

APPENDIX A

MORPHOLOGIC DESCRIPTION OF SOIL PROFILES FOR THE
WATERSHED AND SHORELINE OF HILLS CREEK RESERVOIR

Appendix A-1

Dome Creek: Site 12, Sampled 7/21/71

Lane County, Oregon, Hills Creek Reservoir Watershed, SE $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 30, T.24S., R.4E.; North bank of Dome Creek, about $\frac{1}{4}$ mile north of Forest Service Road 2406B.

About 3400 feet elevation, 12% south slope, and well drained. The profile was located on old land slide deposits just above a fresh slump into Dome Creek. Representative of U.S. Forest Service Cut-Bank Stability Survey Unit #46.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
01 and 02	4-0	Partially decomposed litter
A	0-20	Dark brown (7.5YR 3.5/4) very gravelly loam, weak fine granular; very friable, nonsticky, nonplastic; few pumice particles; about 35% rounded shot <0.7 cm in diameter.
12-1		
B1	20-40	Reddish brown (5YR 4/4) very gravelly loam, brown (7.5YR 5/4) dry; weak coarse subangular blocky; very friable, nonsticky, nonplastic; few pumice particles; about 35% rounded shot <0.7 cm in diameter.
12-2		
B2	40-75	Brown (7.5YR 4/4) gravelly silt loam to gravelly loam, yellowish brown (10YR 5/3.5) dry; weak coarse subangular blocky; very friable, slightly sticky, slightly plastic; few pumice particles; about 30% gravel <2.5 cm in diameter.
12-3		
B3	75-150	Brown (7.5YR 4/4) gravelly silt loam, yellowish brown (10YR 5/4) dry; structureless; friable, slightly sticky, slightly plastic; common pale yellow pumice particles, common cobbles, gravel content 25-30%.
12-4		
C	150+	Brown (10YR 4/3) and reddish brown (5YR 4/3) very gravelly loam, light yellowish brown (10YR 6/4) dry; massive; slightly sticky and slightly plastic; about 40% gravel mostly fine.
12-5		

Appendix A-2

Buck Creek: Site 13, Sampled 7/21/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 13, T.23S., R.3E.; Road cut on north of Forest Service Road 2321 and about 300 feet west of Powder Creek and Buck Creek junction.

About 3280 feet elevation. This is somewhat poorly drained soil over saprolitic greenish breccia. This profile is from an old land slide area and is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #35.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A 13-1	0-20	Brown (7.5YR 4/2) gravelly loam, brown (7.5YR 5.5/2) dry; weak fine granular; slightly sticky, slightly plastic; about 20% soft gravel.
B21 13-2	20-50	Brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; weak coarse blocky; sticky and plastic; about 10% soft gravel.
B22 13-3	50-88	Brown (10YR 4/3) silty clay loam; weak very fine prismatic to nearly massive; sticky and plastic; few fine prominent reddish brown mottles.
C1 or B3 13-4	88-150	Dark reddish gray (5YR 4/2) light silty clay loam stratified with reddish brown (5YR 4/4) very gravelly sandy loam (band 5-8 cm thick), reddish brown and light reddish brown (5YR 5/3 and 6/3) dry; massive; sticky and plastic.
C12 13-5	>150+	Weak red (2.5YR 5/2) to yellowish red banded silty clay; massive; sticky and plastic; about 10-15% gravel; grayish mottles; seeping of water at about 150 cm.

Appendix A-3

North Coffeepot Creek: Site 14, Sampled 7/22/71

Lane County, Oregon, Hills Creek Reservoir Watershed NE $\frac{1}{4}$, NW $\frac{1}{4}$,
Sec. 5, T.23S., R.4E; East side road cut on Forest Service Road 2253.

About 3500 feet elevation. Well drained soil over soft weathered
greenish tuff breccias. This profile represents part of U.S. Forest
Service Cut-Bank Stability Survey Unit #36.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A 14-1	0-38	Dark grayish brown (10YR 4/2) gravelly loam, brown (10YR 5/3) dry; weak medium granular; friable, slightly sticky, slightly plastic; about 20% gravel; few reddish brown mottles.
IIC or C 14-2	38-150	Light brownish gray (10YR 6/2) sandy loam, white (10YR 8/1) dry; massive; very friable, nonsticky, nonplastic; 10-12% soft gravel, few cobbles, some cobbles are of unweathered tuff breccia; few brown clay films on fracture faces. This horizon extends even below 150 cm.

Appendix A-4

South Coffeepot Creek: Site 15, Sampled 7/22/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NE $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 6, T.23S., R.4E; north bank of Coffeepot Creek about 1/10 mile south of Forest Service Road 2253A in clear-cut 9.

About 3200 feet elevation. This is a moderately well drained soil. Profile was sampled at the edge of a stream bank failure. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #49.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A 15-1	0-25	Brown (10YR 4/3) gravelly loam, pale brown (10YR 6/3) dry; strong medium granular; slightly sticky, slightly plastic; about 15-20% gravel, few cobbles; few reddish mottles.
B2 15-2	25-75	Dark grayish brown (10YR 4/2) gravelly light clay loam, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky; slightly sticky, slightly plastic; about 30% coarse fragments of which 15% is gravel and 15% is cobbles; few, medium, faint grayish brown (2.5Y 5/2) and brown (7.5YR 5.4) mottles.
B3 15-3	75-180	Brown (10YR 5/3) gravelly clay loam to gravelly loam, light yellowish brown (10YR 6/4) dry; massive; slightly sticky, slightly plastic; about 20% coarse fragments of which 15% is cobbles and 5% is gravel; few fine faint mottles.
C 15-4	>180	Brown (10YR 4/3) silty clay, brown (5YR 5/4) and 10YR 5/3) dry; massive; very sticky, very plastic; about 35% coarse fragments of which 10% is gravel and 25% is angular cobbles; common fine faint mottles; few pumice or yellowish tuff particles of gravel size.

Appendix A-5

Buck Mountain: Site 16, Sampled 7/22/71

Lane County, Oregon, Hills Creek Reservoir Watershed, SW $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 34, T.22S., R.4E.; slump on south side of Forest Service Road 224.

About 3500 feet elevation. Well drained soil underlain by soft greenish tuff breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #36.

Horizon and Sample No.	Depth (cm)	
A 16-1	0-25	Brown (10YR 4/3) gravelly loam, brown (10YR 5/3) dry; strong medium granular; friable, nonsticky, nonplastic; about 18% gravel <0.7 cm.
B21 16-2	25-60	Brown (10YR 4/3) gravelly silt loam, brown (10YR 5/3) dry; moderate fine subangular blocky; friable, slightly sticky, slightly plastic; about 18% gravel.
B22 16-3	60-125	Dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky; sticky and plastic; about 12% gravel, few cobbles; common large pores.
B3 16-4	>125+	Brown (10YR 4/3) light silty clay loam, light yellowish brown (10YR 6/4) dry; weak coarse subangular blocky, nearly massive; friable, sticky, and plastic; about 13% coarse fragments of which about 8% is gravel and 5% is cobbles; few large pores.
C 16-5		Soft greenish tuff breccia.

Appendix A-6

Little Willow Creek: Site 17, Sampled 7/23/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NW $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 25, T.22S., R.3E.; north side road cut on Forest Service Road 224; the area looks like an old slump basin and there are several small road cut failures along this cut.

About 2800 feet elevation. Somewhat poorly drained soil over saprolitic greenish tuff breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #41.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A1 17-1	0-25	Reddish brown (5YR 4/3) gravelly or shotty loam, pinkish gray (5YR 6/2) dry; strong medium and fine granular; friable, slightly sticky, slightly plastic; very porous; clear smooth boundary.
A2 17-2	25-45	Brown (10YR 4/3) light silty clay loam, light brownish gray (10YR 6/2) and light gray (10YR 7/1) dry; weak medium subangular blocky; sticky and plastic; fairly porous; abrupt smooth boundary.
B2t 17-3	45-88	Variegated, mostly grayish brown (2.5Y 5/3) silty clay (about 55% clay); weak fine prismatic to nearly massive; hard, very sticky, very plastic; common weathered soft gravel; few medium distinct brown mottles; very impervious.
B3t 17-4	88-125	Variegated gravelly clay; weak coarse angular blocky to massive; very hard, very sticky, very plastic; about 25% soft gravel; few fine dark grayish brown (2.5Y 4/3) clay films.
C 17-5	>125+	Variegated gravelly clay; massive; about 25% gravel, mostly soft; very sticky, very plastic; some slickensides.

Appendix A-7

Juniper Creek: Site 18 and 19, Sampled 8/13/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NE $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 34, T.22S., R.4E.; old slump material on west side of Forest Service Road 224M. Site 18 and 19 are about 50 feet apart.

About 3500 feet elevation. This is a road cut about 20 feet deep and water seeps out at the base of the cut. Representative of U.S. Forest Service Mantle Stability Survey Unit #35 or #37.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
C 18-1	75-609	Olive gray (5Y 4.5/2) silty clay loam (about 7% medium sand grains), olive (5Y 5/3) dry; massive; hard, sticky, and plastic; slakes in water.
C 19-1	>305+	Pale olive (5Y 6/3) silty clay (about 7% medium sand grains), pale yellow (5Y 7/3) dry; massive; hard, very sticky, very plastic.

Appendix A-8

Packard Creek: Site 22, Sampled 8/13/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NE $\frac{1}{4}$, Sec. 16, T.22S., R.2E.

About 2300 feet elevation. Well drained soil over reddish colored saprolitic breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #25.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
01 and 02	5-0	Partially decomposed litter
A	0-25	Brown (7.5YR 4/3) light clay loam, light brown (7.5YR 6/3) dry; strong fine subangular blocky and coarse granular; friable, sticky, and plastic; abundant roots; white mycellium growth on peds; gradual wavy boundary.
22-1		
B1	25-50	Reddish brown (5YR 4/3) silty clay loam, reddish brown (5YR 5/3) dry; moderate medium subangular blocky; friable, sticky, and plastic; common large pores; abundant roots; white mycellium growth on peds; gradual wavy boundary.
22-2		
B2t	50-98	Red (2.5YR 4/6 crushed peds) silty clay, yellowish red (5YR 4/6) dry; moderate medium subangular blocky; firm, sticky, and plastic; few rock fragments; common roots; continuous thin and moderately thick discontinuous clay films; gradual wavy boundary.
22-3		
B3t	98-130	Yellowish red (5YR 5/6 crushed peds) silty clay loam. Weak coarse subangular blocky; sticky and plastic; many weathered rock fragments; common roots; common thick patchy red (2.5YR 4/6) clay films; weathered saprolitic material becoming predominant with depth.
22-4		
C	130-180	Variegated (7.5YR 6/6, 5/8, 7/3, and 8/3) silty clay loam; soft tuff saprolite, massive; friable, slightly sticky, slightly plastic; few thick red (2.5YR 4/6) clay films on fracture planes.
22-5		

Appendix A-9

Swift Creek: Site 23, Sampled 9/14/71

Lane County, Oregon, Hills Creek Reservoir Watershed, SE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 28; 22S., R.5E.; south side road cut of Forest Service Road 210.

About 4100 feet elevation, about 20% slope. Well drained soil from pumice over deep morainal deposit. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #60 except for the pumice mantle common to this watershed.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
01 and 02	3-0	Partially decomposed litter.
A1	0-10	Brown (7.5YR 4/3) very gravelly sandy loam;
23-1		massive; friable, nonsticky, nonplastic; about 30% gravel (mostly pumice); gradual wavy boundary.
AC	10-50	Brown (7.5YR 4/4) very gravelly loamy sand;
23-2		single grained; loose, nonsticky, nonplastic; about 40% gravel (mostly pumice) about 5% andesitic cobbles; abrupt wavy boundary.
IIC	>50+	Dark brown (10YR 3/3) light gravelly loam;
23-3		massive; slightly sticky, nonplastic (smeary); common roots; about 30% gravel, about 20% cobbles and few stones, this is a very deep deposit, the sample was collected from 90-110 cm depth.

Appendix A-10

Grassy Glade: Site 24, Sampled 9/14/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 20, T.24S., R.4E.; east side road cut of Forest Service Road 2402B, near crest of ridge.

About 3200 feet elevation and about 15% slope. Pumice influenced well drained soil over hard green breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #31 in this watershed.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A1 24-1	0-8	Very dark grayish brown (7.5YR 3/2) loam, light brownish gray (10YR 6/2) dry; moderate very fine granular; friable, nonsticky, nonplastic; abundant sand and few gravel size pumice; clear wavy boundary.
B1 24-2	8-25	Dark brown (7.5YR 3/3) gravelly loam; weak very fine subangular blocky; nonsticky, nonplastic; many sand sized and few gravel sized pumice particles; gradual wavy boundary.
B2 24-3	25-50	Reddish brown (6YR 4/4) gravelly loam; weak fine subangular blocky, nearly massive; friable, nonsticky, nonplastic (smeary); about 50% angular hard green breccia gravel and cobbles and common pumice particles; clear wavy boundary.
R or IIR 24-4	>50	Hard green breccia

Appendix A-11

Coffeepot Creek: Site 25, Sampled 9/14/71

Lane County, Oregon Hills Creek Reservoir Watershed, SW $\frac{1}{4}$, Sec. 25, T.22S., R.3E.; road cut on Forest Service Road 2231A in clear-cut 14 and on crest of Spur Ridge.

About 2600 feet elevation. Well drained soil over moderately soft red breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #26.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A1 25-1	0-20	Dark brown (5YR 3/2) very gravelly loam, pinkish gray (5YR 6/2) dry; strong medium and fine sub-angular blocky; nonsticky, nonplastic; about 35% gravel; abrupt wavy.
B1 25-2	20-50	Dark reddish gray (4YR 4/2) gravelly loam, gray (5YR 6/1) dry; moderate medium subangular blocky; slightly hard, slightly sticky, slightly plastic; about 15% gravel.
B21t 25-3	50-80	Weak red (2.5YR 4/2) gravelly loam, weak medium subangular blocky slightly hard, slightly sticky, slightly plastic; about 30% rock fragments with hardness of about 2.
B22t 25-4	80-128	Dark reddish gray (5YR 4/2) gravelly silty clay loam; moderate medium subangular blocky; sticky and plastic; thin discontinuous clay films; 30% rock fragments.
C 25-5	>128+	Variegated (matrix, yellowish red 5YR 5/8) very gravelly clay loam; massive; sticky and plastic; very porous; common thick patchy brown (10YR 4/3) clay films; this is saprolitic red tuff.

Appendix A-12

Hills Creek: Site 26, Sampled 9/14/71

Lane County, Oregon, Hills Creek Reservoir Watershed, NW $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 36, T.21S., R.3E.; about 50 feet north of Forest Service Road 210.

About 1600 feet elevation. Well drained soil on 40% south slope over hard green breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #31.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
01 and 02	3-0	Partially decomposed litter.
A1 26-1	0-13	Dark brown (10YR 3/3) gravelly loam, light brownish gray (10YR 6/2) dry; strong medium granular; slightly sticky, slightly plastic; about 20% gravel; clear smooth boundary.
B1 26-2	13-35	Brown (10YR 4/3) gravelly loam; strong fine subangular blocky; slightly sticky, slightly plastic; about 30% gravel and 5% cobbles; clear wavy boundary.
B2 26-3	35-70	Dark yellowish brown (10YR 4/4) clay loam; weak medium subangular blocky; sticky, plastic; about 70% angular fragments of greenish tuff breccia; abrupt irregular boundary.
R 26-4	>70+	Hard greenish tuff breccia rock.

Appendix A-13

Larison Creek: Site 27, Sampled 9/14/71

Lane County, Oregon, Hills Creek Reservoir Watershed, SE $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 10, T.22S., R.3E.; west road cut on Forest Service Road 211.

About 1600 feet elevation. Well drained soil on about 20% east slope and over hard red tuff breccia. This profile is representative of U.S. Forest Service Cut-Bank Stability Survey Unit #21.

<u>Horizon and Sample No.</u>	<u>Depth (cm)</u>	
A1 27-1	0-15	Dusky red (2.5YR 3/2) very gravelly silt loam, pinkish gray (5YR 6/2) dry; strong medium granular; friable, slightly sticky, slightly plastic; about 35% gravel.
B 27-2	15-50	Dusky red (2.5YR 3/2) very gravelly silt loam; weak fine subangular blocky; slightly sticky, slightly plastic; about 70% soft angular fragments of red tuff breccia.
R 27-3	>50+	Moderately hard fractured red tuff breccia.

