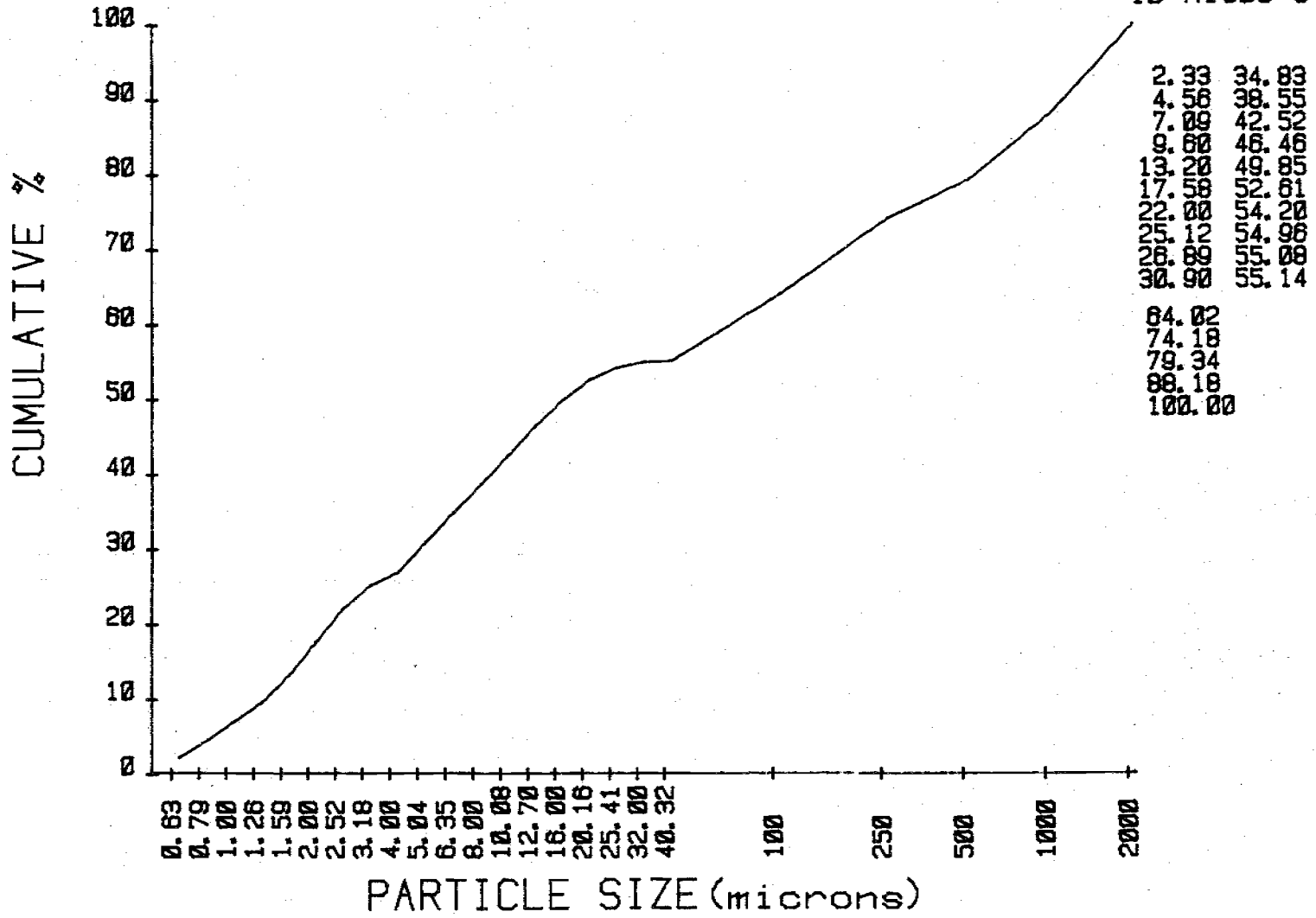
ID M1508-5



2.33	9.93
2.23	7.22
2.53	9.98
2.51	3.93
3.56	2.46
4.36	2.76
4.42	1.56
3.12	0.76
1.76	0.12
4.01	0.06
0.88	
0.16	
3.16	
0.84	
11.82	

### CUMULATIVE CURVE SAND-SILT-CLAY

ID M1508-5



Unnamed Clay 79-MT-1509 (160501B-1)

Classification: fine clayey, mixed Cumulic Cryoboroll.

General Site Characteristics

Location: Flathead County, Montana: section 8, T. 36N., R. 23W.

Forest: Flathead National Forest

Area:

Described By/Date:

Landform: 26C-8

Habitat Type: (Abies lasiocarpa)/(Clintonia uniflora-Menziesia ferruginea)

Formation Name:

Parent Rock/Material: Lintla argillite

Climate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 38 percent

Infiltration:

Aspect:

Permeability:

Elevation: 5400 feet MSL

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

O1 8-0 centimeters (3-0 inches).

A1 0-5 centimeters (0-2 inches). Brown (10YR 5/3) with very dark gray (10YR 3/1) organic mottles, moist; clay; moderate medium granular structure; friable, nonsticky and nonplastic; medium acid pH 5.6, noncalcareous; common fine and medium roots; clear wavy boundary.

B2 5-10 centimeters (2-7 inches). Dark yellowish brown (10YR 4/3) moist; gravelly clay loam; moderate medium subangular blocky structure; friable, nonsticky and slightly plastic; medium acid pH 5.6, noncalcareous; 32 percent gravels by weight; few fine and medium roots; clear wavy boundary.

A1b 18-24 centimeters (7-9 inches). Black (10YR 2/1) moist; clay; moderate medium granular structure; friable, nonsticky and slightly plastic; medium acid pH 5.8, noncalcareous; 13 percent gravels by weight; few thin clay films on ped faces; few fine roots; clear wavy boundary.

79-MT-1509 (cont.)

IIB22tb 24-31 centimeters (9-12 inches). Dark grayish brown (10YR 4/2) moist; gravelly clay; moderate medium subangular blocky structure; friable, nonsticky and slightly plastic; medium acid pH 5.8, noncalcareous; 22 percent gravels by weight; few thin clay on ped faces.

IICb 31-82 centimeters (12-32 inches). Slightly acid pH 6.0, noncalcareous; 36 percent gravels by weight.

Remarks: Fire influenced soil.

Pedon: Unamed Clay 79-MT-1509 (160501B-1)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	01	0-0	NS	NS	NS	NS				
2	A1	0-5	5.6	0.38	106	1.4				
3	B2	5-18	5.6	0.25	59	0.7				
4	A1b	18-24	5.8	0.24	75	1.2				
5	I1B22tb	24-31	5.8	0.20	78	1.5				
	I1Cb	31-82	6.0	0.15	44	0.5				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation					Fraction		
	meq/100 gms					%		%		ratio			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	18.8	4.8	0.1	0.9	21.1	59.5	54	16.41	9.54	0.535	18	1.80	8.3
3	10.5	3.4	0.1	0.4	13.6	74.0	51	4.19	2.44	0.157	16	0.68	8.1
4	20.4	5.0	0.1	0.4	19.4	57.5	57	9.43	5.48	0.265	21	0.87	8.2
5	16.5	4.6	0.1	0.4	16.9	45.4	56	5.90	3.43	0.235	15	0.78	9.0
	8.2	2.6	0.1	0.2	6.0	15.3	65	1.39	0.81	0.068	12	0.64	7.9

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

517



Pedon: Unnamed Clay 79-MT-1509 (160501B-1)

Date: December 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.	
CM	-----X-----							-----X-----		
8-0						NS	NS	NS	NS	NS
0-5						11.23	28.18	60.59	none	Clay
5-18						25.87	34.37	39.76	32	Gr. clay loam
18-24						8.06	29.80	62.14	13	Clay
24-31						12.81	32.80	54.39	22	Gr. clay
31-82						33.60	40.67	35.73	36	Gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar	
CM	-----X-----			-----q/cc-----		-----X-----		-----X-----
8-0				NS	NS	NS	NS	NS
0-5				54.7	34.4	IS	IS	IS
5-18				33.1	20.9	41	23	17
18-24				45.2	32.9	IS	IS	IS
24-31				41.7	30.5	57	49	8
31-82				25.4	14.3	27	16	11

Remarks: Mechanicals were run by the pipette method  
 Water content-Anita Falen  
 NS-no sample  
 IS-insufficient sample

Analysis by: Debbie Hall

519

FH33

Mg-saturated, glycolated

160501 B-1

79-MT-1509-4

IB224 24-31 cm

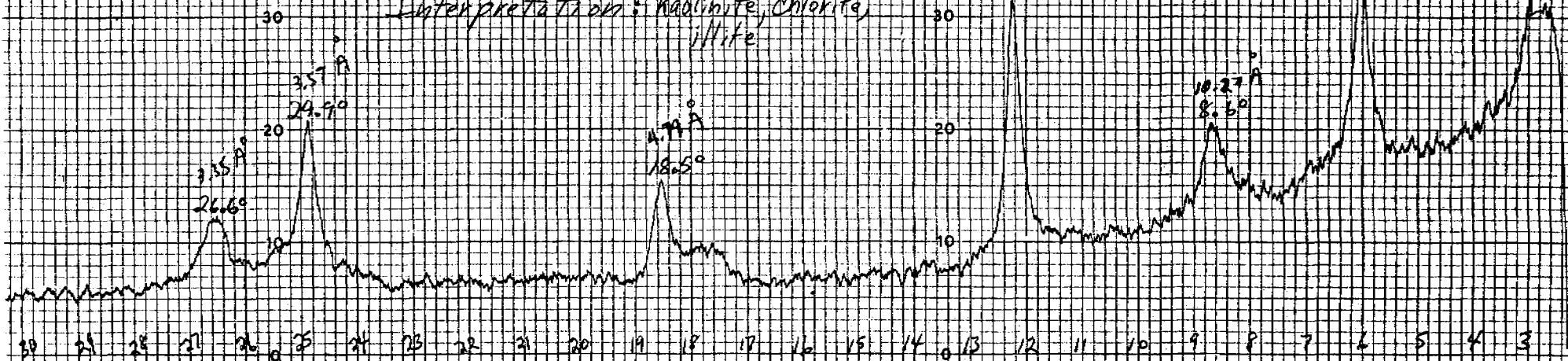
Slides prepared by: Falen and Blank

Slides run by: Chris Dillon

Slides interpreted by: Moody and Falen

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

Interpretation: Kaolinite, chlorite,  
illite



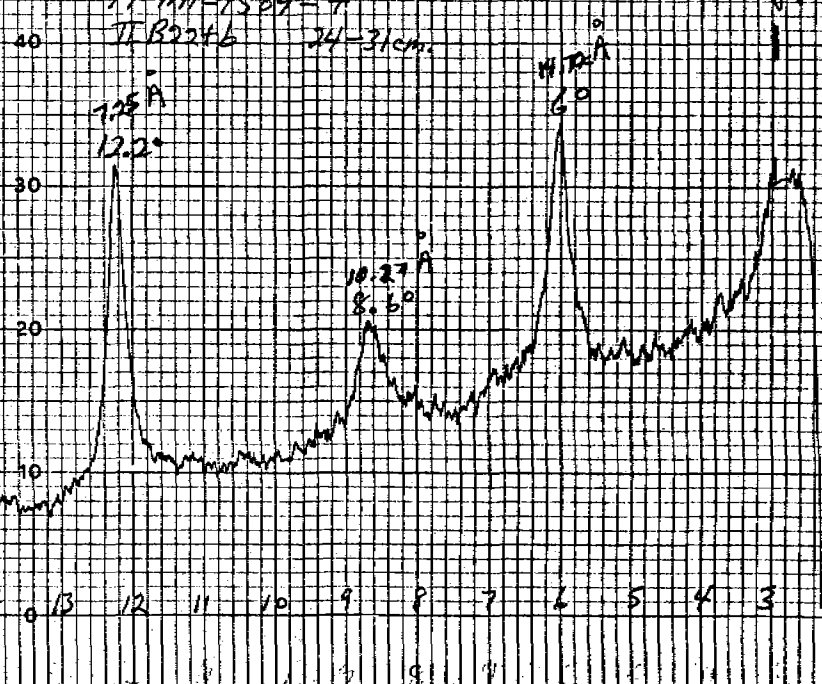
FH33

Mg-saturated, glycolated

160501 B-1

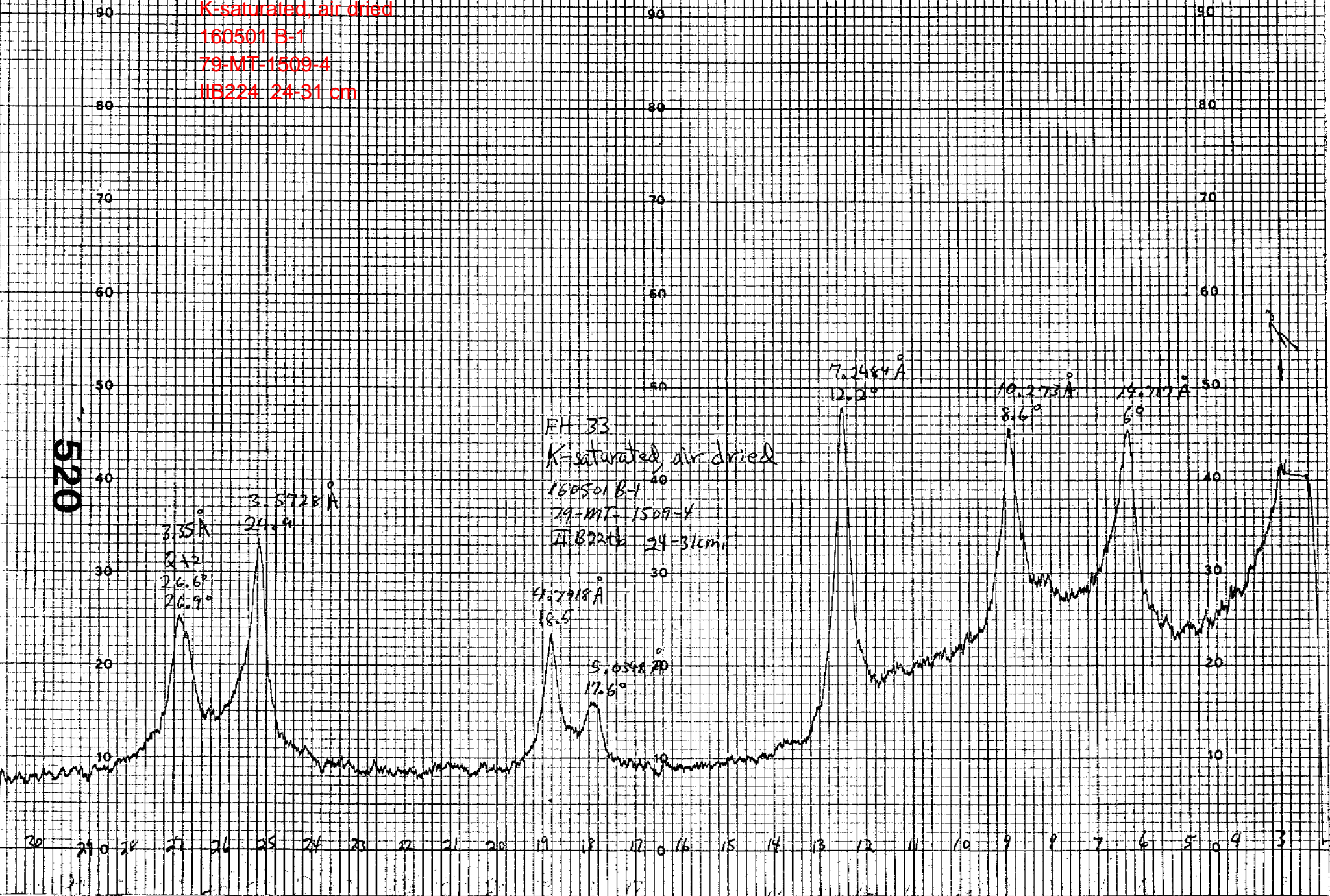
79-MT-1509-4

IB224 24-31 cm



FH33  
K-saturated, air dried  
160501 B-1  
79-MT-1509-4  
IIB224 24.31 cm

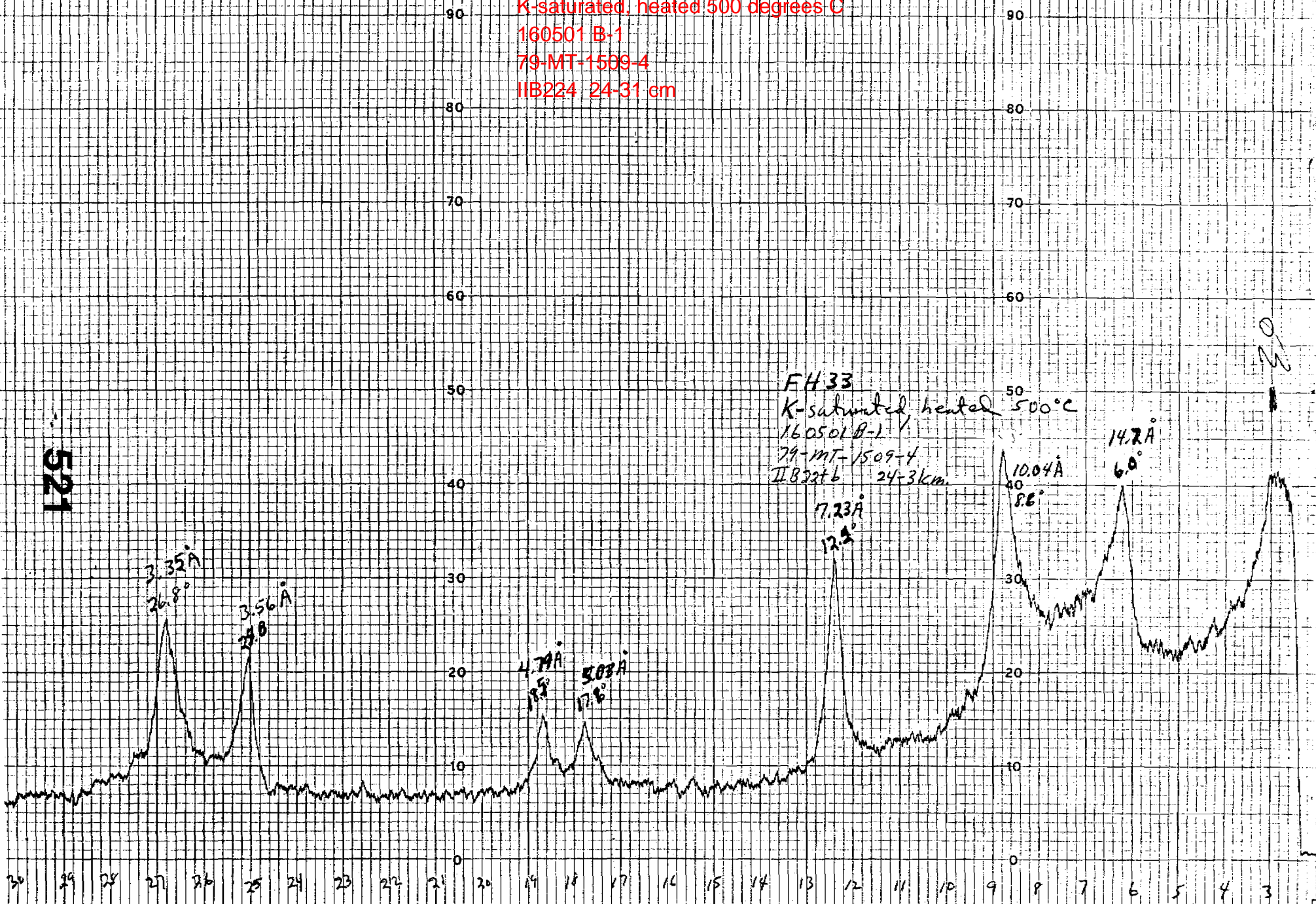
520



30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3



FH33  
K-saturated, heated 500 degrees C  
160501 B-1  
79-MT-1509-4  
IIB224 24-31 cm



# GALLATIN



Unnamed Sandy Loam 79-MT-3401 (130501R-1)

Classification: coarse loamy, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Park County, Montana: north of the town of Big Timber, Ixex Guard station, northeast 1/4 of section 14, T. 3N., R. 10E.

Forest: Gallatin National Forest

Area: Crazy Mountains

Described By/Date:

Landform: dissected ridge with surf. top. strongly influenced by underlain sandstone beds

Habitat Type: mountain meadow, surrounded by Douglas fir (Psme)

Formation Name:

Parent Rock/Material: waterlain volcanic sandstone

Climate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 25 percent

Infiltration:

Aspect: southwest

Permeability:

Elevation: 6560 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A11 0-9 centimeters (0-4 inches). Brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine crumb structure; slightly hard, very friable, slightly sticky and slightly plastic; slightly acid pH 6.5, noncalcareous; 10 percent gravel by weight.

A12 9-39 centimeters (4-15 inches). Brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; slightly acid pH 6.3, noncalcareous; 16 percent gravel by weight.

B1 39-75 centimeters (15-30 inches). Brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; slightly acid pH 6.2, noncalcareous; 13 percent gravel by weight.

79-MT-3401 (cont.)

B2 75-116 centimeters (30-46 inches). Brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; slightly acid pH 6.4, noncalcareous; 6 percent gravel by weight.

C 116+ centimeters (46+ inches). Light yellowish brown (2.5YR 6/4) loamy sand, light yellowish brown (2.5YR 6/4) moist; single grained structure; loose, loose, nonsticky and nonplastic; neutral pH 6.6, noncalcareous; no gravels.



Pedon: Unamed Sandy Loam 79-MT-3401 (130501R-1)

Date: July 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
							meq/1000 gms							
1	A11	0- 9	7.0	6.5	0.52	54	2.1	1.9	0.2	0.2	0.0	2.5	0.4	0.6
2	A12	9- 39	6.9	6.3	0.36	48	1.3	0.5	0.3	0.1	0.0	1.3	0.6	0.6
3	B1	39- 75	6.8	6.2	0.28	43	0.8	0.4	0.3	0.0	0.0	0.9	0.4	0.5
4	B2	75-116	7.1	6.4	0.22	42	0.4	0.2	0.4	0.0	0.0	0.8	0.4	0.5
5	C	116+	7.2	6.6	0.22	42	0.3	0.2	0.6	0.0	0.0	0.6	0.2	0.5

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
					meq/100 gms	%	%		ratio	%	%			
1	11.8	2.7	0.1	0.8	28.6	0	3.57	2.07	0.196	11	nil	nil	0.90	11.3
2	12.9	3.0	0.1	0.6	28.0	0	2.47	1.44	0.139	10	nil	nil	0.84	4.8
3	12.4	3.6	0.1	0.4	26.1	0	1.38	0.80	0.094	9	nil	nil	0.87	3.6
4	17.0	4.4	0.4	0.1	27.3	1	0.30	0.18	0.018	10	nil	nil	0.94	3.2
5	13.3	4.0	0.6	0.1	19.1	3	0.30	0.17	0.015	11	nil	nil	1.00	2.4

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-3401 (130501R-1)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
0- 9						66.34	21.49	12.18	10	Sandy loam
9- 39						61.95	23.87	14.18	16	Sandy loam
39- 75						62.10	23.73	14.17	13	Sandy loam
75-116						83.85	12.43	3.72	6	Loamy sand
116+						84.20	12.95	2.85	none	Loamy sand

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc	%		%		
0- 9				21.9	21.4	NDNP	NDNP	NDNP	
9- 39				20.4	12.4	NDNP	NDNP	NDNP	
39- 75				19.1	11.8	NDNP	NDNP	NDNP	
75-116				16.8	8.8	NDNP	NDNP	NDNP	
116+				15.5	7.9	NDNP	NDNP	NDNP	

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

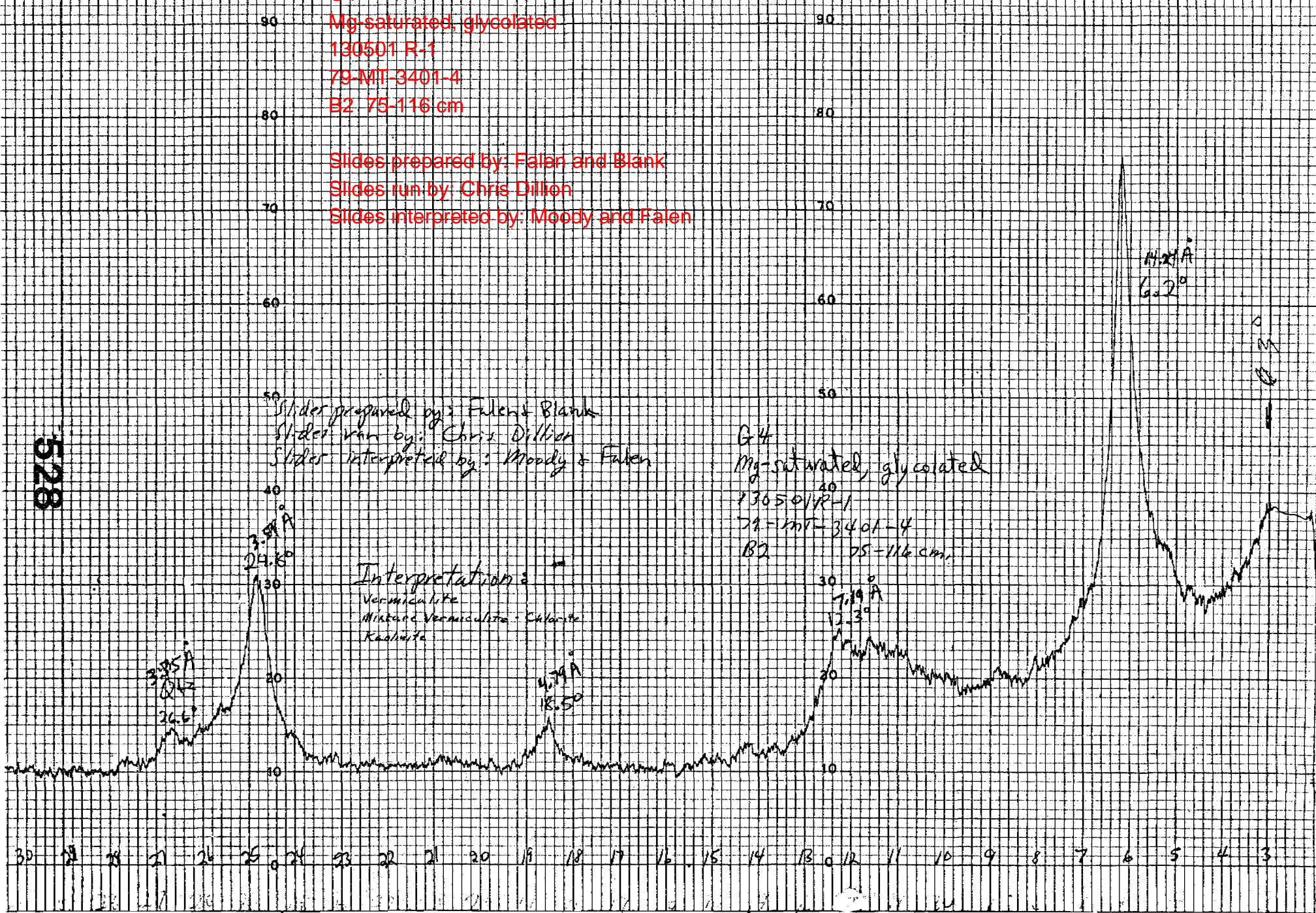
G4  
Mg-saturated, glycolated  
130501 R-1  
79-MIT-3401-4  
B2 75-116 cm

Slides prepared by: Falen and Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody and Falen

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

Interpretation:  
Vermiculite  
Mixture Vermiculite - Chlorite  
Kaolinite

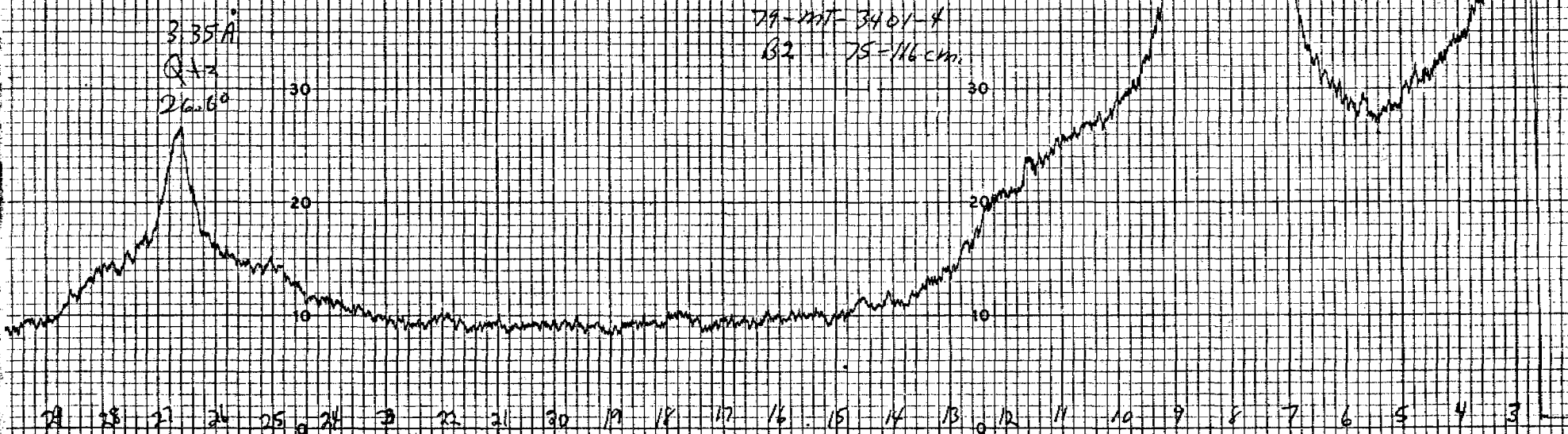
G4  
Mg-saturated, glycolated  
130501 R-1  
79-MIT-3401-4  
B2 75-116 cm



G4  
K-saturated, air dried  
130501 R-1  
79-MT-3401-4  
B2 75-116 cm

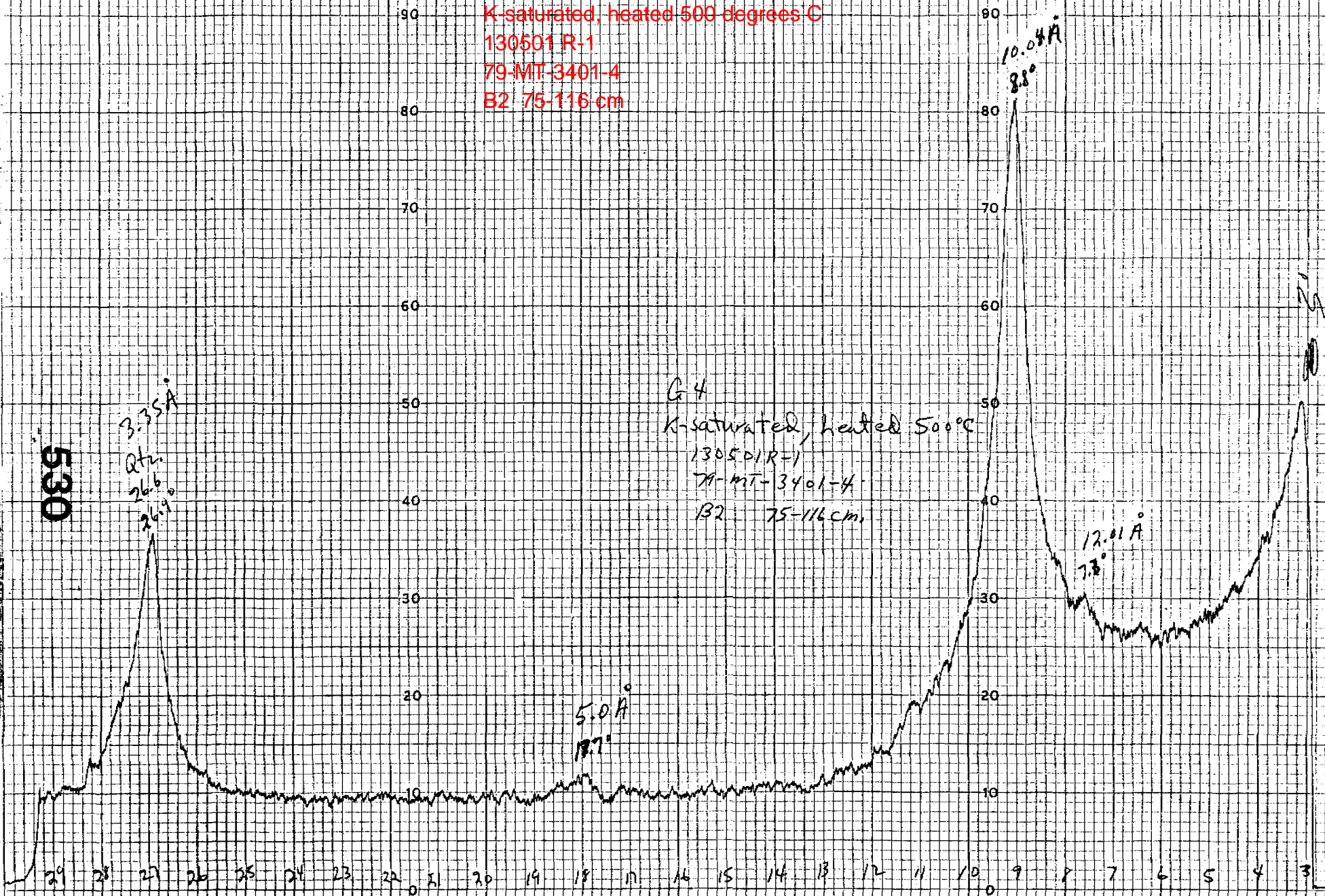
529

G4  
K-saturated, air dried  
130501 R-1  
79-MT-3401-4  
B2 75-116 cm





G4  
K-saturated, heated 500 degrees C  
130501 R-1  
79-MT-3401-4  
B2 75-116 cm



Unnamed Very Gravelly Sandy Loam 79-MT-4901 (060401R-1)

Classification: loamy skeletal, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Sweet Grass County, Montana: south of the town of Big Timber, lower Deer Creek drainage, southeast 1/2 of section 32, T.2S., R.15E.

Forest: Gallatin National Forest

Area: Deer Creek

Described By/Date:

Landform: dissected ridge with surface topography influenced by underlain sandstone beds

Habitat Type: Douglas fir (Psme)/snowberry (Syal) with blue bunch wheatgrass (Agsp)

Formation Name:

Parent Rock/Material: waterlain volcanic sandstone

Climate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 40 percent

Infiltration:

Aspect: southeast

Permeability:

Elevation: 6000 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A11 0-15 centimeters (0-6 inches). Very dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine crumb structure; soft, friable, slightly sticky and slightly plastic; slightly acid pH 6.1, noncalcareous; 63 percent gravel by weight.

A12 15-38 centimeters (6-15 inches). Dark grayish brown (10YR 4/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine crumb structure; soft, friable, slightly sticky and slightly plastic; slightly acid pH 6.4, noncalcareous; 46 percent gravel by weight.

A13 38-65 centimeters (15-26 inches). Dark grayish brown (10YR 4/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak fine crumb structure; slightly hard, friable, nonsticky and nonplastic; neutral pH 6.6, noncalcareous; 50 percent gravel by weight.

79-MT-4901 (cont.)

B2 65-87 centimeters (26-34 inches). Brown (10YR 4/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; neutral pH 6.6, noncalcareous; 65 percent gravel by weight.

C 87-120 centimeters (34-47 inches).

Pedon: Unnamed Very Gravelly Sandy Loam 79-MT-4901 (060401R-1)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	A11	0-15	6.1	0.34	63	9.9				
2	A12	15-38	6.4	0.36	44	7.8				
3	A13	38-65	6.6	0.32	41	4.6				
4	B2	65-87	6.6	0.35	41	5.5				
5	C	87-120	6.6	0.36	40	5.2				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
	meq/100 gms						%	%		ratio			
1	15.3	3.2	0.1	1.4	7.6	27.0	72	6.65	3.86	0.250	15	0.37	8.5
2	9.7	1.5	0.2	1.2	4.5	25.5	74	1.85	1.08	0.091	12	0.54	8.1
3	7.5	1.0	0.5	0.8	4.2	27.2	70	1.35	0.79	0.066	12	0.50	8.3
4	15.0	2.7	0.8	0.4	3.6	27.0	84	0.88	0.51	0.047	11	0.35	8.2
5	14.8	3.2	0.8	0.4	3.3	23.5	85	0.61	0.36	0.035	10	0.24	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



Pedon: Unnamed Very Gravelly Sandy Loam 79-MT-4901 (060401R-1)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt. vol.	
CM	----- % -----							----- % -----		
0- 15						65.16	21.26	13.58	63	V. gr. sandy loam
15- 38						65.93	19.88	14.19	46	Gr. sandy loam
38- 65						64.61	20.33	15.06	50	V. gr. sandy loam
65- 87						79.02	4.90	16.08	65	V. gr. sandy loam
87- 120						69.56	18.21	12.23	76	V. gr. sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquit	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index	
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
CM	----- % -----			----- g/cc -----		----- % -----		----- % -----	
0- 15				25.5	13.7	NDNP	NDNP	NDNP	
15- 38				18.8	11.6	NDNP	NDNP	NDNP	
38- 65				18.7	11.5	NDNP	NDNP	NDNP	
65- 87				16.8	10.9	NDNP	NDNP	NDNP	
87-120				14.9	9.9	NDNP	NDNP	NDNP	

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

534

Unnamed Gravelly Loam 79-MT-3462 (021002R-1)

Classification: loamy skeletal, mixed Pachic Cryoboroll.

General Site Characteristics

Location: Park County, Montana: north of the town Big Timber, Cottonwood drainage,  
northeast 1/4 of section 13, T.3N., R.10E.

Forest: Gallatin National Forest

Area: Crazy Mountains

Described By/Date:

Landform: glacial till (ground moraine) with hummocky relief

Habitat Type: mountain grassland

Formation Name:

Parent Rock/Material: waterlain volcanic sandstone

Weathering:

Topography:

Slope: 20-40 percent

Aspect: south

Elevation: 6800 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A11 0-30 centimeters (0-12 inches). Brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; medium acid pH 5.8, noncalcareous; 26 percent gravel by weight.

A12 30-47 centimeters (12-19 inches). Brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; medium acid pH 5.7, noncalcareous; 32 percent gravel by weight.

B1 47-60 centimeters (19-24 inches). Brown (10YR 5/3.5) gravelly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; medium acid pH 5.9, noncalcareous; 32 percent gravel by weight.

79-MT-3402 (cont.)

B2 60-80 centimeters (24-32 inches). Pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; slightly acid pH 6.2, noncalcareous; 27 percent gravel by weight.

Pedon: **Unamed Gravelly Loam 79-NT-3482 (0210028-1)**

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> 10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A11	0-30	5.8	0.14	46	2.2				
2	A12	30-47	5.7	0.14	46	1.3				
3	B1	47-60	5.9	0.14	44	1.3				
4	B2	60-80	6.2	0.16	46	1.1				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms												
1	8.0	1.4	0.1	0.6	7.3	20.4	58	2.60	1.51	0.125	12	0.74	8.7
2	7.8	1.1	0.1	0.5	8.2	19.7	54	2.00	1.16	0.115	10	0.68	8.8
3	8.2	1.1	0.1	0.5	6.9	19.3	59	1.78	1.04	0.098	11	0.68	8.7
4	9.8	1.4	0.1	0.3	5.1	20.2	69	1.31	0.76	0.080	10	0.73	8.5

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unconsolidated Gravelly Loam 79-WT-3402 (021002R-1)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone			
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	Textural	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	Classes
cm	%							%			
0-30						39.88	39.87	21.05	26		Gr. loam
30-47						39.34	38.52	22.14	32		Gr. loam
47-60						36.19	41.52	22.29	32		Gr. loam
60-80						37.75	40.94	21.31	27		Gr. loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic		
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index		
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-30						22.9	12.5	25	16	9
30-47						23.4	13.0	25	14	11
47-60						23.6	13.1	25	17	8
60-80						21.3	11.7	25	11	14

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water Content-Anita Falen

Analysis by: Debbie Hall

538

Unnamed Loam 79-MT-4902 (110801R)

Classification: loamy skeletal, mixed Dystric Cryochrept.

General Site Characteristics

Location: Sweet Grass County, Montana: north of Yellowstone National Park, Lake Plateau area, section 11, T.6S., R.13E.

Forest: Gallatin (Custer) National Forest

Area: Beartooth Primitive area

Described By/Date:

Landform: windswept plateau with a strongly convex macror relief

Habitat Type: alpine turf (Tundra)

Formation Name:

Parent Rock/Material: metamorphics, granite, gneiss, schist Climate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 10-15 percent

Infiltration:

Aspect: northwest

Permeability:

Elevation: 10,820 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

O1 2-0 centimeters (1-0 inches). Many fine live and partially decomposed roots.

A1 0-4 centimeters (0-2 inches). Light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine crumb structure; soft, very friable, slightly sticky and slightly plastic; very strongly acid pH 4.7, noncalcareous; no gravels.

B2 4-8 centimeters (2-3 inches). Brown (7.5YR 4/4) gravelly sandy loam, no dry color; single grained structure; loose, loose, slightly sticky and slightly plastic; 44 percent gravel by weight; medium acid pH 6.0, noncalcareous.

C 8+ centimeters (3+ inches). Brown (7.5YR 5/2) moist; no lab sample; gravelly loam; single grained structure; loose, loose, nonsticky and nonplastic; 40 percent coarse fragments by volume

Peden: Unnamed Loam 79-MT-4902 (110801R)

Date: July 1980

Sample No.	Horizon	Depth	pH paste	ECx10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
		cm					%			
1	01	2-0	NS	NS	NS	NS				
	A1	0-4	4.7	0.24	115	0.8				
2	B2	4-8	6.0	0.23	61	0.6				
	C	8+	NS	NS	NS	NS				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	DC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms						%	%			ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	6.0	1.7	0.2	0.3	28.9	35.7	22	18.61	10.82	0.730	15	1.00	8.1
2	4.0	1.3	0.1	0.1	15.4	20.9	26	6.07	3.53	0.310	11	0.56	8.2
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

540

Pedon: Unnamed Loam 79-MT-4902 (110801R)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
2-0						NS	NS	NS	NS	NS
0-4						47.21	36.55	16.24	none	Loam
4-8						61.21	27.80	10.99	44	Gr. sandy loam
8+						NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
2-0						NS	NS	NS	NS	NS
0-4						40.0	30.6	NDNP	NDNP	NDNP
4-8						18.3	11.1	NDNP	NDNP	NDNP
8+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

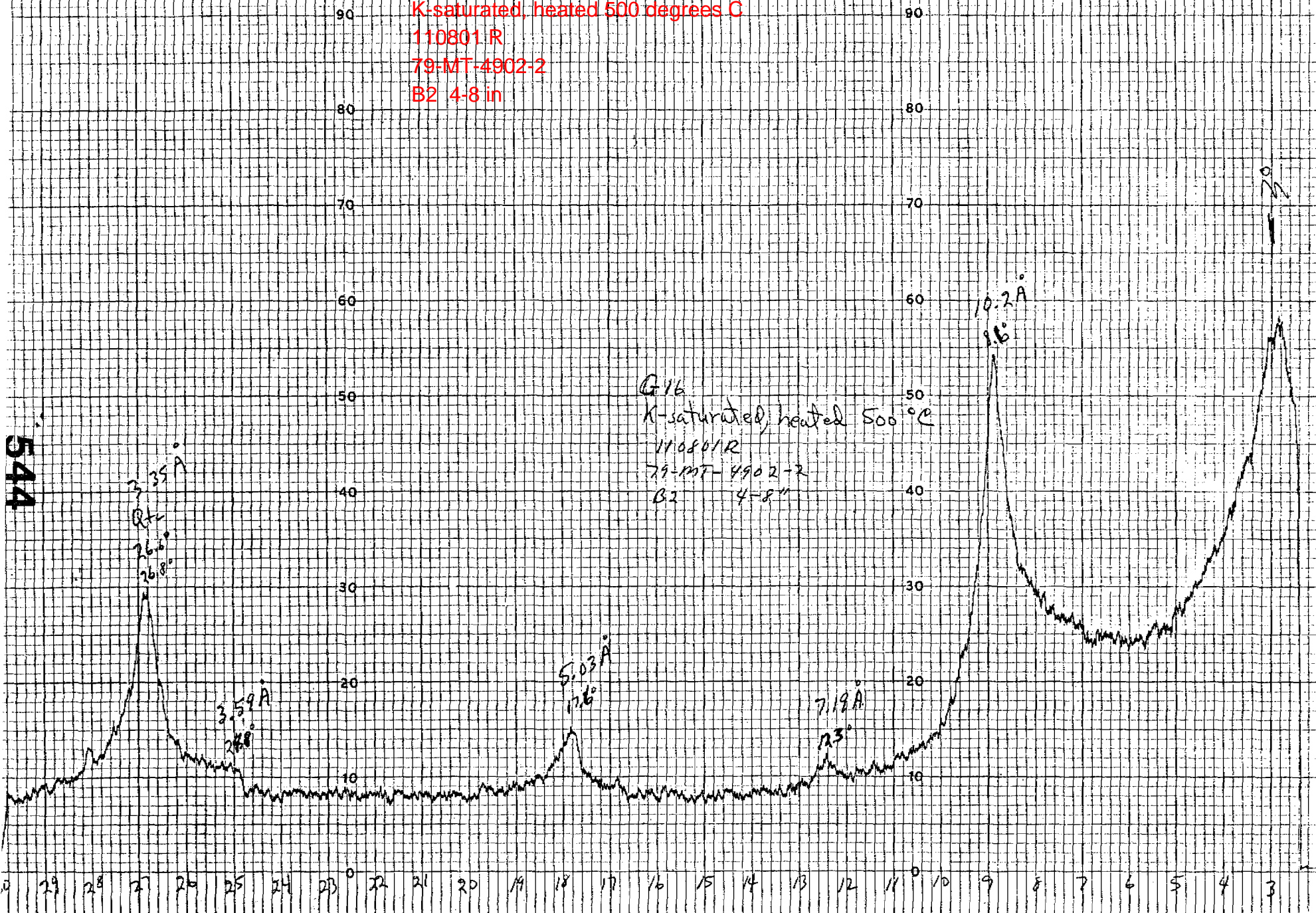
Analysis by: Debbie Hall

541



G16  
K-saturated, heated 500 degrees C  
110801 R  
79-MT-4902-2  
B2 4-8 in

544



Unnamed Clay Loam 79-MT-1629 (080701R-3)

Classification: fine clayey, mixed Argic Pachic Cryoboroll.

General Site Characteristics

Location: Gallatin County, Montana: north of Yellowstone National Park, Big Creek drainage, northwest 1/4 of section 12, T. 7S., R. 5E.

Forest: Gallatin National Forest

Area: Gallatin Range

Described By/Date:

Landform: a steep ridge face of a deep geologic block glide

Habitat Type: mountain meadow with some big sagebrush (*Artr*) associated with Idaho fescue (*Feid*)

Formation Name:

Parent Rock/Material: volcanic rx.--andesite, basalts, breccias Climate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 40 percent

Infiltration:

Aspect: south

Permeability:

Elevation: 8150 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A11 0-9 centimeters (0-4 inches). Dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) moist; moderate very fine crumb structure; slightly hard, friable, slightly sticky and slightly plastic; medium acid pH 6.0, noncalcareous; 14 percent gravels by weight.

A12 9-24 centimeters (4-9 inches). Dark brown (10YR 3/3) clay loam, very dark brown (10YR 2/2) moist; moderate coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; medium acid pH 5.7, noncalcareous; 14 percent gravels by weight.

B21t 24-45 centimeters (9-18 inches). Brown (10YR 4/3) clay loam, dark brown (7.5YR 3/2) moist; moderate very coarse subangular blocky structure; slightly hard, friable, sticky and plastic; medium acid pH 5.7, noncalcareous; no gravels; thin clay films in root channels and on ped faces.

79-HT-1629 (cont.)

B22t 45-60 centimeters (18-24 inches). Brown (10YR 4/3) clay, dark reddish brown (5YR 3/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; medium acid pH 5.6, noncalcareous; no gravels.

Pedon: Unnamed Clay Loam 79-MT-1629 (880701R-3)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A11	0-9	6.0	0.34	82	7.5				
2	A12	9-24	5.7	0.32	80	2.5				
3	B21t	24-45	5.7	0.28	74	1.0				
4	B22t	45-60	5.6	0.27	71	1.0				

Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
	meq/100 gms												
1	16.3	3.4	0.1	2.8	10.7	42.2	68	7.57	4.40	0.350	13	0.88	8.6
2	16.9	3.4	0.1	2.5	11.1	41.8	67	5.89	3.43	0.290	12	0.86	8.4
3	17.4	3.7	0.1	2.2	10.5	41.4	69	4.51	2.62	0.205	13	1.00	8.4
4	21.8	5.2	0.2	1.9	9.6	52.2	75	2.35	1.37	0.147	9	1.00	8.6

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Clay Loam 79-MT-1629 (880701R-3)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
0-9						31.88	34.73	33.39	14	Clay loam
9-24						30.47	35.10	34.43	14	Clay loam
24-45						28.92	35.31	35.76	none	Clay loam
45-60						24.84	33.53	41.63	none	Clay

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod Core		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-9						40.3	21.9	55	32	23
9-24						37.9	21.6	50	33	17
24-45						33.6	21.5	50	31	18
45-60						41.0	24.9	IS	IS	IS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 IS-insufficient sample  
 Water content-Anita Falen

Analysis by: Debbie Hall



G20

Mg-saturated, glycolated

080701 R-3

79-MT-1629-4

B224 45-60 cm

Slides prepared by: Falen and Blank

Slides run by: Chris Dillon

Slides interpreted by Moody and Falen

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

G20

Mg-saturated, glycolated

080701 R-3

79-MT-1629-4

B224 45-60 cm

Interpretation:

random mixtures of  
Illite-Montmorillonite  
small amount kaolinite



549



550

G20  
K-saturated, air dried  
080701 R-3  
79-MT-1629-4  
B224 45-60 cm

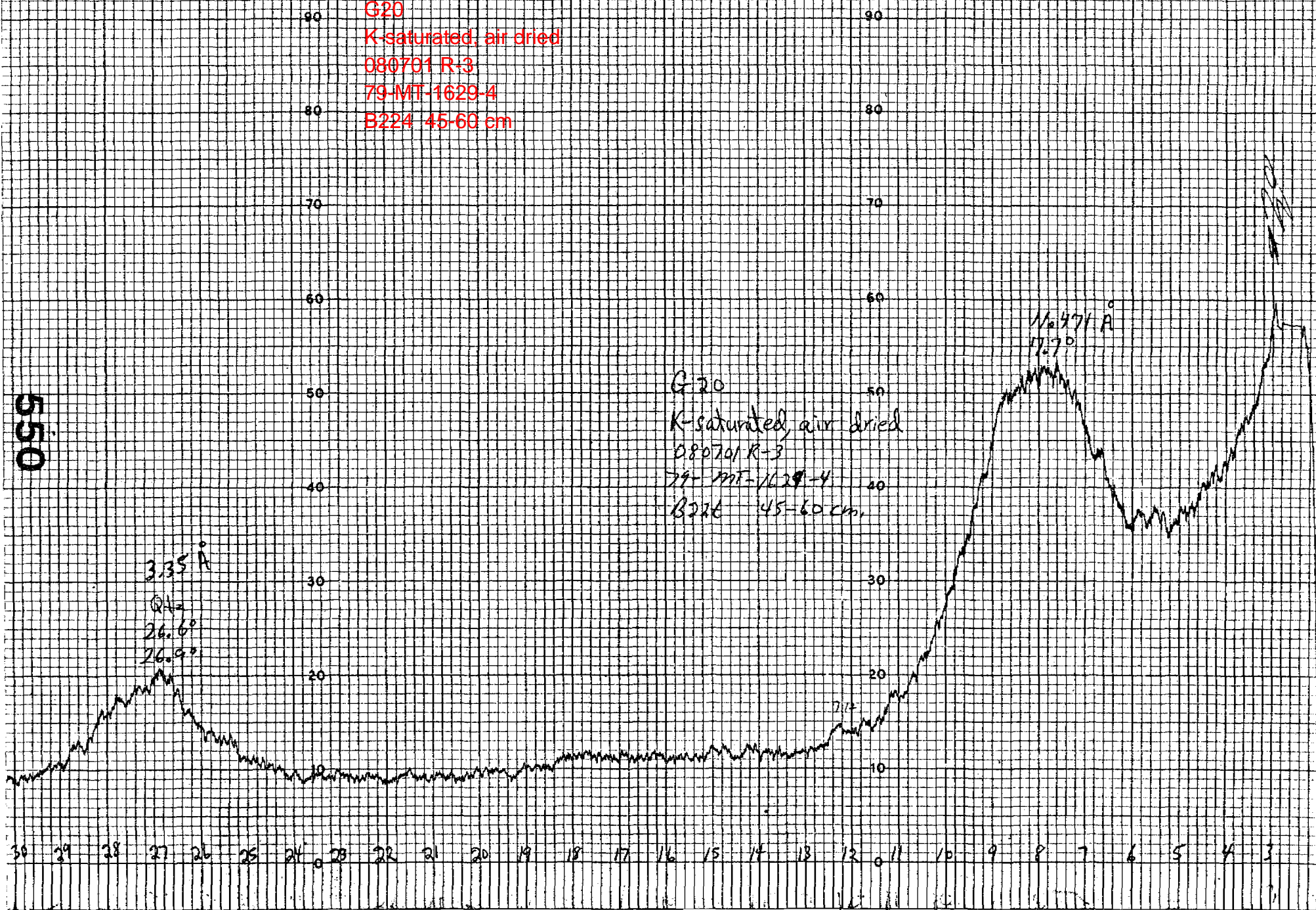
G20  
K-saturated, air dried  
080701 R-3  
79-MT-1629-4  
B226 45-60 cm

3.35 Å  
Q1 =  
26.6°  
26.9°

11.47 Å  
17.7°

27.2°

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3



G20  
K-saturated, heated 500 degrees C  
080701 R-3  
79-MT-1629-4  
B224 45-60 cm

551

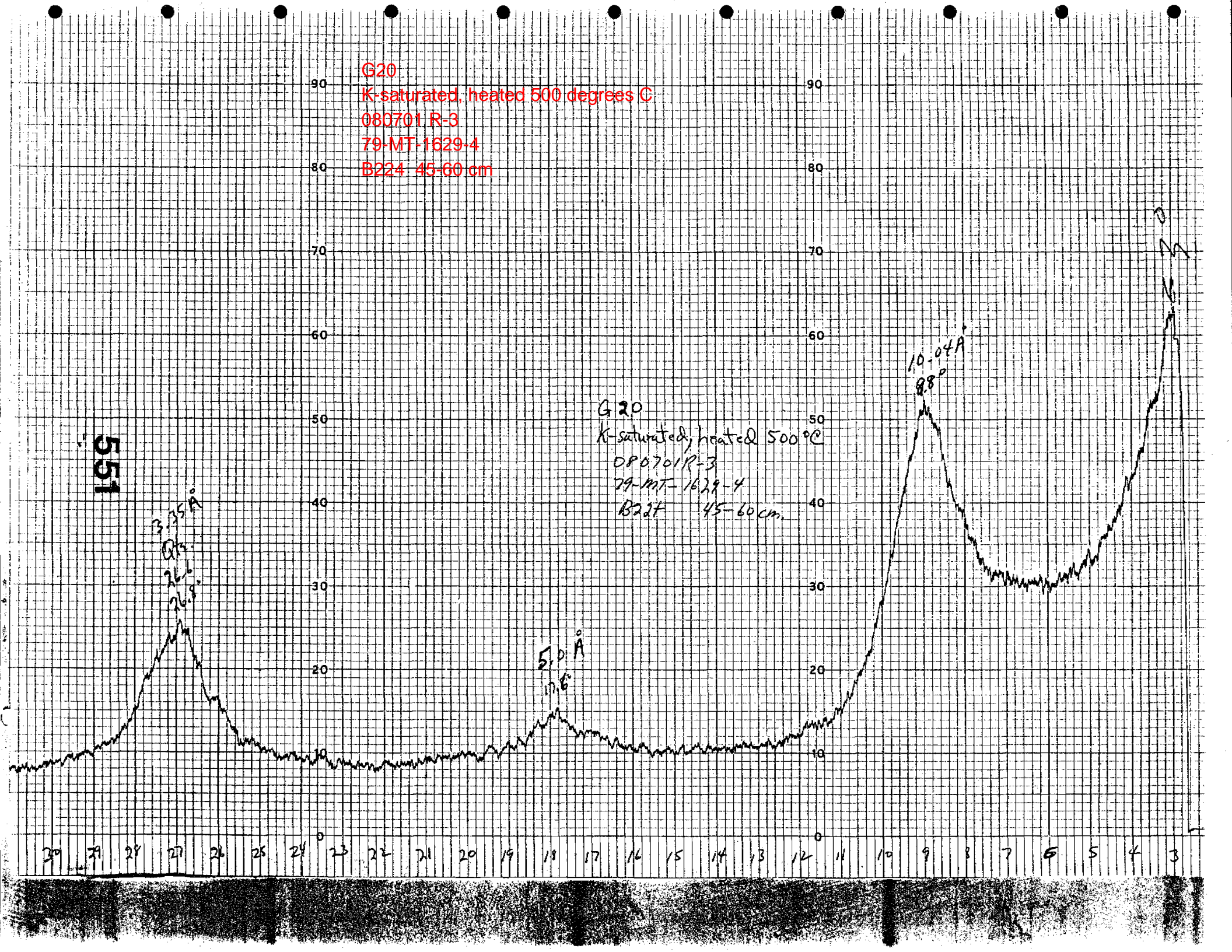
G20  
K-saturated, heated 500 °C  
080701 R-3  
79-MT-1629-4  
B224 45-60 cm

3.35 Å  
26.8°  
22.6°  
Q<sub>1</sub>

5.0 Å  
17.6°

10.04 Å  
88°

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3





Unnamed Gravelly Loam 79-MT-1630 (880701R-2)

Classification: fine clayey, mixed Mollic Cryoboralf.

General Site Characteristics

Location: Gallatin County, Montana: north of Yellowstone National Park, Rock Creek drainage, section 23, T. 75., R. 5E.

Forest: Gallatin National Forest

Area: Gallatin Range

Described By/Date:

Landform: glacial till (ground moraine) with hummocky relief

Habitat Type: a dense lodge pole pine (Pice) overstory associated with the understory shrubs thin leaved huckleberry (Vagl) and grouse whortleberry (Vasc).

Formation Name:

Parent Rock/Material: volcanic rx.--andesite, basalts, brecciasClimate:

Weathering:

Precipitation:

Topography:

Erosion:

Slope: 0-15 percent

Infiltration:

Aspect: southern

Permeability:

Elevation: 7880 feet

Storage:

Soil Depth:

Drainage:

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A1 0-22 centimeters (0-9 inches). Grayish brown (10YR 5/2) gravelly loam, very dark brown (10YR 2/2) moist; weak very coarse subangular blocky structure parting to weak fine crumb structure; soft, friable, slightly sticky and slightly plastic; strongly acid pH 5.2, noncalcareous; 21 percent gravels by weight.

B1 22-28 centimeters (9-11 inches). Light brownish gray (10YR 6/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; soft, friable, slightly sticky and slightly plastic; strongly acid pH 5.4, noncalcareous; 17 percent gravels by weight.

B2t 28-50 centimeters (11-20 inches). Light brownish gray (10YR 6/2) gravelly sandy clay, dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; strongly acid pH 5.4, noncalcareous; common thin clay films on ped faces; 32 percent gravels by weight.

B3 50+ centimeters (20+ inches). Morphology undescribed.

Pedon: Unnamed Gravelly Loam 79-MT-1630 (080701R-2)

Date: July 1980

Sample No.	Horizon	Depth	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	A1	0-22	5.2	0.26	74					
2	B1	22-28	5.4	0.23	64					
3	B2†	28-50	5.4	0.21	78					
	B3	50+	NS	NS	NS					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H		%		%		ratio		
	meq/100 gms												
1	7.2	1.9	0.2	1.0	15.5	31.8	40	4.09	2.38	0.143	17	0.79	8.9
2	10.4	2.8	0.1	0.8	10.0	30.0	59	1.58	0.92	0.071	13	0.83	8.8
3	16.5	4.3	0.2	0.9	11.4	41.1	66	1.13	0.66	0.057	12	0.68	8.7
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Loam 79-MT-1630 (080701R-2)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
0-22						40.14	36.83	23.03	21	Gr. loam
22-28						42.99	29.18	27.84	17	Gr. clay loam
28-50						36.74	19.35	43.91	32	Gr. sandy clay
50+						NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
cm	%			g/cc	%		%		
0-22					33.2	19.2	IS	IS	IS
22-28					32.9	19.4	IS	IS	IS
28-50					41.4	28.3	56	35	21
50+					NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Folen  
 IS-insufficient sample

Analysis by: Debbie Hall

Unnamed Gravelly Loam 79-MT-3483 (160901R)

Classification: loamy skeletal, mixed Glosic Cryoboralf.

General Site Characteristics

Location: Park County, Montana: north of the town of Big Timber, Shields River drainage, northwest 1/4 of section 28, T. 5N., R. 11E.

Forest: Gallatin National Forest

Area: Crazy Mountains

Described By/Date:

Landform: glacial till (ground moraine) with hummocky relief

Habitat Type: a dense overstory of lodge pole pine (Pico) associated with the understory shrubs thin leaved huckleberry (Bagl) and grouse whortleberry (Vasc)

Formation Name:

Parent Rock/Material: waterlain volcanic sandstone

Weathering:

Topography:

Slope: 26-30 percent

Aspect: northern

Elevation: 6820 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A21 0-10 centimeters (0-4 inches). Pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; moderate fine crumb structure; slightly hard, friable, sticky and plastic; very strongly acid pH 4.9, noncalcareous; 42 percent gravels by weight.

A22 10-22 centimeters (4-9 inches). Pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; very strongly acid pH 4.9, noncalcareous; 28 percent gravels by weight.

A&B 22-54 centimeters (9-21 inches). Pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; strongly acid pH 5.2, noncalcareous; clay lamellae bands occur every 10 centimeters that are 1 centimeter thick; 35 percent gravels by weight.

79-MT-3403 (cont.)

B4A 54-80 centimeters (21-32 inches). Pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, slightly firm, sticky and plastic; strongly acid pH 5.2, noncalcareous; clay lamellae bands occur every 5 centimeters that are 2 centimeters thick; 40 percent gravels by weight.

B2t 54-80 centimeters (21-32 inches). Composite of clay lamellae bands.

C 80+ centimeters (32+ inches). Pale brown (10YR 6/3) gravelly clay loam, brown (10YR 5/3) moist; no lab sample; massive structure; hard, firm, sticky and plastic; neutral pH 6.0, noncalcareous; greater than 35 percent coarse fragments by volume.

Pedon: Unnamed Gravelly Loam 79-MT-3403 (160901R)

Date: July 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A21	0-10	4.9	0.21	52	12.4				
2	A22	10-22	4.9	0.18	50	12.2				
3	A&B	22-54	5.2	0.25	38	8.4				
4	B&A	54-80	5.2	0.27	36	4.8				
5	B2t	54-80	5.3	0.26	38	4.6				
	C	80+	NS	NS	NS	NS				

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Sample No.	Exchangeable Ions				Ext. Acidity H	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K									
1	3.4	1.2	0.1	0.6	11.6	22.7	31	2.72	1.58	0.098	16	0.58	8.7
2	3.4	1.3	0.1	0.6	11.6	20.5	32	2.44	1.42	0.090	16	0.72	8.7
3	4.8	1.2	0.1	0.4	6.5	15.4	50	0.78	0.45	0.051	9	0.66	8.6
4	5.8	1.3	0.1	0.4	6.5	15.7	54	0.70	0.41	0.054	8	0.60	8.4
5	6.2	1.4	0.2	0.3	6.2	16.1	57	0.55	0.32	0.037	9	0.60	8.3
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Loam 79-MT-3403 (160901R)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%							%			
0-10						44.40	35.09	20.51	42		Gr. loam
10-22						41.42	40.88	17.70	28		Gr. loam
22-54						45.72	37.41	16.88	34		Gr. loam
54-80						43.59	37.77	18.64	40		Gr. loam
54-80						46.65	32.45	20.90	40		Gr. loam
80+						NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
0-10						23.9	13.2	26	NP	ND
10-22						24.4	12.8	25	NP	ND
22-54						19.3	10.6	19	NP	ND
54-80						19.9	11.3	20	NP	ND
54-80						18.5	11.5	20	14	6
80+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Debbie Hall

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Unnamed Gravelly Silt Loam 79-MT-1631 (031201R-1)

Classification: loamy skeletal Typic Cryoboralf.

General Site Characteristics

Location: Gallatin County, Montana: south of the town of Bozeman, Bear Creek drainage, northeast 1/4 of section 9, T.4S., R. 5E.

Forest: Gallatin National Forest

Area: Gallatin Range

Described By/Date:

Landform: colluvial slope at the base of a steep ridge

Habitat Type: a dense overstory of lodge pole pine (Pice) associated with the prostrate shrub twin flower (Libe).

Formation Name:

Parent Rock/Material: limestone

Weathering:

Topography:

Slope: 35 percent

Aspect: northeast

Elevation: 6600 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock:

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A2 0-34 centimeters (0-13 inches). Grayish brown (10YR 5/2) gravelly silt loam, brown (10YR 4/3) moist; weak very fine crumb structure; loose, loose, slightly sticky and slightly plastic; strongly acid pH 5.5, noncalcareous; 17 percent gravel by weight.

B2tca 34-80 centimeters (13-32 inches). Yellowish brown (10YR 5/4) gravelly clay, yellowish brown (10YR 5/4) moist; strong very fine angular blocky structure; slightly hard, friable, sticky and plastic; neutral pH 6.7, slightly effervescent; 31 percent gravels by weight; many thick clay films.

Cca 80+ centimeters (32+ inches). Yellowish brown (10YR 5/4) moist; gravelly clay loam; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; moderately alkaline pH 8.3, strongly effervescent; 34 percent gravels by weight.



Pedon: Unnamed Gravelly Silt Loam 79-MT-163i (031201R-1)

Date: July 1980

Sample No.	Horizon	Depth	pH 1:5	pH paste	EC <sup>3</sup> x10	% Water at Saturation	Soluble Ions							
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>
		cm	mmhos/cm			meq/1000 gms								
1	A2	0-34	5.8	5.5	0.21	68	1.1	0.3	0.1	0.2	0.0	1.2	0.3	0.6
2	B2tca	34-80	7.4	6.7	0.57	66	3.9	0.3	0.2	0.1	0.0	4.3	0.2	0.5
3	Cca	80+	8.3	7.4	0.41	54	2.2	0.1	0.1	0.1	0.0	1.8	0.2	0.5

560

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
		meq/100 gms				%	%		ratio	%	%	ppm		
1	9.2	1.8	0.1	1.1	30.9	0	3.40	1.98	0.138	14	nil	nil	0.83	13.9
2	24.4	1.6	0.1	1.0	45.7	0	1.70	0.99	0.086	12	nil	2.6	0.69	13.0
3	22.3	0.7	0.1	0.5	41.4	0	0.83	0.48	0.041	12	nil	6.7	0.66	13.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Gravelly Silt Loam 79-MT-1631 (031201R-1)

Date: January 1981

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CM	%							%		
0-34						24.95	53.27	22.17	17	Gr. silt loam
34-80						12.17	39.56	48.27	31	Gr. clay
80+						35.14	36.05	28.01	34	Gr. clay loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic		
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index		
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
CM	%			g/cc		%				
0-34						37.5	14.1	NDNP	NDNP	NDNP
34-80						40.9	24.8	54	25	29
80+						31.8	17.9	41	20	21

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

G30  
Mg-saturated, glycolated  
031201 R-1  
79-MT-1631-2  
B24 34-80 cm

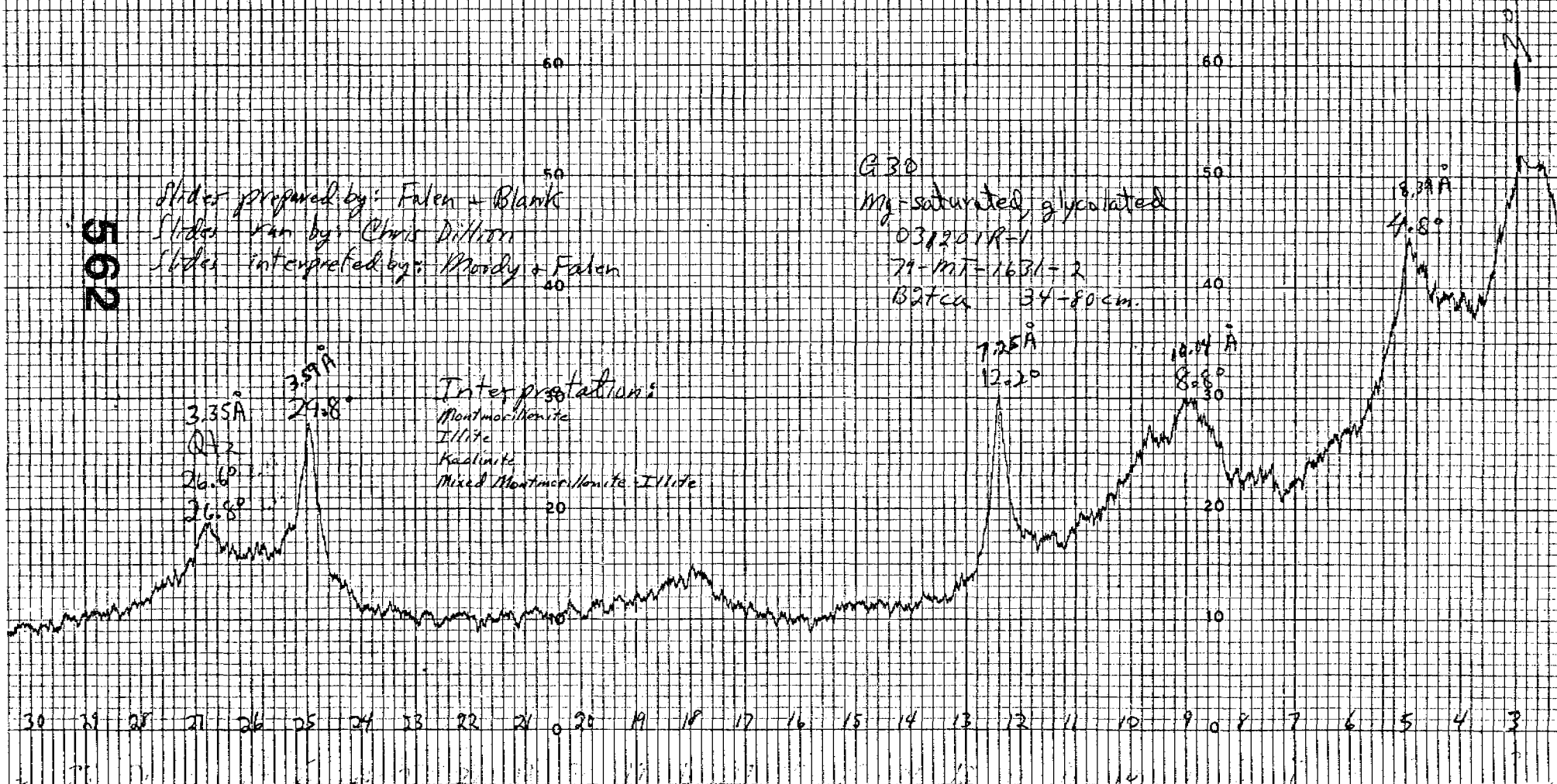
Slides prepared by: Falen and Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody and Falen

662

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody + Falen

Interpretations:  
Montmorillonite  
Illite  
Kaolinite  
Mixed Montmorillonite Illite

G30  
Mg-saturated, glycolated  
031201 R-1  
79-MT-1631-2  
B24ca 34-80 cm.

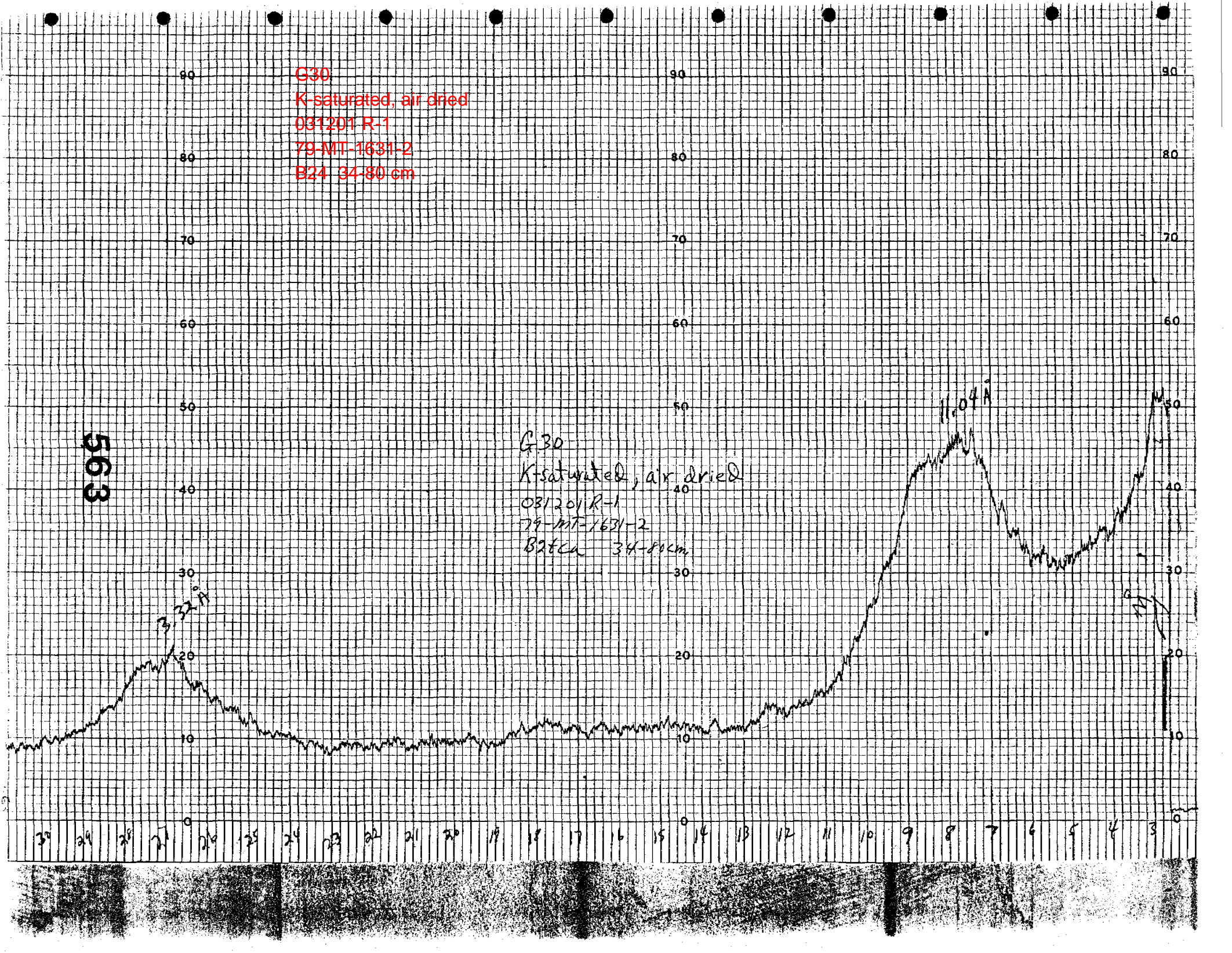




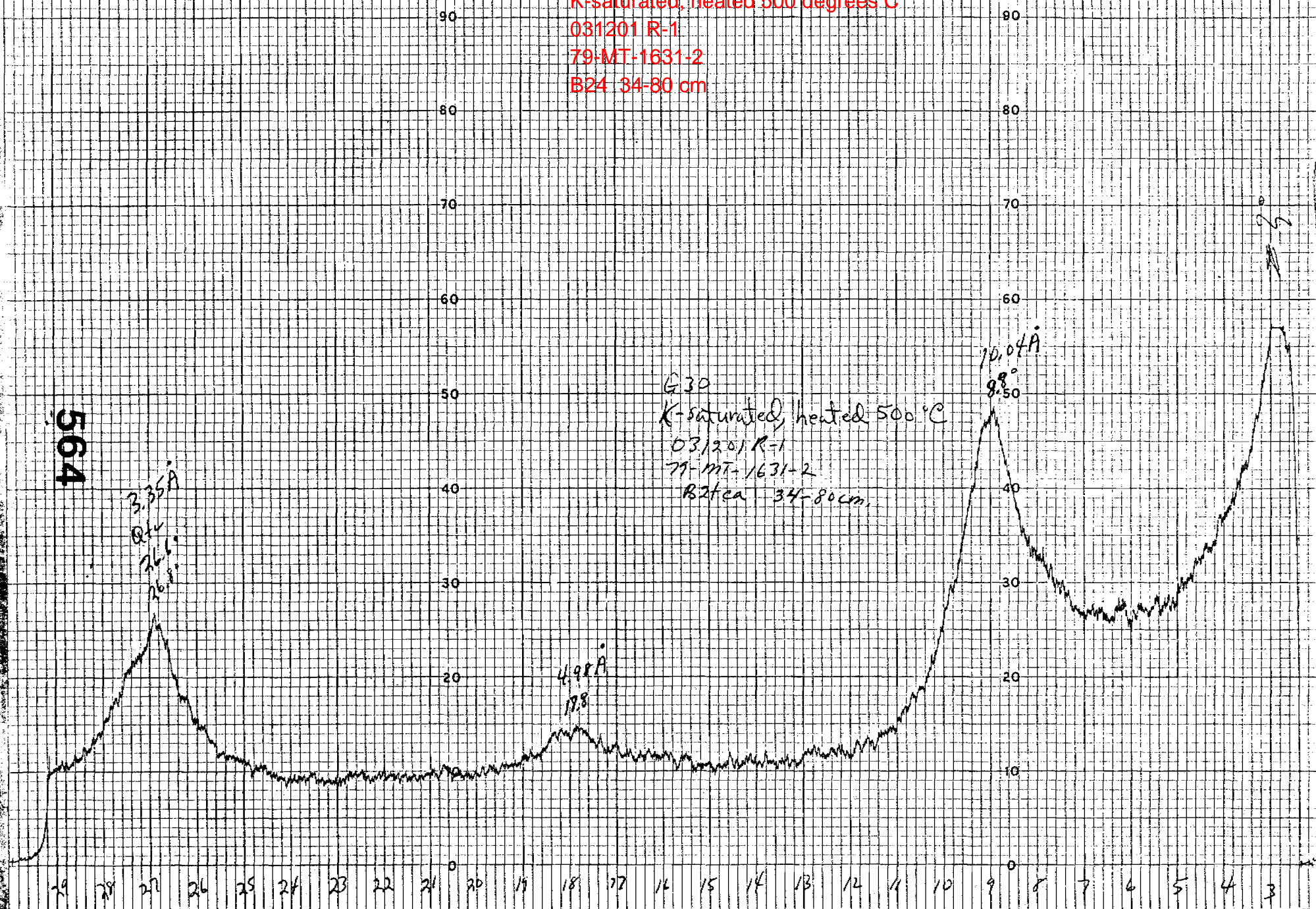
G30  
K-saturated, air dried  
031201 R-1  
79-MT-1631-2  
B24 34-80 cm

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G30  
K-saturated, air dried  
031201 R-1  
79-MT-1631-2  
B24 34-80 cm



G30  
K-saturated, heated 500 degrees C  
031201 R-1  
79:MT-1631-2  
B24 34-80 cm



# KOOTENAI



Unnamed Silt Loam 79-ID-1141 (010701B-3)

Classification: medial over loamy, mixed Entic Cryorthod.

General Site Characteristics

Location: Boundary County, Idaho; southeast 1/4 of section 34, T. 59N., R. 2E.  
Forest: Kootenai National Forest; Troy Ranger District  
Area: Calder Mountain, point 3  
Described By/Date: Bruce Wicherski and Nick Gerhardt on August 29, 1978  
Parent Rock/Material: granitic  
Habitat Type: (Abies lasiocarpa)/(Clintonia uniflora)/(Menziesia ferruginea)  
Topography:  
Landform: oversteepened slope bottom  
Weathering:  
Formation Name:  
Slope: 52 percent  
Aspect: 20 degrees north-northeast  
Elevation: 4550 feet  
Soil Depth: 83 centimeters  
Eff. Rooting Depth: 83 centimeters  
Litter Type: MOR  
Surface Rock:

Climate: cyclic, udic  
Precipitation: 80 inches  
Erosion:  
Infiltration: very rapid  
Permeability: moderate  
Storage:  
Drainage: well drained  
Air Temp:  
Soil Temp at 20 inches: 7.8 deg. C  
Salt/Alkal:

Remarks:

Pedon Description

O1&O2 2-0 centimeters (1-0 inches). Clear wavy boundary.

A2 0-10 centimeters (0-4 inches). Gray to light gray and very dark grayish brown (10YR 6/1 and 10YR 3/2) moist; silt loam; moderate medium subangular blocky structure; parting to moderate fine subangular blocky structure parting to moderate fine granular structure; friable, slightly sticky and nonplastic; no gravels; many very fine common medium fine and coarse roots; few irregular, common very fine vesicular, common fine vesicular pores, few fine continuous tubular pores; extremely acid pH 4.0, noncalcareous; percolation rapid; clear wavy boundary.

B21ir 10-29 centimeters (4-11.5 inches). Dark reddish brown (5YR 3/3) moist; gravelly silt loam; moderate medium subangular blocky structure parting to weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 21 percent gravels by weight; common medium and fine, few very fine roots; few interstitial, common fine vesicular, common very fine vesicular pores; very strongly acid pH 4.6, noncalcareous; percolation rapid; clear wavy boundary.





B22ir 29-39 centimeters (11.5-15.5 inches). Dark yellowish brown (10YR 3/4) moist; gravelly silt loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; 20 percent gravels by weight; common medium roots; common medium tubular continuous, common fine tubular continuous, common very fine vesicular pores; very strongly acid pH 4.8, noncalcareous; percolation moderately rapid; gradual wavy boundary.

B23ir 39-62 centimeters (15.5-24.5 inches). Dark yellowish brown (10YR 3/4) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 26 percent gravels by weight; few fine and very fine roots; common medium tubular continuous pores, common fine tubular continuous pores, common very fine vesicular pores; very strongly acid pH 4.9, noncalcareous; percolation moderate; clear wavy boundary.

R 83+ centimeters (32.5+ inches).

Remarks: Classification assumes low OM content based solely on field observations. Point is located on oversteepened slope adjacent to stream channel. bedrock is granite. B21ir, B22ir, and B23ir are loess deposits. A2 contains charred wood fragments and the grayish color is masked by them, there are also ash remains. B horizons have been mixed by colluvium from above and movement downslope, and pockets of several colors are present. Reddish color (5YR 3/3) in B21ir is banded and in places seems cemented. There are also bands of black interspersed in the B horizons.