APPENDIX B

CORRELATION OF TURBIDITY AND SUSPENDED SOLIDS
CONCENTRATION FOR WATER FROM HILLS CREEK RESERVOIR
AND TRIBUTARY STREAMS

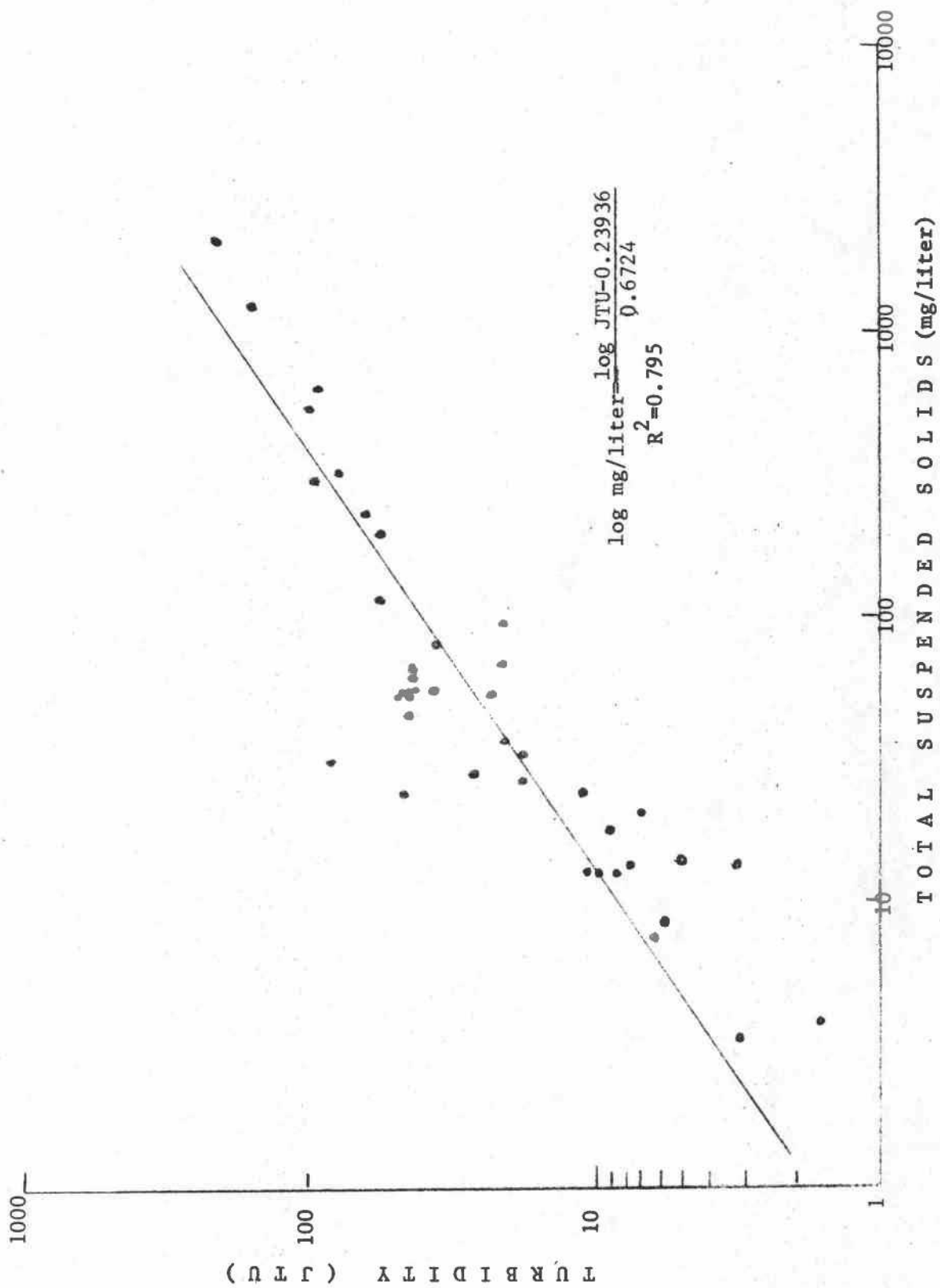


Figure B-1. Correlation of turbidity and suspended solids concentration for water from Hills Creek reservoir and tributary streams.

APPENDIX C

X-RAY DIFFRACTION PATTERNS FOR SAMPLES
FROM THE WATERSHED AND TRIBUTARY STREAMS
OF HILLS CREEK RESERVOIR

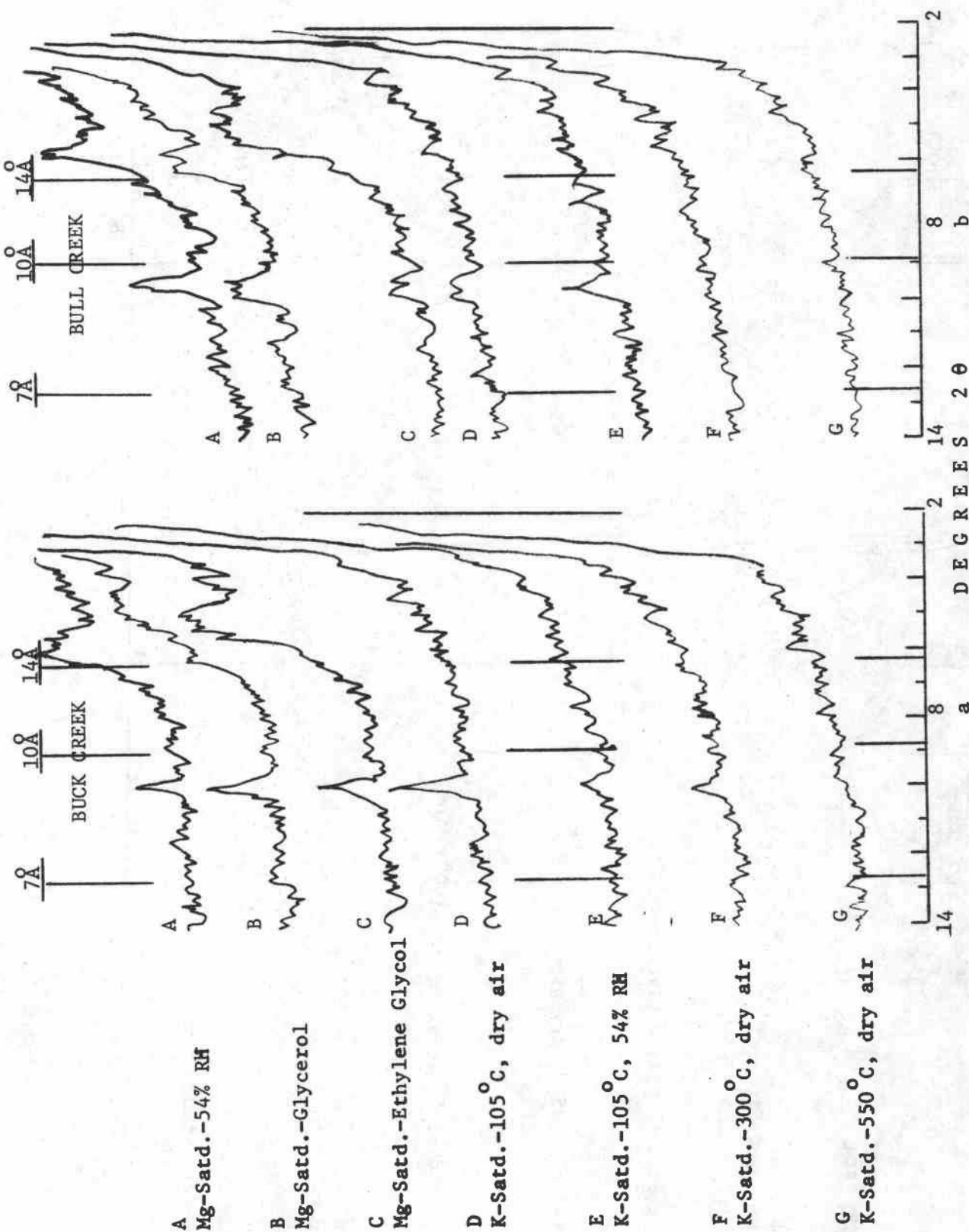


Figure C-1. X-ray diffraction patterns of suspended solids (<50 μ) in water samples collected on March 11, 12, and 13.

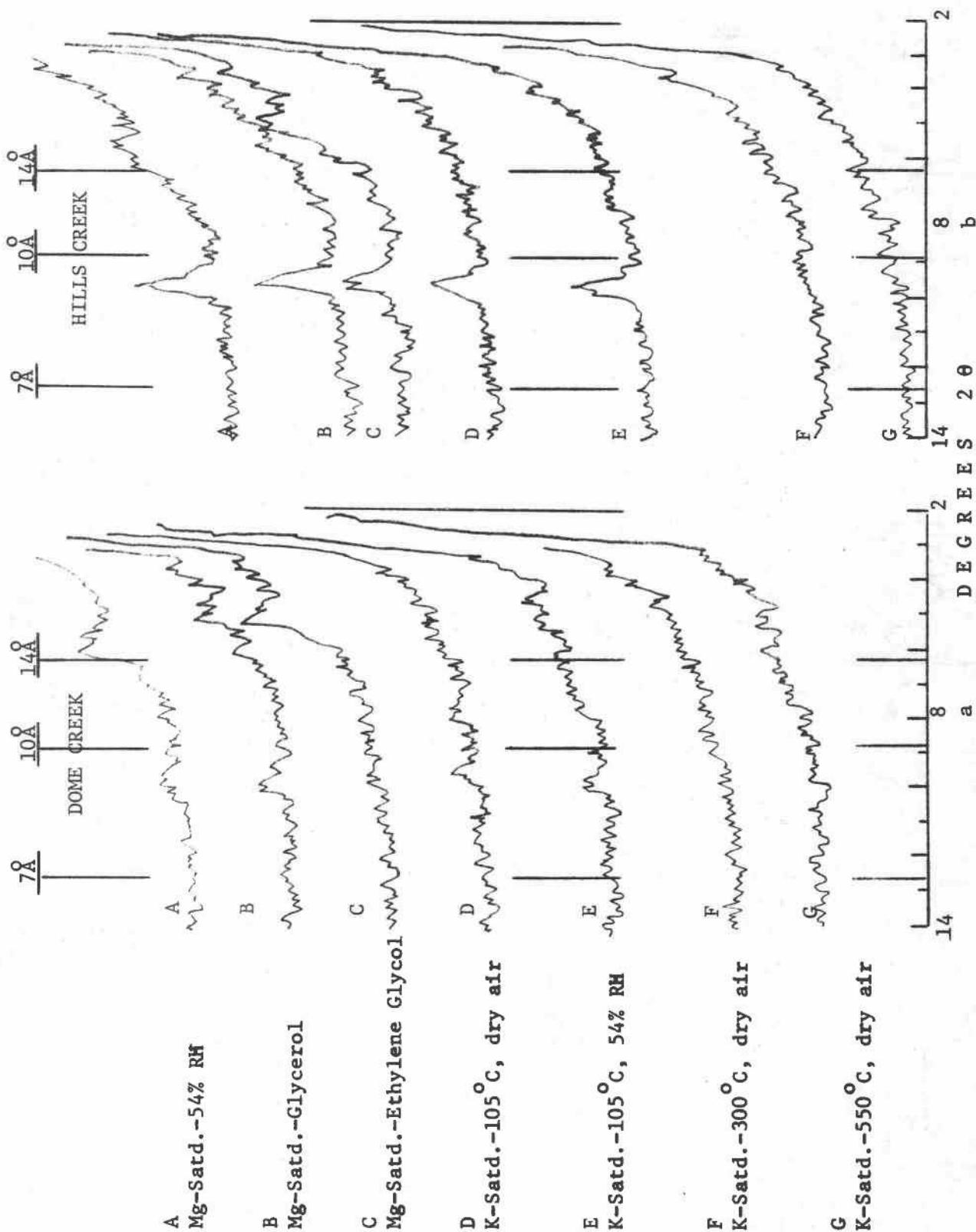


Figure C-2. X-ray diffraction patterns of suspended solids (<50 μ) in water samples collected on March 11, 12, and 13.

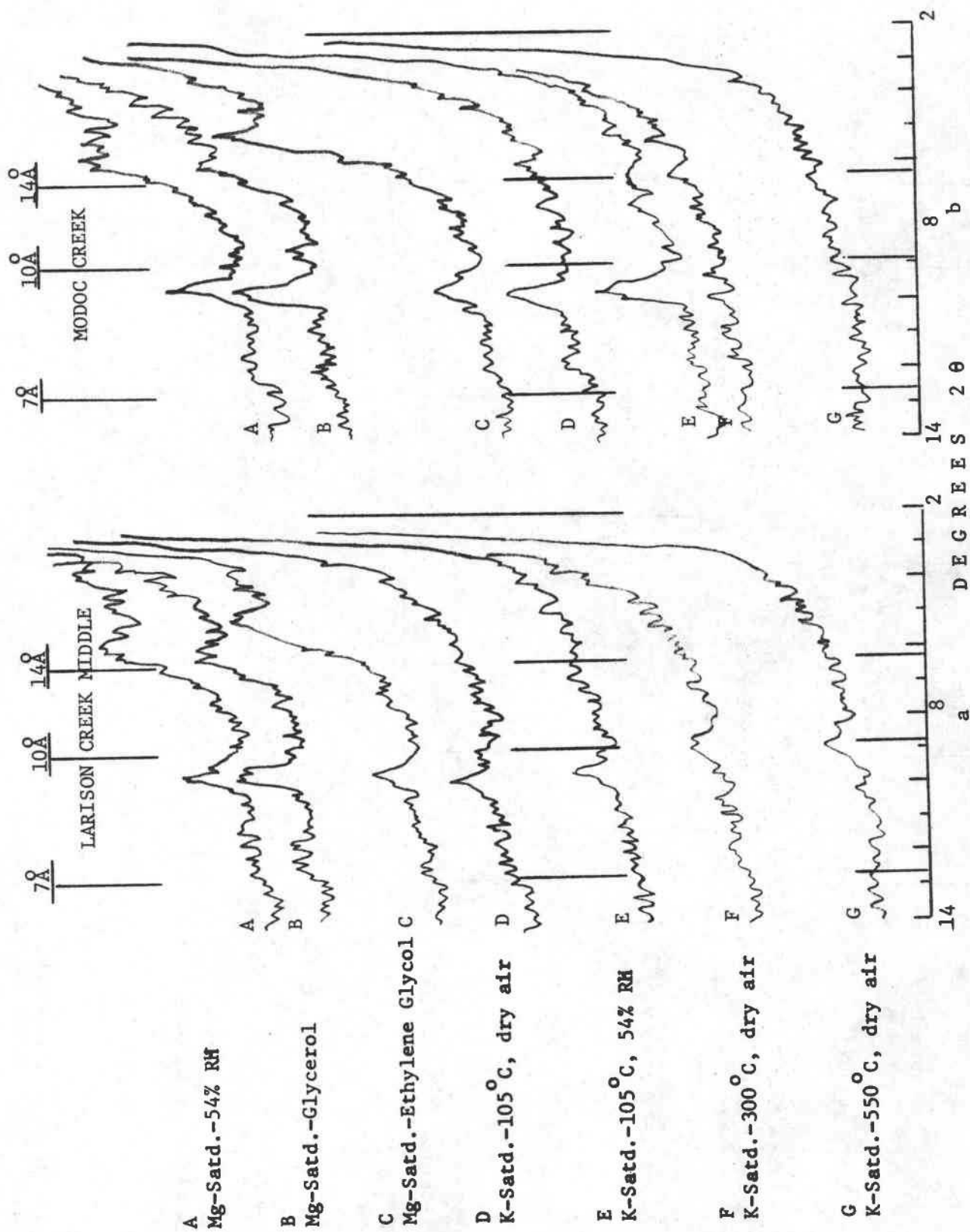


Figure C-3. X-ray diffraction patterns of suspended solids (<50μ) in water samples collected on March 11, 12, and 13.

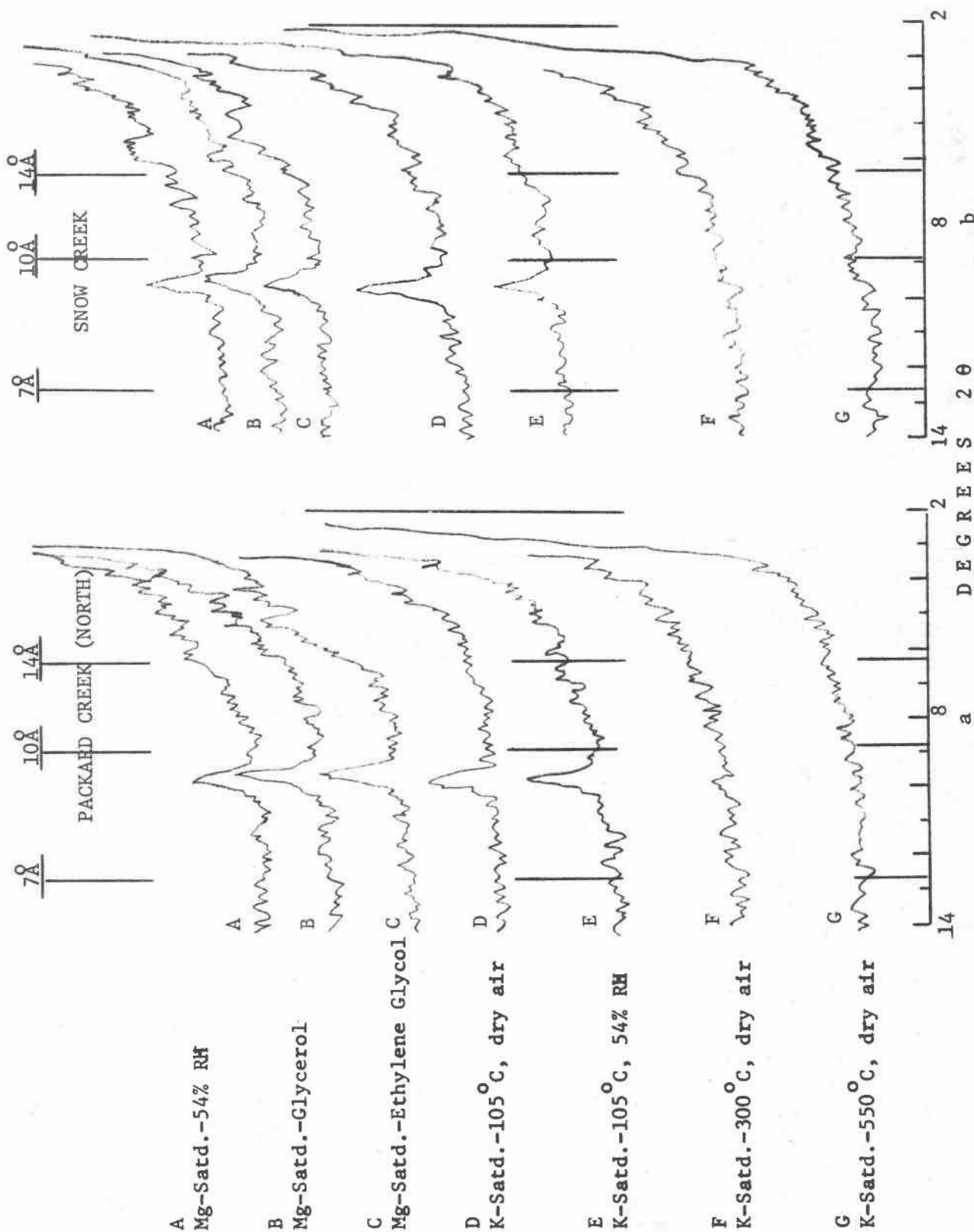


Figure C-4. X-ray diffraction patterns of suspended solids (<50μ) in water samples collected on March 11, 12, and 13.

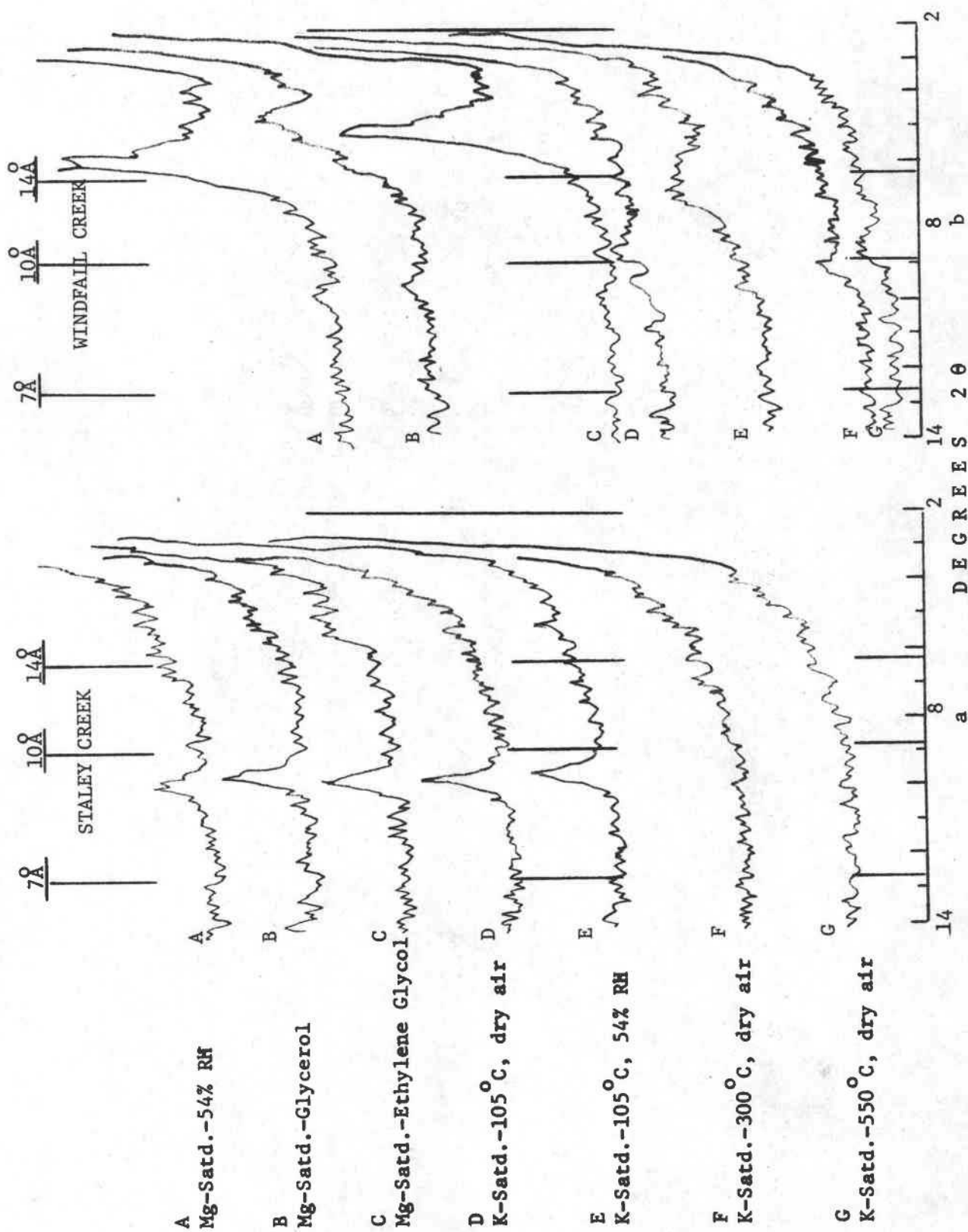


Figure C-5. X-ray diffraction patterns of suspended solids (<50 μ) in water samples collected on March 11, 12, and 13.

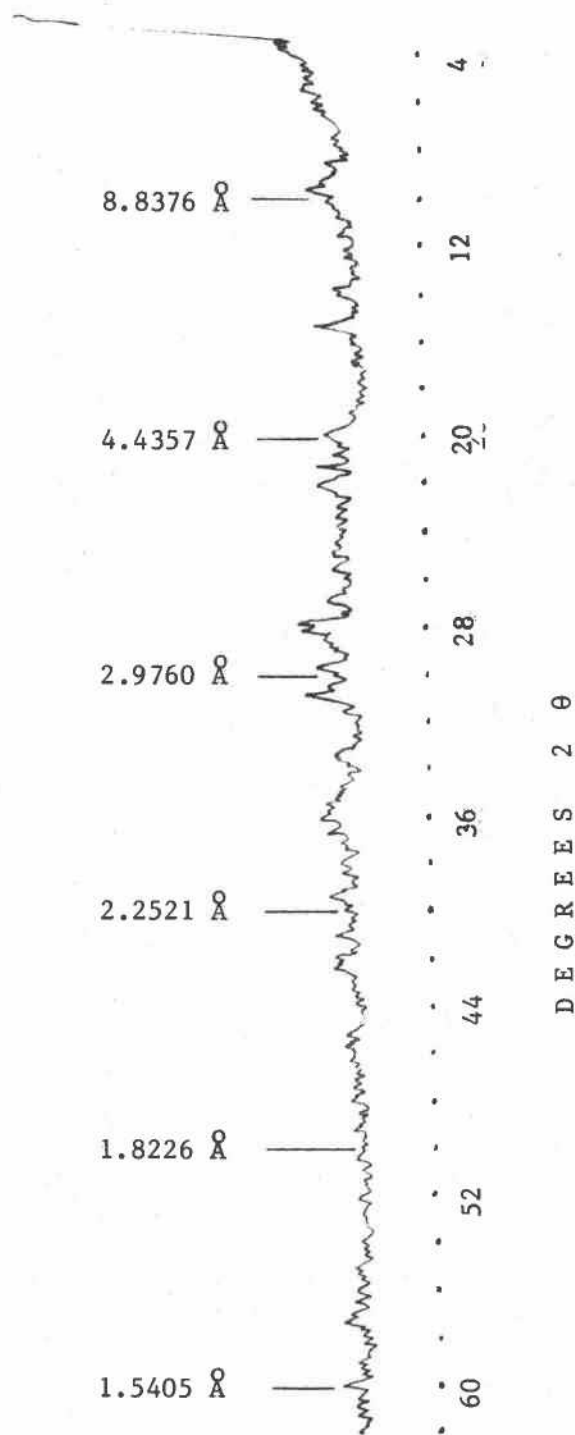


Figure C-6. Powder diffraction pattern of suspended solids from Hills Creek Gaging Station (HCR) collected on March 11, 12, and 13 of 1971.

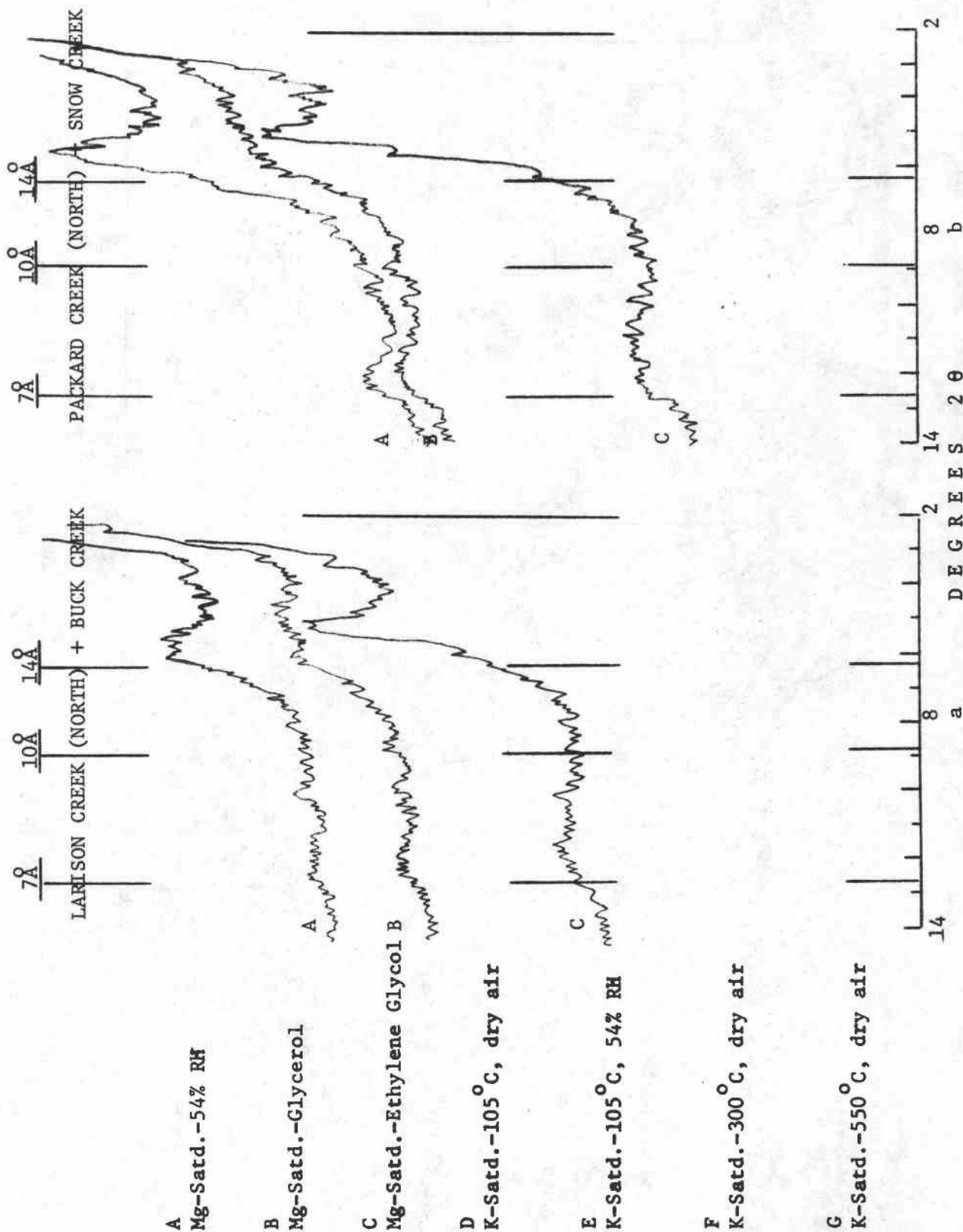


Figure C-7. X-ray diffraction patterns of crystalline suspended solids (amorphous material removed) in water samples collected on March 11, 12, and 13. (a) Larison Creek (north) + Buck Creek (b) Packard Creek (north) + Snow Creek.

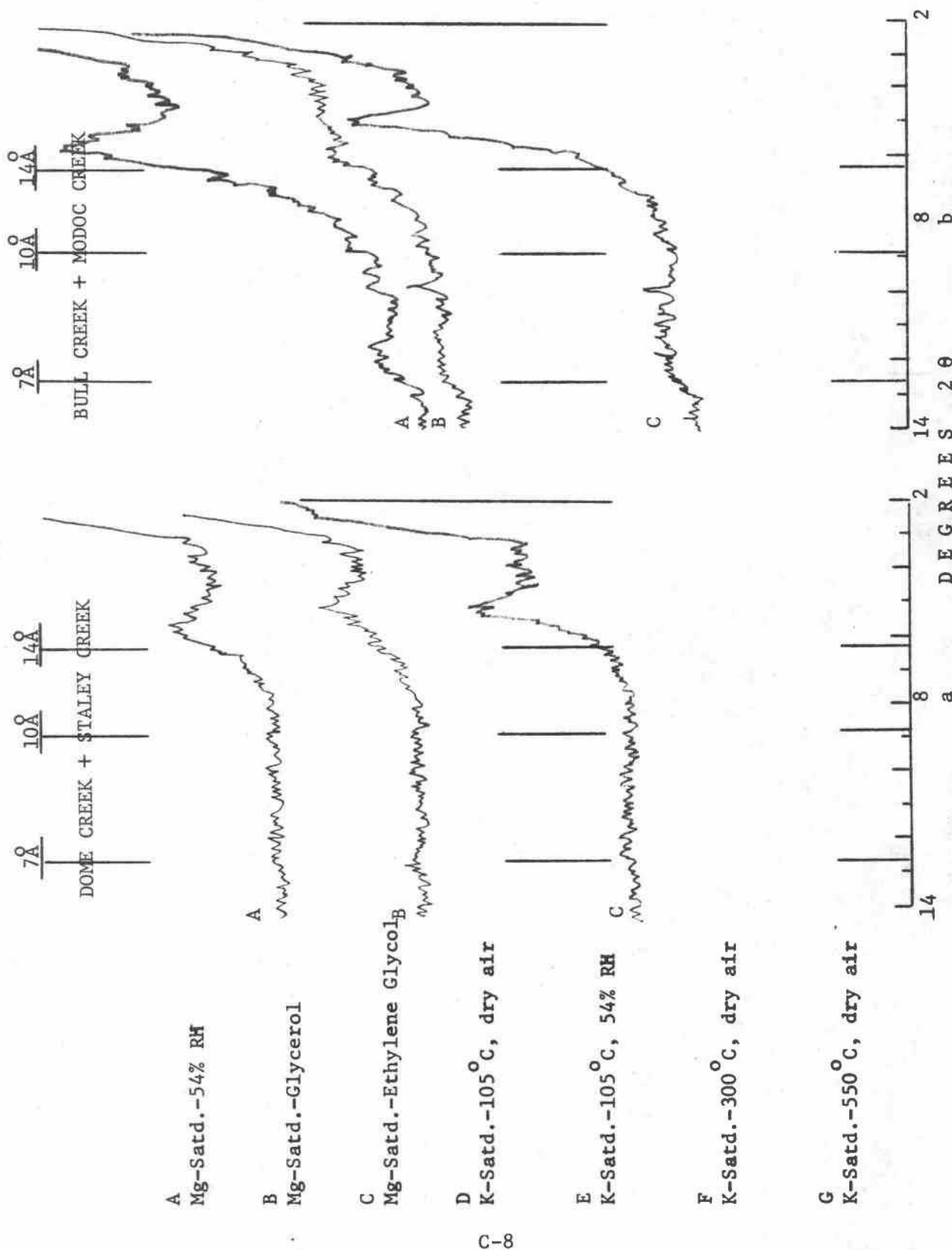


Figure C-8. X-ray diffraction patterns of crystalline suspended solids (amorphous material removed) in water samples collected on March 11, 12, and 13.