Peden: Unnamed Silt Loam 79-ID-1141 (010701B-3)

Date: January 1980

Sample No.	Horizon	Depth	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
							%				
1	01-01	2-8	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	A2	0-10	4.3	0.19	146	0.7	0.90	0.35	0.36	0.17	no
3	B21ir	10-29	4.6	0.11	93	0.6	1.48	1.58	0.72	0.81	yes
4	B22ir	29-39	4.8	0.09	91	0.8	1.15	1.80	0.47	0.90	yes
5	B23ir	39-62	4.9	0.06	80	0.8	0.98	1.73	0.35	0.87	yes
	B3ir	62-83	5.1	0.08	56	0.7	0.88	0.90	0.17	0.24	no
	R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	DM	OC	N	C:N	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H		%		%		ratio		
	meq/100 gms												
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.4	1.2	0.1	0.5	34.3	35.7	13	17.57	10.21	0.750	14	1.00	7.5
3	0.4	0.2	0.1	0.3	37.4	30.4	3	11.67	6.79	0.500	14	0.79	11.7
4	0.2	0.1	0.1	0.3	39.1	33.4	2	11.39	6.62	0.400	17	0.80	11.8
5	0.2	0.1	0.1	0.2	33.6	28.9	2	8.64	5.02	0.287	17	0.74	11.8
	0.2	0.1	0.1	0.2	19.7	17.5	3	3.39	1.97	0.139	14	0.55	11.7
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

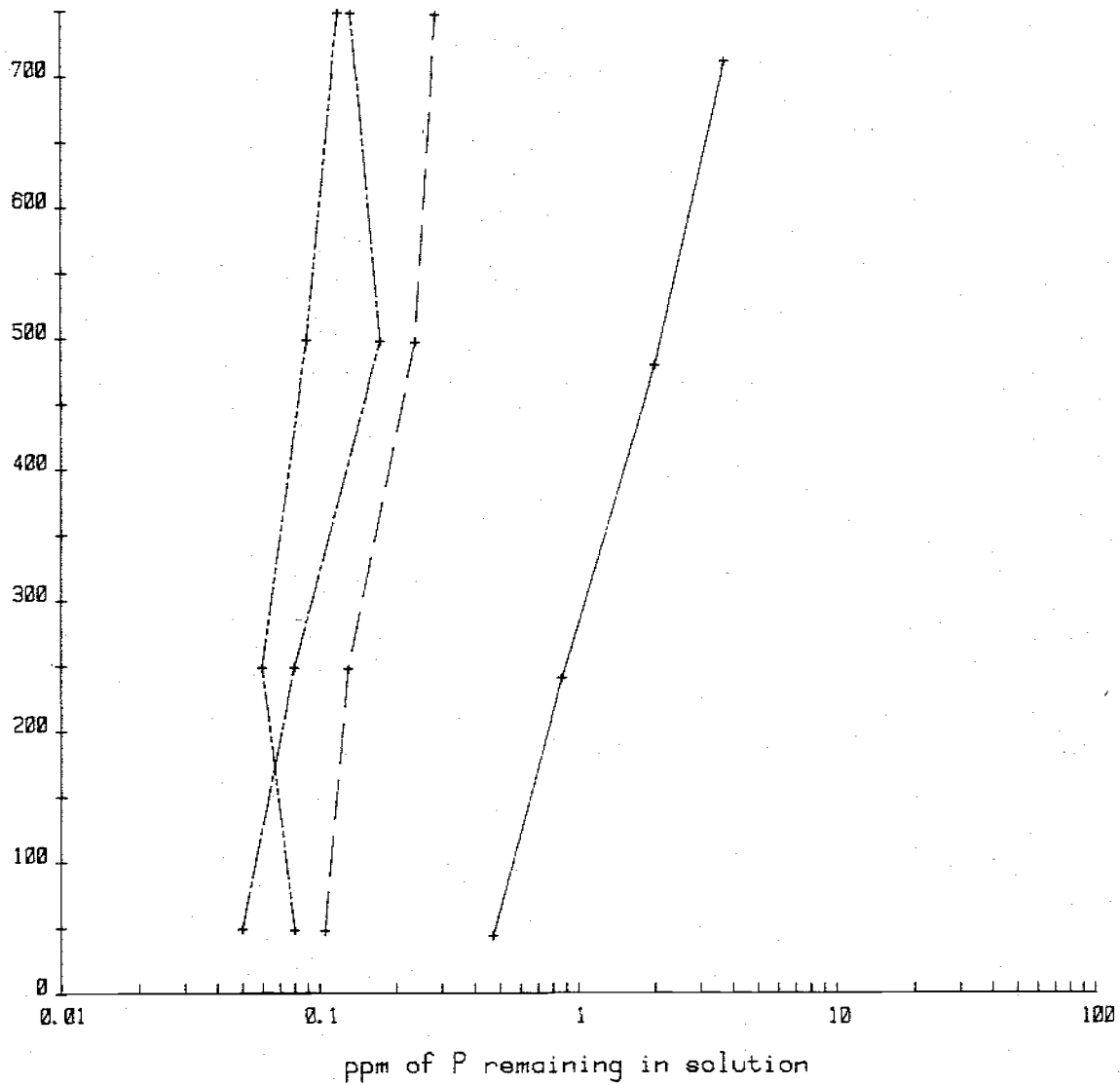
Analysis by: Zelda Fadness

570

 $\mu\text{g P sorbed/g soil}$ 

## Phosphorus Isotherm

79-ID-1141

 $\mu\text{g/g soil}$  Soln ppm

A2

45 0.47

241 0.87

480 2.03

712 3.82

B21ir

49 0.11

249 0.13

498 0.24

747 0.29

B22ir

50 0.05

249 0.08

498 0.18

749 0.14

B23ir

49 0.08

249 0.06

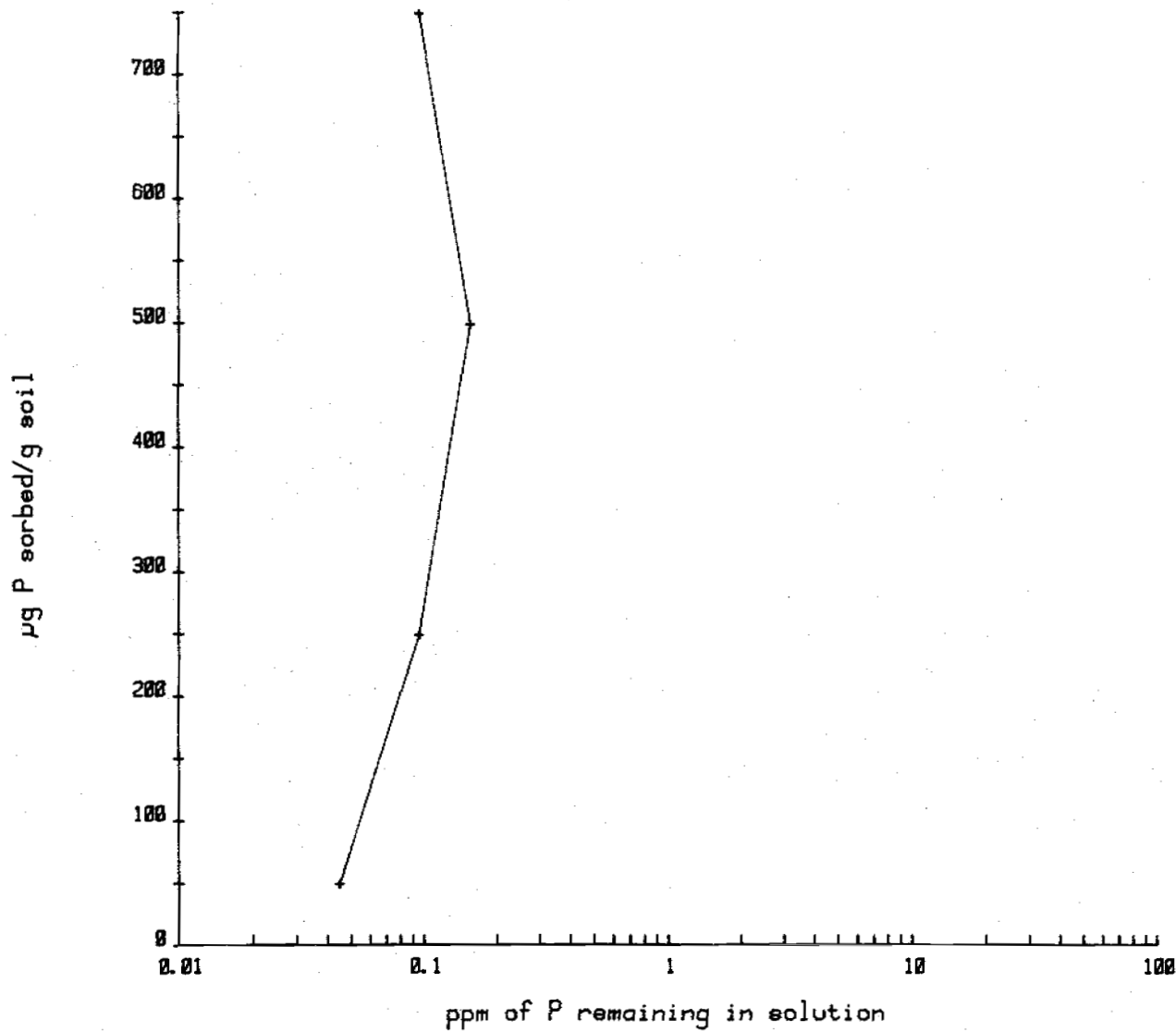
499 0.09

749 0.12

571

### Phosphorus Isotherm

79-ID-1141



μg/g soil    Soln ppm

————— 83in

50            0.05

249          0.10

498          0.16

749          0.18

Pedon: Unnamed Silt Loam 79-ID-1141 (010701B-3)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.
cm	-----X-----							-----Z-----		
2-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-10	6.62	7.22	6.10	12.07	13.21	45.30	50.78	3.92	none	Silt loam
10-29	4.02	6.06	3.06	10.28	12.56	36.79	55.89	7.32	21	Gr. silt loam
29-39	3.34	5.24	4.43	10.88	13.71	37.59	57.69	4.74	20	Gr. silt loam
39-62	3.61	5.19	4.53	12.69	15.72	41.74	54.99	3.27	26	Gr. silt loam
62-83	3.91	7.65	6.90	15.39	16.42	50.26	46.70	3.04	45	Gr. fine sandy loam
83+	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Cjed	Core	Bar	Bar			
cm	-----X-----			-----g/cc-----		-----Z-----		-----Z-----		
2-0						NS	NS	NS	NS	NS
0-10						50.3	28.6	NDNP	NDNP	NDNP
10-29						42.1	21.9	NDNP	NDNP	NDNP
29-39						43.7	28.8	NDNP	NDNP	NDNP
39-62						40.3	17.9	NDNP	NDNP	NDNP
62-83						28.2	11.6	NDNP	NDNP	NDNP
83+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

Identification		I1141-1	I1141-2	I1141-3	I1141-4
Units		-----%			
TC (0.63-2.00)		3.92	7.32	4.74	3.27
TSi (2.00-50)		50.78	55.89	57.69	54.99
TS (50-2000)		45.30	36.79	37.57	41.74
Clay	0.63-0.794	1.22	1.35	0.71	0.50
	0.794-1.00	0.73	1.33	0.80	0.52
	1.00-1.26	0.64	1.48	0.95	0.65
	1.26-1.59	0.57	1.36	0.94	0.67
	1.59-2.00	0.77	1.81	1.35	0.94
Fine Silt	2.00-2.52	0.99	2.11	1.80	1.19
	2.52-3.17	1.18	2.19	2.20	1.41
	3.17-4.00	1.31	2.05	2.25	1.41
	4.00-5.04	1.36	2.87	3.19	2.16
Medium Silt	5.04-6.35	2.46	3.46	4.08	2.89
	6.35-8.00	3.19	4.23	4.92	3.59
	8.00-10.08	4.00	4.85	5.51	4.26
	10.08-12.70	5.44	5.85	6.56	5.49
	12.70-16.0	6.57	6.45	7.17	6.76
	16.0-20.2	7.16	6.60	7.00	7.31
Coarse Silt	20.2-25.4	6.80	6.28	5.31	6.53
	25.4-32.0	5.25	4.63	4.14	5.76
	32.0-40.3	3.37	2.91	2.99	4.23
	40.3-50.8	1.63	1.35	0.45	1.91
	50.8-64.0	0.08	0.10	0.10	0.94
VFS (50-100)		13.21	12.56	13.71	15.72
FS (100-250)		12.07	10.28	10.88	12.69
MS (250-500)		6.18	3.86	4.43	4.53
CoS (500-1000)		7.22	6.06	5.24	5.19
VCoS (1000-2000)		6.62	4.02	3.34	3.61
Greater than 2000		none	21	20	26
Textural Class		SiL	Gr. SiL	Gr. SiL	Gr. SiL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

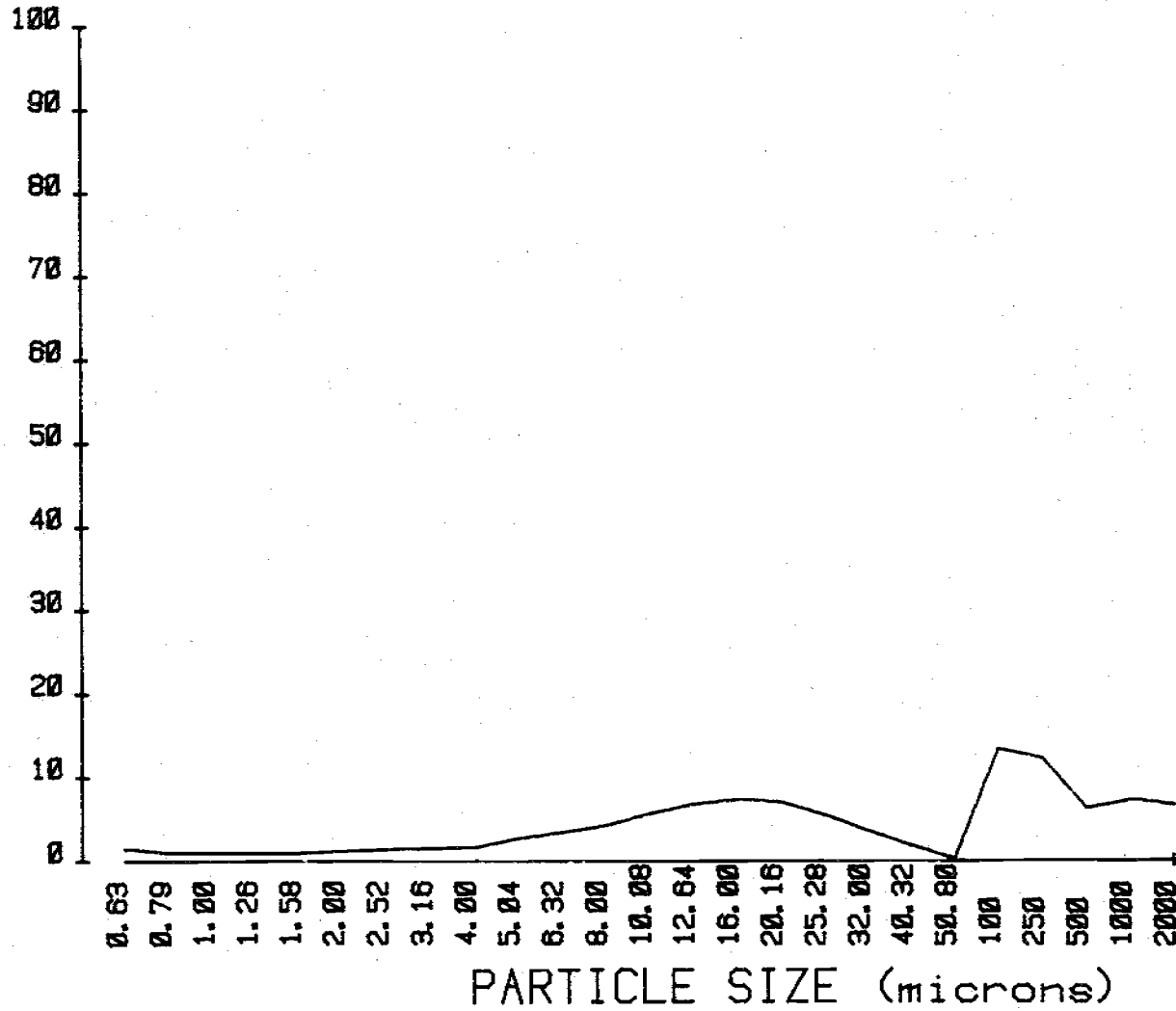
Date: September 1980

Identification		I1141-5		
Units		-----%		
TC (0.63-2.00)		3.04		
TSi (2.00-50)		46.70		
TS (50-2000)		50.26		
Clay	0.63-0.794	0.44		
	0.794-1.00	0.46		
	1.00-1.26	0.55		
	1.26-1.59	0.61		
	1.59-2.00	0.98		
Fine Silt	2.00-2.52	1.41		
	2.52-3.17	1.84		
	3.17-4.00	2.03		
	4.00-5.04	2.85		
Medium Silt	5.04-6.35	3.61		
	6.35-8.00	4.31		
	8.00-10.08	4.76		
	10.08-12.70	5.58		
	12.70-16.0	5.53		
Coarse Silt	16.0-20.2	5.13		
	20.2-25.4	4.20		
	25.4-32.0	2.88		
	32.0-40.3	1.84		
	40.3-50.8	0.64		
	50.8-64.0	0.09		
VFS (50-100)		16.42		
FS (100-250)		15.39		
MS (250-500)		6.90		
CoS (500-1000)		7.65		
VCoS (1000-2000)		3.91		
Greater than 2000		45		
Textural Class		Gr. FSL		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I1141-1



1.22	3.19
0.73	9.90
0.64	5.44
0.57	0.57
0.77	7.16
0.99	0.79
1.16	5.25
1.31	3.37
1.36	1.63
2.46	0.87
13.21	
12.07	
6.18	
7.22	
6.62	

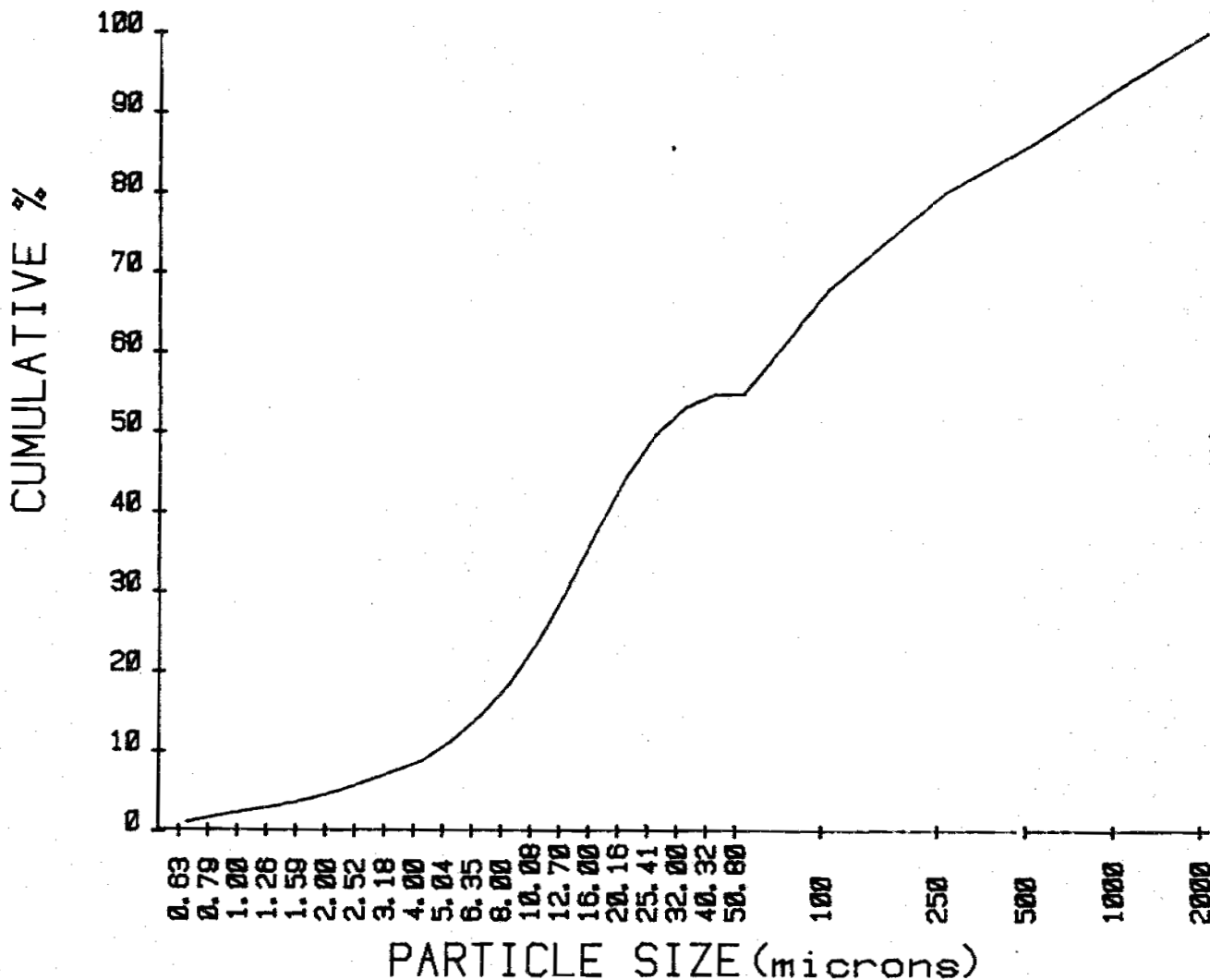
575

x



CUMULATIVE CURVE SAND-SILT-CLAY

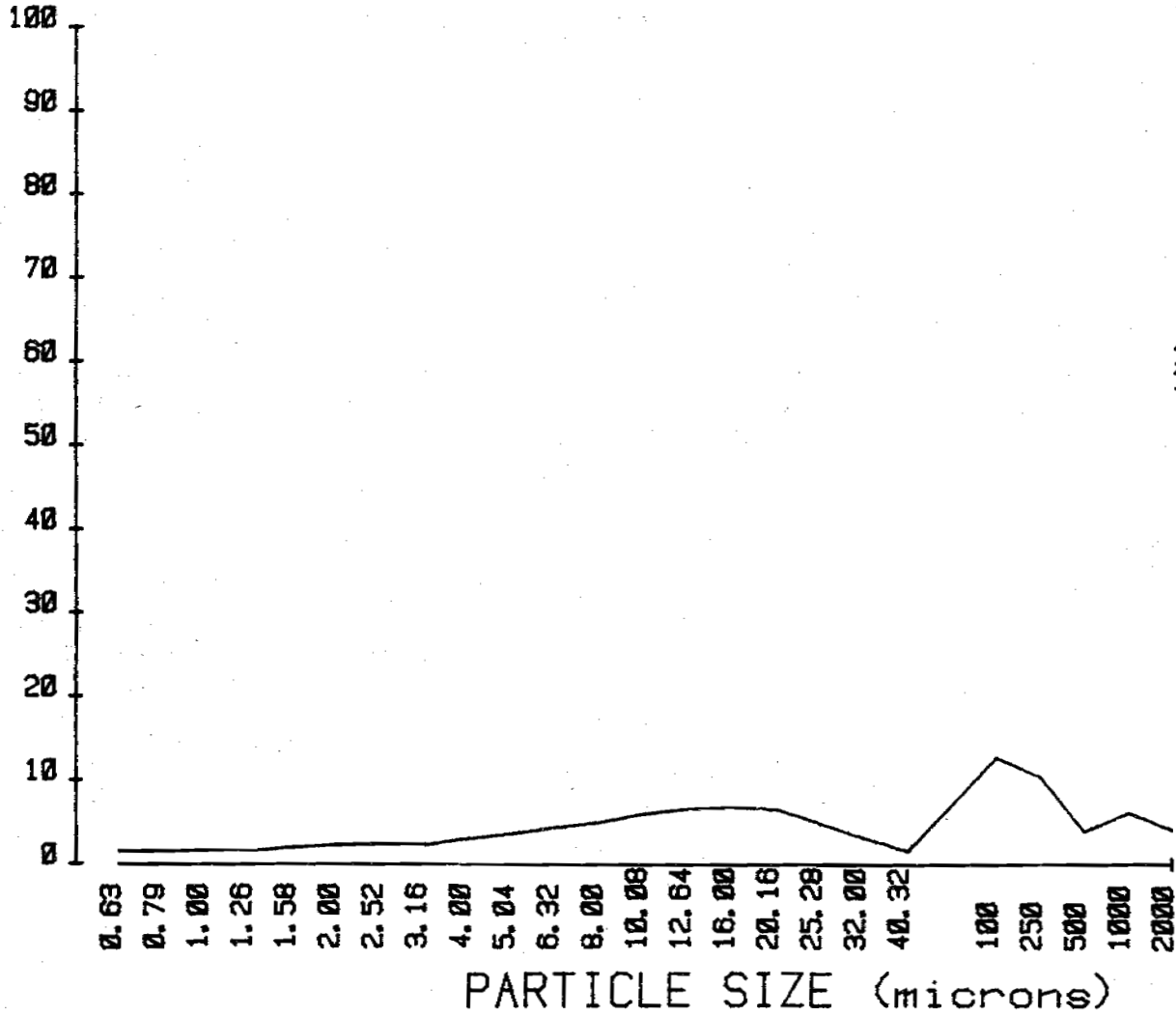
ID I1141-1



1.22	14.42
1.94	18.41
2.58	23.85
3.15	30.42
3.92	37.58
4.91	44.37
6.10	49.62
7.40	53.00
8.77	54.63
11.23	54.70
67.91	
79.98	
86.16	
93.38	
100.00	

PLOT SAND-SILT-CLAY

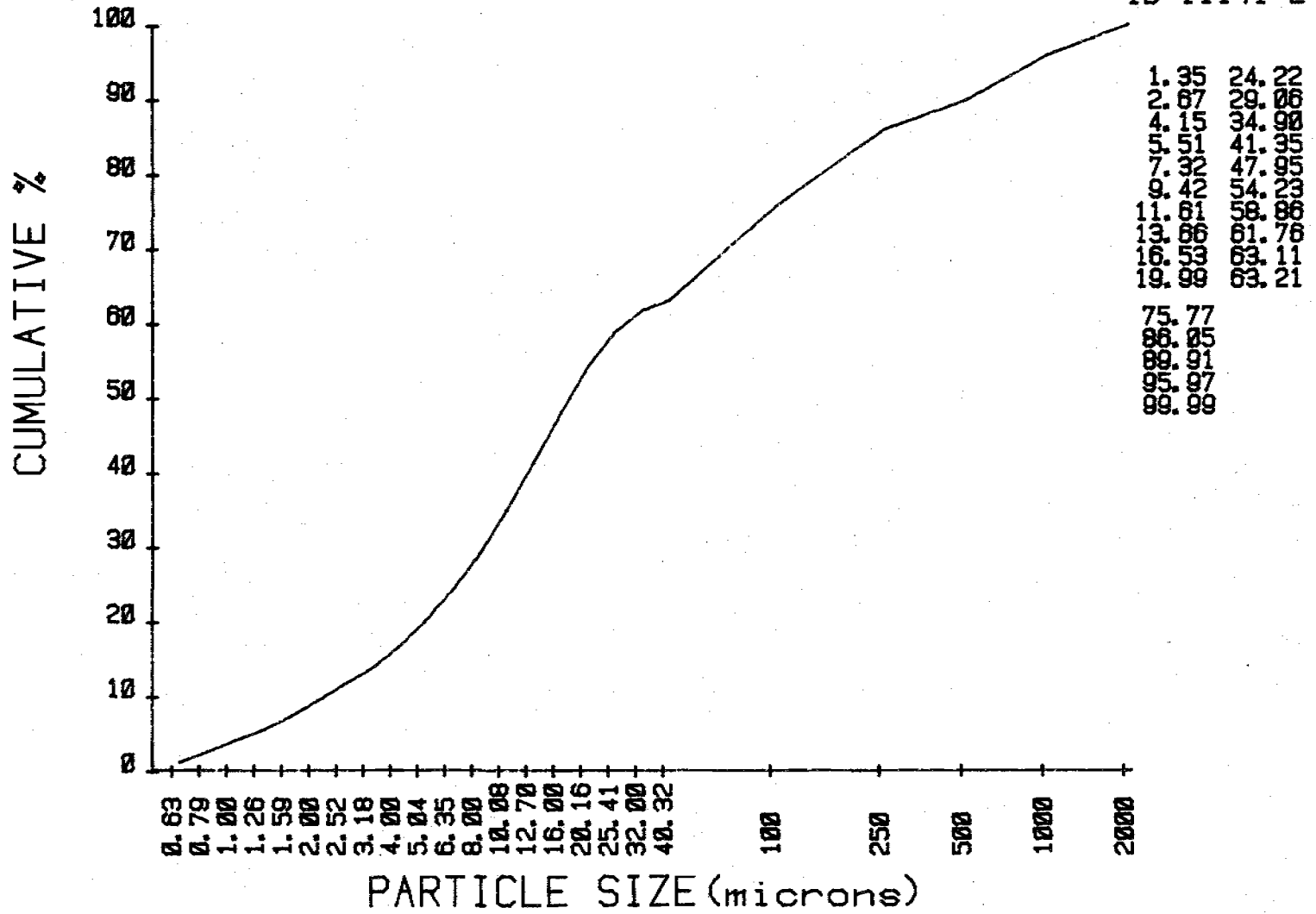
ID I1141-2



1.35	4.23
1.33	4.85
1.48	5.84
1.36	6.45
1.80	6.68
2.10	6.28
2.19	4.63
2.85	2.91
2.87	1.35
3.46	0.10
12.56	
10.26	
3.86	
6.86	
4.82	

### CUMULATIVE CURVE SAND-SILT-CLAY

ID I1141-2

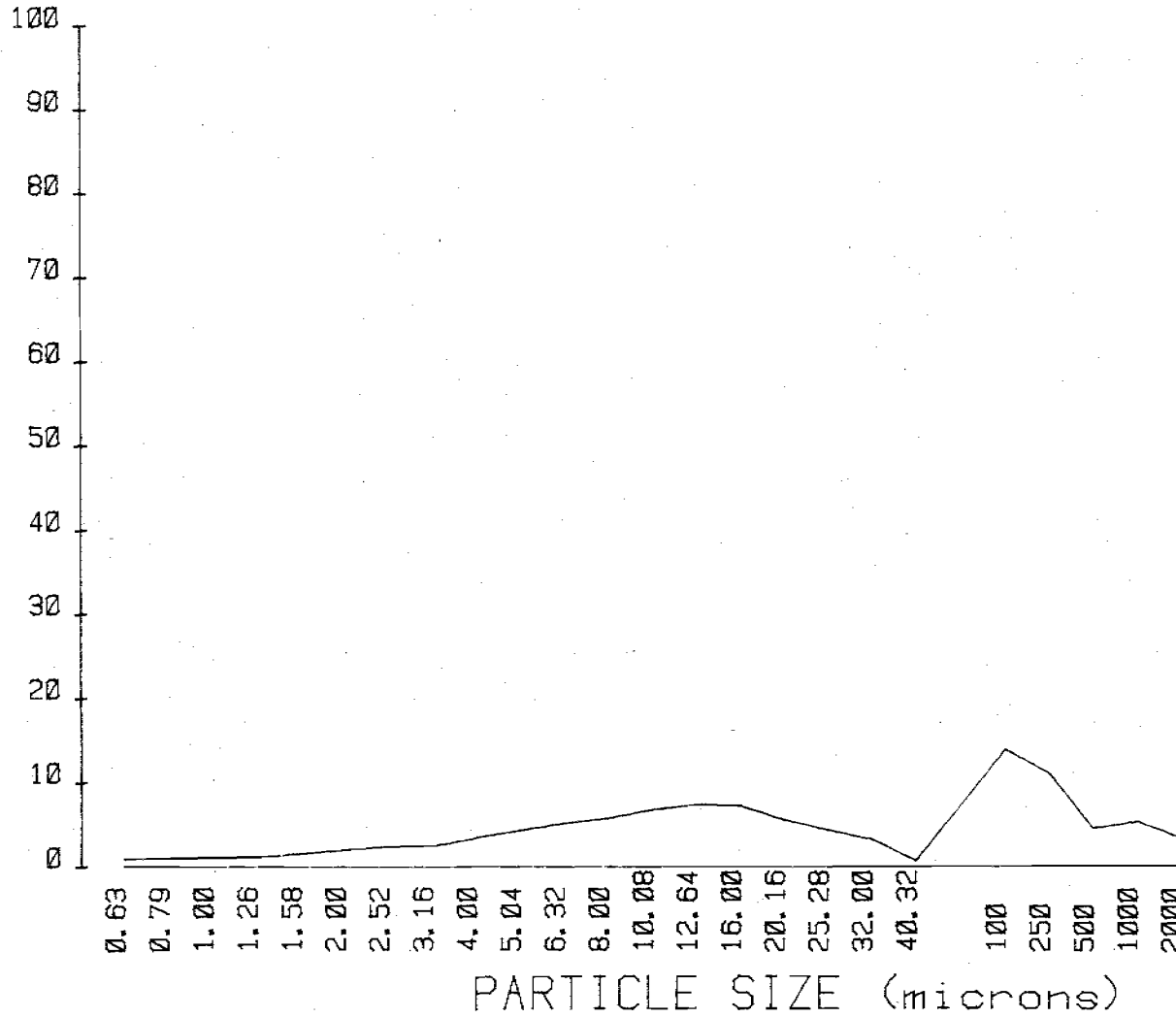


PLOT SAND-SILT-CLAY

ID I1141-3

579

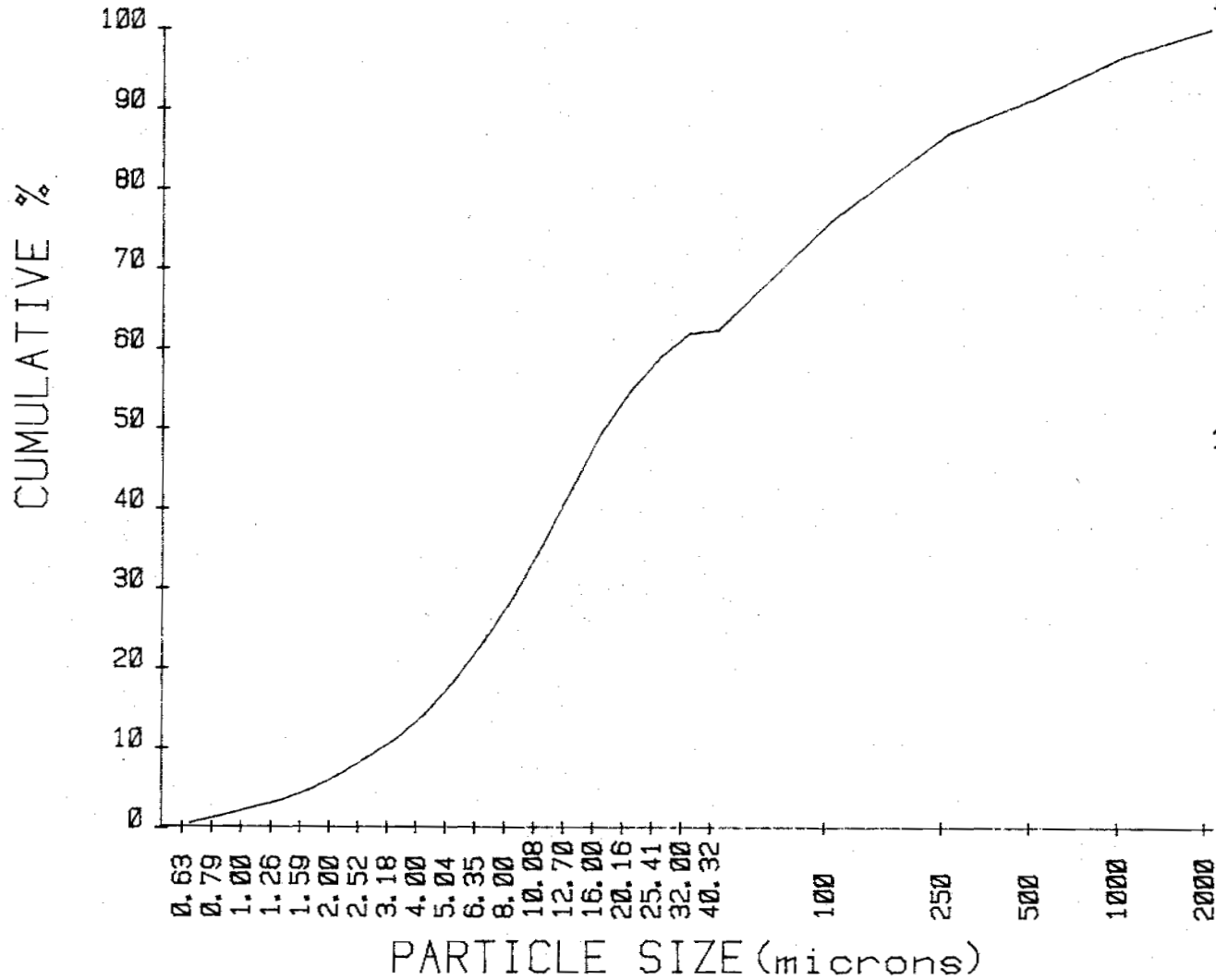
%



0.71	4.92
0.80	5.51
0.95	6.56
0.94	7.17
1.34	7.00
1.80	5.31
2.20	4.14
2.25	2.99
3.19	0.45
4.08	0.10
13.71	
10.88	
4.43	
5.24	
3.34	

CUMULATIVE CURVE SAND-SILT-CLAY

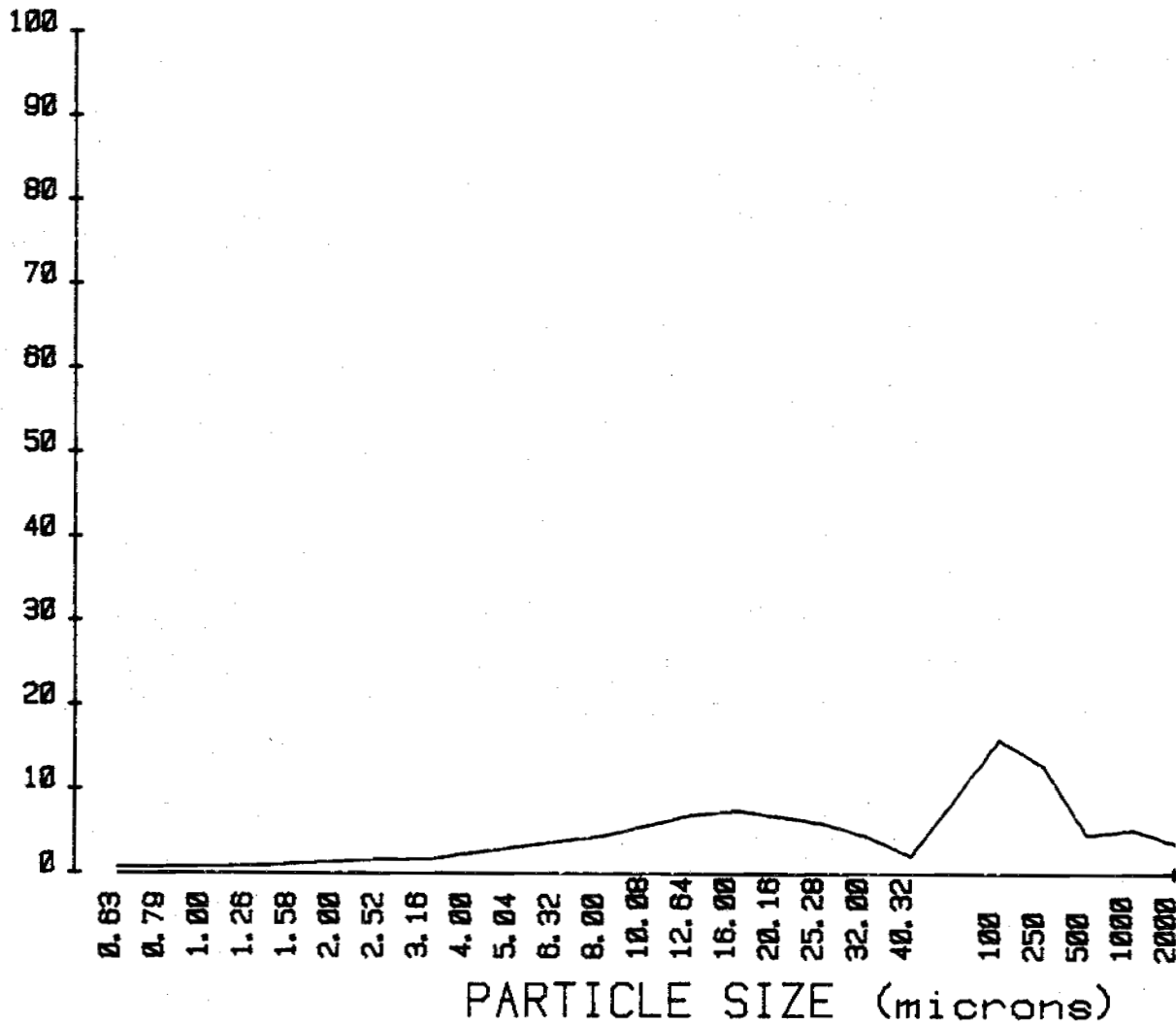
ID I1141-3



0.71	23.18
1.51	28.69
2.46	35.25
3.40	42.42
4.74	49.42
6.54	54.73
8.74	58.87
10.99	61.86
14.18	62.31
18.26	62.41
76.12	
87.00	
91.43	
96.67	
100.01	

### PLOT SAND-SILT-CLAY

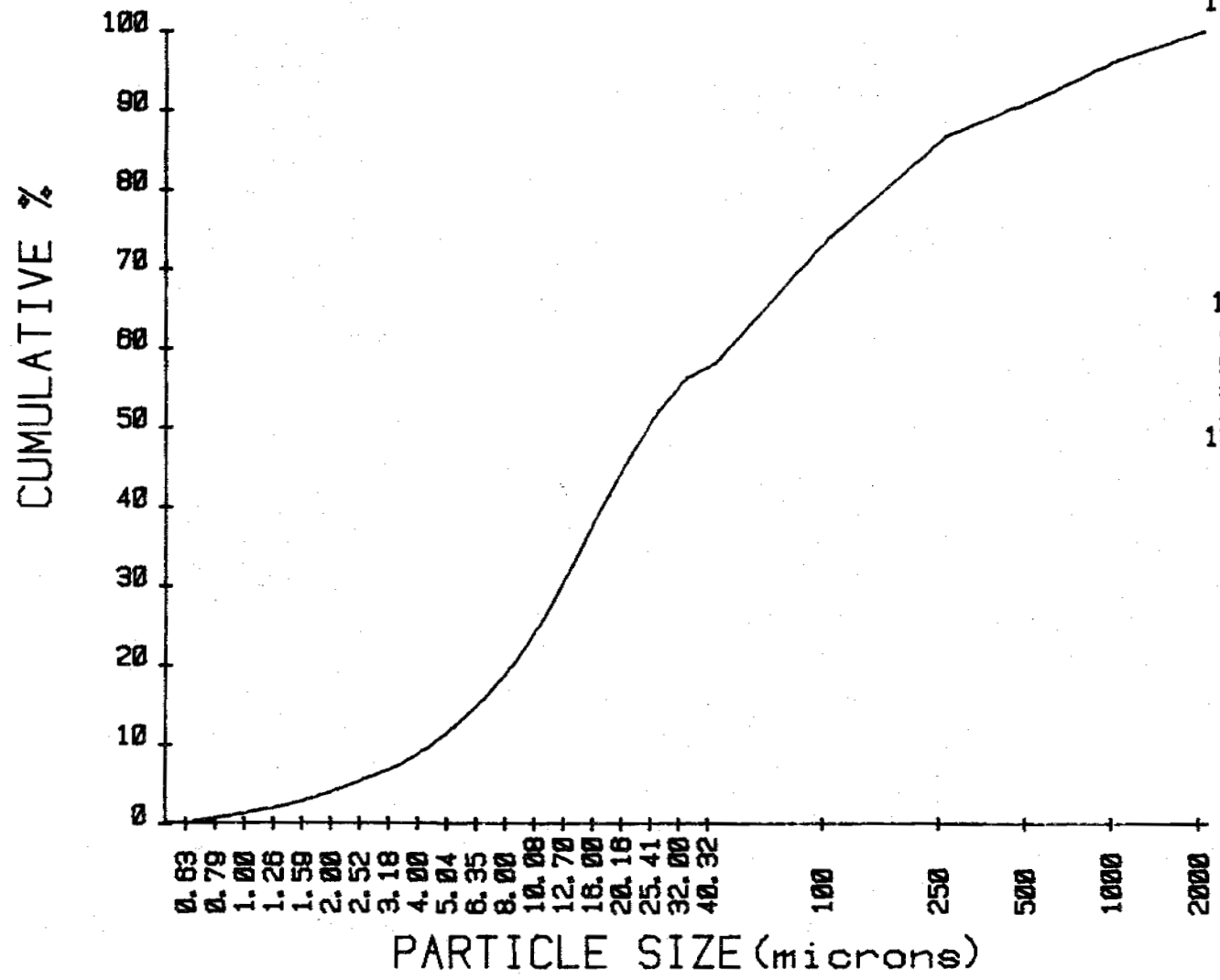
ID I1141-4



0.49	3.59
0.52	4.26
0.65	5.49
0.67	6.76
0.94	7.31
1.19	6.53
1.41	5.76
1.41	4.23
2.16	1.91
2.89	0.09
15.72	
12.89	
4.53	
5.19	
3.61	

CUMULATIVE CURVE SAND-SILT-CLAY

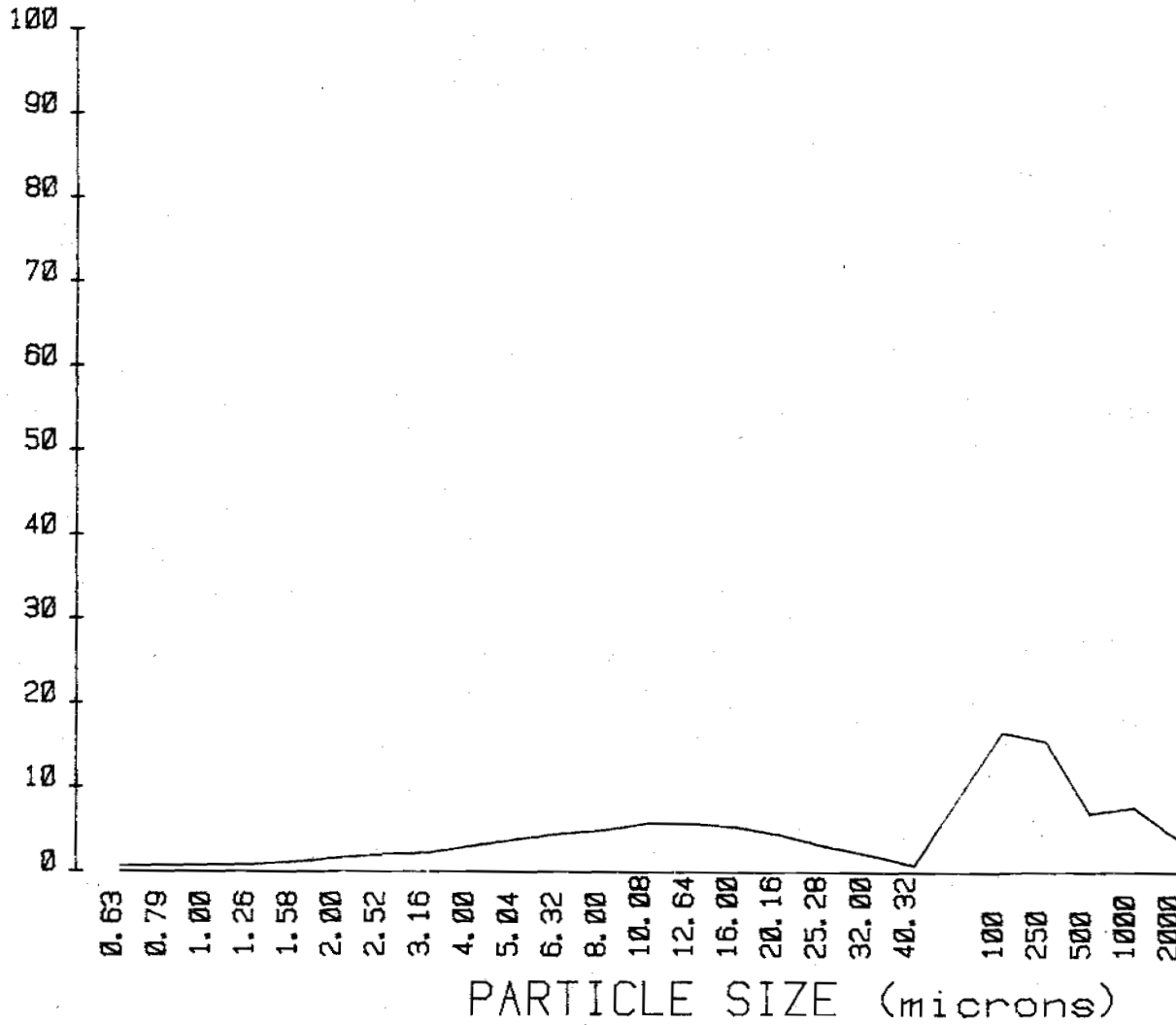
ID T1141-4



0.49	15.92
1.01	20.18
1.66	25.67
2.33	32.43
3.27	39.74
4.46	46.26
5.87	52.03
7.28	58.26
9.45	58.17
12.33	58.26
73.98	
86.67	
91.20	
96.39	
100.00	

PLOT SAND-SILT-CLAY

ID I1141-5



0.44	4.31
0.46	4.76
0.55	5.58
0.61	5.53
0.97	5.13
1.41	4.20
1.84	2.88
2.09	1.84
2.85	0.64
3.61	0.09
16.42	
15.39	
6.90	
7.65	
3.91	

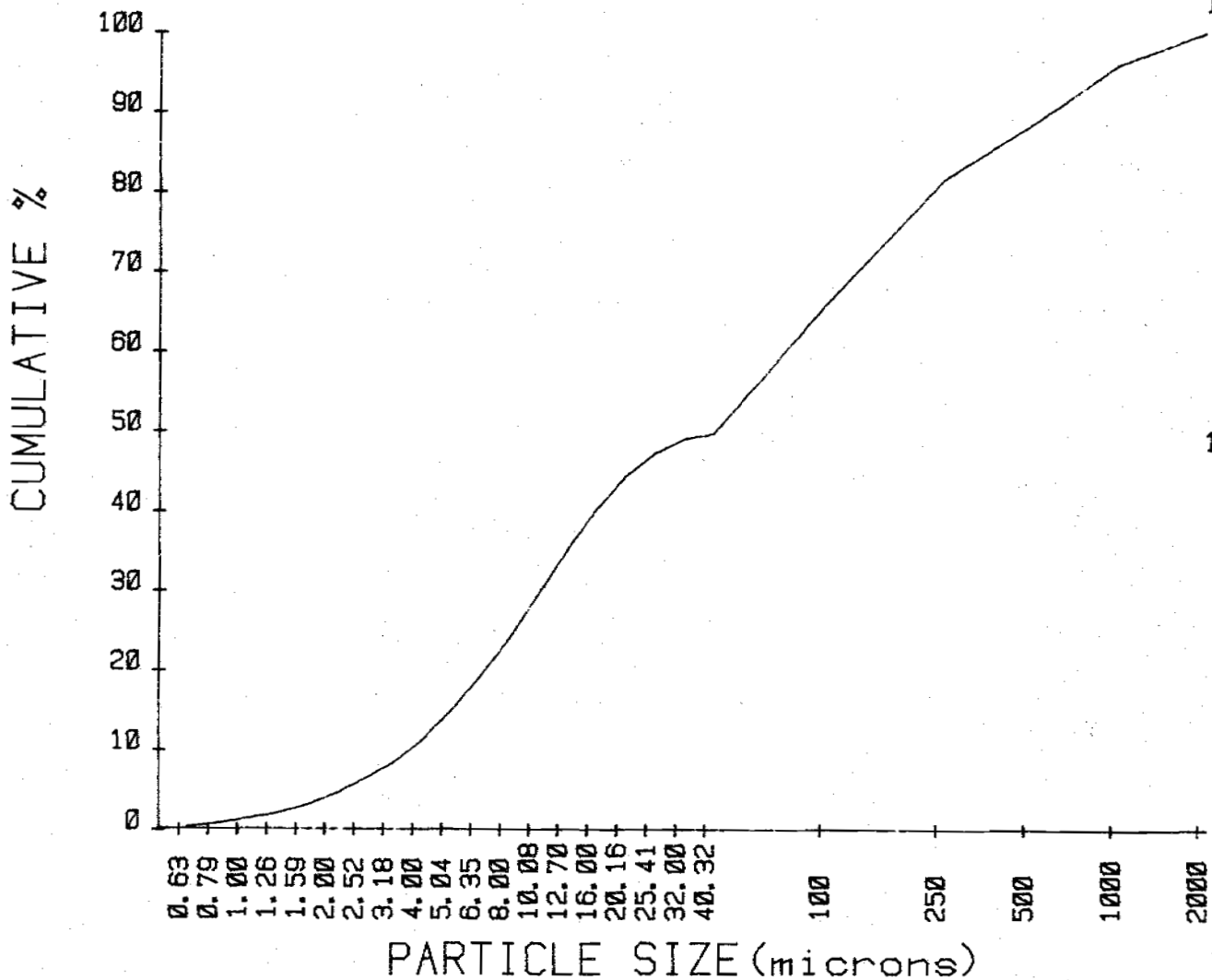
583

z



CUMULATIVE CURVE SAND-SILT-CLAY

ID I1141-5



0.44	19.09
0.90	23.84
1.45	29.42
2.06	34.95
3.04	40.08
4.45	44.29
6.29	47.16
8.31	49.01
11.16	49.65
14.77	49.74
66.16	
81.55	
88.45	
96.10	
100.01	

Unnamed Sandy Loam 79-MT-2724 (130913G-3)

Classification: coarse loamy, mixed, frigid Typic Xerorthents.

General Site Characteristics

Location: Lincoln County, Montana; northwest 1/4 of section 20, T. 37N., R. 27W.

Forest: Kootenai National Forest; Rexford Ranger District

Area: Sophie Lake, point 3

Described By/Date: Terry Svalberg and Kevin Conelly on July 13, 1978

Parent Rock/Material: calcareous sands

Habitat Type: (*Pinus ponderosa*)/(*Pseudotsuga menziesii*)/(*Festuca idahoensis*)

Topography:

Landform: hill slope

Weathering:

Formation Name: Quaternary glacial deposit

Slope: 40 percent

Aspect: 350 degrees north

Elevation: 2480 feet

Soil Depth:

Eff. Rooting Depth: 156+ centimeters

Litter Type: MOR

Surface Rock: 0 percent

Climate:

Precipitation: 20 inches

Erosion: moderate

Infiltration: very rapid

Permeability: moderate

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches: 12.8 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O1&O2 4-0 centimeters (1.5-0 inches).

A11 0-19 centimeters (0-7.5 inches). Brown to dark brown (10YR 4/3) moist; sandy loam; weak coarse and medium subangular blocky structure parting to single grained; friable, nonsticky and nonplastic; many fine and very fine, common medium and coarse roots; common fine tubular continuous pores and many fine vesicular pores; moderately alkaline pH 7.9, violently effervescent; percolation moderate; trace gravels by weight; clear wavy boundary.

A12 19-45 centimeters (7.5-18 inches). Yellowish brown (10YR 5/4) moist; loamy sand; very weak medium subangular blocky structure parting to single grained; loose, nonsticky and nonplastic; many very fine, fine, and medium, few coarse roots; many fine interstitial pores; trace gravels by weight; moderately alkaline pH 8.0, violently effervescent; percolation moderate; clear wavy boundary.

79-MT-2724 (cont.)

AC 45-103 centimeters (18-40.5 inches). Light yellowish brown (2.5Y 6/4) moist; loamy sand; very weak medium subangular blocky structure parting to single grained structure; friable, nonsticky and nonplastic; common very fine, many fine and medium roots; many fine interstitial, common fine tubular constricted, common fine vesicular pores; no gravels; moderately alkaline pH 8.2, violently effervescent; percolation moderate; clear wavy boundary.

C 103-156+ centimeters (40.5-61.5+ inches). Pale yellow (2.5Y 7/4) moist; loam; moderately coarse medium subangular blocky structure parting to single grained structure; firm, slightly sticky and slightly plastic; many very fine roots; common fine interstitial and common fine vesicular pores; strongly alkaline pH 8.7, violently effervescent; no gravels; percolation moderate.

Pedon: Unnamed Sandy Loam 79-MT-2724 (130913G-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mahos/cm	% Water at Saturation	Soluble Ions							SAR		
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl		SO <sub>4</sub>	
							meq/1000 gms									
1	A11	4-19	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	A12	19-45	8.0	7.9	0.41	46	1.7	0.9	0.1	0.0	0.0	1.7	0.1	0.2	0.2	0.2
3	AC	45-103	8.6	8.0	0.30	43	1.1	0.9	0.1	0.0	0.0	1.2	0.1	0.2	0.2	0.2
4	C	103-156+	9.0	8.2	0.34	38	0.6	1.1	0.1	0.0	0.2	0.8	0.1	0.2	0.2	0.2
			9.3	8.7	0.40	39	0.3	2.0	0.3	0.1	0.3	1.1	0.2	0.2	0.2	0.2

Sample No.	Exchangeable Ions				CEC	ESP	OM	DC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms					%	%	ratio	%	%				ppm	
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	5.9	1.7	0.1	0.1	10.5	0	2.06	1.20	0.093	13	nil	18.0	1.00	5.6
3	3.9	1.7	0.1	0.1	5.5	0	1.19	0.69	0.054	13	nil	24.3	1.00	2.0
4	1.8	1.5	0.1	0.1	3.2	0	0.66	0.39	0.028	14	nil	30.2	1.00	1.3
	1.4	2.2	0.1	0.1	2.5	4	0.47	0.27	0.023	12	nil	35.9	1.00	0.5

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-2724 (130913G-3)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
CA	%							%		
4- 0						NS	NS	NS	NS	NS
0- 19						76.96	15.05	7.99	trace	Sandy loam
19- 45						85.05	8.42	6.53	trace	Loamy sand
45-103						78.70	15.31	5.99	none	Loamy sand
103-156+						50.86	41.59	7.55	none	Loam

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core g/cc	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
CA	%				%		%		
2- 0					NS	NS	NS	NS	NS
0- 19					11.4	7.0	NDNP	NDNP	NDNP
19- 45					7.7	5.2	NDNP	NDNP	NDNP
45-103					8.2	4.8	NDNP	NDNP	NDNP
103-156+					17.9	4.5	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
Water content-Anita Falen  
NS-no sample

Analysis by: Debbie Hall

Unnamed Gravelly Sandy Loam 79-MT-2725 (080101R-1)

Classification: sandy skeletal, mixed, frigid Typic Udipsamment.

General Site Characteristics

Location: Lincoln County, Montana: southwest 1/4 of section 11, T. 32N., R.34W.

Forest: Kootenai National Forest; Troy Ranger District

Area: Star Creek, point 1

Described By/Date: Jeff Collins

Parent Rock/Material: fluvial gravels-diorite and quartzite

Habitat Type: (*Thuja plicata*)/(*Clintonia uniflora*)

Topography:

Landform: stream terrace

Weathering: average

Formation Name: Pritchard

Slope: 15 percent

Aspect: 150 degrees southeast

Elevation: 3960 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: MOR

Surface Rock:

Climate:

Precipitation: 50 inches

Erosion: minimal

Infiltration: rapid

Permeability: very rapid

Storage:

Drainage: excessive

Air Temp:

Soil Temp at 20 inches: 9.4 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O1&O2 2-8 centimeters (1-0 inches).

A1 0-3 centimeters (0-1 inches). Dark brown (10YR 3/3) moist; gravelly sandy loam; weak fine granular structure; soft, very friable, nonsticky and nonplastic; 44 percent gravels by weight; many very fine, fine, and medium roots; many fine continuous irregular pores; medium acid pH 5.9, noncalcareous; percolation rapid; abrupt wavy boundary.

AC 3-23 centimeters (1-9 inches). Dark yellowish brown (10YR 4/4) moist; gravelly loamy sand; weak fine subangular blocky structure parting to weak fine granular structure; slightly hard, friable, slightly sticky and nonplastic; 28 percent gravels by weight; many very fine, fine, and medium roots; many fine continuous interstitial pores, and many fine discontinuous vesicular pores; strongly acid pH 5.5, noncalcareous; percolation very rapid; gradual wavy boundary.

79-HT-2725 (cont.)

C            23-109+ centimeters (9-43+ inches). Dusky red (2.5YR 3/2) moist; gravelly loamy sand; single grained structure; 44 percent gravels by weight; many fine, and common medium roots; many fine, medium continuous pores; strongly acid pH 5.5, noncalcareous; percolation very rapid.

Pedon: Unnamed Gravelly Sandy Loam 79-MT-2725 (888101R-1)

Date: January 1980

Sample No.	Horizon	Depth	pH paste	EC <sub>10</sub> <sup>3</sup>	% Water at Saturation	Available P	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
		cm	mhos/cm		ppm		%				
	01-02	2- 0	NS	NS	NS	NS					
1	A1	0- 3	5.9	0.31	41	0.3					
2	AC	3- 23	5.5	0.11	33	0.2					
3	C	23-109+	5.5	0.15	35	0.2					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
		meq/100 gms						%		ratio			
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	1.9	0.7	1.1	0.2	5.7	6.9	33	1.26	0.74	0.039	19	0.56	9.3
2	1.2	0.3	1.1	0.2	4.0	3.9	30	0.49	0.28	0.017	16	0.72	9.7
3	1.3	0.6	1.1	0.2	4.0	5.0	34	0.93	0.54	0.021	26	0.56	9.5

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zaida Fadness



Pedon: Unnamed Gravelly Sandy Loam 79-MT-2725 (080101R-1)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	NS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%							%			
2- 0							NS	NS	NS	NS	NS
0- 3							71.20	25.31	3.48	44	Gr. sandy loam
3- 23							76.20	21.23	2.57	28	Gr. loamy sand
23-109+							82.80	13.46	3.74	44	Gr. loamy sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	g/cc		%		%		
cm	%			g/cc		%		%		
2- 0						NS	NS	NS	NS	NS
0- 3						13.2	4.6	NDNP	NDNP	NDNP
3- 23						10.1	3.4	NDNP	NDNP	NDNP
23-109+						8.3	3.7	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Debbie Hall

K12

Mg-saturated, glycolated

080101 R-1

79-MT-2725-3

C 23-109 cm

Slides prepared by: Falen and Blank

Slides run by: Chris Dillion

Slides interpreted by: Moody and Falen

90  
80  
70  
60  
50  
40  
30  
20  
10

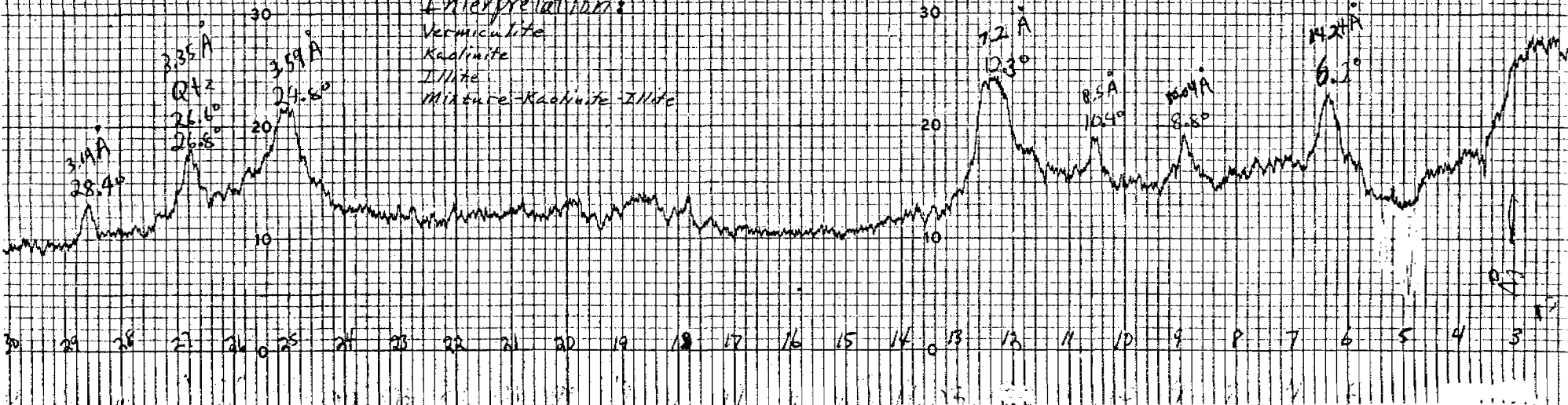
90  
80  
70  
60  
50  
40  
30  
20  
10

593

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillion  
Slide interpreted by: Moody & Falen

K12  
Mg-saturated, glycolated  
080101 R-1  
79-MT-2725-3  
C 23-109 cm.

Interpretations:  
Vermiculite  
Kaolinite  
Illite  
Mixture-Kaolinite-Illite

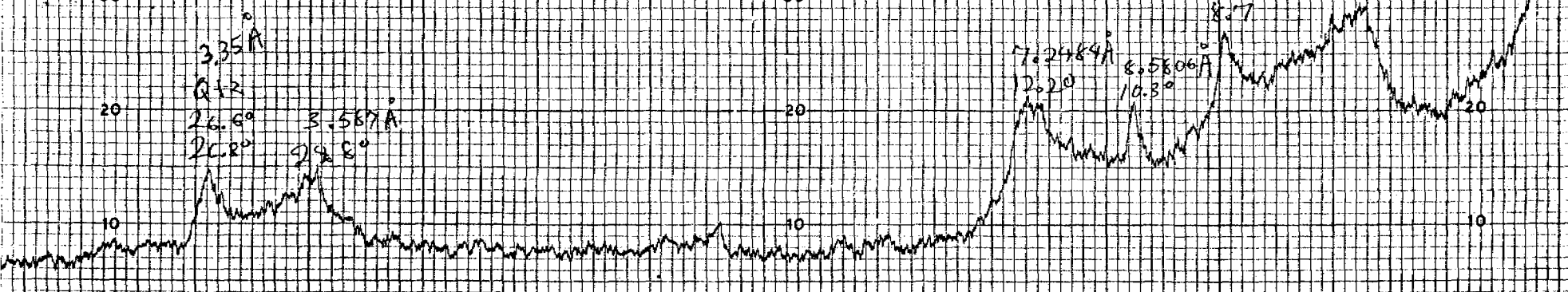




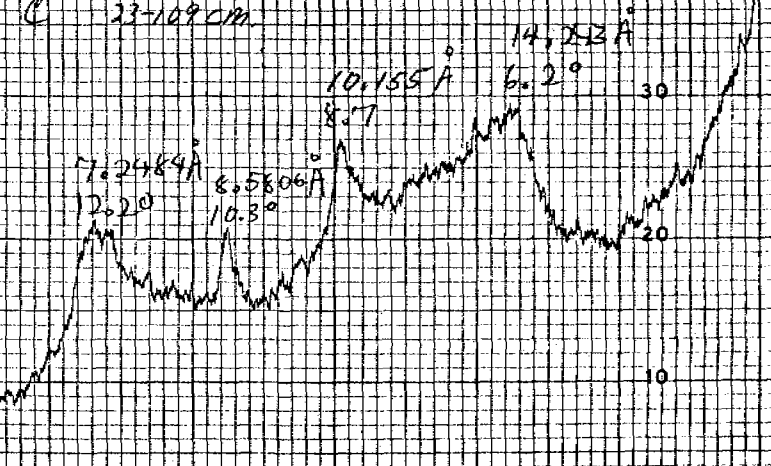
K12  
K-saturated, air dried  
080101 R-1  
79-MT-2725-3  
C 23-109 cm

594

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3



K12  
K-saturated, air dried  
080101 R-1  
79-MT-2725-3  
C 23-109 cm



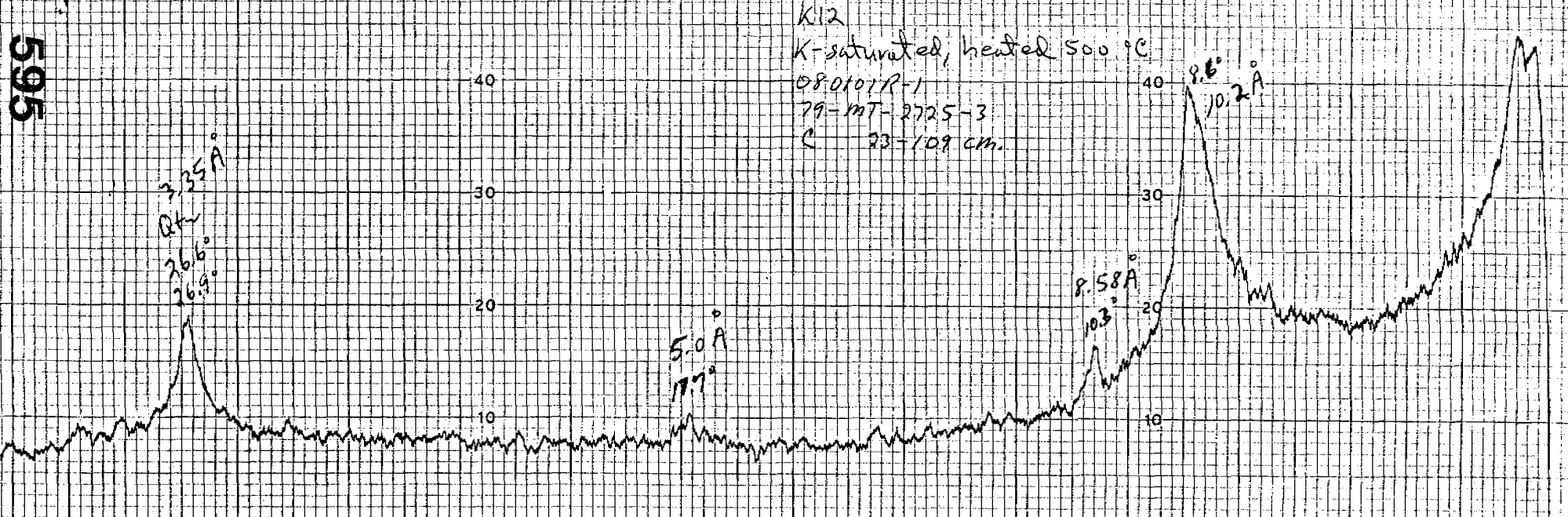
K12  
K-saturated, heated 500 degrees C  
080101 R-1  
79-MT-2725-3  
C 23-109 cm

90  
80  
70  
60  
50  
40  
30  
20  
10  
0

90  
80  
70  
60  
50  
40  
30  
20  
10  
0

595

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3



7.35 Å  
26.6°  
26.9°

5.0 Å  
17.7°

8.58 Å  
10.3°

8.6°  
10.2 Å

100

K12  
K-saturated, heated 500 °C  
080101 R-1  
79-MT-2725-3  
C 23-109 cm.



Unnamed Sandy Loam 79-MT-2726 (120903G-3)

Classification: coarse loamy, mixed, frigid Typic Calcixeroll.

General Site Characteristics

Location: Lincoln County, Montana; northwest 1/4 of section 7, T. 36N., R. 27W.

Forest: Kootenai National Forest; Fortine Ranger District

Area: Tobacco River, point 3

Described By/Date: Garry Edson and Kevin Conelly on July 21, 1978

Parent Rock/Material: alluvial sands and gravels

Habitat Type: (*Pinus ponderosa*)/(*Peruvia tridentata*)

Topography:

Landform: side slope

Weathering: minimal

Formation Name: Quaternary glacial

Slope: 8 percent

Aspect: 130 degrees southeast

Elevation: 2820 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: none

Surface Rock: 0 percent

Climate:

Precipitation: 20 inches

Erosion: slight

Infiltration: moderate

Permeability: slow

Storage:

Drainage: slow

Air Temp:

Soil Temp at 20 inches: 14.4 deg. C

Salt/Alkal:

Remarks:

Pedon Description

A1 0-27 centimeters (0-10.5 inches). Dark brown (10YR 3/3) dry; sandy loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; no gravels; common fine, very fine and coarse roots, many medium roots; many very fine continuous tubular, many very fine vesicular pores; moderately alkaline pH 8.0, strongly effervescent; percolation moderate; clear wavy boundary.

B2 27-59 centimeters (10.5-23 inches). Grayish brown (10YR 5/2) dry; loamy sand; very weak medium coarse subangular blocky structure; slightly firm, soft, nonsticky and nonplastic; trace gravels by weight; few medium, few very fine roots; many very fine irregular pores; moderately alkaline pH 8.3, strongly effervescent; percolation moderately slow; gradual wavy boundary.

C 59-117 centimeters (23-46 inches). Reddish brown (2.5YR 5/4) dry; sand; single grained structure; loose, soft, nonsticky and nonplastic; 5 percent gravels by weight; few medium roots; many very fine irregular pores; strongly alkaline pH 8.7, strongly effervescent; percolation moderately slow; clear wavy boundary.

79-MT-2726 (cont.)

IICca 117-200 centimeters (46-79 inches). Gray (10YR 5/1) dry; gravelly sand; single grained structure; loose, soft, nonsticky and nonplastic; roots absent; 17 percent gravels by weight; many very fine irregular pores; strongly alkaline pH 9.8, strongly effervescent; percolation slow.

Remark: Nodules occur at the boundary between A1 and B2. Zone at 25-30 centimeters. They are: M2, R, Sc.

Pedon: Unnamed Sandy Loam 79-MT-2726 (120903G-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	Z Water at Saturation	Soluble Ions							SAR
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	
							meq/1000 gms							
1	A1	0-27	8.5	8.0	0.34	46	1.6	0.7	0.2	0.0	0.4	1.6	0.1	0.2
2	B2	27-59	9.1	8.3	0.28	33	0.5	0.7	0.1	0.1	0.3	0.8	0.0	0.1
3	C	59-117	9.3	8.7	0.24	37	0.2	0.8	0.4	0.1	0.3	0.7	0.1	0.2
4	IICca	117-200	9.3	9.0	0.25	39	0.1	0.2	1.0	0.0	0.3	0.6	0.2	0.0

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	%	ratio	%	%	ppm					
1	7.1	2.0	0.1	0.2	11.1	1	2.70	1.57	0.125	13	nil	11.2	1.00	2.6
2	1.7	1.0	0.1	0.1	2.9	0	0.44	0.25	0.028	9	nil	16.7	1.00	0.8
3	0.7	0.9	0.1	0.1	0.9	0	0.13	0.07	0.007	10	nil	11.4	0.95	1.0
4	0.5	0.8	0.1	0.1	0.7	14	0.07	0.04	0.007	6	nil	11.9	0.83	0.9

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

Pedon: Unnamed Sandy Loam 79-MT-2726 (1209036-3)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
CM	-----X-----							-----X-----			
0-27						62.69	28.24	9.06	none		Sandy loam
27-59						85.97	10.52	3.51	trace		Loamy sand
59-117						91.90	0.83	7.27	5		Sand
117-200						96.19	2.21	1.60	17		Gr. sand

Depth	Silt Size Distribution (mm)			Bulk Density Clod Core g/cc	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Bar	Bar			
CM	-----X-----			-----X-----		-----X-----			
0-27					19.3	8.4	NDNP	NDNP	NDNP
27-59					5.3	3.1	NDNP	NDNP	NDNP
59-117					2.2	1.9	NDNP	NDNP	NDNP
117-200					2.0	1.8	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall



Unnamed Sandy Loam 79-MT-2727 (1209036-1)

Classification: loamy skeletal, mixed, mesic Pachic Calcixeroll.

General Site Characteristics

Location: Lincoln County, Montana; northwest 1/4 section 7, T. 36N., R. 27W.

Forest: Kootenai National Forest; Rexford Ranger District

Area: Tobacco River, point 1

Described By/Date: Terry Svalberg and Marci Neuhauser on July 21, 1978

Parent Rock/Material: loess/till

Habitat Type: (*Pinus ponderosa*)/(*Festuca idahoensis*)

Topography:

Landform: open side hill

Weathering:

Formation Name: Quaternary glacial

Slope: 28 percent

Aspect: 76 degrees

Elevation: 2650 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: very skimpy

Surface Rock: 0 percent

Climate: frigid, xeric

Precipitation: 20 inches

Erosion:

Infiltration: moderate

Permeability: moderately slow

Storage:

Drainage: slow

Air Temp:

Soil Temp at 20 inches: 18.3 deg. C

Salt/Alkal:

Remarks:

Pedon Description

A11 0-7 centimeters (0-3 inches). Dark brown (10YR 3/3) moist; sandy loam; moderate fine and medium granular structure; friable, slightly sticky and nonplastic; 14 percent gravels by weight; many fine and few medium roots; many fine continuous tubular pores; moderately alkaline pH 7.9, slightly effervescent; percolation moderate; clear wavy boundary.

A12 7-25 centimeters (3-10 inches). Dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to weak fine and medium granular structure; friable, nonsticky and nonplastic; 10 percent gravels by weight; many fine and few medium roots; common fine continuous pores; moderately alkaline pH 8.0, violently effervescent; percolation moderate; gradual wavy boundary.

79-NT-2727 (cont.)

B21 25-56 centimeters (10-22 inches.) Brown (10YR 5/3) moist; loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; 15 percent gravels by weight; common fine and medium roots; common fine continuous tubular pores and few fine vesicular pores; mildly alkaline pH 7.8, violently effervescent; percolation moderately slow; abrupt wavy boundary.

IIB22 56-76 centimeters (22-30 inches). Pale brown (10YR 7/3) dry; very gravelly sandy loam; moderate coarse subangular blocky structure; very firm, nonsticky and nonplastic; 50 percent gravels by weight; few fine and medium roots; few fine constricted tubular pores and common fine vesicular pores; moderately alkaline pH 8.1, violently effervescent; percolation moderately slow; gradual wavy boundary.

IIC 76-114 centimeters (30-45 inches). Very pale brown (10YR 7/3) moist, with very pale brown on ped faces (10YR 7/4); very gravelly loam; massive structure; very firm, slightly sticky and slightly plastic; 59 percent gravels by weight; few medium roots; moderately alkaline pH 8.4, violently effervescent; percolation slow.

Remarks: C when very moist tends to have texture of clay loam, but quickly dries out to loam texture. C layer is very compact, very hard to penetrate.

Pedon: Unnamed Sandy Loam 79-MT-2727 (1209036-1)

Date: January 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions							SAR
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	
							meq/1000 gms							
1	A11	0- 7	8.4	7.9	0.37	62	2.5	0.7	0.1	0.3	0.0	2.8	0.1	0.2
2	A12	7- 25	8.4	8.0	0.32	60	1.9	0.8	0.2	0.2	0.0	2.0	0.2	0.2
3	B21	25- 56	8.5	7.8	0.34	61	1.7	1.1	0.2	0.2	0.0	3.0	0.1	0.2
4	IIB22	56- 76	8.9	8.1	0.33	37	0.7	0.6	0.2	0.2	0.0	1.5	0.1	0.1
5	IIC	76-114	9.2	8.4	0.38	31	0.2	1.0	0.3	0.3	0.3	0.8	0.1	0.2

Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
meq/100 gms				%	%	ratio	%	%	ppm					
1	8.7	1.3	0.1	0.6	12.9	1	5.03	2.92	0.242	12	nil	8.4	0.86	3.6
2	6.8	1.7	0.1	0.4	10.6	0	3.93	1.76	0.130	14	nil	14.7	0.90	2.4
3	5.7	1.9	0.1	0.3	9.1	0	2.85	1.65	0.160	10	nil	17.7	0.85	1.8
4	2.7	1.4	0.1	0.1	3.2	3	0.97	0.57	0.067	9	nil	28.0	0.44	1.5
5	1.4	1.9	0.1	0.3	1.8	6	0.27	0.16	0.018	8	nil	27.7	0.41	1.6

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zeldo Fadness

Pedon: Unnamed Sandy Loam 79-MT-2727 (120903G-1)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm			
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.		
cm	%							%				
0- 7							53.62	38.63	7.74	14		Sandy loam
7- 25							50.25	40.14	9.61	10		Loam
25- 56							49.26	41.47	9.27	15		Loam
56- 76							56.54	34.90	8.56	56		V.gr. sandy loam
76-114							39.85	38.93	21.22	59		V.gr. loam

Depth	Silt Size Distribution (mm)				Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0- 7						21.4	8.2	NDNP	NDNP	NDNP
7- 25						16.7	8.9	NDNP	NDNP	NDNP
25- 56						17.7	8.8	NDNP	NDNP	NDNP
56- 76						15.1	5.8	NDNP	NDNP	NDNP
76-114						14.7	7.3	16	6	10

Remarks: Mechanicals were run by the pipette method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Debbie Hall

Unnamed Gravelly Fine Sandy Loam 79-ID-0952 (070701R-2)

Classification: medial over loamy, mixed, frigid Andic Dystrachrepts.

General Site Characteristics

Location: Lincoln County, Montana; northeast of section 1, T. 59N., R. 2E.  
Forest: Kootenai National Forest; Troy Ranger District  
Area: Emerson Creek, point 3  
Described By/Date: T. Svalberg, P. Schoeneberger, and J. Collins on August 30, 1978  
Parent Rock/Material: loess/till  
Habitat Type: (Tsuga heterophylla)/(Clintonia uniflora)  
Topography:  
Landform: oversteepened drainage wall  
Weathering: normal  
Formation Name: granitic  
Slope: 70 percent toe  
Aspect: 300 degrees west-northwest  
Elevation: 4800 feet  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type: MOR  
Surface Rock: 2 percent  
Climate: frigid, udic  
Precipitation: 80 inches  
Erosion: slight surface  
Infiltration: rapid  
Permeability: rapid  
Storage:  
Drainage: moderately excessive  
Air Temp:  
Soil Temp at 20 inches:  
Salt/Alkal:

Remarks:

Pedon Description

O1&O2 1-0 centimeters (0.5-0 inches).

A2 0-2.5 centimeters (0-1 inches). Light gray (10YR 7/1) moist; no lab sample; silt loam; weak fine granular structure; soft, very friable, nonsticky and nonplastic; rounded and subrounded gravel and cobbles, trace percent by weight; many very fine, fine, and medium, common coarse roots; many very fine, fine vesicular and irregular pores; extremely acid pH 4.2, noncalcareous; percolation rapid; abrupt wavy boundary.

B21ir 2.5-13 centimeters (1-5 inches). Dark brown (7.5YR 3/4) moist; gravelly fine sandy loam; weak fine granular structure; soft, very friable, nonsticky and nonplastic; 23 percent gravels by weight; many very fine, fine, medium and coarse roots; many very fine and fine vesicular pores, many very fine and fine irregular pores; very strongly acid pH 5.0, noncalcareous; percolation rapid; clear wavy boundary.

B22ir 13-30 centimeters (5-12 inches). Dark yellowish brown (10YR 4/6) moist; gravelly fine sandy loam; weak medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; 19 percent gravels by weight; many very fine and fine, common medium and coarse roots; many very fine and fine vesicular and irregular pores, common fine continuous tubular pores; strongly acid pH 5.4, noncalcareous; percolation rapid; clear wavy boundary.

B3ir 30-76 centimeters (12-30 inches). Dark yellowish brown (10YR 4/6) moist; gravelly fine sandy loam; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; 19 percent gravels by weight; common very fine, fine and medium, few coarse roots; few very fine and fine vesicular pores, few very fine and fine continuous irregular pores; medium acid pH 5.7, noncalcareous; percolation rapid; clear irregular boundary.

IIC 76-99 centimeters (30-39 inches). Dark yellowish brown (10YR 4/5) matrix with partial band at lower bounday, dark yellowish brown (10YR 3/4) moist; gravelly sandy loam; massive structure; slightly hard, friable, slightly sticky and nonplastic; 28 percent gravels by weight; common very fine and fine, few medium roots; common very fine and fine irregular pores, common medium irregular and continuous pores; medium acid pH 5.7, noncalcareous; percolation rapid; gradual irregular boundary.

IIIC 99-132 centimeters (39-52 inches). Dark yellowish brown (10YR 4/4) moist; gravelly loamy coarse sand; single grained structure; soft, loose, nonsticky and nonplastic; 38 percent gravels by weight; common very fine and fine, few medium roots; many very fine and fine irregular pores, common medium continuous tubular pores; strongly acid pH 5.5, noncalcareous; percolation rapid; clear wavy boundary.

R 132+ centimeters (52+ inches).

Comments: Microsite location is along a stream bank. A2 is variable in depth (0.5-1 inch). B21 appears to be going towards B21ir. B3 and IIC consist of mixed materials with scattered pockets and partial (buried?) horizons, cause due to site location, fluvial reworking. Subsection delineation should correspond to M22.

Pedon: Unnamed Gravelly Fine Sandy Loam 79-ID-0952 (070701R-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	ECx10 <sup>3</sup> mhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
	01-02	1- 0	NS	NS	NS	NS					
	A2	0-2.5	NS	NS	NS	NS					
1	B21ir	2.5- 13	5.0	0.10	62	0.3					
2	B22ir	13- 30	5.4	0.05	61	0.2					
3	B3ir	30- 76	5.7	0.04	63	0.0					
4	IIC	76- 99	5.7	0.06	40	0.3					
5	IIIC	99-132	5.5	0.09	35	0.8					
	R	132+	NS	NS	NS	NS					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation					Fraction		
	meq/100 gms					%	% ratio						
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	0.2	0.1	0.1	0.2	20.8	17.3	3	4.54	2.64	0.123	21	0.77	11.7
2	0.2	0.1	0.1	0.1	15.3	13.0	3	2.97	1.73	0.084	21	0.81	11.6
3	0.2	0.1	0.1	0.1	13.5	10.9	4	2.07	1.20	0.056	21	0.82	11.5
4	0.2	0.1	0.1	0.1	8.2	5.7	6	0.83	0.48	0.036	13	0.72	11.5
5	0.3	0.1	0.1	0.1	9.4	8.6	6	1.15	0.67	0.046	15	0.62	11.4
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

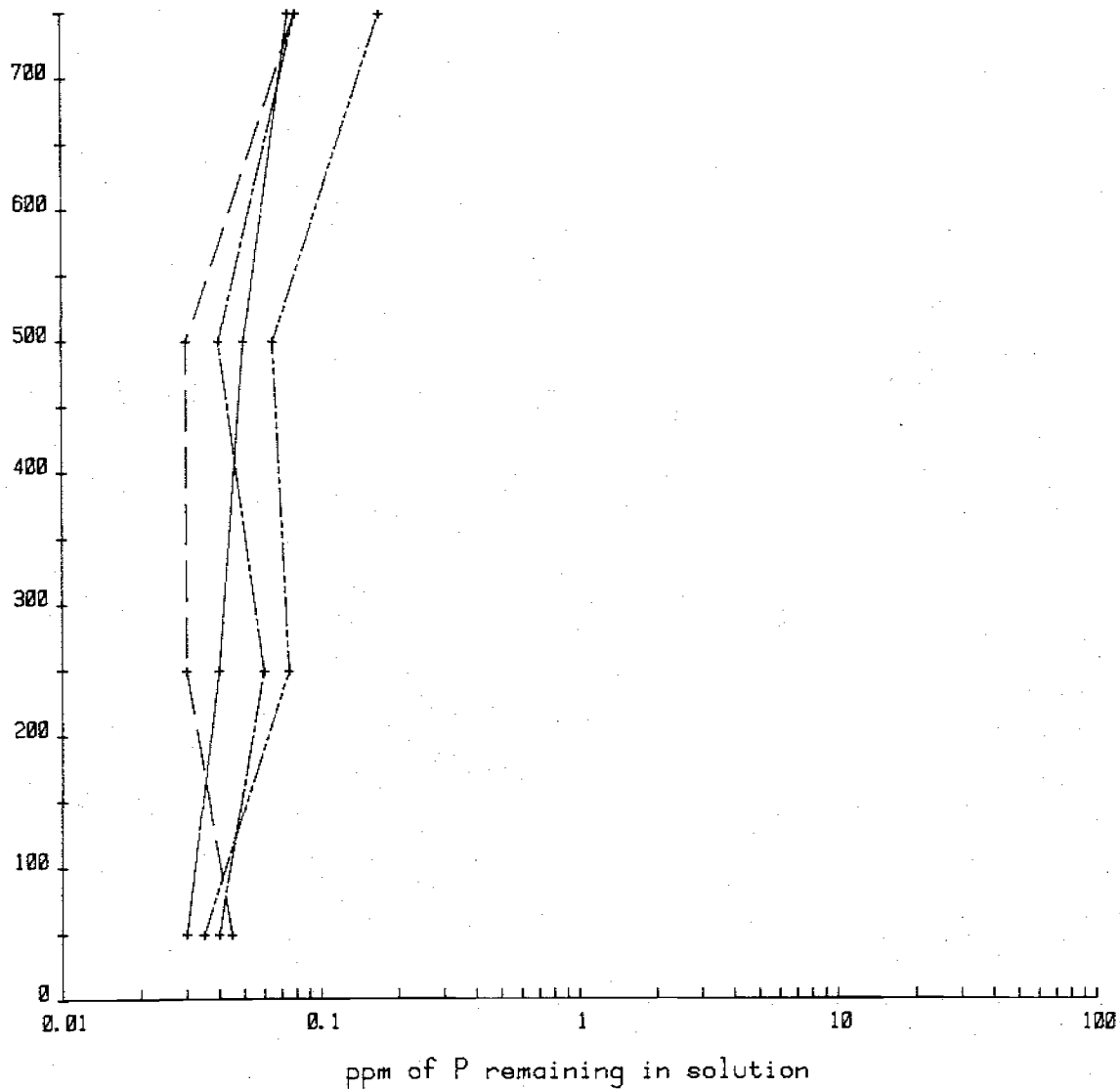
909

# Phosphorus Isotherm

79-ID-0952

607

µg P sorbed/g soil

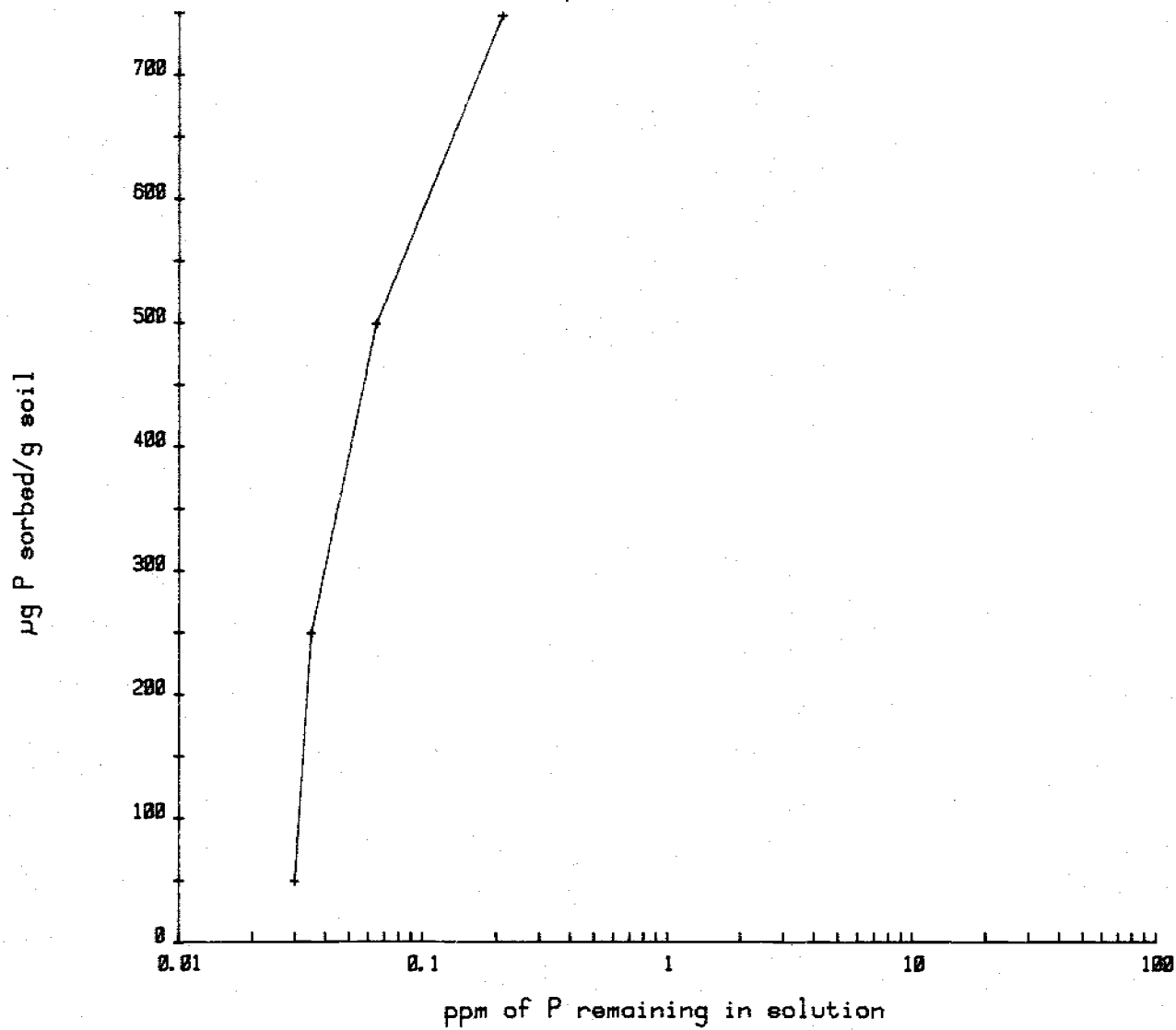


µg/g soil	Soln ppm
----- B21ir	
50	0.03
250	0.04
500	0.05
749	0.08
----- B22ir	
50	0.05
250	0.03
500	0.03
749	0.08
----- B3ir	
50	0.04
249	0.06
500	0.04
749	0.08
----- IIC	
50	0.04
249	0.08
499	0.07
748	0.17



# Phosphorus Isotherm

79-10-0952



µg/g soil	Soln ppm
50	0.03
250	0.04
499	0.07
748	0.22

Pedon: Unnamed Gravelly Fine Sandy Loam 79-ID-0952 (070701R-2)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone			Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.	
cm	X							X			
1- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-2.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2.5- 13	10.05	10.64	7.30	14.55	14.32	56.86	40.00	3.14	23		Gr. fine sandy loam
13- 30	8.40	10.39	7.11	14.23	14.68	54.81	41.87	3.32	19		Gr. fine sandy loam
30- 76	9.06	10.32	7.50	15.52	16.10	58.50	39.84	1.66	19		Gr. fine sandy loam
76- 99	12.83	11.53	8.26	16.05	14.60	63.27	33.08	3.65	28		Gr. sandy loam
99-132	20.26	22.56	10.92	15.22	10.09	79.04	18.10	2.86	38		Gr. loamy coarse sand
132+	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	X			g/cc		X		X		
1- 0						NS	NS	NS	NS	NS
0-2.5						NS	NS	NS	NS	NS
2.5- 13						27.1	21.4	NDNP	NDNP	NDNP
13- 30						27.0	18.8	NDNP	NDNP	NDNP
30- 76						28.5	16.2	NDNP	NDNP	NDNP
76- 99						16.9	11.1	NDNP	NDNP	NDNP
99-132						12.4	6.5	NDNP	NDNP	NDNP
132+						NS	NS	NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

Identification		I0952-1	I0952-2	I0952-3	I0952-4
Units		-----%			
TC (0.63-2.00)		3.14	3.32	1.66	3.65
TSi (2.00-50)		40.00	41.87	39.84	33.08
TS (50-2000)		56.86	54.81	58.50	63.27
Clay	0.63-0.794	0.53	0.43	0.24	0.53
	0.794-1.00	0.48	0.54	0.26	0.57
	1.00-1.26	0.56	0.67	0.30	0.72
	1.26-1.59	0.60	0.68	0.33	0.74
	1.59-2.00	0.96	1.02	0.53	1.09
Fine Silt	2.00-2.52	1.37	1.35	0.74	1.39
	2.52-3.17	1.73	1.57	0.96	1.59
	3.17-4.00	1.85	1.62	1.08	1.59
	4.00-5.04	2.44	2.34	1.54	1.64
Medium Silt	5.04-6.35	3.09	3.04	2.02	2.45
	6.35-8.00	3.48	3.57	2.54	2.75
	8.00-10.08	3.62	3.99	2.96	2.91
	10.08-12.70	4.13	5.07	3.89	3.32
	12.70-16.0	4.19	5.17	4.54	3.45
	16.0-20.2	4.01	4.86	5.13	3.25
Coarse Silt	20.2-25.4	3.81	3.59	4.78	2.79
	25.4-32.0	2.80	2.78	4.19	2.40
	32.0-40.3	2.46	2.25	3.38	2.29
	40.3-50.8	0.95	0.61	2.03	1.12
	50.8-64.0	0.07	0.06	0.07	0.13
VFS (50-100)		14.32	14.68	16.10	14.60
FS (100-250)		14.55	14.23	15.52	16.05
MS (250-500)		7.30	7.11	7.50	8.26
CoS (500-1000)		10.64	10.39	10.32	11.53
VCoS (1000-2000)		10.05	8.40	9.06	12.83
Greater than 2000		23	19	18	28
Textural Class		Gr.FSL	Gr.FSL	Gr.FSL	Gr.SL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

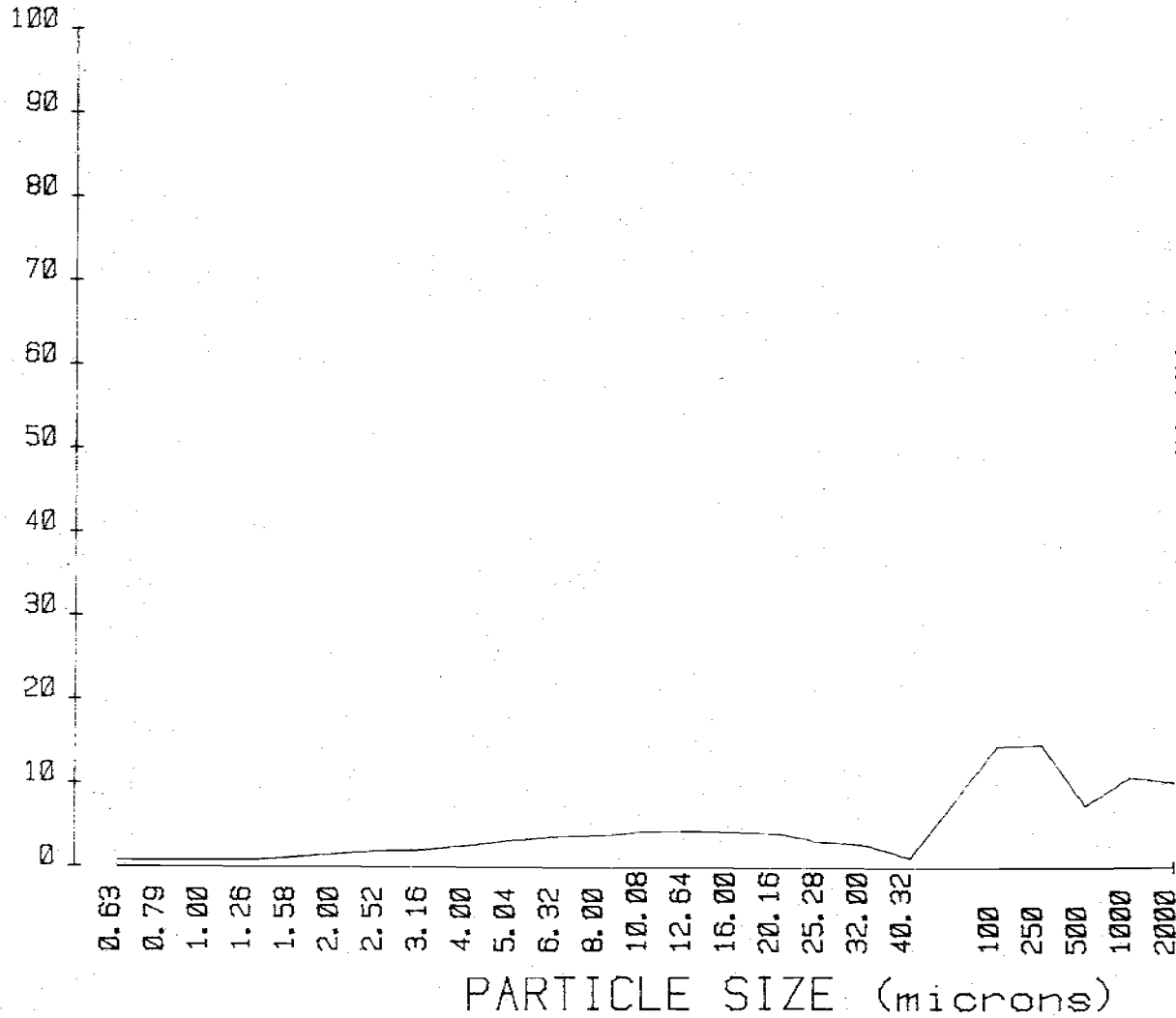
Date: September 1980

Identification		I0952-5			
Units		-----%			
TC (0.63-2.00)		2.86			
TSi (2.00-50)		18.10			
TS (50-2000)		79.04			
Clay	0.63-0.794	0.61			
	0.794-1.00	0.49			
	1.00-1.26	0.54			
	1.26-1.59	0.52			
	1.59-2.00	0.70			
Fine Silt	2.00-2.52	0.81			
	2.52-3.17	0.84			
	3.17-4.00	0.77			
	4.00-5.04	1.10			
Medium Silt	5.04-6.35	1.30			
	6.35-8.00	1.49			
	8.00-10.08	1.62			
	10.08-12.70	1.92			
	12.70-16.0	2.05			
	16.0-20.2	1.84			
Coarse Silt	20.2-25.4	1.66			
	25.4-32.0	1.34			
	32.0-40.3	0.93			
	40.3-50.8	0.25			
	50.8-64.0	0.19			
VFS (50-100)		10.09			
FS (100-250)		15.22			
MS (250-500)		10.92			
CoS (500-1000)		22.56			
VCoS (1000-2000)		20.26			
Greater than 2000		38			
Textural Class		Gr. LCS			

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

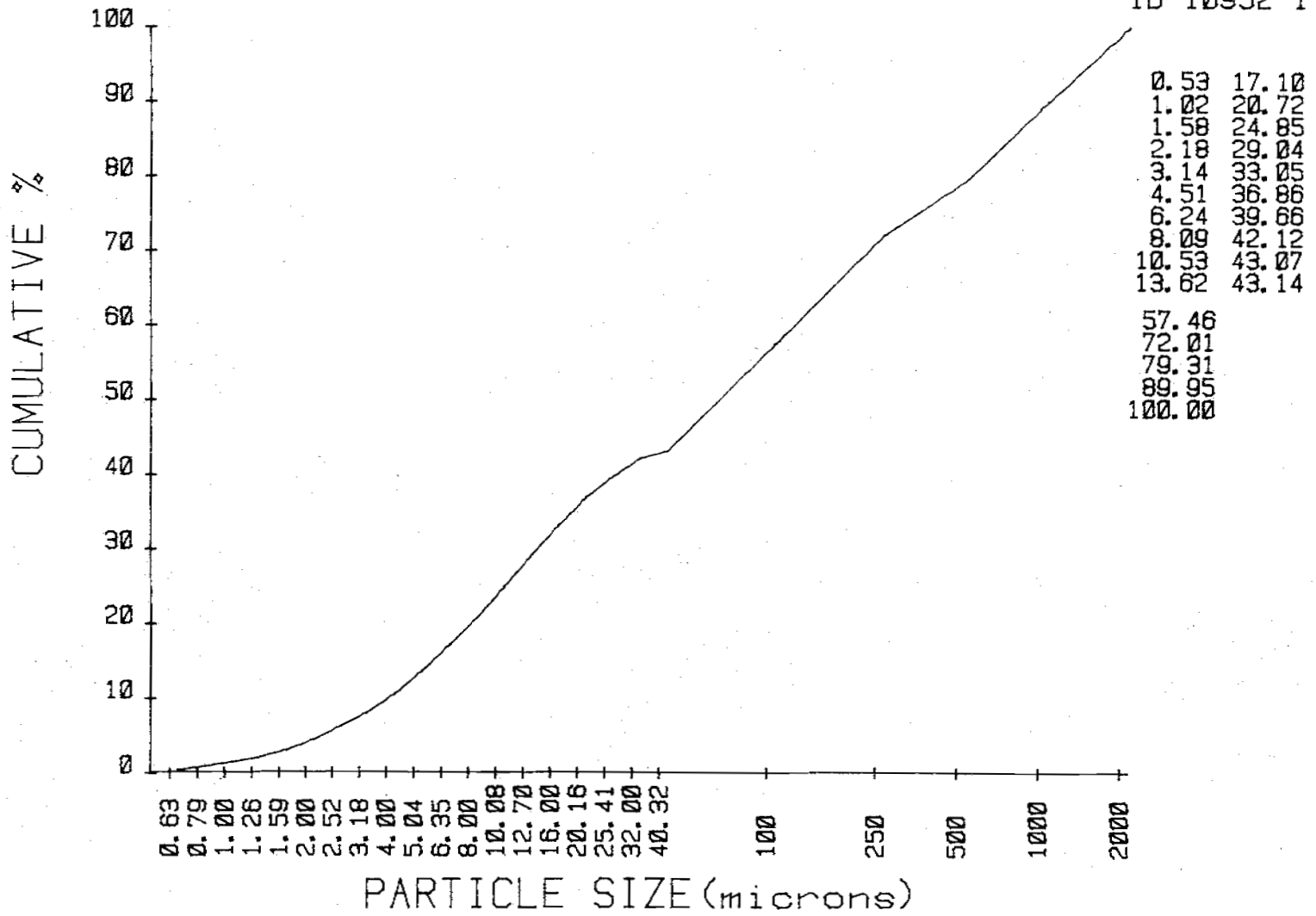
ID 10952-1



0.53	3.48
0.48	3.62
0.56	4.19
0.60	4.19
0.96	4.01
1.37	3.81
1.73	2.80
1.85	2.46
2.44	0.95
3.09	0.07
14.32	
14.55	
7.30	
10.64	
10.05	