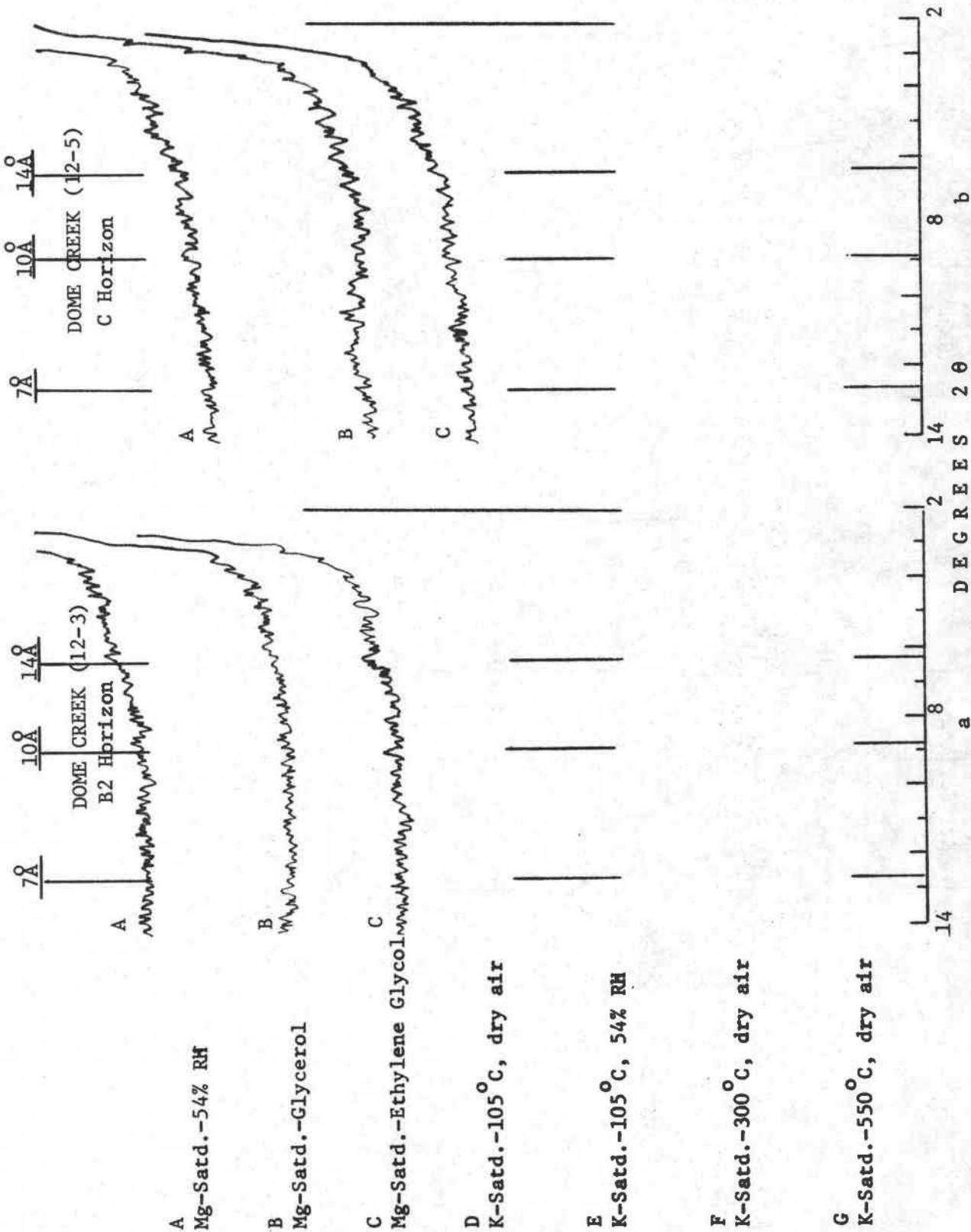


Figure C-9. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

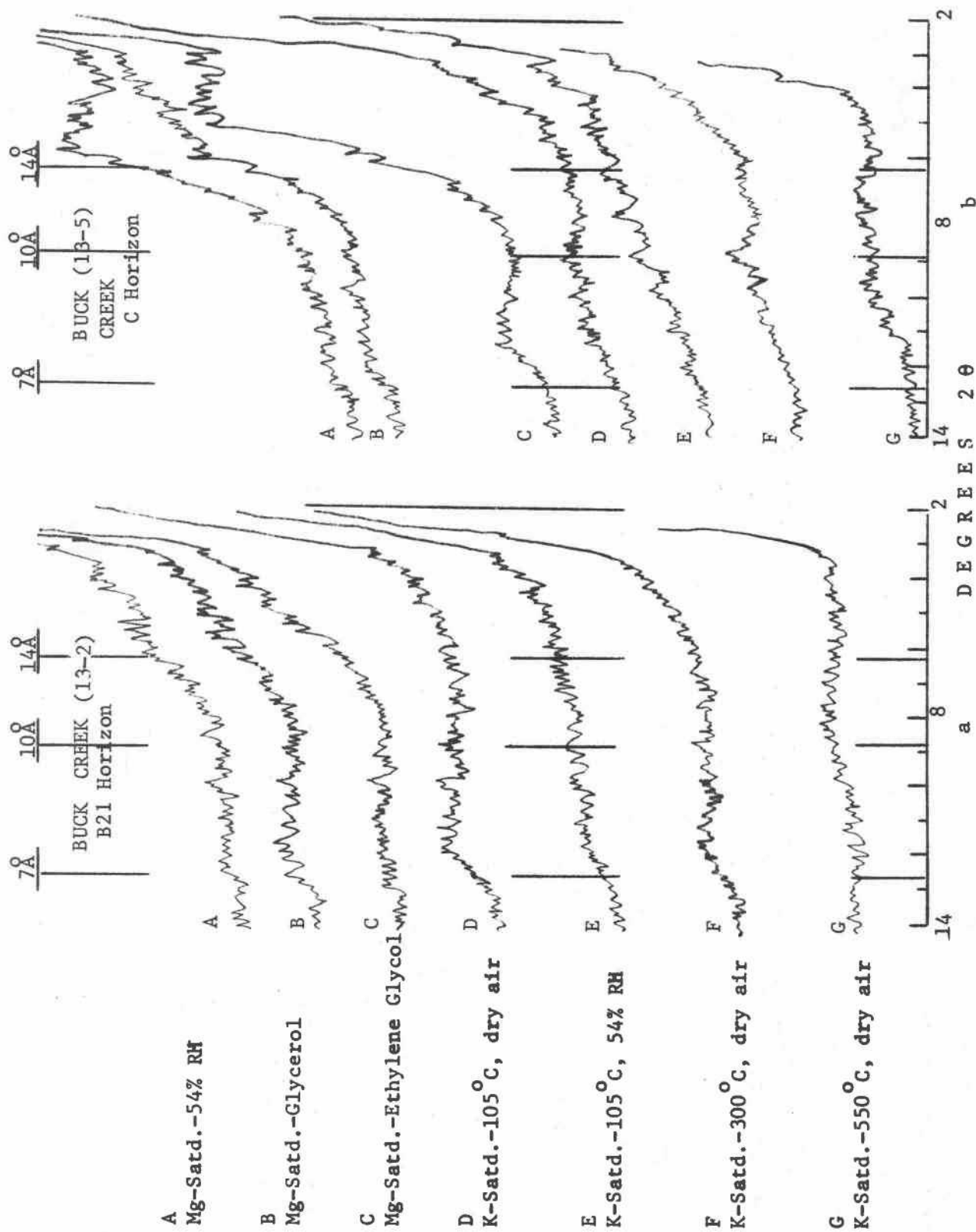


Figure C-10. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

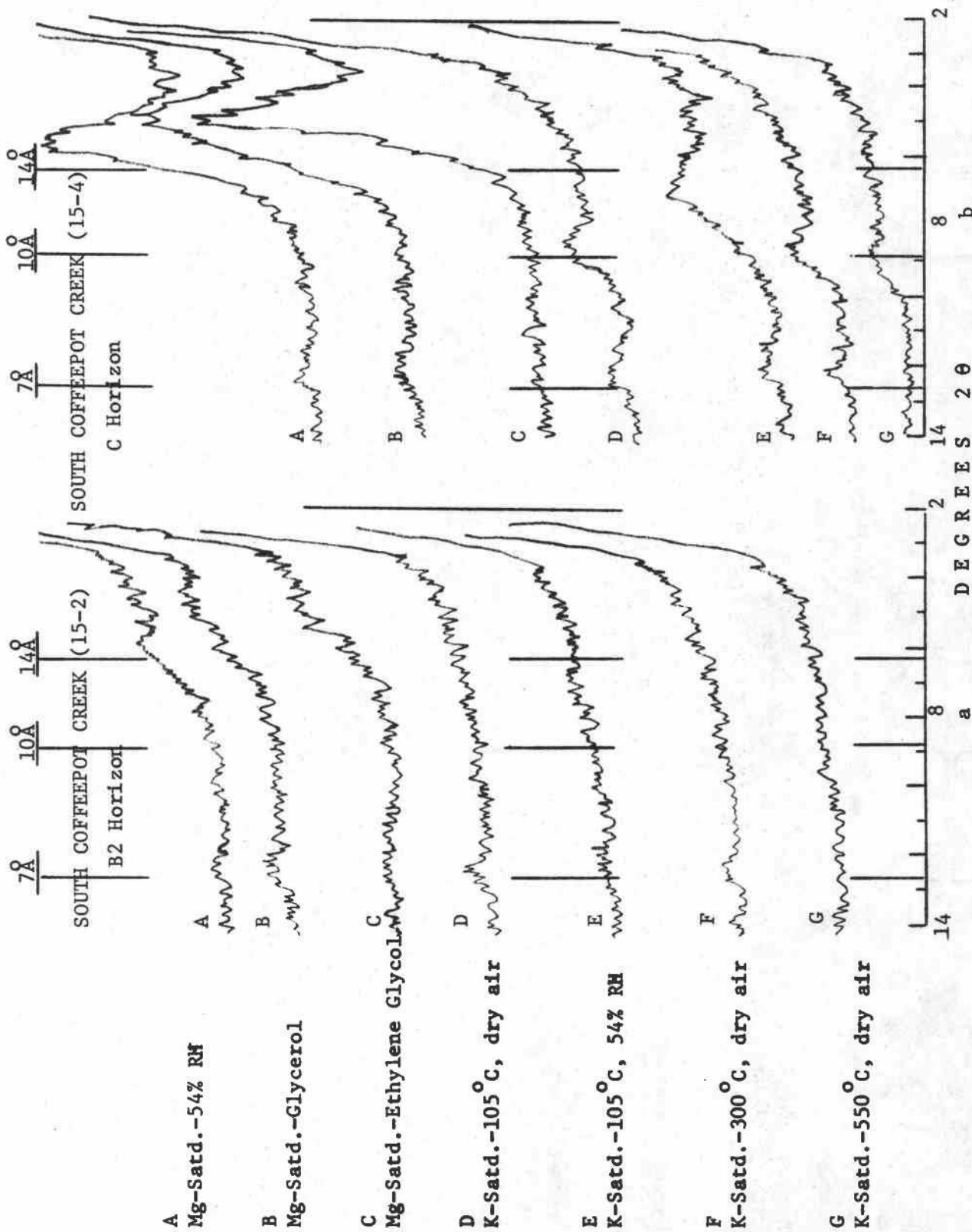


Figure C-11. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

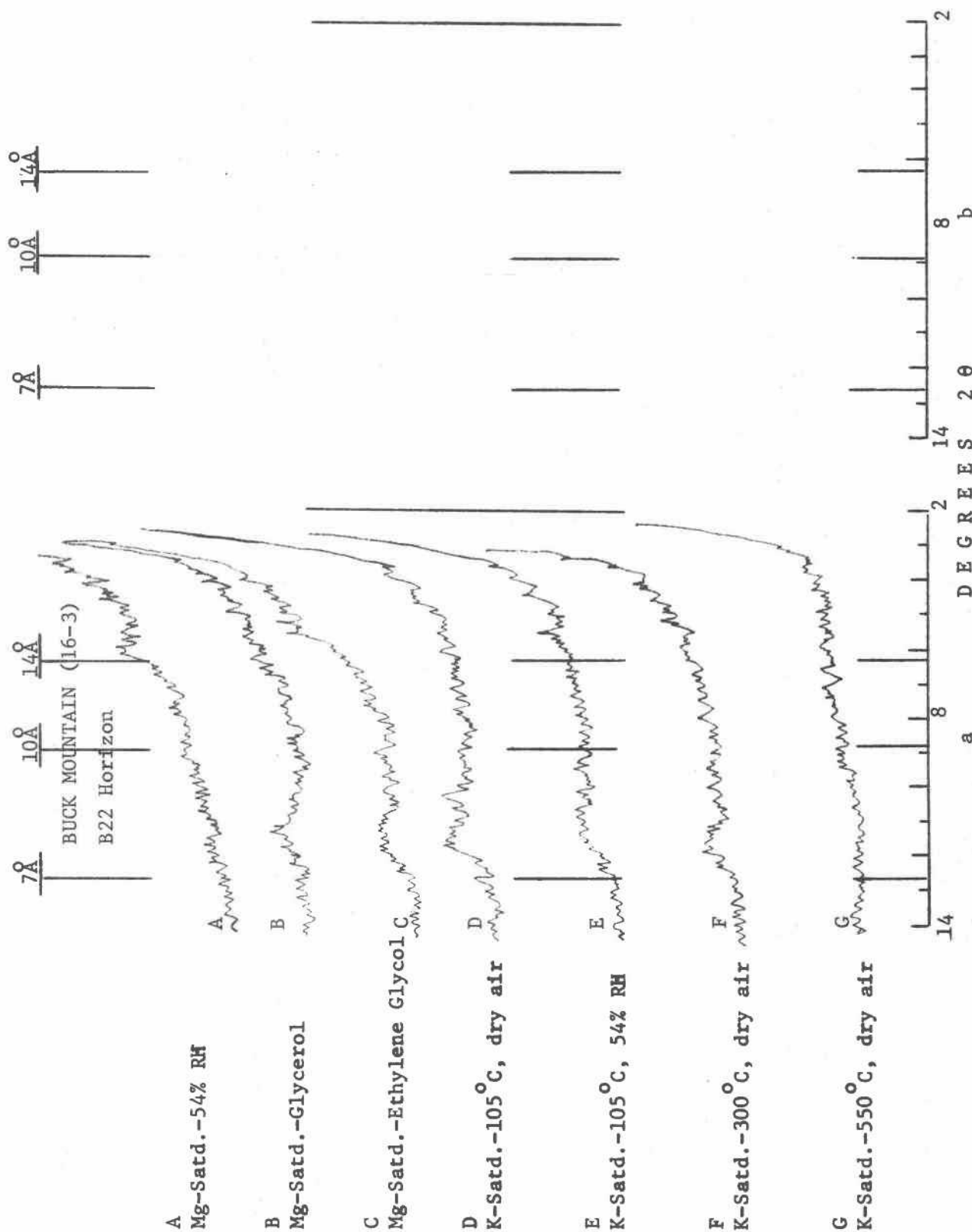


Figure C-12. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

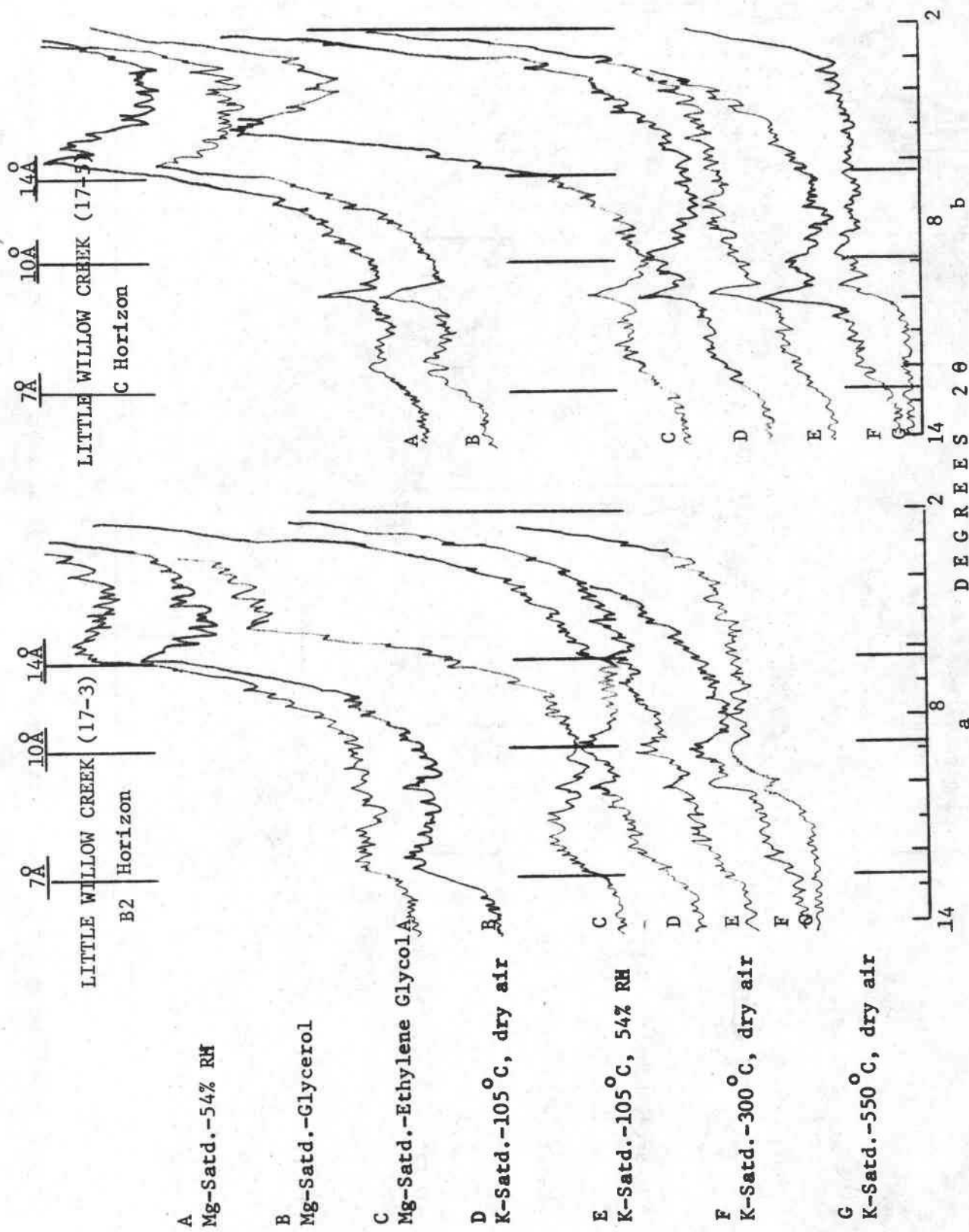


Figure C-13. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

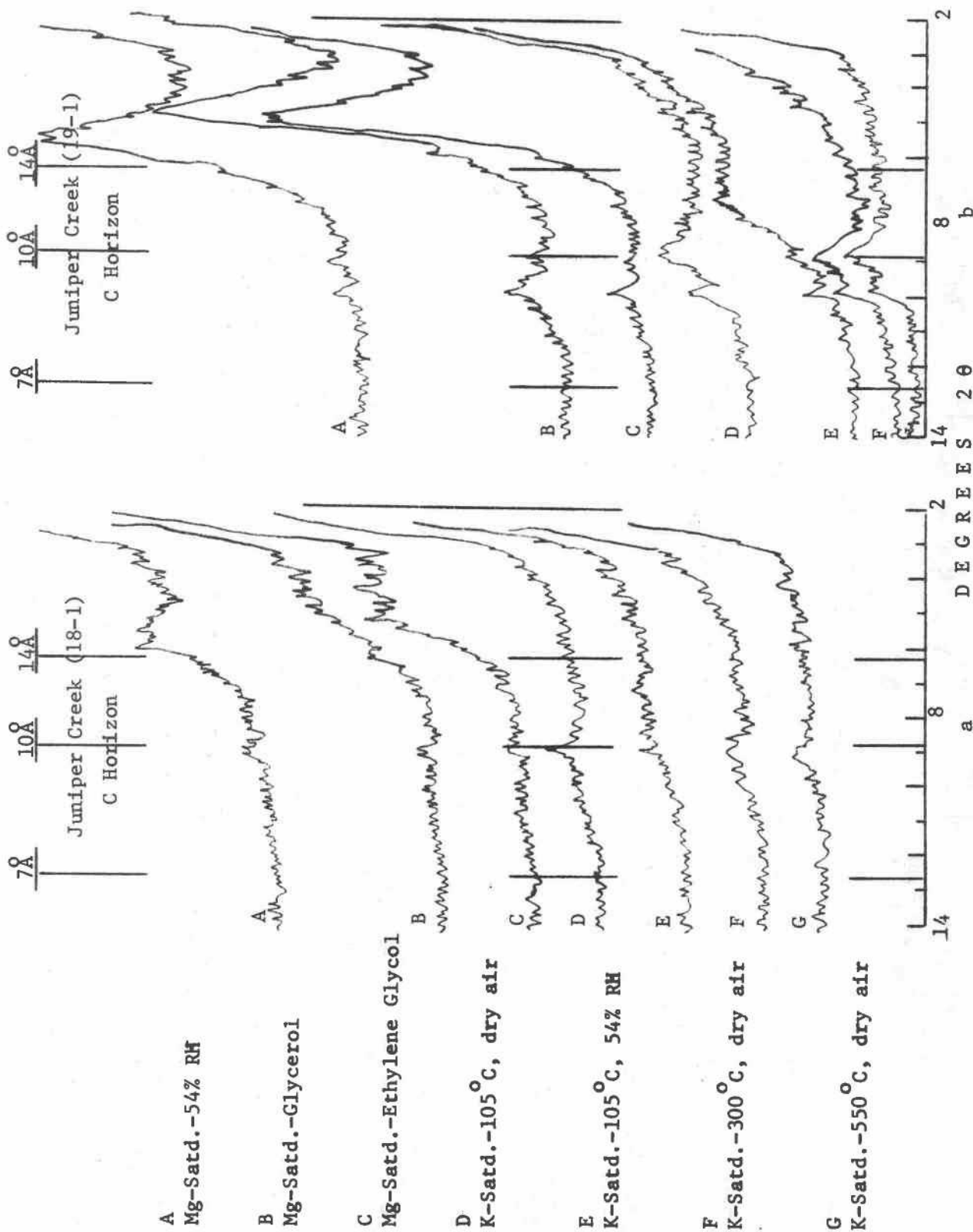


Figure C-14. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

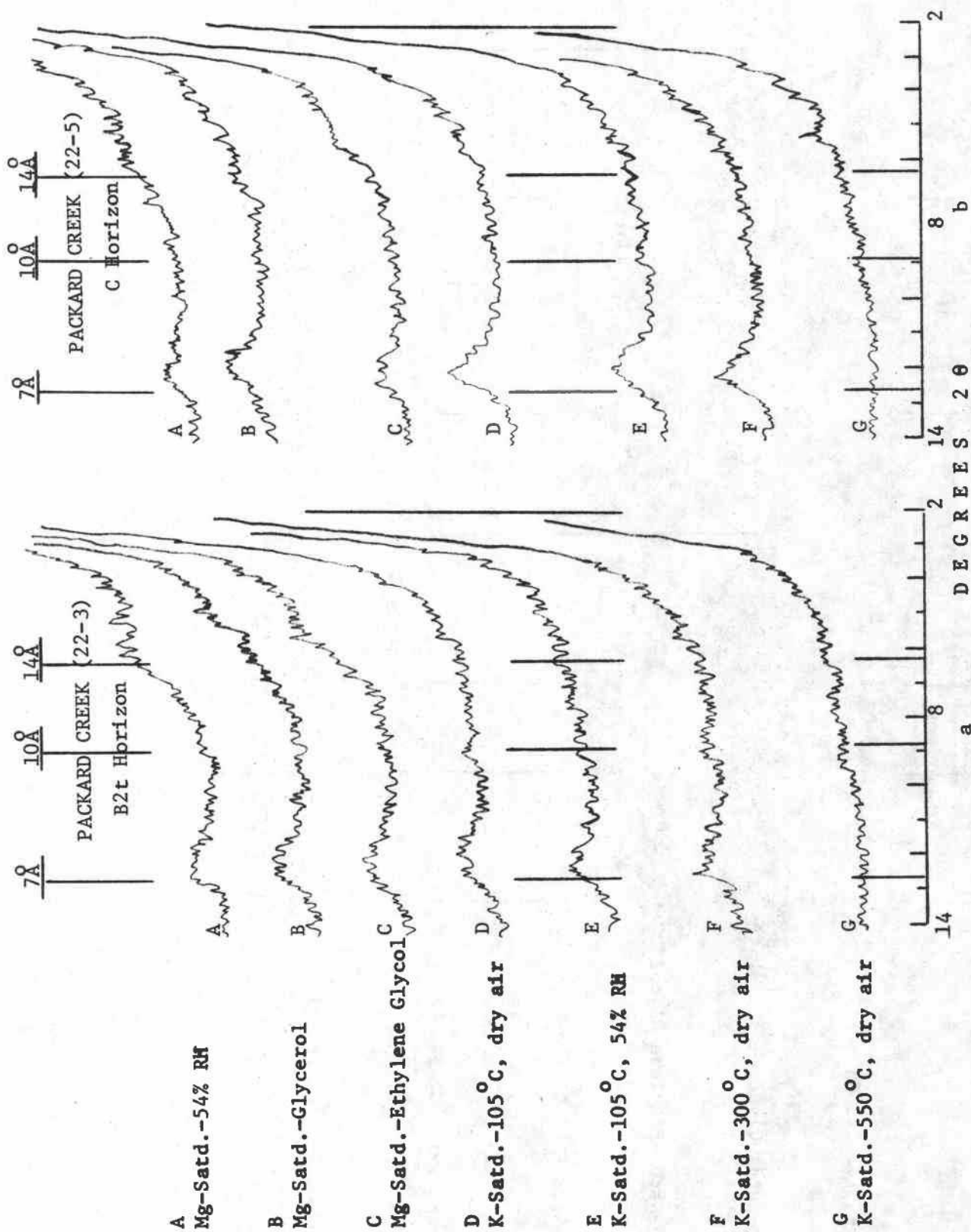