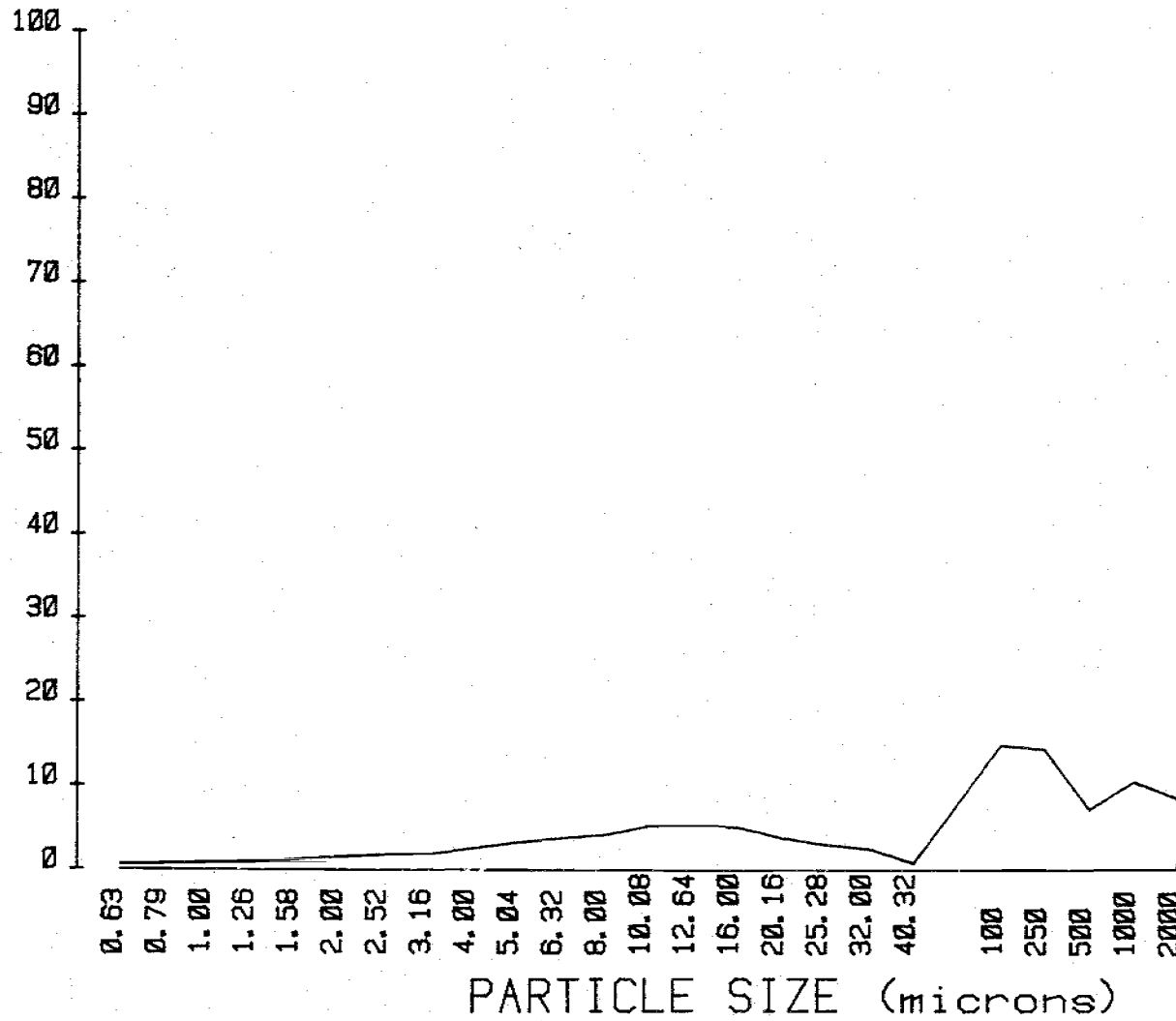
CUMULATIVE CURVE SAND-SILT-CLAY

ID I0952-1



PLOT SAND-SILT-CLAY

ID 10952-2



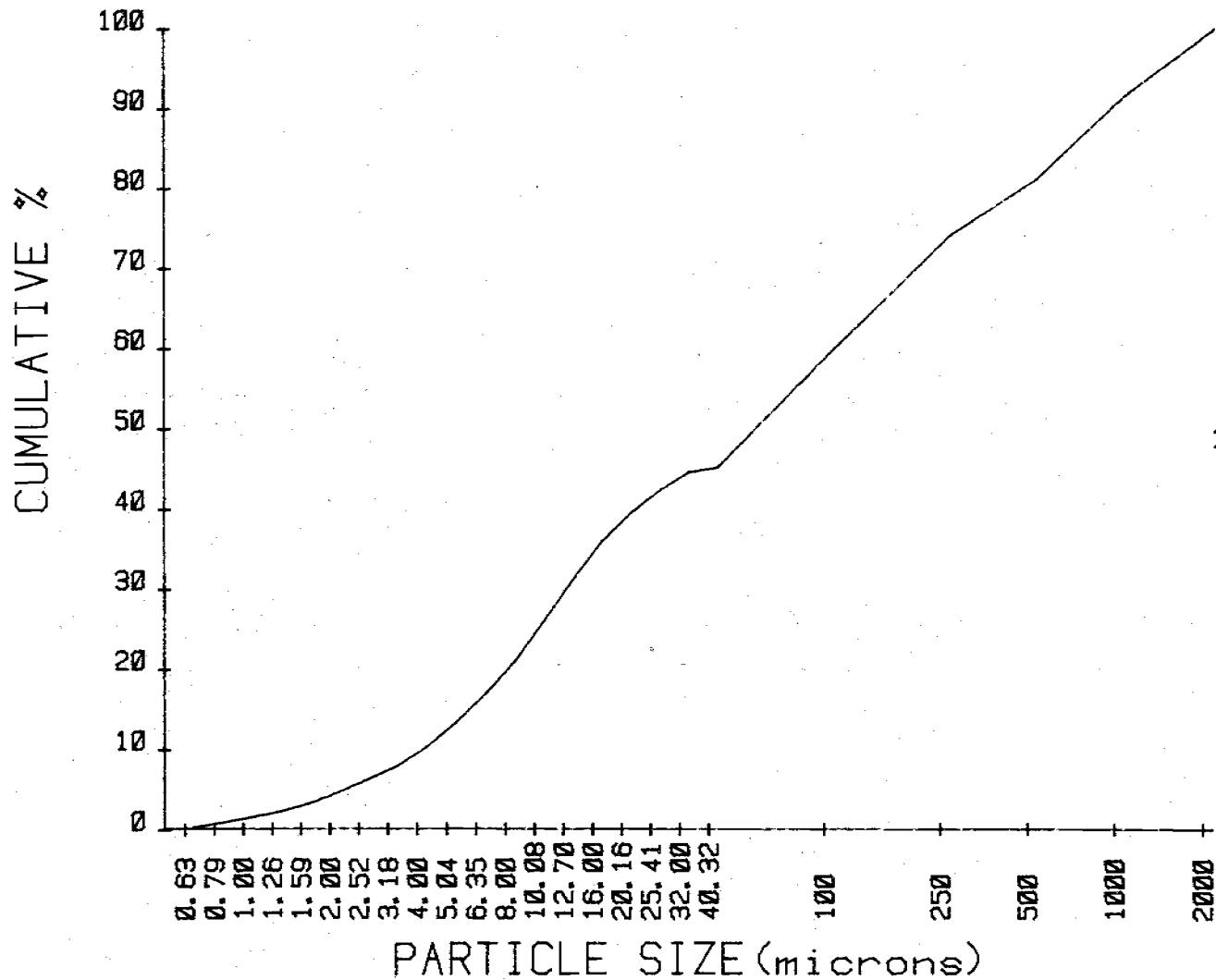
0.49	3.57
0.53	3.99
0.66	5.07
0.68	5.17
1.02	4.86
1.35	3.59
1.57	2.78
1.62	2.25
2.34	0.61
3.04	0.06
14.68	
14.23	
7.11	
10.39	
8.40	

719

Z

CUMULATIVE CURVE SAND-SILT-CLAY

ID I0952-2



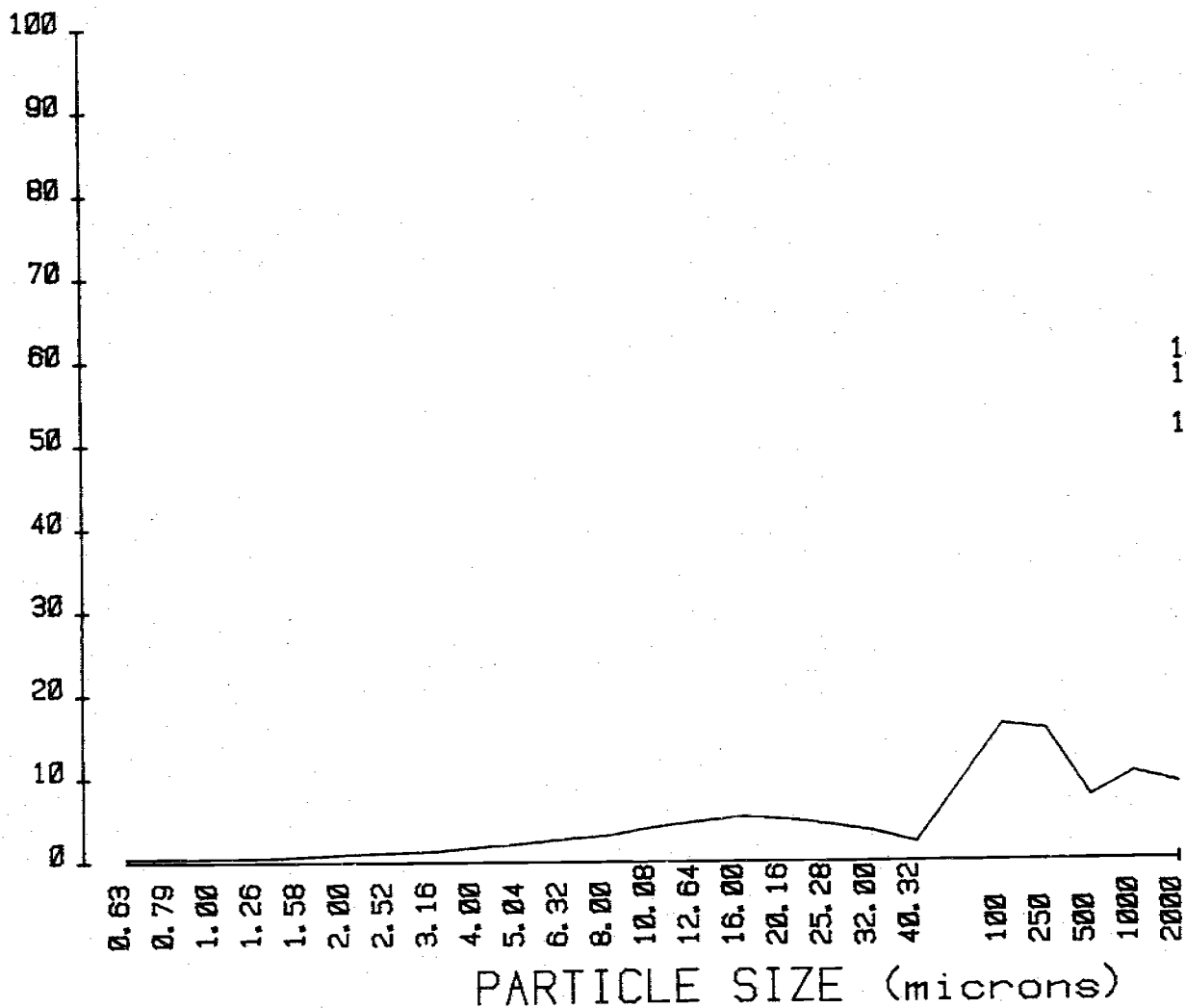
0.43	16.81
0.96	20.80
1.63	25.87
2.31	31.04
3.32	35.90
4.67	39.50
6.24	42.28
7.86	44.52
10.20	45.13
13.24	45.19
59.87	
74.10	
81.21	
91.60	
100.00	



9T9

# PLOT SAND-SILT-CLAY

ID I0952-3

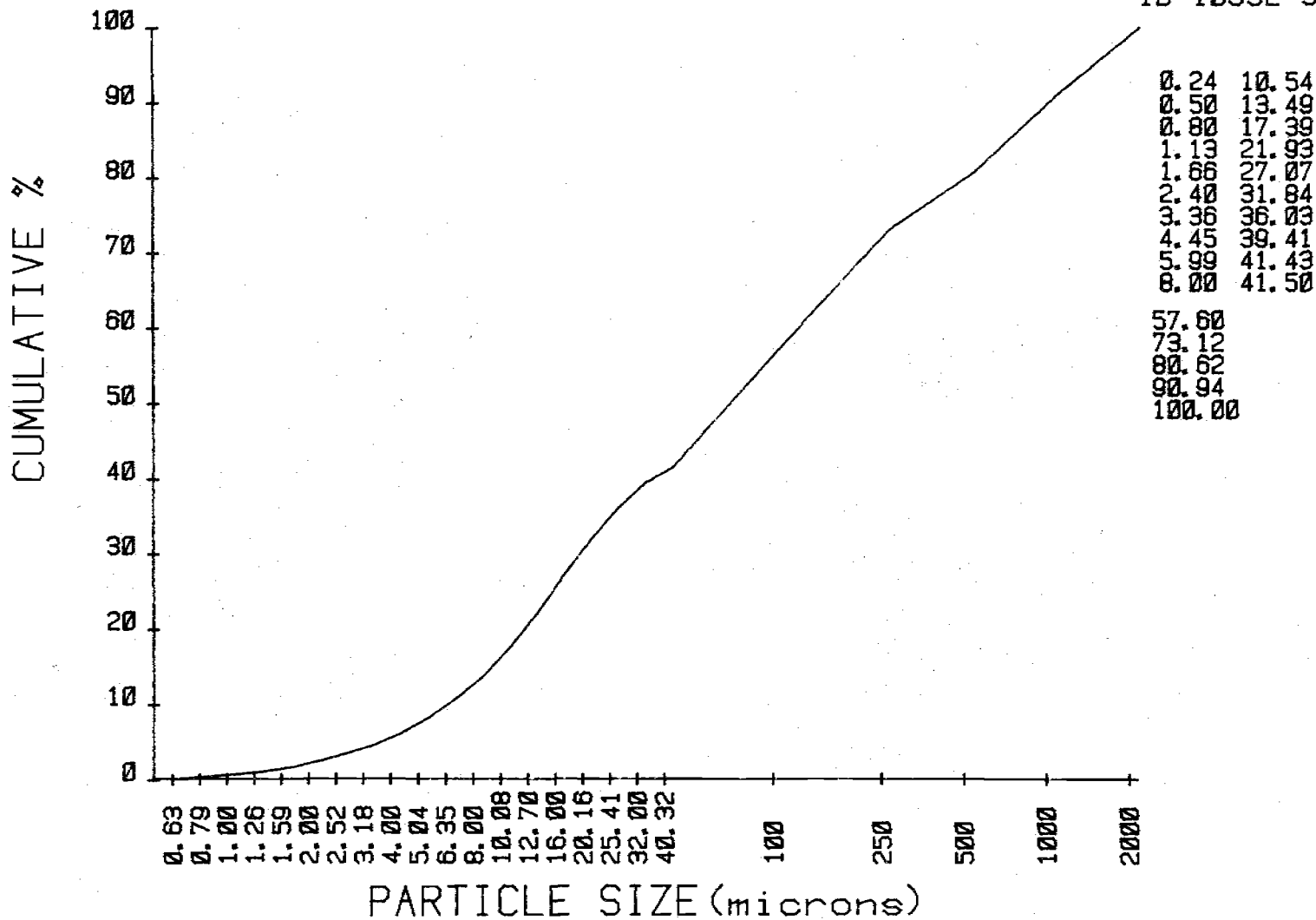


0.24	2.54
0.26	2.95
0.30	3.69
0.33	4.54
0.53	5.13
0.74	4.78
0.96	4.18
1.08	3.38
1.54	2.02
2.01	0.07
16.10	
15.52	
7.50	
10.32	
9.06	

LT9

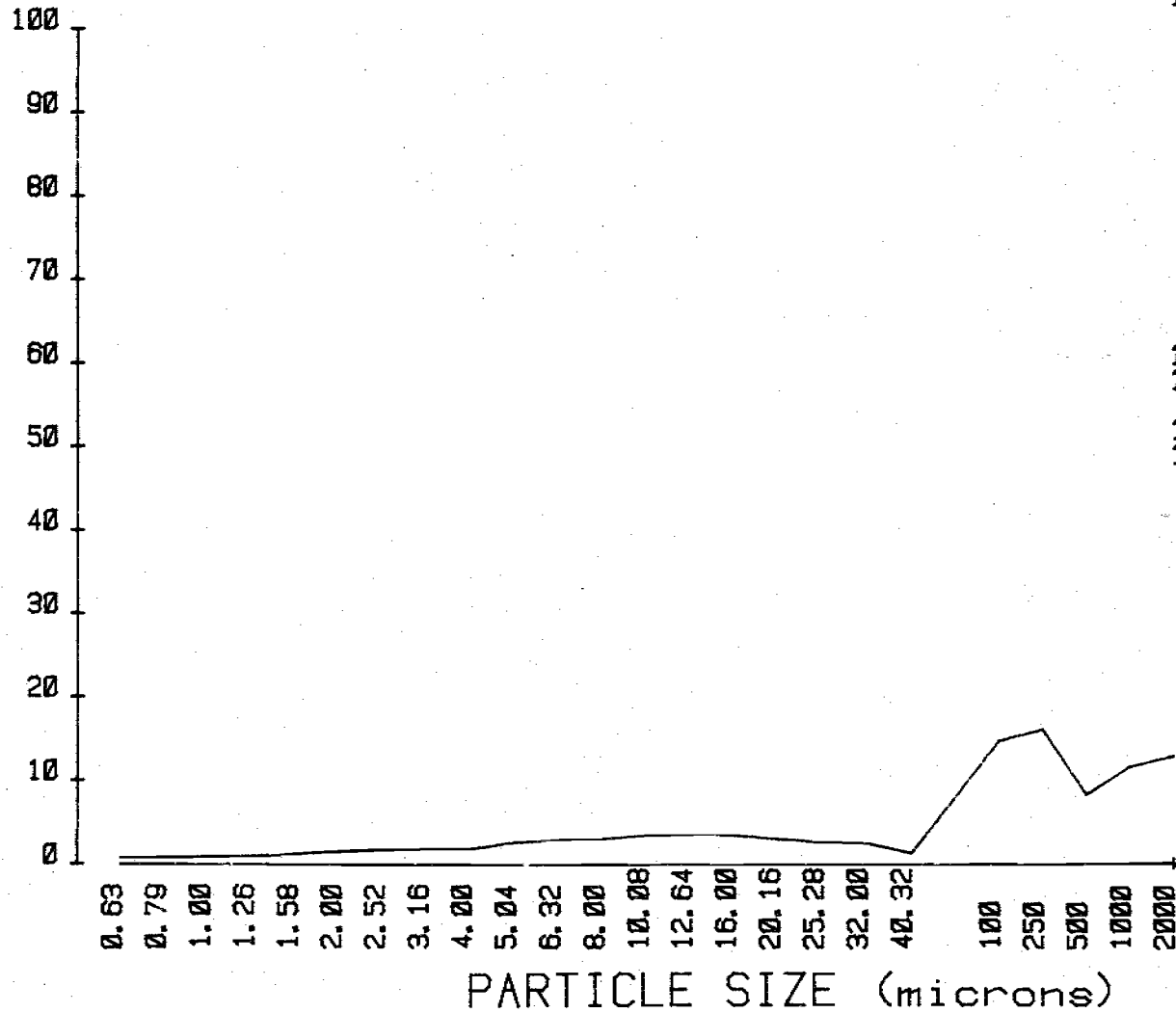
### CUMULATIVE CURVE SAND-SILT-CLAY

ID I0952-3



PLOT SAND-SILT-CLAY

ID I0952-4



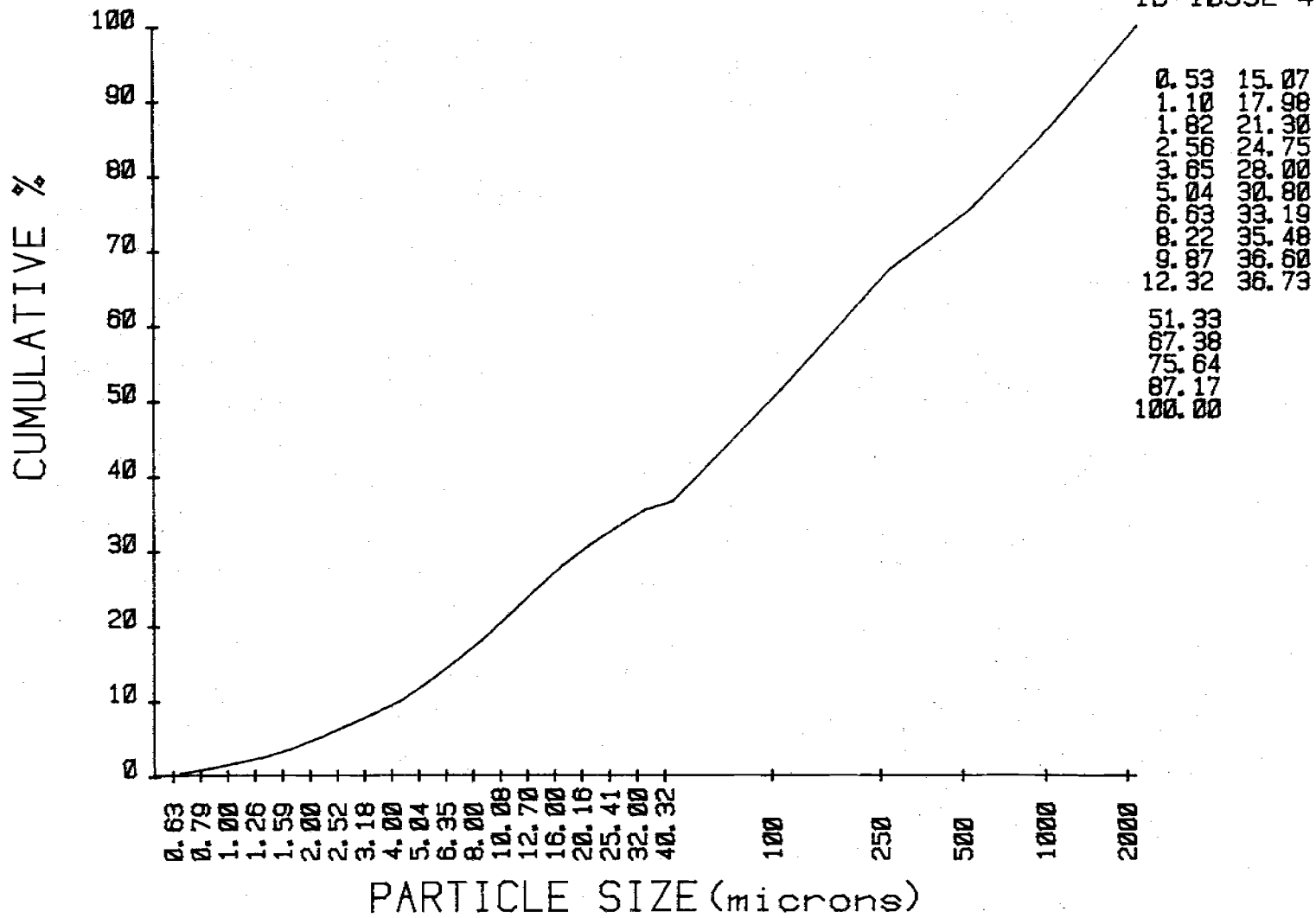
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0.72	3.32
0.74	3.45
1.00	3.25
1.30	2.79
1.50	2.40
1.59	2.29
1.64	1.12
2.45	0.13
14.60	
16.05	
8.26	
11.53	
12.89	

819

x

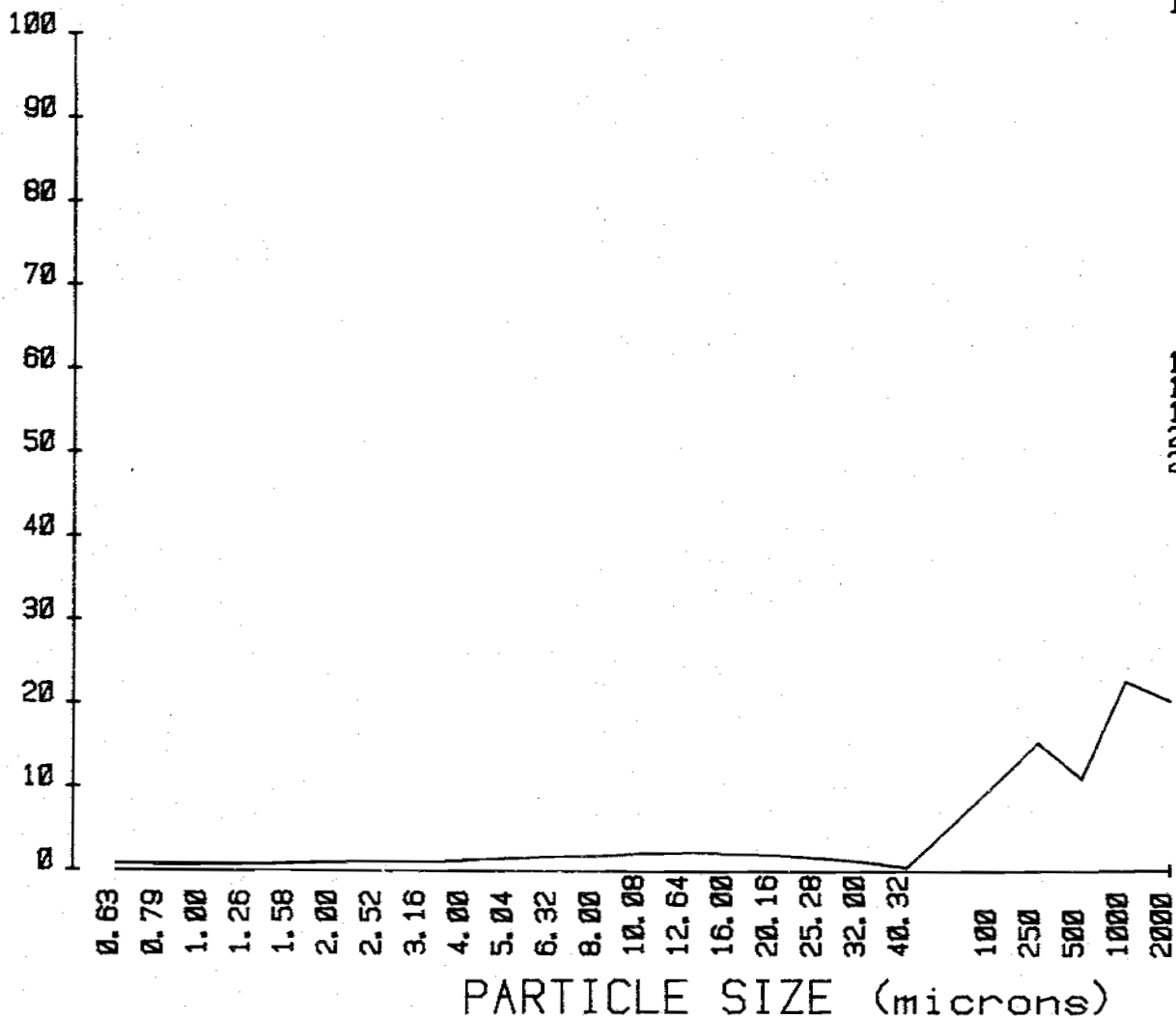
CUMULATIVE CURVE SAND-SILT-CLAY

ID I0952-4



PLOT SAND-SILT-CLAY

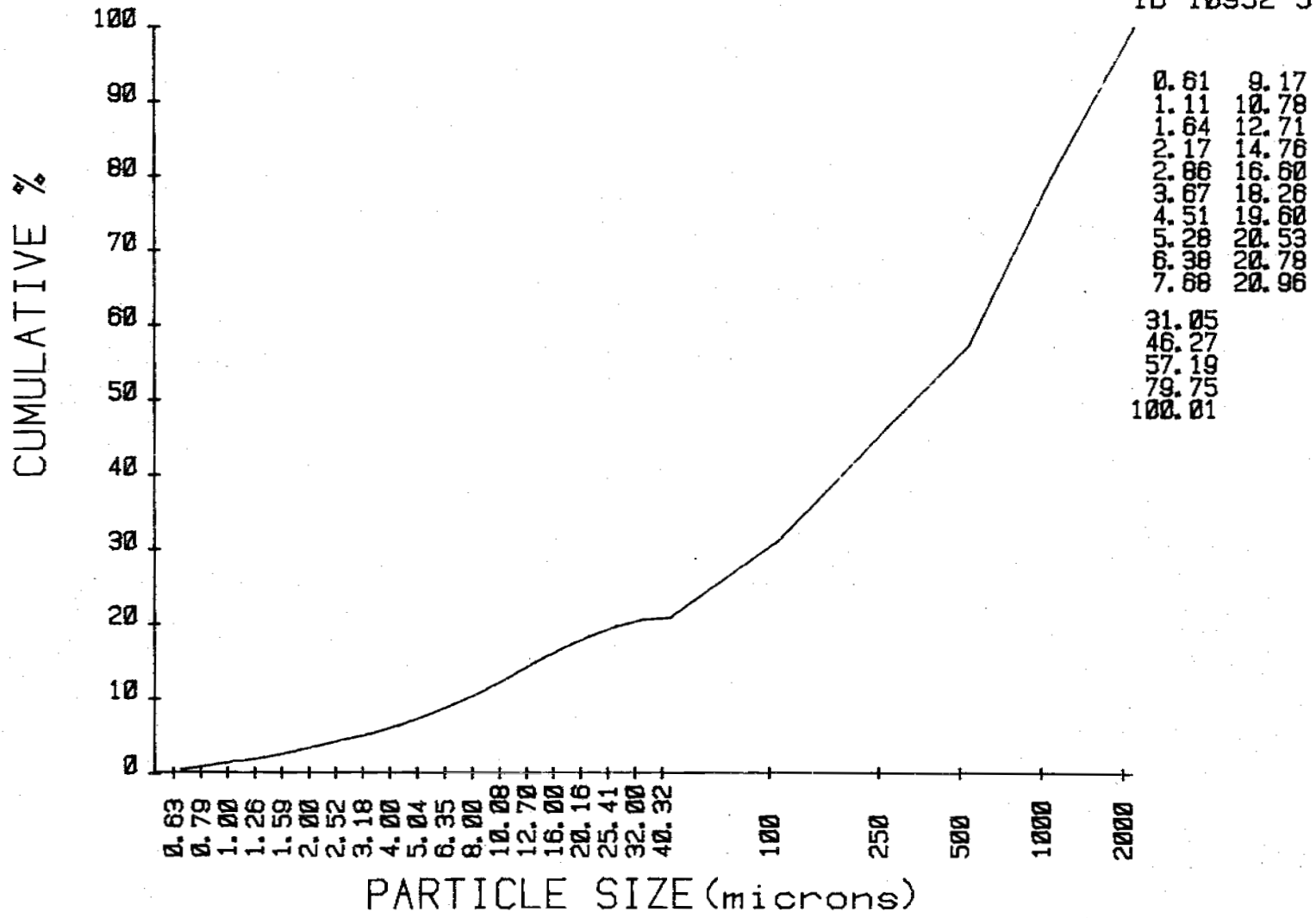
ID 10952-5



0.61	1.49
0.49	1.62
0.54	1.92
0.52	2.05
0.70	1.84
0.81	1.66
0.84	1.34
0.77	0.93
1.10	0.25
1.30	0.18
10.00	
15.22	
10.92	
22.56	
20.26	

CUMULATIVE CURVE SAND-SILT-CLAY

ID 10952-5



Unnamed Silt Loam 79-MT-2728 (880101R-2)

Classification: medial over loamy-skeletal, mixed Typic Cryochrept.

General Site Characteristics

Location: Lincoln County, Montana; southeast 1/4 of section 11, T. 32N., R. 34W.

Forest: Kootenai National Forest; Troy Ranger District

Area: Star Creek, point 2

Described By/Date:

Parent Rock/Material: quartzite, diorite

Habitat Type: (Tsuga heterophylla)/(Clintonia uniflora)

Topography:

Landform: bench

Weathering: IIB2 highly weathered rock

Formation Name: Pritchard

Slope: 12 percent

Aspect: 85 degrees east

Elevation: 3000 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: MOR

Surface Rock:

Climate:

Precipitation: 50 inches

Erosion: minimal

Infiltration: rapid

Permeability: moderate

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 8.3 deg. C

Salt/Alkal:

Remarks:

Pedon Description

01&02 3-0 centimeters (1-0 inches).

A2 0-2 centimeters (0-1 inches). Gray (10YR 6/1) moist; no lab sample; silt loam; weak fine granular structure; very friable, soft, nonsticky and nonplastic; subangular to subround quartz, diorite, sandy argillites, a trace; many fine, common medium roots; pores are continuous throughout; very strongly acid pH 4.5, noncalcareous; percolation rapid; possibly St. Helen's T ash; abrupt wavy boundary.

B2ir 2-16 centimeters (1-6 inches). Brown to dark brown (7.5YR 4/4) moist; silt loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; subangular to subround quartz, diorite, sandy argillites, 13 percent gravels by weight; many fine, common medium roots; many very fine, and fine continuous vesicular and tubular pores throughout; medium acid pH 5.8, noncalcareous; percolation rapid; clear broken boundary.

IIA2 16-50 centimeters (6-19 inches). Dark yellowish brown (10YR 4/4) moist; gravelly sandy loam; weak medium angular blocky structure; friable, slightly hard, slightly sticky and nonplastic; subangular to subround quartz, diorite, sandy argillites, 24 percent gravels by weight; common fine and medium roots; common very fine vesicular and tubular pores, few fine continuous tubular pores; medium acid pH 5.7, noncalcareous; percolation moderately rapid; gradual wavy boundary.

IIB1 50-87 centimeters (19-32.5 inches). Reddish brown (2.5YR 4/4) moist; very gravelly very fine sandy loam; weak medium angular blocky structure; friable, slightly sticky and nonplastic; small amount of very few thin clay films line tubular or interstitial pores; subangular to subround quartz, diorite, sandy argillites, 56 percent gravels by weight; common fine, few medium roots; common very fine discontinuous vesicular pores and common very fine continuous tubular pores; medium acid pH 5.7, noncalcareous; percolation moderate; clear wavy boundary.

IIB2ir 87-93 centimeters (32.5-35 inches). Reddish brown (2.5YR 4/4) with dark yellowish brown (10YR 4/4) matrix with iron accumulative zones, moist; very gravelly very fine sandy loam; moderate medium platy structure; firm, hard, slightly sticky and nonplastic; very thin clay films line tubular or interstitial pores; subangular to subround quartz, diorite, sandy argillites, 50 percent gravels by weight; few fine and medium roots at top of horizon; common very fine discontinuous irregular pores; medium acid pH 5.7, noncalcareous; percolation moderate; clear wavy boundary.

IIC 93-125 centimeters (35-49 inches). Reddish brown (5YR 4/3) moist; gravelly loamy sand; weak medium platy structure; subangular to subround quartz diorite, sandy argillites, 47 percent gravels by weight; no roots; medium acid pH 5.8, noncalcareous.

Remarks: In IIB2 lamellae are found laying parallel to the soil horizon. These bands are quite distinct and appear to be zones of iron accumulation. It also appears to inhibit the finer roots from penetrating and possibly could restrict the permeability of the soil. The iron is commonly associated with fine to medium rock fragments, with a lighter colored leached (?) zone, generally below the band.



Pedon: Unnamed Silt Loam 79-MT-2728 (080101R-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC#10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	01-02	3- 0	NS	NS	NS	NS					
2	A2	0- 2	NS	NS	NS	NS					
2	B2ir	2- 16	5.8	0.10	64	0.2					
3	IIA2	16- 50	5.7	0.09	32	0.2					
3	IIB1	50- 87	5.7	0.11	32	0.0					
4	IIB2ir	87- 93	5.7	0.10	35	0.0					
5	IIC	93-125	5.8	0.09	28	0.3					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
meq/100 gms							%	%		ratio			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
1	1.6	0.4	0.1	0.1	13.9	13.2	14	2.05	1.20	0.046	26	0.87	10.9
2	1.0	0.3	0.1	0.1	4.2	2.9	26	0.37	0.22	0.014	16	0.76	9.6
3	1.1	0.7	0.1	0.1	3.8	2.3	32	0.25	0.14	0.012	12	0.44	8.8
4	1.2	0.7	0.1	0.1	3.7	3.7	37	0.44	0.26	0.014	19	0.50	9.6
5	1.8	0.4	0.1	0.1	1.3	1.1	65	0.08	0.05	0.005	10	0.53	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

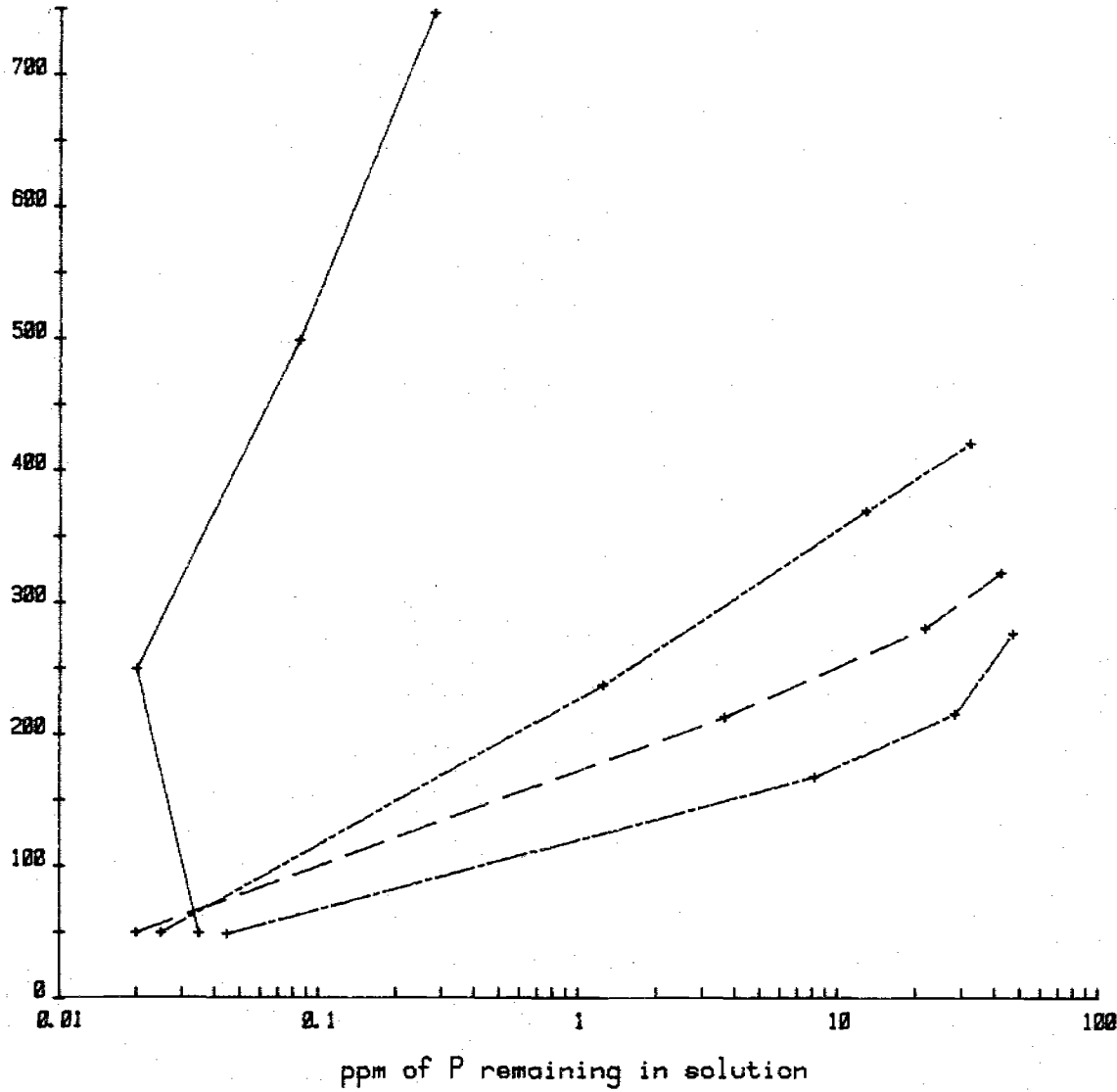
624A

624B

### Phosphorus Isotherm

79-MT-2728

µg P sorbed/g soil



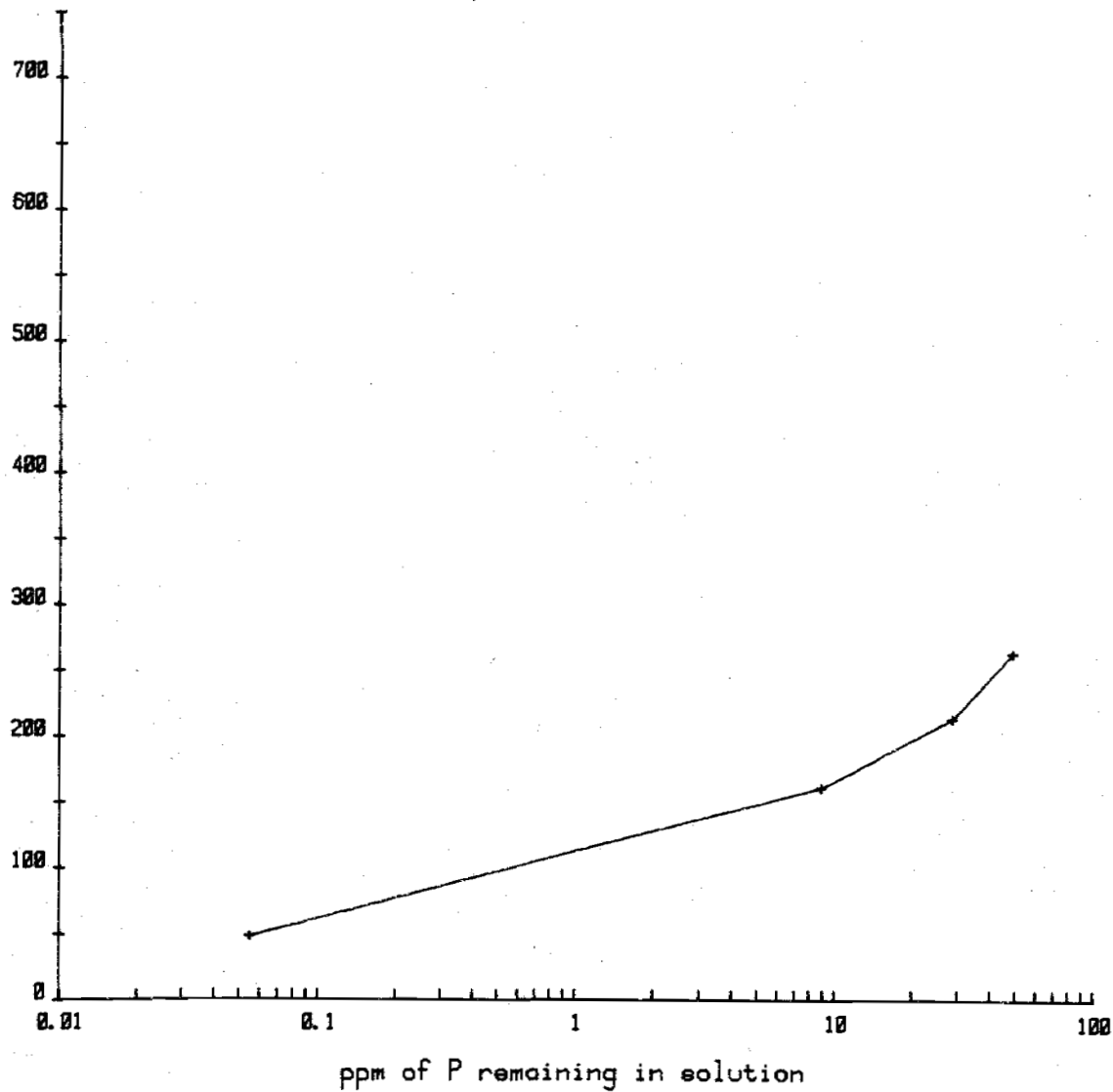
µg/g soil	Soln ppm
----- B2ir	
50	0.04
250	0.02
499	0.09
747	0.29
----- IIA2	
50	0.02
213	3.69
281	21.93
323	42.72
----- IIB1	
50	0.05
168	8.22
216	28.44
277	47.34
----- IIB2ir	
50	0.03
238	1.25
370	13.05
421	32.88

# Phosphorus Isotherm

79-MT-2728

$\mu\text{g/g soil}$	Soln ppm
49	0.86
162	8.85
214	28.62
264	48.60

625  
1000  $\mu\text{g P adsorbed/g soil}$



Pedon: Unnamed Silt Loam 79-MT-2728 (080101R-2)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm wt. vol.	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002		
cm	-----X-----							-----X-----		
3- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2- 16	1.94	3.18	4.03	13.31	17.94	40.41	55.28	4.31	13	Silt loam
16- 50	2.39	3.66	4.85	21.81	21.62	54.34	43.81	2.65	24	Gr. sandy loam
50- 87	2.01	3.98	5.75	21.59	21.86	55.19	42.37	2.44	56	V.gr. very fine sandy loam
87- 93	1.38	2.88	3.32	19.81	22.06	49.45	45.92	4.63	50	V.gr. very fine sandy loam
93-125	1.57	4.42	7.35	32.15	27.26	72.74	25.27	1.99	47	Gr. loamy sand

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	-----X-----			-----g/cc-----		-----X-----		-----X-----	
3- 0						NS	NS	NS	NS
0- 2						NS	NS	NS	NS
2- 16						24.8	15.6	NDMP	NDMP
16- 50						11.7	4.6	NDMP	NDMP
50- 87						10.2	4.5	NDMP	NDMP
87- 93						14.7	6.3	NDMP	NDMP
93-125						4.3	2.6	NDMP	NDMP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

626

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

Identification		M2728-1	M2728-2	M2728-3	M2728-4
Units		-----%			
TC (0.63-2.00)		4.31	2.65	2.44	4.63
TSi (2.00-50)		55.28	43.01	42.37	45.92
TS (50-2000)		40.41	54.34	55.19	49.45
Clay	0.63-0.794	0.61	0.45	0.42	0.80
	0.794-1.00	0.66	0.44	0.40	0.82
	1.00-1.26	0.84	0.51	0.48	0.94
	1.26-1.59	0.89	0.51	0.46	0.96
	1.59-2.00	1.32	0.74	0.48	1.21
Fine Silt	2.00-2.52	1.72	0.98	0.93	1.52
	2.52-3.17	2.02	1.23	1.17	1.69
	3.17-4.00	2.13	1.35	1.31	1.46
	4.00-5.04	2.43	1.55	1.49	1.29
Medium Silt	5.04-6.35	3.98	2.84	2.74	3.08
	6.35-8.00	4.88	3.67	3.60	4.01
	8.00-10.08	5.59	4.25	4.14	4.52
	10.08-12.70	6.97	5.19	5.14	5.42
	12.70-16.0	7.26	5.55	5.48	5.66
	16.0-20.2	6.57	5.57	5.41	5.56
Coarse Silt	20.2-25.4	5.87	5.07	4.79	4.78
	25.4-32.0	3.83	3.17	3.41	3.79
	32.0-40.3	1.70	2.01	1.79	2.09
	40.3-50.8	0.25	0.49	0.78	0.86
	50.8-64.0	0.07	0.10	0.22	0.17
VFS (50-100)		17.94	21.62	21.86	22.06
FS (100-250)		13.31	21.81	21.59	19.81
MS (250-500)		4.03	4.85	5.75	3.32
CoS (500-1000)		3.18	3.66	3.98	2.88
VCoS (1000-2000)		1.94	2.39	2.01	1.38
Greater than 2000		13	24	56	50
Textural Class		SL	Gr.SL	VGr.VFSL	VGr.VFSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

Identification		M2728-5			
Units		-----%			
TC (0.63-2.00)		1.99			
TSi (2.00-50)		25.27			
TS (50-2000)		72.74			
Clay	0.63-0.794	0.33			
	0.794-1.00	0.33			
	1.00-1.26	0.40			
	1.26-1.59	0.39			
	1.59-2.00	0.54			
Fine Silt	2.00-2.52	0.69			
	2.52-3.17	0.79			
	3.17-4.00	0.75			
	4.00-5.04	1.15			
Medium Silt	5.04-6.35	1.49			
	6.35-8.00	1.75			
	8.00-10.08	1.89			
	10.08-12.70	2.23			
	12.70-16.0	2.31			
	16.0-20.2	2.20			
Coarse Silt	20.2-25.4	2.35			
	25.4-32.0	2.67			
	32.0-40.3	3.16			
	40.3-50.8	1.40			
	50.8-64.0	0.45			
VFS (50-100)		27.26			
FS (100-250)		32.15			
MS (250-500)		7.35			
CoS (500-1000)		4.42			
VCoS (1000-2000)		1.57			
Greater than 2000		47			
Textural Class		Gr. LS			

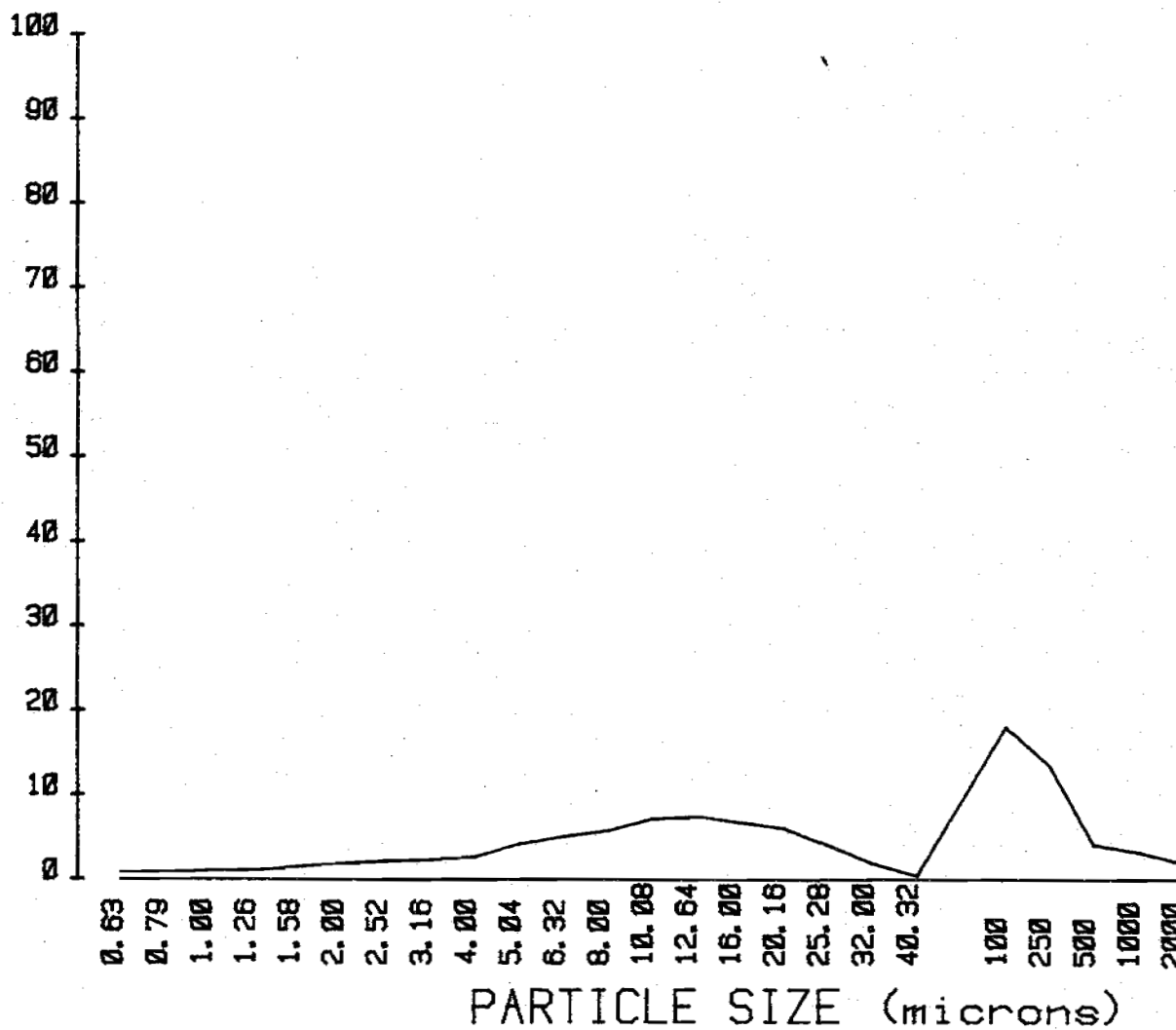
Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2728-1

629

x



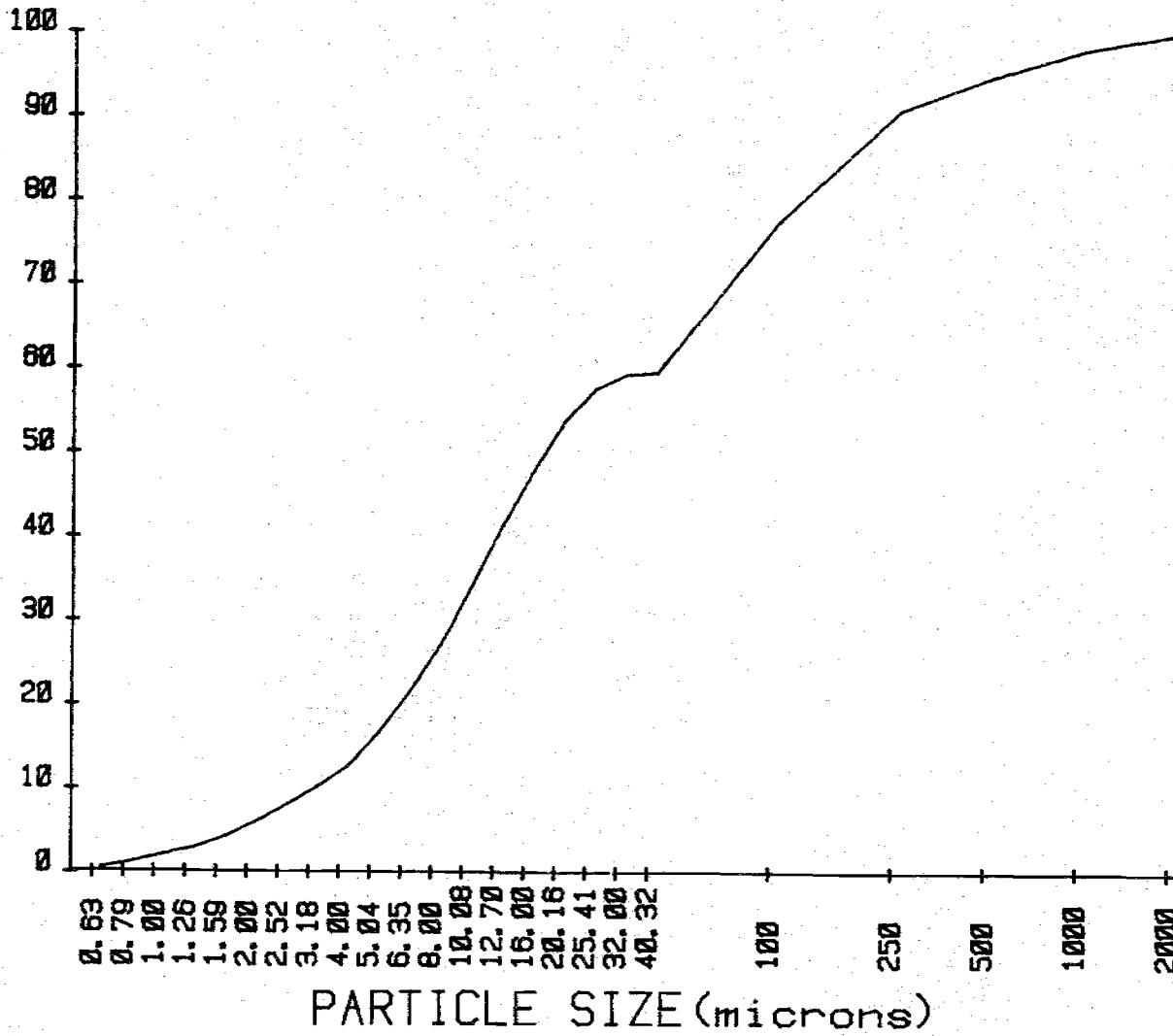
0.61	4.88
0.66	5.59
0.84	6.97
0.89	7.26
1.31	6.57
1.72	5.87
2.02	3.83
2.13	1.70
2.43	0.24
3.98	0.07
17.94	
13.31	
4.03	
3.18	
1.94	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2728-1

039

CUMULATIVE %



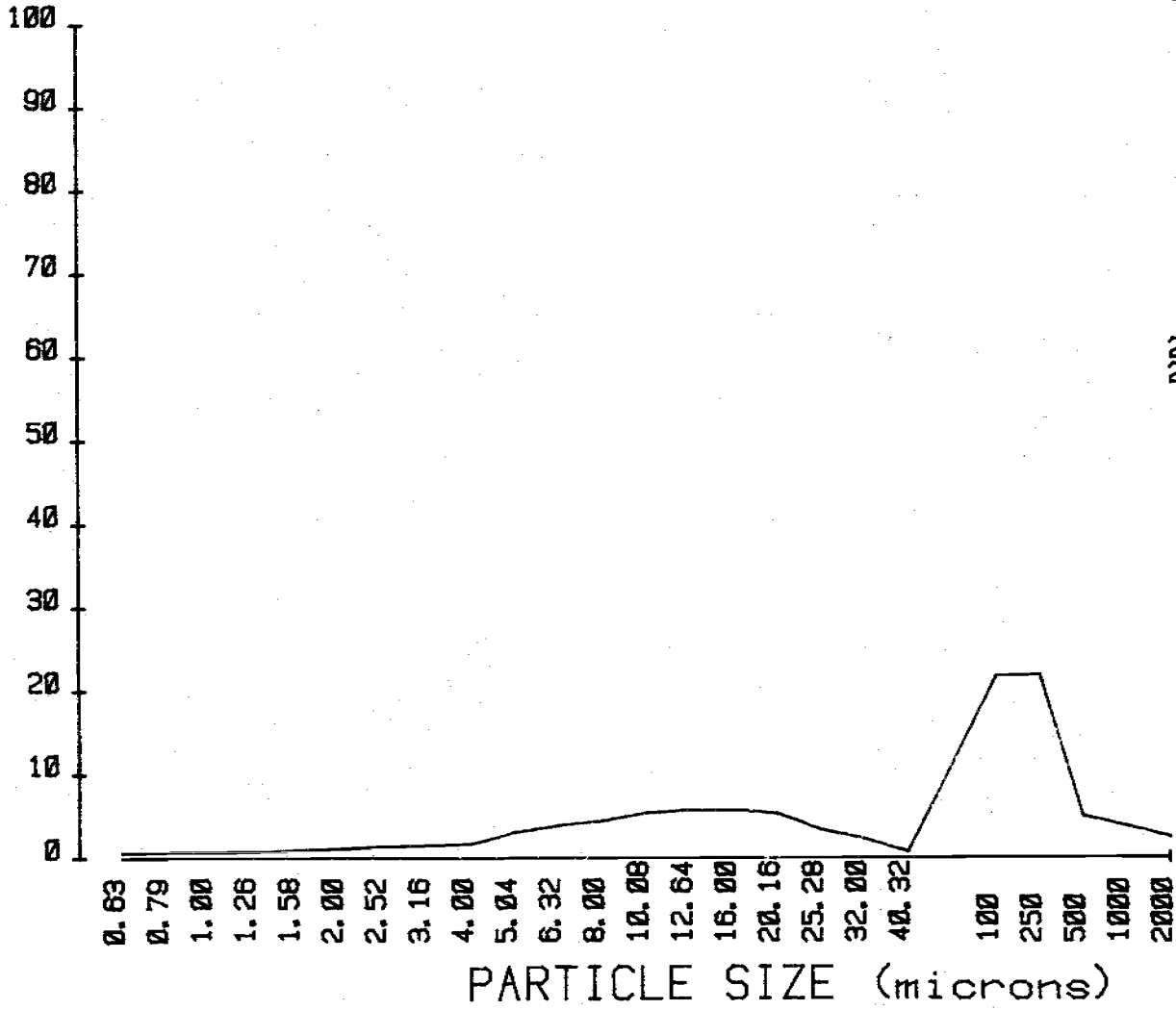
0.61	21.49
1.27	27.07
2.11	34.05
3.00	41.31
4.31	47.87
6.03	53.74
8.06	57.58
10.19	59.28
12.62	59.52
16.61	59.59
77.53	
90.84	
94.87	
98.05	
99.99	



PLOT SAND-SILT-CLAY

ID M2728-2

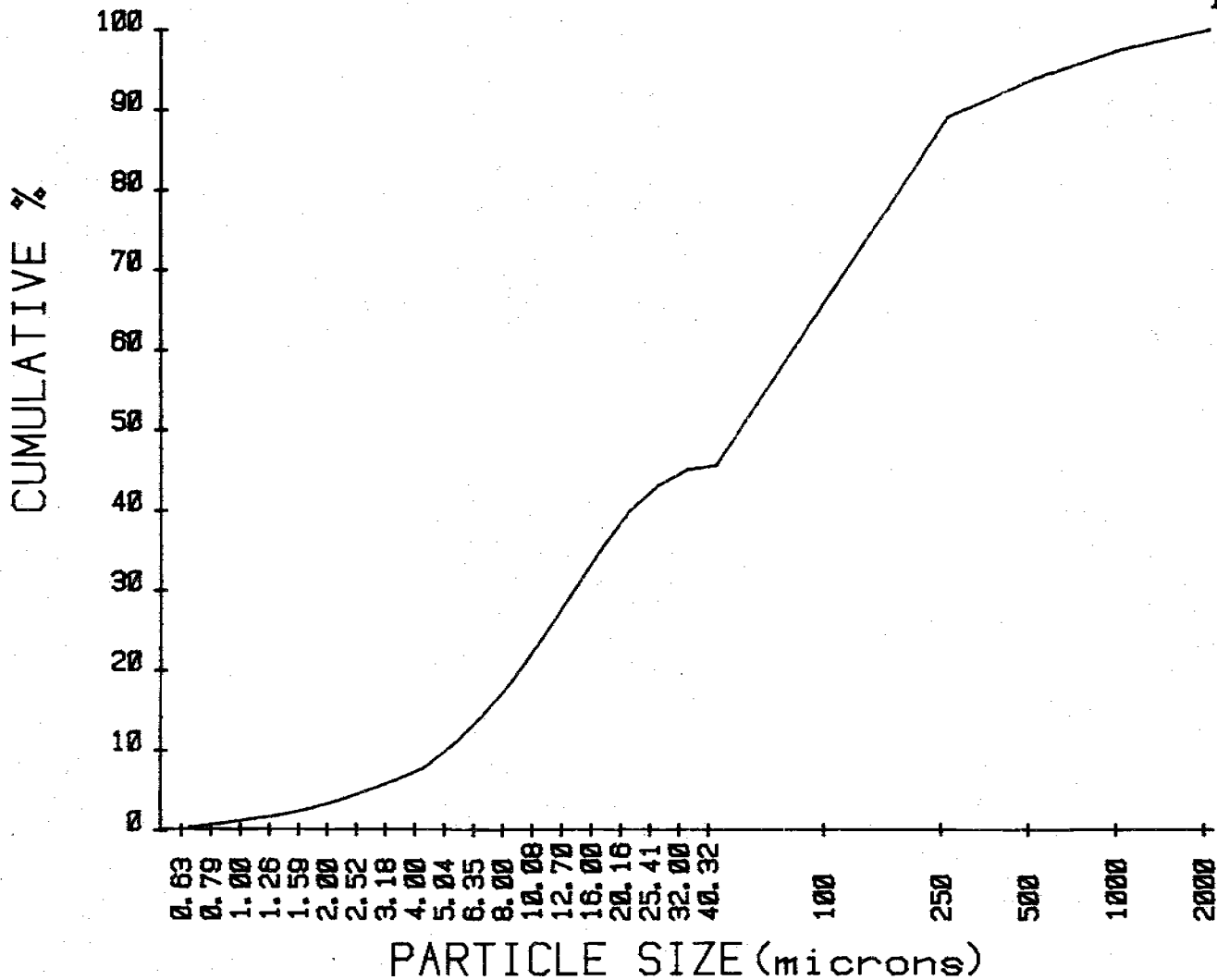
631 \*



0.46	3.67
0.44	4.25
0.51	5.19
0.51	5.55
0.74	5.57
0.98	5.87
1.23	5.17
1.34	2.01
1.55	0.49
2.84	0.09
21.62	
21.61	
4.85	
3.66	
2.96	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2728-2



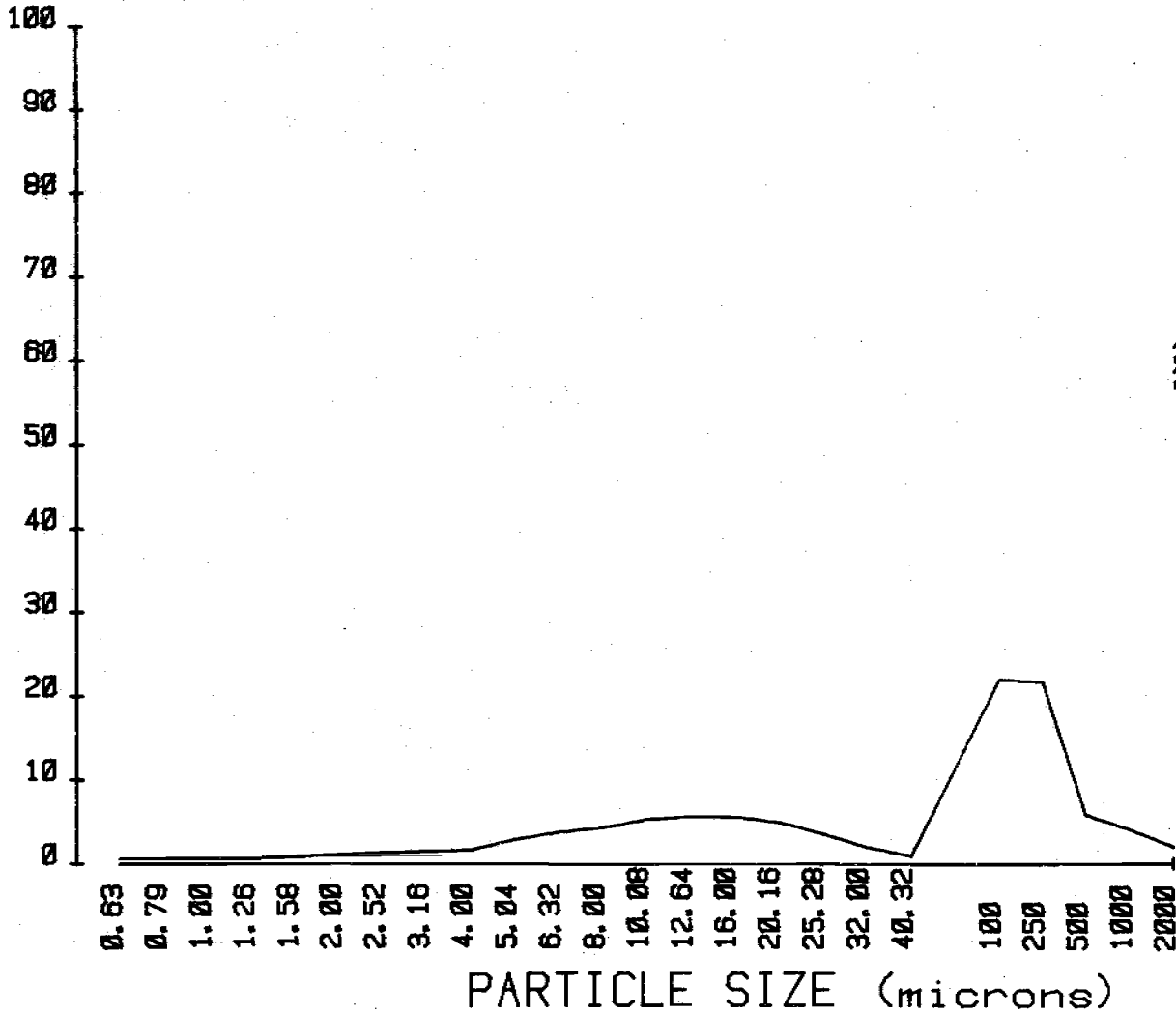
0.46	14.26
0.80	18.52
1.41	23.71
1.91	29.25
2.65	34.82
3.63	39.89
4.87	43.87
6.21	45.87
7.76	45.57
10.60	45.66
67.28	
89.09	
93.94	
97.60	
99.99	

632

PLOT SAND-SILT-CLAY

ID M2728-3

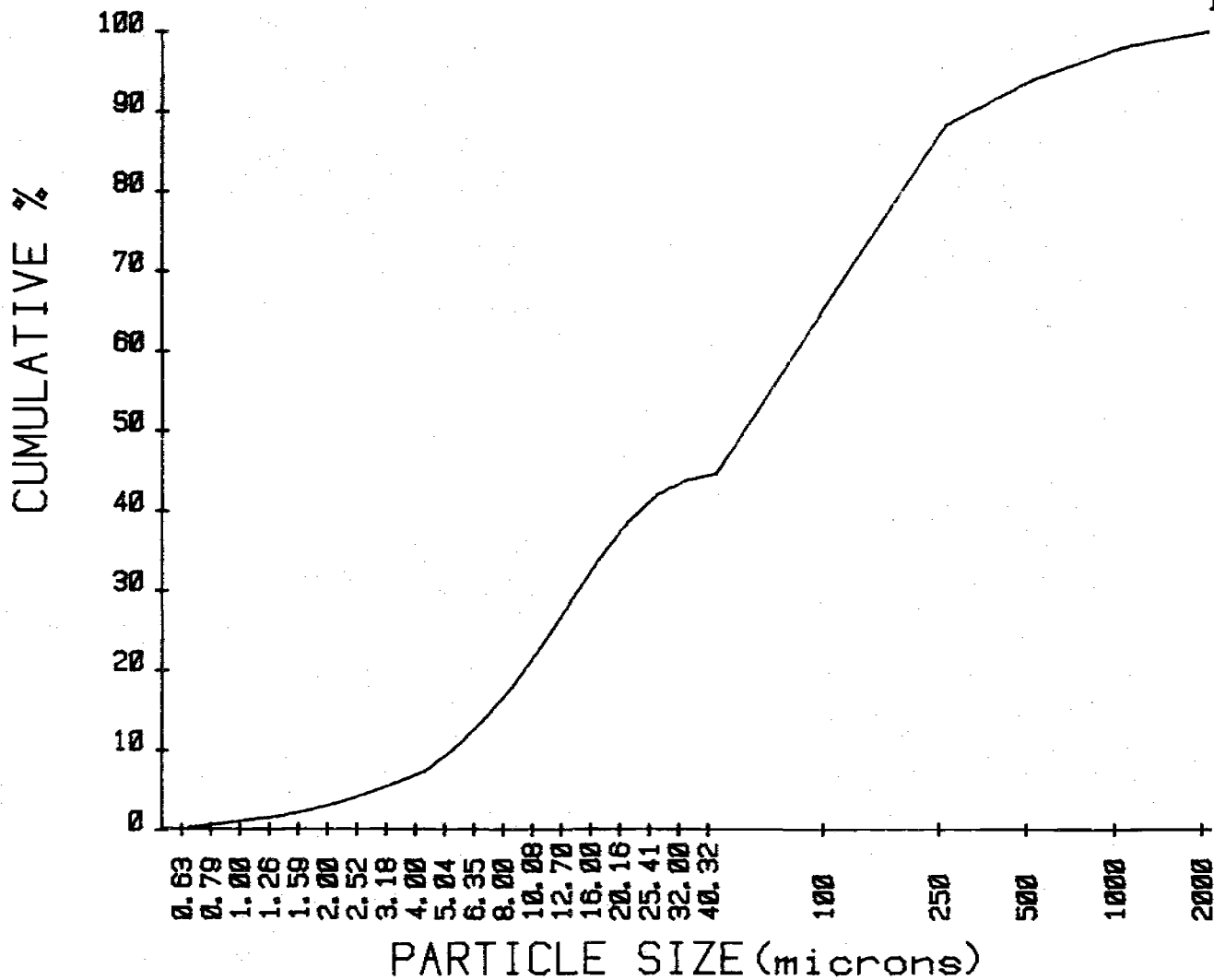
633 x



0.42	3.60
0.48	4.14
0.48	5.14
0.46	5.48
0.68	5.41
0.92	4.79
1.17	3.41
1.31	1.79
1.49	0.78
2.74	0.22
21.86	
21.59	
5.75	
3.98	
2.01	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2728-3



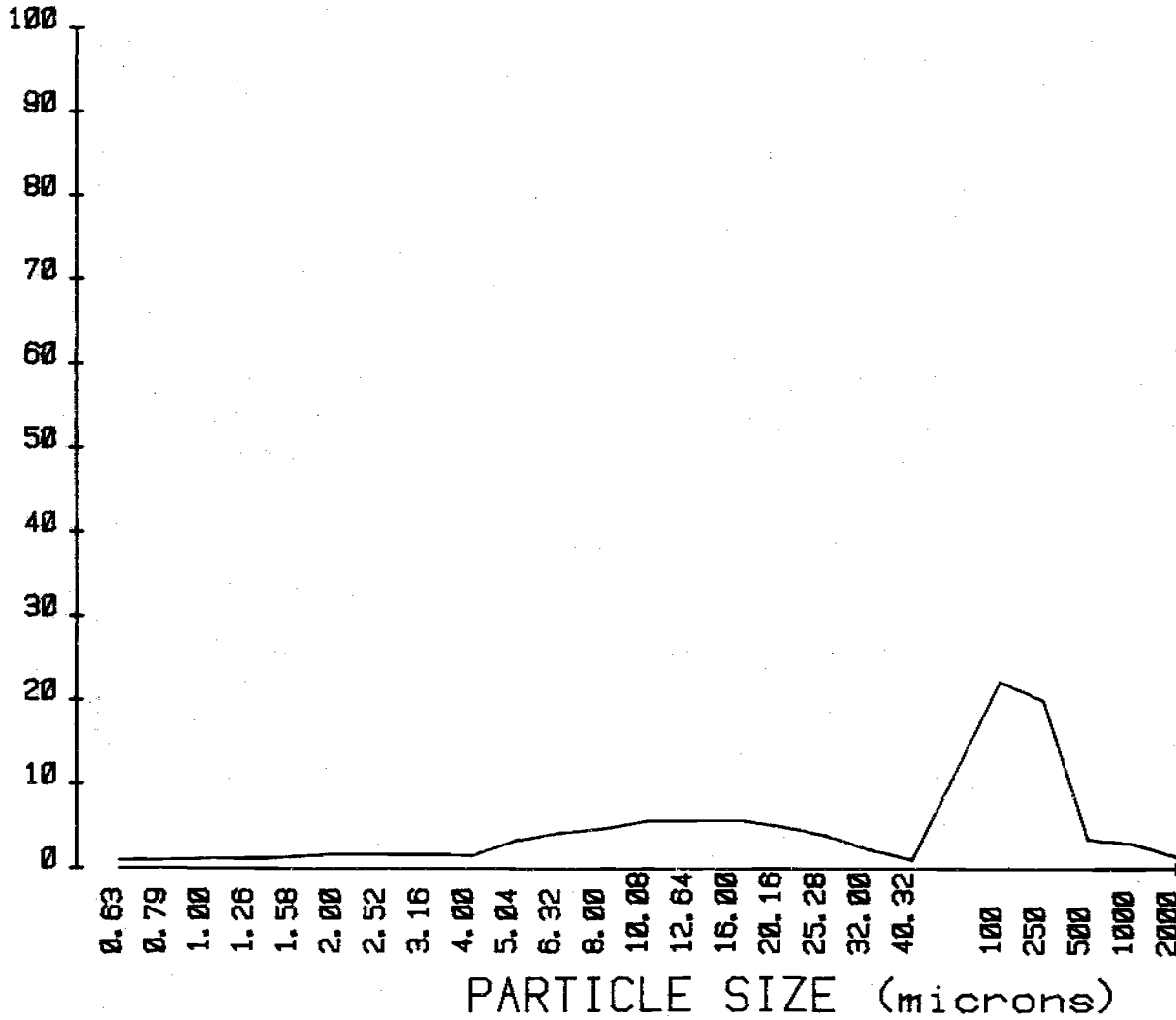
0.42	13.67
0.63	17.82
1.30	22.95
1.76	28.43
2.44	33.83
3.37	38.62
4.53	42.83
5.85	43.82
7.34	44.56
10.07	44.81
66.67	
88.26	
94.81	
97.99	
100.00	

PLOT SAND-SILT-CLAY

ID M2728-4

635

x



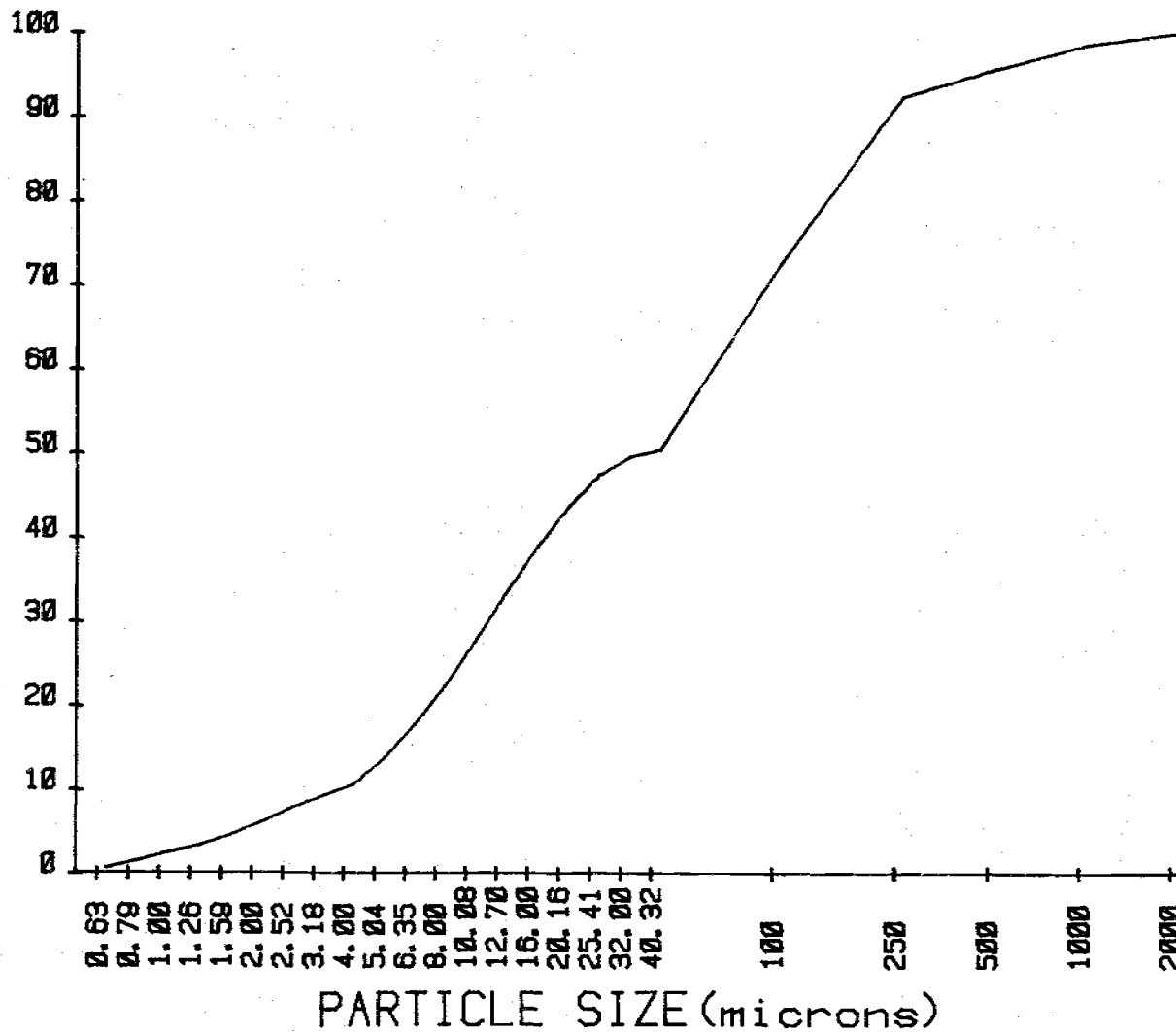
0.80	4.01
0.82	4.52
0.94	5.42
0.86	5.86
1.21	5.56
1.51	4.78
1.69	3.79
1.48	2.09
1.29	0.86
3.08	0.17
22.06	
19.81	
3.92	
2.88	
1.38	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2728-4

636

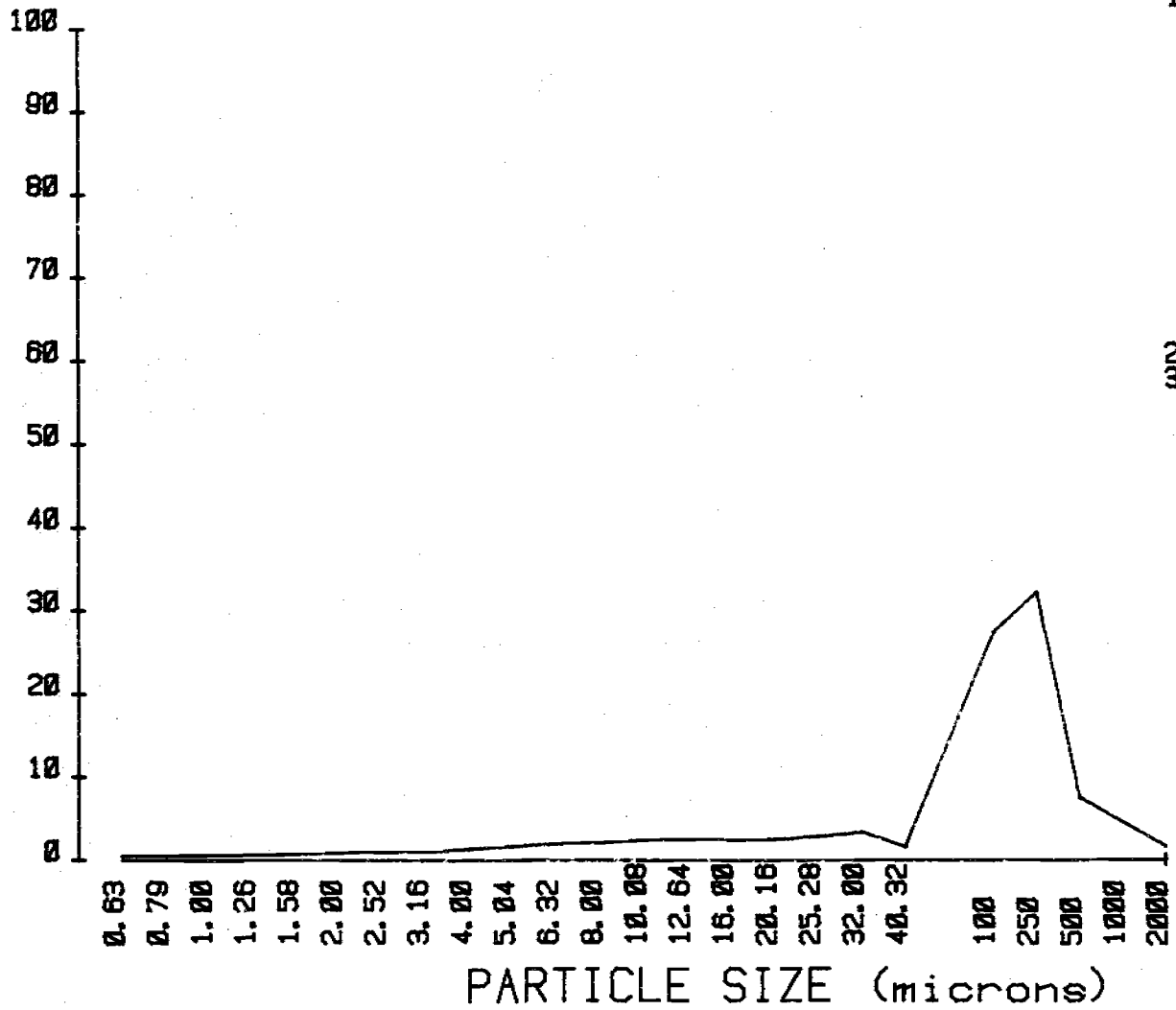
CUMULATIVE %



0.80	17.69
1.63	22.21
2.58	27.64
3.42	33.30
4.63	38.86
6.15	43.85
7.84	47.44
9.92	49.59
10.80	50.38
13.68	50.55
72.61	
92.42	
95.74	
98.62	
100.00	

PLOT SAND-SILT-CLAY

ID M2728-5

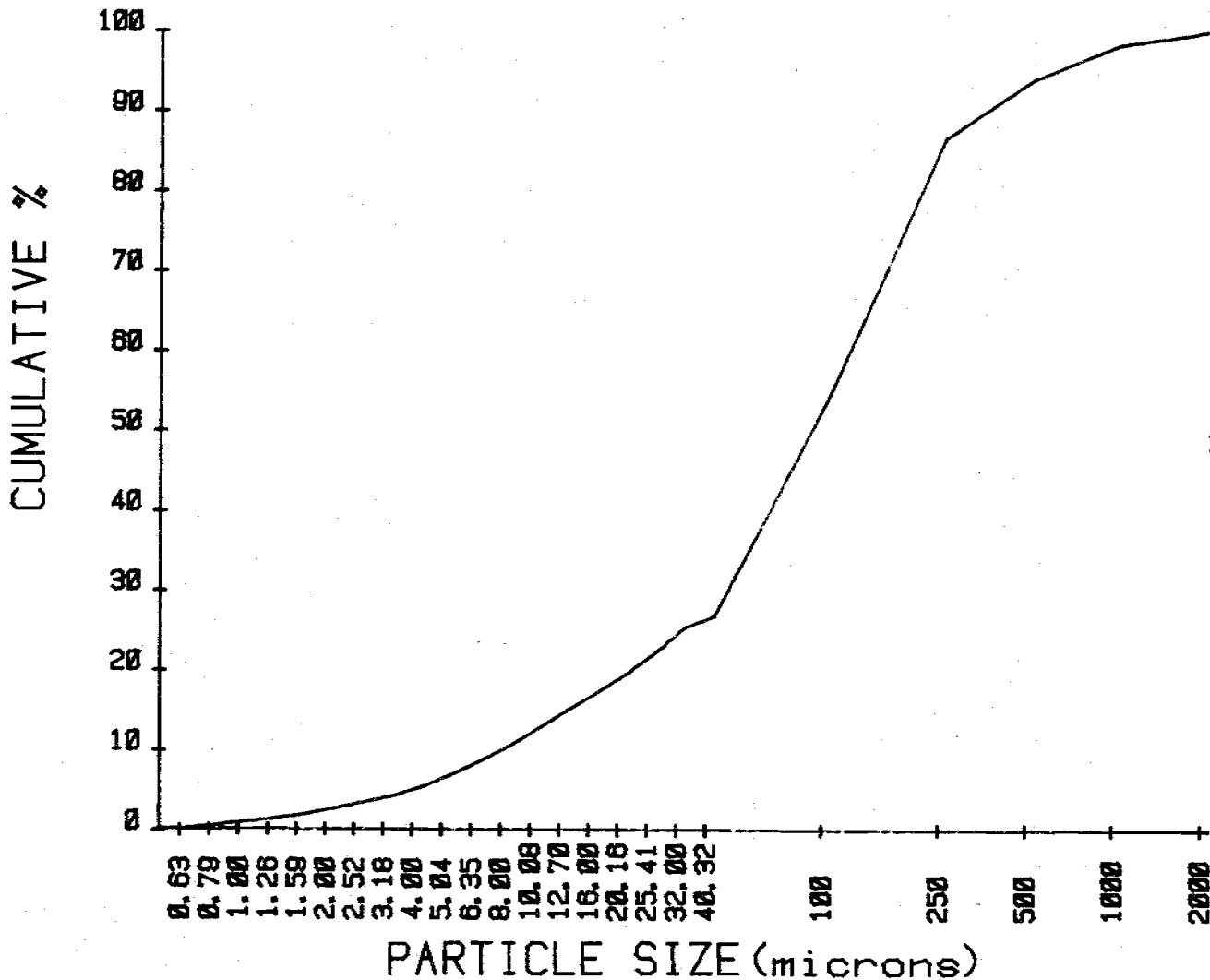


0.33	1.75
0.33	1.89
0.40	2.23
0.39	2.31
0.54	2.20
0.69	2.35
0.79	3.16
0.75	3.16
1.15	1.40
1.49	0.45
27.28	
32.15	
7.35	
4.42	
1.57	

637 x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2728-5



638

0.33	6.60
0.66	10.50
1.00	12.73
1.45	15.04
1.90	17.23
2.68	19.58
3.46	22.25
4.21	25.41
5.36	26.81
6.66	27.26
54.52	
66.67	
84.02	
96.44	
98.81	
99.25	
99.41	
99.58	
99.73	
99.84	
99.94	
99.98	
99.99	



Unnamed Gravelly Silt Loam 79-MT-2729 (131101R-3)

Classification: coarse over loamy skeletal, medial, mixed Typic Cryorthod.

General Site Characteristics

Location: Lincoln County, Montana; southeast 1/4 of section 15  
Forest: Kootenai National Forest, Fortine Ranger District  
Area: Mount Wam, Point 3  
Described By/Date: Terry Svalberg and Phil Schoeneberg on July 11, 1978  
Parent Rock/Material: loess/till  
Habitat Type: (*Abies lasiocarpa*)/(*Menziesia ferruginea*)  
Topography:  
Landform: wet sidehill  
Weathering: normal  
Formation Name: Upper Piegan or Siyeh  
Slope: 30 percent  
Aspect: 280 degrees  
Elevation: 5380 feet  
Soil Depth:  
Eff. Rooting Depth:  
Litter Type: MOR  
Surface Rock: less than 5 percent  
Climate: cryic, vdic  
Precipitation: 55 inches  
Erosion: minimal  
Infiltration: moderate  
Permeability: moderate  
Storage:  
Drainage: moderately well  
Air Temp:  
Soil Temp at 20 inches: 7 deg. C  
Salt/Alkal:

Remarks:

Pedon Description

O1&O2 2.5-8 centimeters (1-0 inches).

A2 0-5 centimeters (0-2 inches). Gray (10YR 5/1) moist; gravelly silt loam; moderate medium platy to moderate very fine subangular blocky structure; friable, slightly sticky and slightly plastic; rounded and subrounded gravel and cobbles, 46 percent; many very fine, common fine and few medium roots; common very fine and fine continuous tubular pores and many very fine, few fine vesicular pores; strongly acid pH 5.3, noncalcareous; percolation moderate; abrupt wavy boundary.

B21ir 5-10 centimeters (2-4 inches). Reddish brown (5YR 4/4) moist; gravelly silt loam; moderate medium subangular blocky to moderate very fine subangular blocky structure; friable, nonsticky and nonplastic; rounded and subrounded gravel and cobbles, 26 percent; many very fine, common fine, and few medium roots; common very fine and fine continuous tubular, and many very fine and few fine vesicular pores; strongly acid pH 4.9, noncalcareous; percolation rapid; clear wavy boundary.

B22ir 10-18 centimeters (4-7 inches). Dark yellowish brown (10YR 4/4) moist; silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; rounded and subrounded gravel and cobbles, 14 percent; many very fine, common fine and few medium roots; common very fine and fine continuous tubular pores and many very fine and fine vesicular pores; strongly acid pH 5.4, noncalcareous; percolation rapid; clear wavy boundary.

A1b 18-23 centimeters (7-9 inches). Dark brown (10YR 3/3) moist; silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; rounded and subrounded gravels and cobbles, 13 percent; many very fine, common fine and few medium roots; common very fine and fine continuous tubular pores and many very fine and fine vesicular pores; medium acid pH 5.6, noncalcareous; percolation moderate; abrupt wavy boundary.

B21b 23-32 centimeters (9-12.5 inches). Yellowish brown (10YR 5/6) moist; silt loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; few thin interstitial, few thin clay films on ped faces; rounded and subrounded gravel and cobbles, 13 percent; many very fine, common fine and few medium roots; common fine and very fine continuous tubular pores and many fine and very fine vesicular pores; medium acid pH 5.8, noncalcareous; percolation moderate; abrupt wavy boundary.

IIB22 32-37 centimeters (12.5-14.5 inches). Brown to dark brown (10YR 4/3) moist; very gravelly silt loam; moderate medium subangular blocky structure; blocky structure; loose, nonsticky and nonplastic; subangular and angular gravels and cobbles, 79 percent; few very fine and common fine roots; many very fine and fine discontinuous interstitial pores and few fine continuous tubular pores; very strongly acid pH 5.4, noncalcareous; percolation rapid; clear wavy boundary.

IIA2 37-51 centimeters (14.5-20 inches). Grayish brown (2.5Y 5/2) moist; very gravelly silt loam; weak fine subangular blocky structure; very friable, sticky and plastic; subangular and angular flags, 78 percent; common fine and very fine roots; many very fine and common fine discontinuous interstitial pores; strongly acid pH 5.2, noncalcareous; percolation rapid; gradual wavy boundary.

IIAC 51-71 centimeters (20-28 inches). Pale brown with yellowish brown mixed (10YR 5/6) moist; very gravelly coarse sandy loam; weak fine subangular blocky structure; loose, sticky and plastic; subangular and angular flags, 78 percent; many very fine and fine continuous interstitial pores; strongly acid pH 5.1, noncalcareous; percolation moderate; irregular wavy boundary.

IIC 71-114 centimeters (28-45 inches). Light yellowish brown matrix (10YR 6/4) moist; color due to coarse fragments; very gravelly coarse sandy loam; single grained; loose, sticky and plastic; fractured bedrock 85 percent; many very fine and fine continuous interstitial pores; strongly acid pH 5.1, noncalcareous; percolation moderate.

Remarks: IIA2 has lenses of silt. Textures of II soils are approximate due to large quantities of coarse fragments and wet soils.

Pedon: Unnamed Gravelly Silt Loam 79-MT-2729 (131101R-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sub>10</sub> <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	O1&O2	2.5- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	A2	0- 5	5.3	0.16	88	0.9	nd	nd	nd	nd	nd
3	B21ir	5- 10	4.9	0.06	120	3.3	1.81	0.97	1.00	1.40	yes
4	B22ir	10- 18	5.4	0.05	119	0.6	1.30	0.76	0.24	0.92	yes
5	A1b	18- 23	5.6	0.04	113	0.7	nd	nd	nd	nd	nd
6	B21b	23- 32	5.8	0.05	128	0.3	nd	nd	nd	nd	nd
7	IIR22	32- 37	5.4	0.08	60	1.2	nd	nd	nd	nd	nd
8	IIA2	37- 51	5.2	0.10	40	2.1	nd	nd	nd	nd	nd
9	IIAC	51- 71	5.1	0.08	32	2.7	nd	nd	nd	nd	nd
9	IIC	71-114	5.1	0.08	30	2.5	nd	nd	nd	nd	nd

149

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H		Saturation					Fraction	
----- neq/100 gms -----				-----		----- % -----		----- % -----		----- ratio -----			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	1.6	0.8	0.1	0.1	15.3	16.6	15	2.58	1.50	0.088	17	0.54	7.9
3	0.4	0.3	0.1	0.2	45.8	50.0	2	13.61	7.92	0.265	30	0.74	11.1
4	0.2	0.2	0.2	0.1	37.4	33.9	2	11.66	4.66	0.199	23	0.86	11.3
5	0.1	0.2	0.1	0.2	38.9	30.4	2	7.86	4.57	0.185	25	0.87	11.4
6	0.2	0.2	0.2	0.1	32.3	30.4	2	5.87	3.41	0.138	25	0.87	11.3
7	0.5	0.7	0.1	0.2	14.2	15.7	10	2.32	1.35	0.061	22	0.21	10.3
8	0.5	0.4	0.1	0.1	7.8	7.5	12	0.83	0.48	0.027	18	0.22	9.7
9	0.2	0.2	0.1	0.1	7.1	6.3	7	0.69	0.40	0.021	19	0.22	9.7
9	0.3	0.8	0.1	0.1	3.7	4.2	24	0.17	0.10	0.010	10	0.15	8.7

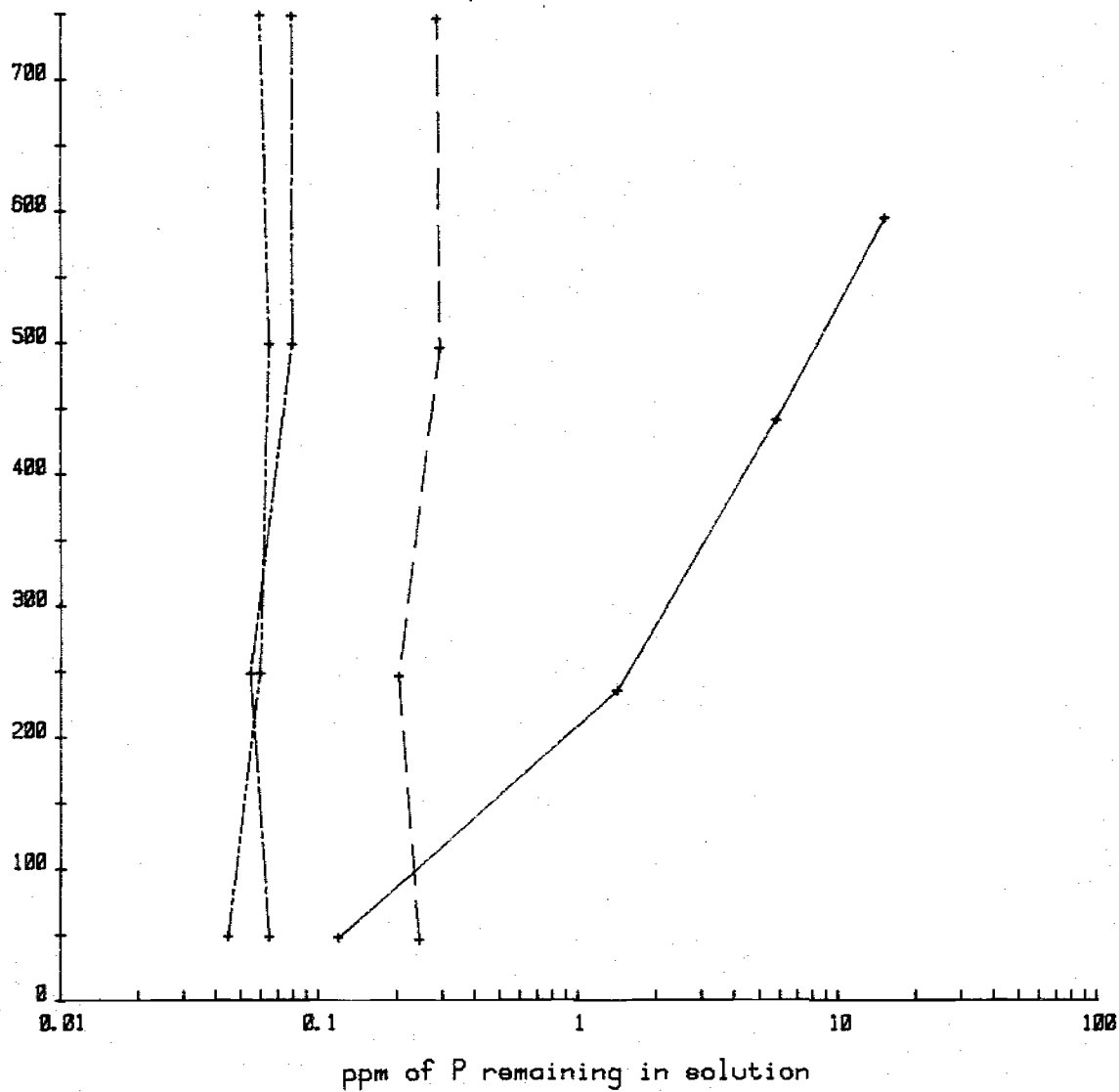
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample  
 nd-not determined

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-2729

642  
µg P sorbed/g soil



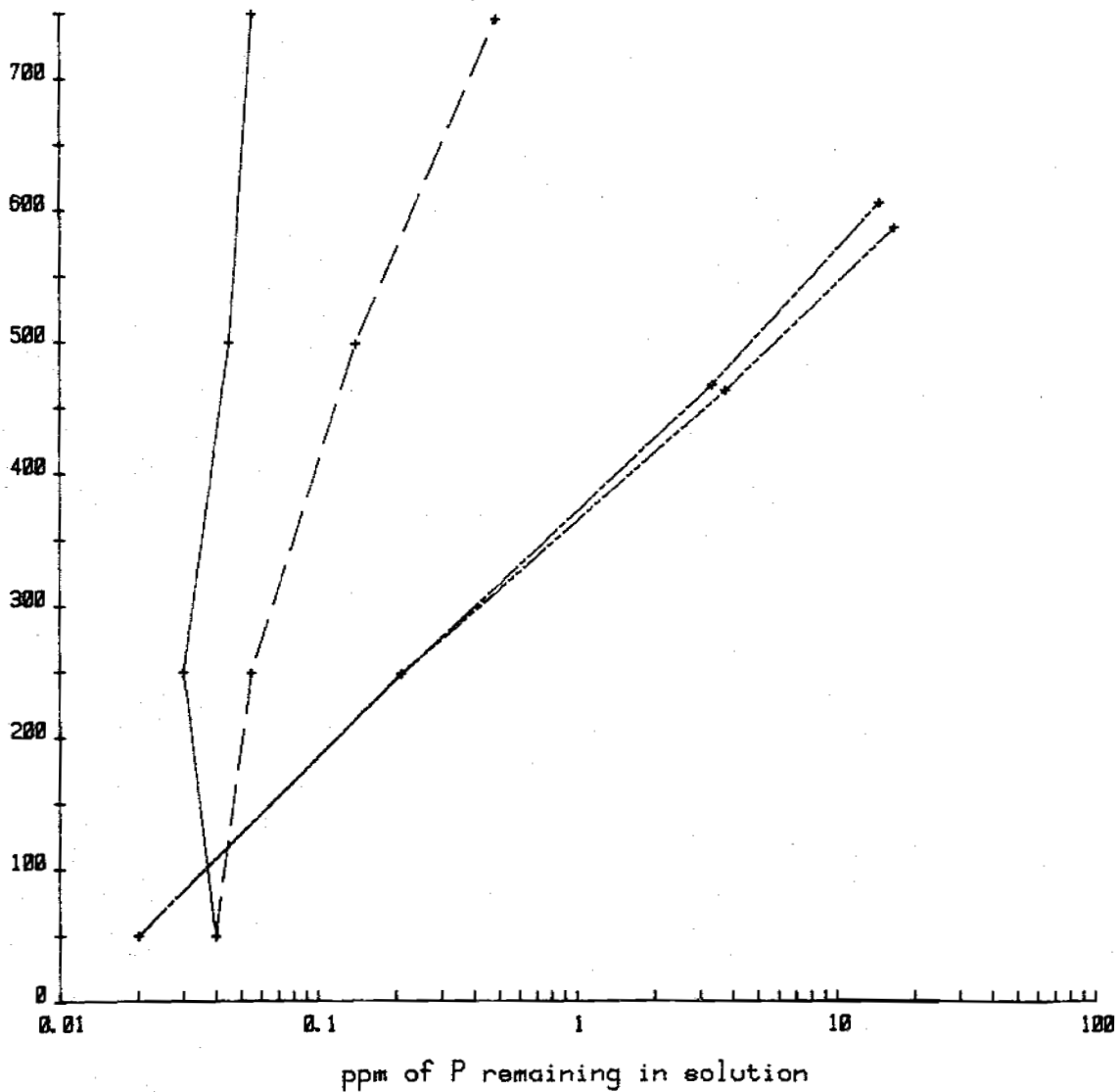
µg/g soil	Soln ppm
----- A2	
49	0.12
236	1.43
442	5.85
595	15.54
----- B21ir	
48	0.25
248	0.21
497	0.38
747	0.29
----- B22ir	
49	0.07
249	0.06
499	0.08
749	0.08
----- A1b	
50	0.05
249	0.06
499	0.07
749	0.06

# Phosphorus Isotherm

79-MT-2729

649

µg P sorbed/g soil



µg/g soil    Soln ppm

————— B21b

50      0.04

250     0.03

500     0.05

749     0.06

————— I1B22

50      0.04

249     0.06

499     0.14

745     0.48

————— IIA2

50      0.02

248     0.21

467     3.30

606     14.43

————— I1AC

50      0.02

248     0.21

463     3.72

587     16.35

# Phosphorus Isotherm

79-WT-2729

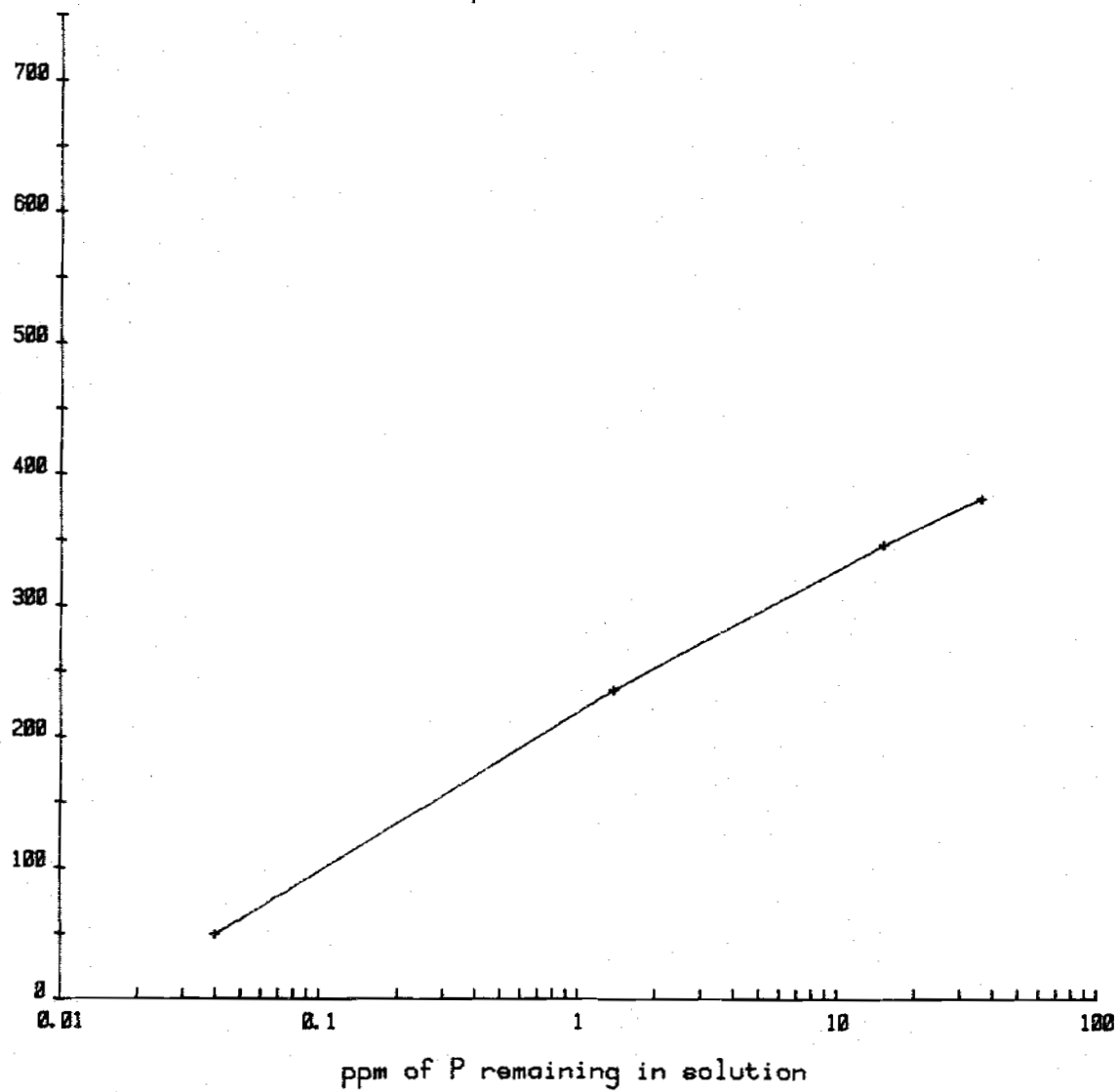
µg/g soil    Soln ppm

———— IIC

50	0.04
236	1.39
347	15.33
382	36.78

779

µg P sorbed/g soil



Pedon: Unnamed Gravelly Silt Loam 79-MT-2729 (131101R-3)

Date: September 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%								%		
2.5- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 5	3.28	3.56	1.53	2.67	9.69	28.72	73.74	5.54	46		Gr. silt loam
5- 10	1.42	2.72	3.65	9.09	17.40	34.28	62.56	3.16	26		Gr. silt loam
10- 18	0.79	1.84	2.45	6.26	19.05	30.39	67.63	1.98	14		Silt loam
18- 23	0.71	2.98	3.40	8.08	18.41	33.58	63.67	2.77	13		Silt loam
23- 32	0.29	0.83	0.99	4.85	21.70	28.67	69.42	1.91	13		Silt loam
32- 37	7.56	10.90	6.06	7.00	8.71	40.22	55.09	4.69	79		V.gr. silt loam
37- 51	9.33	11.70	5.35	6.34	8.86	41.58	51.92	6.50	78		V.gr. silt loam
51- 71	14.24	16.88	6.78	7.70	11.14	56.73	38.08	5.20	78		V.gr. coarse sandy loam
71-114	18.03	21.91	9.36	8.47	7.52	65.29	28.87	5.84	85		V.gr. coarse sandy loam

Depth	Silt Size Distribution (mm)			Bulk Density	Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002		Clod	Core	Bar	Bar	
cm	%			g/cc	%		%		
2.5- 0				NS	NS	NS	NS	NS	NS
0- 5				34.9	18.1	NDNP	NDNP	NDNP	NDNP
5- 10				59.3	43.0	NDNP	NDNP	NDNP	NDNP
10- 18				60.4	38.8	NDNP	NDNP	NDNP	NDNP
18- 23				63.3	37.2	NDNP	NDNP	NDNP	NDNP
23- 32				59.2	9.2	NDNP	NDNP	NDNP	NDNP
32- 37				26.9	4.9	NDNP	NDNP	NDNP	NDNP
37- 51				19.1	4.8	NDNP	NDNP	NDNP	NDNP
51- 71				15.9	4.1	NDNP	NDNP	NDNP	NDNP
71-114				11.9	3.6	NDNP	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

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PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita Falen

Date: September 1980

Identification	M2729-1	M2729-2	M2729-3	M2729-4	
Units	-----%				
TC (0.63-2.00)	5.54	3.16	1.98	2.77	
TSi (2.00-50)	73.74	62.56	67.63	63.67	
TS (50-2000)	20.72	34.28	30.39	33.58	
Clay	0.63-0.794	0.74	0.38	0.17	0.32
	0.794-1.00	0.86	0.45	0.24	0.42
	1.00-1.26	1.09	0.61	0.37	0.55
	1.26-1.59	1.14	0.67	0.45	0.59
	1.59-2.00	1.72	1.05	0.74	0.90
Fine Silt	2.00-2.52	2.27	1.47	1.06	1.22
	2.52-3.17	2.55	1.82	1.41	1.53
	3.17-4.00	2.29	1.94	1.60	1.74
	4.00-5.04	3.67	2.19	2.47	2.57
Medium Silt	5.04-6.35	4.68	3.58	3.43	3.51
	6.35-8.00	5.84	4.27	4.38	4.33
	8.00-10.08	6.82	5.08	5.03	5.09
	10.08-12.70	8.28	6.24	6.60	6.78
	12.70-16.0	9.11	7.12	7.65	7.77
	16.0-20.2	8.97	7.27	7.91	8.46
Coarse Silt	20.2-25.4	7.72	7.36	8.37	7.94
	25.4-32.0	6.45	6.54	7.55	6.36
	32.0-40.3	3.20	5.11	6.44	4.50
	40.3-50.8	1.50	2.06	3.33	1.58
	50.8-64.0	0.40	0.53	0.39	0.29
VFS (50-100)	9.69	17.40	19.05	18.41	
FS (100-250)	2.67	9.09	6.26	8.08	
MS (250-500)	1.53	3.65	2.45	3.40	
CoS (500-1000)	3.56	2.72	1.84	2.98	
VCoS (1000-2000)	3.28	1.42	0.79	0.71	
Greater than 2000	46	26	14	13	
Textural Class	Gr. S&L	Gr. SiL	SiL	SiL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2729-5	M2729-6	M2729-7	M2729-8
Units		-----%			
TC (0.63-2.00)		1.91	4.69	6.50	5.20
TSi (2.00-50)		69.42	55.09	51.92	38.08
TS (50-2000)		28.67	40.22	41.58	56.73
Clay	0.63-0.794	0.13	0.59	0.86	0.84
	0.794-1.00	0.24	0.67	1.02	0.90
	1.00-1.26	0.37	0.89	1.29	1.04
	1.26-1.59	0.45	0.98	1.34	1.00
	1.59-2.00	0.72	1.56	2.00	1.43
Fine Silt	2.00-2.52	1.05	2.17	2.57	1.75
	2.52-3.17	1.35	2.71	2.90	1.93
	3.17-4.00	1.54	2.72	2.68	1.68
	4.00-5.04	2.26	4.21	3.77	1.55
Medium Silt	5.04-6.35	3.01	5.08	4.42	2.60
	6.35-8.00	3.79	5.77	4.68	2.94
	8.00-10.08	4.49	5.95	4.69	3.11
	10.08-12.70	5.69	6.71	5.20	3.62
	12.70-16.0	7.30	6.25	5.33	3.90
	16.0-20.2	8.26	5.38	5.50	4.22
Coarse Silt	20.2-25.4	9.00	4.18	4.16	4.07
	25.4-32.0	9.78	2.33	2.76	3.15
	32.0-40.3	7.20	1.35	1.58	2.63
	40.3-50.8	4.46	0.20	1.39	0.89
	50.8-64.0	0.25	0.10	0.30	0.06
VFS (50-100)		21.70	8.71	8.86	11.14
FS (100-250)		4.85	7.00	6.34	7.70
MS (250-500)		0.99	6.06	5.35	6.78
CoS (500-1000)		0.83	10.90	11.70	16.88
VCoS (1000-2000)		0.29	7.56	9.33	14.24
Greater than 2000		13	79	78	78
Textural Class		SiL	V. gr. SiL	V. gr. SiL	V. gr. CoSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2729-9		
Units		-----%		
TC (0.63-2.00)		5.84		
TSi (2.00-50)		28.87		
TS (50-2000)		65.29		
Clay	0.63-0.794	1.01		
	0.794-1.00	1.03		
	1.00-1.26	1.19		
	1.26-1.59	1.11		
	1.59-2.00	1.51		
Fine Silt	2.00-2.52	1.73		
	2.52-3.17	1.78		
	3.17-4.00	1.48		
	4.00-5.04	1.23		
Medium Silt	5.04-6.35	2.06		
	6.35-8.00	2.25		
	8.00-10.08	2.27		
	10.08-12.70	2.55		
	12.70-16.0	2.65		
	16.0-20.2	2.85		
Coarse Silt	20.2-25.4	2.48		
	25.4-32.0	2.83		
	32.0-40.3	1.47		
	40.3-50.8	0.95		
	50.8-64.0	0.29		
VFS (50-100)		7.52		
FS (100-250)		8.47		
MS (250-500)		9.36		
CoS (500-1000)		21.91		
VCoS (1000-2000)		18.03		
Greater than 2000		85		
Textural Class		V. gr. CoSL		

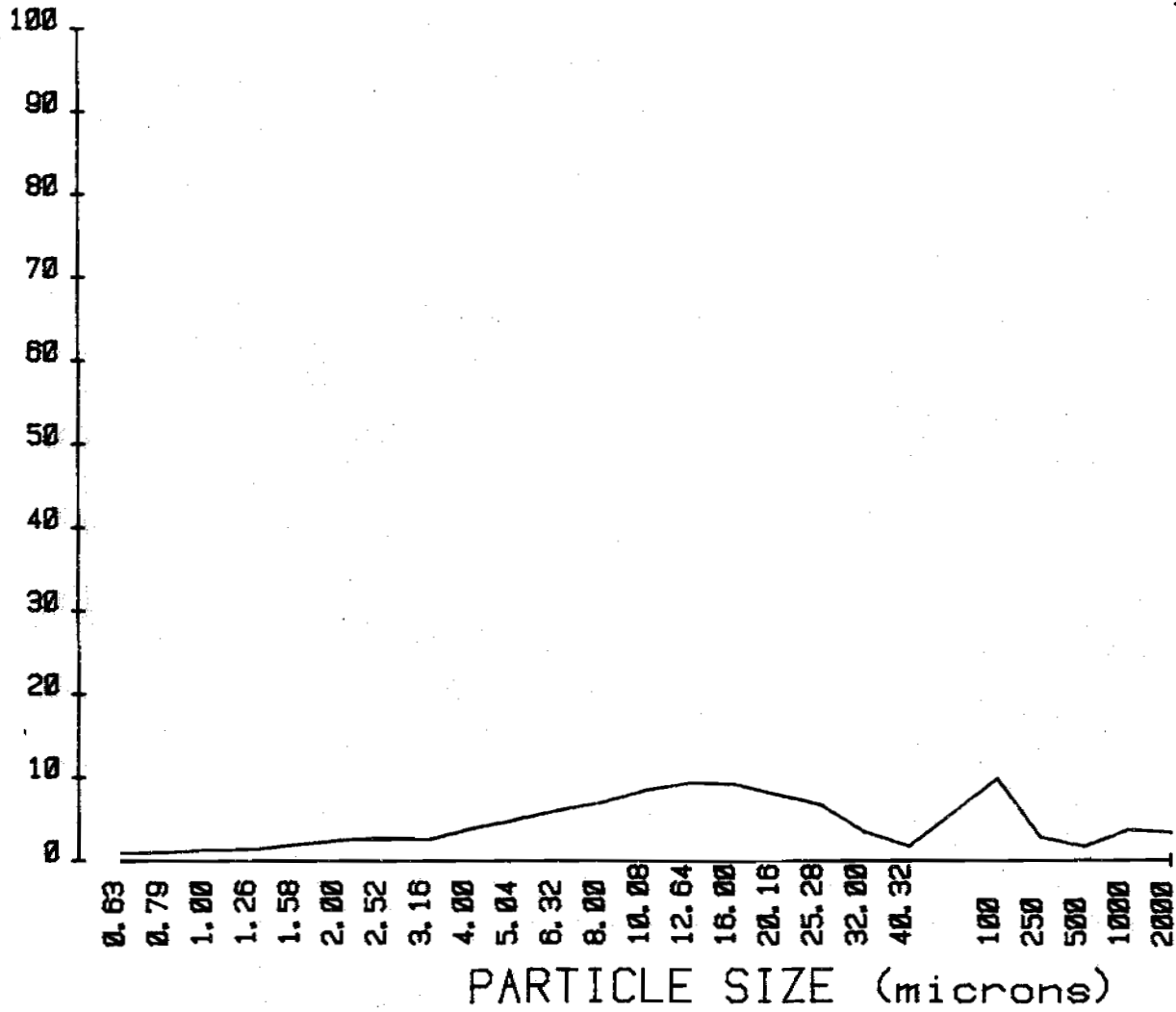
Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2729-1

649

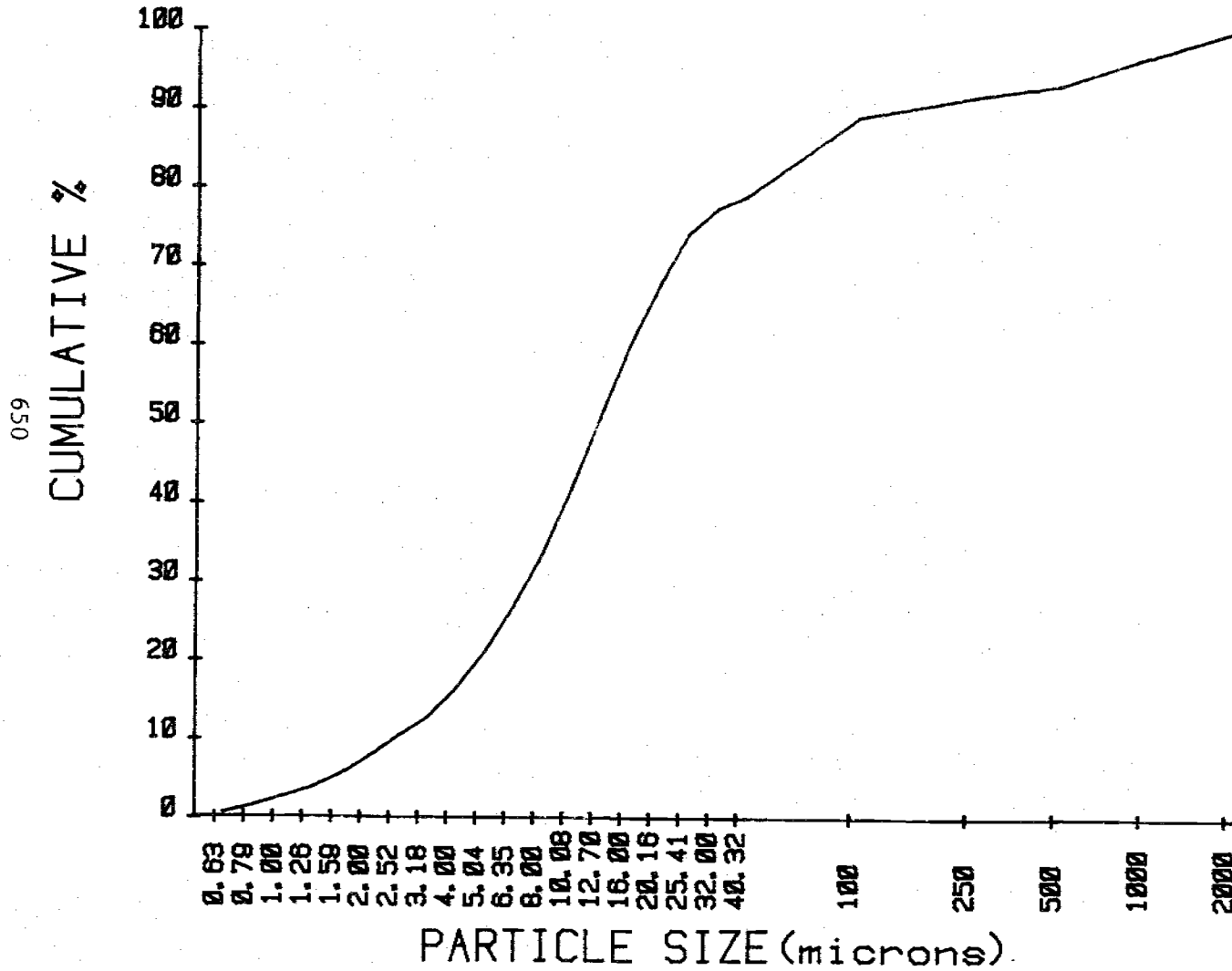
x



0.74	5.84
0.86	6.82
1.00	8.28
1.14	9.11
1.72	8.97
2.27	7.72
2.55	6.45
2.20	3.20
3.67	1.50
4.68	0.40
2.40	0.88
1.07	0.88
1.53	0.28
2.56	0.28

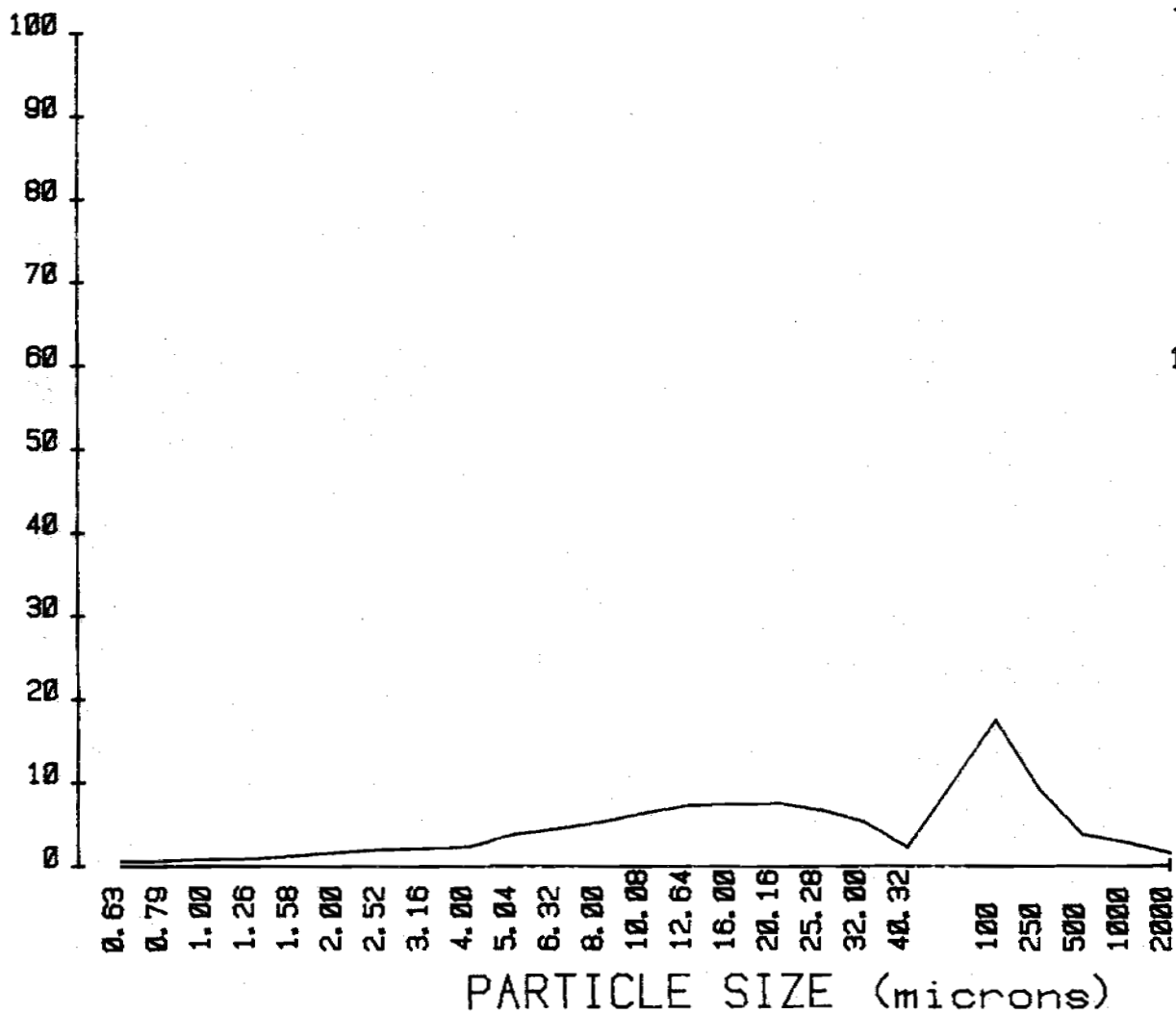
CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-1



PLOT SAND-SILT-CLAY

ID M2729-2



0.38	4.27
0.45	5.08
0.61	6.23
0.67	7.12
1.05	7.27
1.47	7.36
1.82	6.54
1.94	5.11
2.19	2.06
3.58	0.53
17.40	
9.09	
3.05	
2.72	
1.44	

159

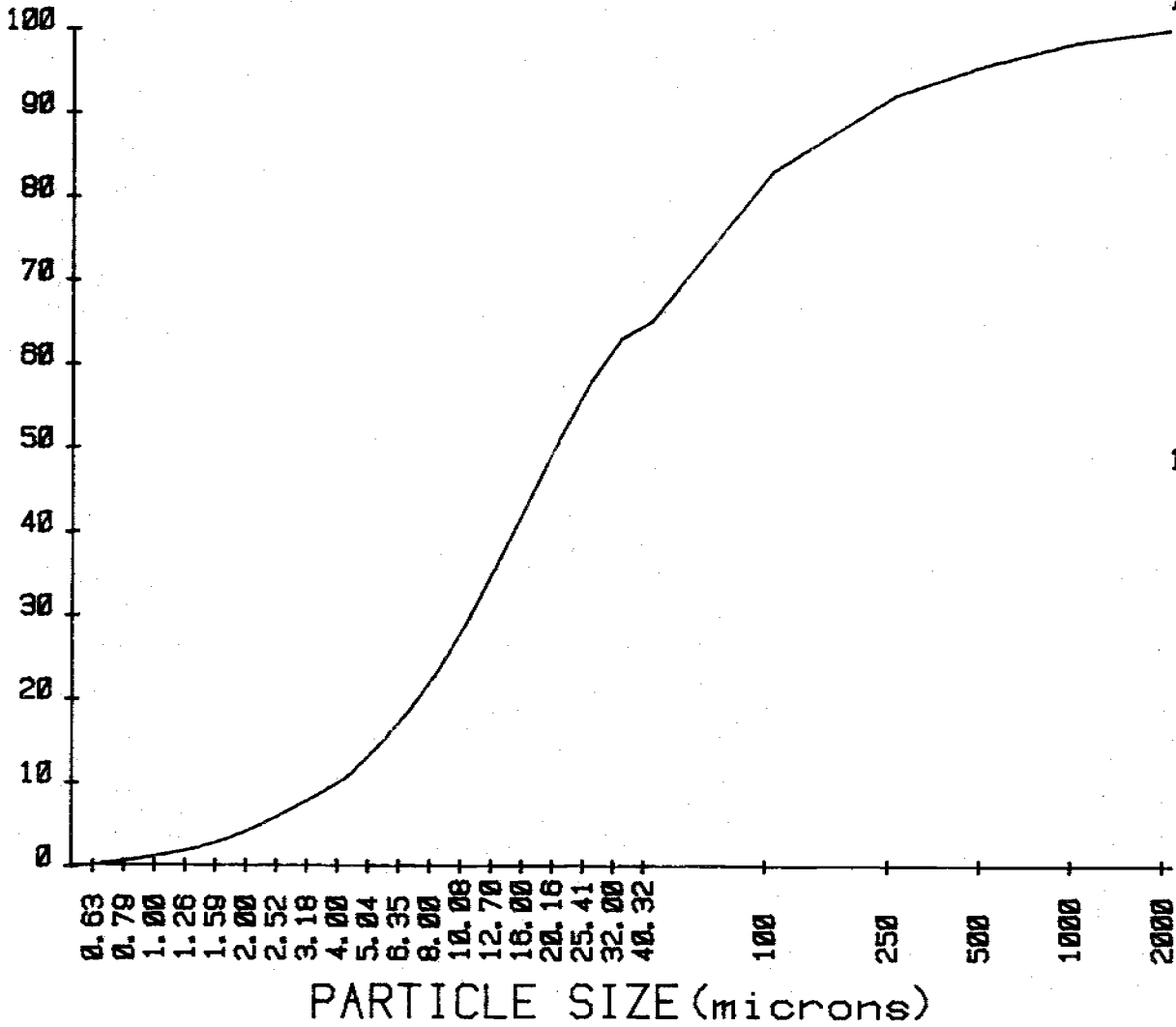
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ID M2729-2

652

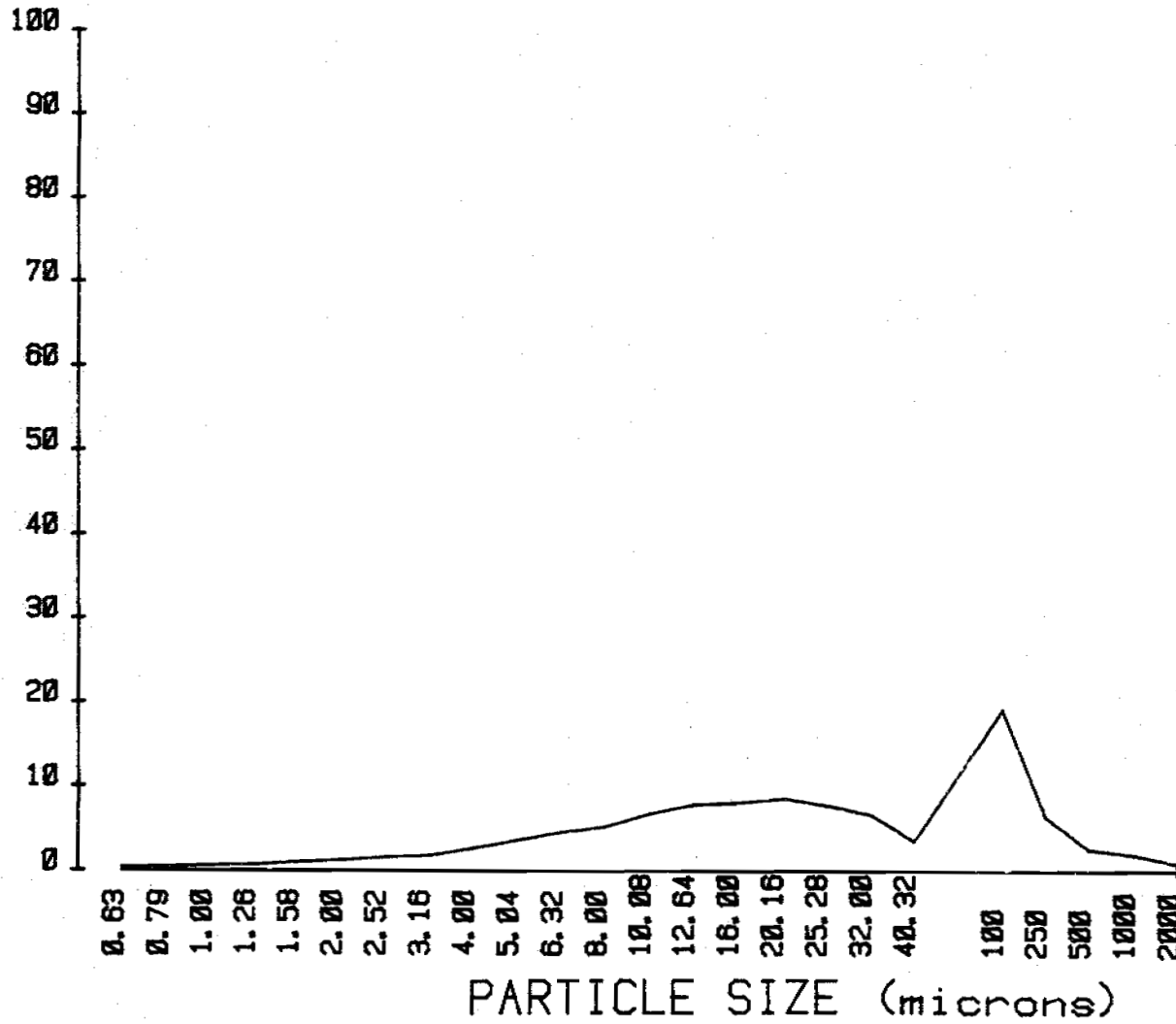
CUMULATIVE %



0.38	10.42
0.63	23.50
1.44	29.73
2.11	36.85
3.16	44.12
4.69	51.46
6.45	58.82
8.98	63.13
12.57	65.10
14.15	65.72
83.12	
92.21	
95.86	
98.58	
100.02	

PLOT SAND-SILT-CLAY

ID M2729-3



0.17	4.37
0.24	5.03
0.37	6.60
0.45	7.65
0.74	7.91
1.06	8.37
1.41	7.55
1.60	6.44
2.47	3.33
3.42	0.39
10.05	
6.26	
2.45	
1.84	
0.79	

859

\*

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-3

759

CUMULATIVE %



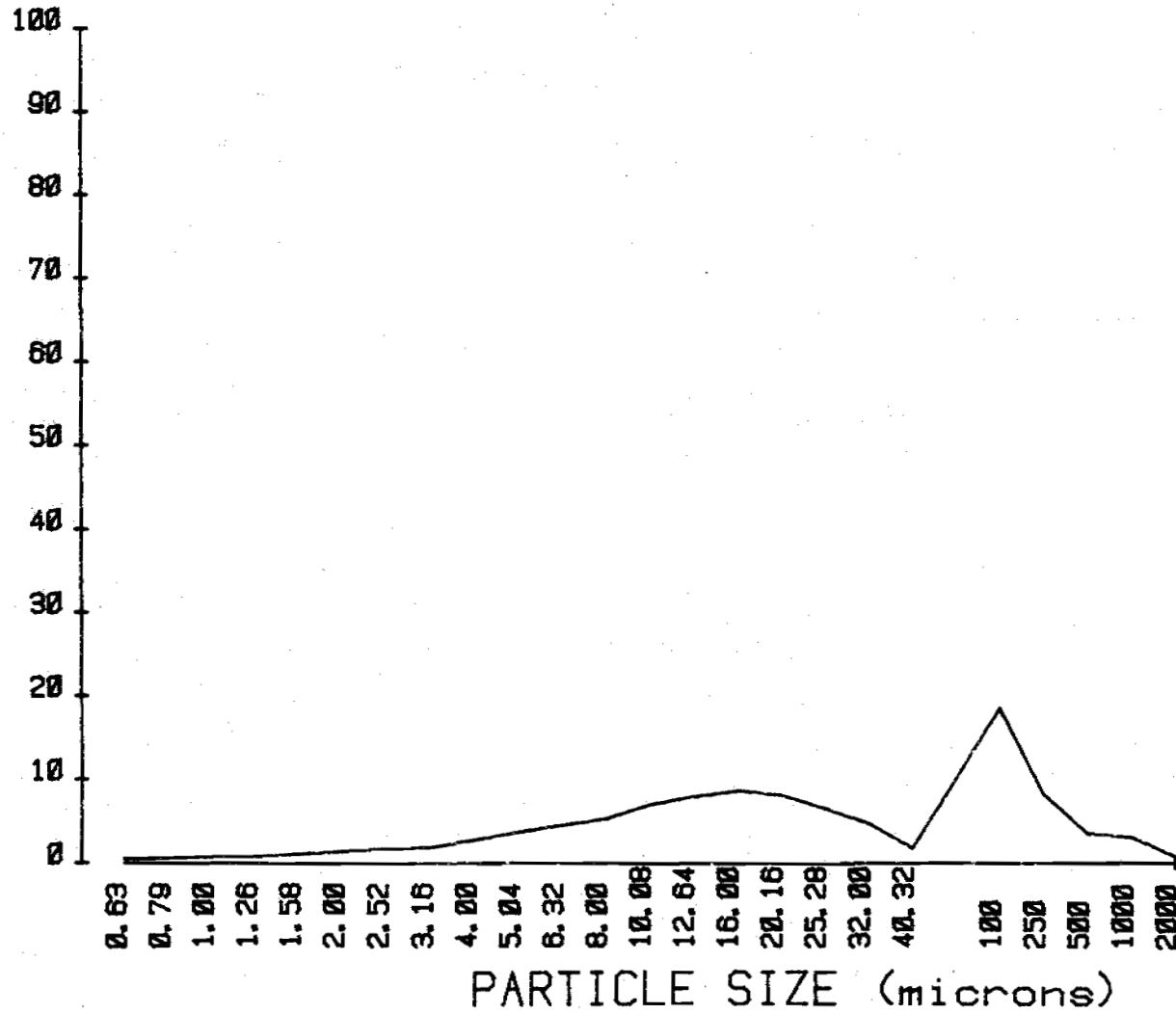
0.17	16.32
0.41	21.35
0.78	27.98
1.24	35.81
1.98	43.52
3.04	51.98
4.45	59.45
6.65	67.88
8.52	77.22
11.95	88.66
16.32	94.92
21.35	97.37
27.98	99.21
35.81	100.00



PLOT SAND-SILT-CLAY

ID M2729-4

559 x



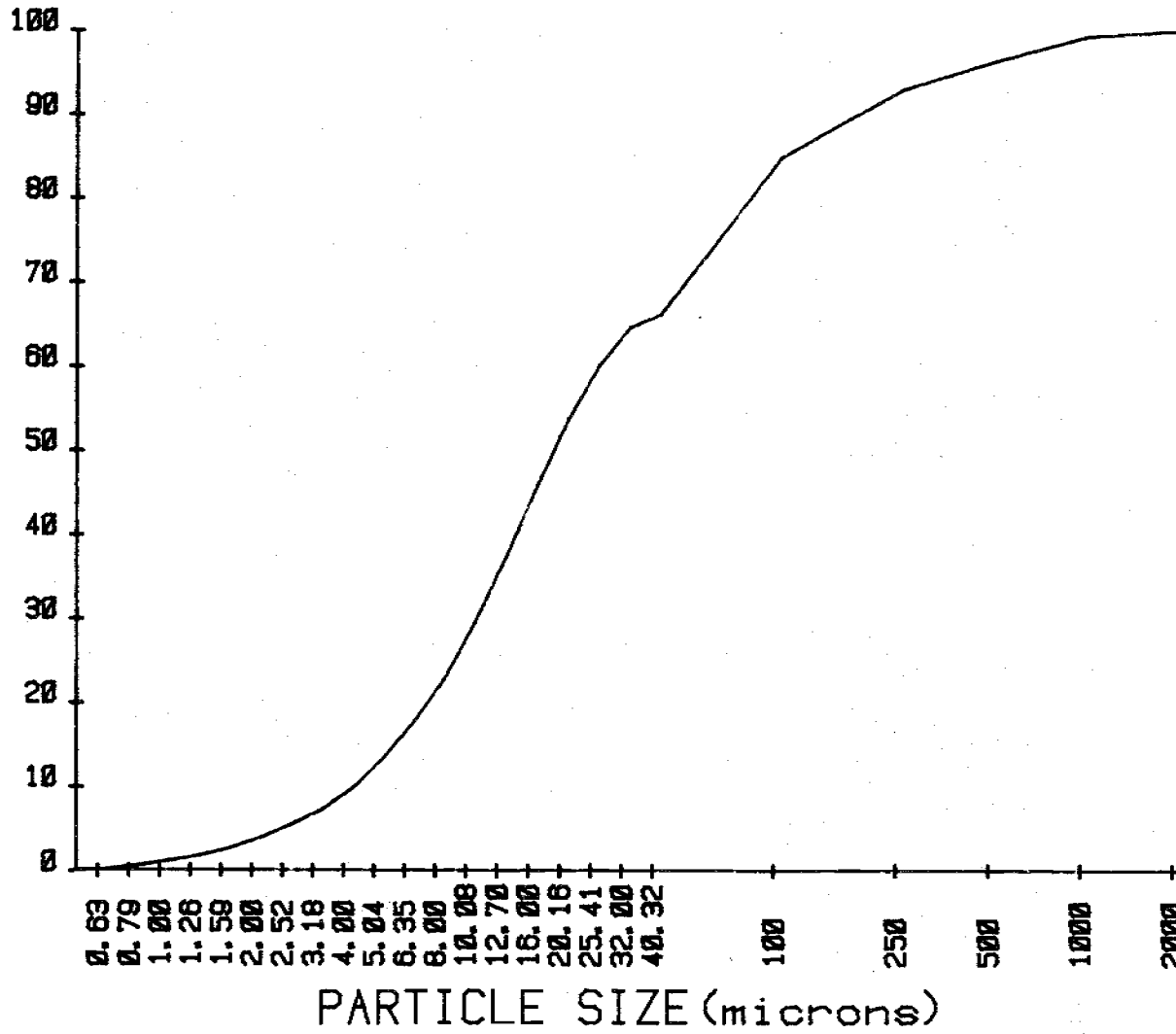
0.32	4.33
0.42	5.09
0.55	6.77
0.69	7.76
0.89	8.46
1.22	7.93
1.53	6.36
1.74	4.50
2.57	1.58
3.51	0.29
10.41	
0.08	
3.40	
2.98	
0.71	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-4

959

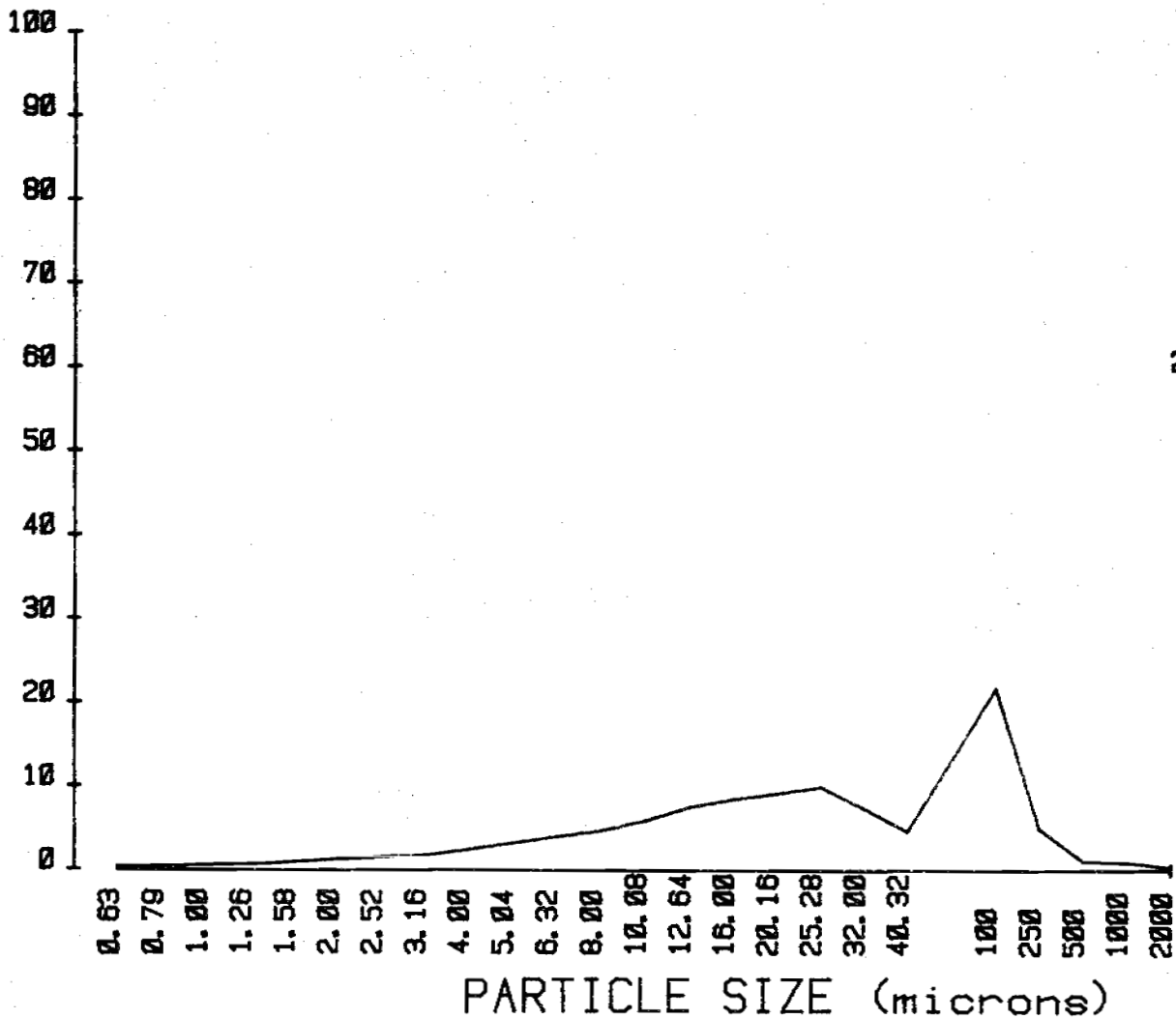
CUMULATIVE %



0.32	17.67
0.73	22.76
1.28	29.53
1.88	37.29
2.77	45.76
3.98	53.88
5.52	60.85
7.28	64.55
9.82	68.13
13.34	68.42
84.83	
92.91	
96.31	
99.29	
100.00	

PLOT SAND-SILT-CLAY

ID M2729-5

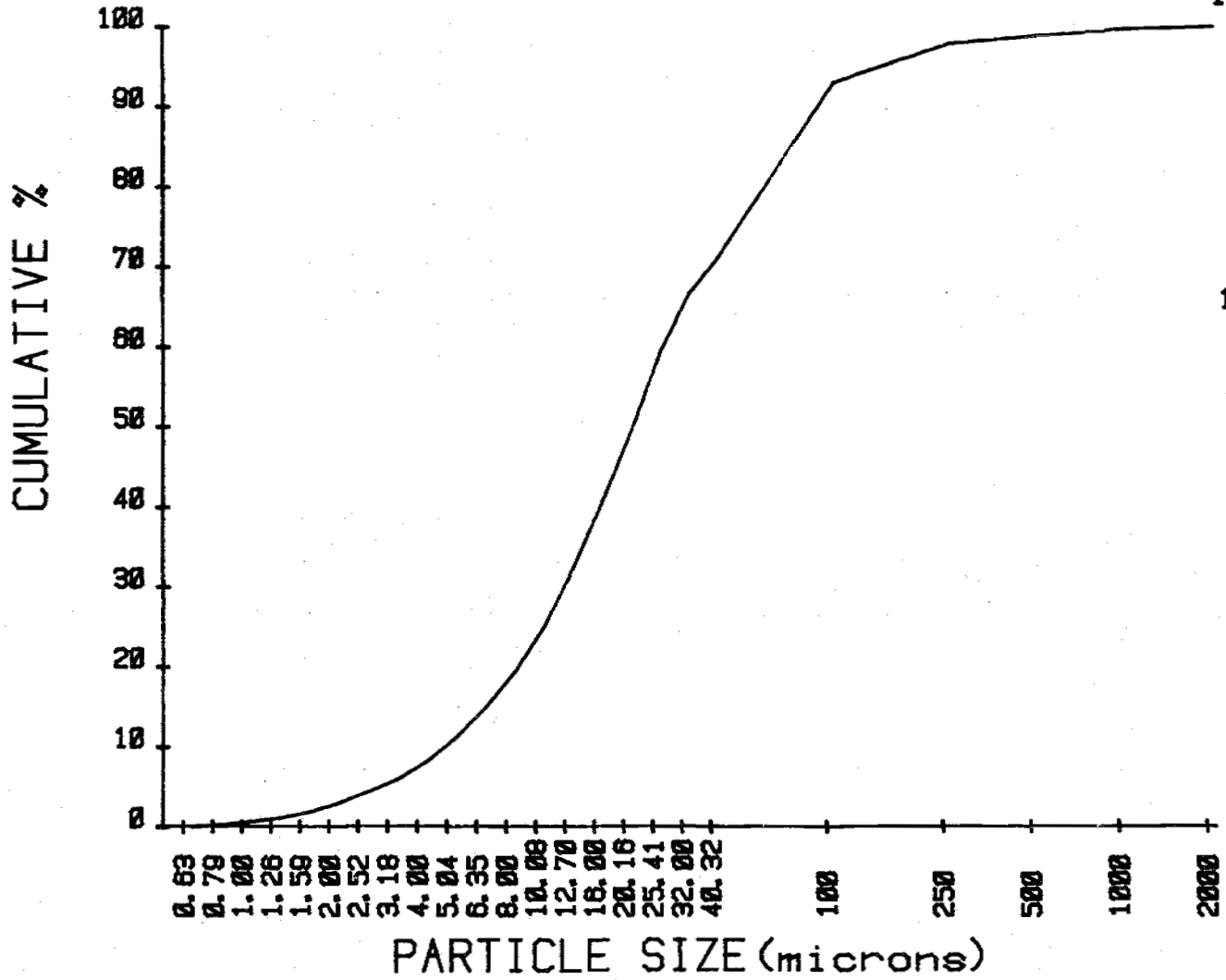


0.12	3.79
0.24	4.49
0.37	5.69
0.45	7.30
0.72	8.26
1.05	9.00
1.35	9.78
1.53	7.20
2.25	4.46
3.01	0.25
21.70	
4.85	
0.98	
0.83	
0.28	

859

### CUMULATIVE CURVE SAND-SILT-CLAY

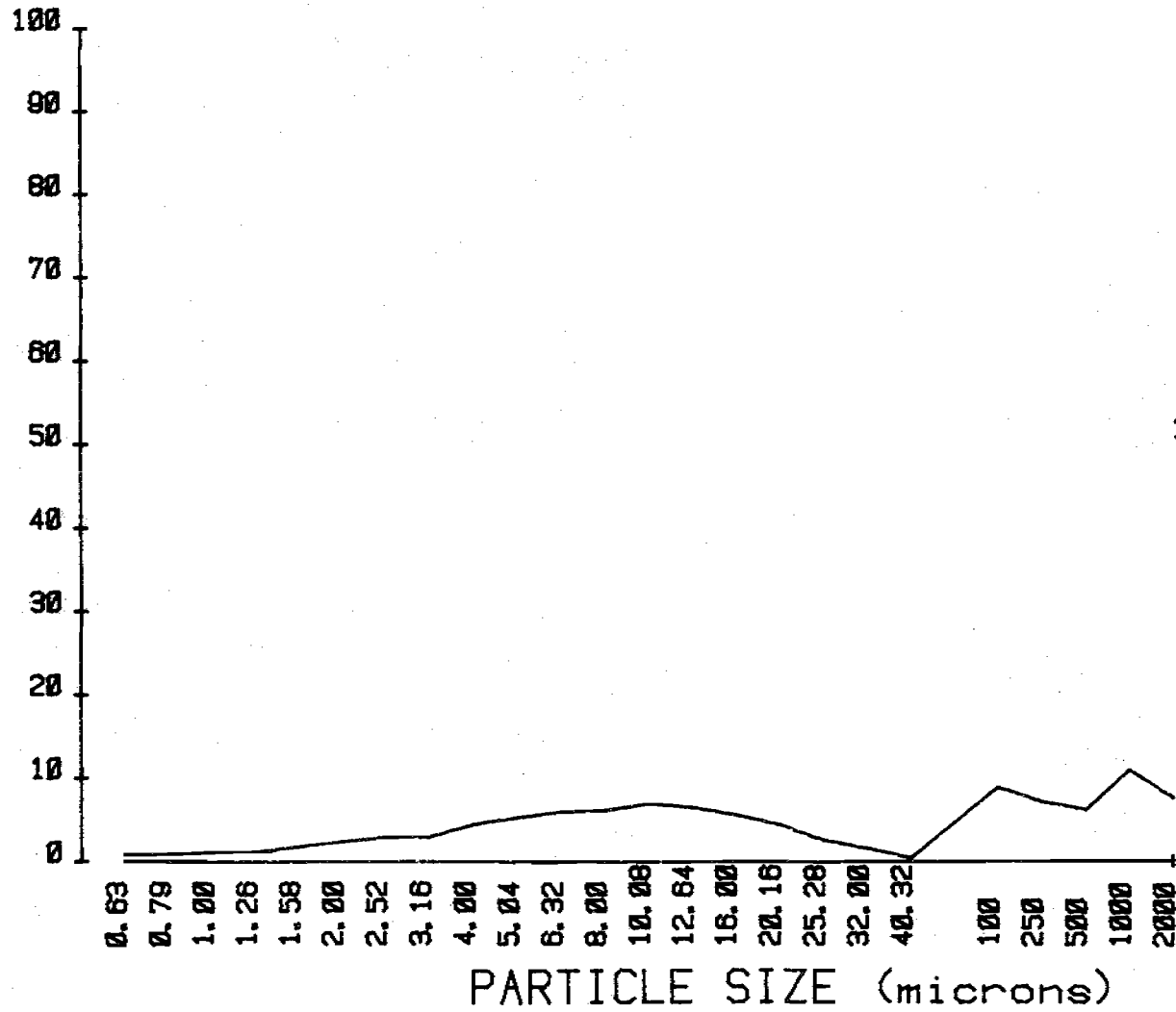
ID M2729-5



0.12	14.98
0.37	19.39
0.74	25.08
1.19	32.38
1.91	40.84
2.98	49.84
4.31	58.42
5.84	66.62
8.18	71.88
11.11	71.33
93.03	
97.88	
98.87	
99.78	
99.98	

PLOT SAND-SILT-CLAY

ID M2729-6



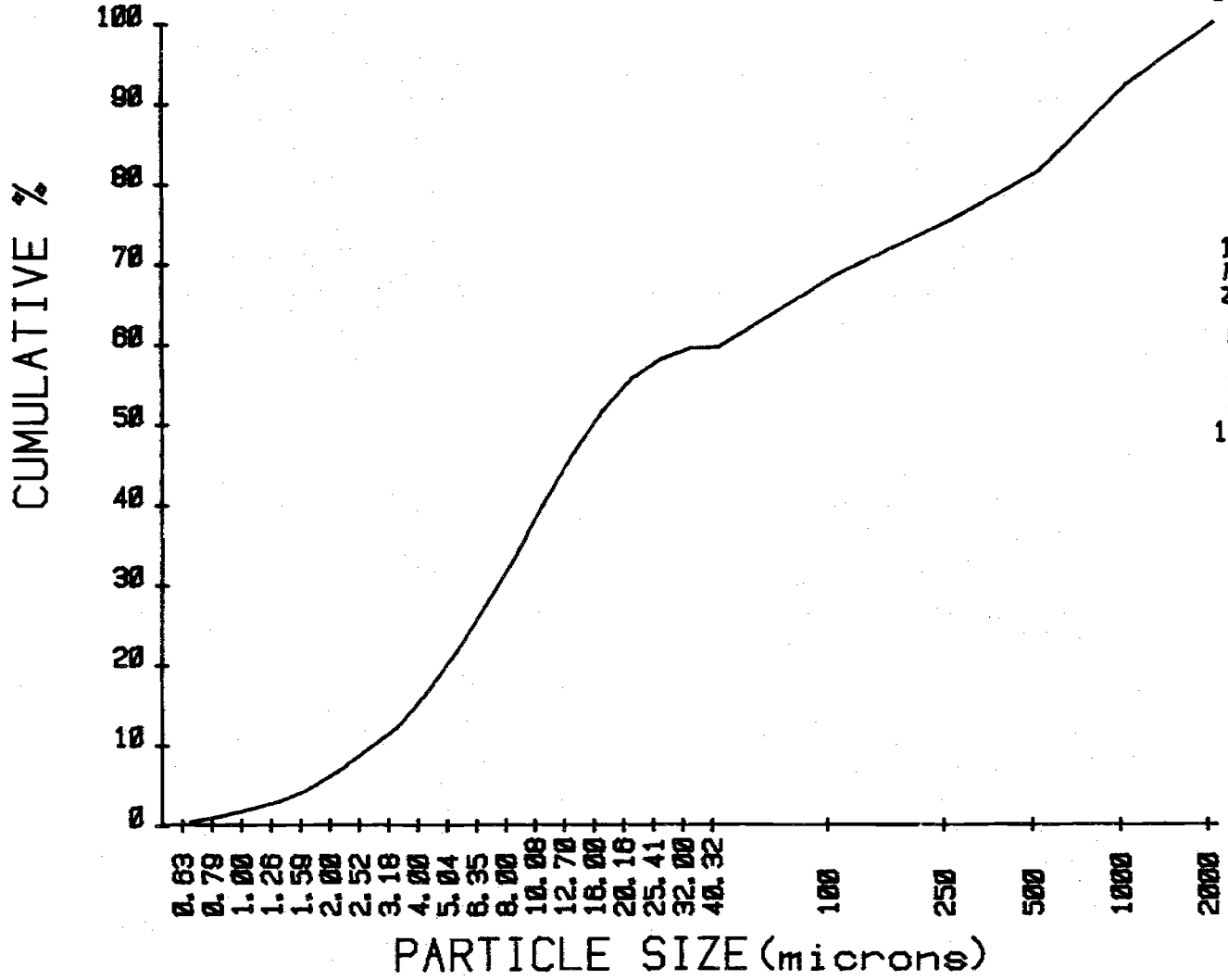
0.59	5.77
0.67	5.95
0.80	6.71
0.98	6.25
1.56	5.38
2.17	4.18
2.71	2.33
2.72	1.35
4.21	0.20
5.08	0.10
8.71	
7.00	
8.06	
10.90	
7.56	

659

%

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-6



0.50	27.34
1.26	33.20
2.15	40.00
3.13	46.25
4.60	51.69
6.86	55.81
9.57	58.13
12.28	59.48
16.49	59.68
21.57	59.78
68.40	
75.49	
81.55	
92.45	
100.01	

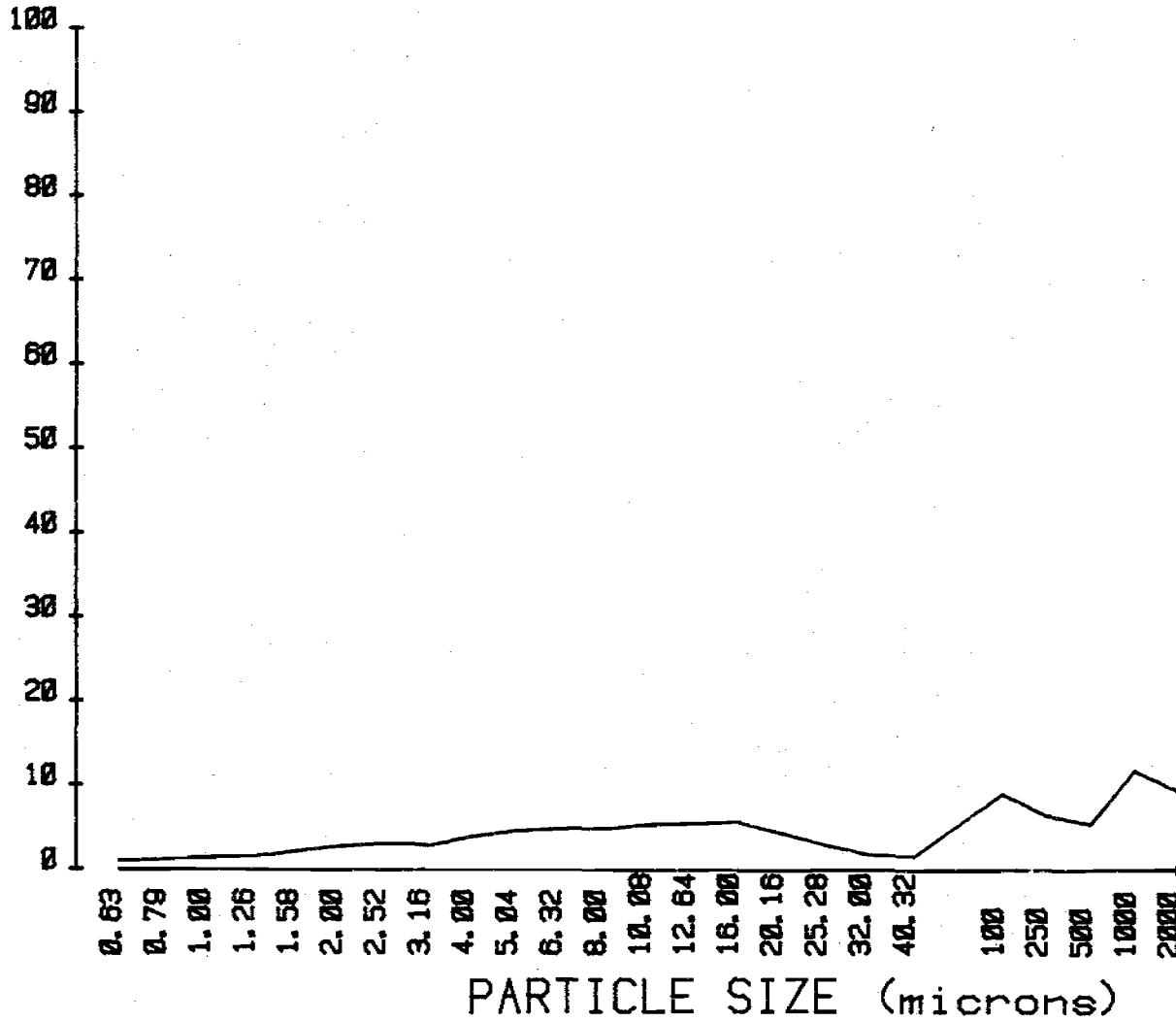
099

PLOT SAND-SILT-CLAY

ID M2729-7

T99

x

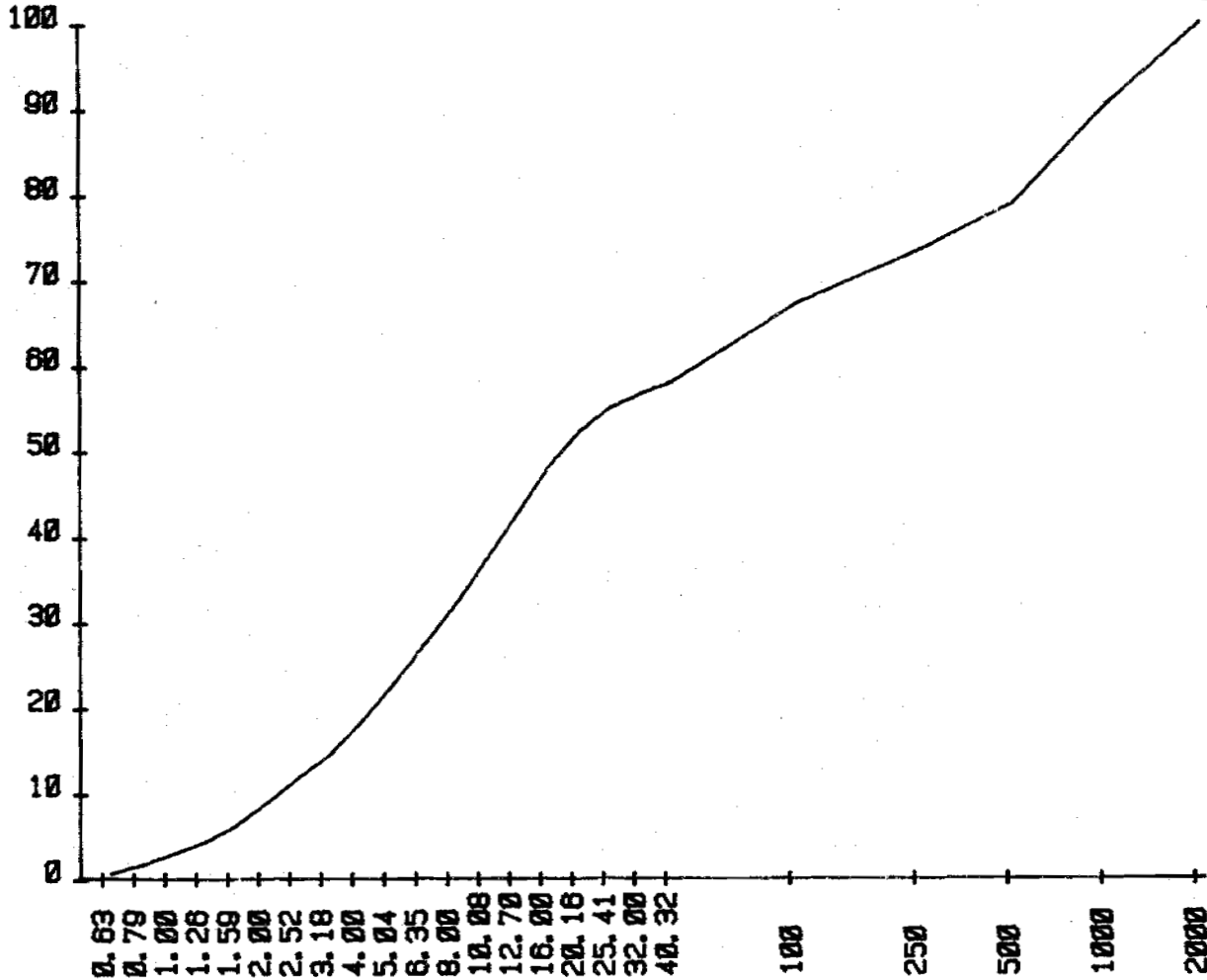


0.86	4.68
1.02	4.68
1.26	5.28
1.34	5.33
2.00	5.50
2.56	4.16
2.90	2.76
2.88	1.56
2.77	1.36
4.42	0.36
0.86	0.86
0.94	0.94
0.95	0.95
1.78	1.78
0.33	0.33

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-7

CUMULATIVE %



PARTICLE SIZE (microns)

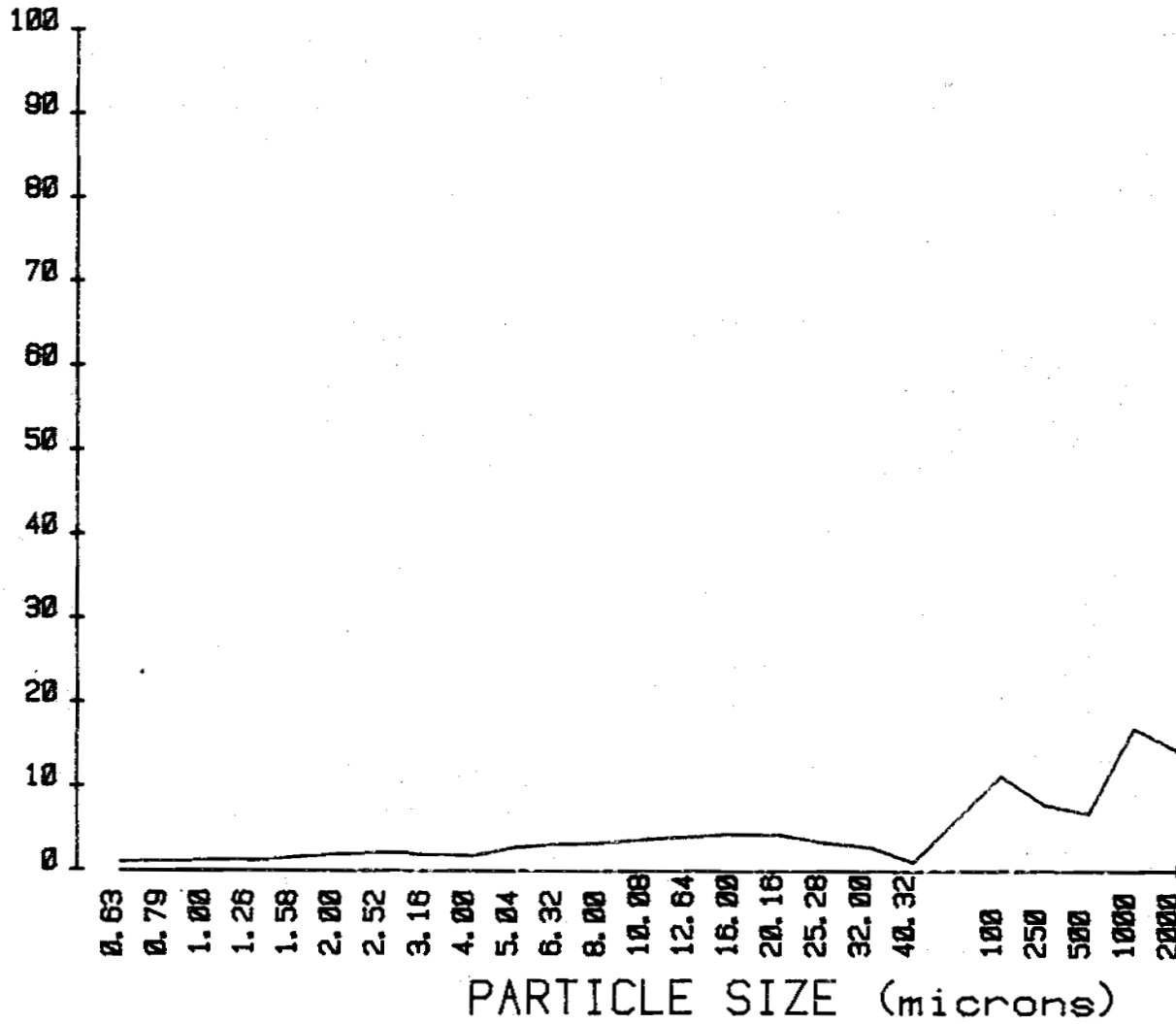
0.63	27.52
0.79	32.21
1.00	37.41
1.26	42.74
1.59	48.23
2.00	52.39
2.52	55.15
3.18	58.74
4.00	58.12
5.04	58.42
6.35	67.28
8.00	73.62
10.00	78.97
12.70	90.67
16.00	100.00
20.00	
25.41	
32.00	
40.32	
100	
250	
500	
1000	
2000	



PLOT SAND-SILT-CLAY

ID M2729-8

899 x



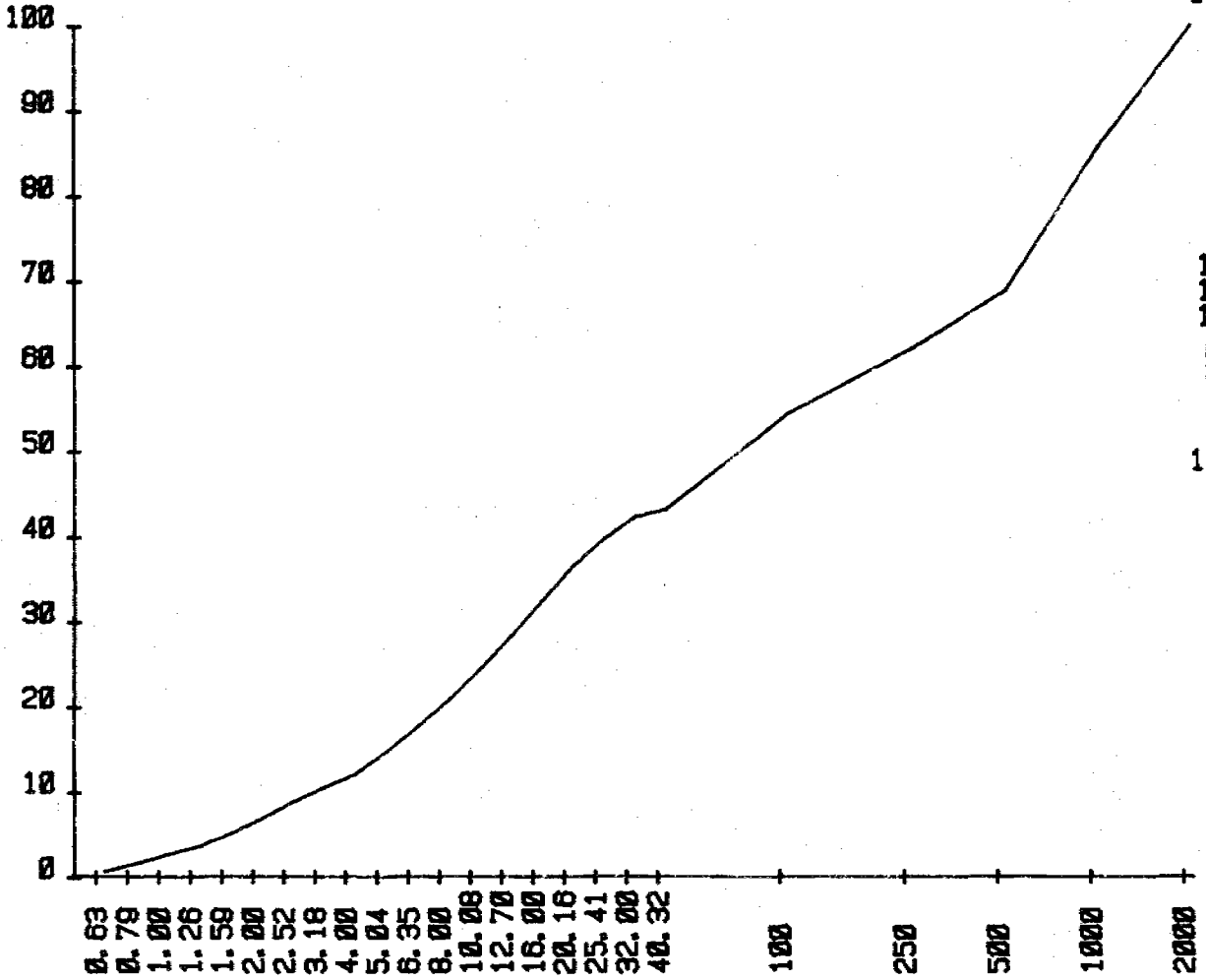
0.84	2.94
0.90	3.11
1.03	3.62
1.00	3.89
1.43	4.22
1.75	4.07
1.93	3.15
1.68	2.63
1.55	0.89
2.60	0.06
11.14	
7.70	
6.78	
16.88	
14.24	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-8

799

CUMULATIVE %



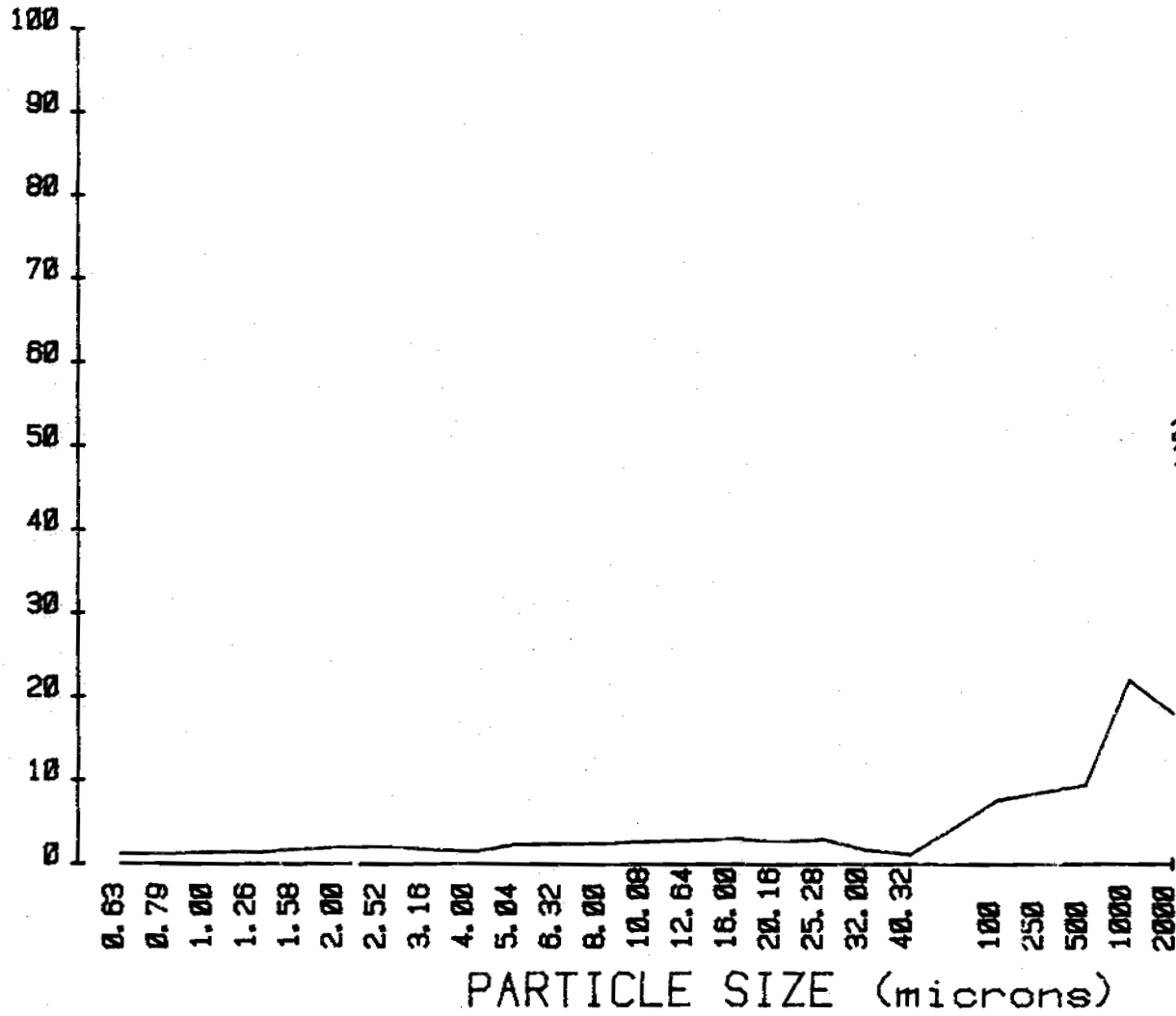
0.63 0.78 1.00 1.26 1.58 2.00 2.52 3.18 4.00 5.04 6.35 8.00 10.00 12.70 16.00 20.16 25.41 32.00 40.32 100 250 500 1000 20000

0.84	17.65
1.74	20.76
2.77	24.38
3.77	28.27
5.20	32.48
6.95	36.55
8.88	39.70
10.58	42.33
12.11	43.21
14.71	43.27
54.41	
62.11	
68.89	
85.77	
100.01	

PARTICLE SIZE (microns)

PLOT SAND-SILT-CLAY

ID M2729-9



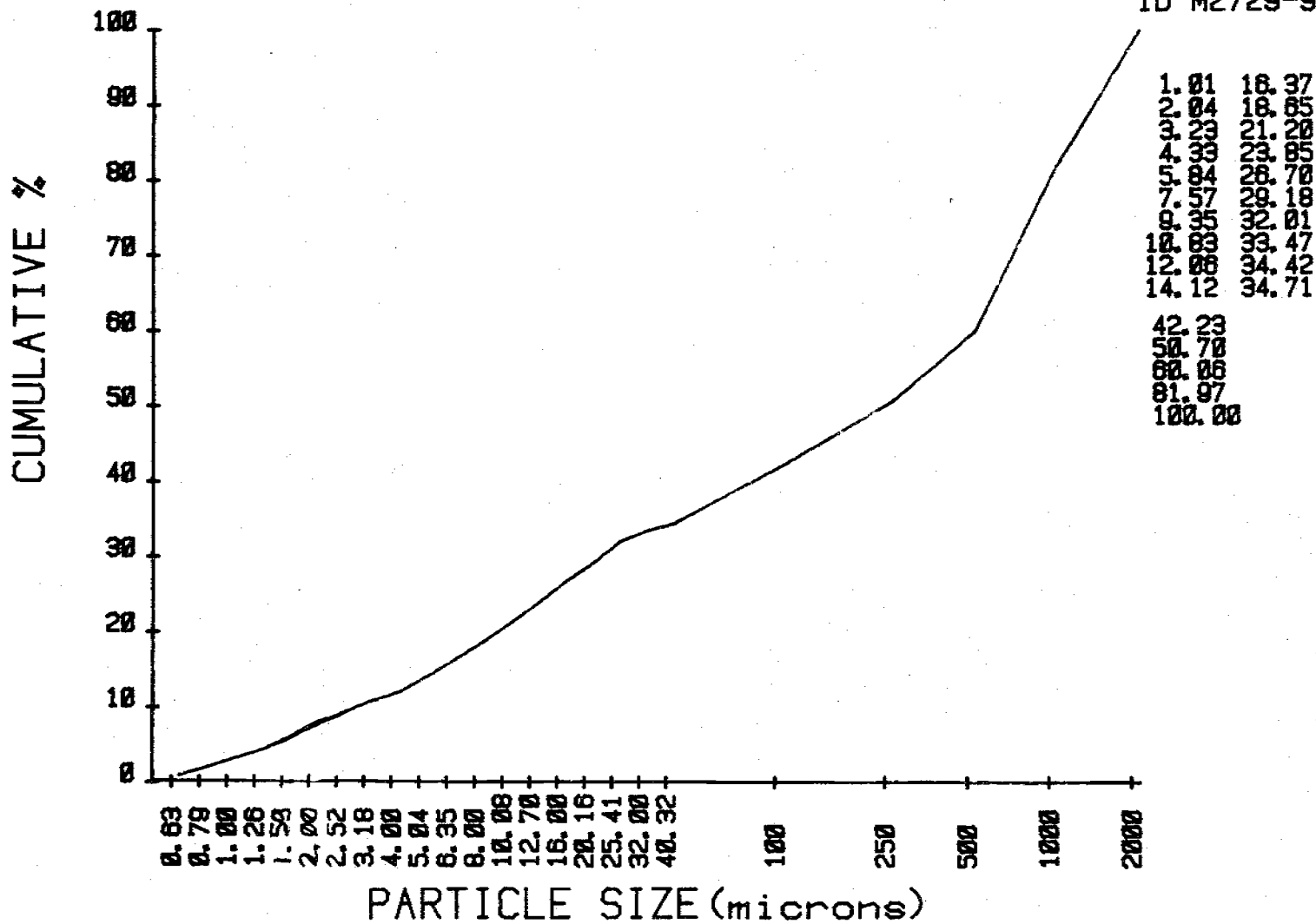
1.01	2.25
1.03	2.27
1.19	2.55
1.10	2.85
1.51	2.85
1.73	2.48
1.78	2.83
1.48	1.47
1.23	0.95
2.06	0.29
7.52	
8.47	
9.38	
21.01	
18.03	

599

x

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2729-9



Unnamed Gravelly Fine Sandy Loam 79-MT-2730 (090501R-1)

Classification: medial over loamy, mixed, frigid Andic Dystrachrept.

General Site Characteristics

Location: Lincoln County, Montana; southeast 1/4 of section 28, T. 33N., R. 31W.