Figure C-15. X-ray diffraction patterns of Clay from Hills Creek Reservoir watershed soil samples.

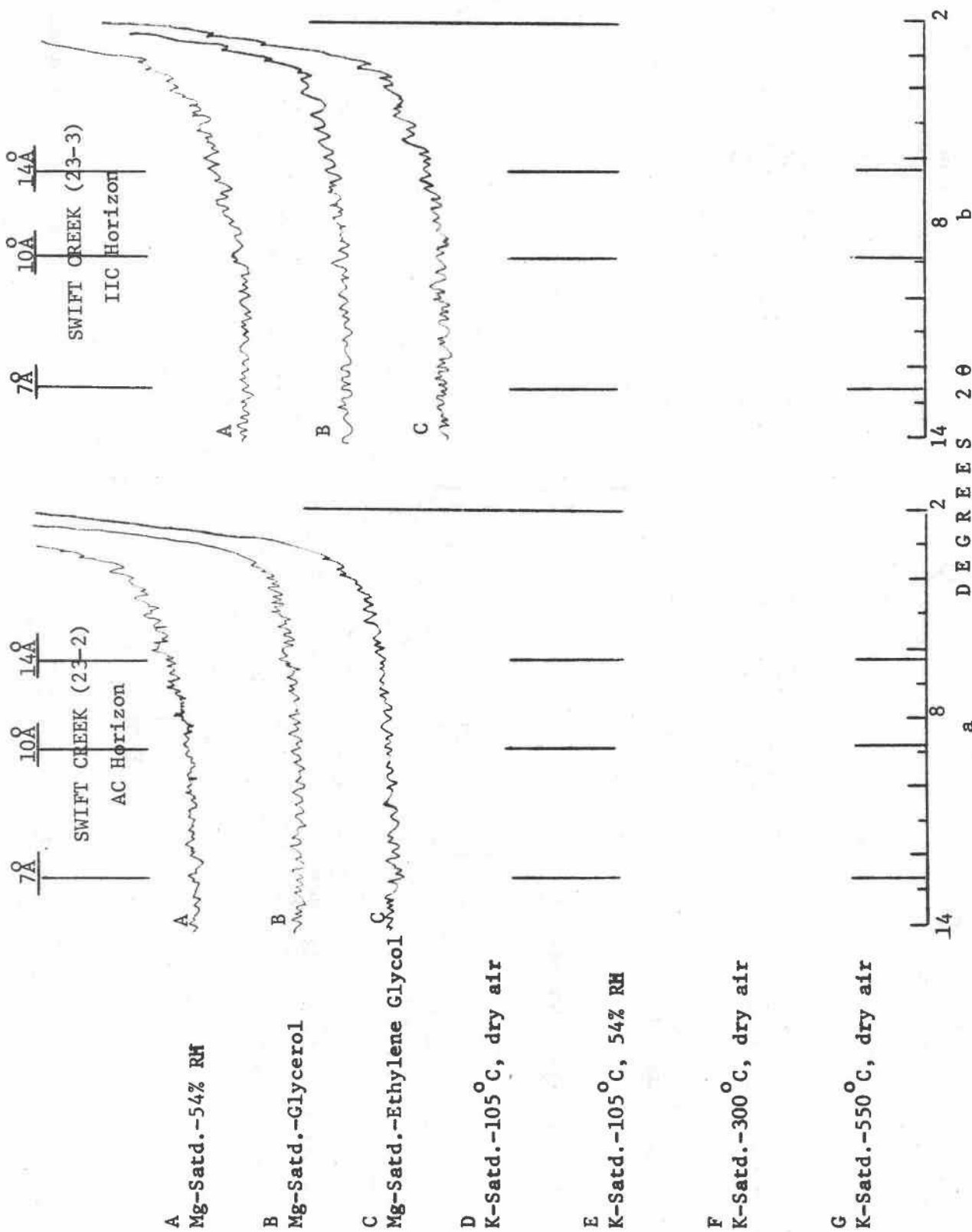


Figure C-16. X-ray diffraction patterns of clay from Hills Creek Reservoir watershed soil samples.

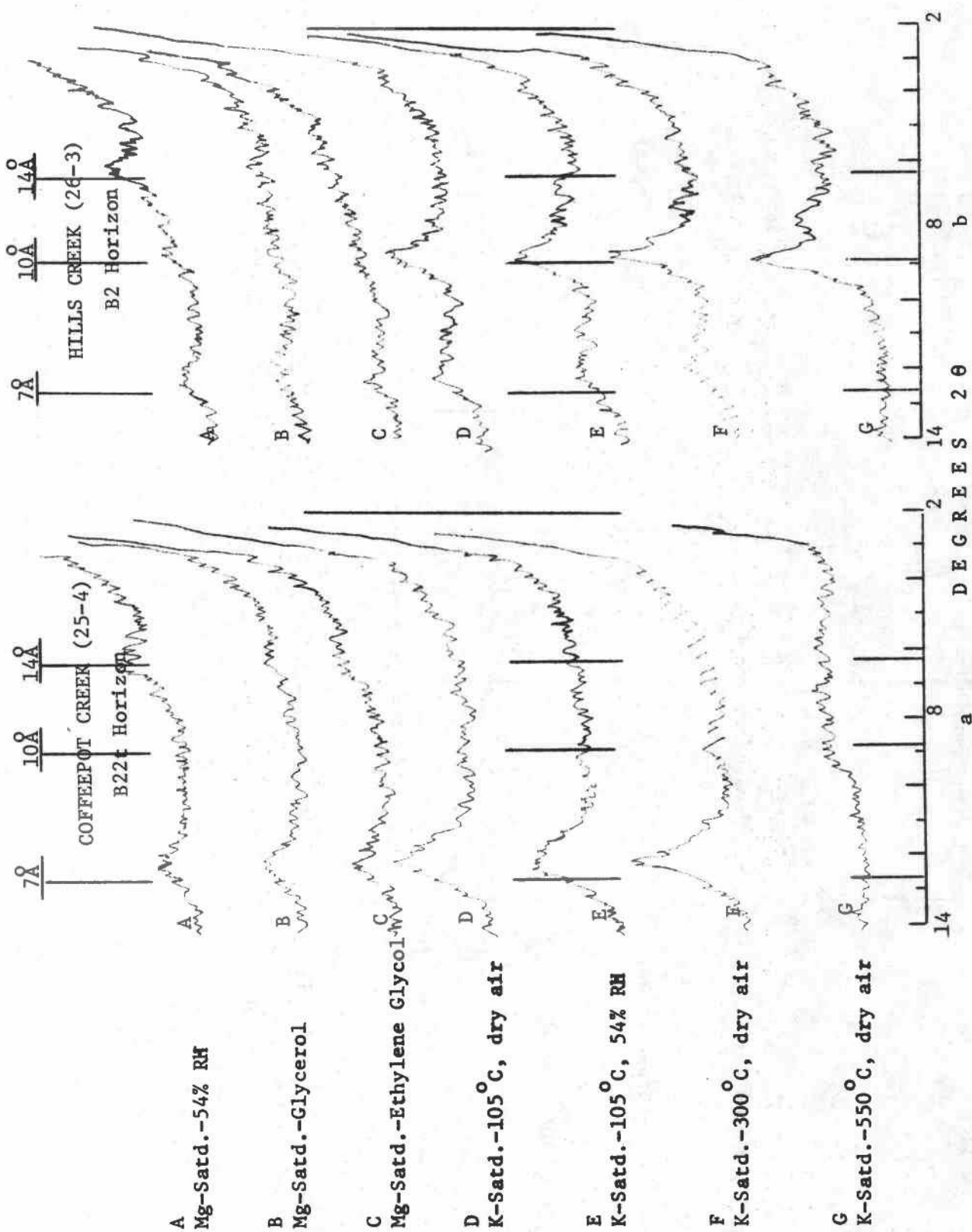


Figure C-17. X-ray diffraction patterns of clay from Hills Creek Reservoir soil samples.

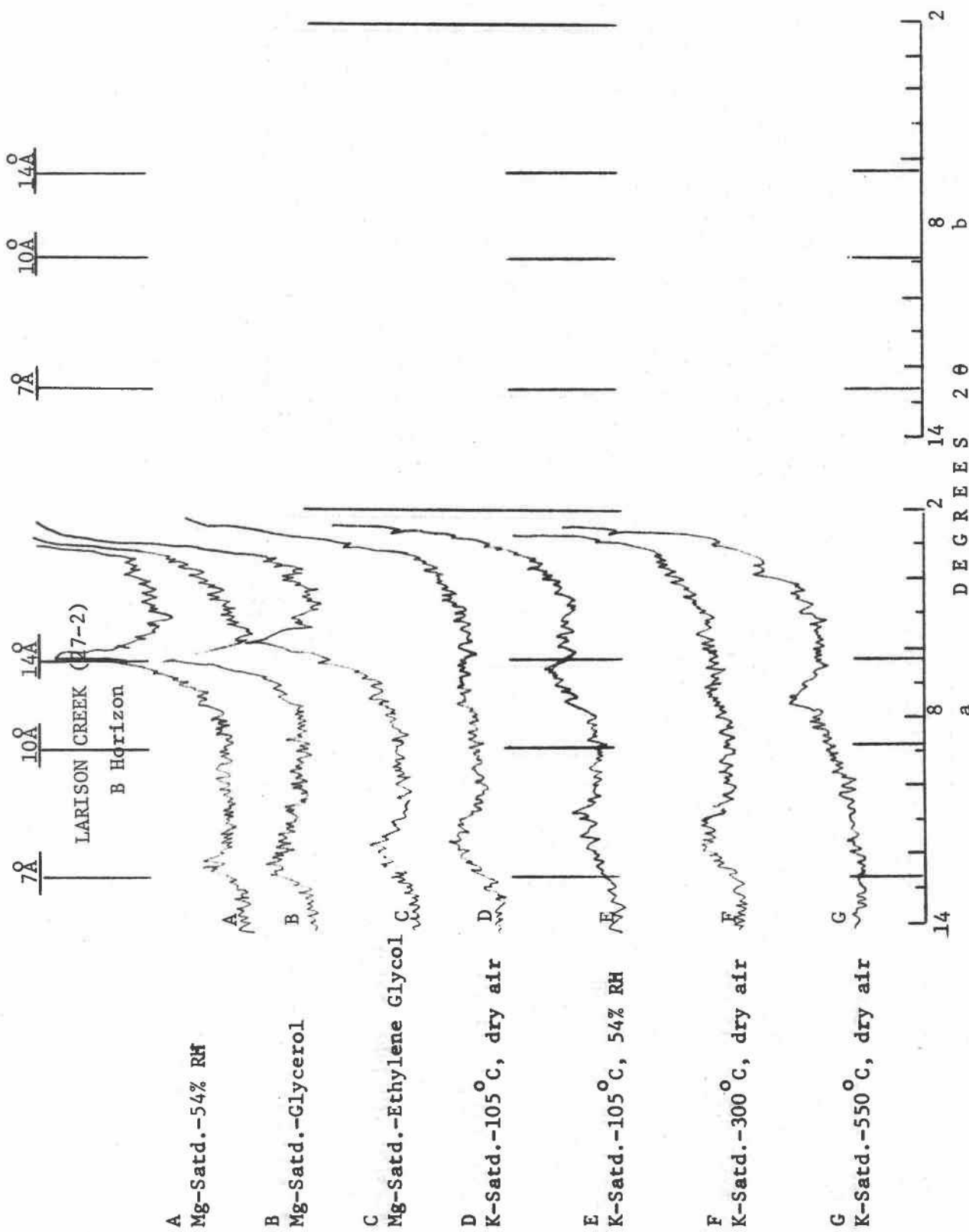


Figure C-18. X-ray diffraction patterns of clay from Larison Creek Reservoir watershed soil samples.

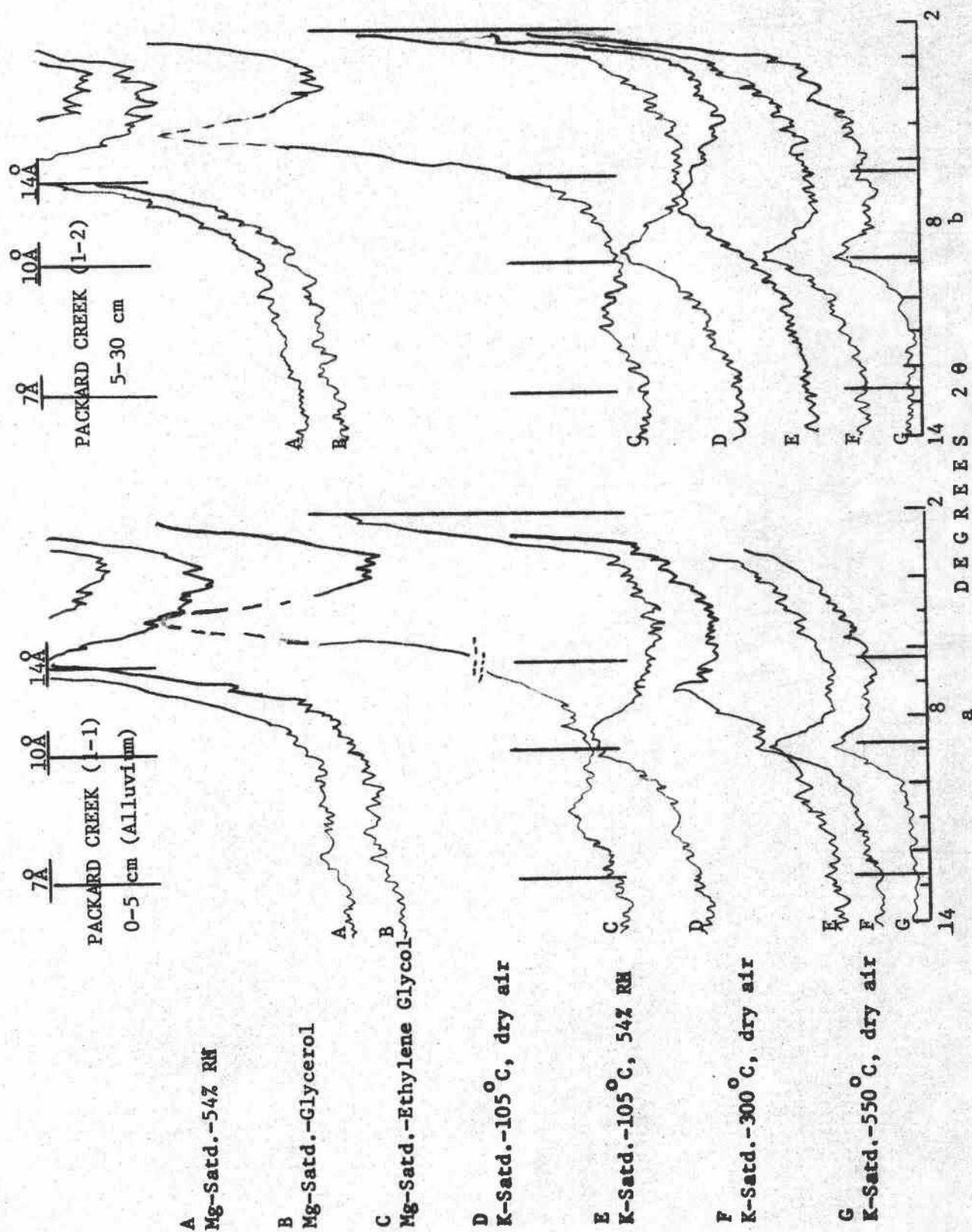


Figure C-19. X-ray diffraction patterns of clay from Hills Creek Reservoir shoreline soil samples.