Libby Ranger District

Forest: Kootenai National Forest

Area: Tom Poole Lake, Point 1

Described By/Date: Garry Edson and Terry Svalberg on June 22, 1978

Parent Rock/Material: sedimentary belt rock

Habitat Type: (Abies grandis)/(Clintonia uniflora)

Topography:

Landform: bench-break in slope

Weathering: slight, saprolytic nature

Formation Name: Wallace

Slope: 14 percent

Aspect: southwest

Elevation: 3880 feet

Soil Depth: 30 inches

Eff. Rooting Depth:

Litter Type: MOR

Surface Rock: 5-10 percent

Climate: frigid, udic

Precipitation: 30 inches

Erosion: minimal

Infiltration: rapid

Permeability: rapid

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches: 8.3 deg. C

Salt/Alkal:

Remarks:

Pedon Description

01602 5-8 centimeters (2-8 inches).

A1 0-4 centimeters (0-1.5 inches). Dark brown (10YR 3/3) moist; gravelly fine sandy loam; weak fine granular structure; loose, slightly sticky and nonplastic; many fine and very fine, common medium roots; strongly acid pH 5.5, noncalcareous; 45 percent gravels by weight; abrupt smooth boundary.

A2 4-20 centimeters (1.5-8 inches). Brown to dark brown (7.5YR 4/4) moist; gravelly silt loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; 49 percent gravels by weight; few fine and very fine, common medium, few coarse roots; many very fine constricted tubular, common fine constricted irregular pores; medium acid pH 5.9, noncalcareous; percolation rapid; clear wavy boundary.

79-MT-2730 (cont.)

B2 20-31 centimeters (8-12 inches). Dark yellowish brown (10YR 4/6) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; 48 percent gravels by weight; common fine, few medium roots; common very fine and fine continuous tubular pores; medium acid pH 5.9, noncalcareous; percolation rapid; gradual wavy boundary.

B3 31-46 centimeters (12-18 inches). Brown to dark brown (7.5YR 4/4) moist; fine sandy loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; 15 percent gravels by weight; few very fine roots; few very fine continuous tubular pores; slightly acid pH 6.1, noncalcareous; percolation very rapid; gradual wavy boundary.

IIAC 46-64 centimeters (18-25 inches). Brown (10YR 5/3) moist; gravelly coarse sandy loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; 27 percent gravels by weight; few very fine roots; many fine to medium interstitial pores; medium acid pH 5.8, noncalcareous; percolation rapid; gradual wavy boundary.

IIC 64+ centimeters (25+ inches). Continuous bedrock with irregular boundary; no lab samples; abrupt irregular boundary.

Remarks:	Run #	Infiltration
	1	8" at 20 minutes equals 24" per hour
	2	5" at 15 minutes equals 20" per hour
	3	6.25" at 20 minutes equals 18.75" per hour

Peden: Unnamed Gravelly Fine Sandy Loam 79-MT-2730 (090501R-1)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC#10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	01-02	5-8	NS	NS	NS	NS					
2	A1	0-4	5.5	0.17	78	1.7					
3	A2	4-20	5.9	0.18	59	0.6					
4	B2	20-31	5.9	0.12	59	0.3					
5	B3	31-46	6.1	0.12	50	0.3					
	IIAC	46-64	5.8	0.17	30	0.2					
	IIC	64+	NS	NS	NS	NS					

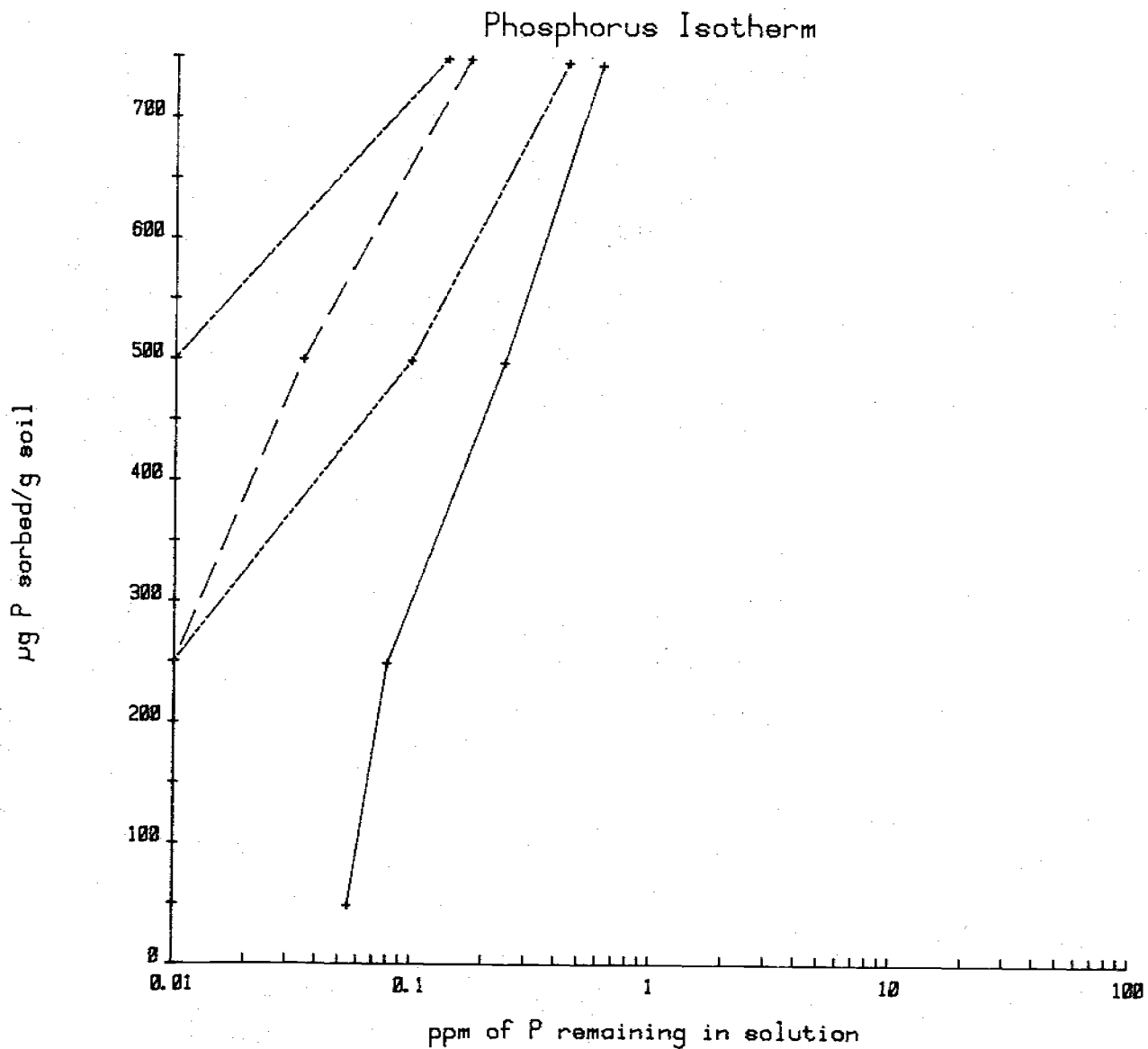
669

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation	%	%	ratio	Fraction			
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.5	0.9	0.1	0.5	13.6	17.0	27	3.74	2.17	0.126	17	0.55	10.3
3	2.0	0.4	0.1	0.4	13.6	15.9	18	2.80	1.63	0.093	18	0.51	10.7
4	1.4	0.4	0.1	0.3	11.8	13.2	16	1.75	1.02	0.079	13	0.52	10.7
5	1.6	0.6	0.1	0.3	8.5	10.7	23	1.05	0.62	0.050	12	0.85	10.5
	3.1	0.7	0.1	0.1	2.9	7.7	58	0.47	0.27	0.023	12	0.73	8.8
	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer  
NS-no sample

Analysis by: Zelda Fadness

670



79-MT-2730

µg/g soil	Soln ppm
----- A1	
49	0.06
249	0.08
498	0.25
744	0.63
----- A2	
50	0.00
250	0.00
500	0.04
748	0.18
----- B2	
50	0.00
250	0.00
500	0.01
749	0.14
----- B3	
50	0.00
250	0.00
499	0.10
746	0.45



# Phosphorus Isotherm

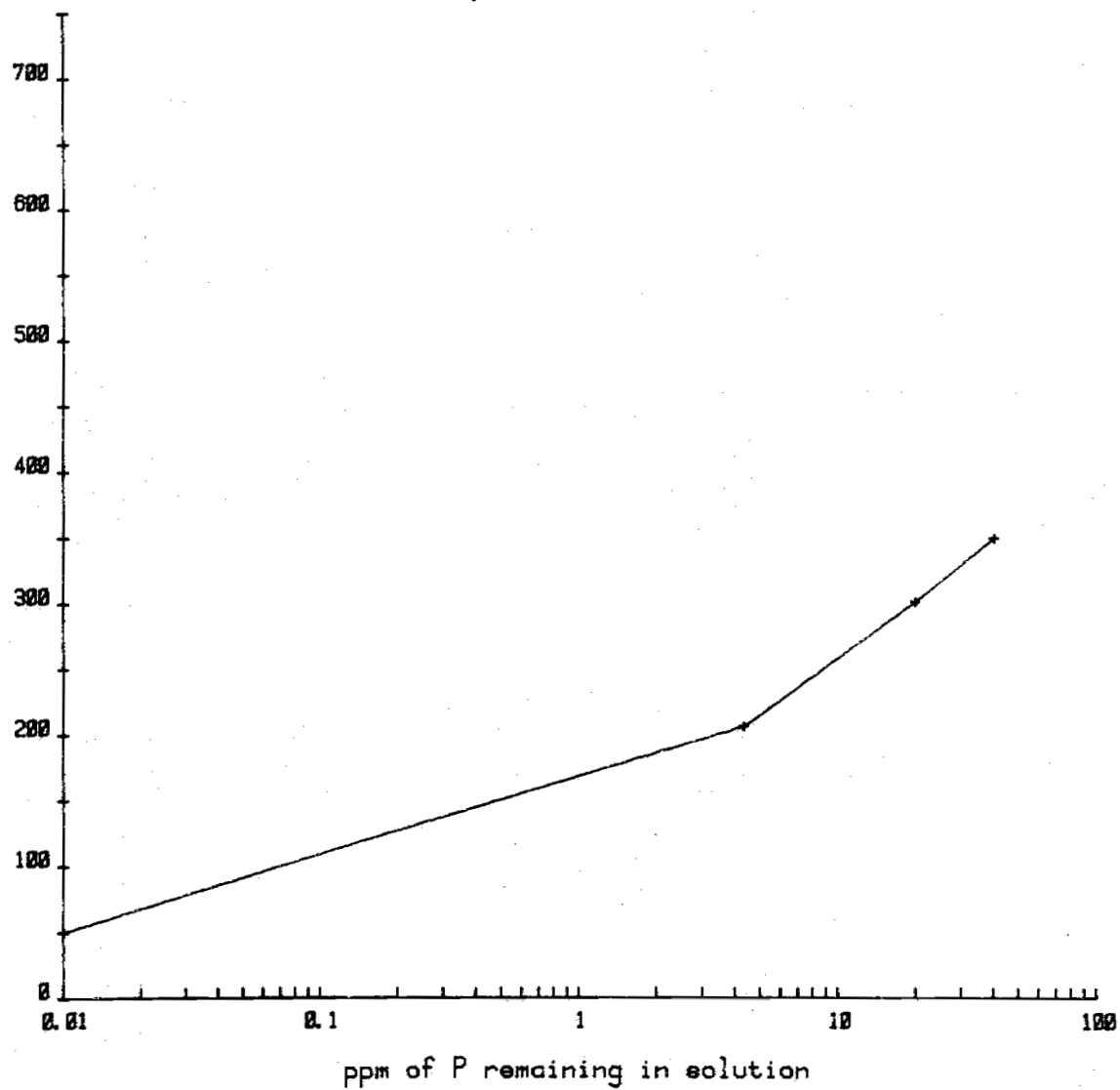
79-MT-2730

µg/g soil    Soln ppm

———— IIAC

50	0.01
207	4.32
302	19.00
350	39.96

671  
µg P sorbed/g soil



Pedon: Unnamed Gravelly Fine Sandy Loam 79-MT-2730 (090501R-1)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
5-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0-4	9.66	9.54	8.96	8.59	11.67	48.41	47.48	4.12	45	Gr. fine sandy loam
4-20	9.60	8.71	5.21	8.23	12.95	44.69	52.93	2.38	49	Gr. silt loam
20-31	7.35	8.27	5.21	9.14	14.62	44.59	53.25	2.16	48	Gr. silt loam
31-46	10.76	10.71	7.18	9.90	12.06	50.61	46.38	3.01	15	Fine sandy loam
46-64	13.56	15.94	12.50	14.85	10.21	67.85	29.65	3.30	27	Gr. coarse sandy loam
64+	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Cled	Core	Bar	Bar	
cm	%			g/cc		%		%
5-0						NS	NS	NS
0-4						30.3	11.5	NDNP
4-20						26.2	11.6	NDNP
20-31						35.2	9.5	NDNP
31-46						31.9	6.1	NDNP
46-64						16.6	4.9	NDNP
64+						NS	NS	NS

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

672

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2730-1	M2730-2	M2730-3	M2730-4
Units		-----%			
TC (0.63-2.00)		4.12	2.38	2.16	3.01
TSi (2.00-50)		47.48	52.93	53.25	46.38
TS (50-2000)		48.41	44.69	44.59	50.61
Clay	0.63-0.794	0.52	0.26	0.31	0.40
	0.794-1.00	0.62	0.34	0.33	0.47
	1.00-1.26	0.78	0.44	0.41	0.59
	1.26-1.59	0.84	0.51	0.44	0.62
	1.59-2.00	1.36	0.83	0.68	0.92
Fine Silt	2.00-2.52	1.67	1.20	0.96	1.21
	2.52-3.17	1.79	1.54	1.28	1.53
	3.17-4.00	1.85	1.68	1.50	1.71
	4.00-5.04	2.64	2.70	2.53	2.65
Medium Silt	5.04-6.35	3.34	3.60	3.57	3.58
	6.35-8.00	4.12	4.53	4.50	4.28
	8.00-10.08	4.54	5.45	5.36	4.80
	10.08-12.70	5.69	6.78	6.47	5.47
	12.70-16.0	6.04	7.09	6.50	5.44
	16.0-20.2	5.89	6.93	6.55	5.52
Coarse Silt	20.2-25.4	4.87	5.49	5.30	4.90
	25.4-32.0	2.92	3.60	4.19	3.42
	32.0-40.3	1.54	1.85	3.10	1.83
	40.3-50.8	0.36	0.43	1.32	0.47
	50.8-64.0	0.22	0.09	0.12	0.80
VFS (50-100)		11.67	12.95	14.62	12.06
FS (100-250)		8.59	8.23	9.14	9.90
MS (250-500)		8.96	5.21	5.21	7.18
CoS (500-1000)		9.54	8.71	8.27	10.71
VCoS (1000-2000)		9.66	9.60	7.35	10.76
Greater than 2000		45	49	48	15
Textural Class		Gr. FSL	Gr. SiL	Gr. SiL	FSL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2730-5		
Units		----- % -----		
TC (0.63-2.00)		3.30		
TSi (2.00-50)		29.65		
TS (50-2000)		67.05		
Clay	0.63-0.794	0.51		
	0.794-1.00	0.53		
	1.00-1.26	0.65		
	1.26-1.59	0.65		
	1.59-2.00	0.97		
Fine Silt	2.00-2.52	1.29		
	2.52-3.17	1.53		
	3.17-4.00	1.57		
	4.00-5.04	2.11		
Medium Silt	5.04-6.35	2.45		
	6.35-8.00	2.63		
	8.00-10.08	2.73		
	10.08-12.70	2.97		
	12.70-16.0	2.91		
	16.0-20.2	2.95		
Coarse Silt	20.2-25.4	2.62		
	25.4-32.0	1.80		
	32.0-40.3	1.60		
	40.3-50.8	0.43		
	50.8-64.0	0.05		
VFS (50-100)		10.21		
FS (100-250)		14.85		
MS (250-500)		12.50		
CoS (500-1000)		15.94		
VCoS (1000-2000)		13.56		
Greater than 2000		27		
Textural Class		Gr. CoSL		

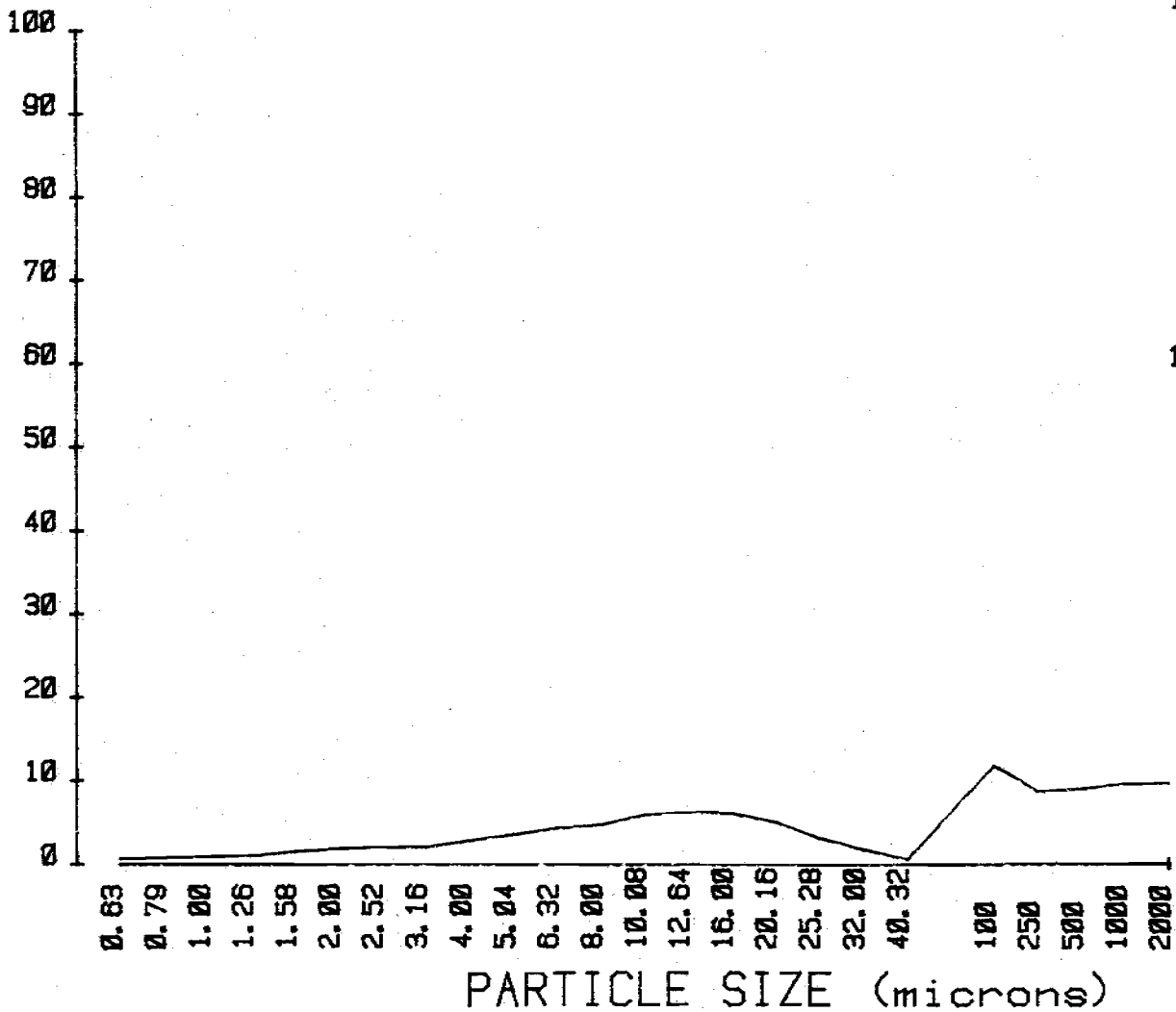
Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2730-1

579

\*



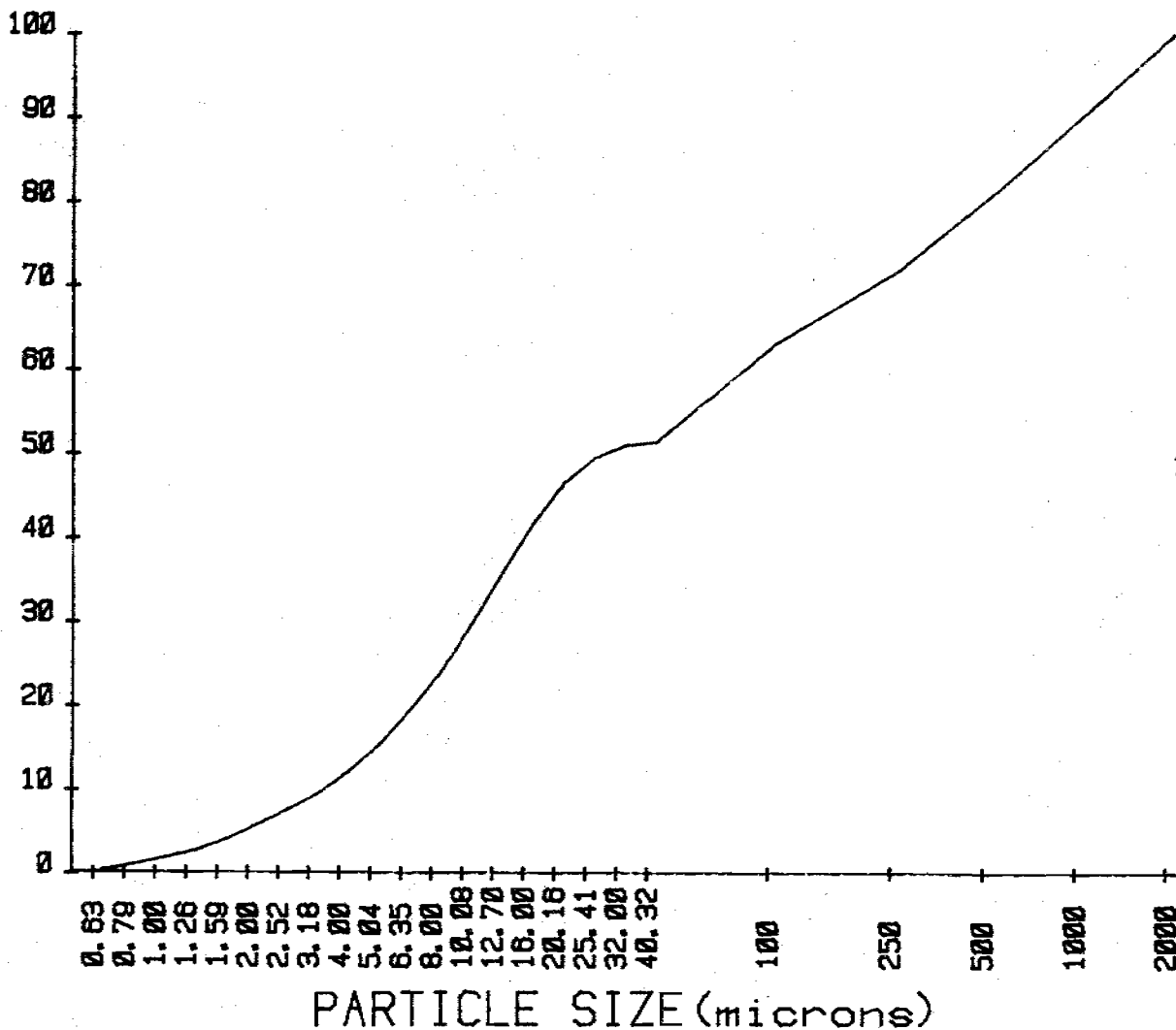
0.52	4.12
0.62	4.54
0.78	5.09
0.84	6.04
1.36	5.89
1.67	4.87
1.79	2.92
1.85	1.54
2.64	0.36
3.34	0.22
11.87	
0.59	
0.96	
0.54	
0.86	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2730-1

979

CUMULATIVE %

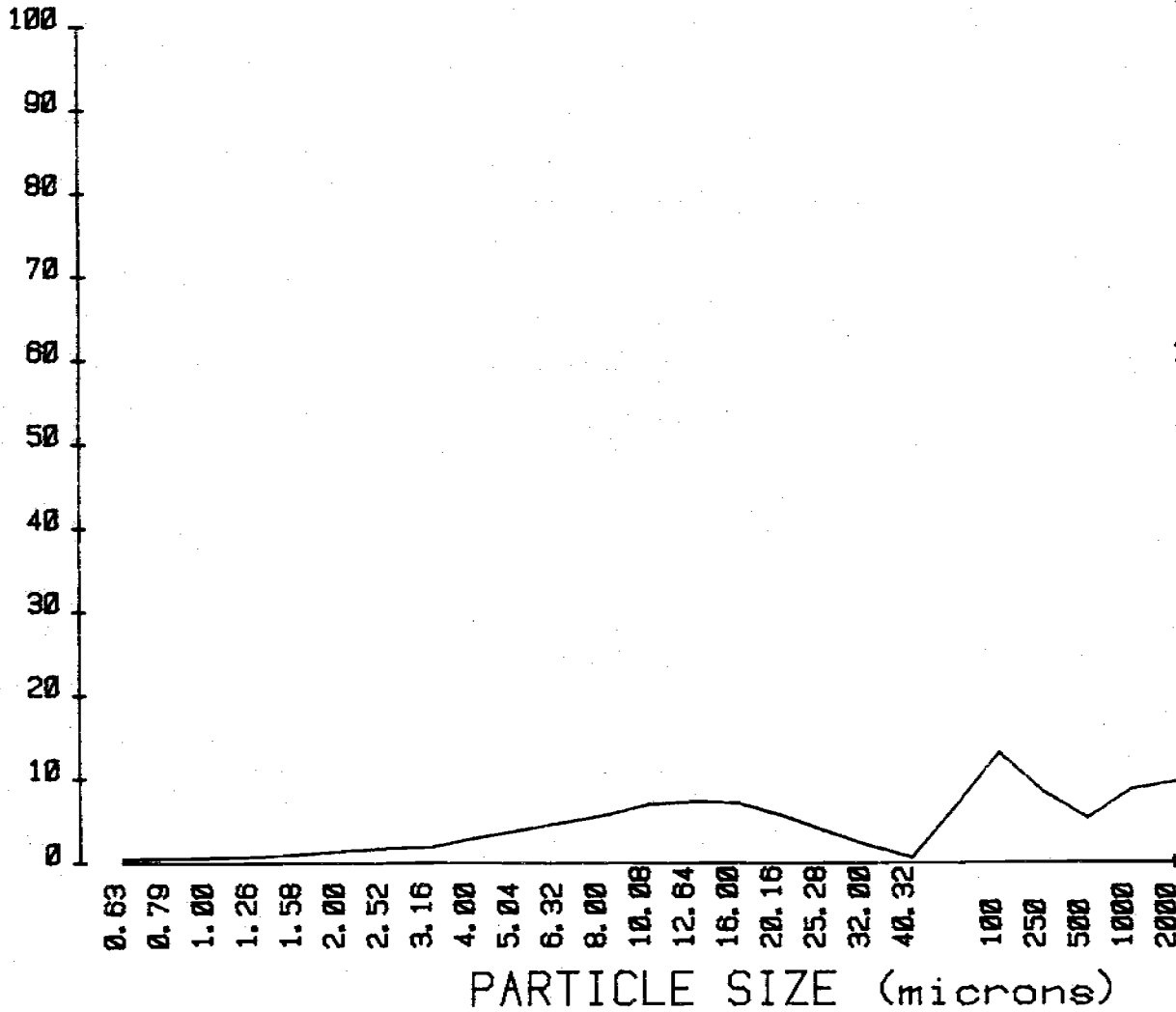


0.52	19.53
1.14	24.07
1.01	29.75
2.76	35.79
4.11	41.68
5.78	46.55
7.58	49.47
9.43	51.00
12.07	51.37
15.41	51.59
63.26	
71.85	
80.81	
90.35	
100.01	

PLOT SAND-SILT-CLAY

ID M2730-2

677

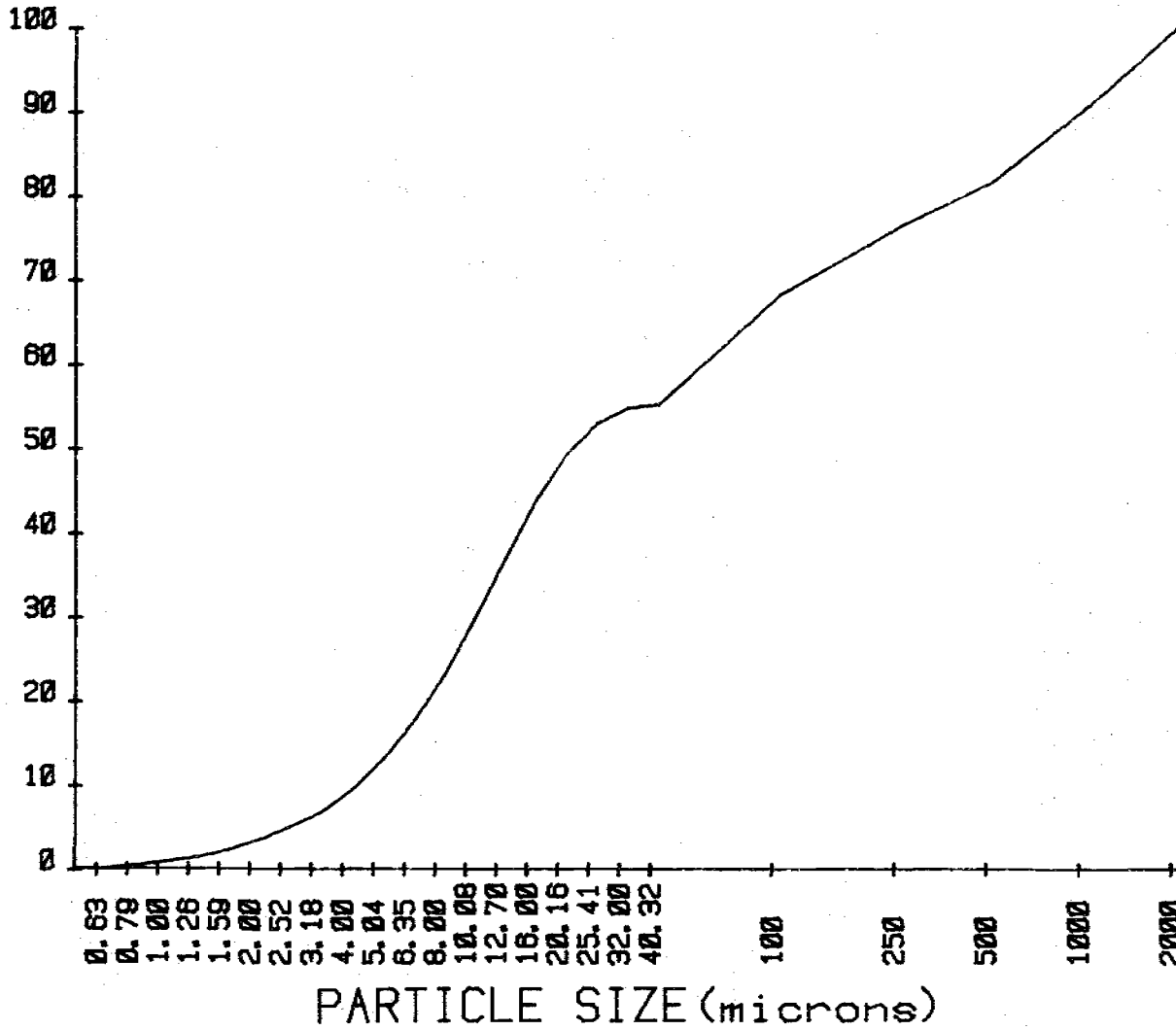


0.26	4.53
0.34	5.45
0.44	6.78
0.51	7.89
0.89	8.99
1.20	5.49
1.54	3.60
1.88	1.85
2.70	0.43
3.60	0.89
12.95	
19.23	
55.21	
89.71	
9.60	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2730-2

879  
CUMULATIVE %



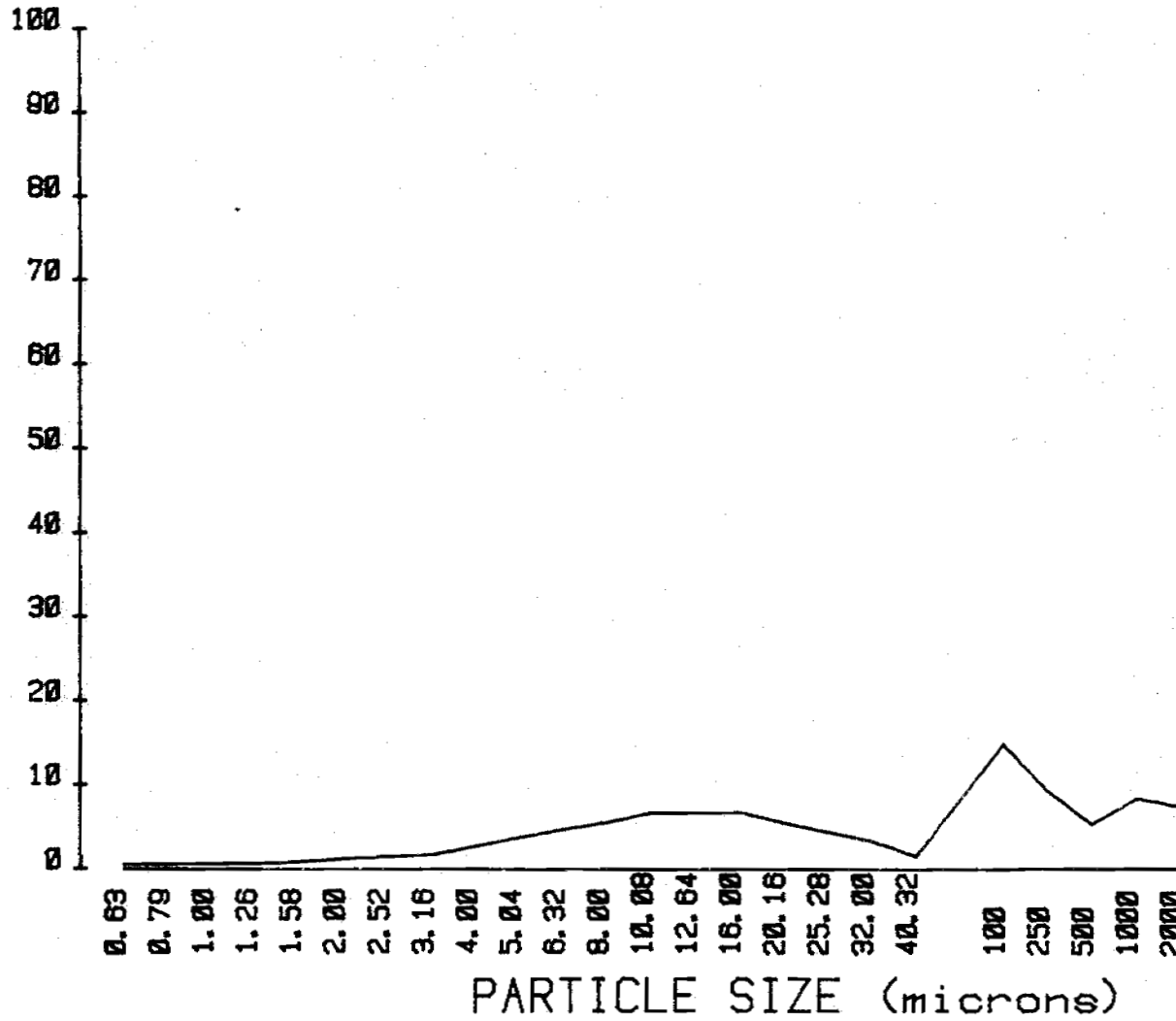
0.26	17.62
0.60	23.07
1.04	29.85
1.55	36.93
2.38	43.86
2.58	49.35
3.12	52.95
4.88	54.79
6.49	55.22
9.88	55.31
13.09	
68.26	
76.49	
81.70	
90.41	
100.01	



PLOT SAND-SILT-CLAY

ID M2730-3

679 x



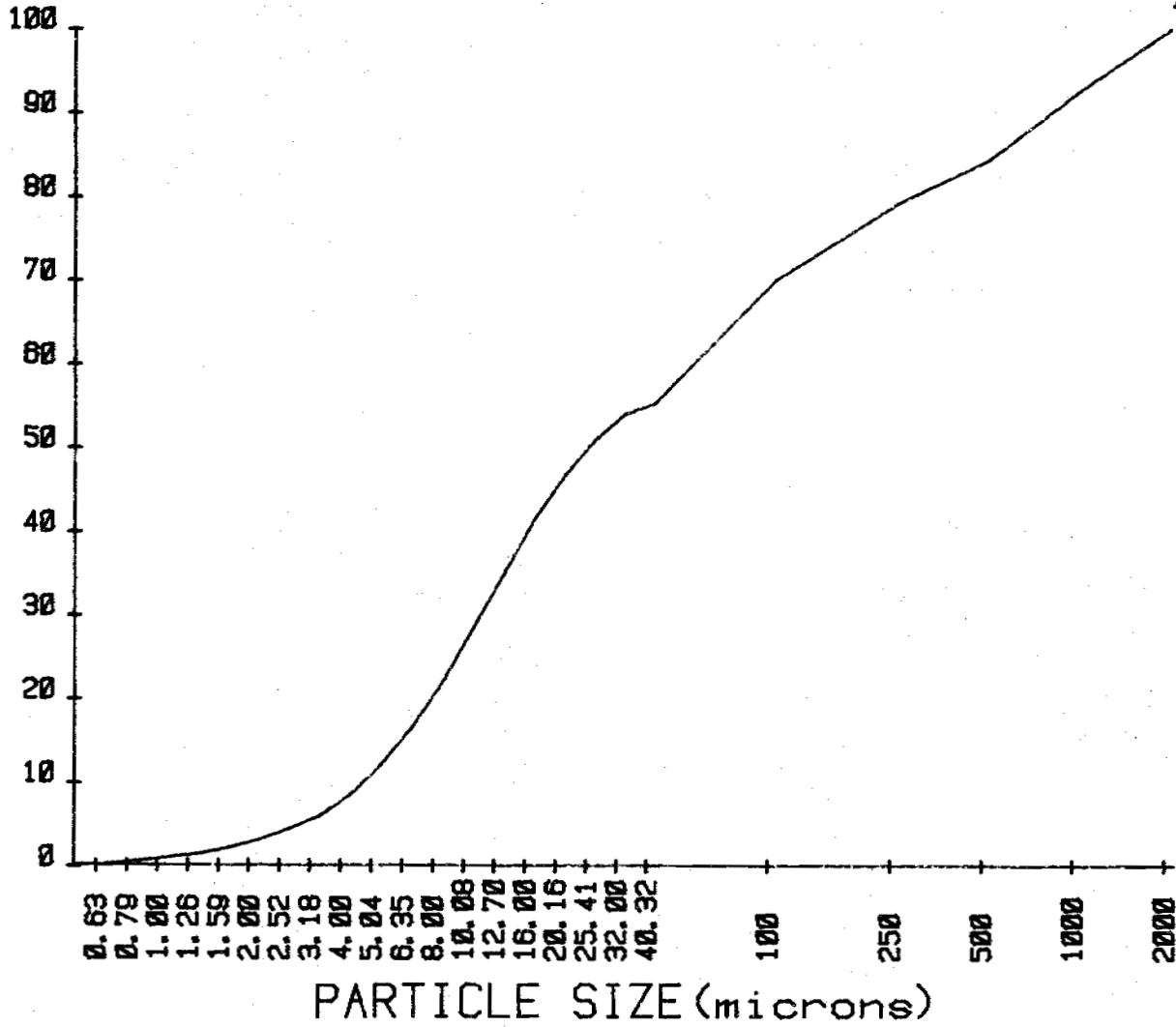
0.31	4.50
0.33	5.36
0.41	6.47
0.44	6.50
0.68	6.55
0.96	5.30
1.28	4.19
1.50	3.10
2.53	1.32
3.57	0.12
14.62	
9.14	
5.21	
9.27	
7.35	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2730-3

089

CUMULATIVE %



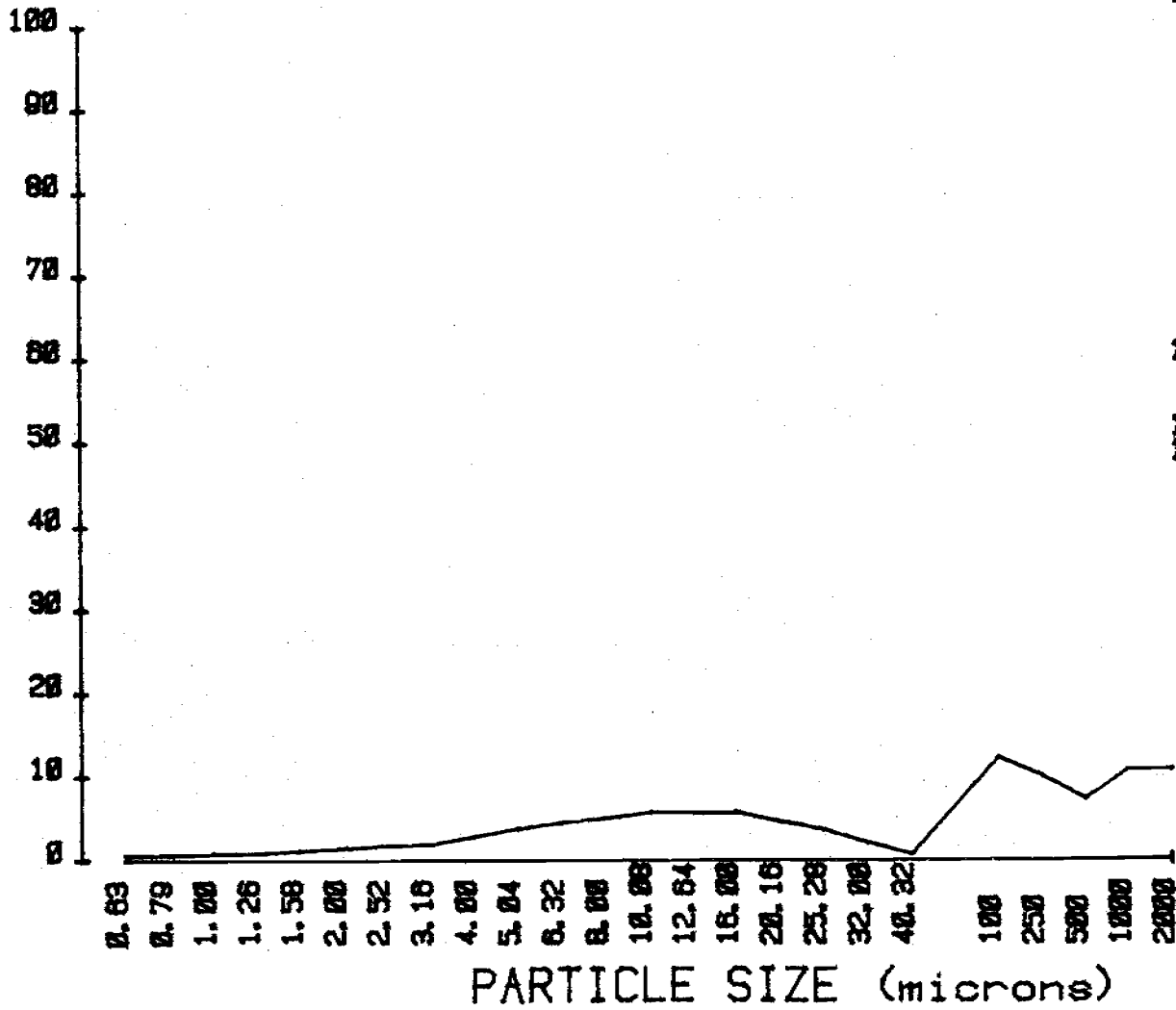
0.31	16.51
0.64	21.87
1.05	28.34
1.48	34.83
2.16	41.38
3.13	46.68
4.41	50.87
5.92	53.97
8.44	55.29
12.01	55.41
70.83	
79.17	
84.36	
92.65	
100.00	

PLOT SAND-SILT-CLAY

ID M2730-4

189

\*



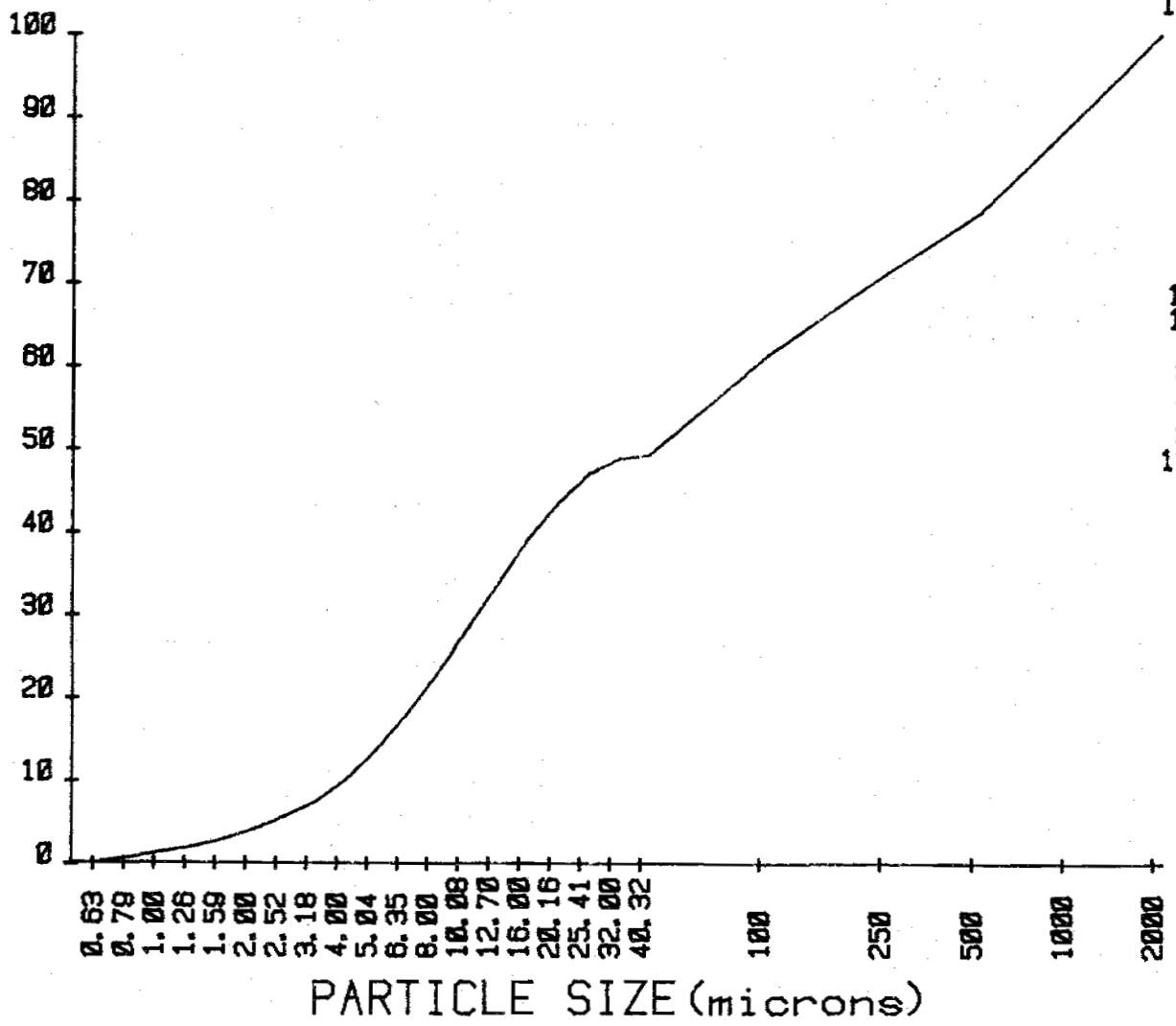
0.40	4.28
0.47	4.80
0.50	4.47
0.56	4.44
0.63	5.52
0.71	4.39
0.73	4.42
0.75	4.89
0.78	4.47
0.80	4.88
1.00	12.86
1.26	8.00
1.58	7.18
2.00	10.71
2.52	10.78

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2730-4

789

CUMULATIVE %



0.40	17.97
0.87	22.77
1.47	28.25
2.00	33.68
3.01	39.20
4.22	43.60
5.76	47.02
7.46	48.84
10.11	49.31
13.00	49.38
61.45	
71.35	
78.53	
89.24	
100.00	

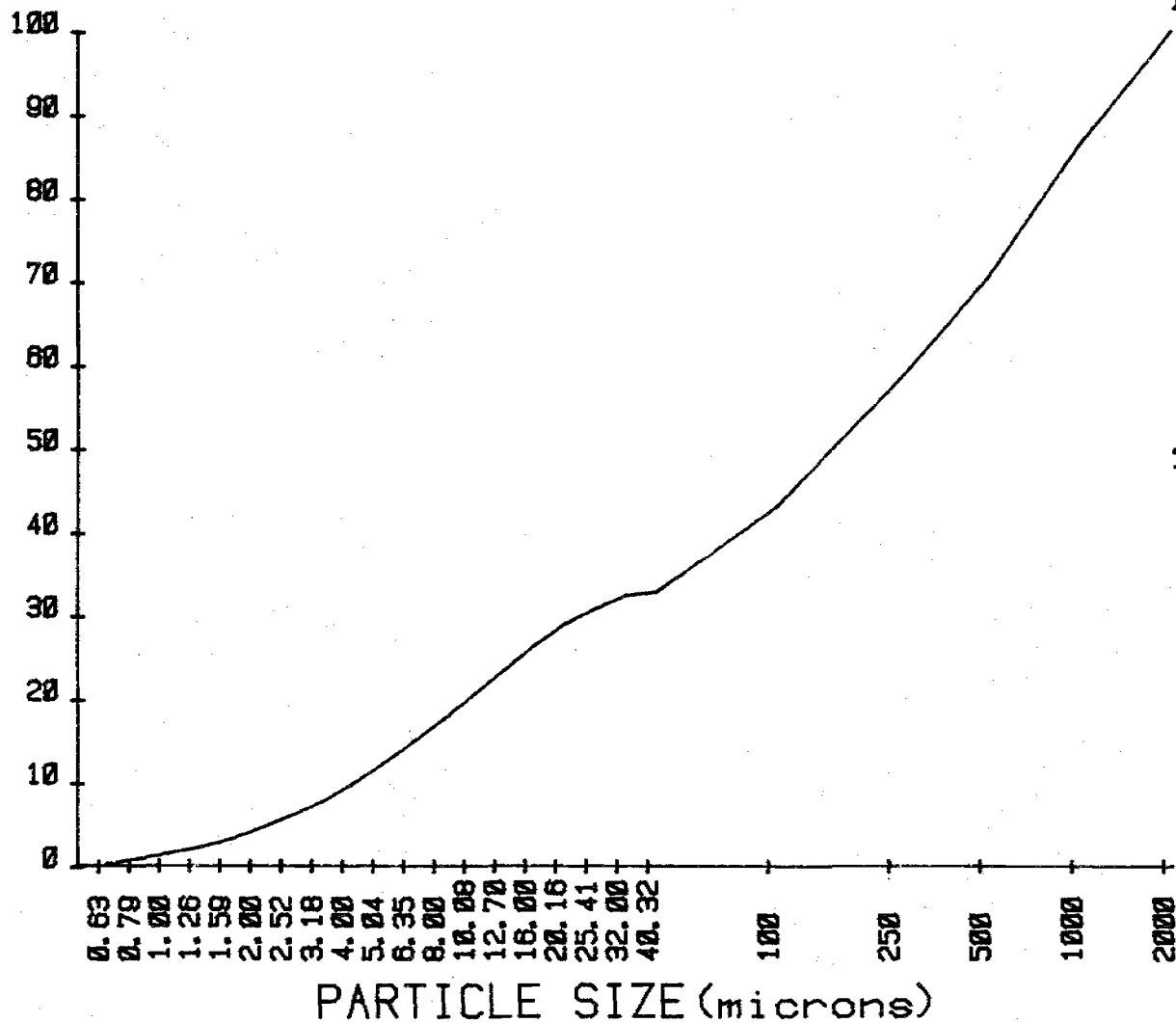


CUMULATIVE CURVE SAND-SILT-CLAY

ID M2730-5

789

CUMULATIVE %



0.51	14.89
1.03	17.62
1.68	20.59
2.33	23.49
3.30	26.44
4.60	29.06
6.13	30.87
7.70	32.46
9.81	32.95
12.26	
43.16	
58.01	
70.51	
86.45	
100.01	

Unnamed Gravelly Loam 79-MT-2731 (071001R-2)

Classification: loamy skeletal, mixed, frigid Typic Dystrachrept.

General Site Characteristics

Location: Lincoln County, Montana; southwest 1/4 of section 8, T. 31N., R. 26W.,  
Fisher River Ranger District

Forest: Kootenai National Forest

Area: Railroad tunnel, point 2

Described By/Date: LIM crew on June 30, 1978

Parent Rock/Material: loess/till

Habitat Type: (*Pseudotsuga menziesii*)/(*Calamagrostis rubescens*)

Topography:

Landform: continental glaciated valley trough wall

Weathering:

Formation Name: Prichard

Slope: 45 percent

Aspect: 210 degrees southwest

Elevation: 4300 feet

Soil Depth:

Eff. Rooting Depth: 60 inches

Litter Type: MOR

Surface Rock:

Climate: frigid, vdic

Precipitation: 30 inches

Erosion: moderately eroded

Infiltration: moderate

Permeability: moderately rapid

Storage:

Drainage: well drained

Air Temp:

Soil Temp at 20 inches: 13.3 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O1&O2 9-0 centimeters (3.5-0 inches).

B21ir 0-14 centimeters (0-5.5 inches). Brown (10YR 5/3) moist; gravelly loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; 43 percent gravels by weight; many very fine, fine and medium roots; few fine vesicular, many very fine tubular continuous pores; medium acid pH 5.8, noncalcareous; clear smooth boundary; percolation moderate.

B22ir 14-33 centimeters (5.5-13 inches). Brown (10YR 5/3) moist; gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; 44 percent gravels by weight; common fine and very fine roots; common fine vesicular, common fine irregular, many very fine tubular continuous pores; medium acid pH 5.9, noncalcareous; percolation moderate; clear wavy boundary.

**IIA2** 33-47 centimeters (13-18.5 inches). Light olive gray (5Y 6/2) moist; very gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; 58 percent gravels by weight; few very fine roots; many fine vesicular, many very fine vesicular, common medium irregular pores; slightly acid pH 6.2, percolation rapid; clear wavy boundary.

**IIA&B** 47-92 centimeters (18.5-36 inches). Pale to yellowish brown (10YR 6/3 to 10YR 5/4) moist; very gravelly fine sandy loam; moderate medium subangular blocky structure; firm, slightly sticky and nonplastic; few thin clay films lining interstitial pores; 60 percent gravels by weight; few very fine roots; medium very fine vesicular, common fine vesicular pores; neutral pH 6.6, noncalcareous; percolation moderately rapid gradual wavy boundary.

**IIB2** 92-165 centimeters (36-65 inches). Yellowish brown (10YR 5/4) moist; very gravelly sandy loam; moderately coarse and moderately medium subangular blocky structure; firm, slightly sticky and slightly plastic; few medium thick clay films lining interstitial pores; 55 percent gravels by weight; few very fine roots; medium fine vesicular, medium very fine vesicular, medium fine tubular discontinuous pores; neutral pH 6.6, noncalcareous; percolation moderately rapid.

**Remarks:** Thin mantle of loess greatly diluted by other material.



Peden: Unnamed Gravelly Loam 79-MT-2731 (071001R-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	B1-02	9- 0	NS	NS	NS	NS					
2	B21ir	0- 14	5.8	0.19	37	5.4					
3	B22ir	14- 33	5.9	0.20	30	4.4					
4	IIA2	33- 47	6.2	0.16	29	2.3					
5	IIA2	47- 92	6.6	0.17	30	0.3					
	IIB2	92-165	6.6	0.25	28	0.2					

687

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms						%		%				
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	2.8	1.2	<.1	0.2	3.8	6.6	53	1.59	0.93	0.045	21	0.57	8.3
3	2.0	0.8	<.1	0.2	2.7	4.8	53	0.60	0.35	0.030	12	0.56	8.2
4	1.9	1.1	<.1	0.1	1.3	3.6	70	0.31	0.18	0.023	8	0.50	8.1
5	2.2	0.9	<.1	0.1	1.1	3.6	74	0.26	0.15	0.020	8	0.40	8.0
	0.4	1.7	0.1	0.3	1.9	6.6	57	0.27	0.15	0.021	7	0.46	8.1

Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

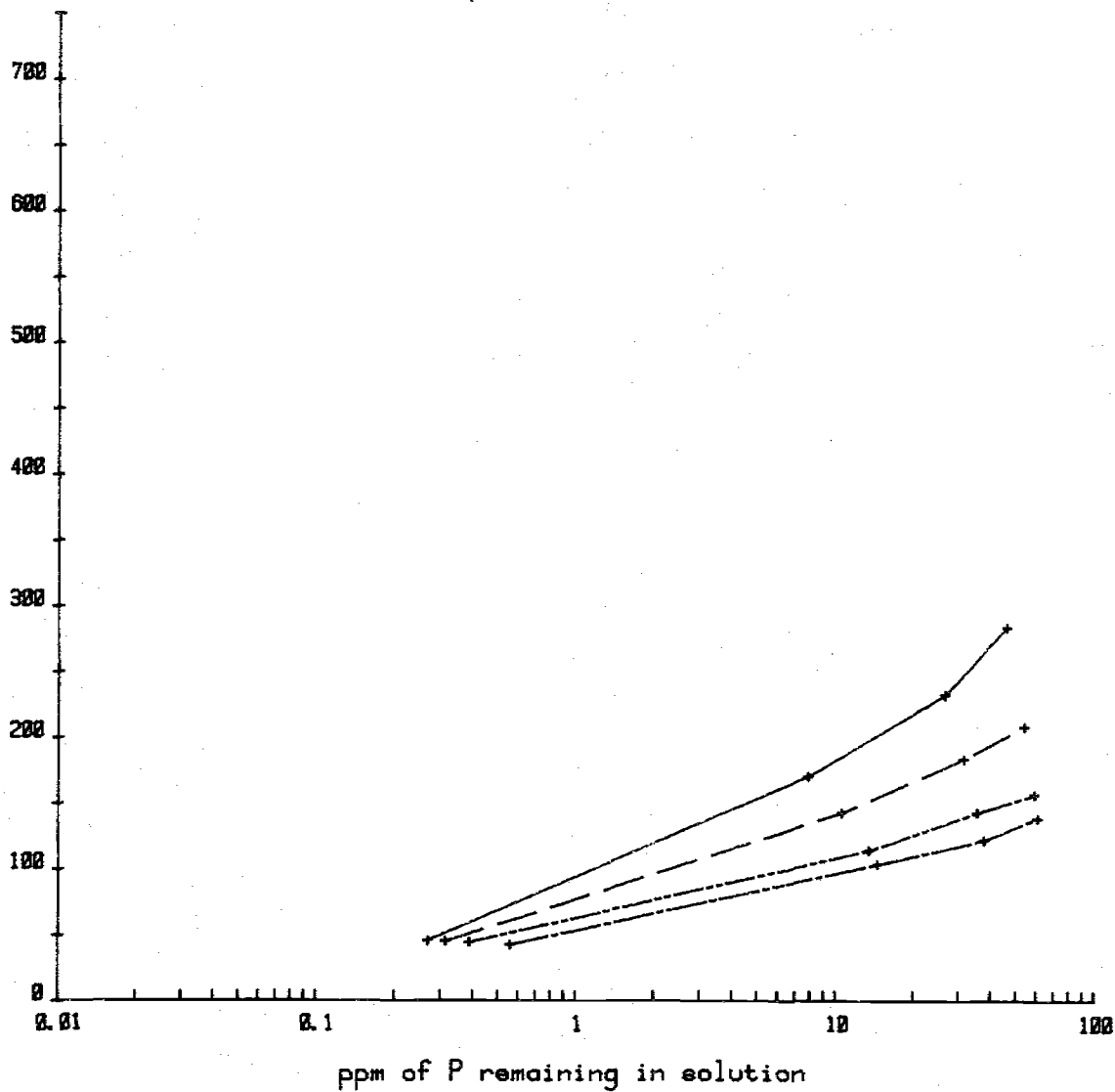
Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-2731

889

μg P sorbed/g soil



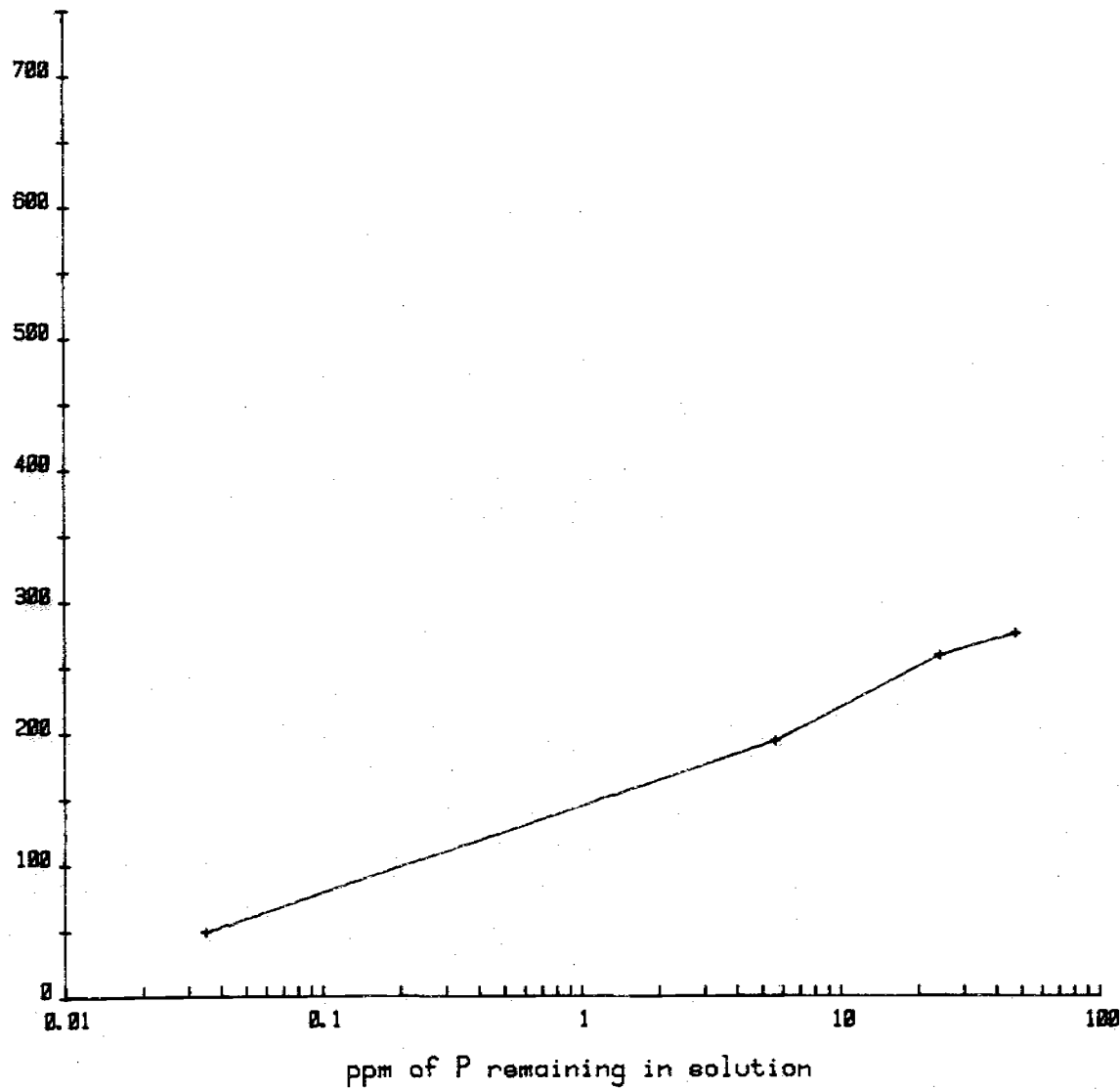
μg/g soil	Soln ppm
----- B21ir	
47	0.27
171	7.89
233	26.70
284	46.56
----- B22ir	
47	0.32
144	10.65
184	31.56
209	54.12
----- IIA2	
44	0.56
105	14.55
123	37.74
139	61.08
----- IIA&B	
46	0.39
115	13.50
144	35.64
157	59.28

# Phosphorus Isotherm

79-NT-2731

$\mu\text{g/g soil}$	Soln ppm
----- IIB2	
50	0.84
194	5.61
259	24.12
276	47.40

689  
 $\mu\text{g P sorbed/g soil}$



Pedon: Unnamed Gravelly Loam 79-MT-2731 (071001R-2)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.	
cm	%							%		
9- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 14	9.83	8.53	4.97	7.19	9.57	40.09	49.78	10.13	43	Gr. loam
14- 33	9.74	9.62	5.65	8.15	9.88	43.04	50.77	6.19	44	Gr. silt loam
33- 47	6.42	8.77	5.87	8.52	10.77	40.35	53.23	6.42	50	V.gr. silt loam
47- 92	7.98	10.18	6.79	10.16	10.40	45.50	48.62	5.88	60	V.gr. fine sandy loam
92-165	10.74	12.83	7.29	10.09	9.63	50.58	44.62	4.80	55	V.gr. sandy loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Hsi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	%			g/cc		%		%	
9- 0					NS	NS	NS	NS	NS
0- 14					24.5	4.6	NDNP	NDNP	NDNP
14- 33					19.1	4.9	NDNP	NDNP	NDNP
33- 47					17.6	4.1	NDNP	NDNP	NDNP
47- 92					17.5	4.5	NDNP	NDNP	NDNP
92-165					18.8	6.8	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

069

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification	M2731-1	M2731-2	M2731-3	M2731-4	
Units	-----%				
TC (0.63-2.00)	10.13	6.19	6.42	5.88	
TSi (2.00-50)	49.78	50.77	53.23	48.62	
TS (50-2000)	40.09	43.04	40.35	45.50	
Clay	0.63-0.794	1.70	1.00	1.03	1.12
	0.794-1.00	1.69	0.95	0.97	0.88
	1.00-1.26	1.96	1.19	1.21	1.07
	1.26-1.59	1.93	1.23	1.26	1.11
	1.59-2.00	2.85	1.82	1.95	1.70
Fine Silt	2.00-2.52	3.54	2.35	2.69	2.24
	2.52-3.17	3.79	2.80	3.33	2.55
	3.17-4.00	2.85	2.43	3.31	2.06
	4.00-5.04	1.79	1.95	3.10	1.38
Medium Silt	5.04-6.35	4.88	4.15	4.88	3.71
	6.35-8.00	5.44	4.68	5.07	4.15
	8.00-10.08	5.90	4.83	4.99	4.40
	10.08-12.70	6.35	5.45	5.58	5.21
	12.70-16.0	5.84	5.18	6.23	5.40
	16.0-20.2	4.12	5.51	5.57	5.60
Coarse Silt	20.2-25.4	3.20	4.56	4.34	5.54
	25.4-32.0	1.47	3.83	2.05	3.67
	32.0-40.3	0.36	1.96	1.06	2.11
	40.3-50.8	0.00	1.04	0.32	0.52
	50.8-64.0	0.25	0.06	0.74	0.08
VFS (50-100)	9.57	9.88	10.77	10.40	
FS (100-250)	7.19	8.15	8.52	10.16	
MS (250-500)	4.97	5.65	5.87	6.79	
CoS (500-1000)	8.53	9.62	8.77	10.18	
VCoS (1000-2000)	9.83	9.74	6.42	7.98	
Greater than 2000	43	44	50	60	
Textural Class	Gr. Loam	Gr. SiL	Gr. SiL	VGr. FSL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2731-5		
Units		----- % -----		
TC (0.63-2.00)		4.80		
TSi (2.00-50)		44.62		
TS (50-2000)		50.58		
Clay	0.63-0.794	0.83		
	0.794-1.00	0.76		
	1.00-1.26	0.91		
	1.26-1.59	0.92		
	1.59-2.00	1.39		
Fine Silt	2.00-2.52	1.87		
	2.52-3.17	2.27		
	3.17-4.00	2.25		
	4.00-5.04	2.23		
Medium Silt	5.04-6.35	3.62		
	6.35-8.00	3.95		
	8.00-10.08	3.90		
	10.08-12.70	4.22		
	12.70-16.0	4.40		
	16.0-20.2	4.43		
Coarse Silt	20.2-25.4	4.52		
	25.4-32.0	3.11		
	32.0-40.3	1.90		
	40.3-50.8	1.26		
	50.8-64.0	0.69		
VFS (50-100)		9.63		
FS (100-250)		10.09		
MS (250-500)		7.29		
CoS (500-1000)		12.83		
VCoS (1000-2000)		10.74		
Greater than 2000		55		
Textural Class		V. gr. SL		

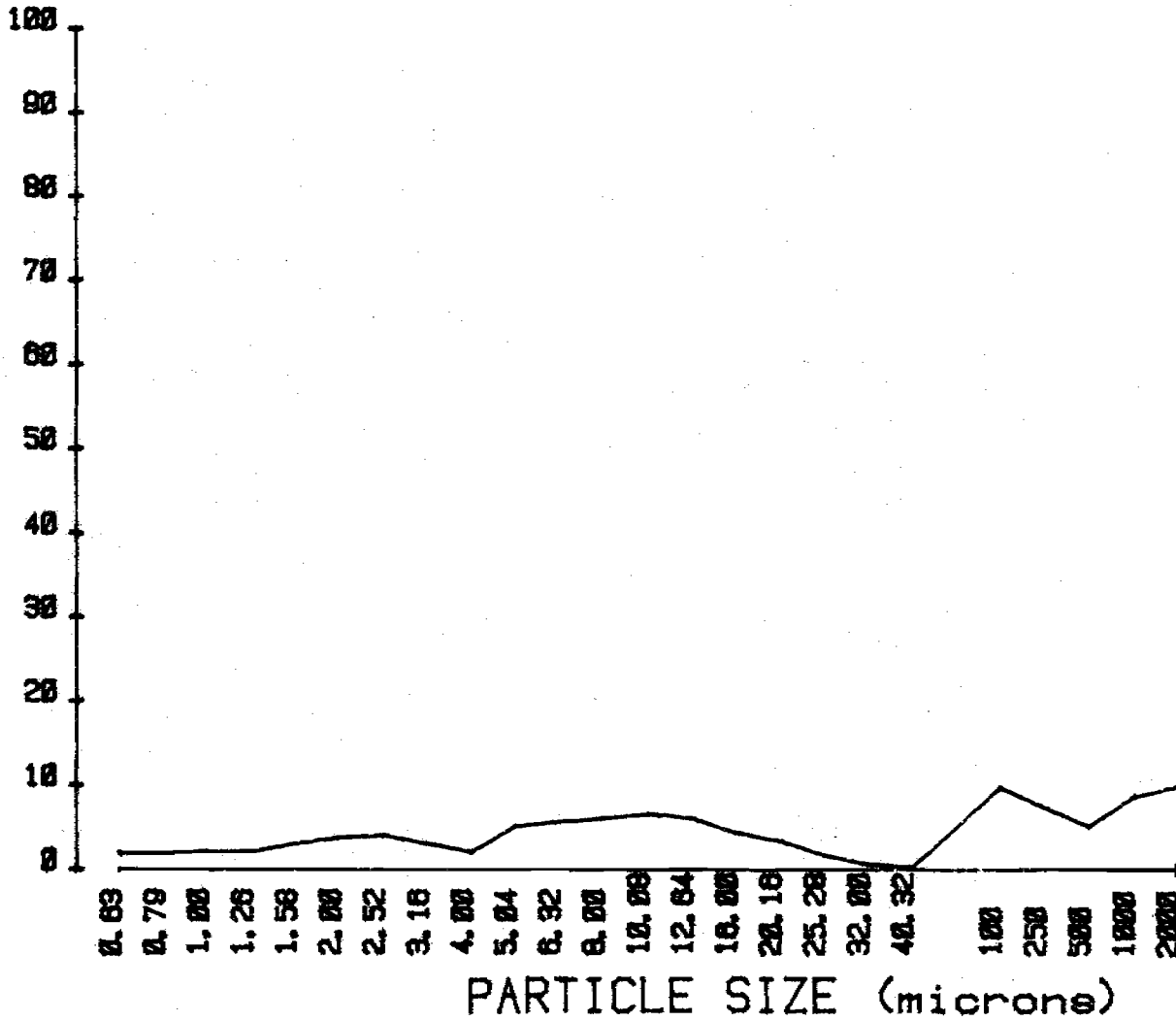
Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2731-1

669

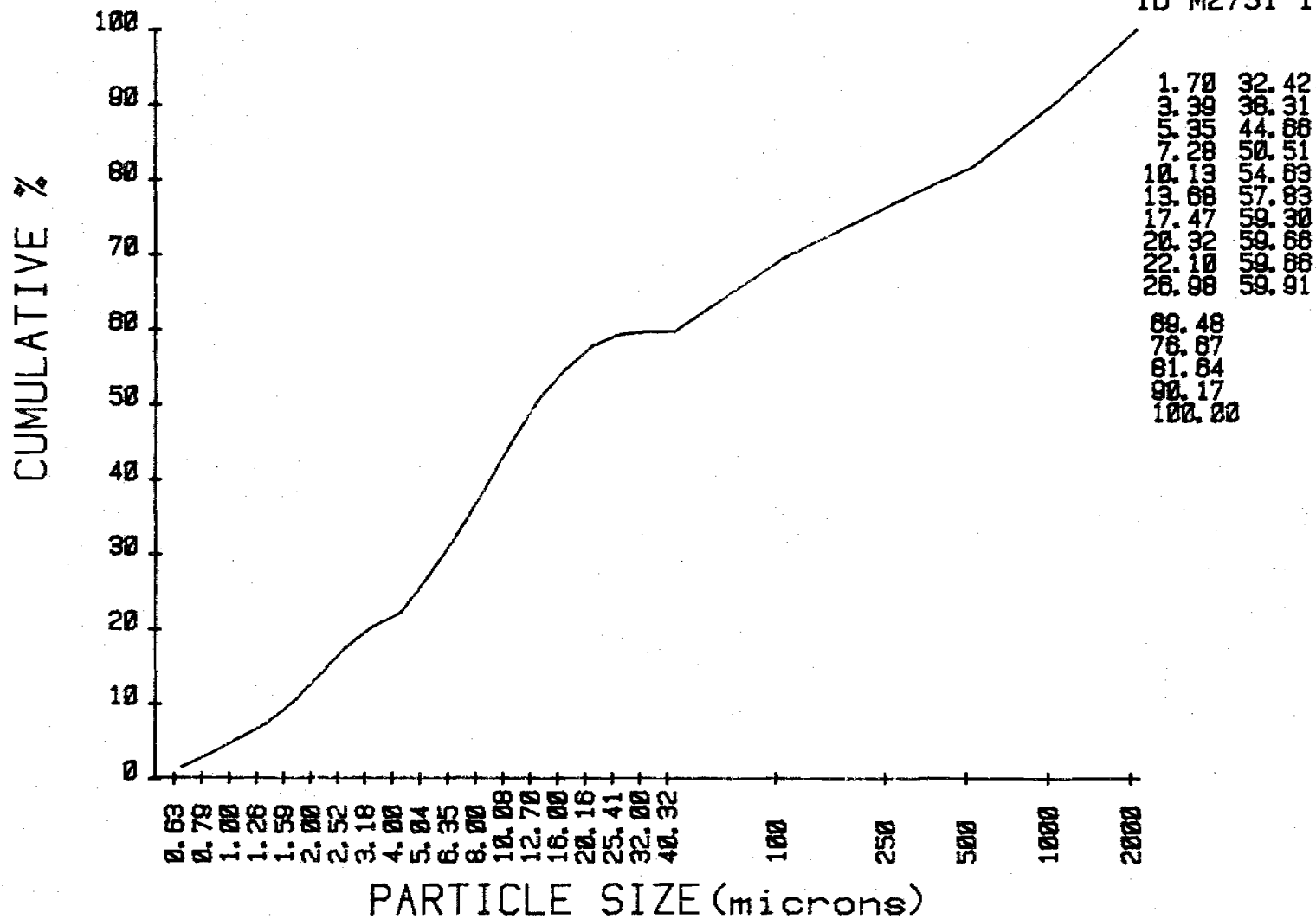
x



1.70	57
1.11	16
1.11	97
2.11	55
3.54	83
5.70	83
9.51	83
1.70	83
4.88	83
5.5	44
6.5	89
8.4	99
12	84
20	12
47	26
38	80
25	25

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2731-1





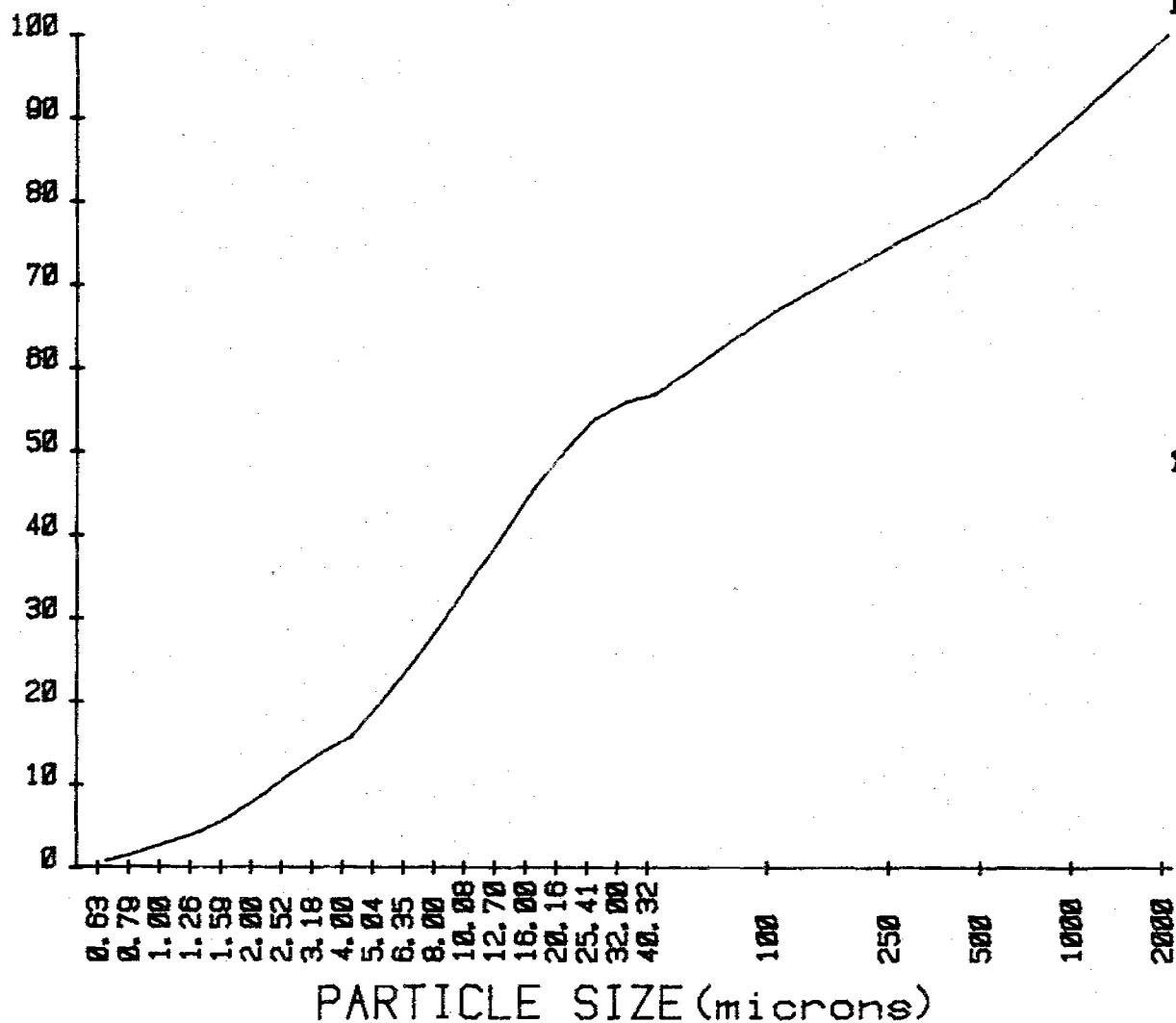


CUMULATIVE CURVE SAND-SILT-CLAY

ID M2731-2

969

CUMULATIVE %

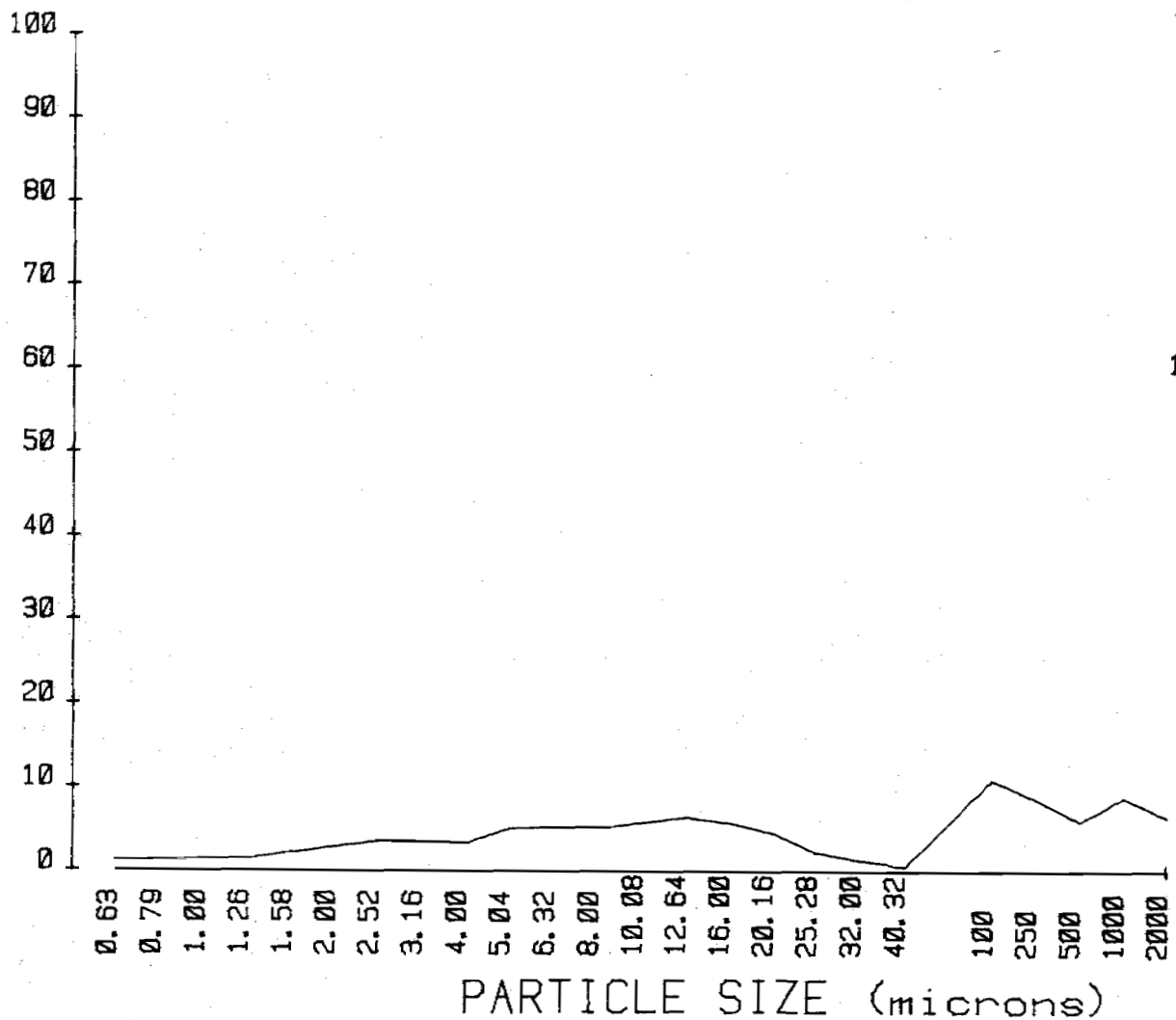


1.00	24.55
1.95	29.98
3.14	34.83
4.37	40.00
6.19	45.51
8.54	50.00
11.34	53.91
13.77	55.86
15.73	56.98
18.88	58.98
66.84	
74.99	
80.84	
90.26	
100.00	

L69

# PLOT SAND-SILT-CLAY

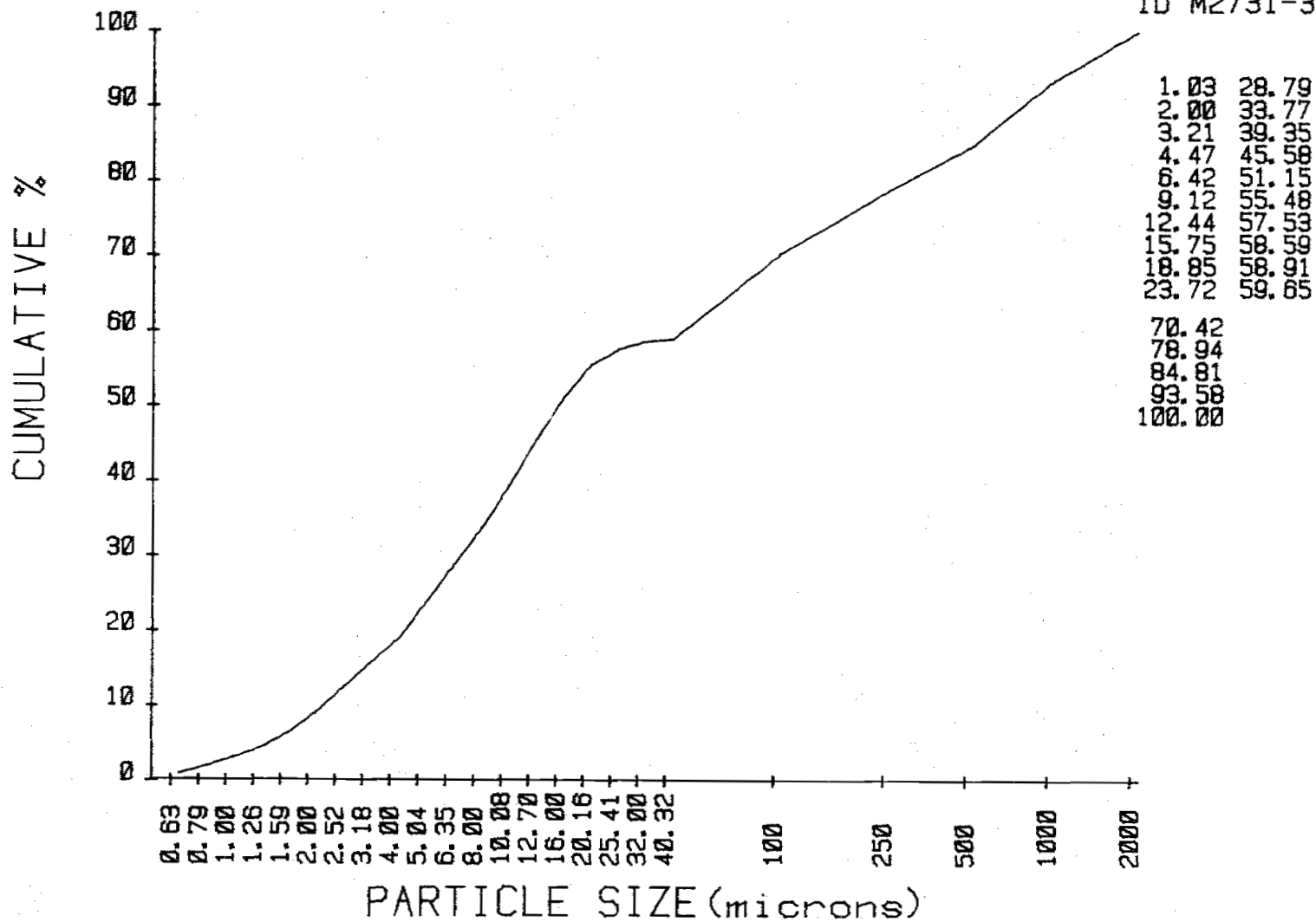
ID M2731-3



1.03	5.06
0.97	4.98
1.21	5.58
1.26	6.23
1.95	5.57
2.69	4.34
3.33	2.05
3.31	1.06
3.10	0.32
4.88	0.74
10.77	
8.52	
5.87	
8.77	
6.42	

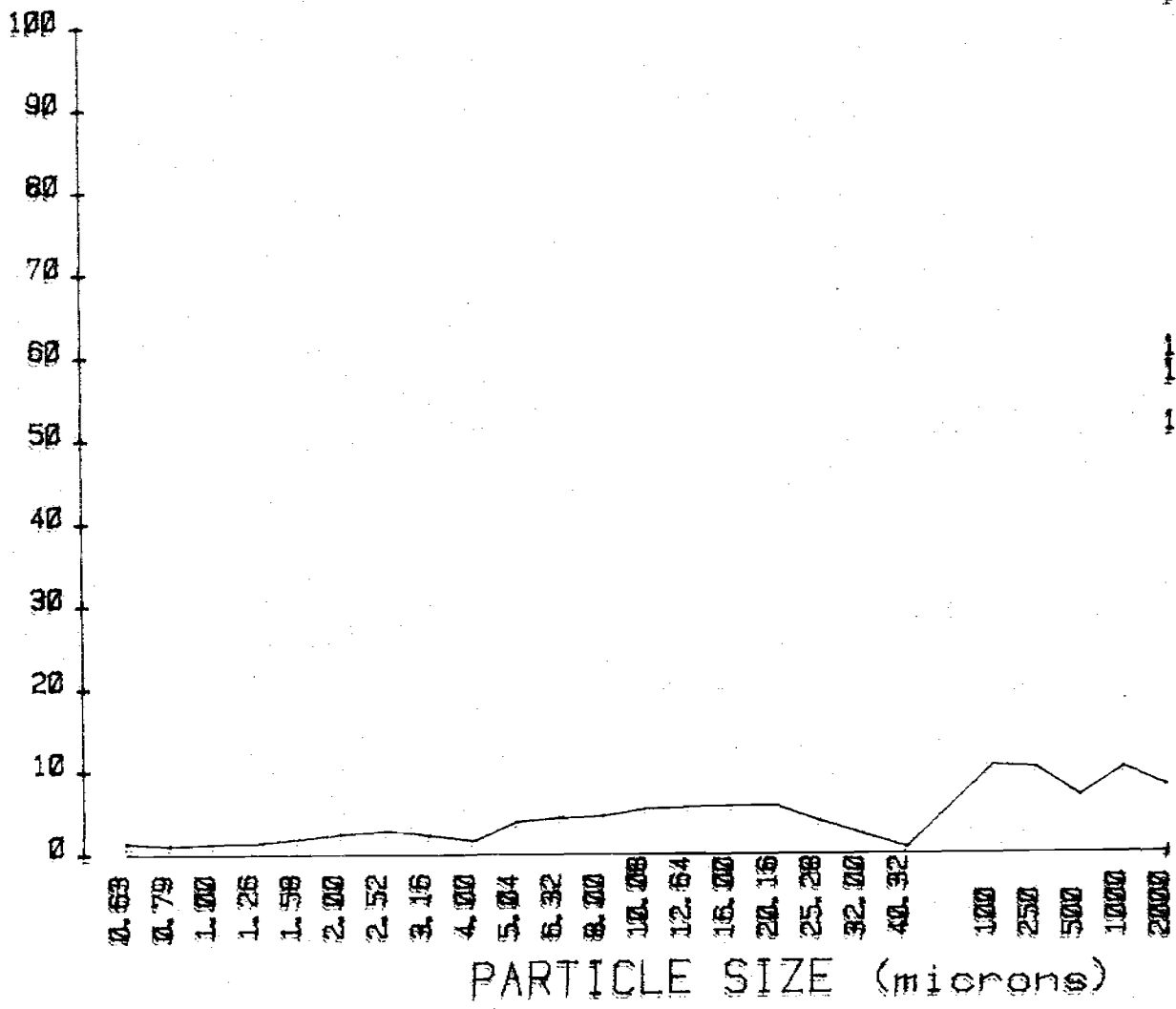
## CUMULATIVE CURVE SAND-SILT-CLAY

ID M2731-3



PLOT SAND-SILT-CLAY

ID M2731-4



1	12	4	15
0.63	0.63	0.63	0.63
0.79	0.79	0.79	0.79
1.00	1.00	1.00	1.00
1.26	1.26	1.26	1.26
1.58	1.58	1.58	1.58
2.00	2.00	2.00	2.00
2.52	2.52	2.52	2.52
3.16	3.16	3.16	3.16
4.00	4.00	4.00	4.00
5.04	5.04	5.04	5.04
6.32	6.32	6.32	6.32
8.00	8.00	8.00	8.00
10.00	10.00	10.00	10.00
12.64	12.64	12.64	12.64
16.00	16.00	16.00	16.00
20.16	20.16	20.16	20.16
25.28	25.28	25.28	25.28
32.00	32.00	32.00	32.00
40.32	40.32	40.32	40.32
100	100	100	100
250	250	250	250
500	500	500	500
1000	1000	1000	1000
2000	2000	2000	2000

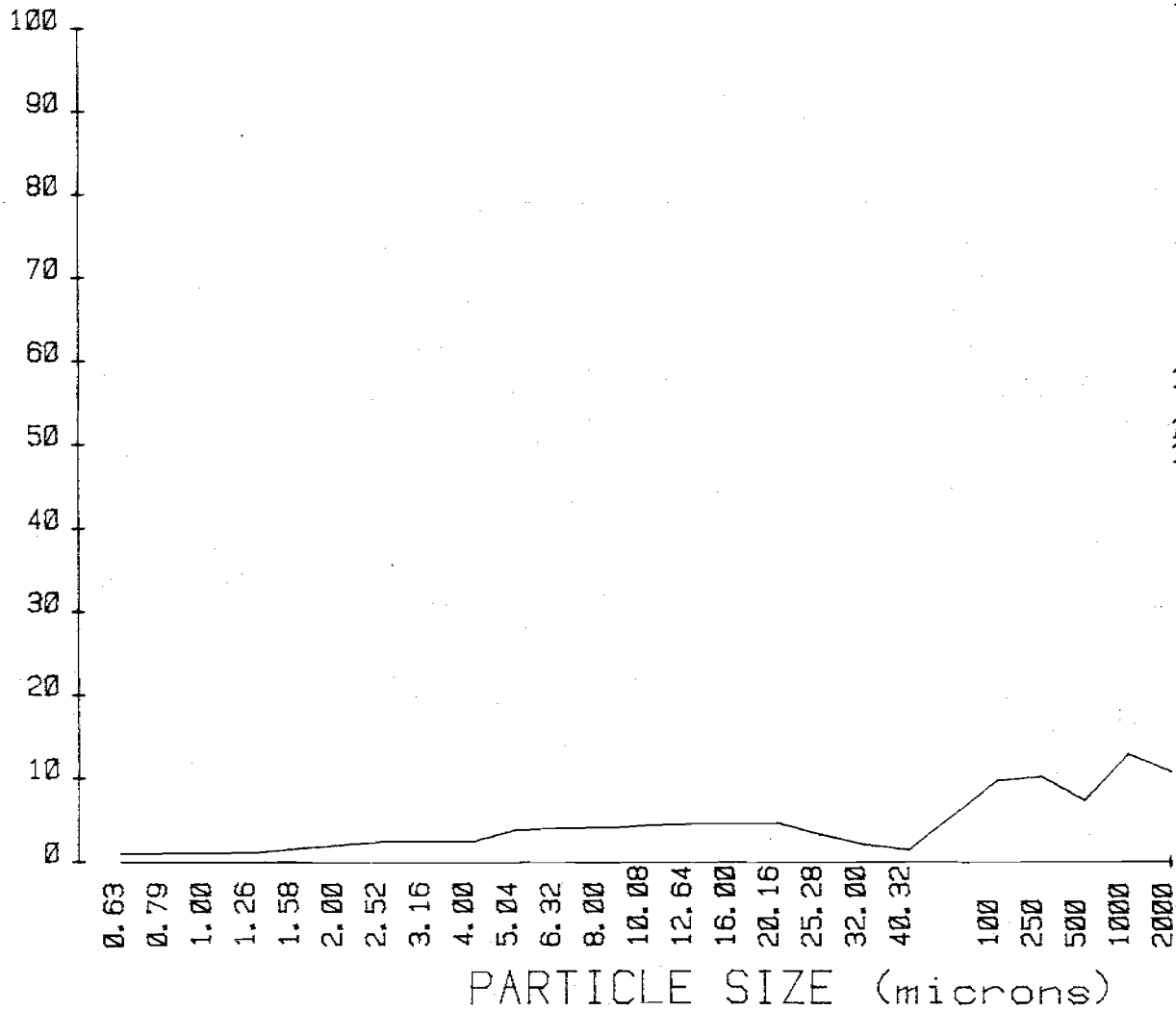


PLOT SAND-SILT-CLAY

ID M2731-5

101

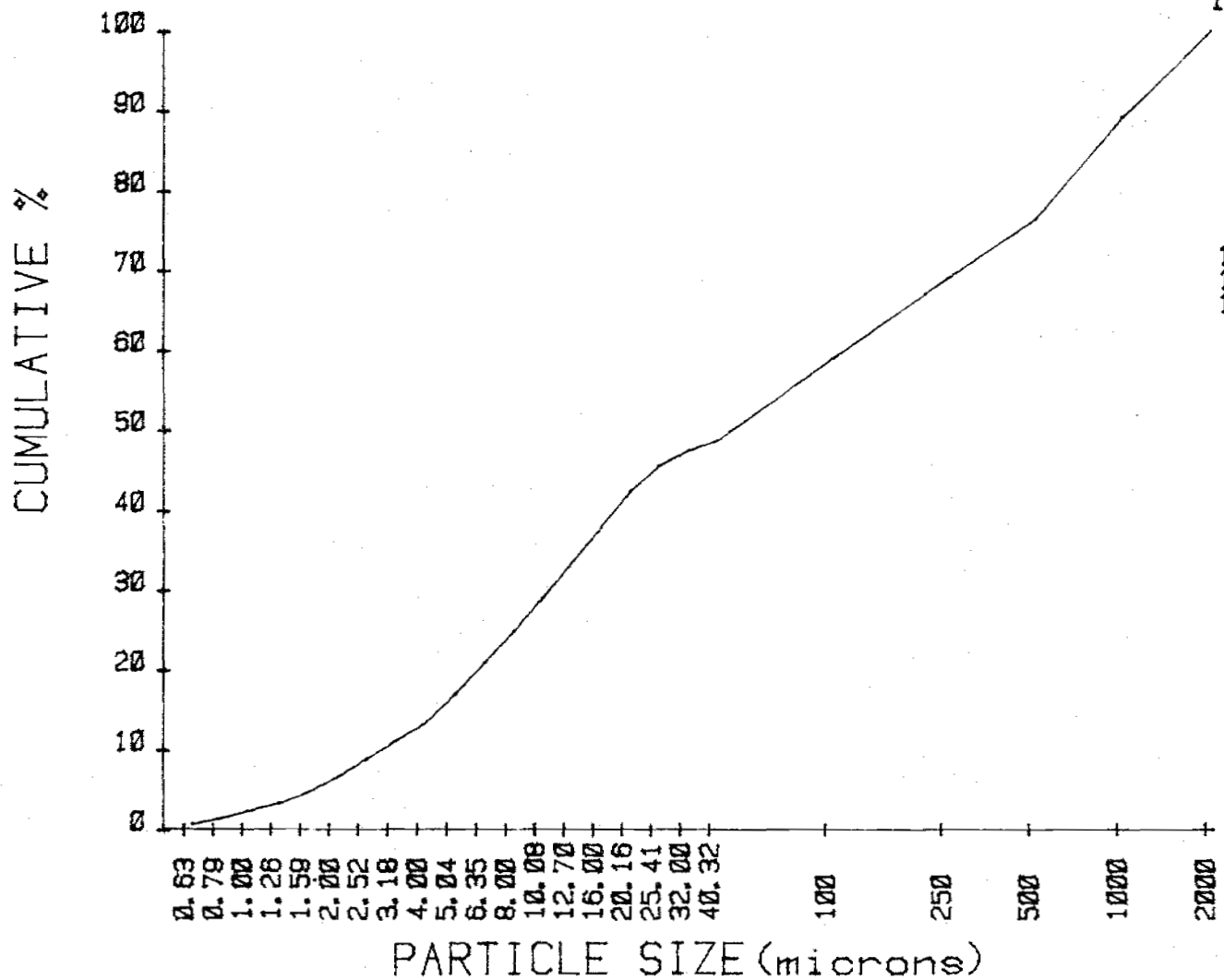
4



0.83	3.95
0.76	3.90
0.91	4.22
0.91	4.40
1.39	4.43
1.87	4.52
2.26	3.11
2.25	1.90
2.23	1.26
3.62	0.69
9.63	
10.00	
7.29	
12.83	
10.74	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2731-5





Unnamed Gravelly Silt Loam 79-MT-2732 (128801R-2)

Classification: medial over loamy-skeletal, mixed Andic Paleoboralf.

General Site Characteristics

Location: Lincoln County, Montana; southwest 1/4 of section 5, T. 36N., R. 28W.,

Rexford Ranger District

Forest: Kootenai National Forest

Area: Hunter Point, point 2

Described By/Date: Terry Svalberg and Kevin Conelly on July 18, 1978

Parent Rock/Material: quartzite loess/till

Habitat Type: (Pseudotsuga menziesii)/(Linnaea borealis)/(Calamagrostis rubescens) phase

Topography:

Landform: wall of draw, footslope

Climate: frigid, udic

Weathering:

Precipitation: 25 inches

Formation Name: Ravalli

Erosion: moderate

Slope: 60 percent

Infiltration: rapid

Aspect: 250 degrees west

Permeability:

Elevation: 3560 feet

Storage:

Soil Depth:

Drainage: well drained

Eff. Rooting Depth:

Air Temp:

Litter Type: MOR

Soil Temp at 20 inches: 10 deg. C

Surface Rock: 2 percent

Salt/Alkal:

Remarks:

Pedon Description

O1&O2 4-0 centimeters (1.5-0 inches).

A1 0-14 centimeters (0-5.5 inches). Light brownish gray (10YR 6/2) dry; new horizon code Ah; gravelly silt loam; moderate fine to medium granular structure; friable, slightly sticky and slightly plastic; 28 percent gravels by weight; many very fine and fine, common medium and coarse roots; many fine and very fine irregular pores; slightly acid pH 6.3, noncalcareous; percolation rapid; abrupt wavy boundary.

B2 14-35 centimeters (5.5-14 inches). Very pale brown (10YR 7/3) dry; new horizon code Bs; gravelly silt loam; moderate fine to medium subangular blocky structure; friable, nonsticky and nonplastic; 26 percent gravels by weight; many very fine, fine, and medium roots, few coarse roots; many fine and very fine irregular pores; neutral pH 6.6, noncalcareous; percolation rapid; abrupt wavy boundary.

I1A2 35-97 centimeters (14-38 inches). White (10YR 8/1) dry; very gravelly silt loam; moderate medium to coarse subangular blocky structure; firm, slightly sticky and slightly plastic; 57 percent gravels by weight; common fine roots; common medium continuous, and few fine vesicular pores; slightly acid pH 6.4, noncalcareous; percolation moderately rapid; clear wavy boundary; new horizon code 2E.

I1A&B 97-110 centimeters (38-43 inches). White to yellow (10YR 8/1 to 10YR 8/6) dry; new horizon code 2E&B; gravelly silt loam; moderate medium to coarse subangular blocky structure; firm, slightly sticky and plastic; common thin clay films on ped faces; 36 percent gravels by weight; few very fine continuous tubular pores, few fine and medium vesicular pores; slightly acid pH 6.1, noncalcareous; percolation moderate; clear wavy boundary.

I1B2t 110-160 centimeters (43-63 inches). Very pale brown to yellow (10YR 7/4 to 10YR 7/6) dry; new horizon code 2Bt; gravelly silt loam; moderate medium to coarse subangular blocky structure; friable, sticky and plastic; common thick clay films in pores and on ped faces; 37 percent gravels by weight; common very fine roots; many fine and very fine continuous tubular pores, common fine and medium vesicular pores; medium acid pH 5.9, noncalcareous; percolation moderately slow; gradual wavy boundary.

I1B3 160-170 centimeters (63-67 inches). Very pale brown with yellow (10YR 7/4 to 10YR 7/6) dry; new horizon code 2Bc; very gravelly silt loam; weak medium subangular blocky structure parting to weak very fine subangular blocky structure; friable, sticky and plastic; common thin clay films on ped faces; 60 percent gravels by weight; common very fine roots; few fine continuous interstitial, common fine vesicular pores; percolation moderately slow; slightly acid pH 6.1, noncalcareous.

Remarks: All rocks coming out were flags.

Pedon: Unnamed Gravelly Silt Loam 79-MT-2732 (120801R-2)

Date: January 1980

Sample No.	Horizon	Depth	pH paste	EC <sup>3</sup> 10	% Water at Saturation	Available P	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
		cm		mmhos/cm		ppm	%				
1	01-02	4- 0	NS	NS	NS	NS					
2	A1	0- 14	6.3	0.11	85	4.2					
3	B2	14- 35	6.6	0.08	81	2.2					
4	IIA2	35- 97	6.4	0.10	34	0.5					
5	IIAB	97-110	6.1	0.09	30	0.3					
6	IIA2t	110-160	5.9	0.17	34	0.2					
	IIA3	160-170	6.1	0.12	31	0.1					

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation					Fraction		
		meq/100 gms					%		%		ratio		
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	0.7	1.5	0.1	0.5	12.2	19.6	19	3.84	2.23	0.106	22	0.72	9.9
3	0.5	1.3	0.1	0.2	11.6	14.8	15	1.84	1.07	0.075	14	0.74	10.3
4	1.7	1.0	0.1	0.1	1.3	3.8	68	0.18	0.11	0.013	8	0.43	8.3
5	3.0	1.9	0.1	0.2	2.0	6.6	75	0.14	0.08	0.013	6	0.64	8.1
6	4.8	2.2	0.1	0.2	2.7	9.7	73	0.26	0.15	0.016	9	0.63	8.2
	4.6	2.0	0.1	0.1	2.9	8.0	70	0.30	0.17	0.014	12	0.40	8.1

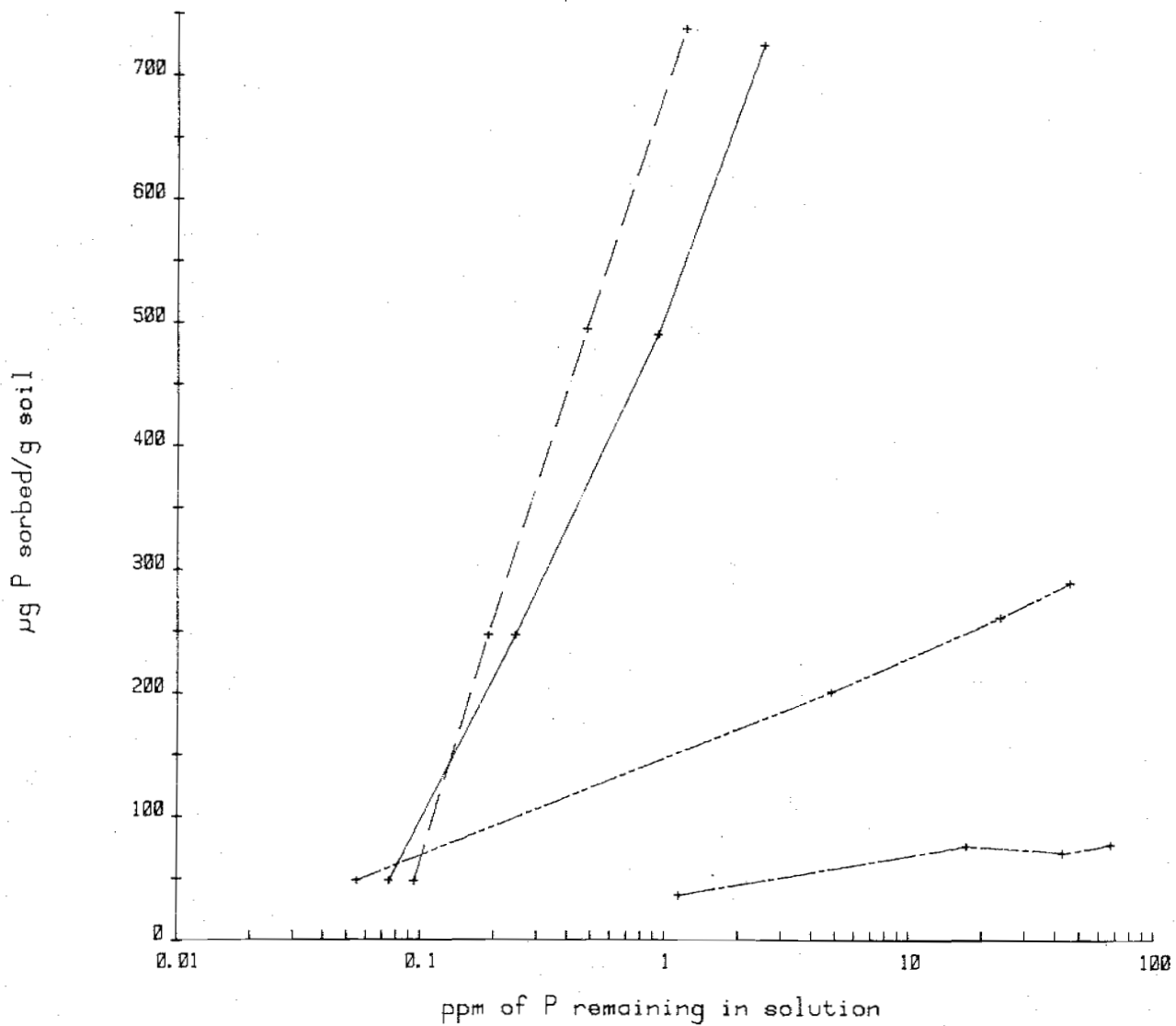
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

705

## Phosphorus Isotherm

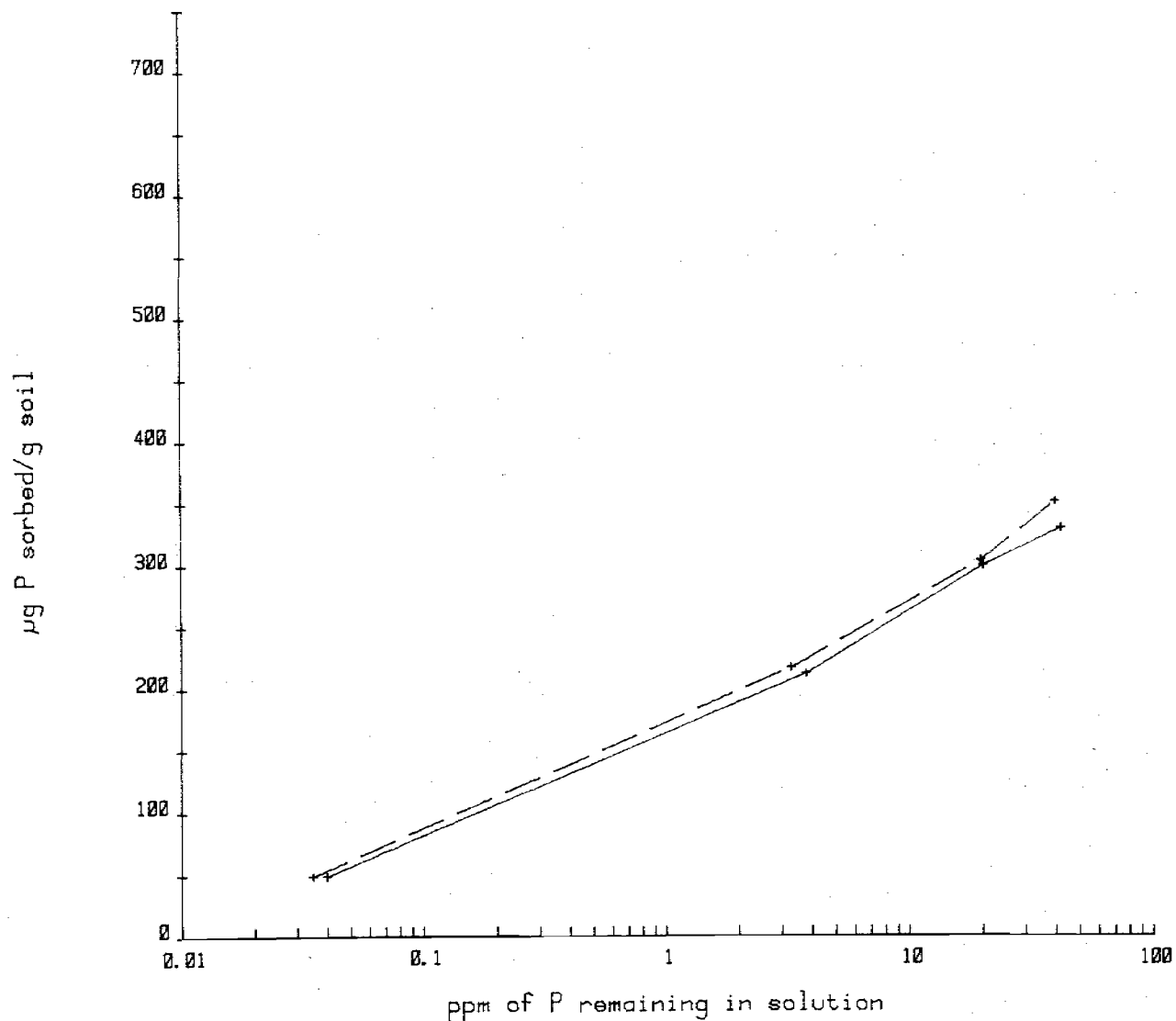
79-MT-2732



µg/g soil	Soln ppm
----- A1	
49	0.08
248	0.25
491	0.95
724	2.59
----- B2	
49	0.10
248	0.19
495	0.49
738	1.25
----- IIA2	
39	1.15
77	17.31
71	42.90
78	67.20
----- IIA&B	
49	0.06
201	4.86
261	23.88
289	46.08

# Phosphorus Isotherm

79-MT-2732



µg/g soil	Soln ppm
IIB2t	
50	0.04
212	3.77
300	20.04
330	42.00
IIB3	
50	0.04
217	3.28
304	19.62
352	39.84

Pedon: Unnamed Gravelly Silt Loam 79-MT-2732 (120801R-2)

Date: September 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm	
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.
cm	-----X-----							-----Z-----		
4- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 14	5.59	6.50	2.61	4.56	16.34	35.75	61.36	2.90	28	Gr. silt loam
14- 35	5.50	8.09	3.46	4.21	16.39	37.64	60.96	1.41	26	Gr. silt loam
35- 97	4.80	4.30	2.23	3.82	10.65	25.80	67.04	7.08	57	V.gr. silt loam
97-110	5.50	6.41	3.29	3.92	8.83	27.94	63.94	8.12	36	Gr. silt loam
110-160	3.49	3.97	2.27	3.03	7.59	20.34	67.22	12.44	37	Gr. silt loam
160-170	6.27	7.02	3.78	5.83	9.26	32.14	60.39	7.47	60	V.gr. silt loam

Depth	Silt Size Distribution (mm)			Water Content		Liquid	Plastic	Plastic	
	CoSi	Msi	Fsi	Bulk Density	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar		
cm	-----Z-----			-----g/cc-----		-----Z-----		-----Z-----	
4- 0				NS	NS	NS	NS	NS	NS
0- 14				44.6	14.7	NDNP	NDNP	NDNP	NDNP
14- 35				41.8	12.0	NDNP	NDNP	NDNP	NDNP
35- 97				20.0	5.1	NDNP	NDNP	NDNP	NDNP
97-110				20.2	8.6	20	NP	NP	ND
110-160				23.2	10.7	23	NP	NP	ND
160-170				19.7	8.7	20	NP	NP	ND

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2732-1	M2732-2	M2732-3	M2732-4
Units		-----%			
TC (0.63-2.00)		2.90	1.41	7.08	8.12
TSi (2.00-50)		61.36	60.96	67.04	63.94
TS (50-2000)		35.75	37.64	25.88	27.94
Clay	0.63-0.794	0.57	0.20	0.95	1.38
	0.794-1.00	0.37	0.25	1.07	1.35
	1.00-1.26	0.49	0.28	1.38	1.61
	1.26-1.59	0.56	0.27	1.47	1.55
	1.59-2.00	0.91	0.41	2.22	2.23
Fine Silt	2.00-2.52	1.23	0.58	2.92	2.75
	2.52-3.17	1.51	0.81	3.42	3.16
	3.17-4.00	1.57	0.92	3.00	2.84
	4.00-5.04	2.91	1.76	2.43	2.55
Medium Silt	5.04-6.35	4.06	2.65	4.89	5.38
	6.35-8.00	5.10	3.77	5.42	6.07
	8.00-10.08	6.07	4.81	5.55	6.10
	10.08-12.70	7.63	6.22	5.92	6.13
	12.70-16.0	7.97	7.23	6.22	6.07
	16.0-20.2	7.99	8.21	6.55	6.52
Coarse Silt	20.2-25.4	6.37	8.28	6.60	5.97
	25.4-32.0	5.42	7.39	5.76	4.84
	32.0-40.3	2.60	5.78	5.24	3.46
	40.3-50.8	0.82	2.18	2.79	2.02
	50.8-64.0	0.10	0.38	0.35	0.09
VFS (50-100)		16.34	16.39	10.65	8.83
FS (100-250)		4.56	4.21	3.82	3.92
MS (250-500)		2.61	3.46	2.23	3.29
CoS (500-1000)		6.65	8.09	4.30	6.41
VCoS (1000-2000)		5.59	5.50	4.88	5.50
Greater than 2000		28	26	57	36
Textural Class		Gr. SiL	Gr. SiL	Gr. SiL	Gr. SiL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

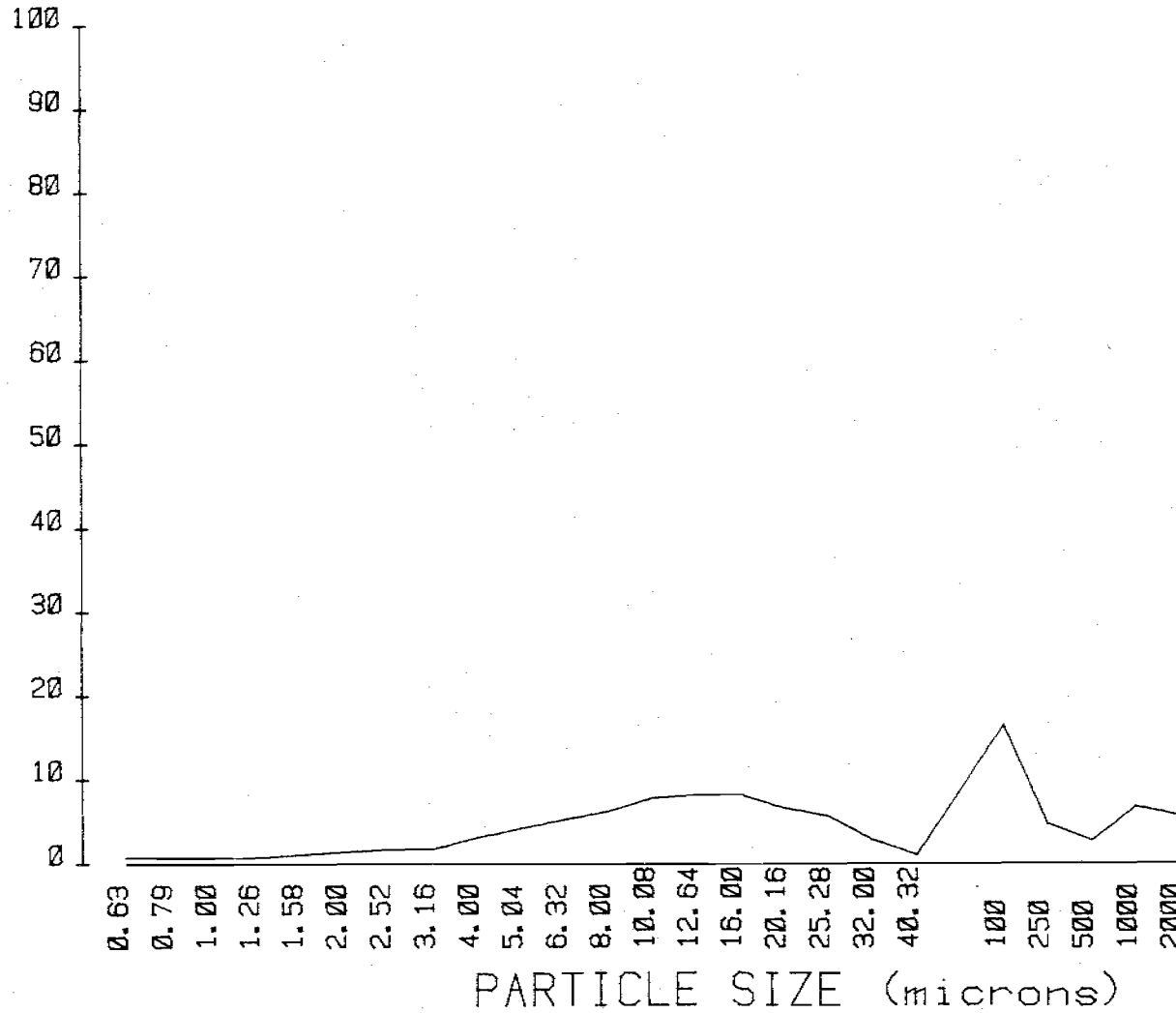
Identification		M2732-5	M2732-6		
Units		-----%			
TC (0.63-2.00)		12.44	7.47		
TSi (2.00-50)		67.22	60.39		
TS (50-2000)		20.34	32.14		
Clay	0.63-0.794	2.00	1.28		
	0.794-1.00	1.98	1.25		
	1.00-1.26	2.44	1.48		
	1.26-1.59	2.40	1.44		
	1.59-2.00	3.62	2.01		
Fine Silt	2.00-2.52	4.73	2.45		
	2.52-3.17	5.15	2.58		
	3.17-4.00	4.06	2.14		
	4.00-5.04	2.47	4.02		
Medium Silt	5.04-6.35	6.40	4.93		
	6.35-8.00	6.76	5.39		
	8.00-10.08	6.33	5.21		
	10.08-12.70	6.50	5.52		
	12.70-16.0	6.00	5.33		
	16.0-20.2	5.71	5.36		
Coarse Silt	20.2-25.4	5.34	5.25		
	25.4-32.0	3.83	4.89		
	32.0-40.3	2.65	3.83		
	40.3-50.8	0.95	2.98		
	50.8-64.0	0.35	0.53		
VFS (50-100)		7.59	9.26		
FS (100-250)		3.03	5.83		
MS (250-500)		2.27	3.78		
CoS (500-1000)		3.97	7.02		
VCoS (1000-2000)		3.49	6.27		
Greater than 2000		37	60		
Textural Class		Gr. SiL	V. gr. SiL		

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980



PLOT SAND-SILT-CLAY

ID M2732-1

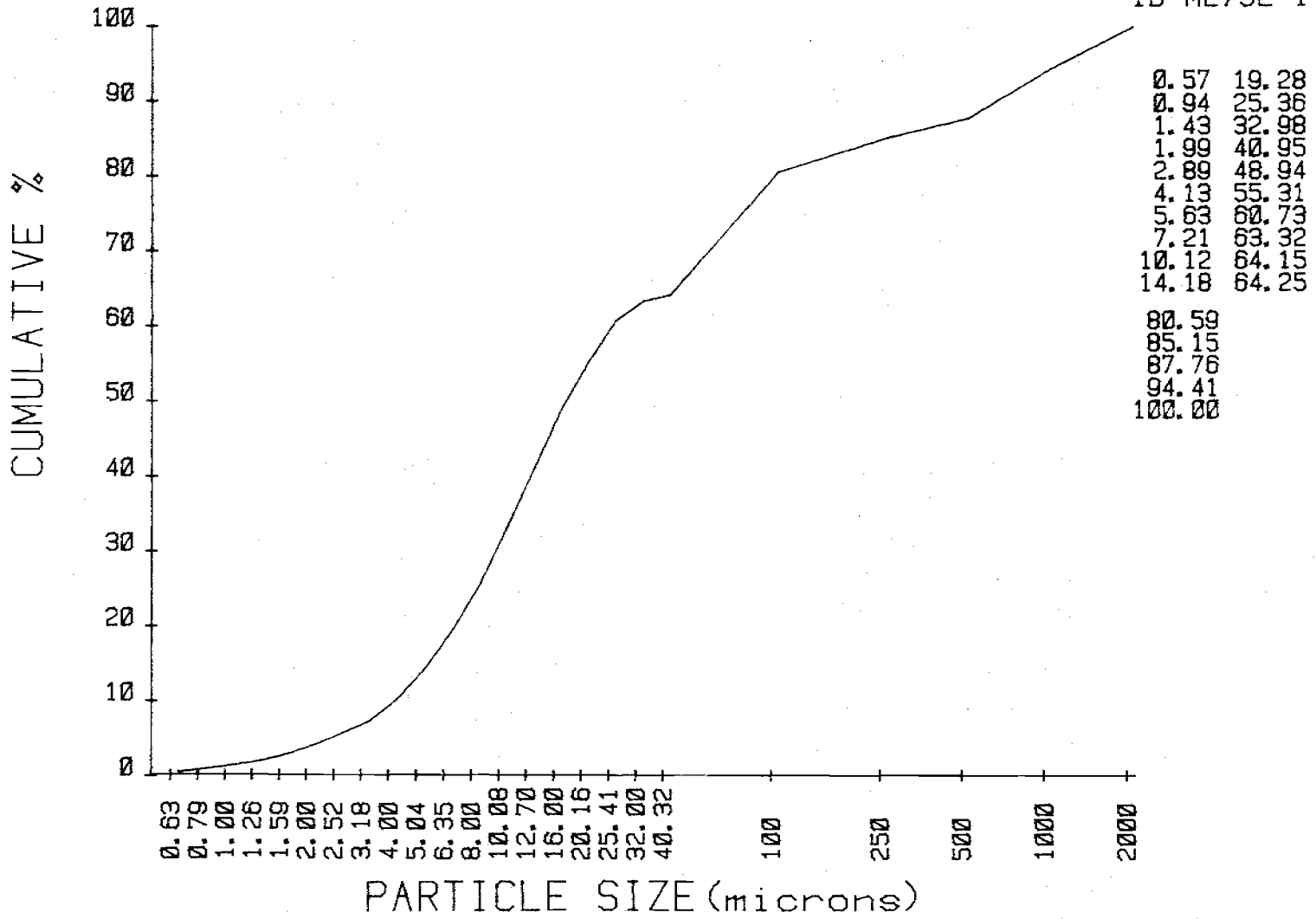


0.57	5.10
0.37	6.07
0.49	7.63
0.56	7.97
0.91	7.98
1.29	6.37
1.51	5.42
1.57	2.60
2.91	0.82
4.06	0.10
16.34	
4.56	
2.61	
6.65	
5.59	

711

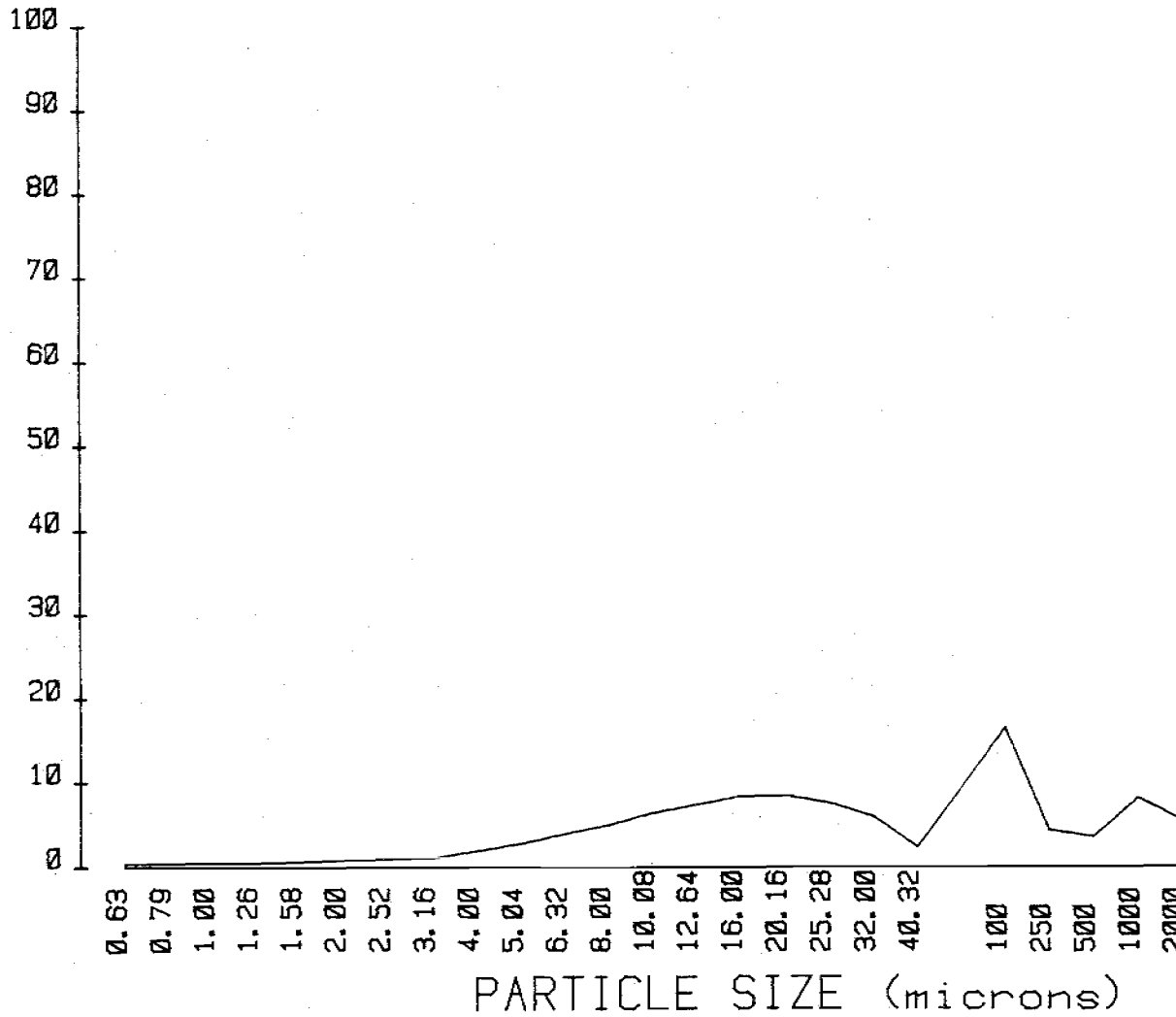
CUMULATIVE CURVE SAND-SILT-CLAY

ID M2732-1



PLOT SAND-SILT-CLAY

ID M2732-2



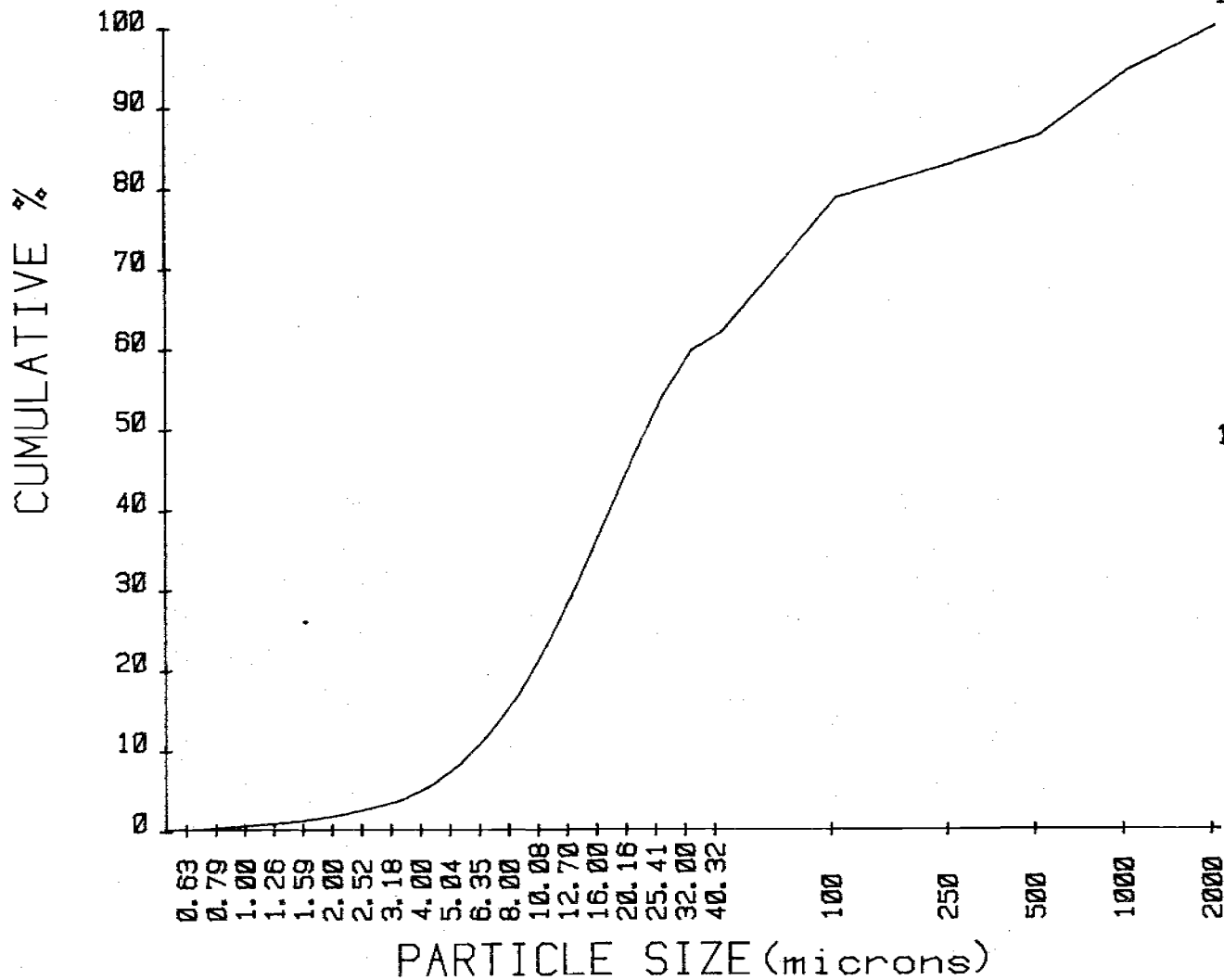
0.20	3.77
0.25	4.81
0.28	6.22
0.26	7.23
0.41	8.21
0.58	8.28
0.80	7.39
0.92	5.78
1.76	2.18
2.65	0.38
16.39	
4.21	
3.46	
8.09	
5.50	

713

Z

CUMULATIVE CURVE SAND-SILT-CLAY

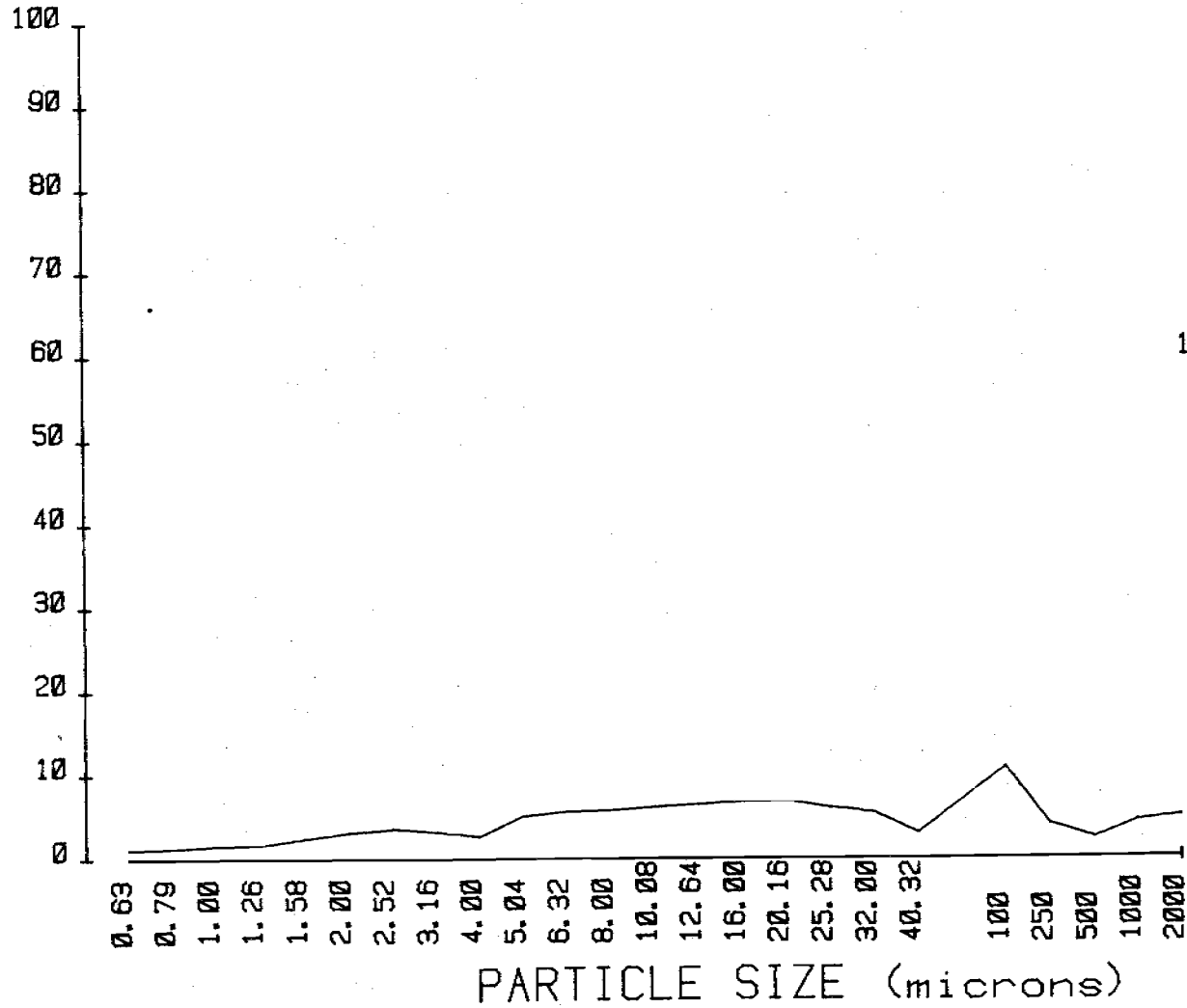
ID M2732-2



0.20	11.89
0.45	16.70
0.73	22.92
0.99	30.15
1.41	38.35
1.99	46.63
2.79	54.02
3.71	59.00
5.47	61.98
8.12	62.36
78.75	
82.96	
86.42	
94.51	
100.01	

PLOT SAND-SILT-CLAY

ID M2732-3



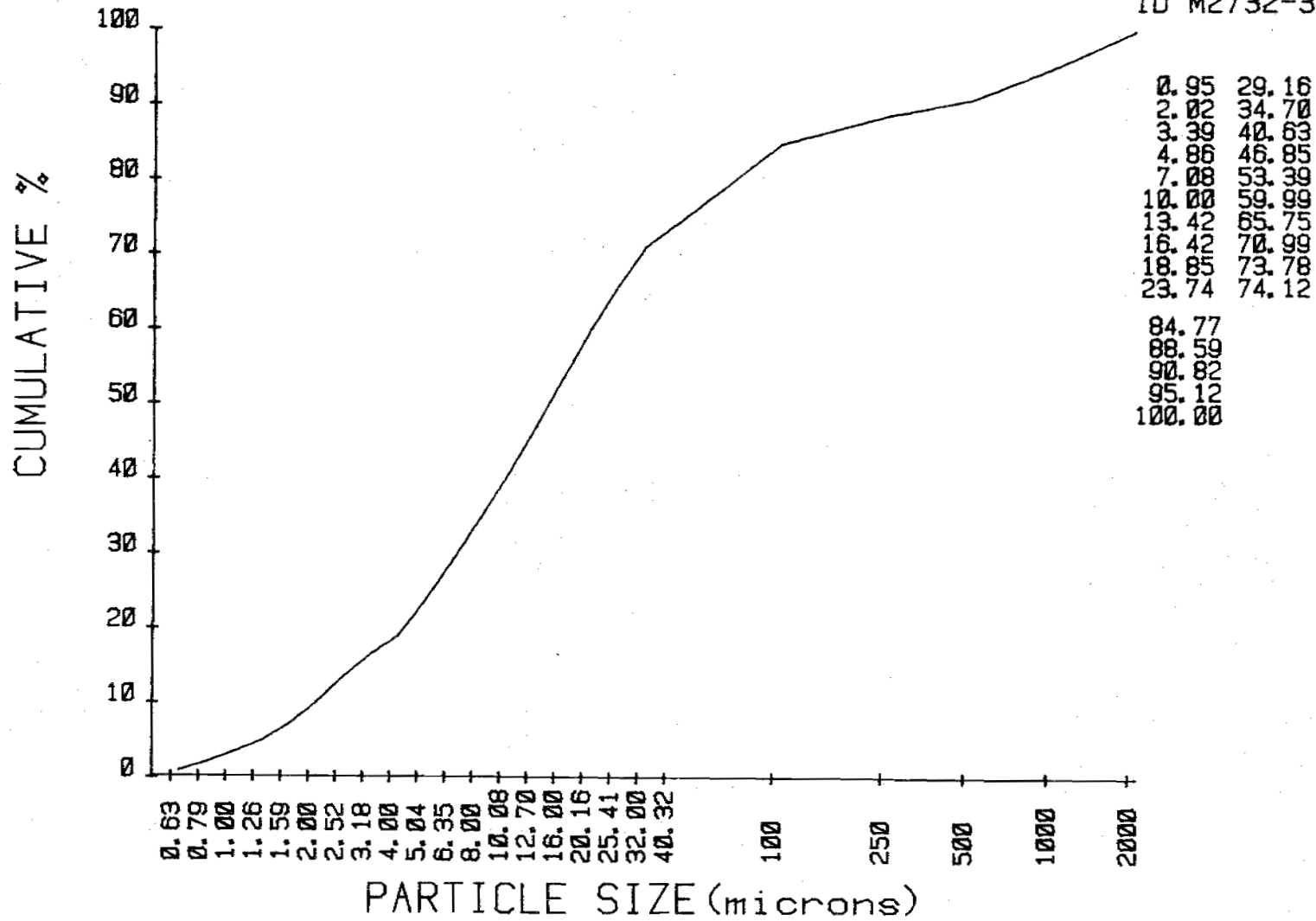
0.95	5.42
1.07	5.55
1.38	5.92
1.47	6.22
2.22	6.55
2.92	6.60
3.42	6.76
3.00	5.76
2.43	5.33
4.89	6.79
	6.34
10.65	
3.82	
2.23	
4.30	
4.88	

715

x

## CUMULATIVE CURVE SAND-SILT-CLAY

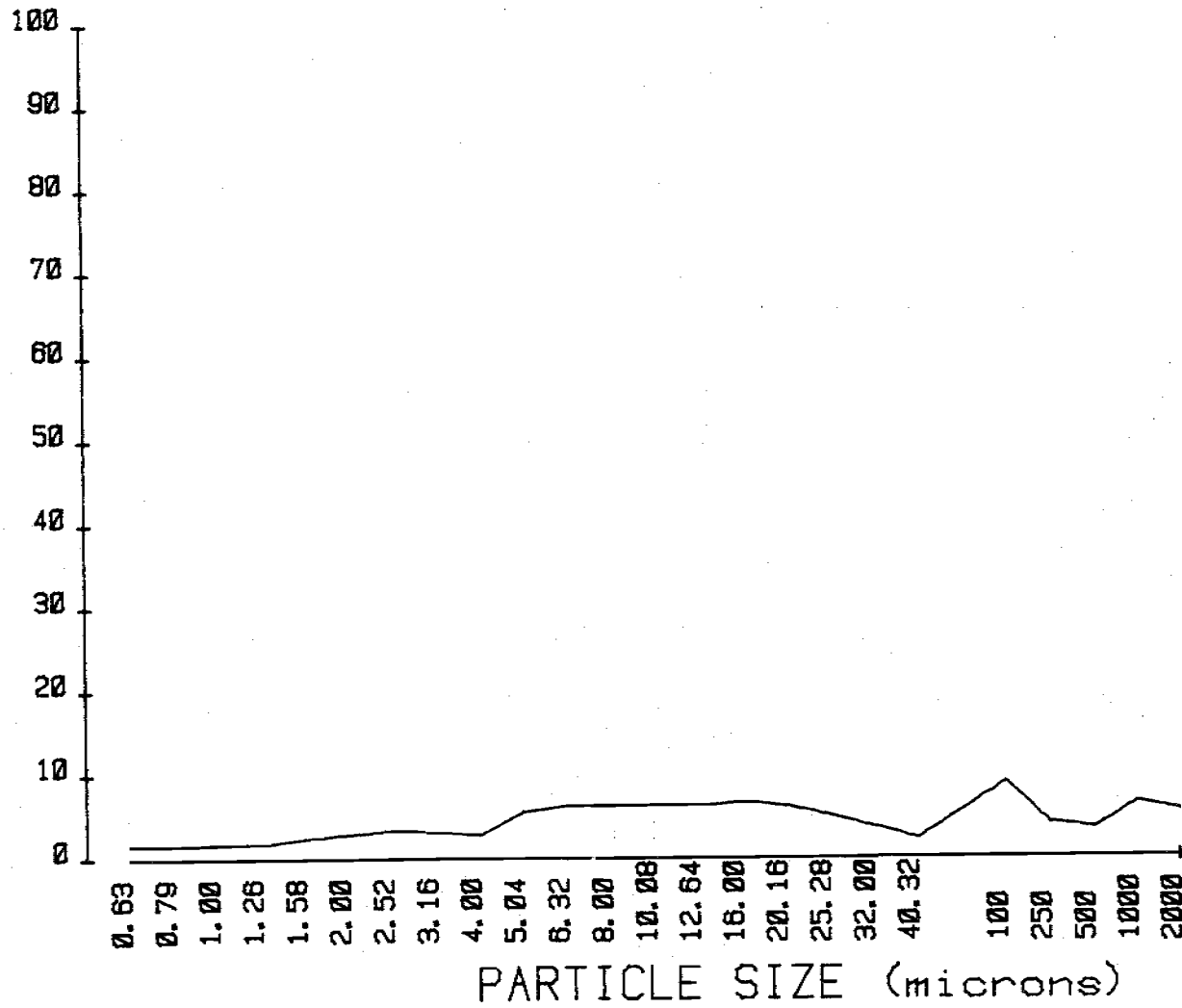
ID M2732-3



PARTICLE SIZE (microns)

PLOT SAND-SILT-CLAY

ID M2732-4

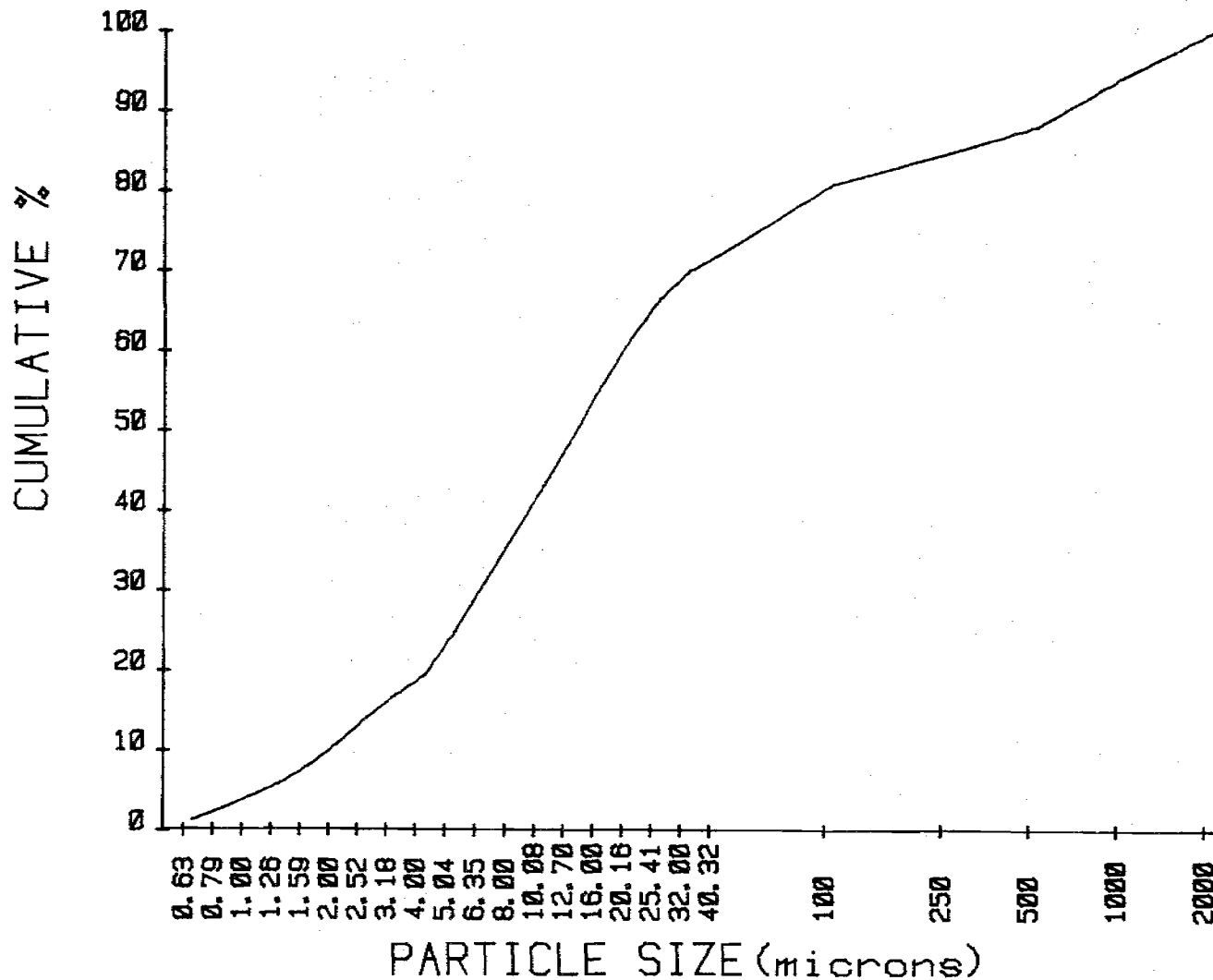


1.38	6.07
1.35	6.10
1.61	6.13
1.55	6.07
2.29	6.52
2.75	5.97
2.15	4.84
2.84	3.46
2.55	2.02
5.38	2.00
8.63	
3.92	
3.29	
6.41	
5.50	

717

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2732-4

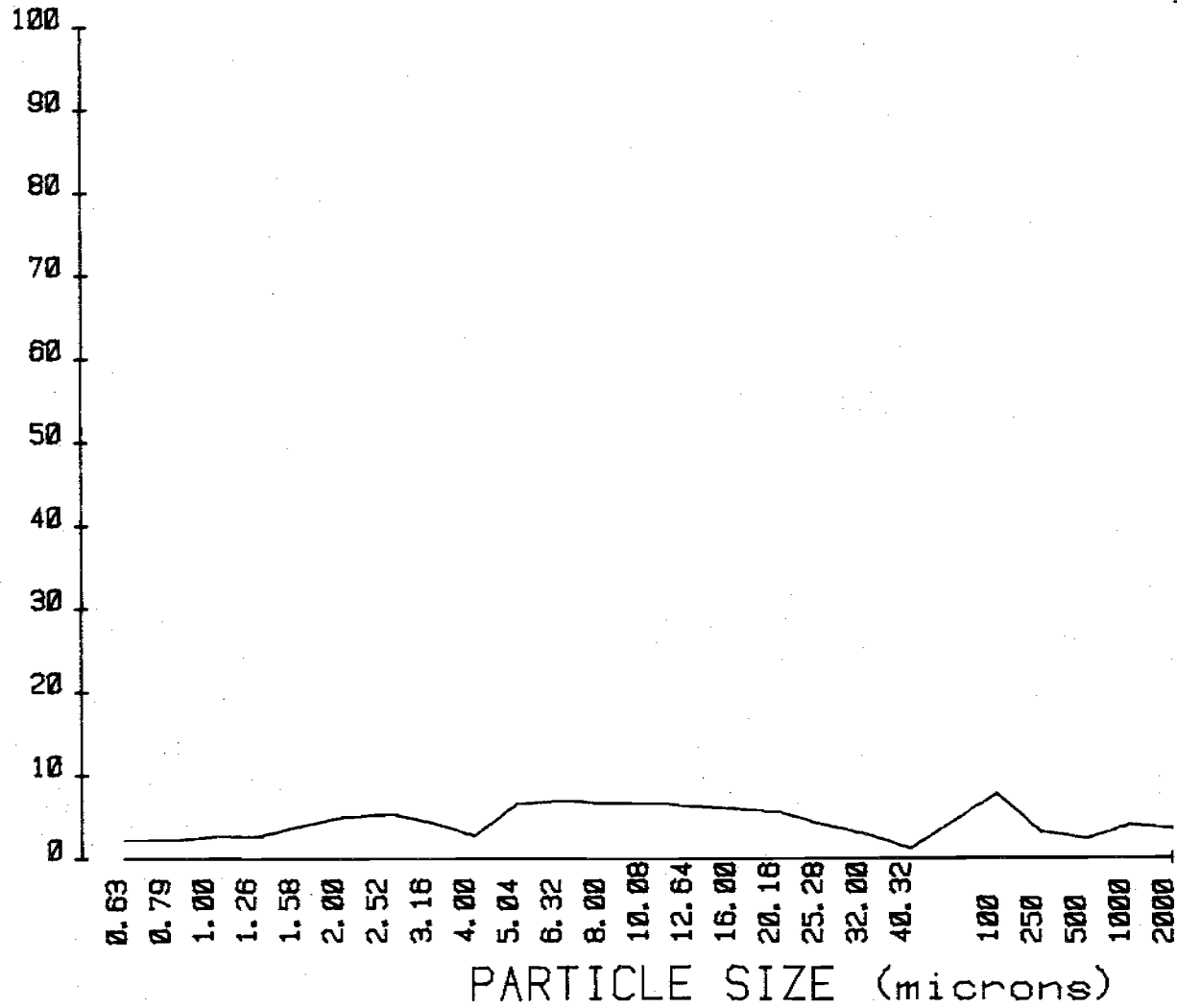


1.38	30.86
2.73	36.95
4.34	43.08
5.89	49.15
8.12	55.67
10.87	61.64
14.03	66.48
16.86	69.94
19.41	71.97
24.79	72.06
80.89	
84.81	
88.10	
94.51	
100.01	



PLOT SAND-SILT-CLAY

ID M2732-5



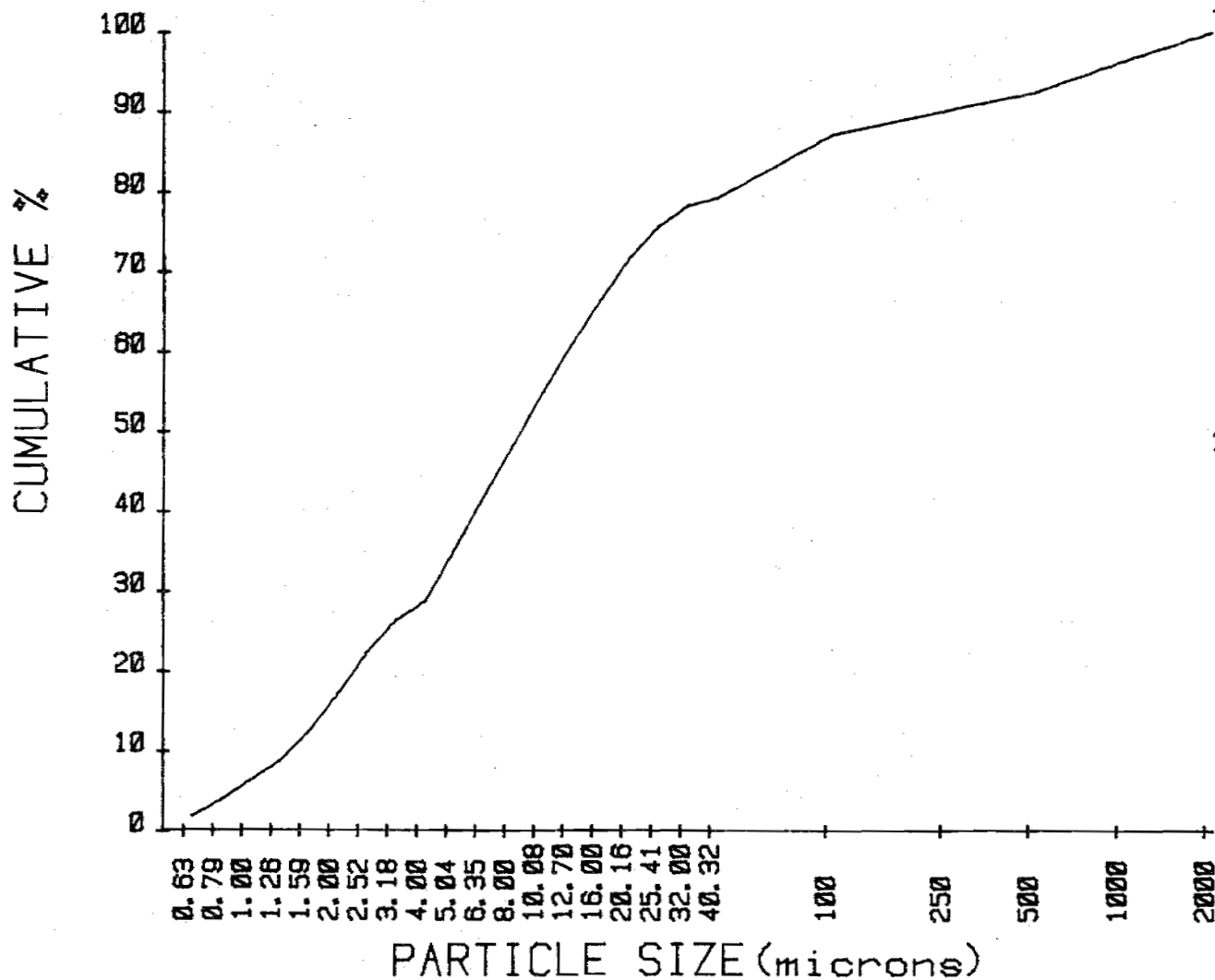
2.00	6.76
1.98	6.33
2.44	6.50
2.40	6.00
3.62	5.71
4.72	5.34
5.15	3.89
4.06	2.65
2.47	0.95
6.40	0.35
7.59	
3.03	
2.27	
3.97	
3.49	

x

PARTICLE SIZE (microns)

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2732-5



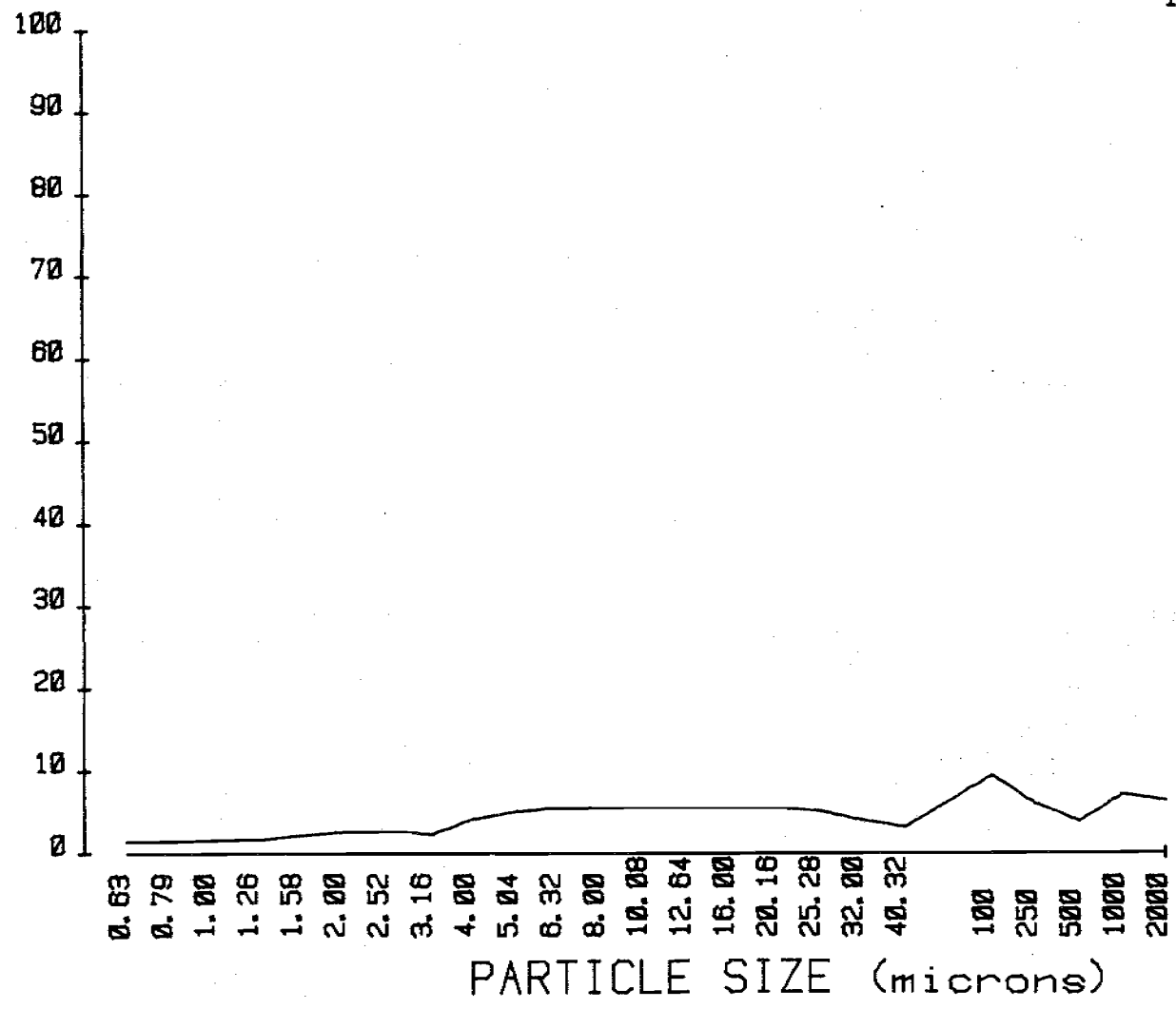
2.00	42.01
3.98	48.34
6.42	54.83
8.82	60.83
12.44	66.54
17.17	71.88
22.32	75.71
26.38	78.36
28.85	79.31
35.25	79.66
87.25	
90.28	
92.55	
96.52	
100.01	

PLOT SAND-SILT-CLAY

ID M2732-6

721

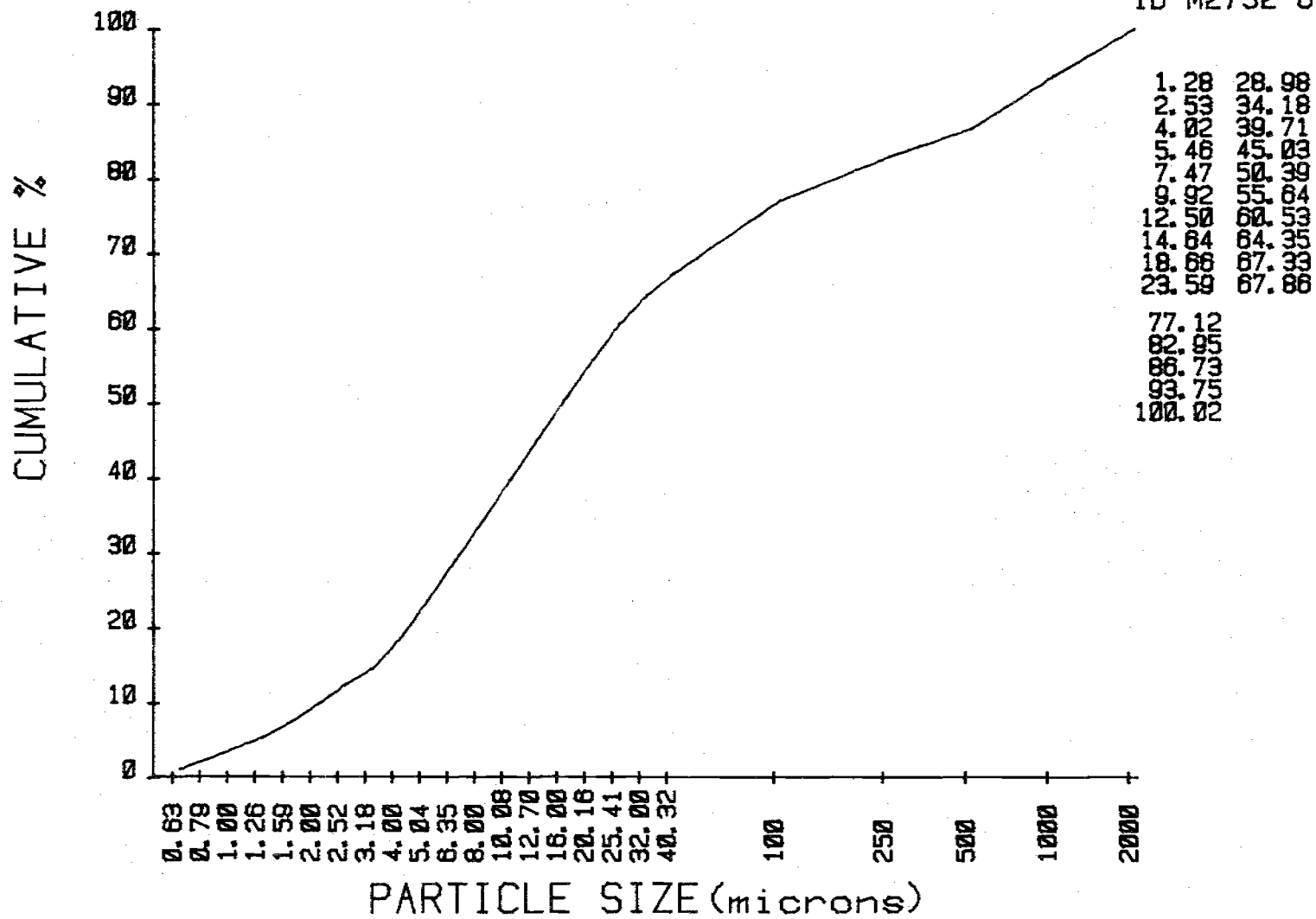
%



1.28	5.26
1.25	5.83
1.48	3.78
1.44	7.02
2.01	8.27
2.44	
2.58	
2.14	
4.01	
4.93	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2732-6



Unnamed Silt Loam 79-MT-2733 (110901-0)

Classification: fine silty over fine clay, mixed Typic Entroboralf.

General Site Characteristics

Location: Lincoln County, Montana; northeast 1/4 of section 6, T. 35N., R. 27W.

Forest: Kootenai National Forest

Area: Pinkham Creek

Described By/Date: TS and KC on July 14, 1978

Parent Rock/Material: loess/lacustrine

Habitat Type: Psme/Syal

Topography:

Landform: bench

Weathering: normal

Formation Name: Lower Piegan

Slope: 2 percent

Aspect:

Elevation: 3450 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: MOR

Surface Rock: 2 percent

Climate:

Precipitation: 22 inches

Erosion: minimal

Infiltration: rapid

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches: 8 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O1 6-8 centimeters (2.5-3 inches).

A2 0-10 centimeters (0-4 inches). Light gray (10YR 7/1) moist; silt loam; weak subangular blocky structure; very friable, slightly sticky and slightly plastic; many very fine discontinuous tubular pores; many very fine, common fine, medium and coarse roots; neutral pH 6.7, noncalcareous; abrupt wavy boundary.

B&A 10-20 centimeters (4-8 inches). Pale brown (10YR 6/3) moist; silty clay loam; massive structure; extremely firm, slightly sticky and plastic; many very fine continuous tubular pores; common very fine roots; mildly alkaline pH 7.5, noncalcareous; clear wavy boundary.

B2t 20-44 centimeters (8-17.5 inches). Light yellowish brown (10YR 6/4) moist; silty clay loam; strong medium and fine subangular blocky structure; firm, slightly sticky and plastic; many very fine and fine continuous tubular pores; common very fine and few medium roots; few thin discontinuous interstitial clay films; mildly alkaline pH 7.8, noncalcareous; clear wavy boundary.

79-MT-2733 (cont.)

B3ca 44-68 centimeters (17.5-27 inches). Light brownish gray (2.5Y 6/2) moist; silty clay loam; strong coarse subangular blocky structure; firm, sticky and plastic; many very fine continuous tubular pores; few very fine roots; common thin discontinuous interstitial clay films; moderately alkaline pH 8.0, strongly effervescent; gradual wavy boundary.

Cca 68-90 centimeters (27-35.5 inches). Very pale brown (10YR 7/3) moist; silt loam; strong fine angular blocky structure; firm, slightly sticky and slightly plastic; many very fine continuous tubular pores; moderately alkaline pH 8.0, violently effervescent.

Pedon: Unnamed Silt Loam 79-MT-2733 (1109010-3)

Date: January 1980

Sample No.	Horizon	Depth cm	pH 1:5	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Soluble Ions								NaF pH	
							Ca	Mg	Na	K	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>		
1	01-02	6-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	A2	0-10	6.4	6.3	0.29	66	1.6	1.1	0.2	0.1	0.0	1.7	0.3	0.1	0.1	8.6
3	B&A	10-20	7.0	6.7	0.27	40	0.9	0.7	0.2	0.1	0.0	1.0	0.3	0.1	0.1	9.1
4	B2t	20-44	7.3	6.9	0.35	49	1.3	1.1	0.3	0.1	0.0	1.2	0.2	0.2	0.2	9.6
5	B3ca	44-68	8.8	7.9	0.33	50	1.0	0.9	0.4	0.1	0.4	1.2	0.1	0.2	0.2	10.4
5	Cca	68-90	9.0	8.2	0.29	49	0.7	1.0	0.4	0.1	0.4	1.3	0.1	0.2	0.2	10.5

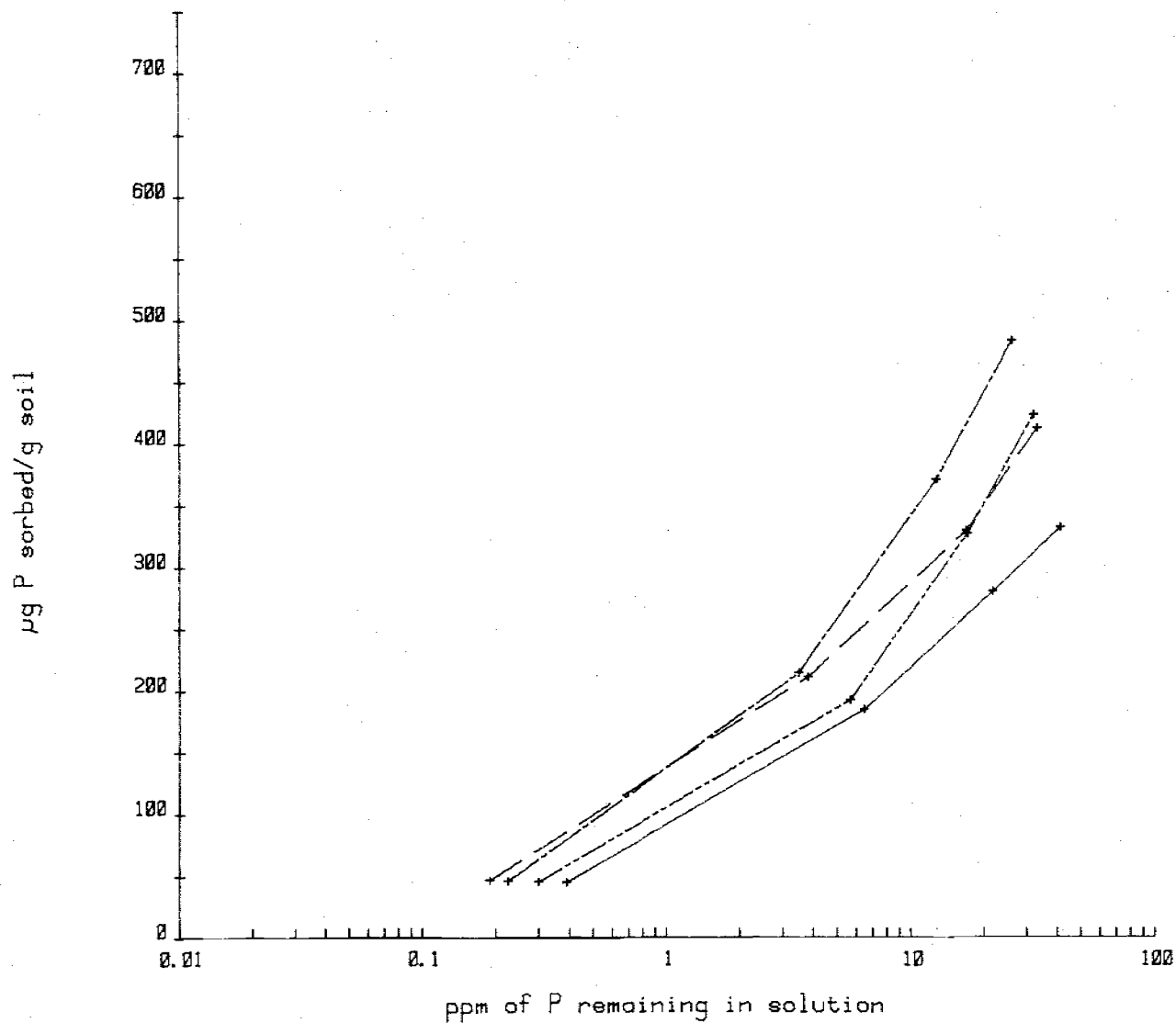
Sample No.	Exchangeable Ions				CEC	ESP	OM	OC	N	C:N	Gypsum	CaCO <sub>3</sub> equiv.	Soil Fraction	Available P
	Ca	Mg	Na	K										
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	3.0	1.1	0.1	0.4	16.4	1	3.87	1.79	0.107	17	nil	nil	0.86	27.0
3	5.2	2.2	0.1	0.7	18.4	1	1.29	0.75	0.073	10	nil	nil	0.92	25.2
4	7.5	3.3	0.1	1.0	28.4	0	1.68	0.97	0.081	12	nil	nil	0.89	23.1
5	4.7	2.3	0.1	3.3	12.3	1	0.57	0.33	0.039	8	nil	23.9	0.82	8.3
5	3.6	3.0	0.1	0.3	8.8	1	0.38	0.22	0.029	8	nil	24.3	0.75	1.6

Remarks: CEC's were leached with 10% acidified NaCl  
 CEC's and Nitrogens were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-2733

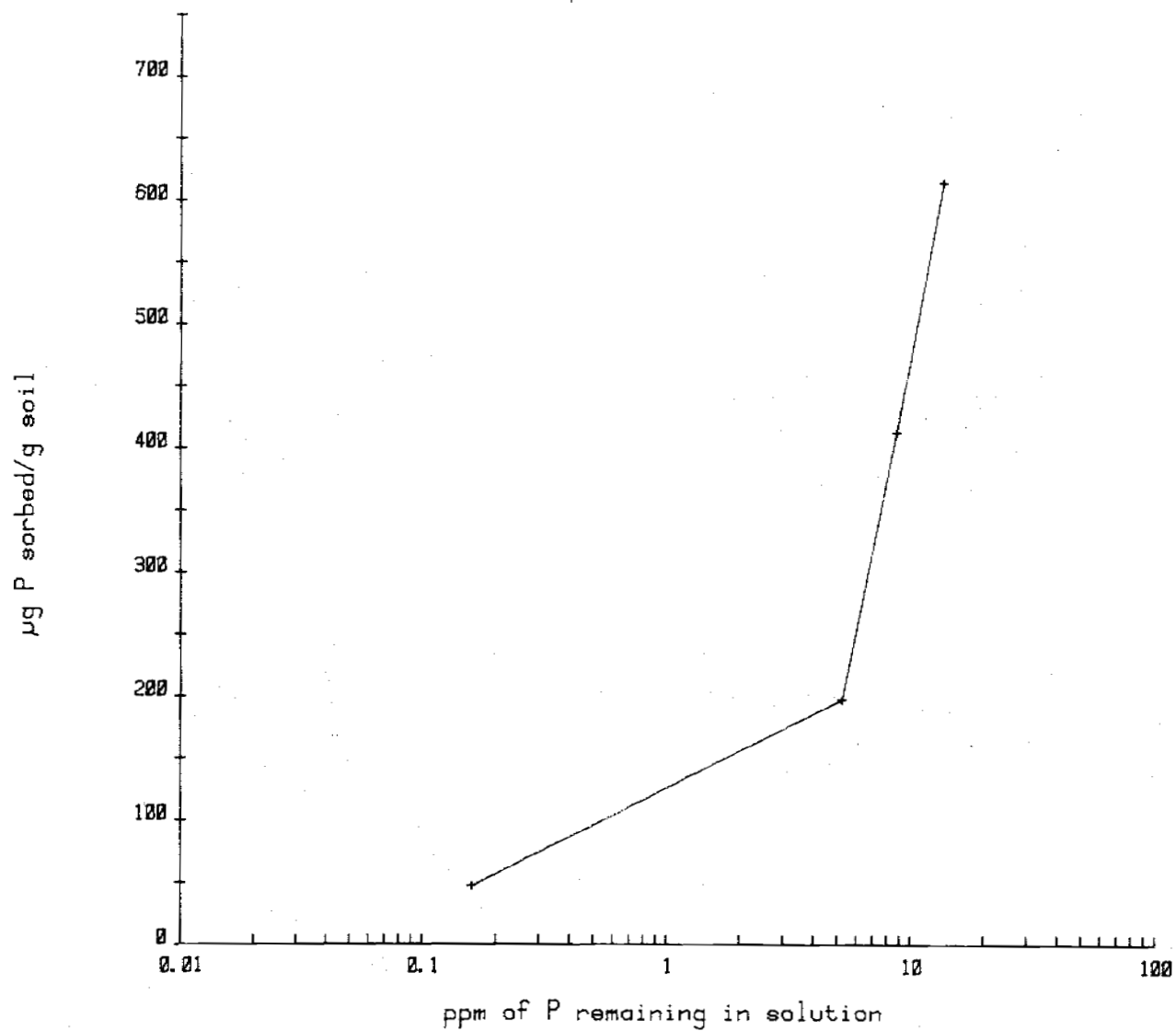


µg/g soil	Soln ppm
<b>A2</b>	
46	0.39
195	6.48
280	21.96
332	41.76
<b>B&amp;A</b>	
48	0.19
212	3.83
330	17.04
413	33.72
<b>B2t</b>	
48	0.23
215	3.51
371	12.90
484	26.64
<b>B3ca</b>	
47	0.30
193	5.70
327	17.28
424	32.64



# Phosphorus Isotherm

79-MT-2733



$\mu\text{g/g}$ soil	Soln ppm
48	0.16
198	5.22
413	8.70
616	13.44

727

Pedon: Unnamed Silt Loam 79-MT-2733 (1109010-3)

Date: September 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
CM	-----X-----								-----X-----		
6-0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Silt loam
0-10	1.27	1.92	1.00	2.77	7.17	14.13	73.91	11.96	14	14	Silty clay loam
10-20	0.41	0.75	0.66	1.67	4.64	8.10	62.24	29.66	8	8	Silty clay loam
20-44	0.55	0.70	0.59	1.69	4.55	8.07	62.35	29.58	11	11	Silty clay loam
44-68	1.51	1.90	1.85	4.25	3.83	13.34	48.53	38.13	18	18	Silty clay loam
68-90	2.10	2.36	2.02	4.22	4.69	15.40	52.52	32.08	25	25	Gr. silty clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Nsi	Fsi	Bulk Density		1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
CM	-----X-----			-----g/cc-----		-----X-----		-----X-----		
6-0						NS	NS	NS	NS	NS
0-10						46.7	18.0	NDMP	NDMP	NDMP
10-20						31.5	17.8	28	NP	ND
20-44						38.8	16.5	36	23	13
44-68						31.9	13.0	33	16	17
68-90						30.0	13.2	31	20	11

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

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FARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2733-1	M2733-2	M2733-3	M2733-4
Units		-----%			
TC (0.63-2.00)		11.96	29.66	29.58	38.13
TSi (2.00-50)		73.91	62.24	62.35	48.53
TS (50-2000)		14.13	8.10	8.07	13.34
Clay	0.63-0.794	1.26	4.28	4.81	5.59
	0.794-1.00	1.68	4.60	4.73	5.86
	1.00-1.26	2.38	6.14	5.88	7.64
	1.26-1.59	2.66	6.16	5.89	7.82
	1.59-2.00	3.99	8.49	8.26	11.23
Fine Silt	2.00-2.52	4.95	9.71	9.51	12.58
	2.52-3.17	4.94	8.76	9.09	9.91
	3.17-4.00	3.86	4.85	5.27	4.92
	4.00-5.04	2.89	2.28	2.44	1.96
Medium Silt	5.04-6.35	5.21	4.97	5.45	4.72
	6.35-8.00	5.48	4.71	4.87	3.76
	8.00-10.08	5.68	4.21	4.18	2.64
	10.08-12.70	7.21	4.18	4.06	2.00
	12.70-16.0	7.90	4.41	4.46	1.52
	16.0-20.2	8.35	4.62	3.76	1.10
Coarse Silt	20.2-25.4	6.45	3.86	4.18	1.17
	25.4-32.0	5.32	2.78	2.73	1.09
	32.0-40.3	3.23	2.23	2.17	0.60
	40.3-50.8	2.36	0.60	0.10	0.50
	50.8-64.0	0.09	0.07	0.09	0.07
VFS (50-100)		7.17	4.64	4.55	3.83
FS (100-250)		2.77	1.67	1.69	4.25
MS (250-500)		1.00	0.66	0.59	1.85
CoS (500-1000)		1.92	0.75	0.70	1.90
VCoS (1000-2000)		1.27	0.41	0.55	1.51
Greater than 2000		14	8	11	18
Textural Class		Silt loam	SiCL	SiCL	Gr. SiCL

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

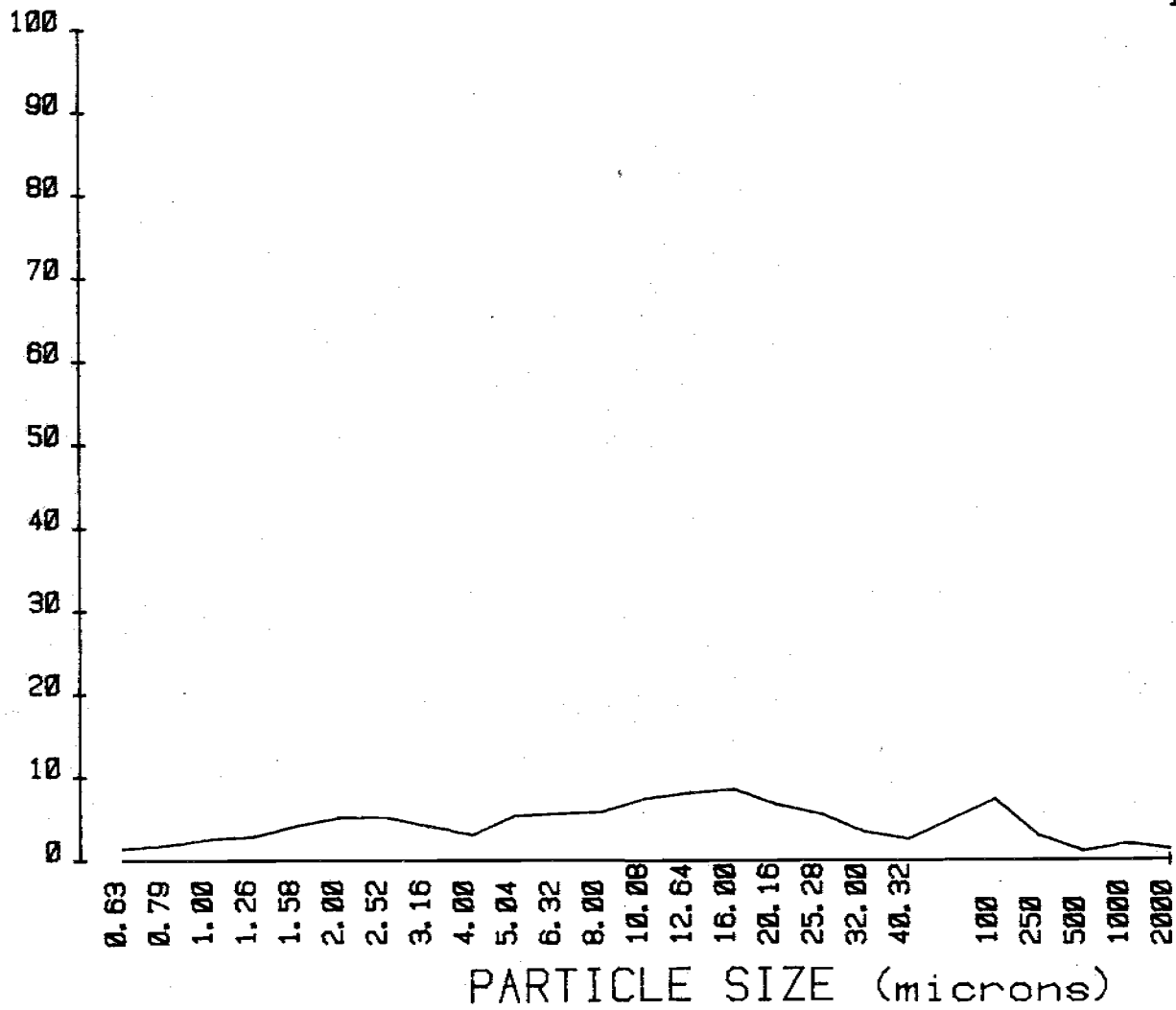
Identification		M2733-5			
Units		----- % -----			
TC (0.63-2.00)		32.08			
TSi (2.00-50)		52.52			
TS (50-2000)		15.40			
Clay	0.63-0.794	4.63			
	0.794-1.00	4.97			
	1.00-1.26	6.44			
	1.26-1.59	6.63			
	1.59-2.00	9.42			
Fine Silt	2.00-2.52	10.83			
	2.52-3.17	9.39			
	3.17-4.00	5.47			
	4.00-5.04	2.40			
Medium Silt	5.04-6.35	5.50			
	6.35-8.00	4.55			
	8.00-10.08	3.24			
	10.08-12.70	2.66			
	12.70-16.0	2.12			
	16.0-20.2	1.93			
Coarse Silt	20.2-25.4	1.86			
	25.4-32.0	1.20			
	32.0-40.3	0.93			
	40.3-50.8	0.38			
	50.8-64.0	0.09			
VFS (50-100)		4.69			
FS (100-250)		4.22			
MS (250-500)		2.02			
CoS (500-1000)		2.36			
VCoS (1000-2000)		2.10			
Greater than 2000		25			
Textural Class		Gr. SiCL			