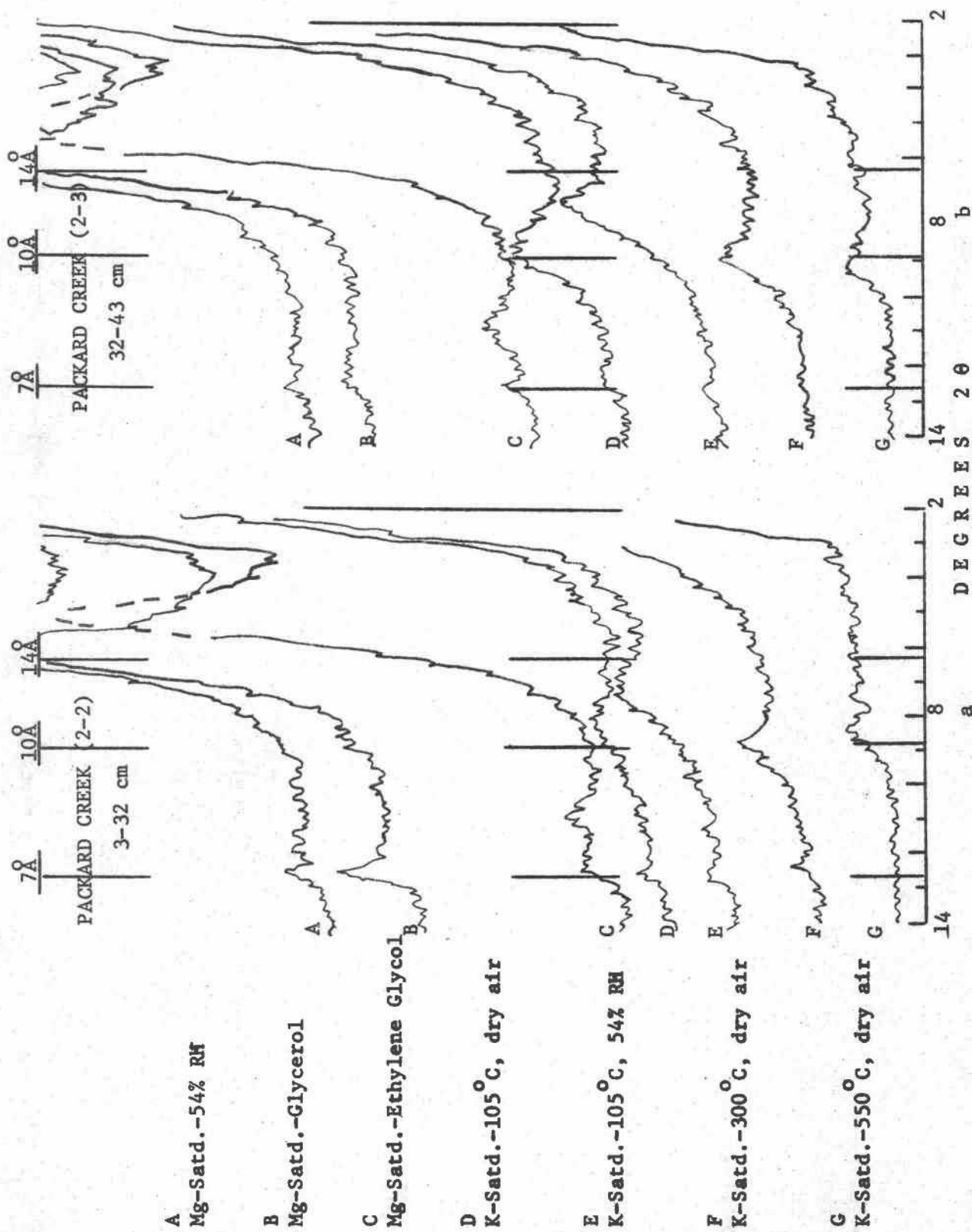


Figure C-20. X-ray diffraction patterns of clay from Hills Creek Reservoir shoreline soil samples.

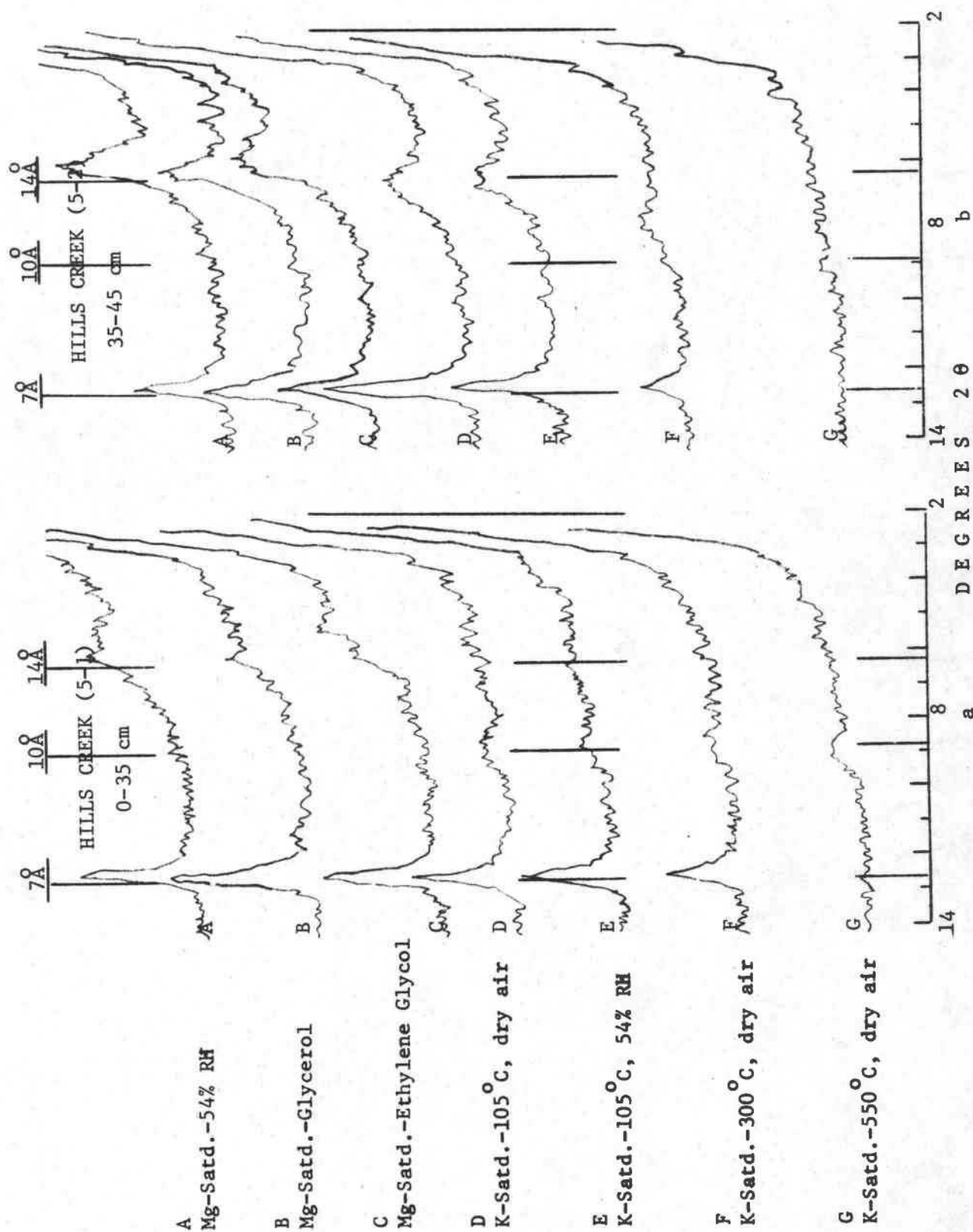


Figure C-21. X-ray diffraction patterns of clay from Hill Creek Reservoir shoreline soil samples.

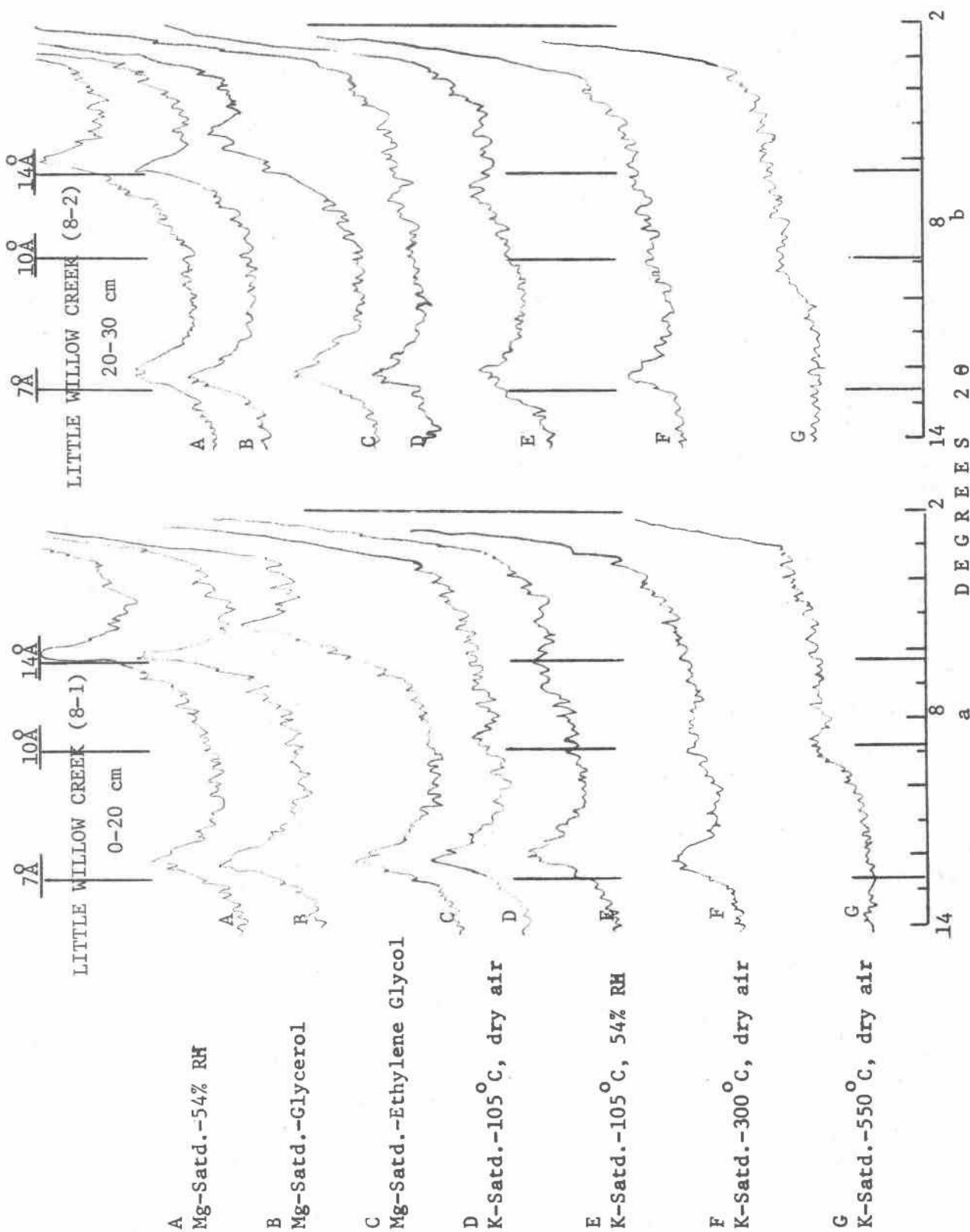


Figure C-22. X-ray diffraction patterns of clay from Hills Creek Reservoir shoreline soil samples.

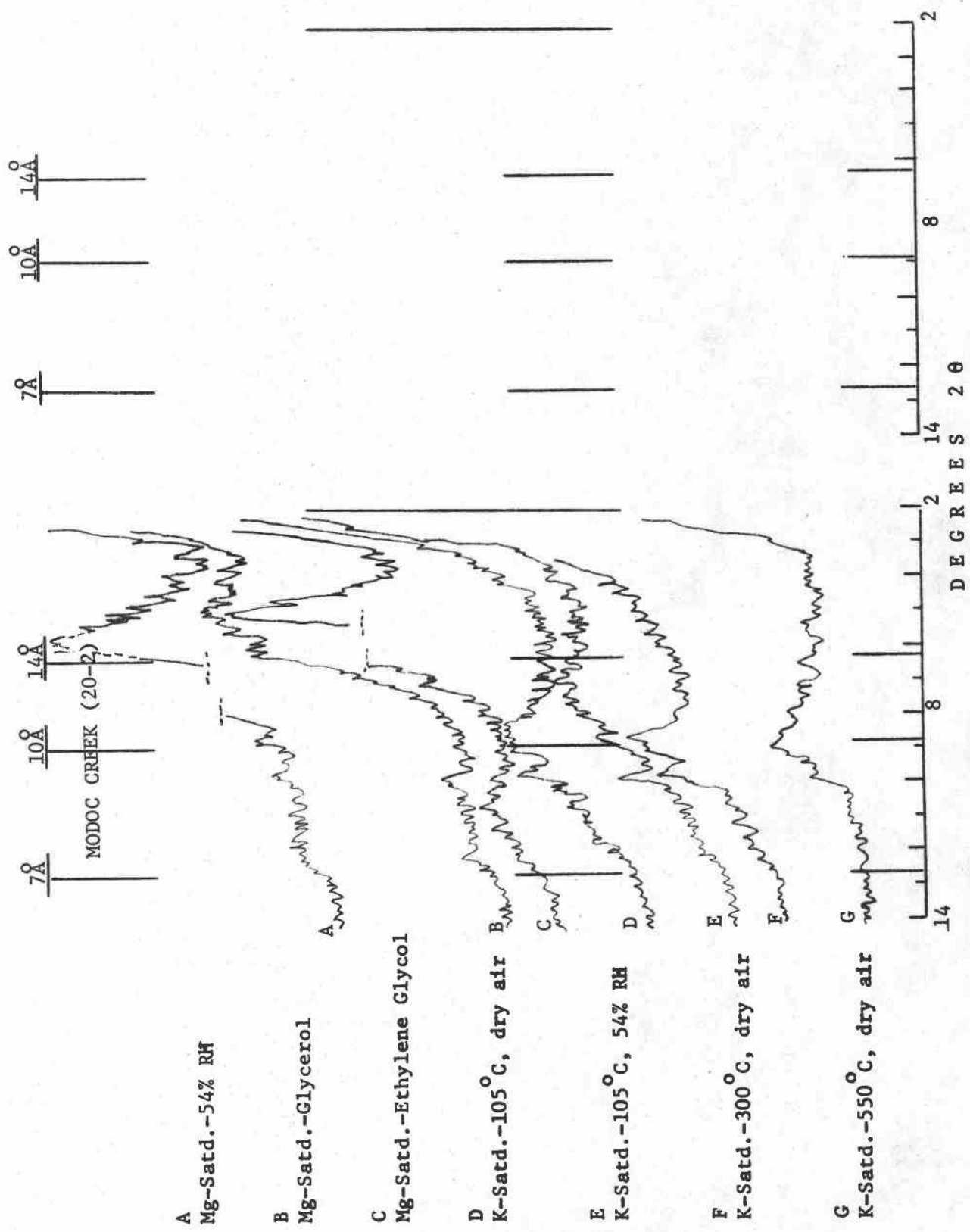


Figure C-23. X-ray diffraction patterns of clay from Hills Creek Reservoir shoreline soil sample.

APPENDIX D

X-RAY DIFFRACTION PATTERNS FOR SAMPLES FROM WATERS
OF OREGON CASCADE RESERVOIRS AND THEIR OUTFLOWS

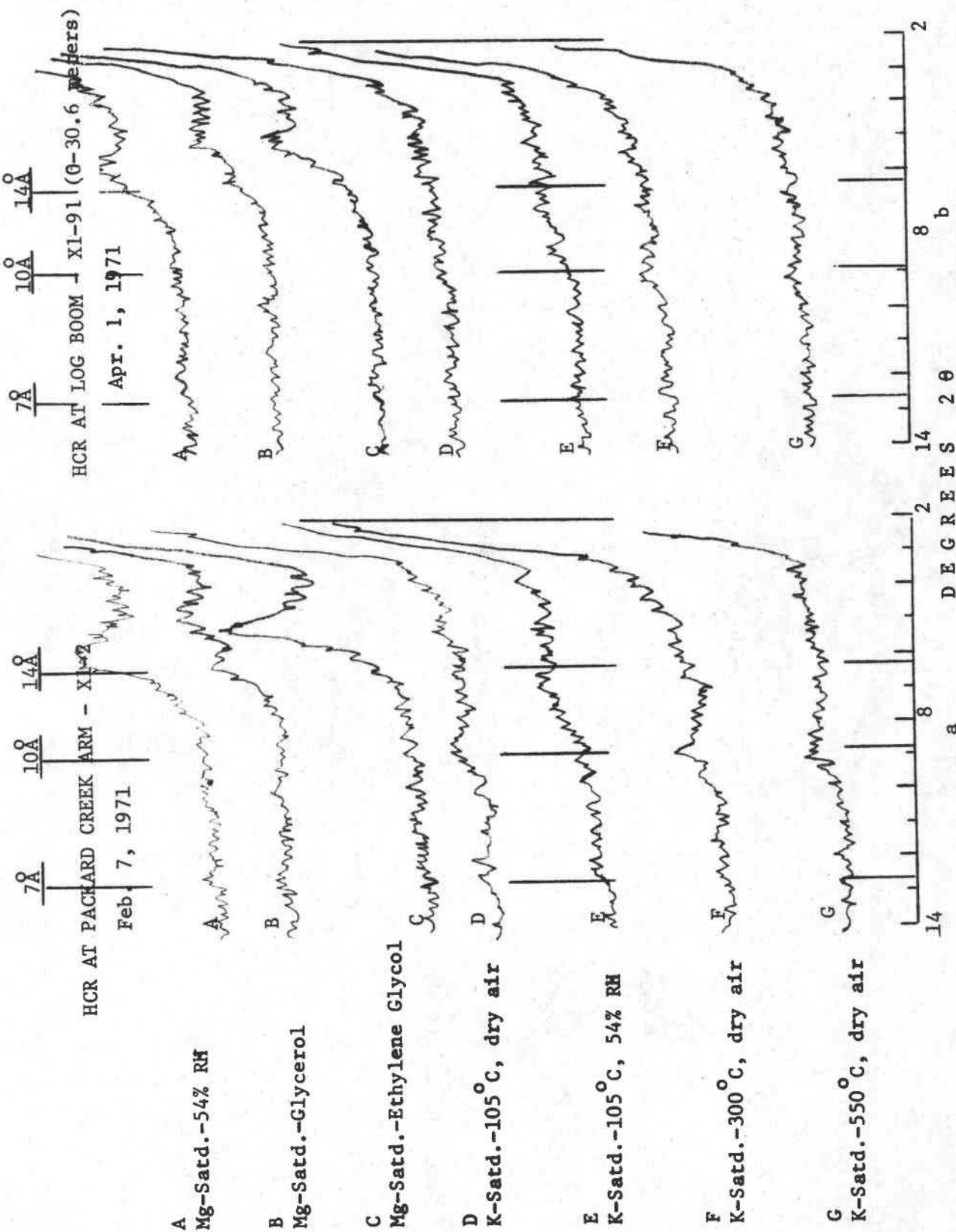


Figure D-1. X-ray diffraction patterns of suspended solids (<50μ) from Hills Creek Reservoir water.

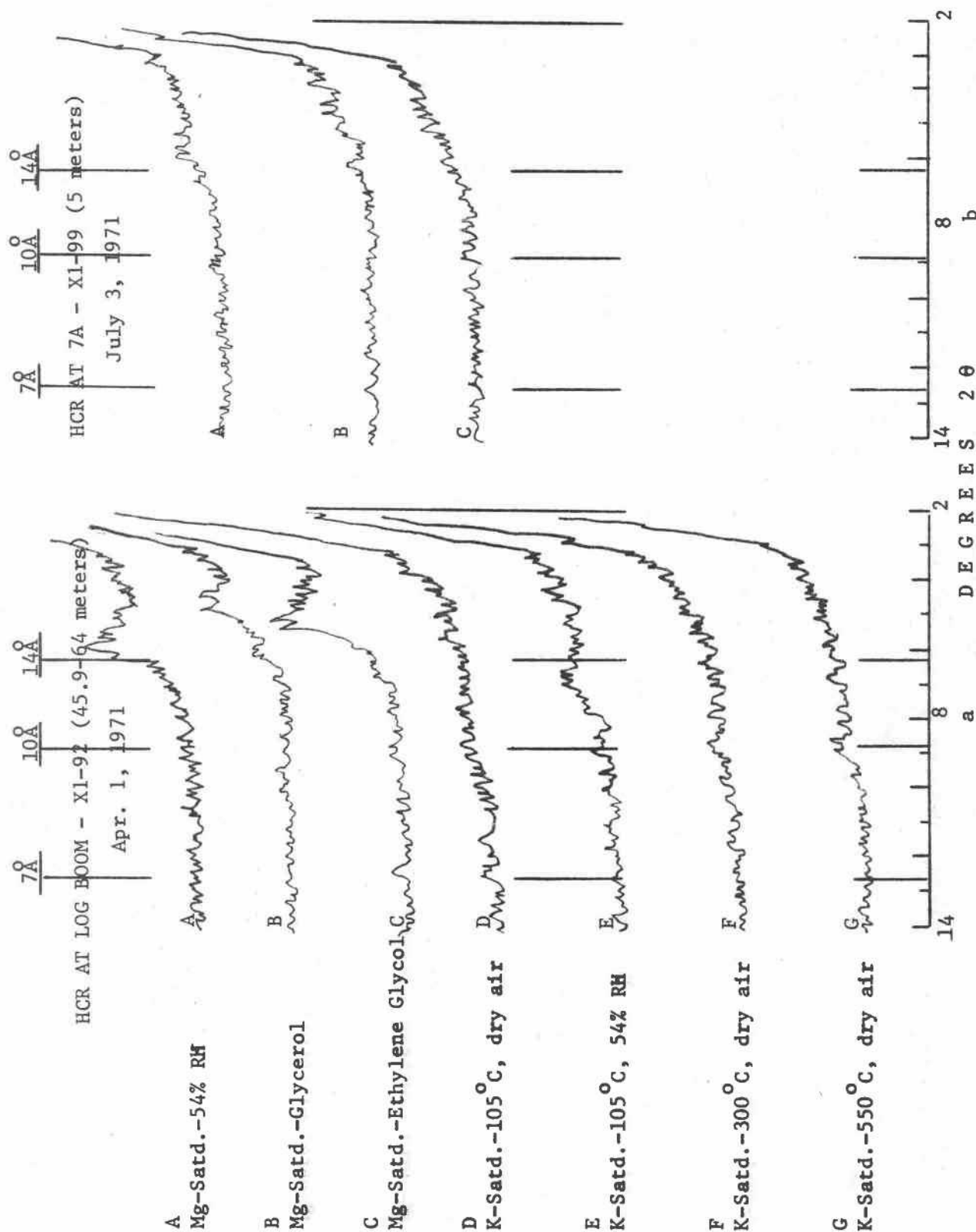


Figure D-2. X-ray diffraction patterns of suspended solids ($<50\mu$) from Hills Creek Reservoir water.

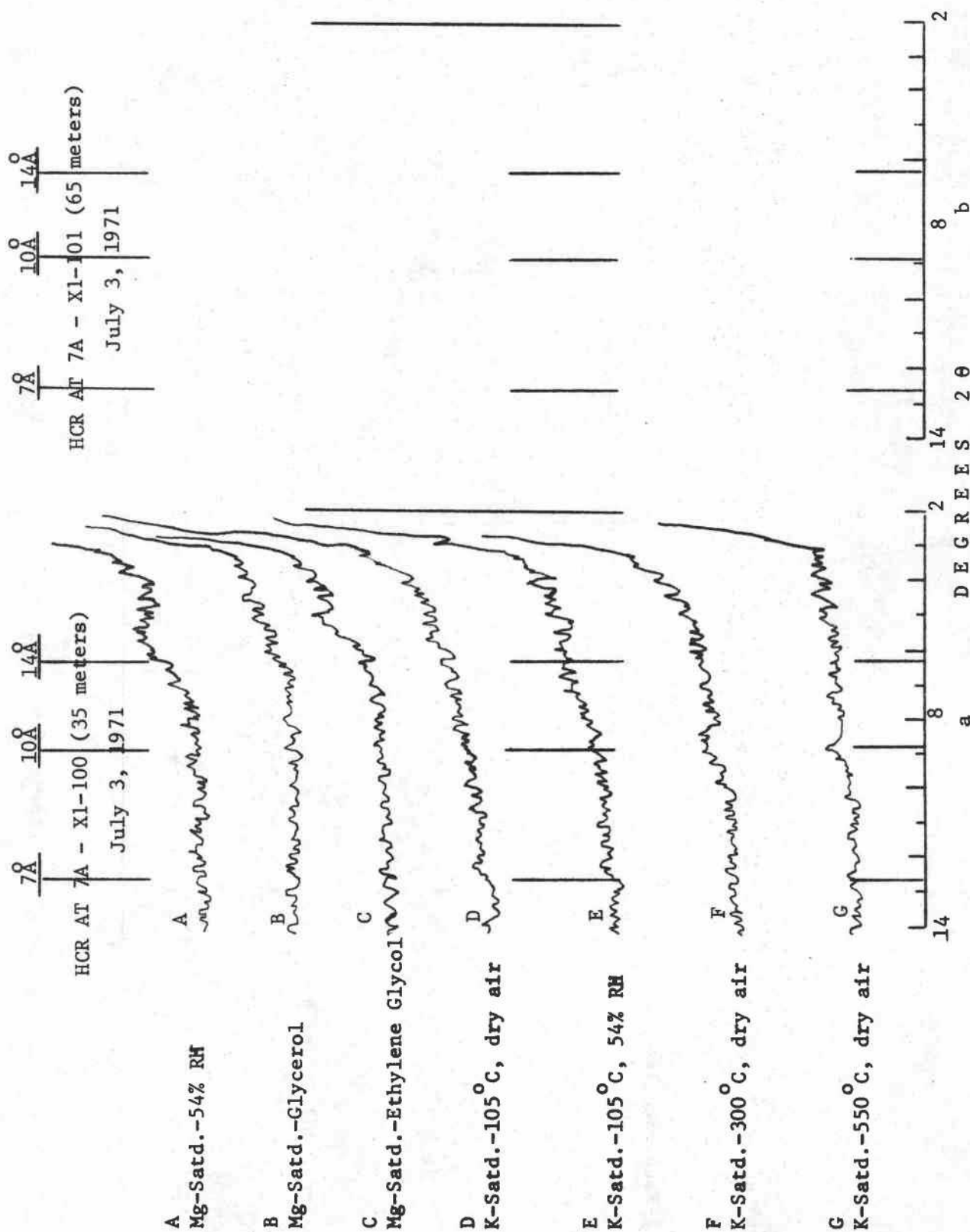


Figure D-3. X-ray diffraction patterns of suspended solids (<50μ) from Hills Creek Reservoir water.

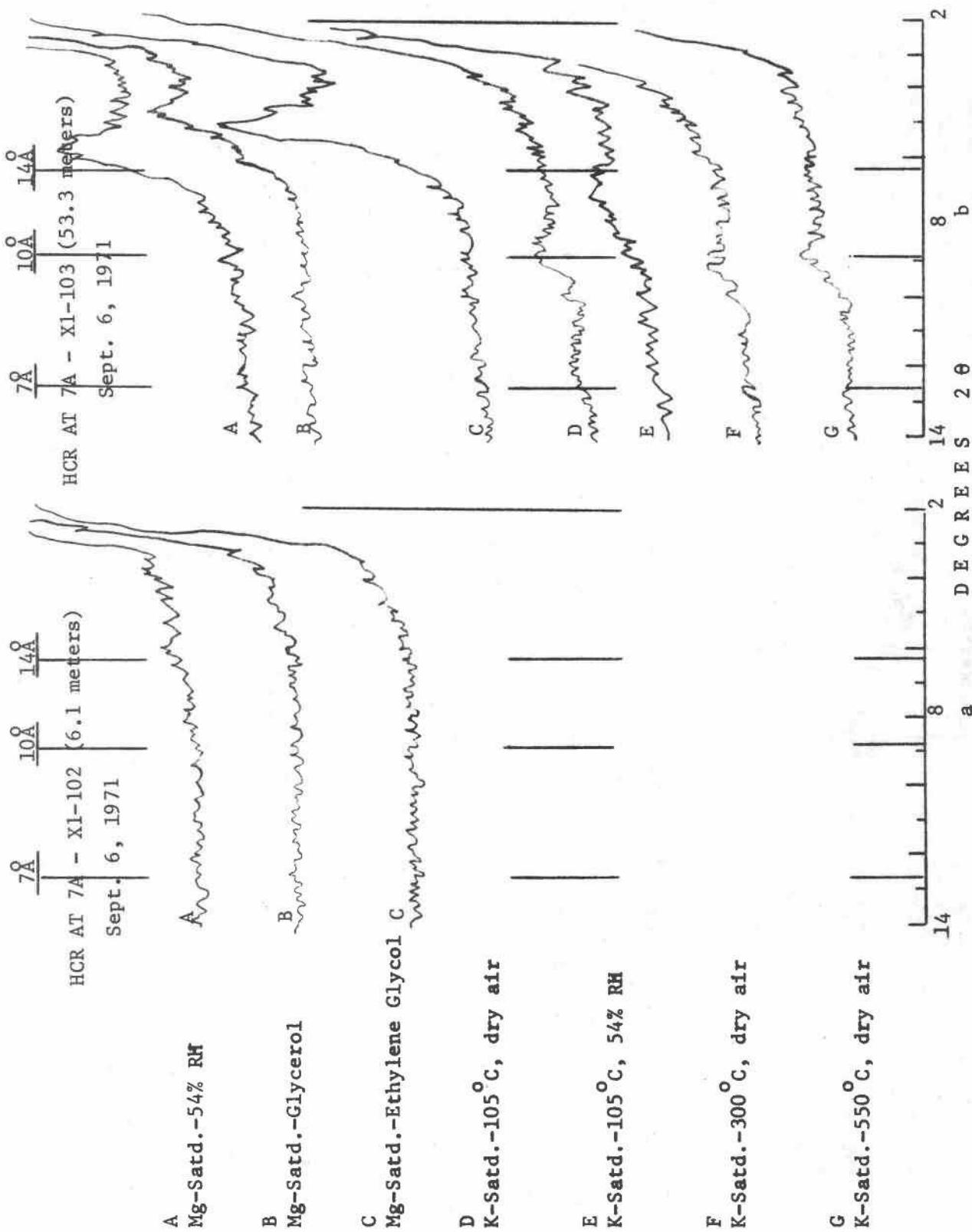


Figure D-4. X-ray diffraction patterns of suspended solids (<50μ) from Hills Creek Reservoir water.

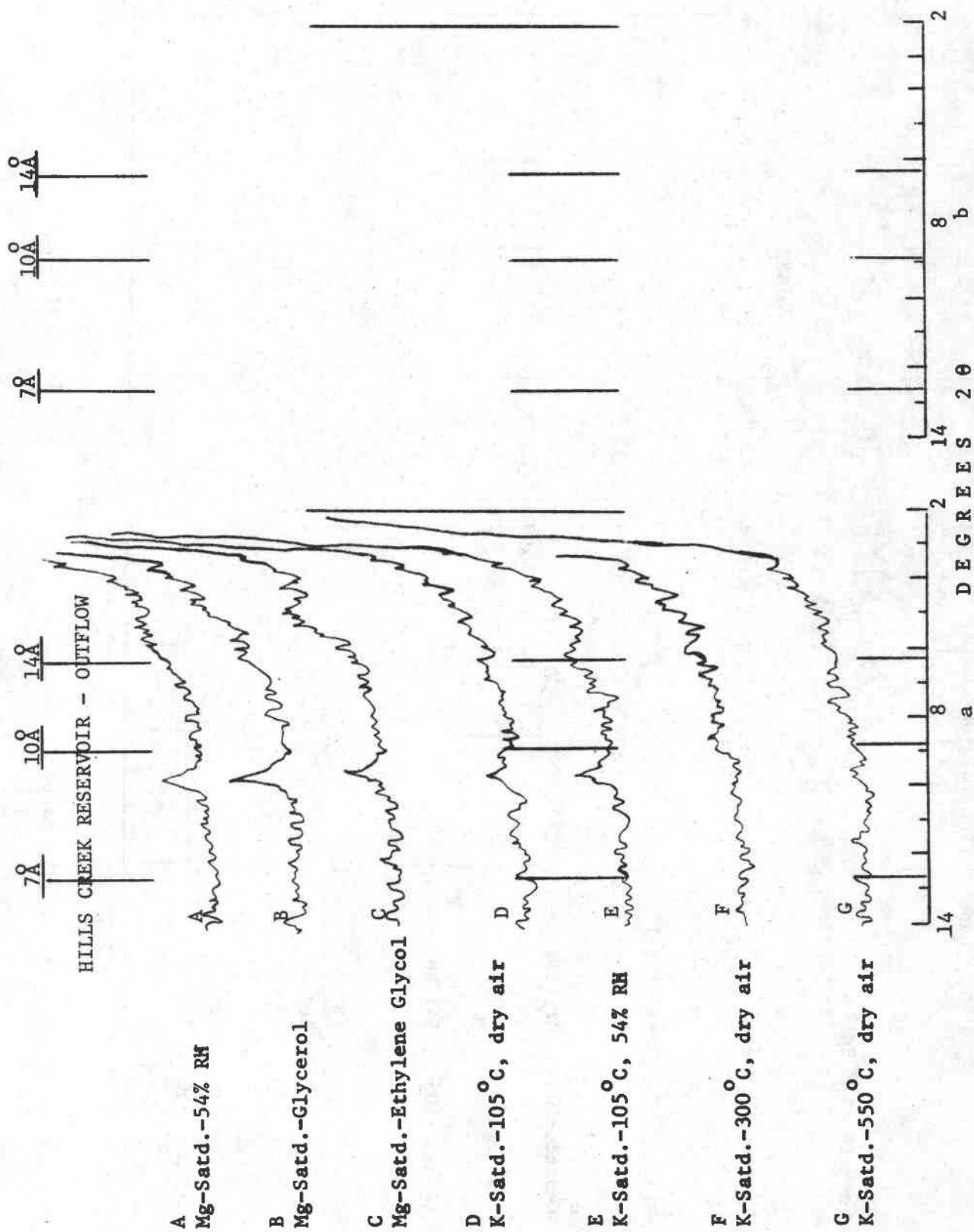


Figure D-5. X-ray diffraction patterns of suspended solids (<50 μ) in water samples collected on March 11, 12, and 13.