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2733-1

731 \*



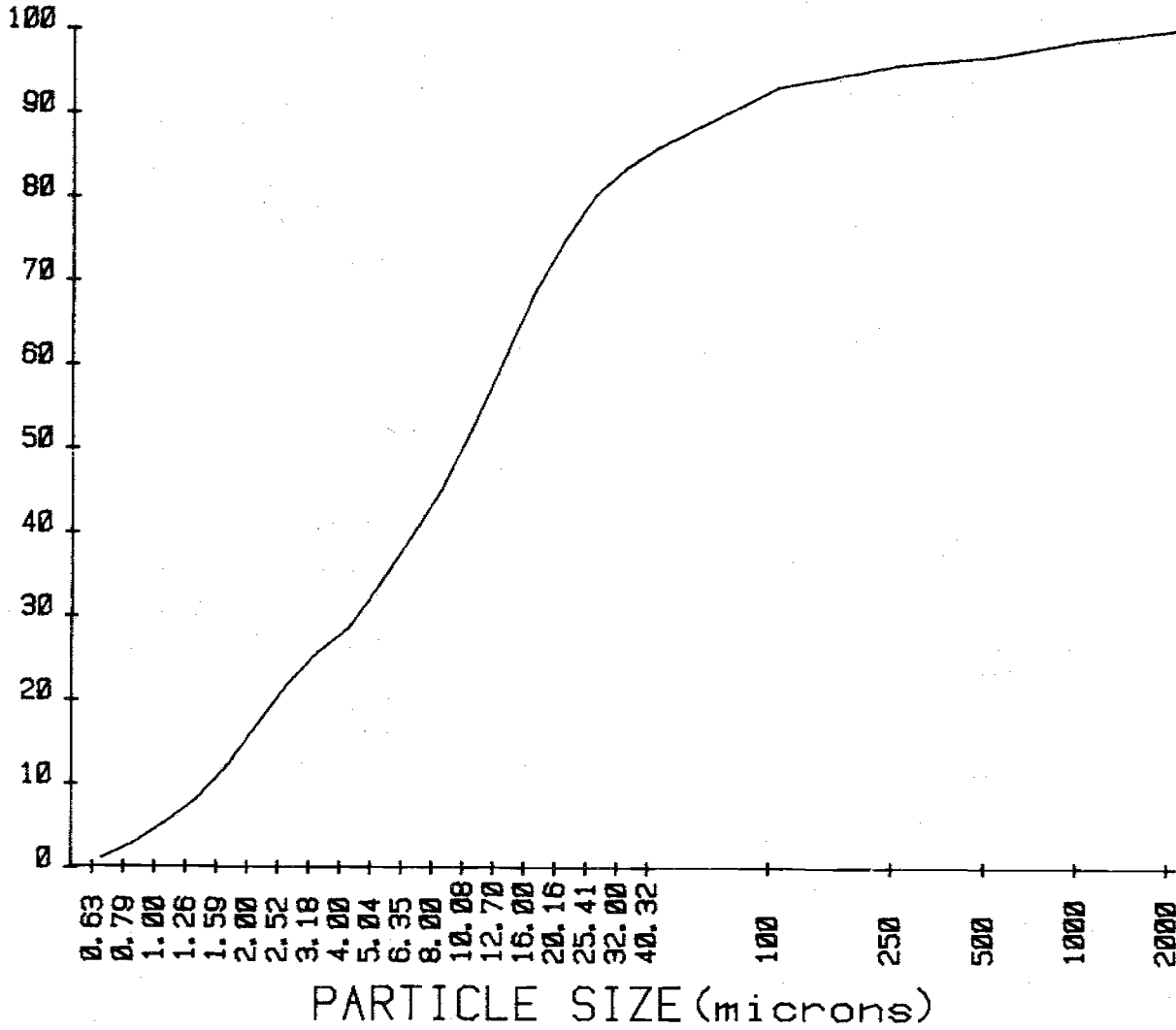
- |      |      |
|------|------|
| 1.26 | 5.48 |
| 1.68 | 5.68 |
| 2.38 | 7.21 |
| 2.66 | 7.90 |
| 3.99 | 8.35 |
| 4.95 | 6.45 |
| 4.94 | 5.32 |
| 3.86 | 3.23 |
| 2.89 | 2.36 |
| 5.21 | 0.00 |
| 7.17 |      |
| 2.77 |      |
| 1.00 |      |
| 1.92 |      |
| 1.27 |      |

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2733-1

7332

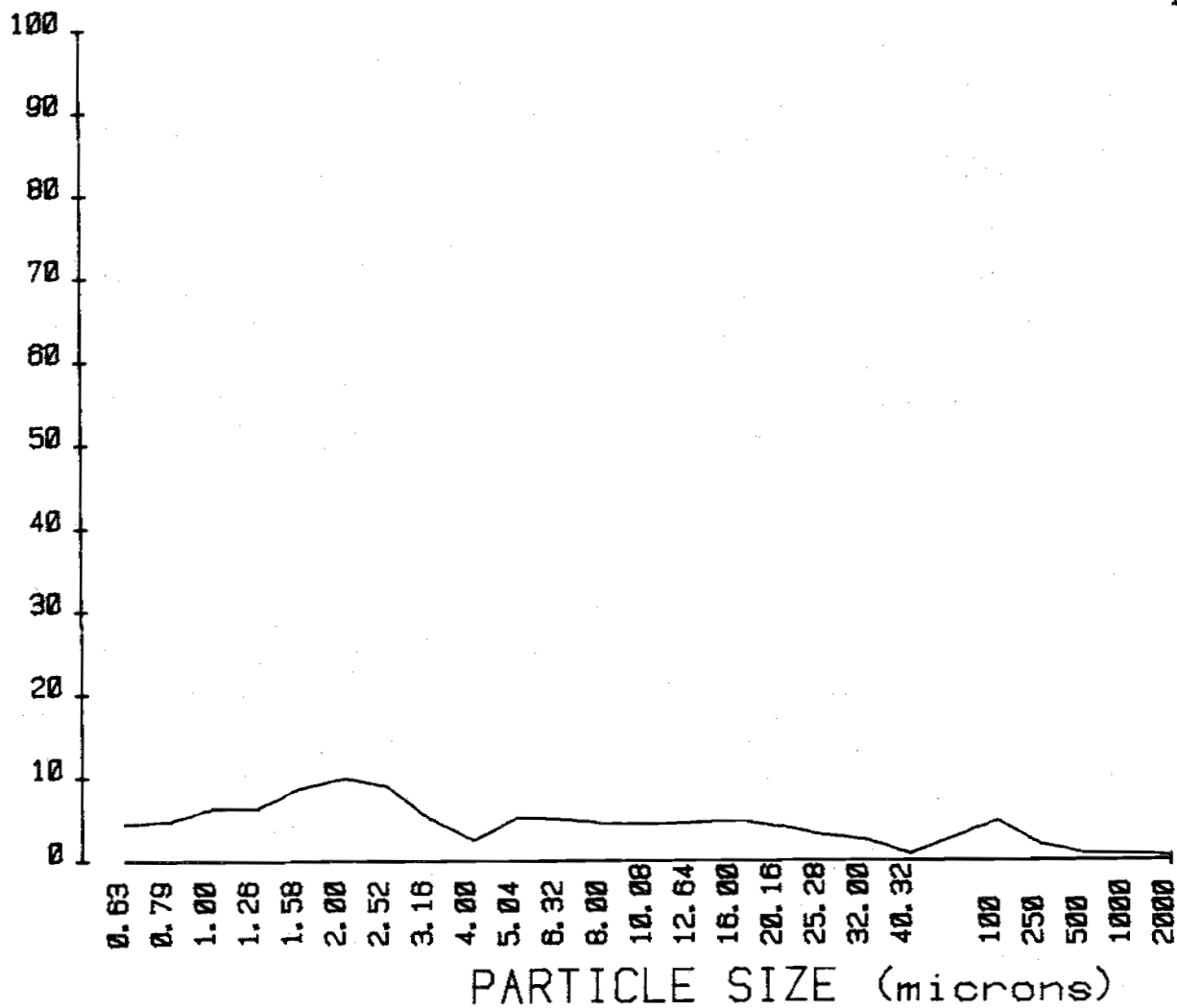
CUMULATIVE %



1.26	39.29
2.94	44.97
5.32	52.18
7.98	60.07
11.96	68.42
16.92	74.87
21.85	80.19
25.71	83.42
28.60	85.78
33.81	85.87
93.04	
95.81	
96.81	
98.73	
100.00	

PLOT SAND-SILT-CLAY

ID M2733-2



4.28	4.70
4.60	4.21
6.13	4.18
6.16	4.41
8.48	4.62
9.71	3.86
8.76	2.78
4.85	2.23
2.28	0.60
4.97	0.07
4.64	
1.67	
0.66	
0.75	
0.41	

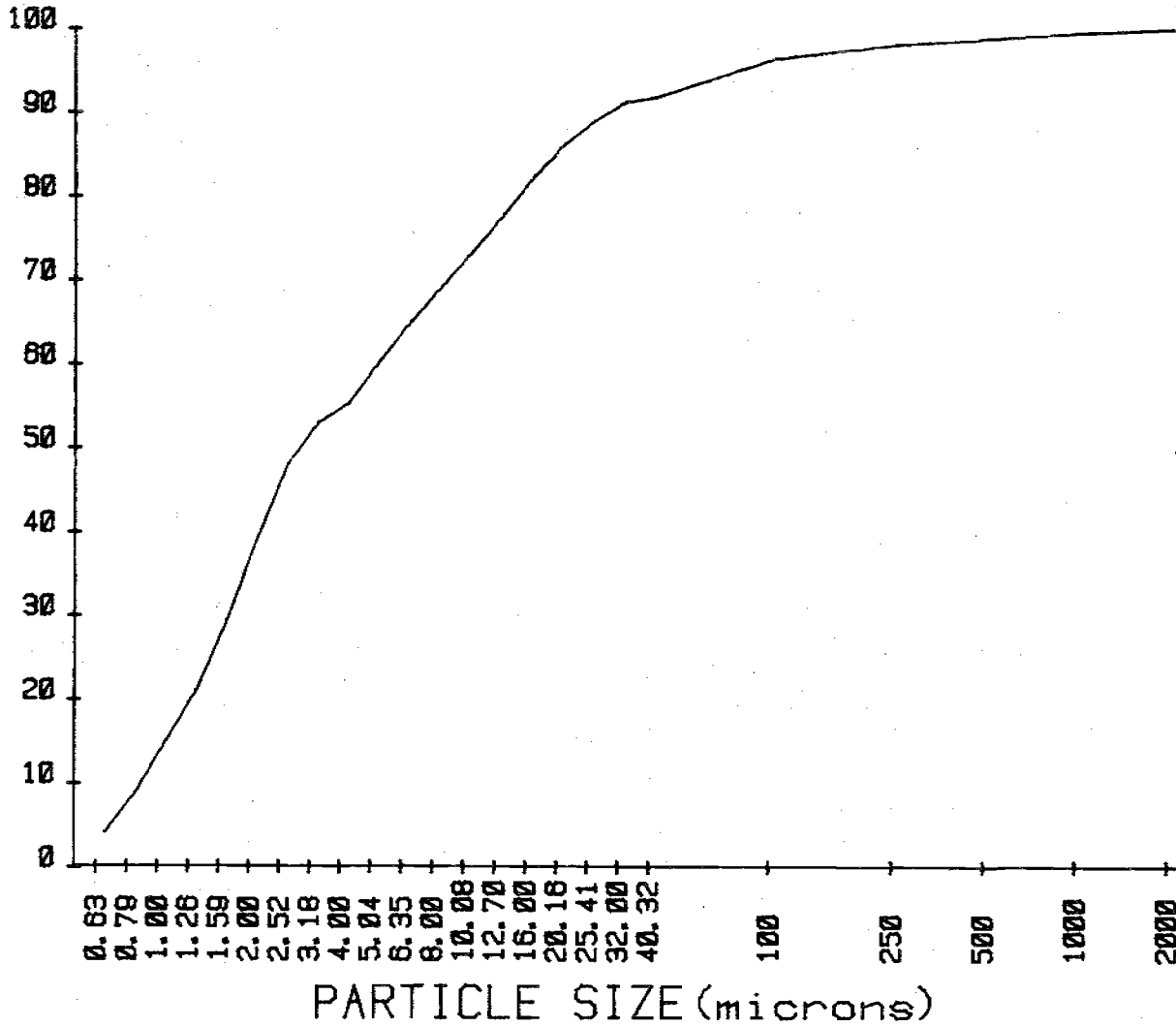
733 \*

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2733-2

734

CUMULATIVE %



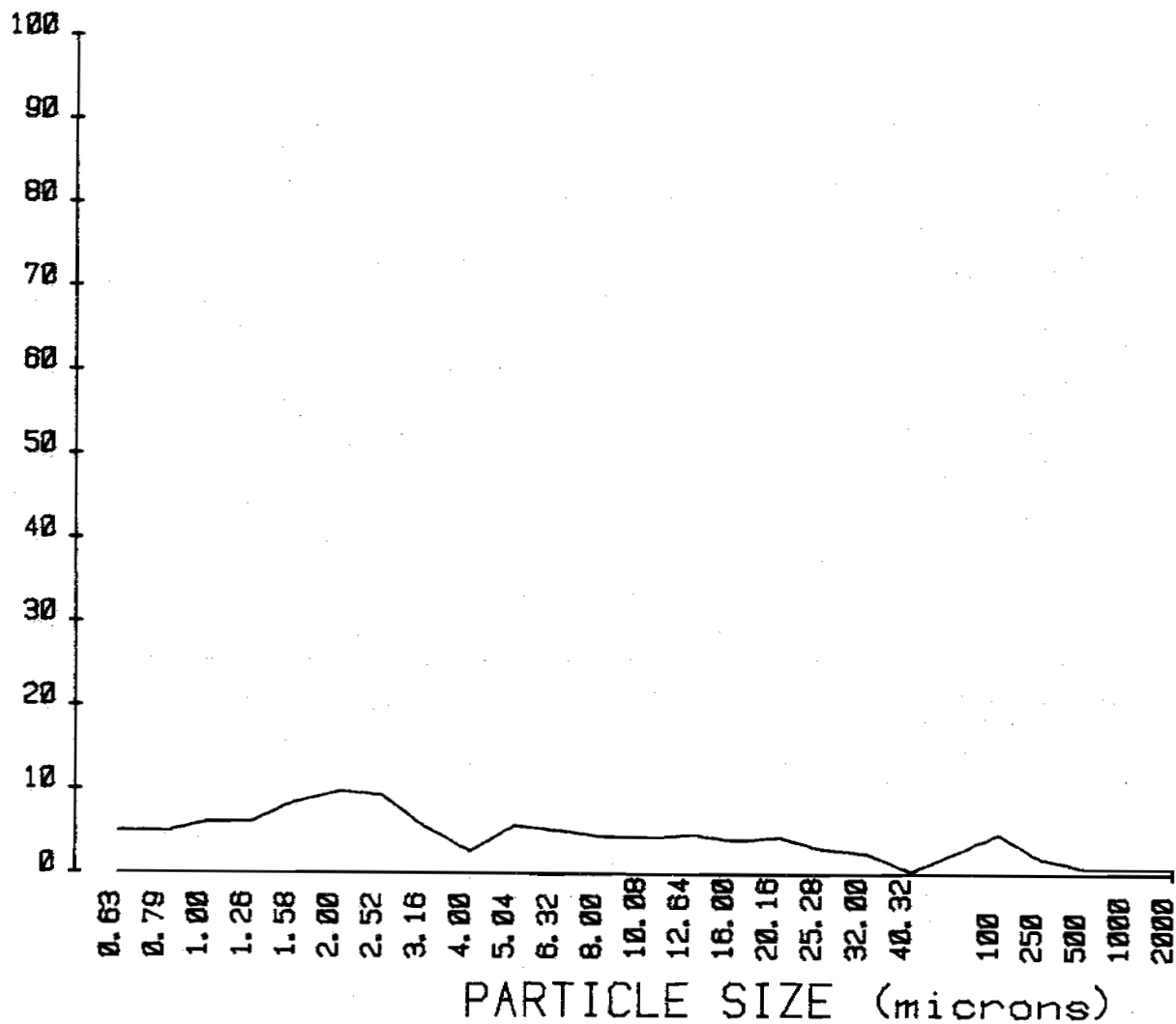
4.28	64.94
8.88	69.15
15.02	73.33
21.18	77.74
29.66	82.36
39.38	86.22
48.14	89.00
52.98	91.23
55.27	91.83
62.23	91.90
96.54	
98.21	
98.87	
99.62	
100.00	



PLOT SAND-SILT-CLAY

ID M2733-3

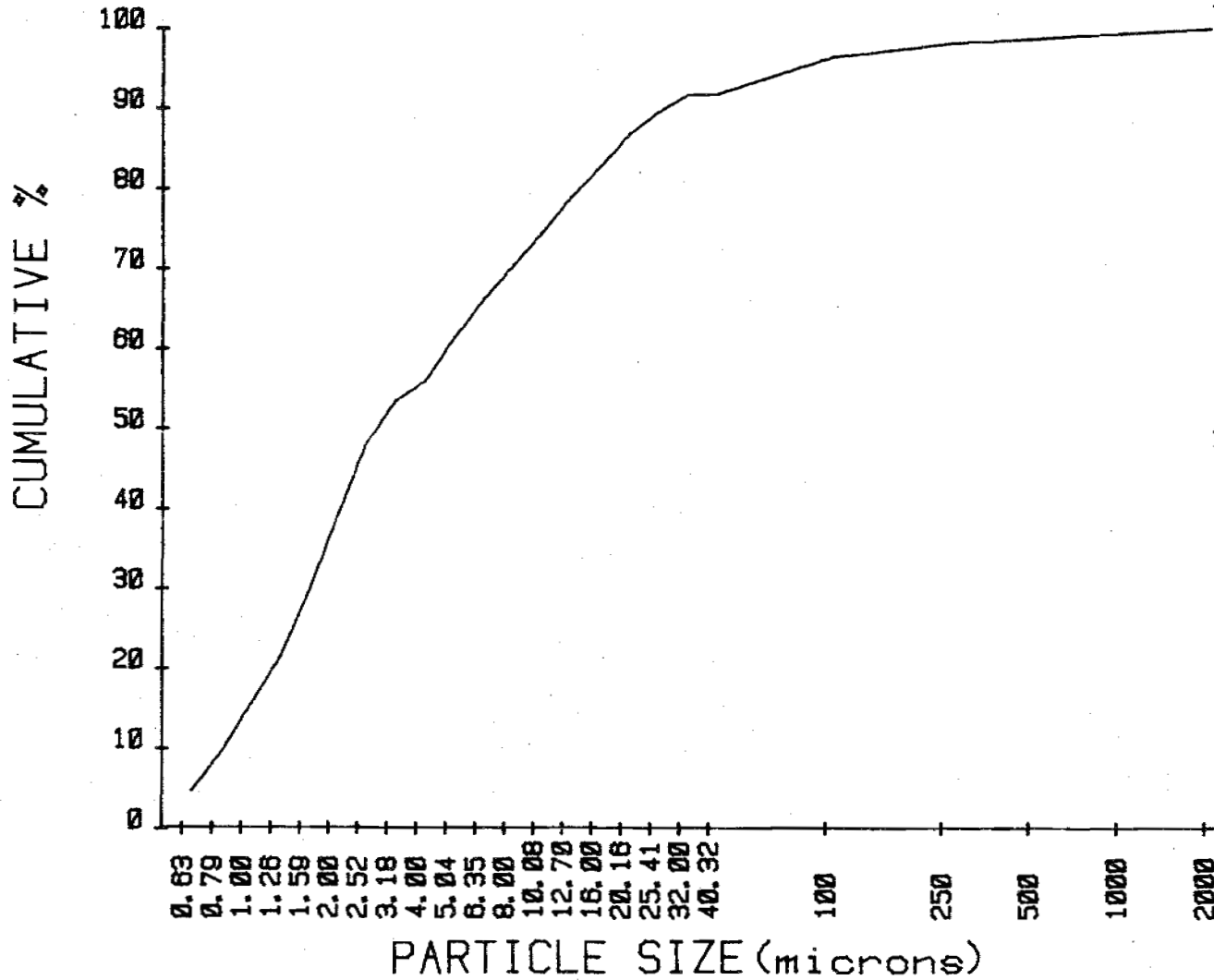
735 x



4.81	4.87
4.73	4.18
5.88	4.06
5.89	4.46
8.26	3.76
9.50	4.18
9.89	2.73
5.27	2.17
2.44	0.10
5.45	0.09
4.55	
1.89	
0.50	
0.70	
0.55	

CUMULATIVE CURVE SAND-SILT-CLAY

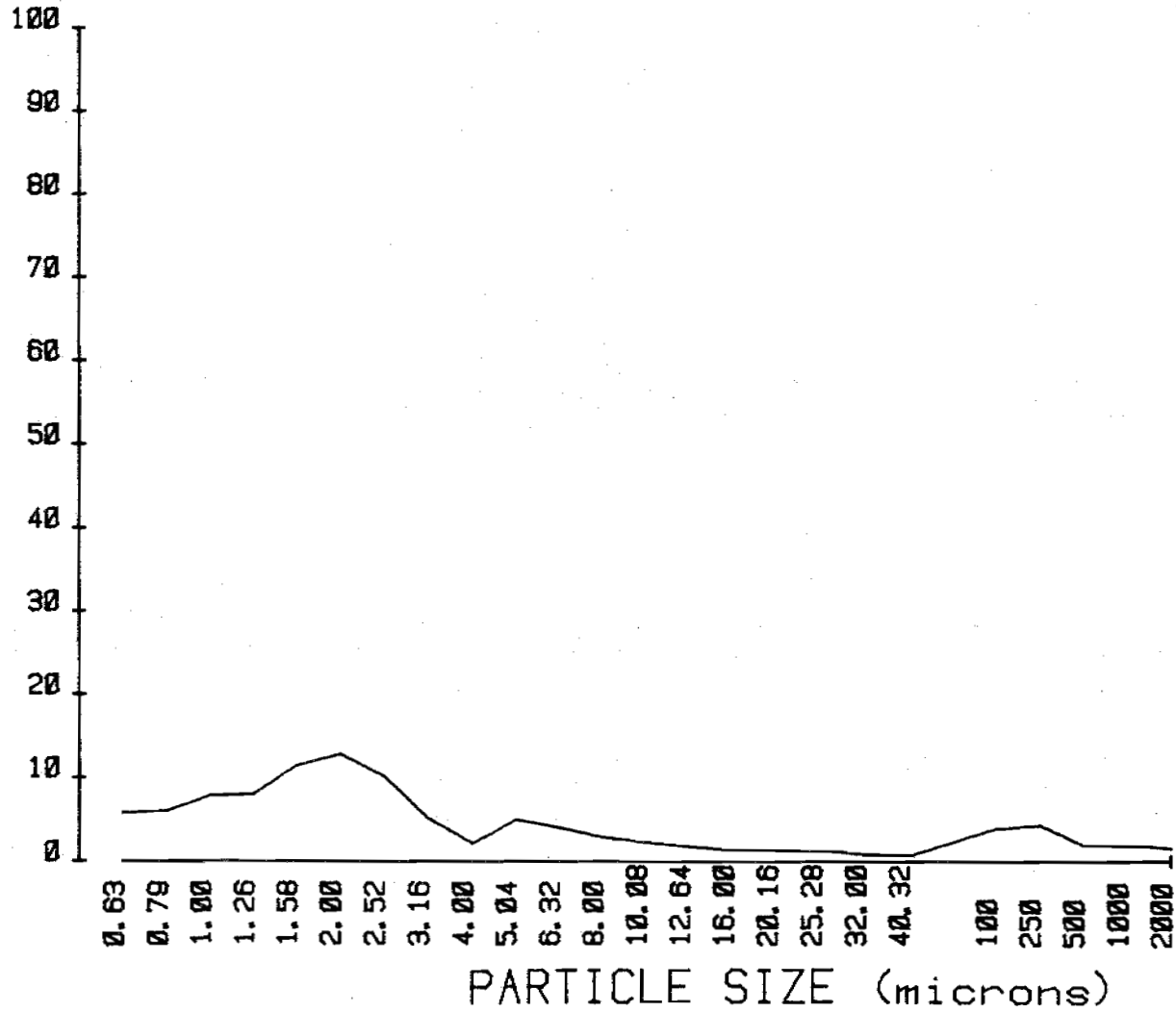
ID M2733-3



736

PLOT SAND-SILT-CLAY

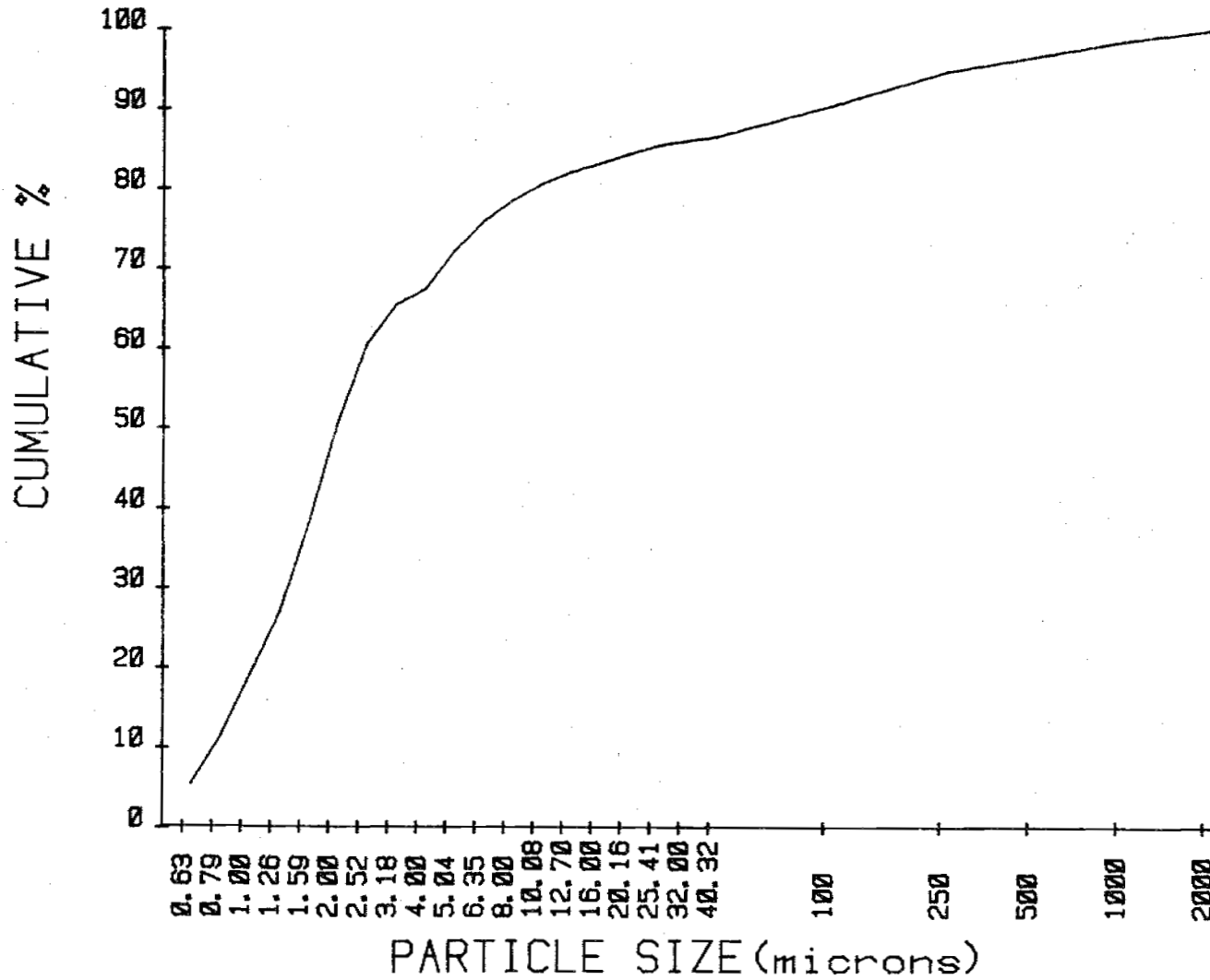
ID M2733-4



5.59	3.75
5.85	2.64
7.64	2.00
7.82	1.52
11.23	1.10
12.58	1.17
9.91	1.09
4.91	0.60
1.98	0.50
4.72	0.07
3.83	
4.25	
1.85	
1.90	
1.51	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2733-4



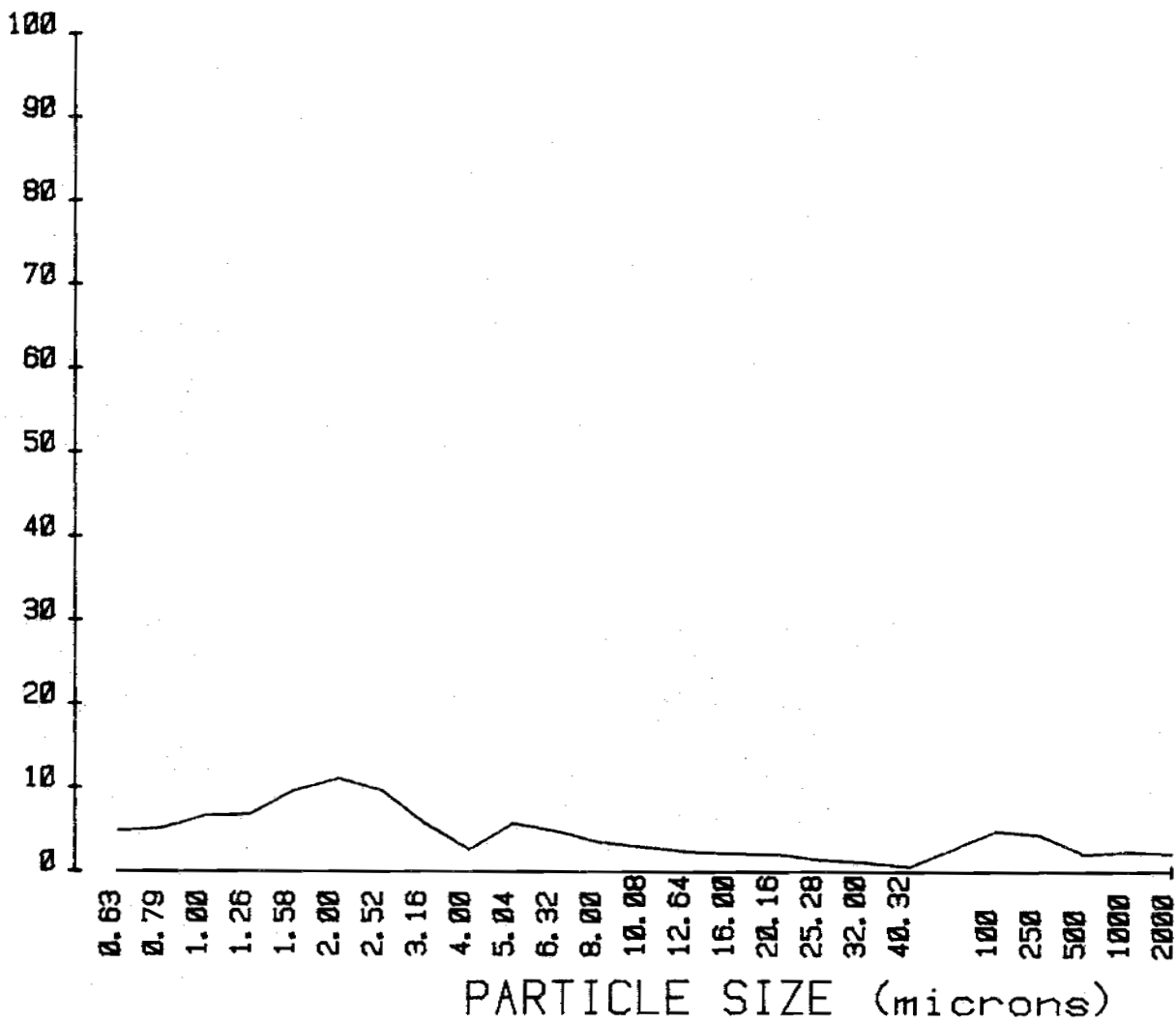
5.59	75.98
11.45	78.61
19.08	80.62
26.90	82.13
38.19	83.29
50.71	84.40
60.62	85.49
65.54	86.00
67.50	86.59
72.22	88.68
75.98	
78.61	
80.62	
82.13	
83.29	
84.40	
85.49	
86.00	
86.59	
88.68	
90.49	
94.74	
96.59	
98.49	
100.00	

738

PLOT SAND-SILT-CLAY

ID M2733-5

687  
739  
x



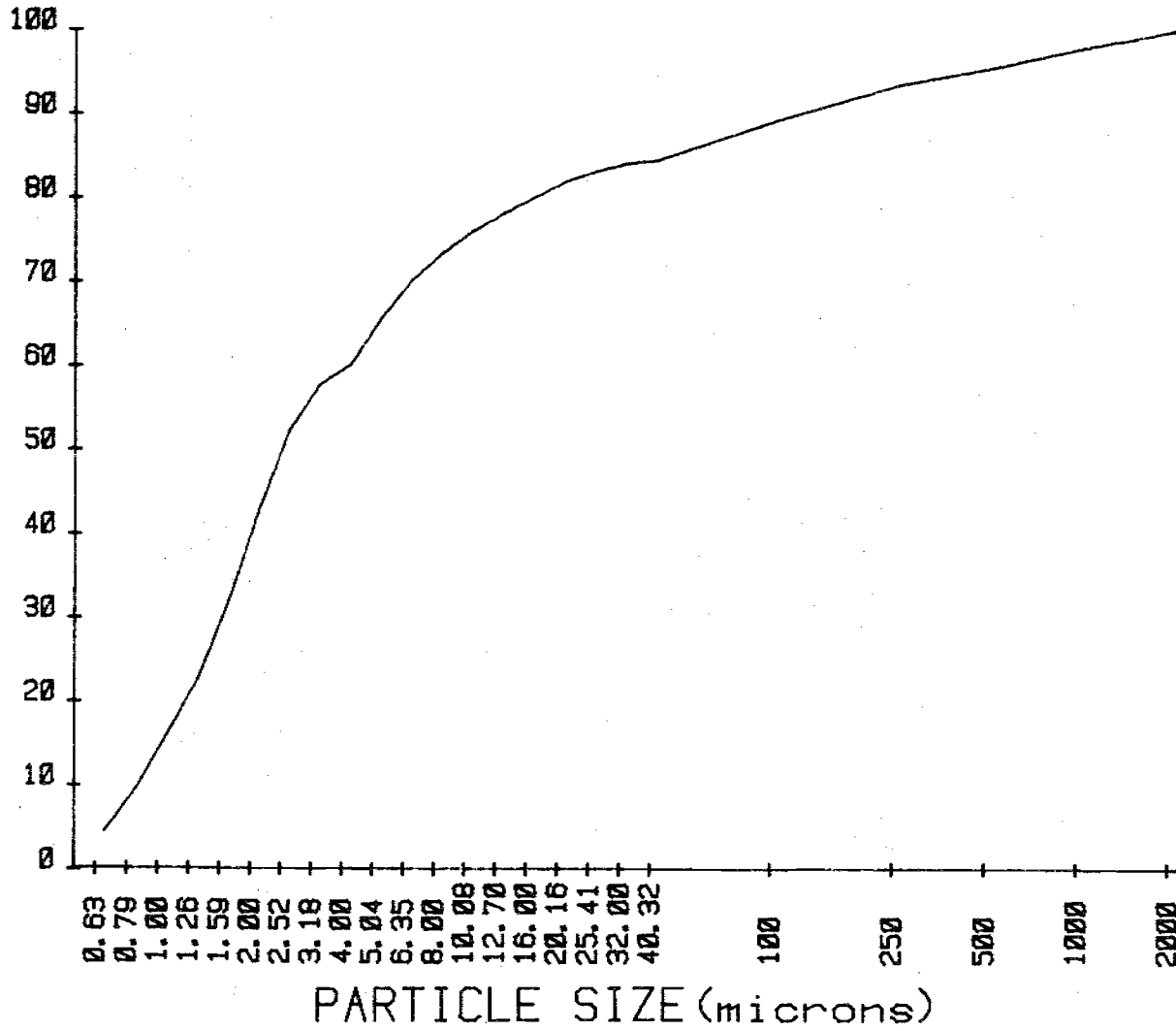
4.63	4.55
4.97	3.24
6.44	2.65
6.63	2.12
9.42	1.99
10.83	1.85
9.39	1.28
5.47	0.93
2.48	0.38
5.58	0.08
4.69	
4.22	
2.82	
2.36	
2.11	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2733-5

077

CUMULATIVE %



4.83	70.21
9.50	73.45
16.83	76.10
22.86	78.22
32.88	80.15
42.91	82.01
52.29	83.21
57.78	84.14
60.16	84.52
65.67	84.60
69.29	
73.45	
76.10	
78.22	
80.15	
82.01	
83.21	
84.14	
84.52	
84.60	
88.29	
93.51	
95.53	
97.80	
100.00	

K59

Mg-saturated, glycolated

1109010-3

79-MT-2733-3

B24 20-44 cm

Slides prepared by: Falen and Blank

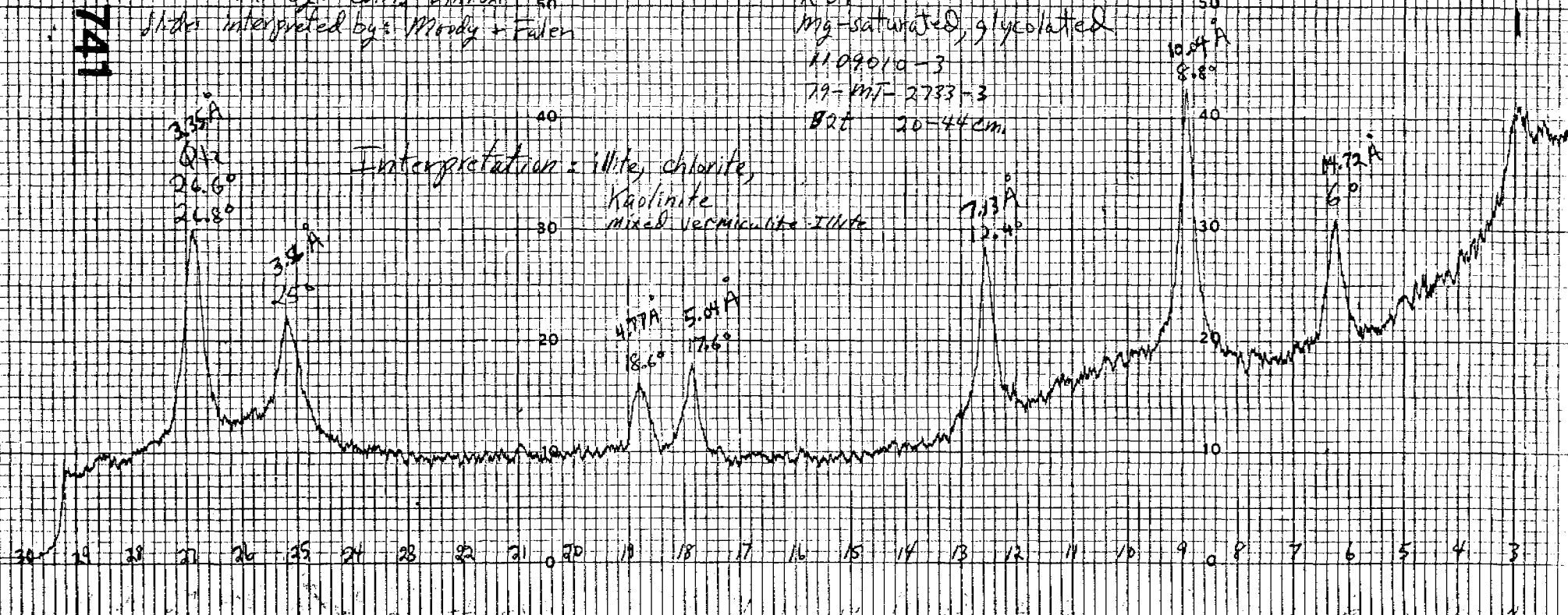
Slides run by: Chris Dillon

Slides interpreted by: Moody and Falen

Slides prepared by: Falen & Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody & Falen

K59  
Mg-saturated, glycolated  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

Interpretation = illite, chlorite,  
kaolinite  
mixed vermiculite-illite



117

20



K59  
K-saturated, air dried  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

742

3.35 Å  
26.6°  
26.6°

3.5587 Å  
25.2°

4.7663 Å  
18.6°  
5.0848 Å  
17.6°

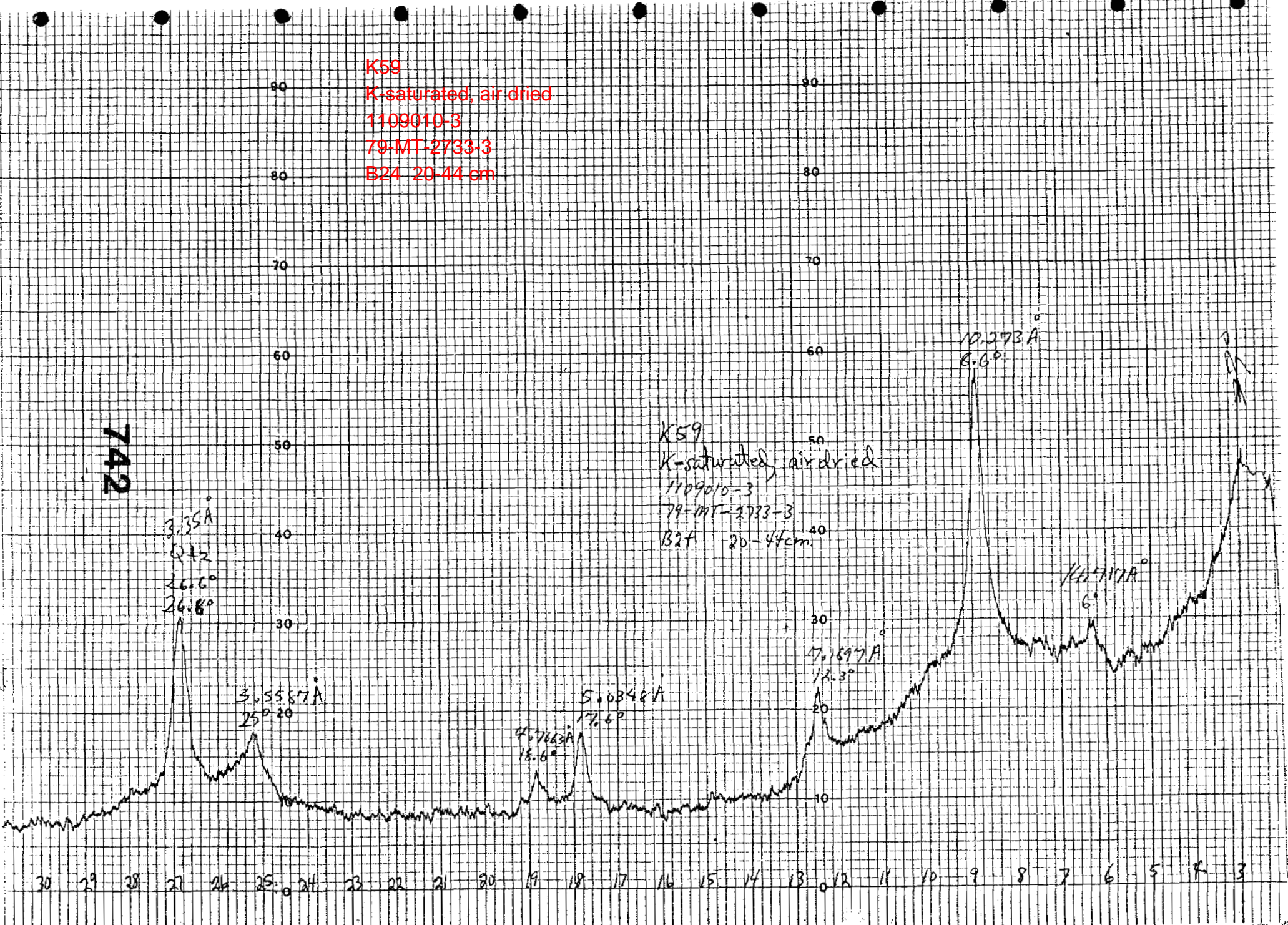
K59  
K-saturated, air dried  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

7.1897 Å  
12.3°

10.273 Å  
8.6°

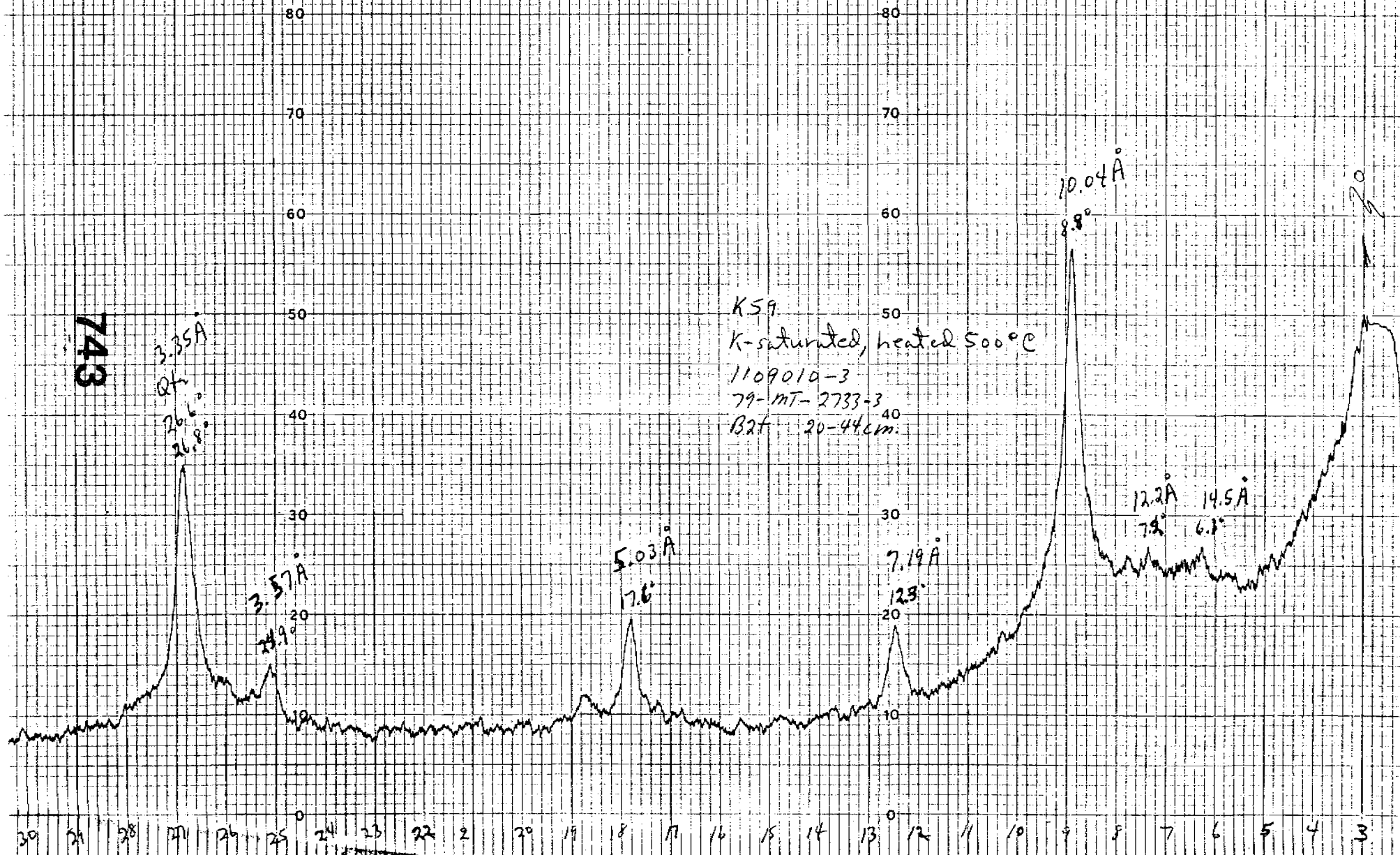
14.117 Å  
6°

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3





K59  
K-saturated, heated 500 degrees C  
1109010-3  
79-MT-2733-3  
B24 20-44 cm



K59  
K-saturated, heated 500°C  
1109010-3  
79-MT-2733-3  
B24 20-44 cm

Unnamed Gravelly Silt Loam 79-MT-2734 (0505010-2)

Classification: loamy skeletal, mixed, frigid Typic Glossoboralf.

General Site Characteristics

Location: Lincoln County, Montana; southwest 1/4 of section 15, T. 29N., R. 31W.

Forest: Kootenai National Forest

Area: Little Hoodoo, point 2

Described By/Date: Marci Neuhauser on June 5, 1979

Parent Rock/Material: ash/alluvium

Habitat Type: (*Pseudotsuga menziesii*)/(*Linnaea borealis*)/(*Symphoricarpos albus*)

Topography:

Landform: sidehill

Weathering:

Formation Name: Quaternary glacial over Wallace

Slope: 15 percent

Aspect: north

Elevation: 2860 feet

Soil Depth:

Eff. Rooting Depth:

Litter Type: MOR

Surface Rock: 0 percent

Climate: cryic, udic

Precipitation: 30 inches

Erosion:

Infiltration: rapid

Permeability: slow

Storage:

Drainage: slow

Air Temp:

Soil Temp at 20 inches: 12.2 deg. C

Salt/Alkal:

Remarks:

Pedon Description

O1&O2 2.5-0 centimeters (1.5-0 inches).

A2 Thin and discontinuous.

B2 0-18 centimeters (0-7 inches). Yellowish brown (10YR 5/8) moist; gravelly silt loam; weak moderate subangular blocky structure; friable, slightly sticky and nonplastic; 24 percent gravels by weight; many fine and very fine, medium and coarse roots; many fine and very fine vesicular and many fine and very fine tubular discontinuous pores; medium acid pH 5.8, percolation rapid; clear wavy boundary.

IIA2 18-46 centimeters (7-18 inches). Light yellowish brown (10YR 6/4) moist; gravelly silt loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; 34 percent gravels by weight; few very fine roots; few fine and and fine vesicular pores; strongly acid pH 5.4, noncalcareous; percolation rapid; gradual wavy boundary.

79-MT-2734 (cont.)

I1A&B        46-81 centimeters (18-32 inches). Pale yellow (2.5Y 7/4) moist; gravelly silt loam; moderate coarse subangular blocky structure; firm, sticky and plastic; 33 percent gravels by weight; few fine and many very fine vesicular pores; strongly acid pH 5.3, noncalcareous; percolation moderate; gradual wavy boundary.

I1B2t        81-101 centimeters (32-40 inches). Dark yellowish brown (10YR 4/6) moist; gravelly silt loam; strong moderate angular blocky structure; very friable, sticky and plastic; many moderately thick clay films occur on the faces of peds; 43 percent gravels by weight; many fine tubular discontinuous, and many very fine vesicular pores; strongly acid pH 5.1, noncalcareous; percolation moderate.

Pedon: Unnamed Gravelly Silt Loam 79-MT-2734 (0505010-2)

Date: January 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides				Spodic
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al	
1	B1-B2	2.5- 0	NS	NS	NS	NS					
2	B2	0- 18	5.8	0.14	58	1.5					
3	IIA2	18- 46	5.4	0.12	31	0.2					
3	IIA&B	46- 81	5.3	0.11	30	0.0					
4	IIB2t	81-101	5.1	0.09	37	0.0					

746

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base	OM	OC	N	C:N	Soil	NaF pH
	Ca	Mg	Na	K	H	Saturation					ratio	Fraction	
	meq/100 gms						%		%				
1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
2	2.8	1.0	0.1	0.3	11.8	14.8	26	2.70	1.57	0.093	17	0.76	10.0
3	1.5	1.1	0.1	0.2	3.8	6.3	43	0.59	0.34	0.030	11	0.66	8.4
3	1.4	1.1	0.1	0.2	3.6	5.5	44	0.44	0.26	0.027	10	0.67	8.1
4	1.5	2.0	0.1	0.2	5.1	7.5	43	0.41	0.24	0.026	9	0.57	8.1

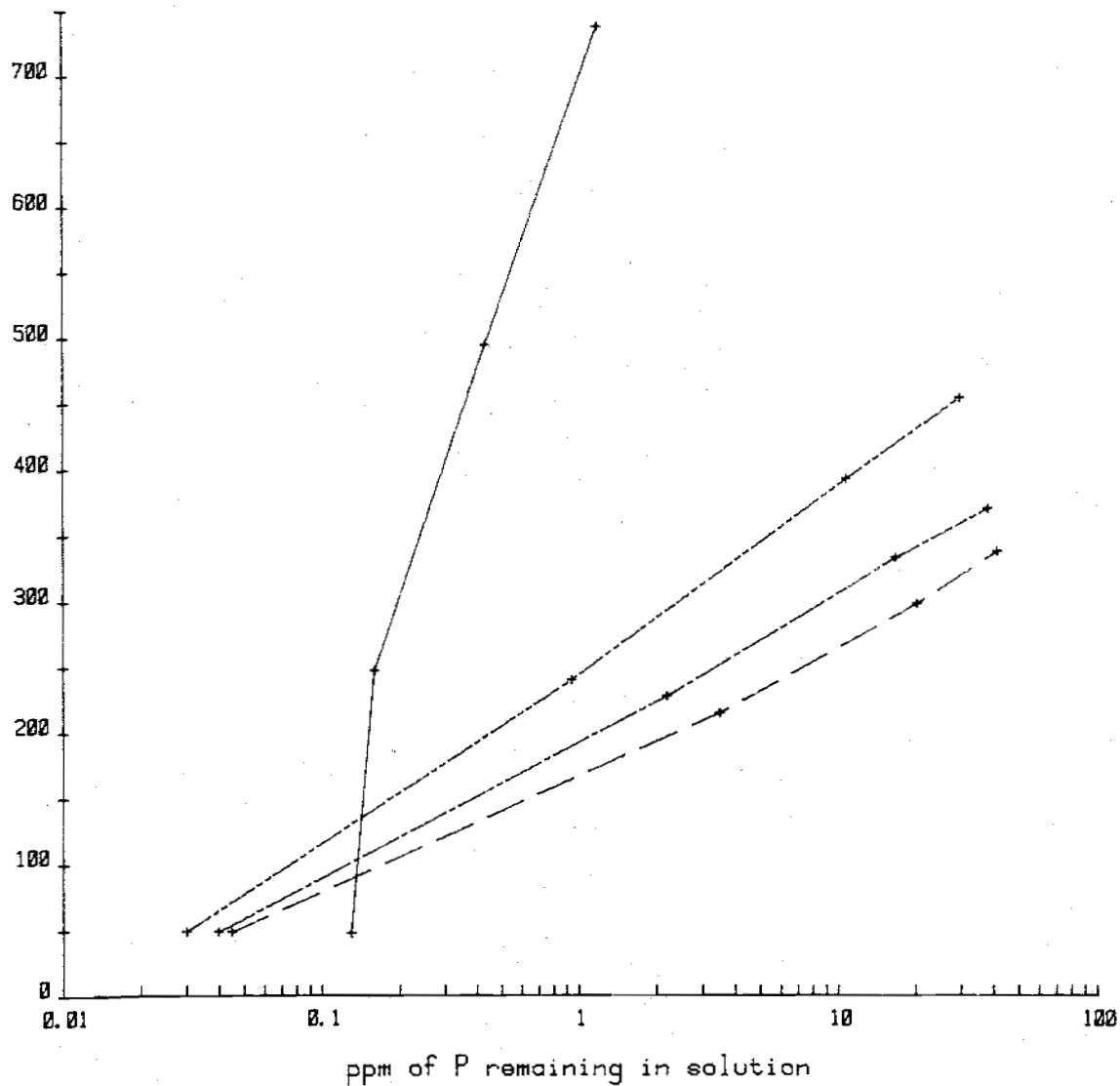
Remarks: CEC's were leached with 10% acidified NaCl  
 Nitrogens and CEC's were run on the Technicon Autoanalyzer  
 NS-no sample

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-MT-2734

747  
µg P sorbed/g soil



µg/g soil    Soln ppm

————— B2

49    0.13

248    0.16

496    0.43

738    1.18

----- IIA2

50    0.05

215    3.49

298    20.16

338    41.16

----- IIA&B

58    0.04

228    2.20

333    16.68

371    37.92

----- IIB2t

58    0.03

241    0.94

393    10.68

455    29.52

Pedon: Unnamed Gravelly Silt Loam 79-MT-2734 (0505010-2)

Date: September 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	NS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	(0.002	wt.	vol.	
cm	%								%		
2.5- 0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
0- 18	3.16	5.42	3.81	7.46	13.74	33.58	59.39	7.03	24		Gr. silt loam
18- 46	5.53	5.84	3.74	7.22	9.94	32.27	52.02	15.71	34		Gr. silt loam
46- 81	4.12	4.45	3.44	6.30	9.20	27.50	53.85	18.65	33		Gr. silt loam
81-101	2.87	3.62	2.86	5.62	9.40	24.34	54.10	21.56	43		Gr. silt loam

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Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquid	Plastic	Plastic
	CoSi	Msi	Fsi			1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
2.5- 0						NS	NS	NS	NS	NS
0- 18						44.1	11.1	NDNP	NDNP	NDNP
18- 46						20.1	5.7	19	NP	ND
46- 81						21.1	6.8	19	NP	ND
81-101						21.2	9.3	23	15	8

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 NS-no sample  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Kootenai National Forest-LIM

Analysis by: Anita and Debbie

Date: January 1981

Identification		M2734-1	M2734-2	M2734-3	M2734-4
Units		-----%			
TC (0.63-2.00)		7.03	15.71	18.65	21.56
TSi (2.00-50)		59.39	52.02	53.85	54.10
TS (50-2000)		33.58	32.27	27.50	24.34
Clay	0.63-0.794	0.96	2.38	3.38	3.86
	0.794-1.00	1.06	2.58	3.23	3.72
	1.00-1.26	1.39	3.14	3.73	4.30
	1.26-1.59	1.45	3.12	3.44	4.08
	1.59-2.00	2.17	4.48	4.86	5.61
Fine Silt	2.00-2.52	2.86	5.64	5.85	6.48
	2.52-3.17	3.31	5.84	6.27	6.21
	3.17-4.00	2.86	3.98	4.09	4.09
	4.00-5.04	2.35	2.47	2.65	2.38
Medium Silt	5.04-6.35	4.59	5.15	5.35	5.09
	6.35-8.00	5.23	5.06	5.03	4.73
	8.00-10.08	5.50	4.33	4.33	4.00
	10.08-12.70	7.08	4.06	3.96	4.24
	12.70-16.0	6.98	3.88	3.39	3.93
	16.0-20.2	6.73	3.05	3.47	3.03
Coarse Silt	20.2-25.4	5.74	3.02	2.36	3.03
	25.4-32.0	3.32	2.48	2.57	2.98
	32.0-40.3	2.21	1.53	2.31	1.92
	40.3-50.8	0.53	0.57	1.02	1.95
	50.8-64.0	0.10	0.97	1.24	0.05
VFS (50-100)		13.74	9.94	9.20	9.40
FS (100-250)		7.46	7.22	6.30	5.62
MS (250-500)		3.81	3.74	3.44	2.86
CoS (500-1000)		5.42	5.84	4.45	3.62
VCoS (1000-2000)		3.16	5.53	4.12	2.87
Greater than 2000		24	34	33	43
Textural Class		Gr. SiL	Gr. SiL	Gr. SiL	Gr. SiL

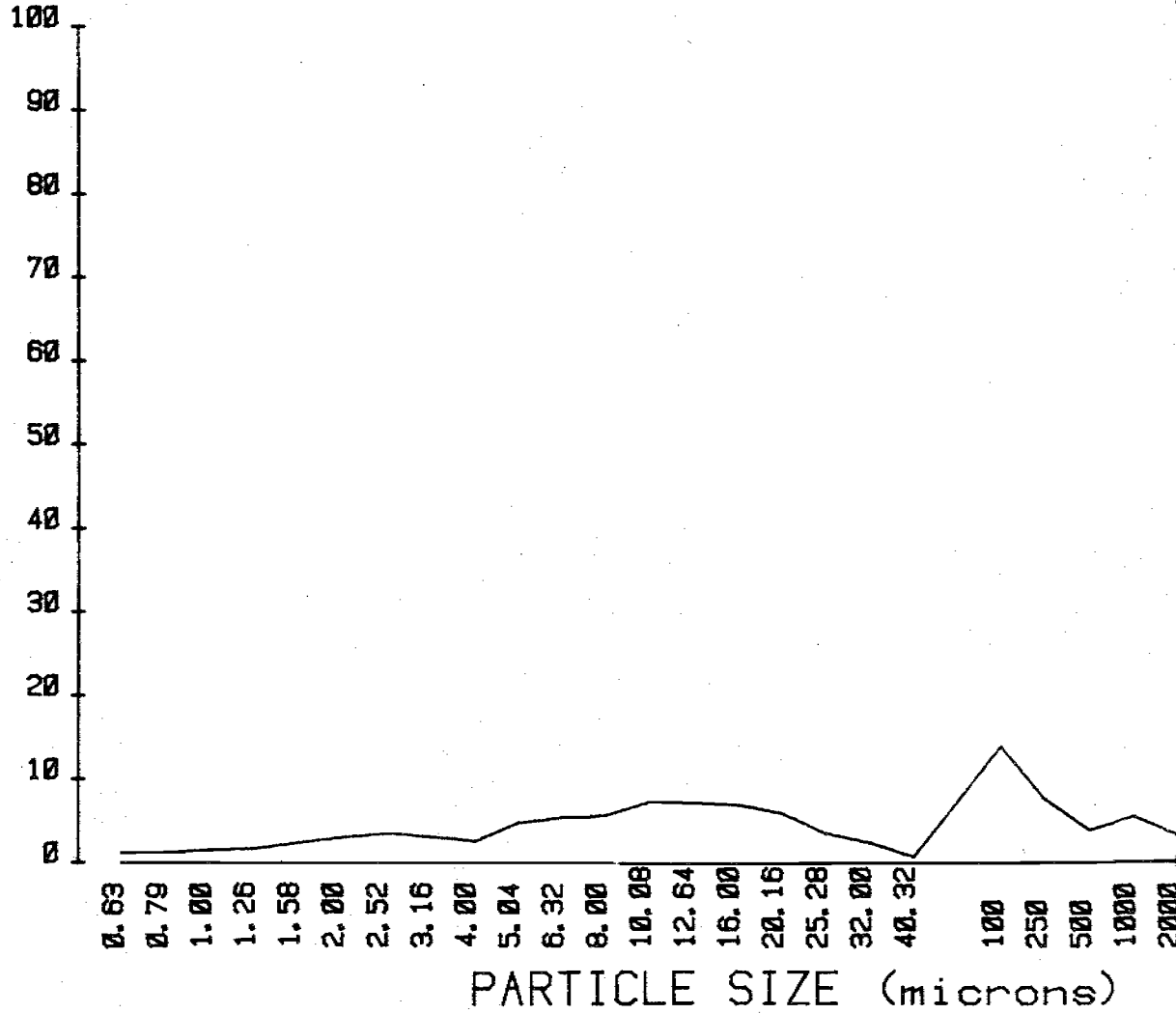
Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID M2734-1

057

z

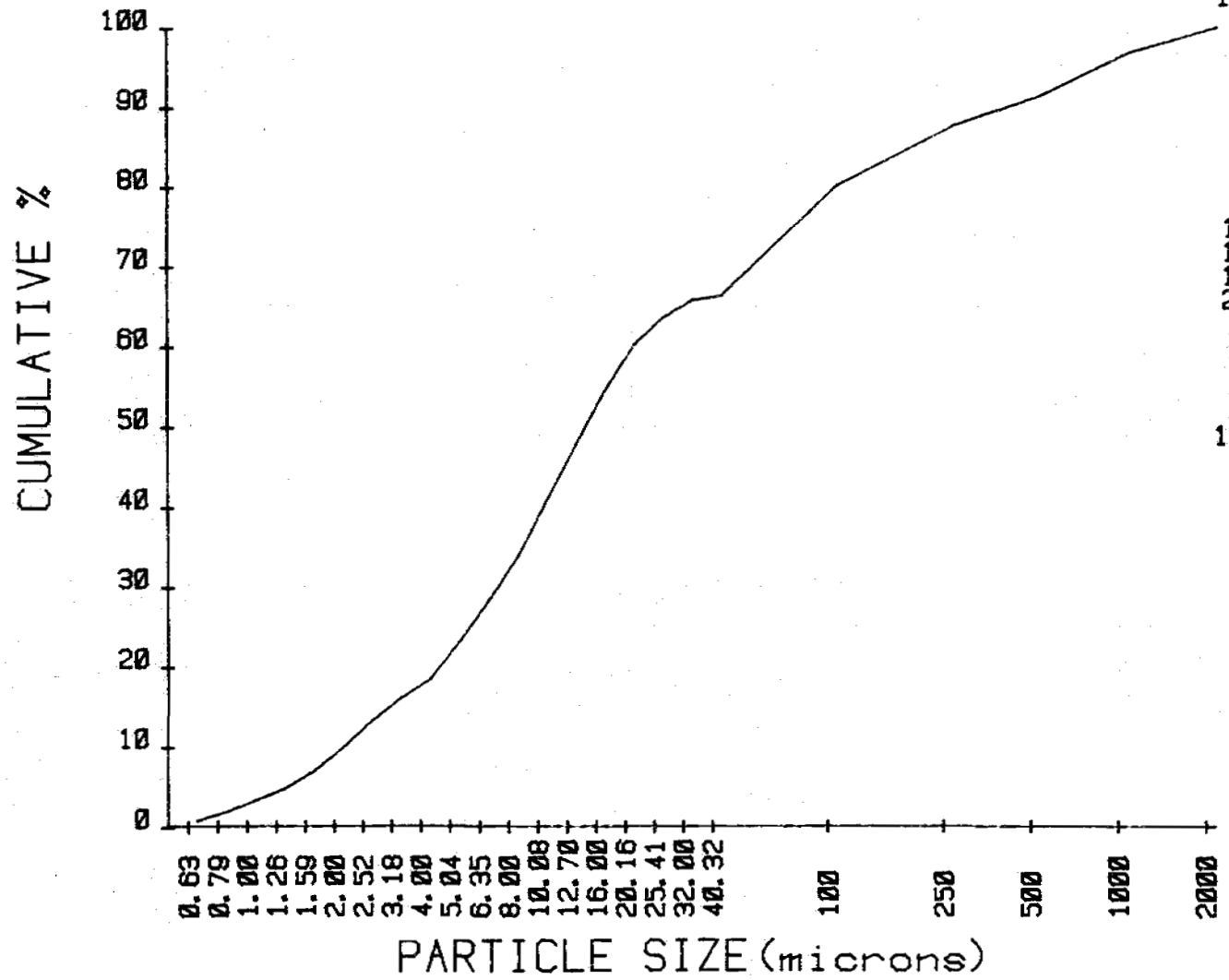




CUMULATIVE CURVE SAND-SILT-CLAY

ID M2734-1

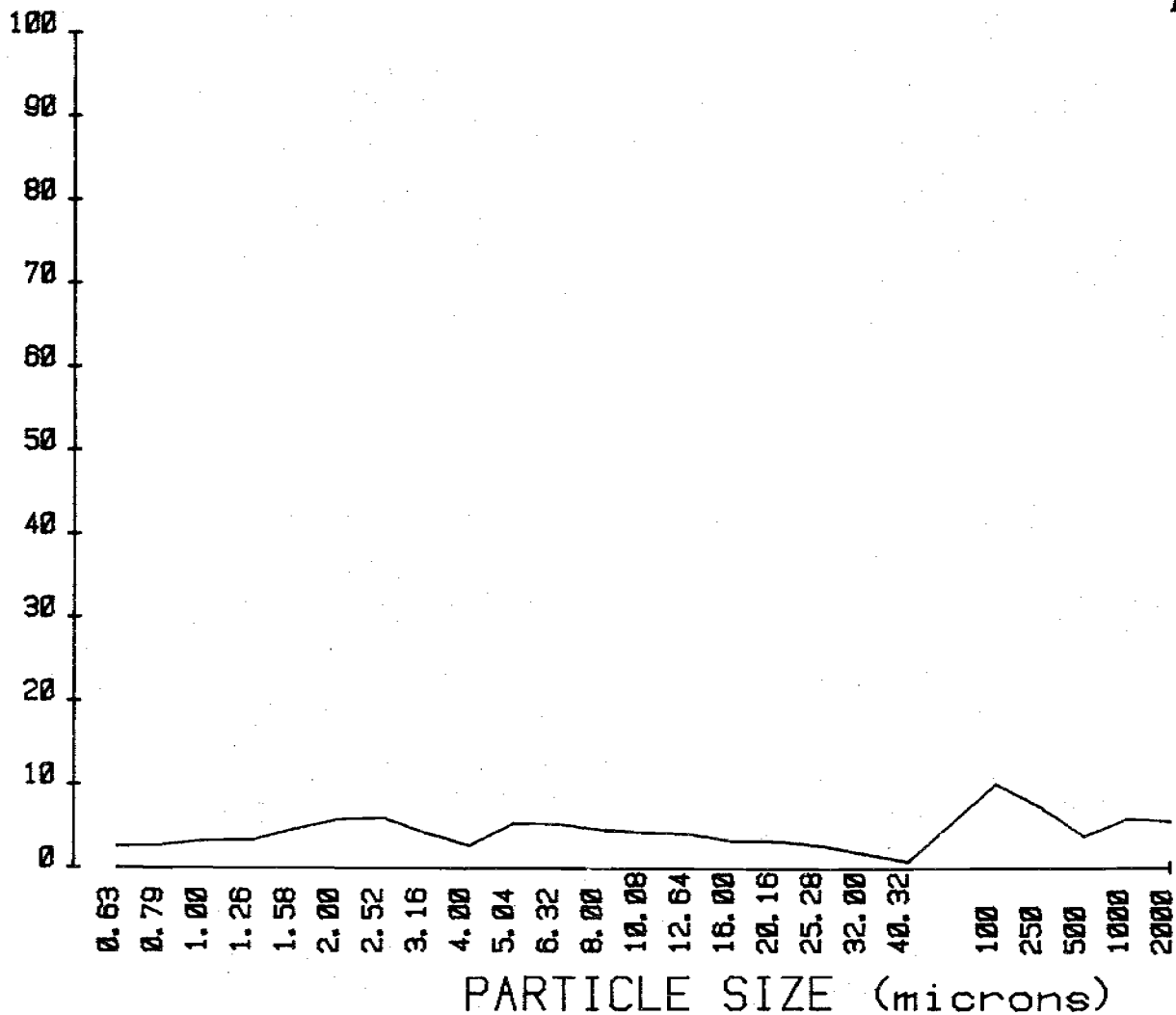
751



0.96	28.23
2.02	33.73
3.41	40.81
4.86	47.79
7.03	54.52
9.89	60.25
13.19	63.57
16.05	65.78
18.40	66.32
23.00	66.42
80.16	
87.62	
91.43	
96.85	
100.01	

PLOT SAND-SILT-CLAY

ID M2734-2



2.38	5.06
2.58	4.33
3.14	4.06
3.12	3.88
4.48	3.05
5.64	3.02
5.64	2.48
3.98	1.53
2.47	0.57
5.15	0.97
0.84	
7.22	
3.74	
0.84	
5.53	

752

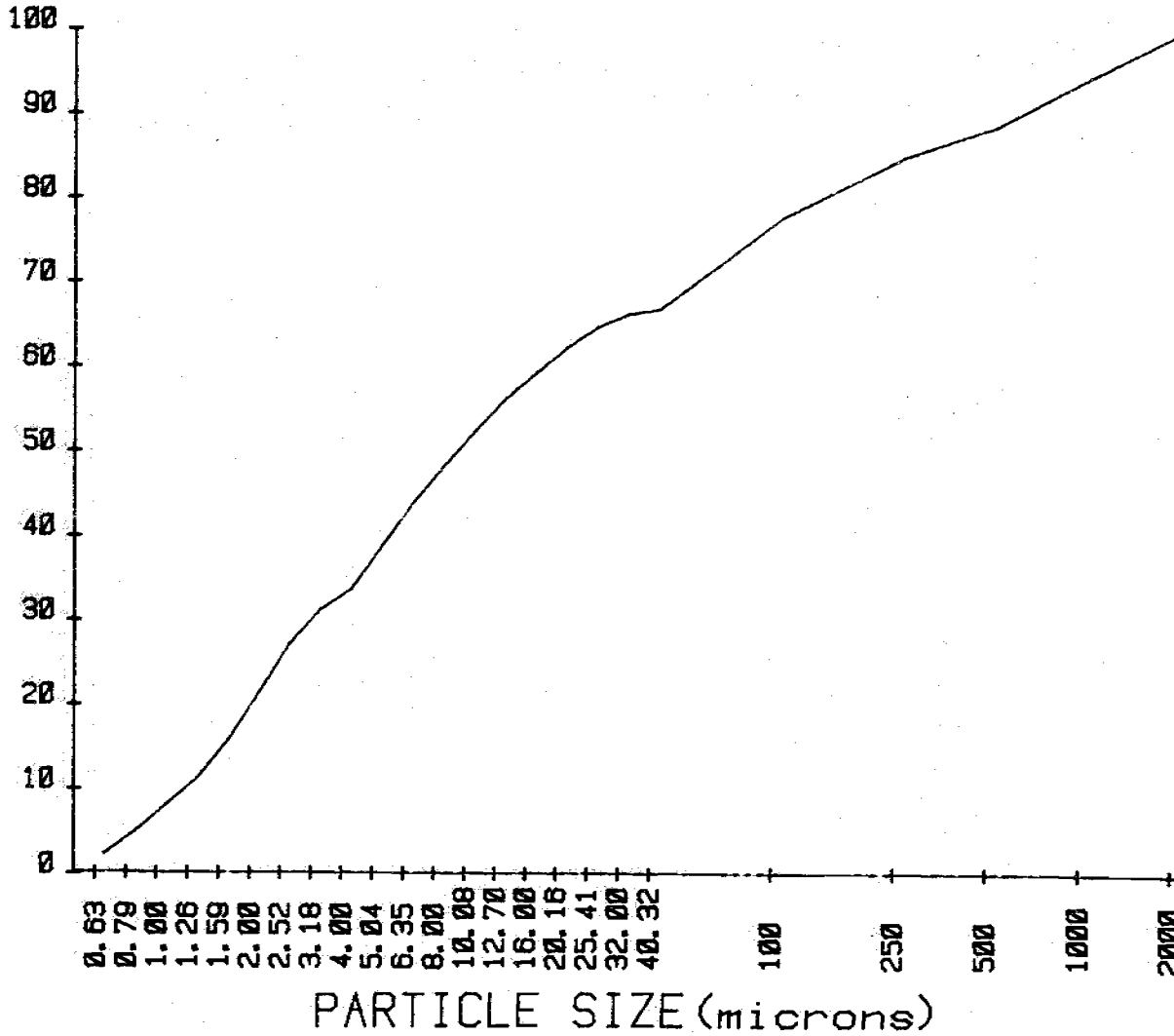
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CUMULATIVE CURVE SAND-SILT-CLAY

ID M2734-2

753

CUMULATIVE %



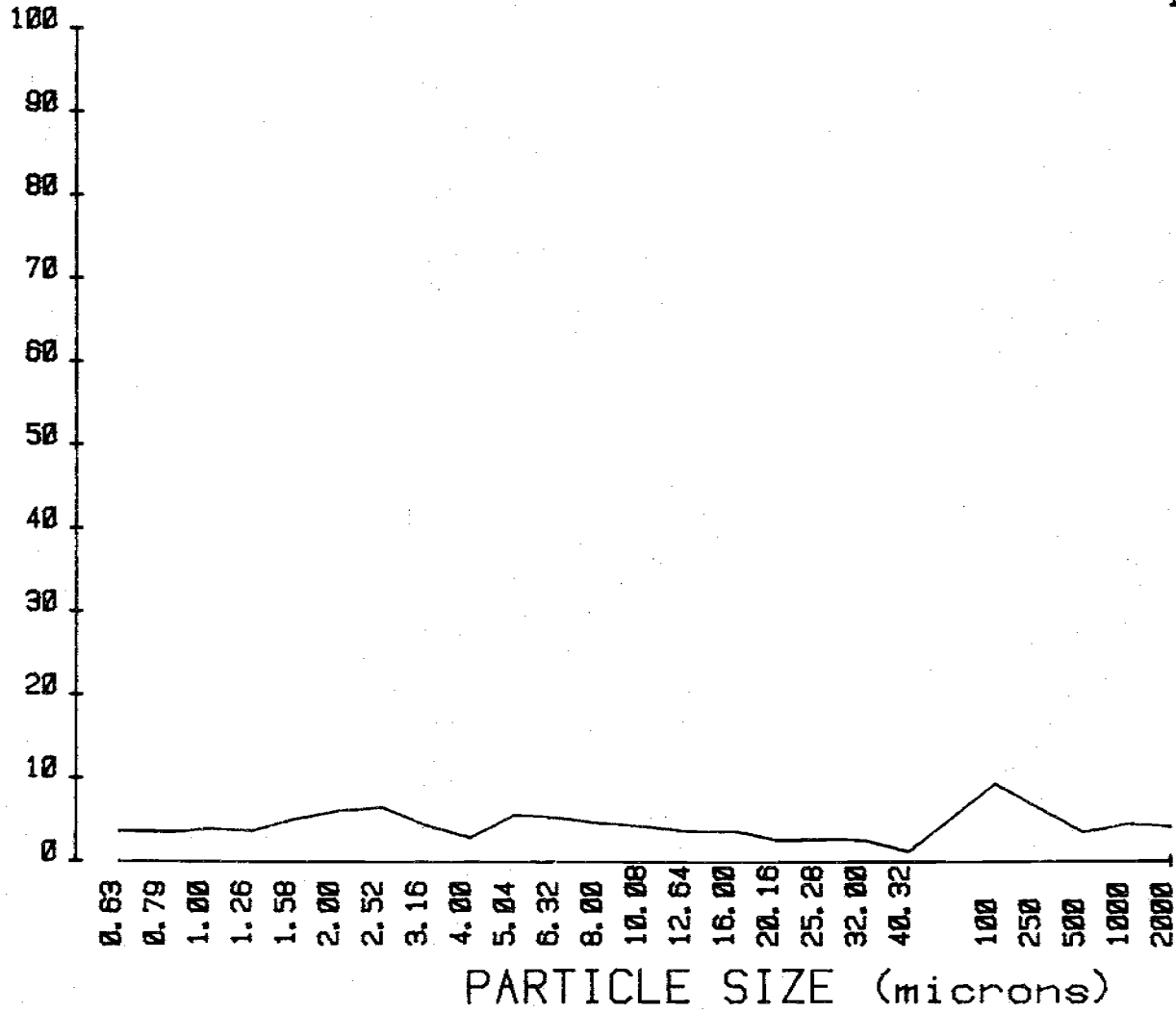
2.38	43.85
4.97	48.18
8.11	52.24
11.23	56.12
15.71	59.17
21.35	62.19
27.18	64.66
31.17	66.20
33.63	66.76
38.78	67.73
77.67	
84.89	
88.63	
94.47	
100.00	

PLOT SAND-SILT-CLAY

ID M2734-3

754

x

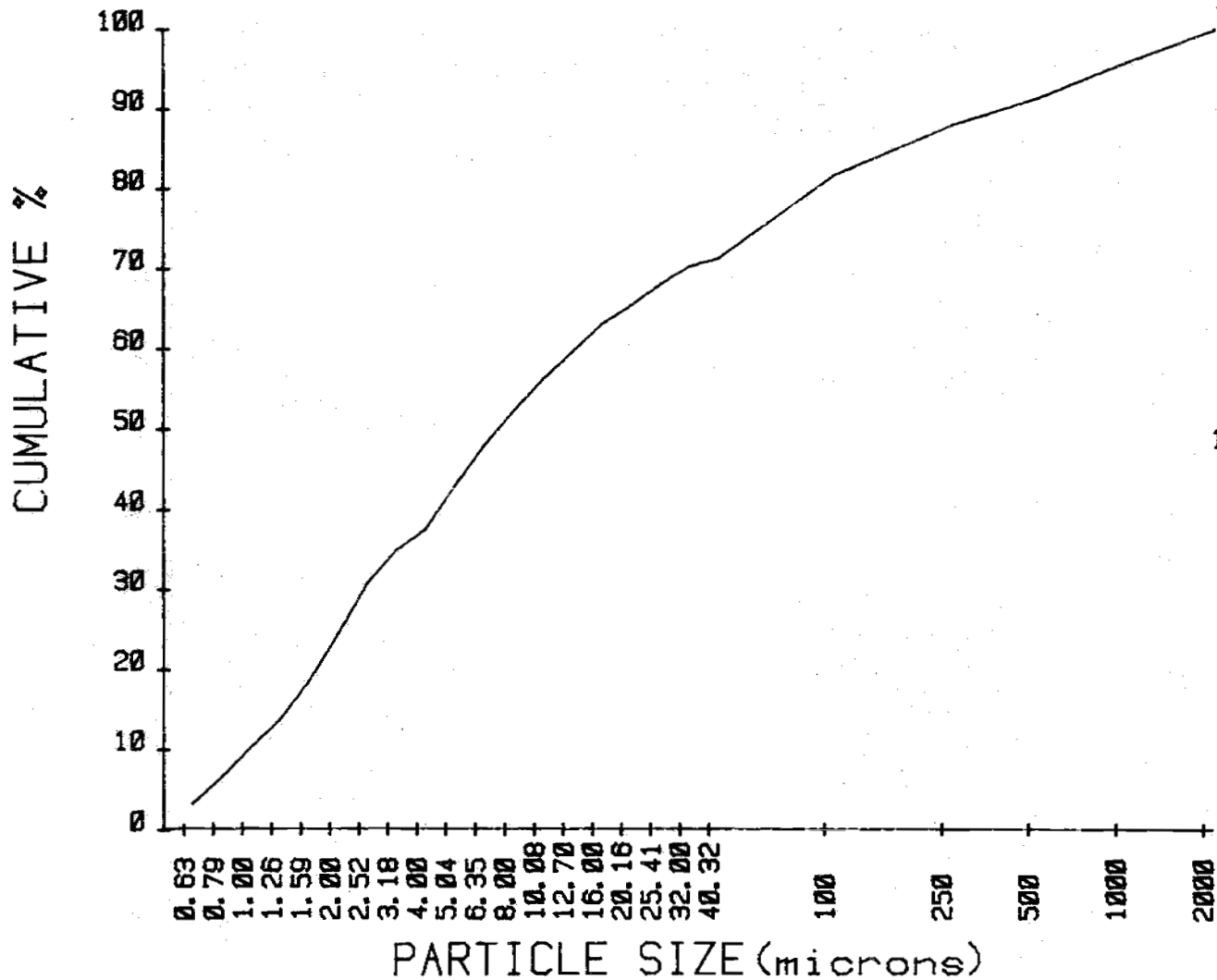


3.38	5.03
3.23	4.33
3.73	3.96
3.44	3.39
4.86	3.47
5.85	2.36
6.27	2.56
4.88	2.31
2.64	1.02
5.35	1.24
8.28	
6.38	
3.44	
4.45	
4.12	

CUMULATIVE CURVE SAND-SILT-CLAY

ID M2734-3

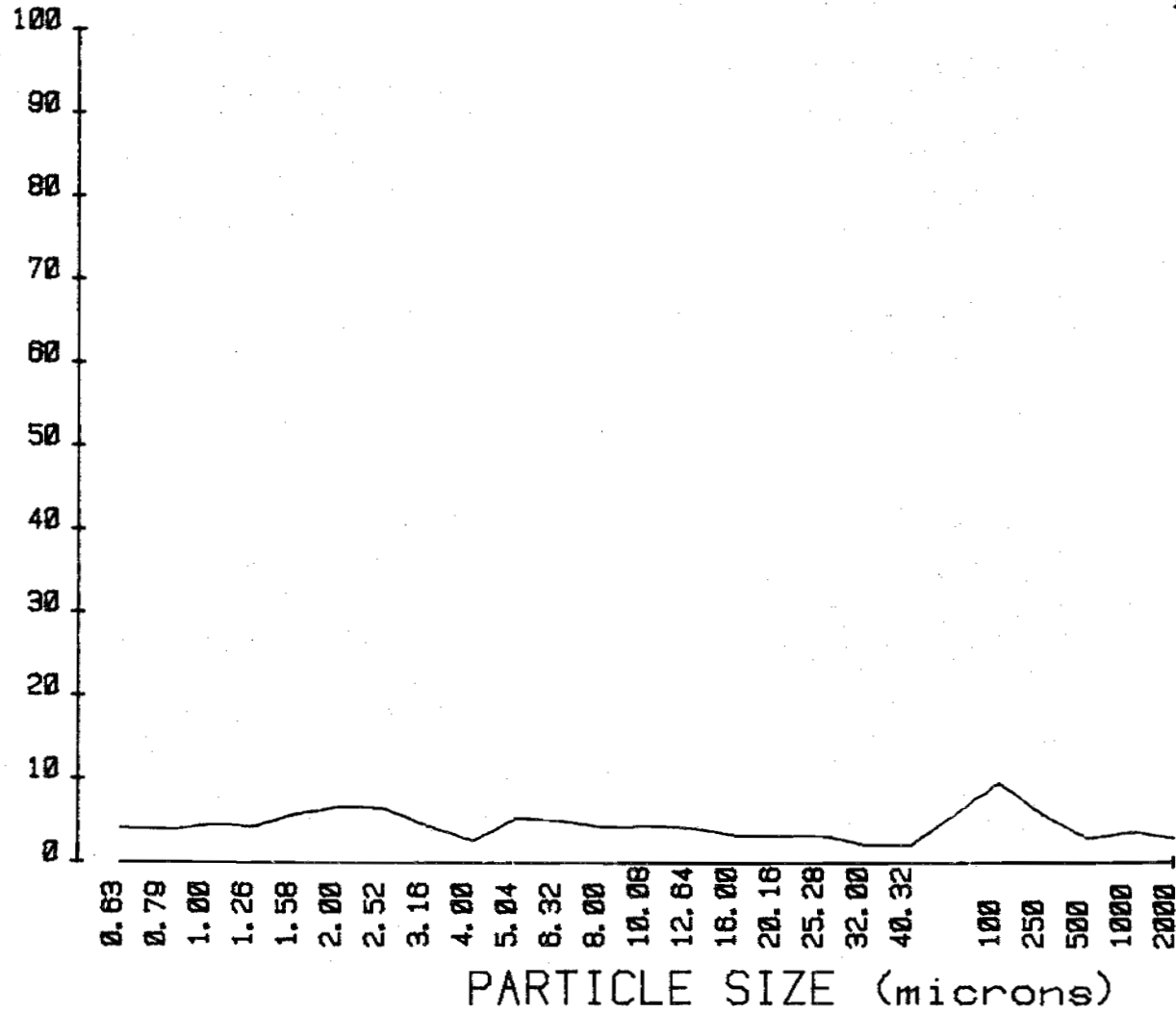
755



3.38	47.87
6.62	52.20
10.34	56.16
13.78	59.55
18.65	63.01
24.50	65.37
30.76	67.94
34.85	70.24
37.49	71.26
42.84	72.50
81.70	
88.00	
91.44	
95.89	
100.01	

PLOT SAND-SILT-CLAY

ID M2734-4

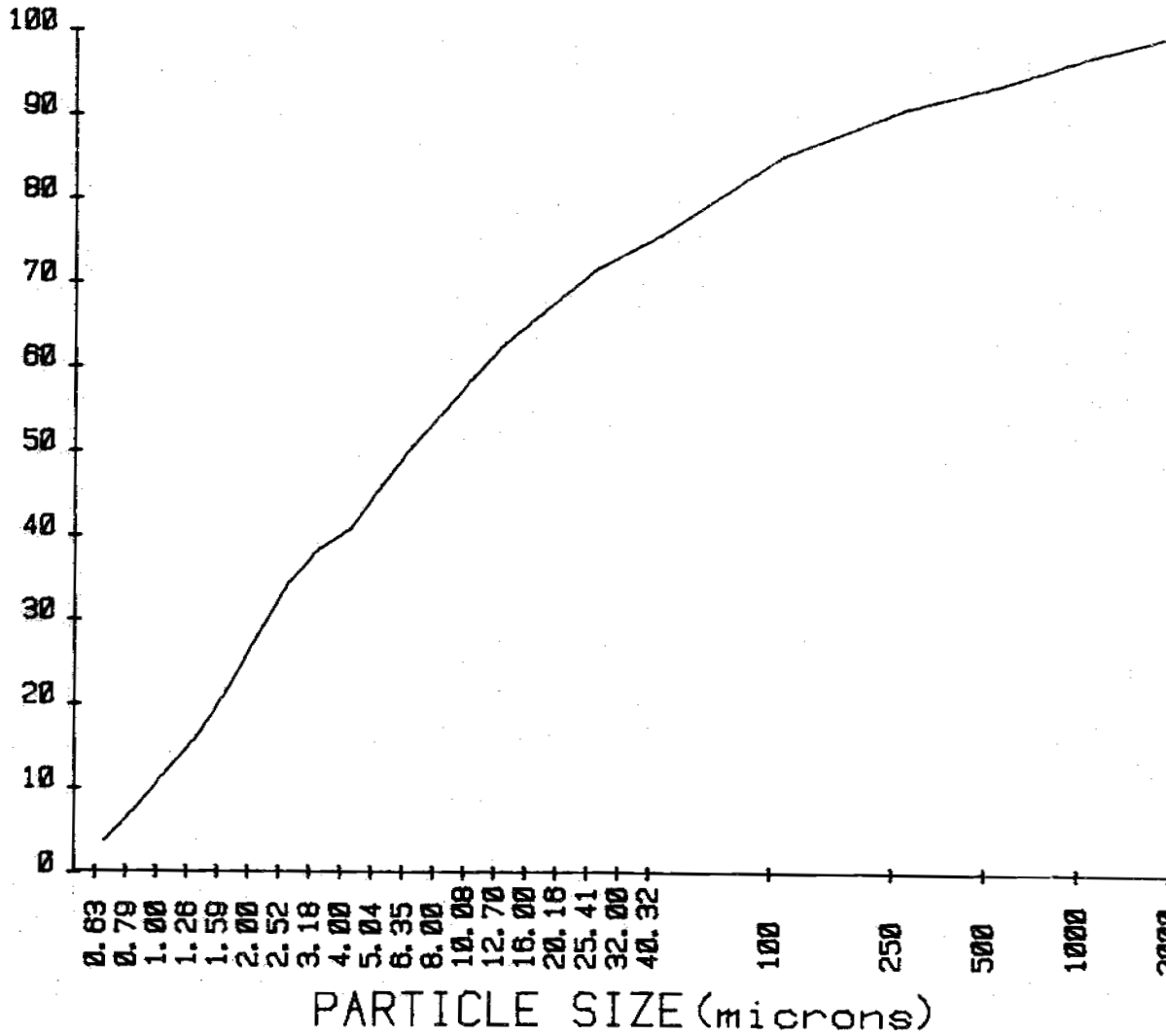


CUMULATIVE CURVE SAND-SILT-CLAY

ID M2734-4

757

CUMULATIVE %



3.86	50.54
7.58	54.54
11.88	58.78
15.96	62.71
21.56	65.74
28.04	68.77
34.25	71.74
38.34	73.66
40.72	75.61
45.81	75.86
85.06	
90.68	
93.54	
97.16	
100.03	

# NEZPERCE





Unnamed Gravelly Loam 79-ID-25147 (Coolwater Ridge)

Classification: coarse-loamy, mixed Typic Cryunbrept.

General Site Characteristics

Location: Idaho County, Idaho: section 3, T. 31N., R. 8E.

Forest: Nez Perce National Forest

Area: Coolwater Ridge

Described By/Date: LH, CG, and KTW; August 15, 1979

Landform: 33

Habitat Type: Subalpine fir (*Abies lasiocarpa*)/ Common beargrass (*Xerophyllum tenax*)

Formation Name:

Parent Rock/Material: granitic slightly metamorphized Climate:

Weathering:

Precipitation:

Topography:

Erosion: runoff at sampling

Slope: 40 percent

Infiltration:

Aspect: 140 degrees

Permeability:

Elevation: 6480 feet

Storage:

Soil Depth:

Drainage: well

Eff. Rooting Depth:

Air Temp:

Litter Type:

Soil Temp at 20 inches:

Surface Rock:

Salt/Alkal:

Remarks:

Pedon Description

A1 0-17 centimeters (0-7 inches). Gravelly sandy loam; very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine, common medium roots; very strong acid pH 5.0, noncalcareous; 19 percent gravel by weight, 10 percent gravel by volume; clear smooth boundary.

B2ir 17-31 centimeters (7-12 inches). Gravelly sandy loam; dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine, and few medium roots; very strongly acid pH 5.0, noncalcareous; 18 percent gravel by weight, 10 percent gravel by volume; clear wavy boundary.

C1 31-45 centimeters (12-18 inches). Yellowish brown (10YR 5/4) gravelly loamy sand, dark yellowish (10YR 4/4) moist; massive structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; strongly acid pH 5.4, noncalcareous; 20 percent gravel by weight, 12 percent gravel by volume; clear smooth boundary.

C2 45-90 centimeters (18-36 inches). Very pale brown (10YR 7/4) gravelly loamy coarse sand, yellowish brown (10YR 5/5) moist; massive structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; strongly acid pH 5.2, noncalcareous; 25 percent gravel by weight, 16 percent gravel by volume.

Pedon: Unnamed Gravelly Sandy Loam 79-ID-25147 (Coolwater Ridge)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
1	A1	0-17	5.0	0.14	73	2.1				
2	B2ir	17-31	5.0	0.10	60	1.0				
3	C1	31-45	5.4	0.05	49	2.0				
4	C2	45-90	5.2	0.06	50	1.7				

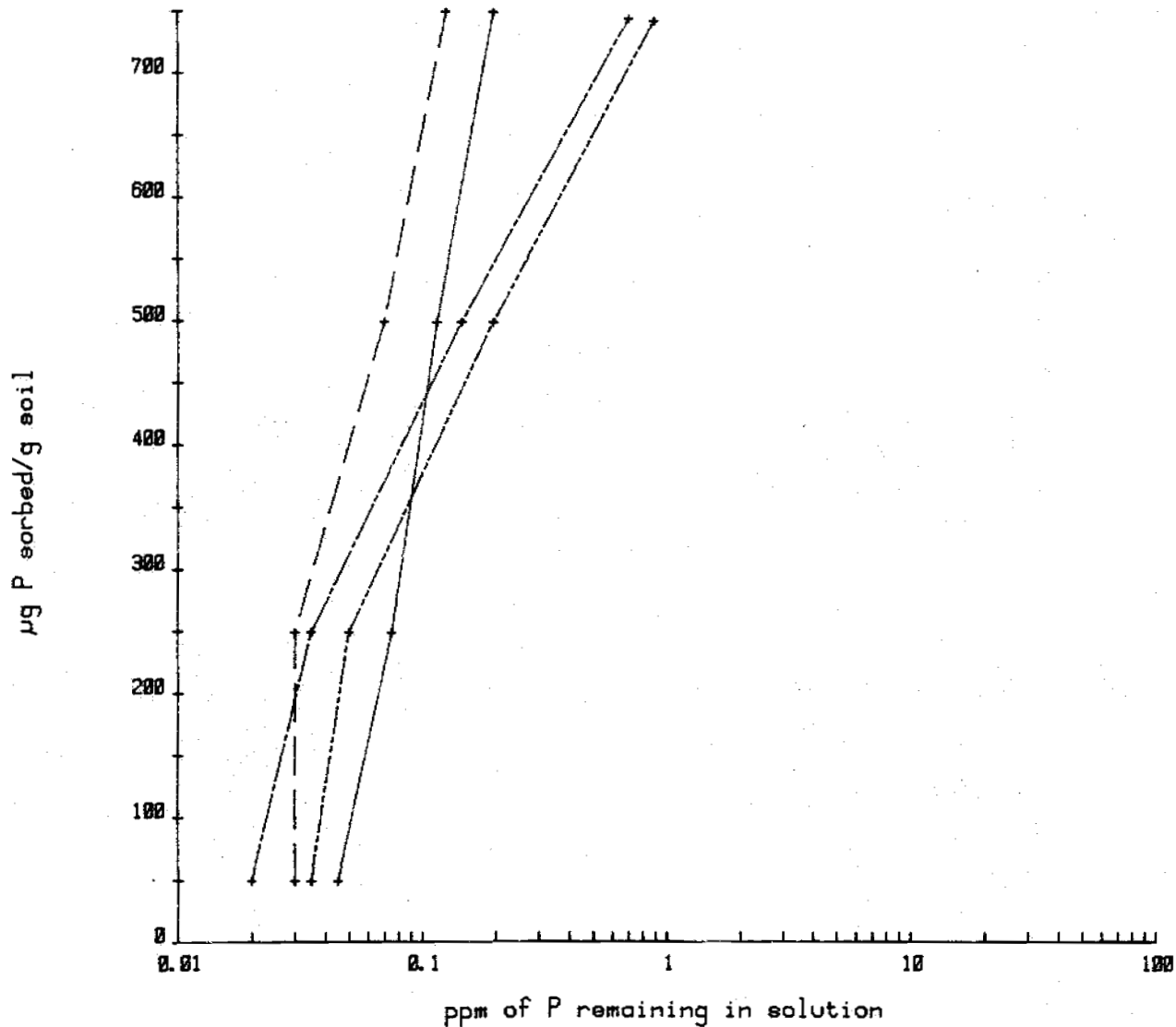
Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	OM	OC	N	C:N ratio	Soil Fraction	NaF pH
	Ca	Mg	Na	K	H								
	meq/100 gms												
1	1.0	0.5	<.1	0.8	17.4	19.1	12	6.69	3.89	0.250	16	0.81	10.9
2	0.5	0.4	<.1	0.5	14.9	15.4	8	4.01	2.33	0.165	14	0.82	11.3
3	0.2	0.1	<.1	0.3	6.2	8.2	9	0.83	0.48	0.040	12	0.80	10.2
4	0.2	0.1	<.1	0.2	6.0	7.5	8	0.68	0.39	0.028	14	0.75	10.3

Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness

# Phosphorus Isotherm

79-ID-25147



µg/g soil	Soln ppm	
----- A1		
50	0.05	
249	0.08	
499	0.12	
748	0.20	
----- B2ir		
50	0.03	
250	0.03	
499	0.07	
749	0.13	
----- C1		
50	0.02	
250	0.04	
499	0.15	
743	0.70	
----- C2		
50	0.04	
250	0.05	
499	0.20	
741	0.88	

Padon: **Unnamed Gravelly Sandy Loam** 79-ID-25147 (Coolwater Ridge)

Date: October 1980

Depth	Particle Size Distribution (mm)								Gravel & Stone		Textural Classes
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt. vol.		
cm	%								%		
0-17	5.44	14.80	12.74	21.11	11.99	66.08	29.81	4.11	19	10	Gr. sandy loam
17-31	5.04	15.74	13.14	22.56	10.98	67.46	26.68	5.87	18	10	Gr. sandy loam
31-45	4.65	16.45	16.28	26.83	15.01	79.22	18.63	2.15	20	12	Gr. loamy sand
45-90	6.02	22.35	17.30	24.06	12.94	82.67	15.43	1.90	25	16	Gr. loamy coarse sand

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Bulk Density		1/3	IS	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002	Clod	Core	Bar	Bar			
cm	%			g/cc		%		%		
0-17						20.1	14.9	NDNP	NDNP	NDNP
17-31						17.6	12.3	NDNP	NDNP	NDNP
31-45						9.6	6.8	NDNP	NDNP	NDNP
45-90						9.6	6.6	NDNP	NDNP	NDNP

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Anita Falen

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Nez Perce National Forest-LIM

Analysis by: Anita and Debbie

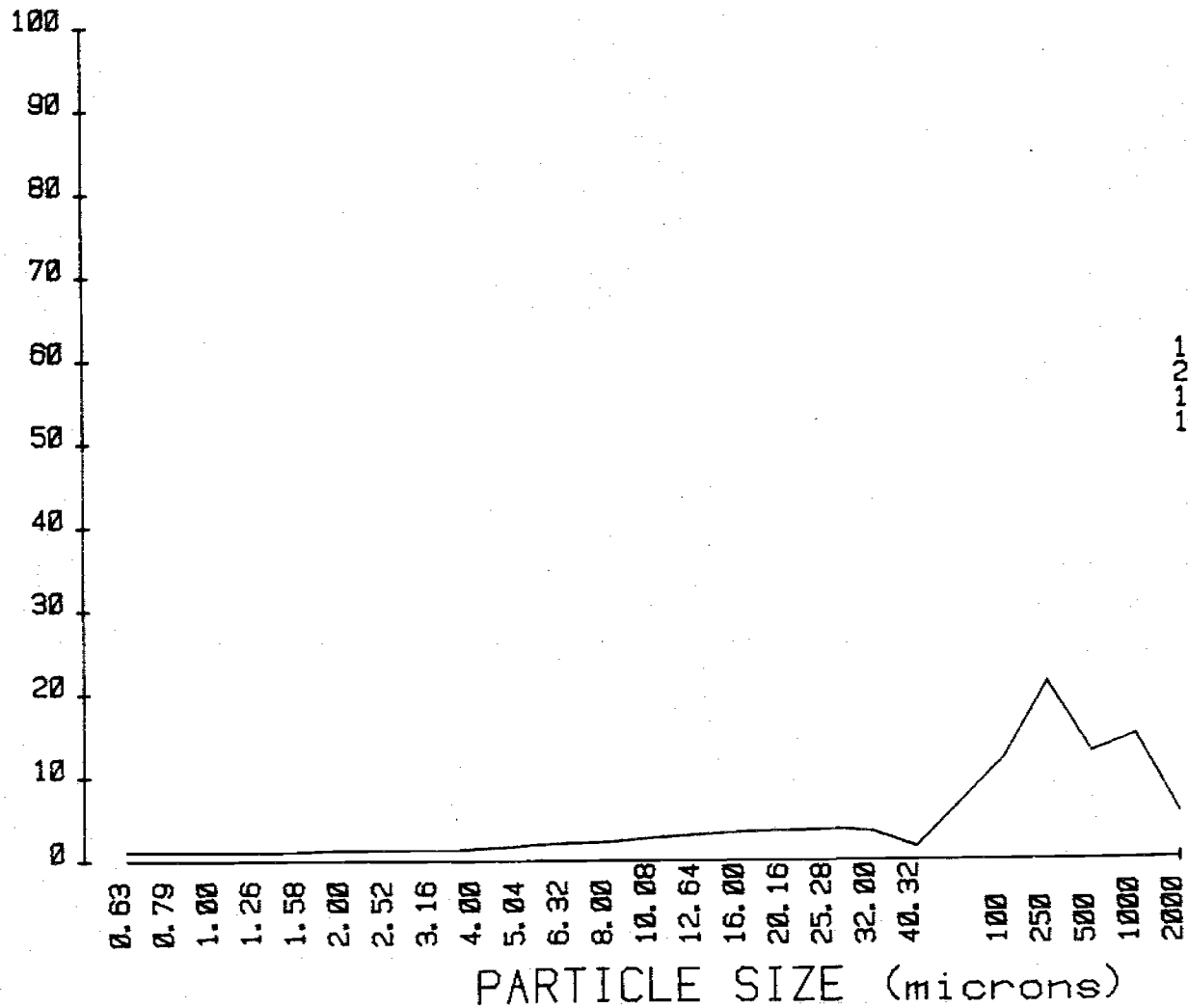
Date: January 1981

Identification		I25147-1	I25147-2	I25147-3	I25147-4
Units		%			
TC (0.63-2.00)		4.11	5.87	2.15	1.90
TSi (2.00-50)		29.81	26.68	18.63	15.43
TS (50-2000)		66.08	67.46	79.22	82.67
Clay	0.63-0.794	0.93	1.25	0.45	0.40
	0.794-1.00	0.80	1.19	0.40	0.35
	1.00-1.26	0.76	1.19	0.43	0.37
	1.26-1.59	0.68	1.00	0.38	0.34
	1.59-2.00	0.94	1.24	0.50	0.46
Fine Silt	2.00-2.52	1.12	1.38	0.56	0.55
	2.52-3.17	1.10	1.41	0.59	0.61
	3.17-4.00	0.98	1.26	0.52	0.58
	4.00-5.04	1.27	1.13	0.73	0.78
Medium Silt	5.04-6.35	1.53	1.77	0.85	0.94
	6.35-8.00	1.84	1.94	0.95	1.04
	8.00-10.08	1.99	2.05	1.00	1.10
	10.08-12.70	2.50	2.34	1.28	1.34
	12.70-16.0	2.86	2.54	1.50	1.48
	16.0-20.2	3.24	2.84	1.79	1.70
Coarse Silt	20.2-25.4	3.37	2.83	2.03	1.69
	25.4-32.0	3.51	2.35	2.25	1.68
	32.0-40.3	3.15	1.88	2.57	1.17
	40.3-50.8	1.36	0.84	1.89	0.68
	50.8-64.0	0.00	0.13	0.12	0.11
VFS (50-100)		11.99	10.98	15.01	12.94
FS (100-250)		21.11	22.56	26.83	24.06
MS (250-500)		12.74	13.14	16.28	17.30
CoS (500-1000)		14.80	15.74	16.45	22.35
VCoS (1000-2000)		5.44	5.04	4.65	6.02
Greater than 2000		19	18	20	25
Textural Class		Gr. SL	Gr. SL	Gr. LS	Gr. LCoS

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

ID I25147-1

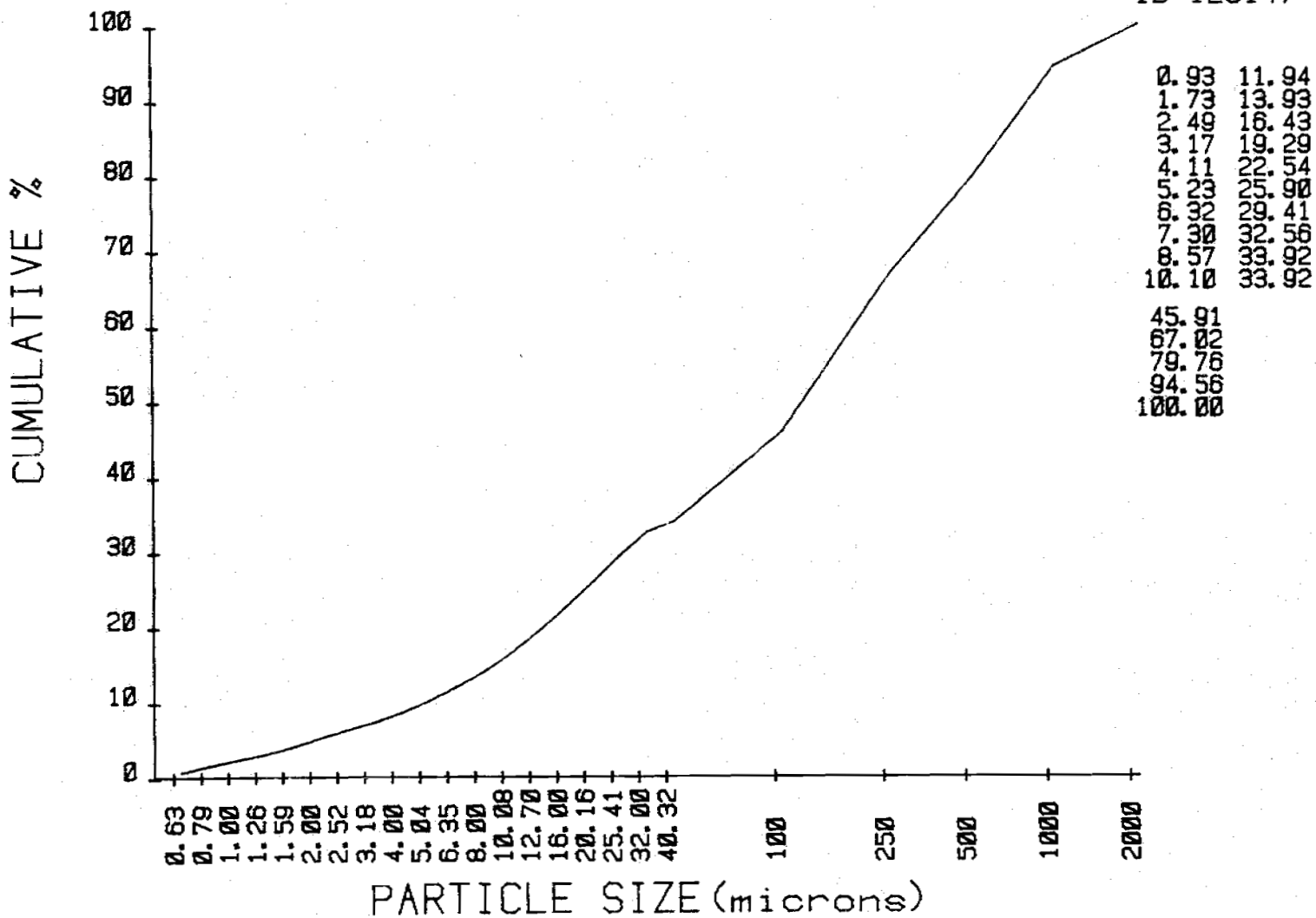


0.93	1.84
0.80	1.99
0.76	2.50
0.68	2.86
0.94	3.24
1.12	3.37
1.10	3.51
0.98	3.15
1.27	1.36
1.53	0.00
11.99	
21.11	
12.74	
14.80	
5.44	

765

CUMULATIVE CURVE SAND-SILT-CLAY

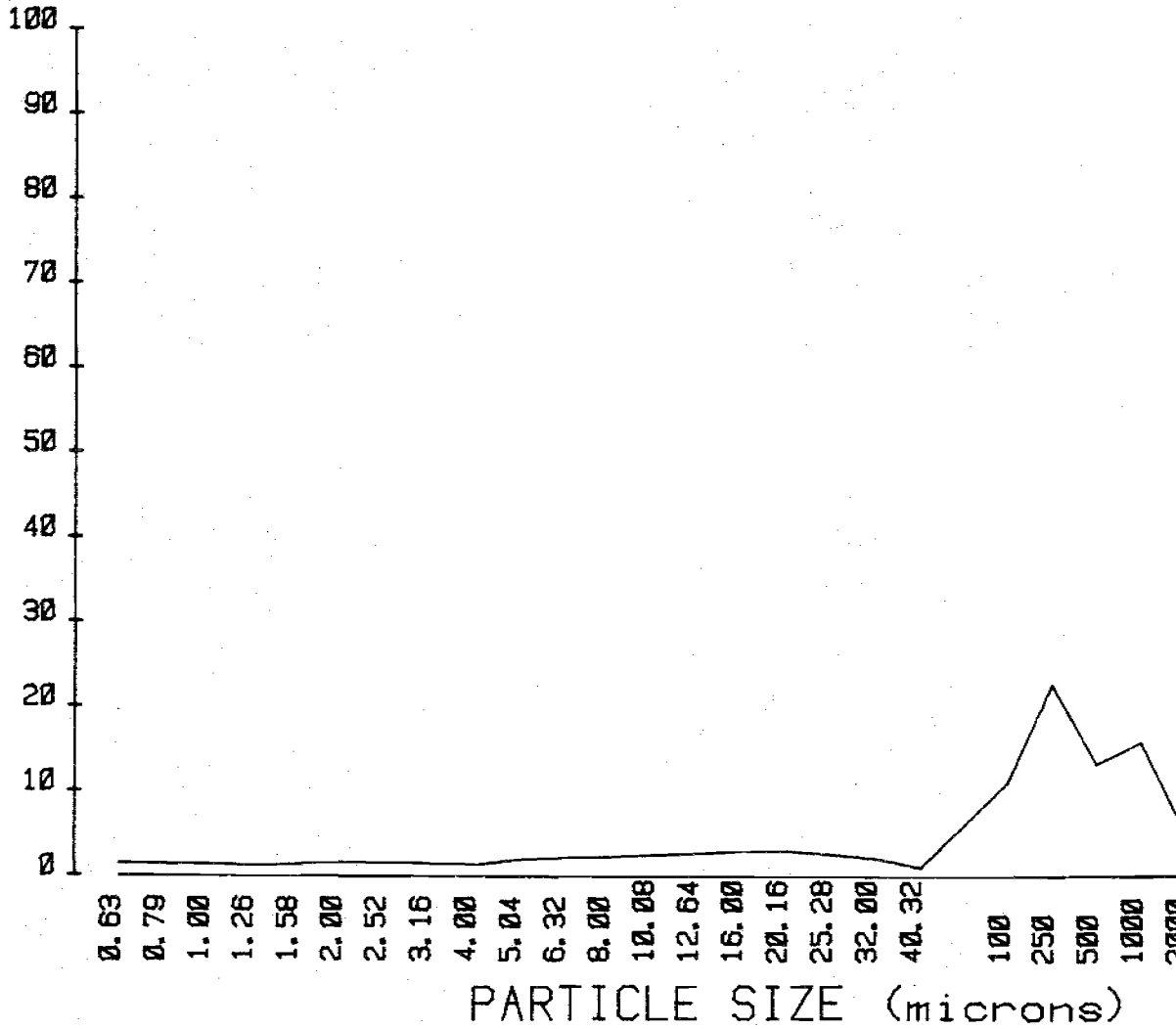
ID I25147-1





PLOT SAND-SILT-CLAY

ID I25147-2

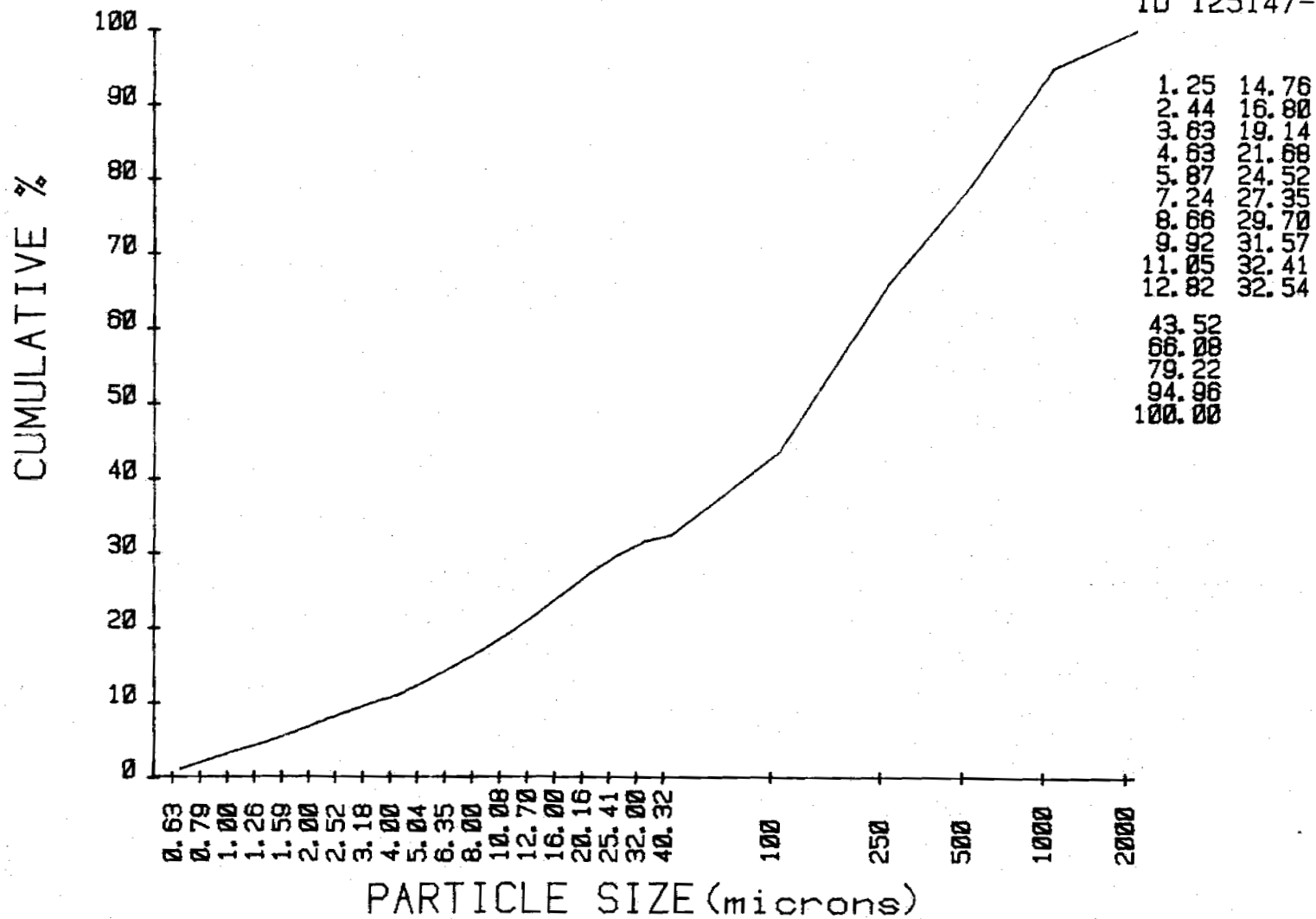


1.25	1.94
1.19	2.05
1.19	2.34
1.00	2.54
1.24	2.84
1.38	2.83
1.41	2.35
1.26	1.88
1.13	0.84
1.77	0.13
10.98	
22.56	
13.14	
15.74	
5.04	

767

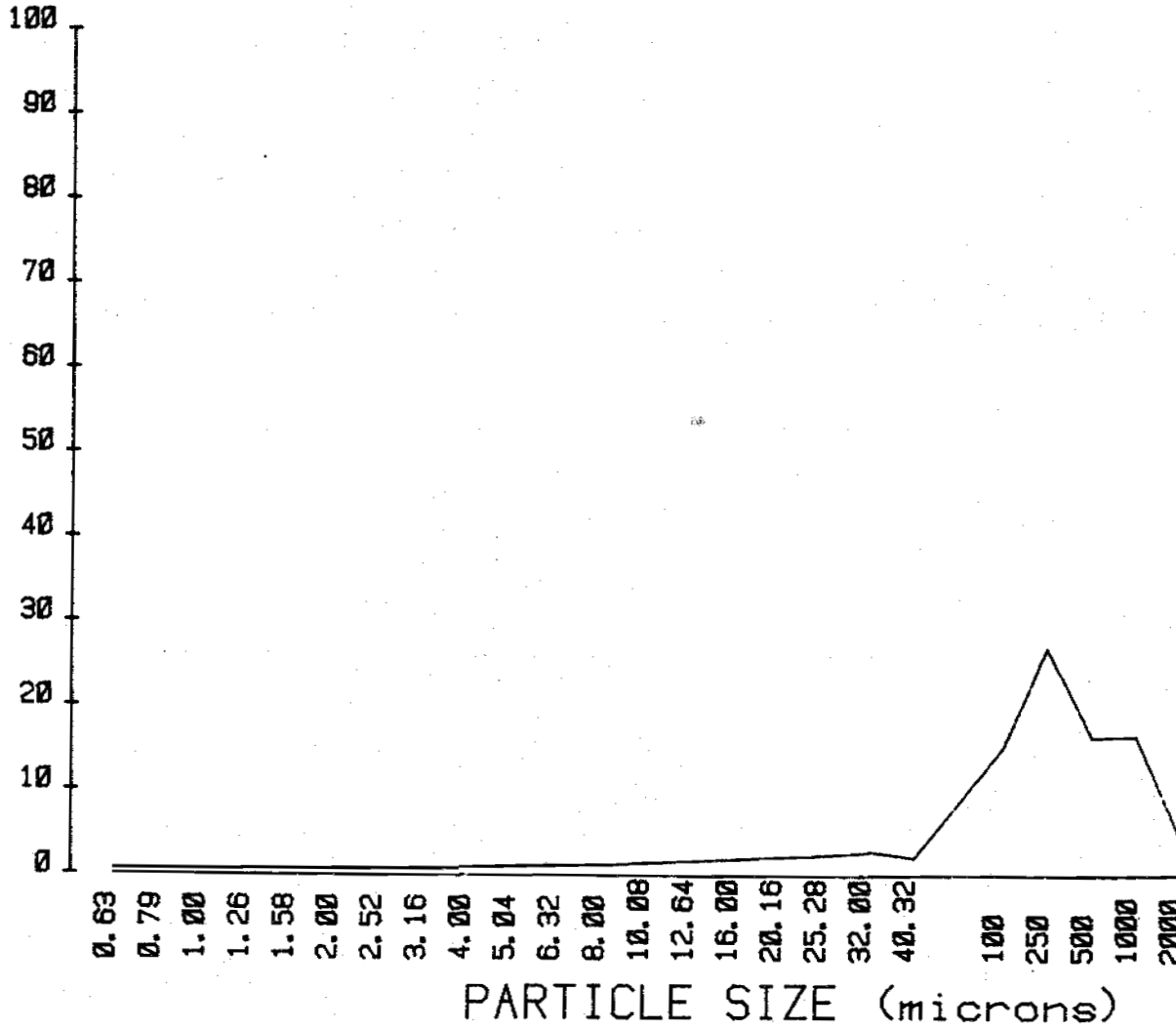
CUMULATIVE CURVE SAND-SILT-CLAY

ID I25147-2



PLOT SAND-SILT-CLAY

ID I25147-3



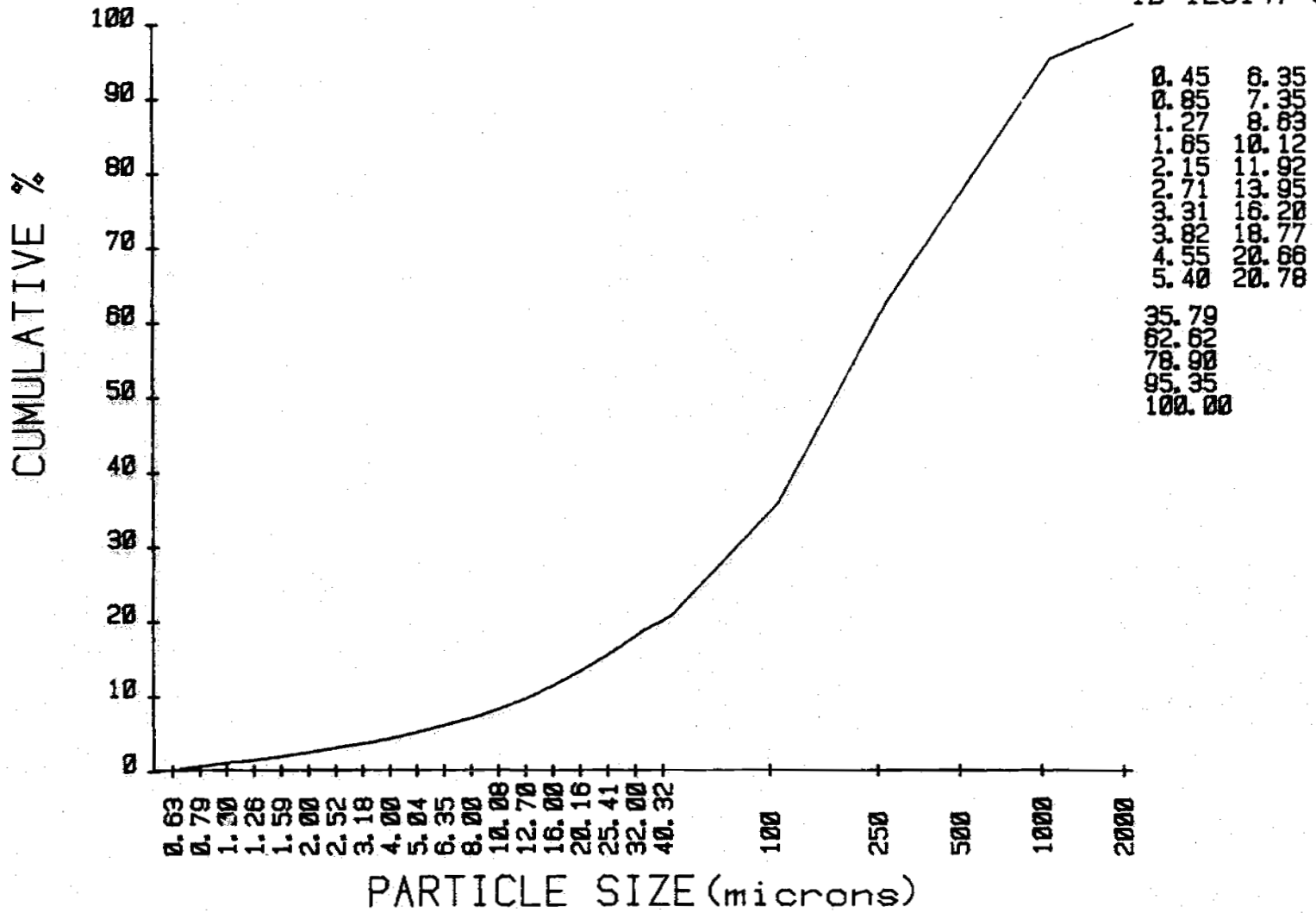
- |       |      |
|-------|------|
| 0.45  | 0.95 |
| 0.40  | 1.00 |
| 0.43  | 1.28 |
| 0.38  | 1.50 |
| 0.50  | 1.79 |
| 0.56  | 2.03 |
| 0.50  | 2.25 |
| 0.52  | 2.57 |
| 0.72  | 1.89 |
| 0.85  | 0.12 |
| 15.01 |      |
| 26.83 |      |
| 16.28 |      |
| 16.45 |      |
| 4.65  |      |

697

x

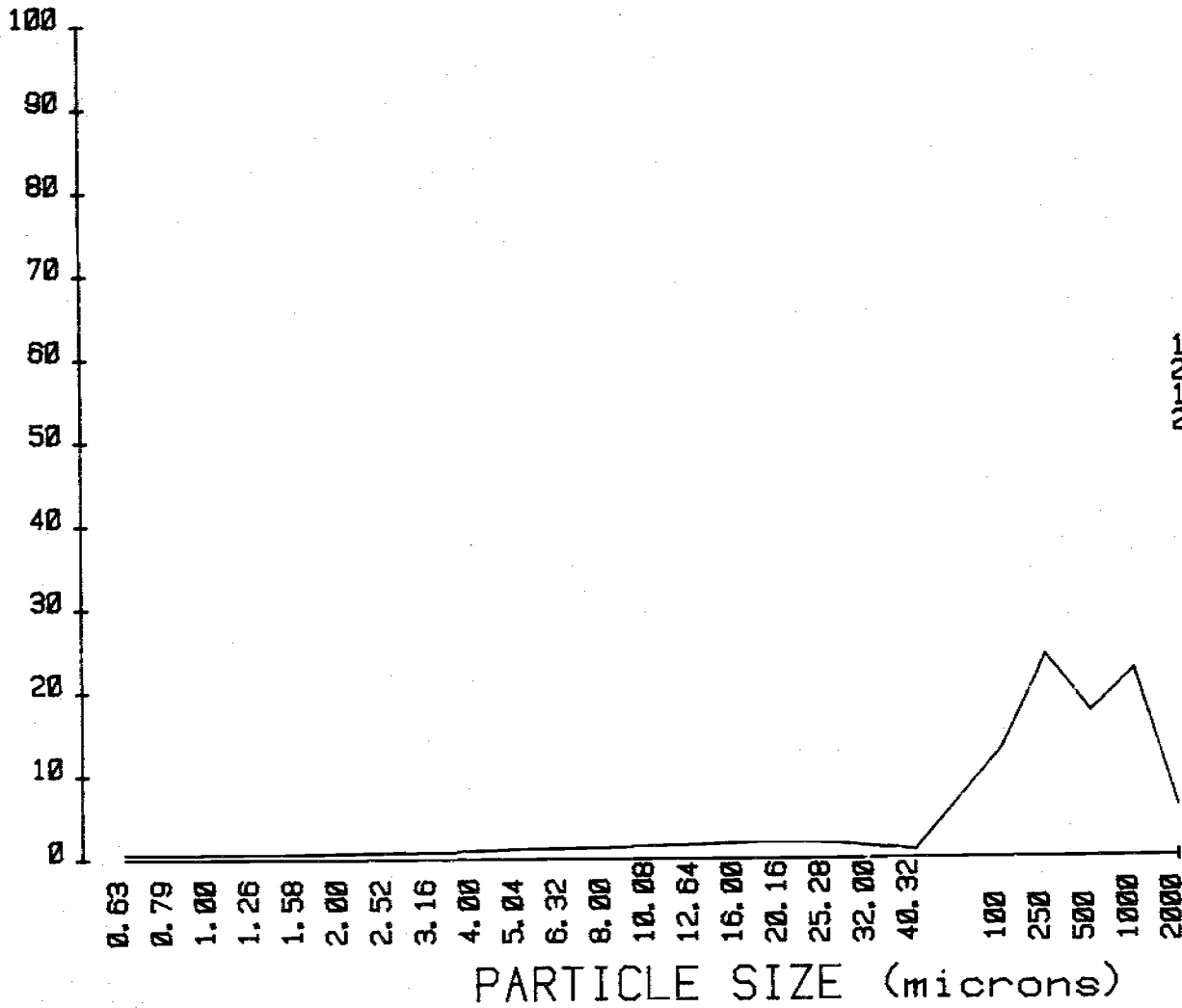
CUMULATIVE CURVE SAND-SILT-CLAY

ID I25147-3



PLOT SAND-SILT-CLAY

ID I25147-4

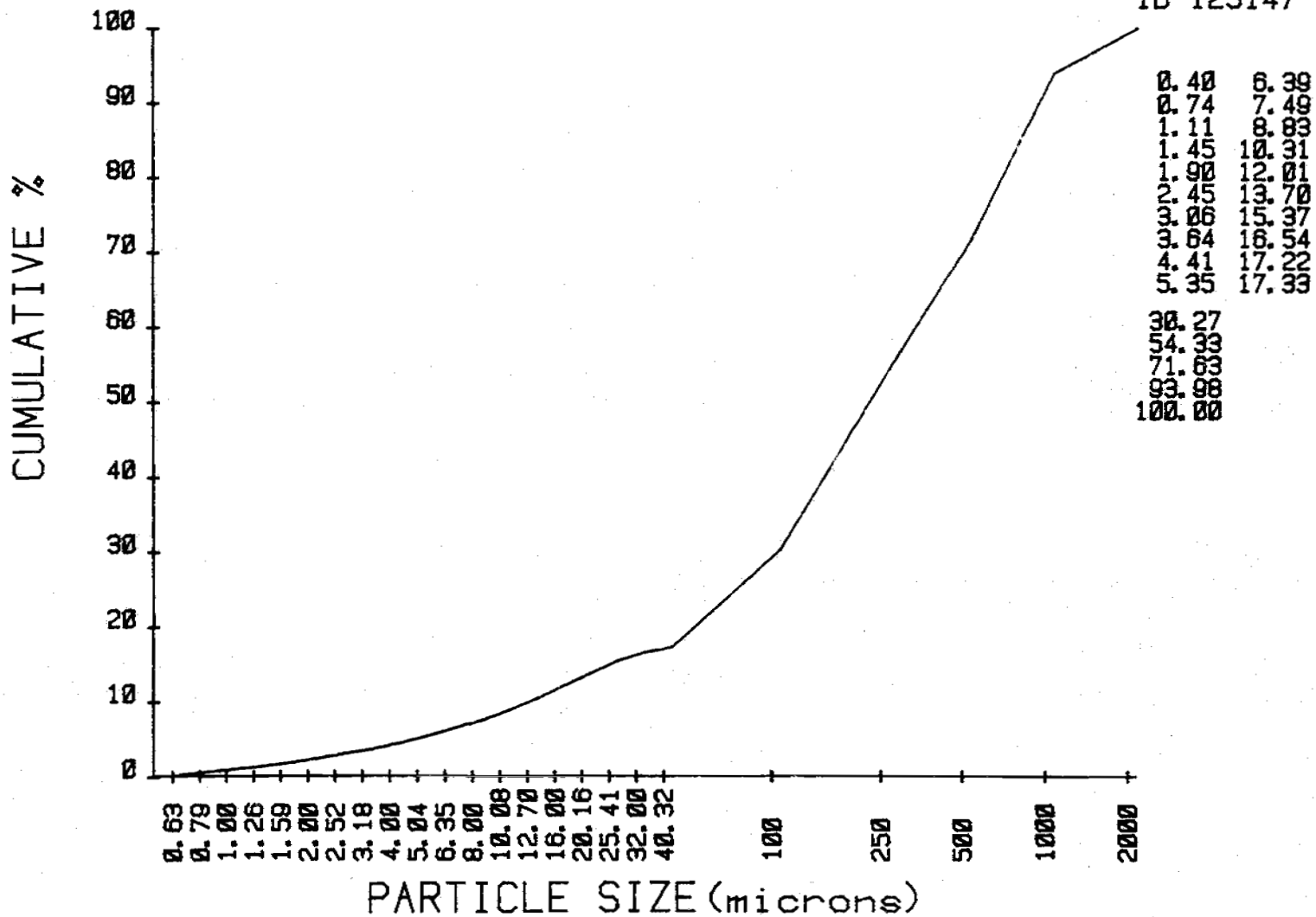


0.40	1.04
0.35	1.10
0.37	1.33
0.34	1.48
0.45	1.70
0.55	1.69
0.61	1.68
0.58	1.17
0.78	0.68
0.94	0.11
12.94	
24.06	
17.30	
22.35	
6.02	

77

CUMULATIVE CURVE SAND-SILT-CLAY

ID I25147-4



Unnamed Silt Loam 79-ID-25149 (Bean Saddle Road)

Classification: fine loamy, mixed, frigid Typic Argixeroll.

General Site Characteristics

Location: Idaho County, Idaho: section 20, T. 25N., R. 1E.

Forest: Nez Perce National Forest

Area: Bean Saddle Road

Described By/Date: Ken Wetring and LZ, September 27, 1979

Landform:

Habitat Type: Douglas fir (*Pseudotsuga menziesii*)/ninebark (*Physocarpus malvaceus*)

Formation Name:

Parent Rock/Material:

Weathering:

Topography:

Slope: 13 percent

Aspect: 266 degrees

Elevation:

Soil Depth:

Eff. Rooting Depth:

Litter Type:

Surface Rock: 5 percent

Climate:

Precipitation:

Erosion:

Infiltration:

Permeability:

Storage:

Drainage:

Air Temp:

Soil Temp at 20 inches:

Salt/Alkal:

Remarks:

Pedon Description

A1 0-10 centimeters (0-4 inches). Very dark grayish brown (10YR 3/2) gravelly silt loam; moderate medium subangular blocky structure parting to strong medium granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and few fine and medium roots; slightly acid pH 6.2, noncalcareous; 25 percent gravel by weight, 14 percent gravel by volume; clear smooth boundary.

B21t 10-43 centimeters (4-17 inches). Very dark grayish brown (10YR 3/2) gravelly silty clay loam; strong medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common thin clay films on ped faces; medium acid pH 6.0, noncalcareous; 27 percent gravel by weight, 17 percent gravel by volume; abrupt smooth boundary.

B22t 43-76 centimeters (17-30 inches). Dark yellowish brown (10YR 4/4) gravelly silt loam; moderate medium prismatic structure parting to strong medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and medium roots; many thin to thick clay films on ped faces and in pores; strongly acid pH 5.4, noncalcareous; 23 percent gravel by weight, 15 percent gravel by volume; clear smooth boundary.

B23t 76-127 centimeters (30-50 inches). Dark yellowish brown (10YR 4/6) gravelly clay loam; moderate medium prismatic structure parting to strong medium and coarse subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common moderately thick clay films on ped faces and in pores; medium acid pH 5.6, noncalcareous; 41 percent gravels by weight, 28 percent gravel by volume.

Pedon: Unnamed Gravelly Silt Loam 79-ID-25149 (Bean Saddle Road)

Date: April 1980

Sample No.	Horizon	Depth cm	pH paste	EC*10 <sup>3</sup> mmhos/cm	% Water at Saturation	Available P ppm	Sesquioxides			
							Di-Citrate Fe	Extract Al	Pyrophosphate Fe	Extract Al
							%			
1	A1	0-10	6.2	0.26	81	12.9				
2	B21t	10-43	6.0	0.15	63	1.6				
3	B22t	43-76	5.4	0.15	42	0.6				
4	B23t	76-127	5.6	0.12	46	0.5				

Sample No.	Exchangeable Ions				Ext. Acidity	CEC	Base Saturation %	DM	DC	N	C:N ratio	Soil Fraction	NaF pH		
	Ca	Mg	Na	K	H										
													meq/100 gms	X	X
1	16.8	3.7	0.1	2.9	10.9	51.8	68	12.07	7.02	0.394	18	0.75	8.6		
2	17.3	8.1	0.1	1.0	7.6	54.3	78	1.56	0.91	0.075	12	0.73	8.4		
3	13.9	4.0	0.1	0.6	5.3	40.4	78	0.65	0.38	0.032	12	0.77	8.2		
4	14.8	4.9	0.1	0.3	4.7	38.2	81	0.60	0.35	0.025	14	0.59	8.1		

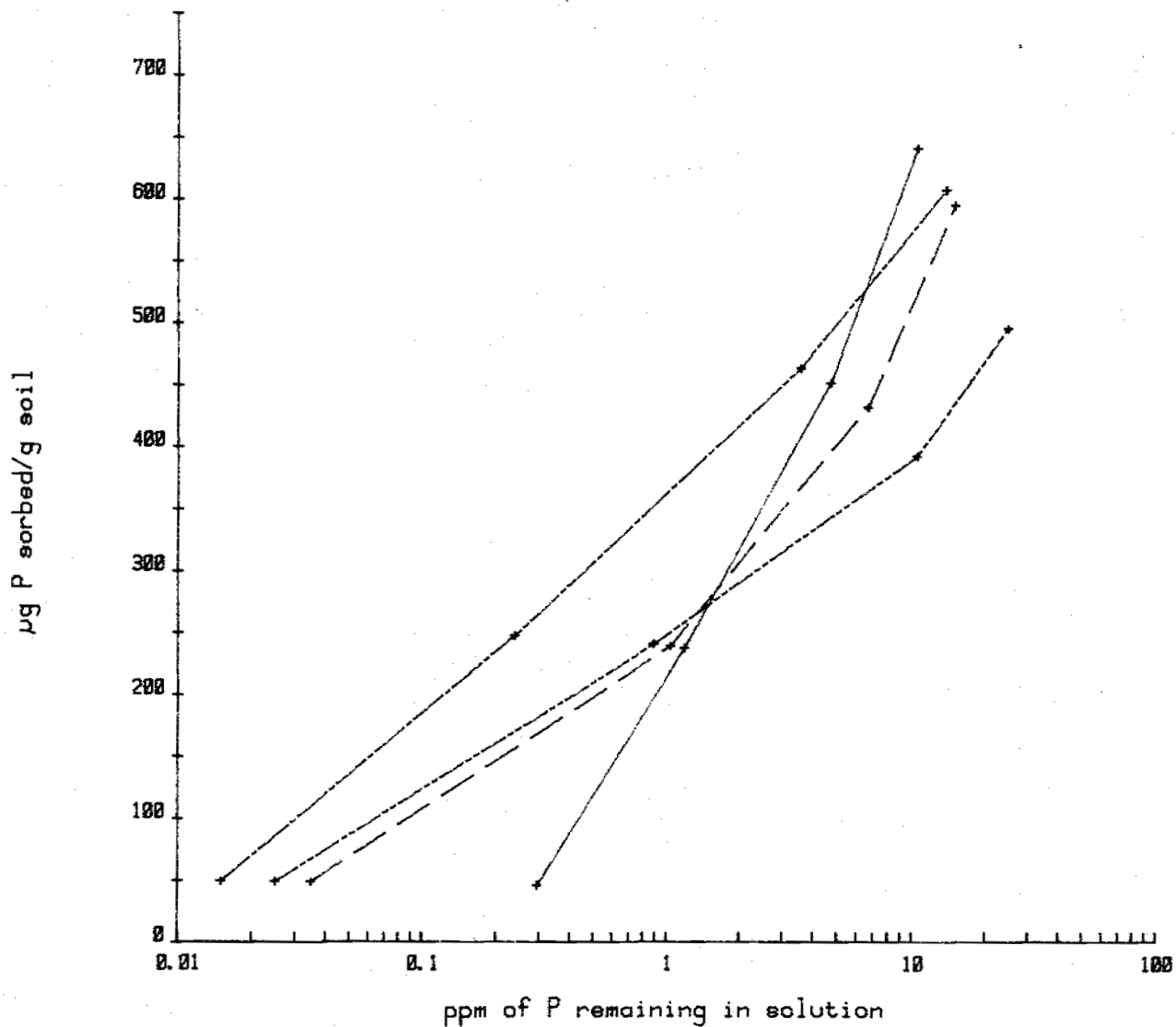
Remarks: CEC's were leached with 10% acidified NaCl  
Nitrogens and CEC's were run on the Technicon Autoanalyzer

Analysis by: Zelda Fadness



# Phosphorus Isotherm

79-10-25149



µg/g soil    Soln ppm

————— A1

47            0.30

238          1.20

452          4.80

641          10.86

----- B21t

50            0.04

240          1.05

432          6.78

595          15.50

----- B22t

50            0.02

240          0.24

464          3.64

608          14.24

----- B23t

50            0.03

241          0.90

393          10.72

496          25.44

Pedon: Unnamed Gravelly Silt Loam 79-ID-25149 (Bean Saddle Road)

Date: October 1980

Depth	Particle Size Distribution (mm)							Gravel & Stone		Textural Classes	
	VCS	CS	MS	FS	VFS	TS	TSi	TC	>2 mm		
	2-1.0	1-0.5	0.5-0.25	0.25-0.1	0.1-0.05	2-0.05	0.05-0.002	<0.002	wt.	vol.	
cm	%							%			
0-10	2.88	4.17	2.57	5.50	9.29	24.39	58.81	16.80	25	14	Gr. silt loam
10-43	1.60	2.45	1.70	4.51	7.76	18.00	53.54	28.46	27	17	Gr. silty clay loam
43-76	2.10	3.59	2.29	6.12	8.81	22.92	54.15	22.93	23	15	Gr. silt loam
76-127	3.13	4.28	3.00	6.88	9.38	26.67	43.22	30.11	41	28	Gr. clay loam

Depth	Silt Size Distribution (mm)			Bulk Density		Water Content		Liquit	Plastic	Plastic
	CoSi	Msi	Fsi	Clod	Core	1/3	15	Limit	Limit	Index
	0.05-0.02	0.02-0.005	0.005-0.002			Bar	Bar			
cm	%			g/cc		%		%		
0-10						38.4	25.0	55	NP	ND
10-43						33.8	23.7	48	23	25
43-76						31.7	16.5	46	20	26
76-127						32.4	16.5	41	19	22

Remarks: Mechanicals were run by the Coulter Counter method  
 Atterbergs were run by Debbie Hall  
 Water content-Anita Falen

Analysis by: Anita Falen

776

PARTICLE SIZE DISTRIBUTION ON COULTER COUNTER MODEL TA II (microns)

Project: Nez Perce National Forest-LIM

Analysis by: Anita and Debbie

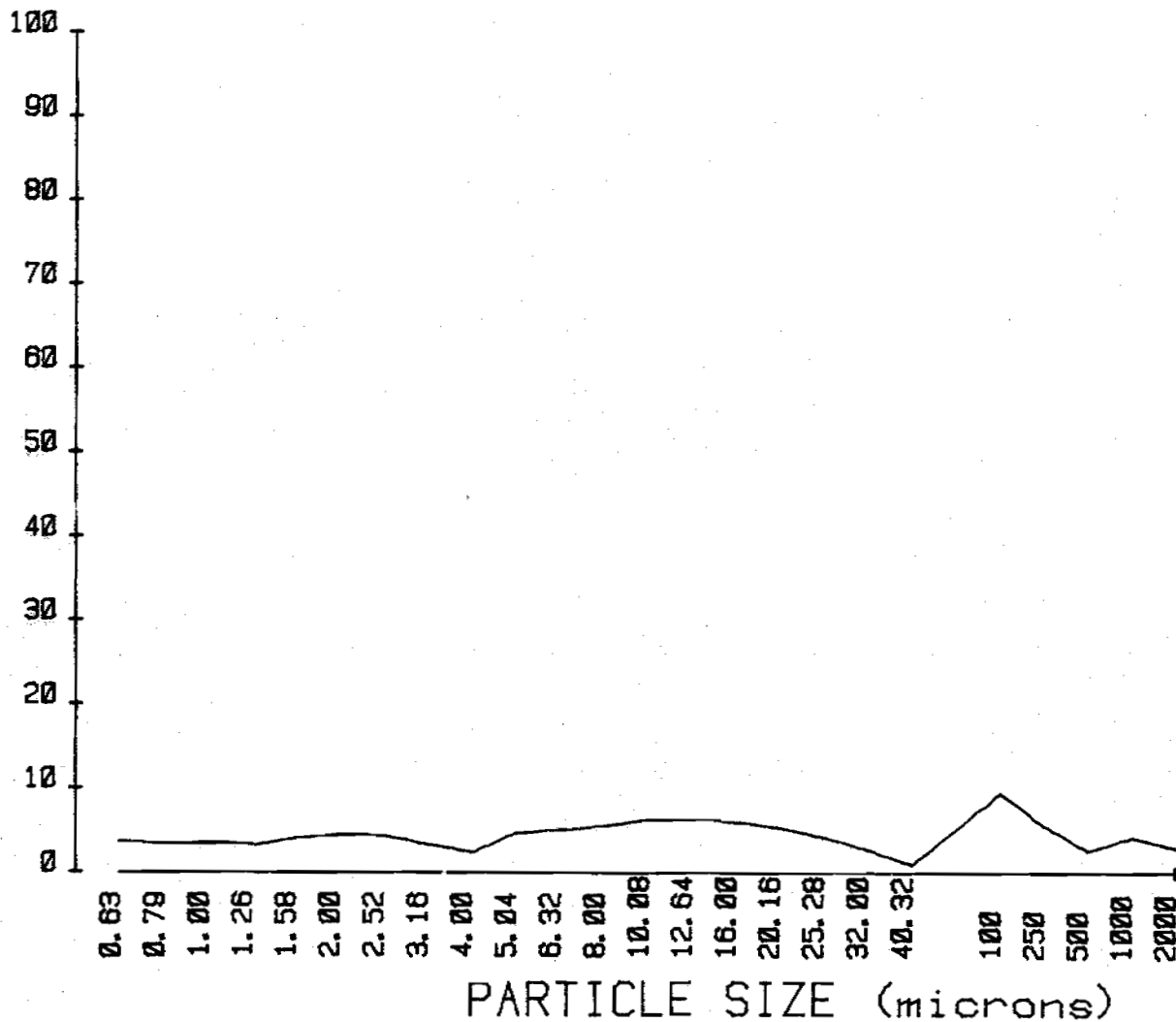
Date: January 1981

Identification	I25149-1	I25149-2	I25149-3	I25149-4	
Units	-----%				
TC (0.63-2.00)	16.80	28.46	22.93	30.11	
TSi (2.00-50)	58.81	53.54	54.15	43.22	
TS (50-2000)	24.39	18.00	22.92	26.67	
Clay	0.63-0.794	3.46	6.56	4.71	5.86
	0.794-1.00	3.11	5.08	4.33	5.73
	1.00-1.26	3.36	5.64	4.86	6.52
	1.26-1.59	3.02	4.97	4.13	5.60
	1.59-2.00	3.86	6.20	4.90	6.40
Fine Silt	2.00-2.52	4.29	6.36	4.55	5.83
	2.52-3.17	4.05	5.13	3.67	4.30
	3.17-4.00	3.06	3.05	2.07	2.59
	4.00-5.04	2.16	1.69	3.59	1.59
Medium Silt	5.04-6.35	4.46	4.21	4.22	3.09
	6.35-8.00	4.89	4.47	4.53	3.27
	8.00-10.08	5.38	4.53	4.56	3.14
	10.08-12.70	6.12	4.95	5.44	3.64
	12.70-16.0	6.18	5.00	5.01	3.73
	16.0-20.2	5.81	4.31	5.17	4.27
Coarse Silt	20.2-25.4	5.14	3.89	3.91	3.18
	25.4-32.0	3.98	3.05	3.13	2.50
	32.0-40.3	2.51	1.74	3.27	1.18
	40.3-50.8	0.80	1.16	0.94	0.91
	50.8-64.0	0.00	0.00	0.10	0.00
VFS (50-100)	9.29	7.76	8.81	9.38	
FS (100-250)	5.50	4.51	6.12	6.88	
MS (250-500)	2.57	1.70	2.29	3.00	
CoS (500-1000)	4.17	2.45	3.59	4.28	
VCoS (1000-2000)	2.88	1.60	2.10	3.13	
Greater than 2000	25	27	23	41	
Textural Class	Gr. SiL	Gr. SiCL	Gr. SiL	Gr. CL	

Prepared by Anita L. Falen, Soil Characterization Lab, U. of I., 1980

PLOT SAND-SILT-CLAY

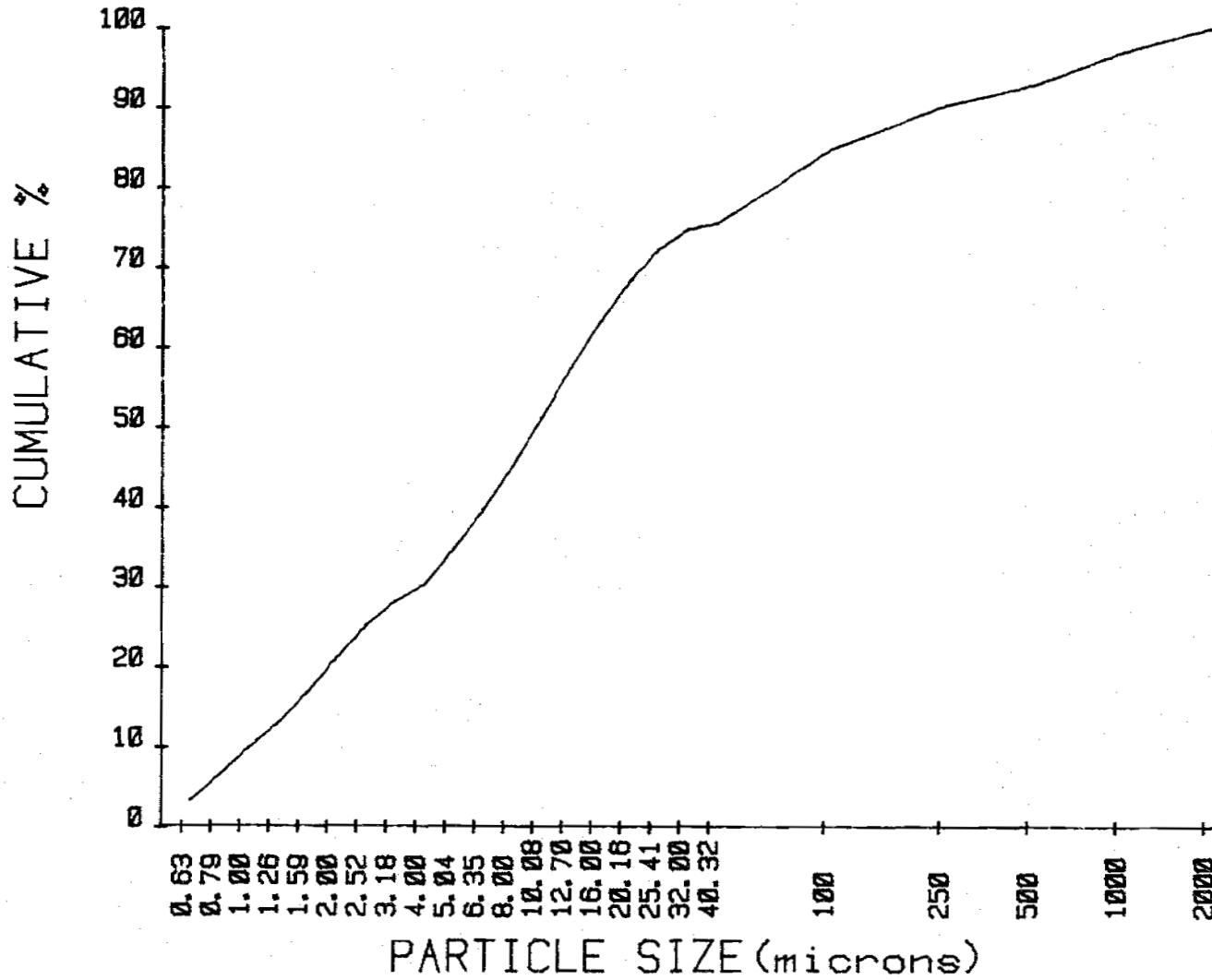
ID I25149-1



3.46	4.89
3.10	5.38
3.36	6.11
3.02	6.18
3.86	5.81
4.29	5.14
4.05	3.97
3.06	2.51
2.16	0.79
4.46	0.00
9.29	
5.50	
2.57	
4.17	
2.88	

### CUMULATIVE CURVE SAND-SILT-CLAY

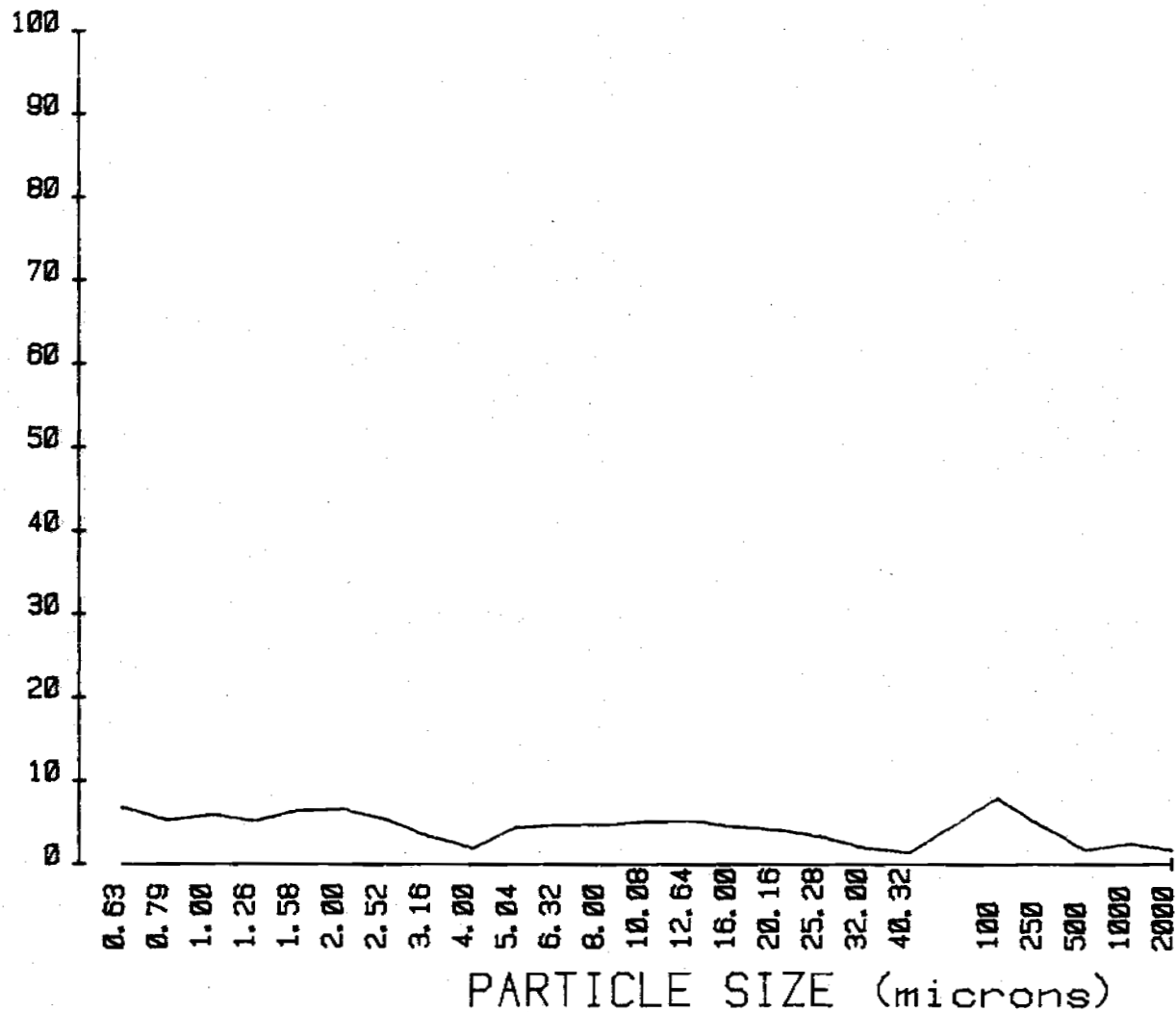
ID I25149-1



3.46	39.72
6.57	45.10
9.92	51.21
12.94	57.39
16.80	63.20
21.09	68.33
25.15	72.31
28.20	74.82
30.36	75.61
34.82	75.61
84.90	
90.40	
92.97	
97.14	
100.02	

PLOT SAND-SILT-CLAY

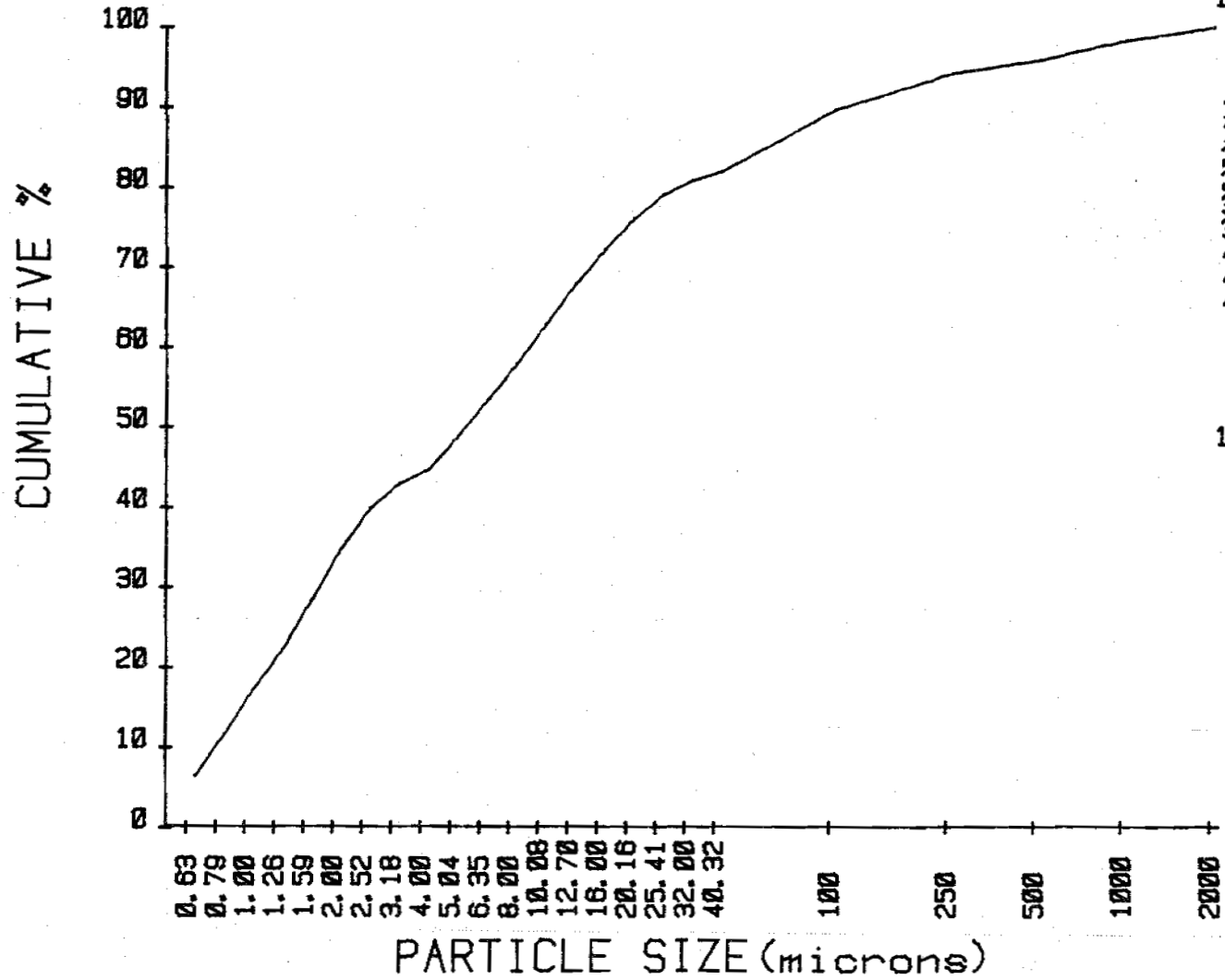
ID I25149-2



087

### CUMULATIVE CURVE SAND-SILT-CLAY

ID I25149-2

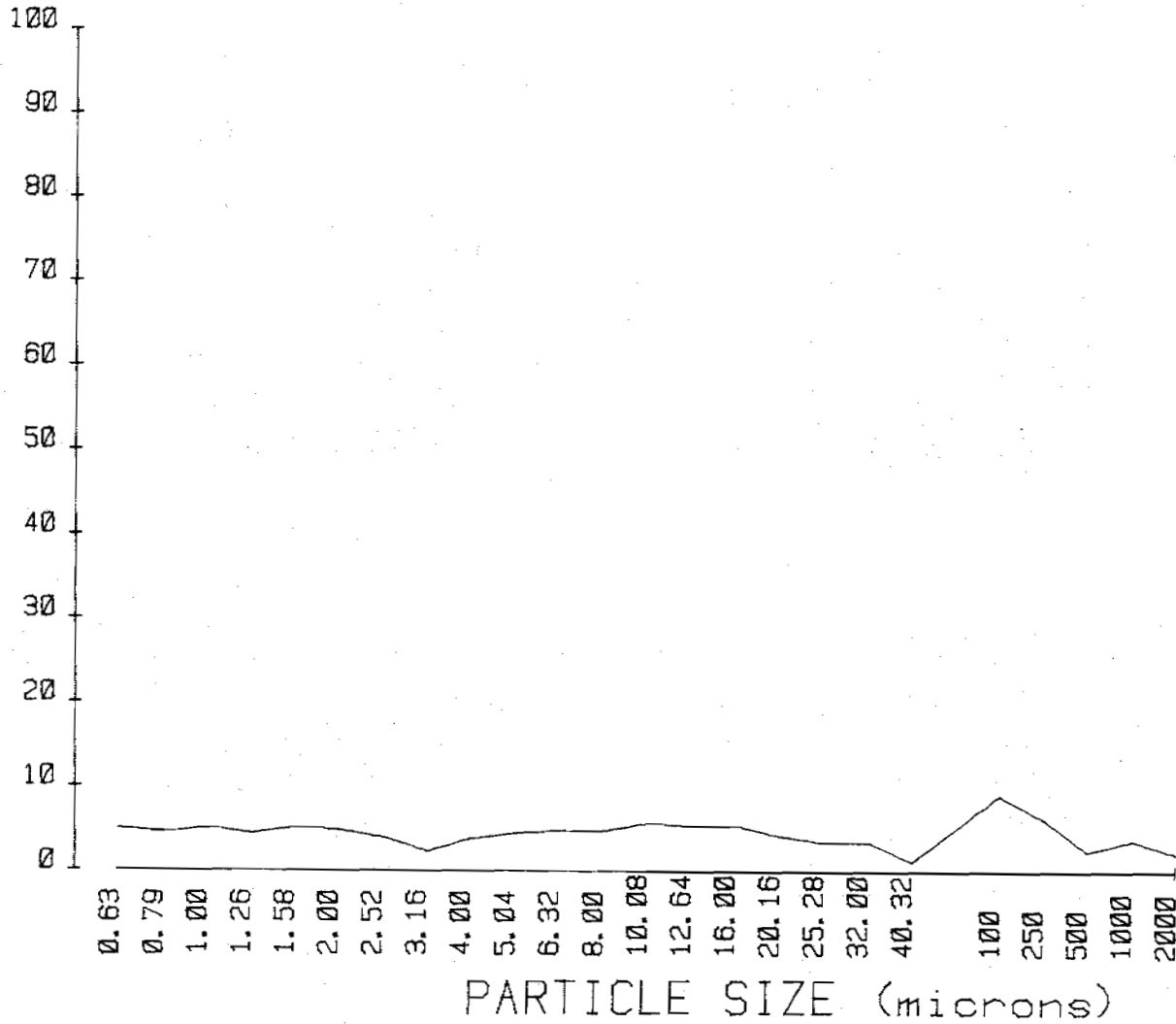


6.58	53.38
11.65	57.90
17.29	62.85
22.26	67.85
28.46	72.16
34.82	76.05
39.95	79.11
43.00	80.84
44.70	82.00
48.91	82.00
89.76	
94.27	
95.97	
98.42	
100.02	

PARTICLE SIZE (microns)

# PLOT SAND-SILT-CLAY

ID I25149-3

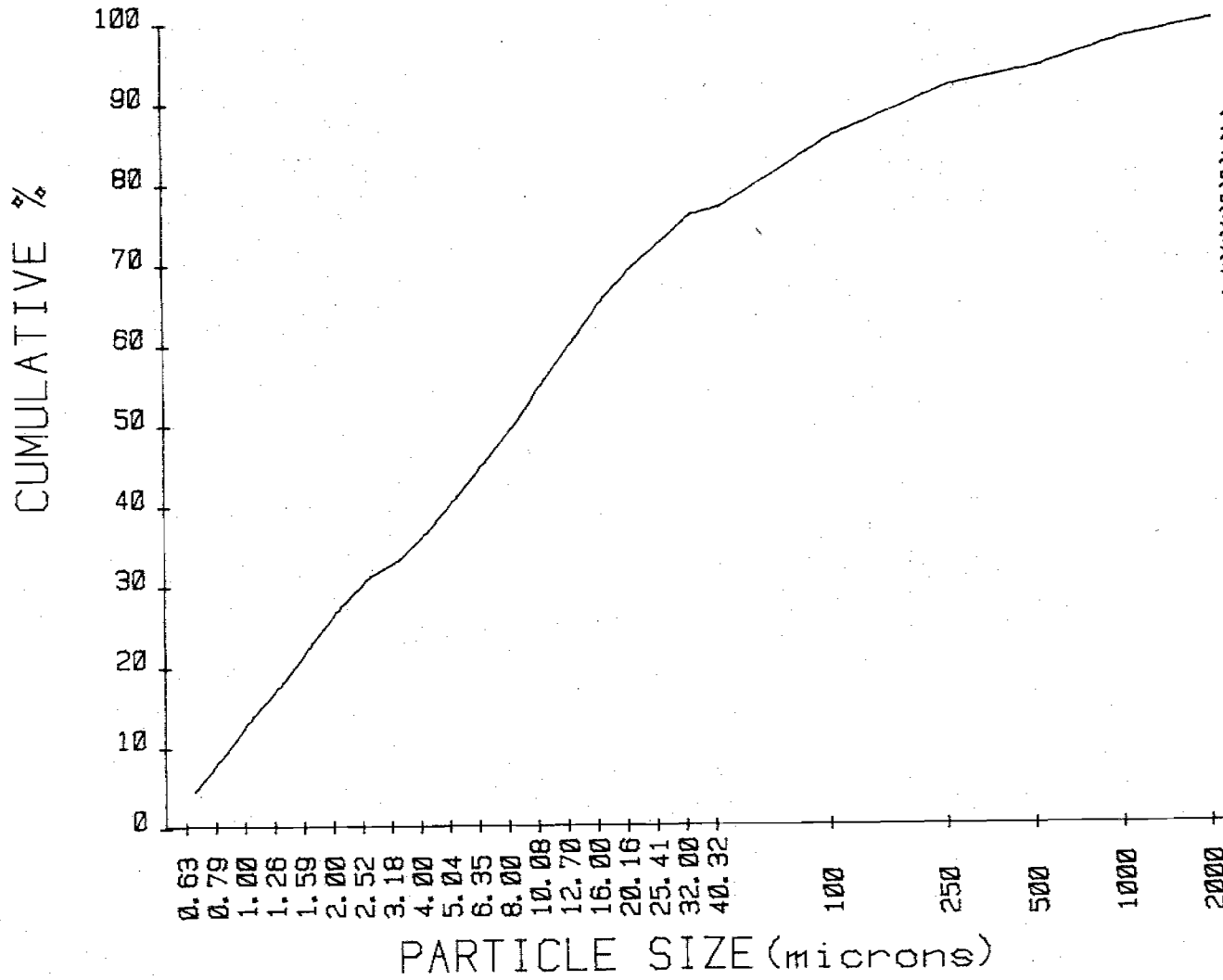


4.71	4.53
4.33	4.56
4.86	5.44
4.13	5.01
4.90	5.17
4.55	3.91
3.67	3.13
2.07	3.27
3.59	0.94
4.22	0.10
8.81	
6.12	
2.29	
3.59	
2.10	



CUMULATIVE CURVE SAND-SILT-CLAY

ID I25149-3

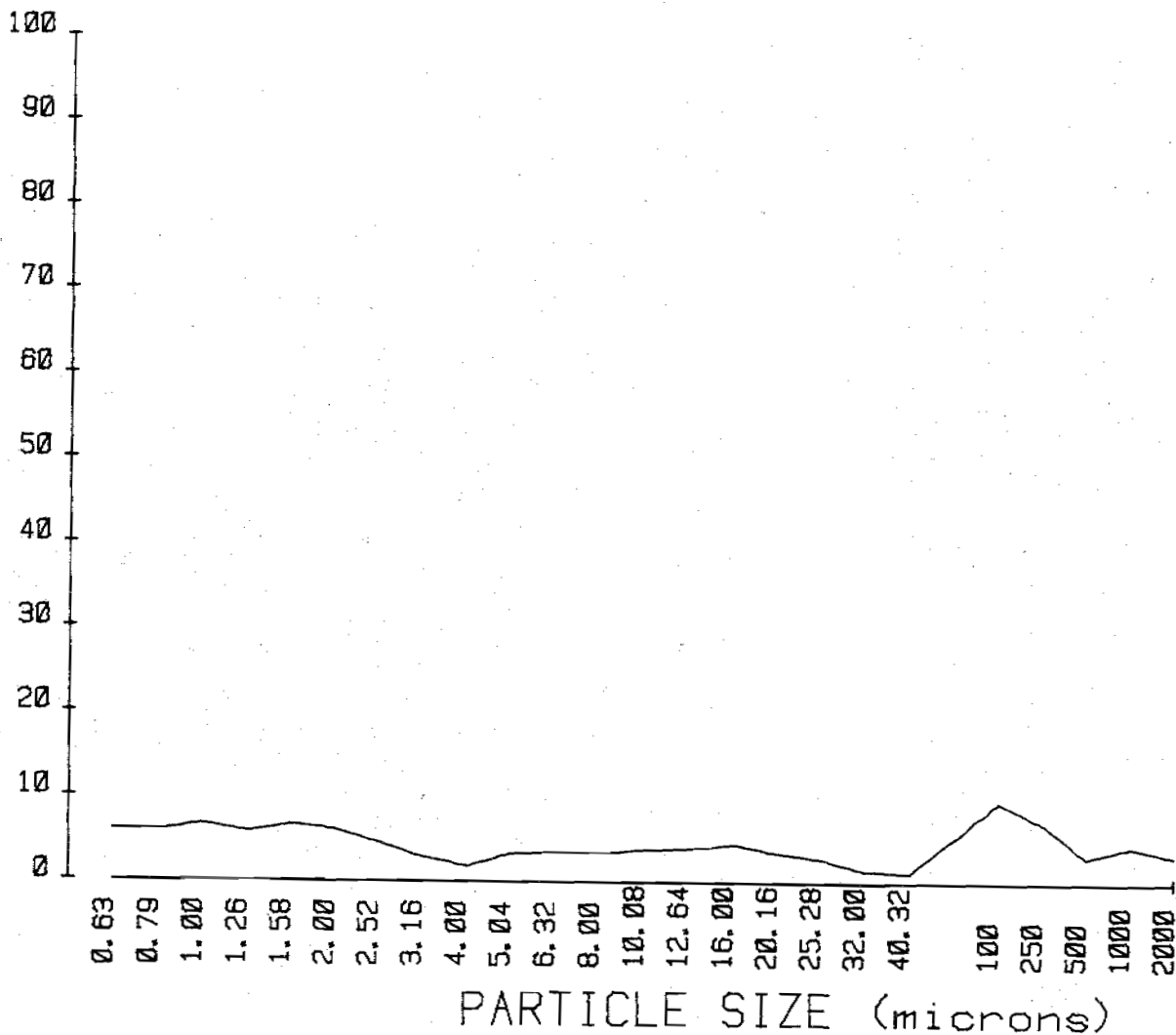


4.71	45.56
9.04	50.12
13.90	55.56
18.03	60.56
22.93	65.74
27.48	69.65
31.15	72.78
33.22	76.04
36.81	76.98
41.83	77.88
85.89	
92.01	
94.30	
97.89	
99.99	

787

# PLOT SAND-SILT-CLAY

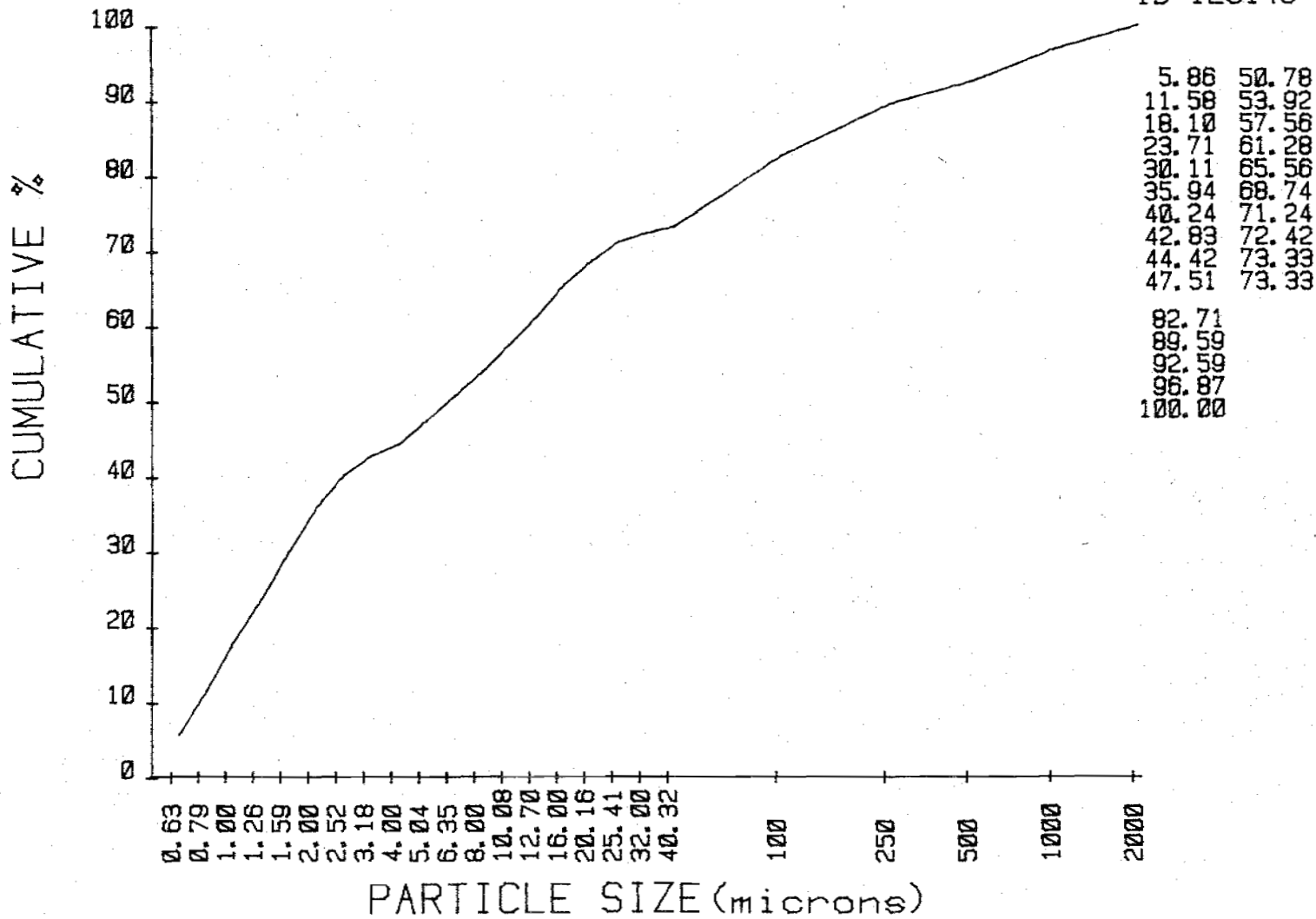
ID I25149-4



5.86	3.27
5.73	3.14
6.52	3.64
5.60	3.73
6.40	4.27
5.83	3.18
4.30	2.50
2.59	1.18
1.59	0.91
3.00	0.00
9.38	
6.88	
3.00	
4.28	
3.13	

CUMULATIVE CURVE SAND-SILT-CLAY

ID I25149-4



Slides prepared by: Falen and Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody and Falen

N7

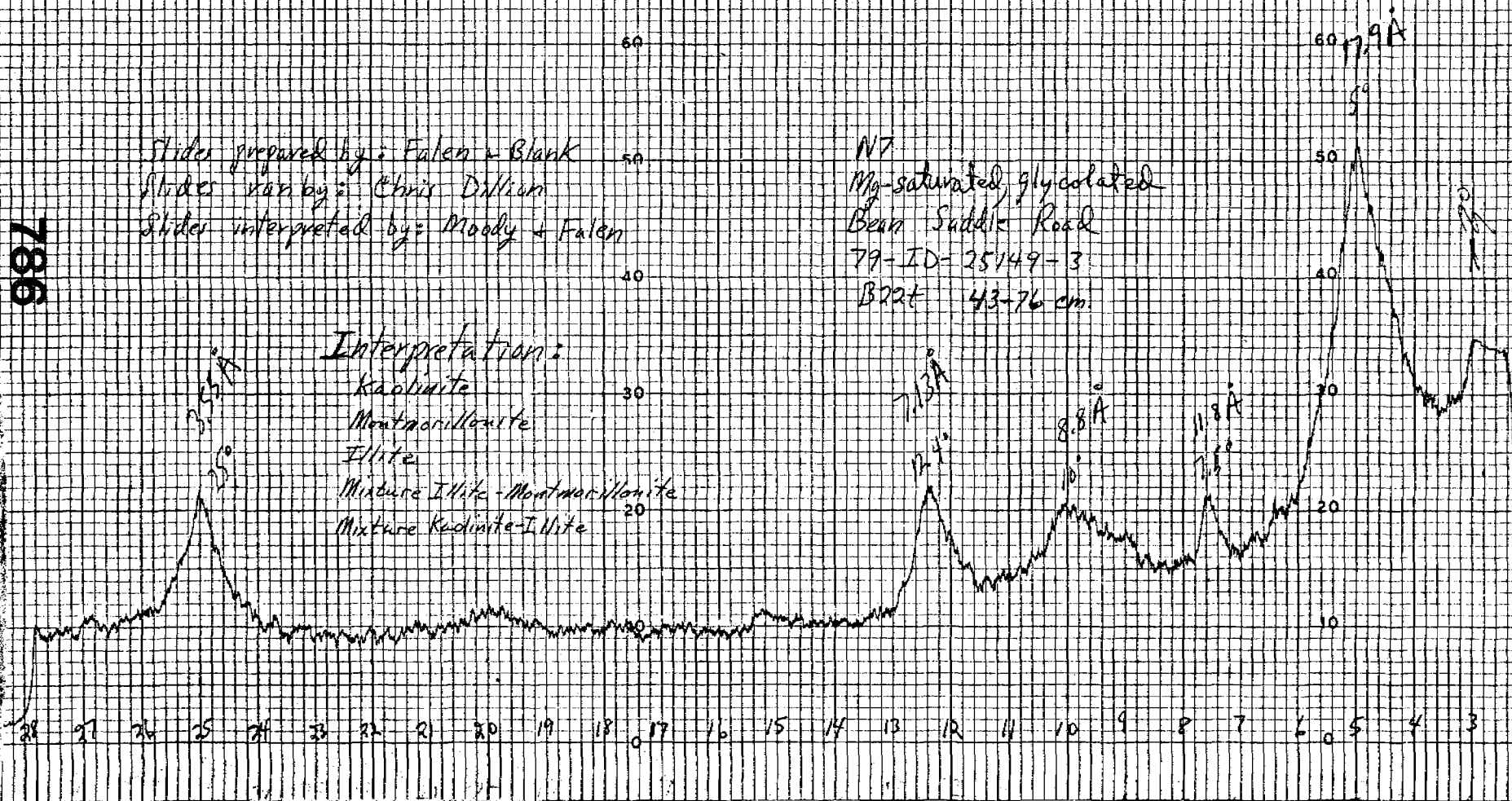
Mg-saturated, glycolated  
Bean Saddle Road  
79-ID-25149-3  
B224 43-76 cm

Slides prepared by: Falen + Blank  
Slides run by: Chris Dillon  
Slides interpreted by: Moody + Falen

N7  
Mg-saturated, glycolated  
Bean Saddle Road  
79-ID-25149-3  
B224 43-76 cm

Interpretation:

Kaolinite  
Montmorillonite  
Illite  
Mixture Illite-Montmorillonite  
Mixture Kaolinite-Illite

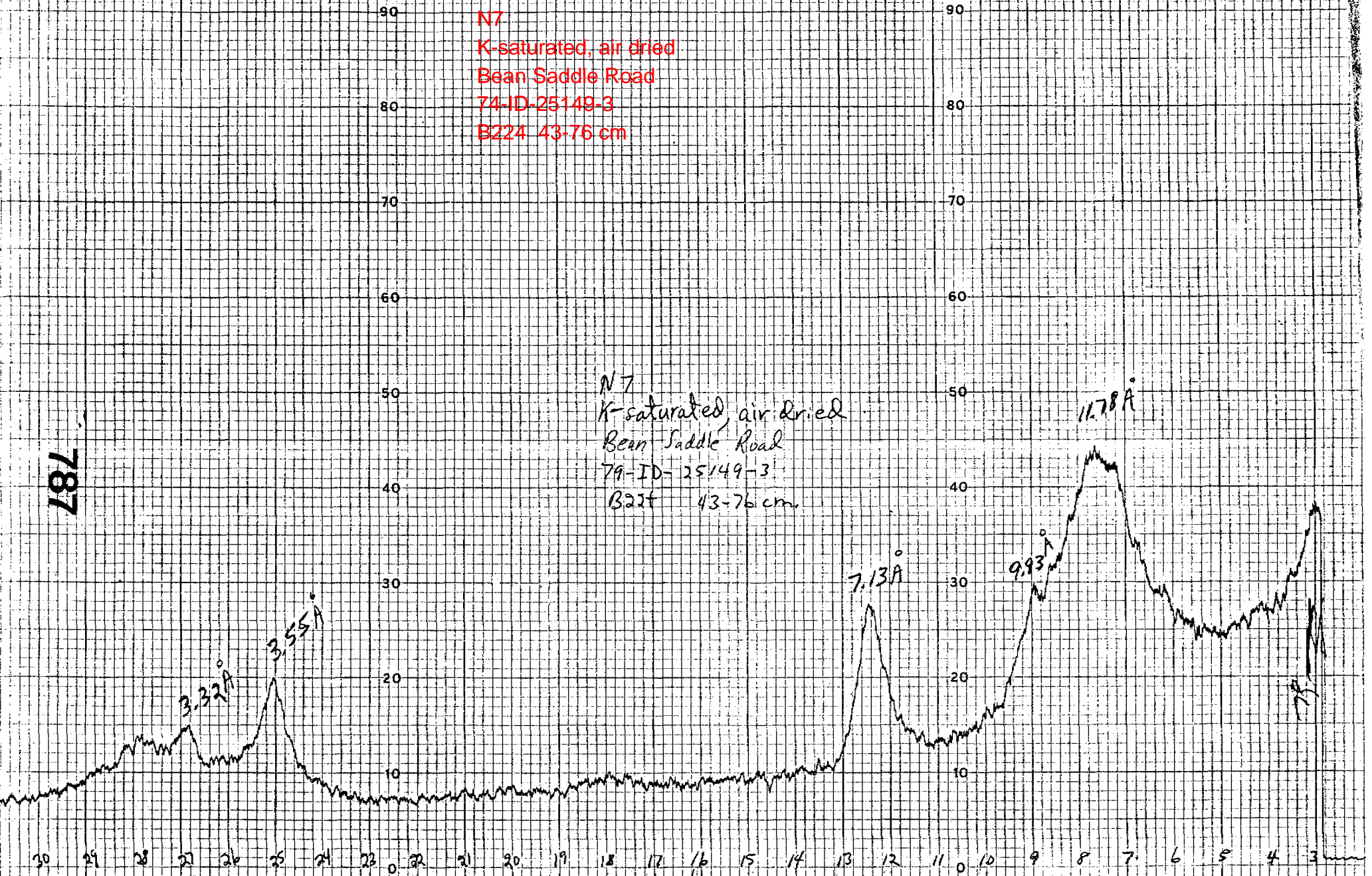




N7  
K-saturated, air dried  
Bean Saddle Road  
74-ID-25149-3  
B224 43-76 cm

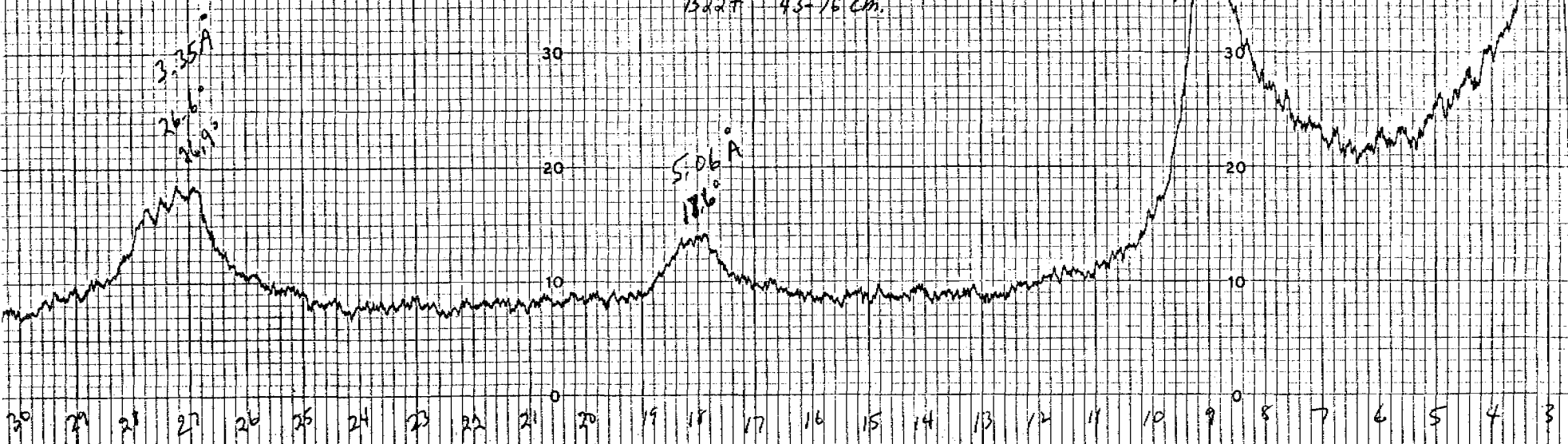
787

N7  
K-saturated, air dried  
Bean Saddle Road  
74-ID-25149-3  
B224 43-76 cm



788

N7  
K-saturated, heated 500 degrees C  
Bean Saddle Road  
79-ID-25149-3  
B224 43-76 cm



N7  
K-saturated, heated 500°C  
Bean Saddle Road  
79-ID-25149-3  
B224 43-76 cm.