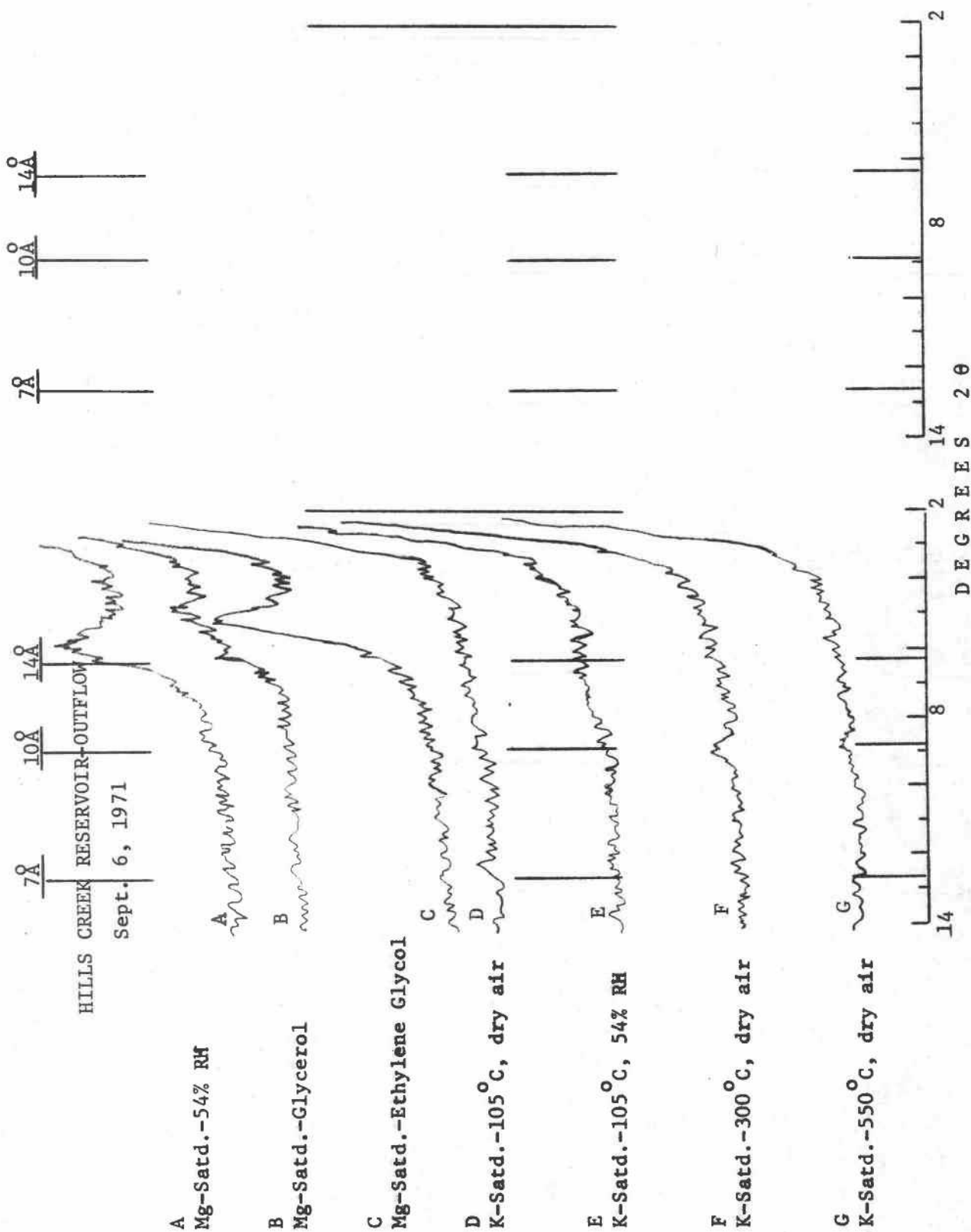


Figure D-6. X-ray diffraction patterns of suspended solids (<50 μ) in water sample.

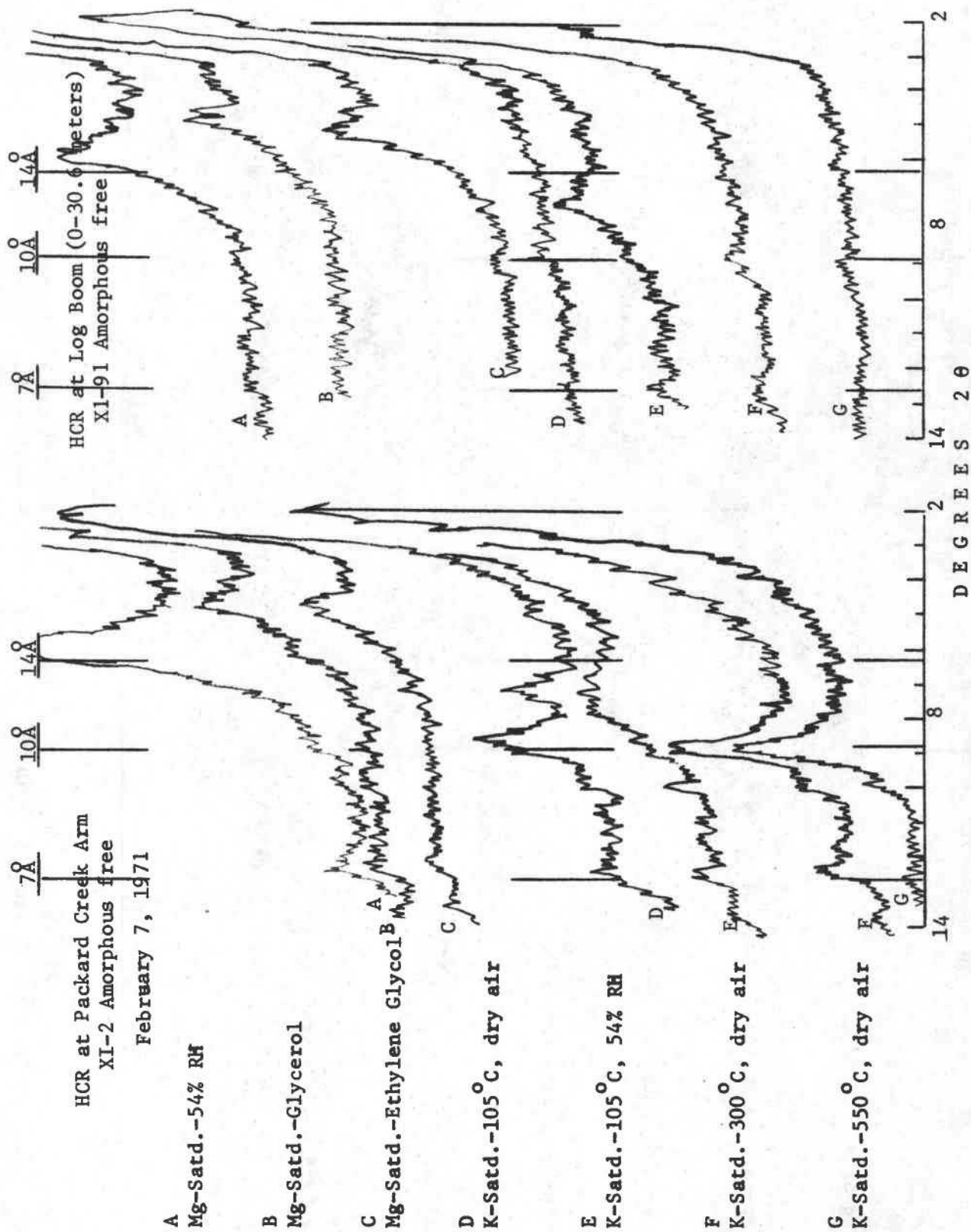


Figure D-7. X-ray diffraction patterns of suspended solids (<50μ) after dissolution of amorphous components from Hills Creek Reservoir water samples.

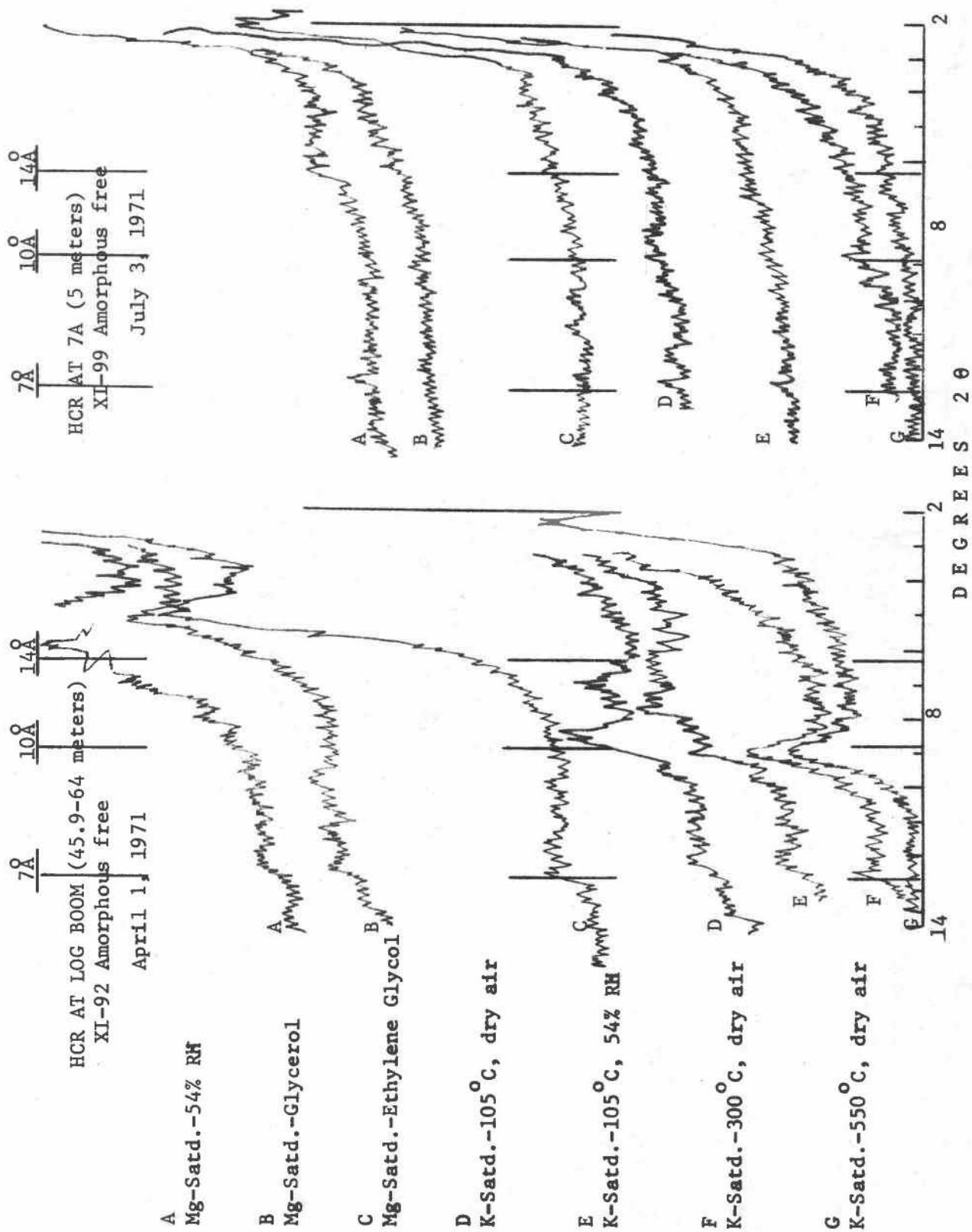


Figure D-8. X-ray diffraction patterns of suspended solids (<50μ) after dissolution of amorphous components from Hills Creek Reservoir water samples.

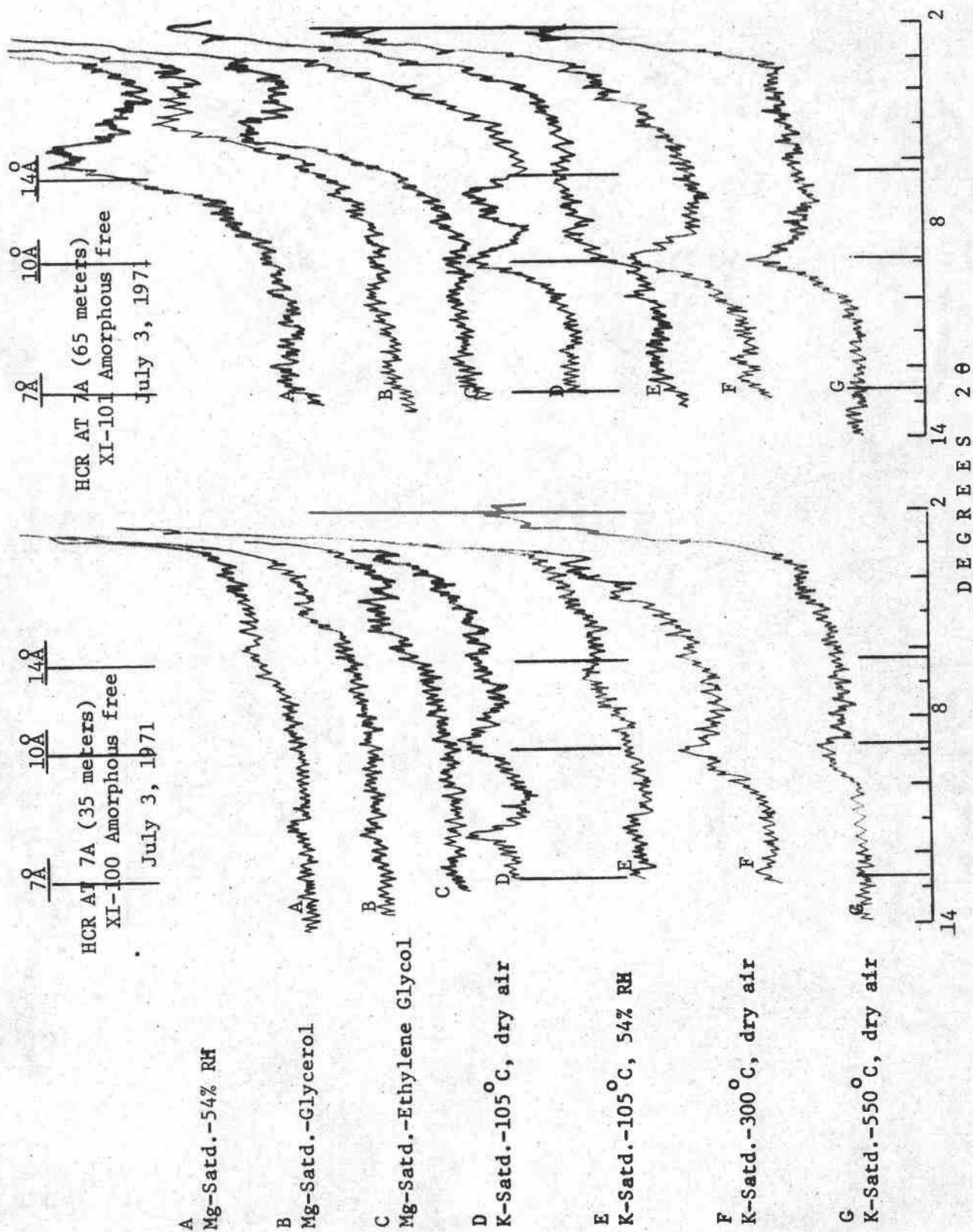


Figure D-9. X-ray diffraction patterns of suspended solids (<50μ) after dissolution of amorphous components from Hills Creek Reservoir water samples.

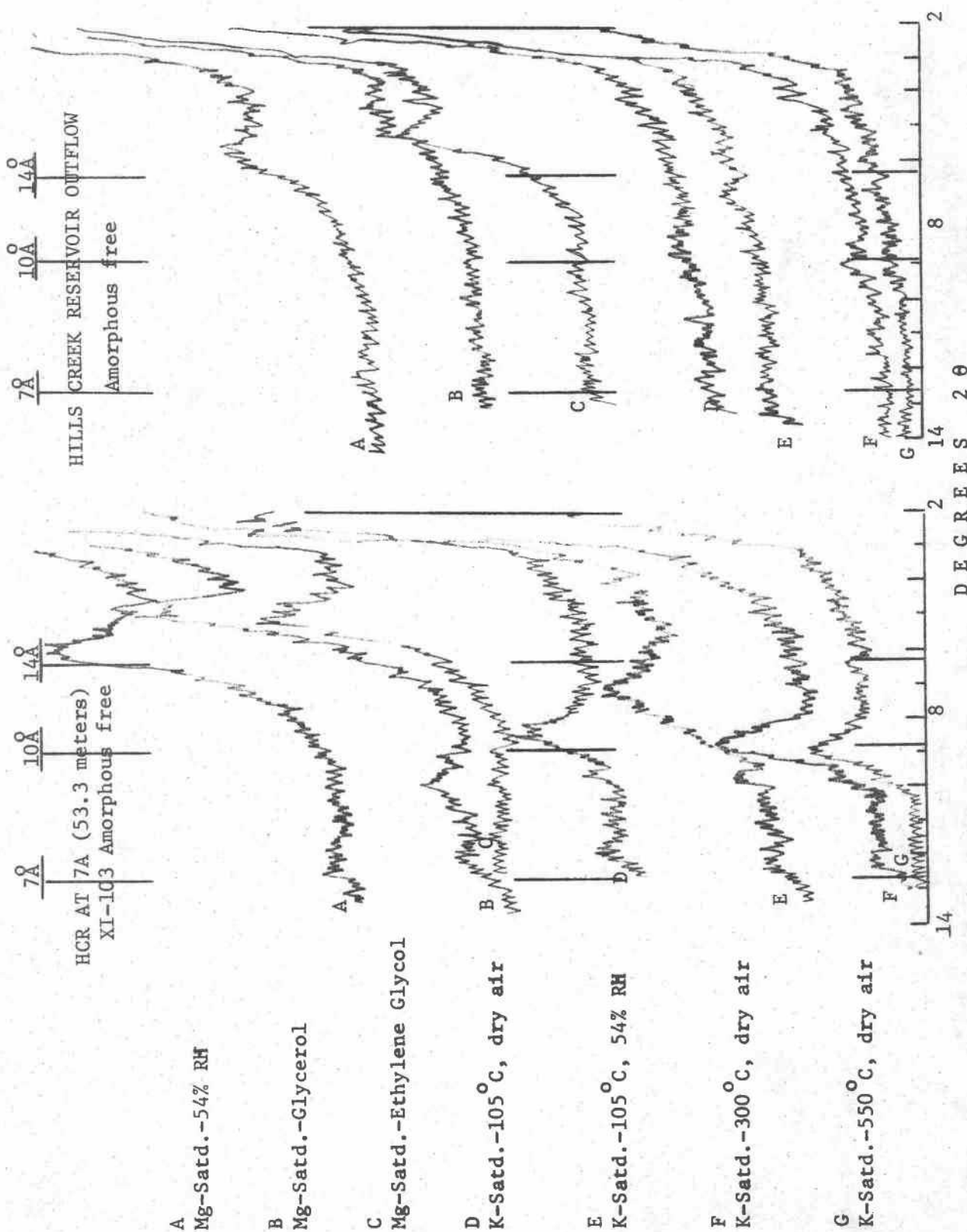


Figure D-10. X-ray diffraction patterns of suspended solids (<50 μ) after dissolution of amorphous components from Hills Creek Reservoir water samples.

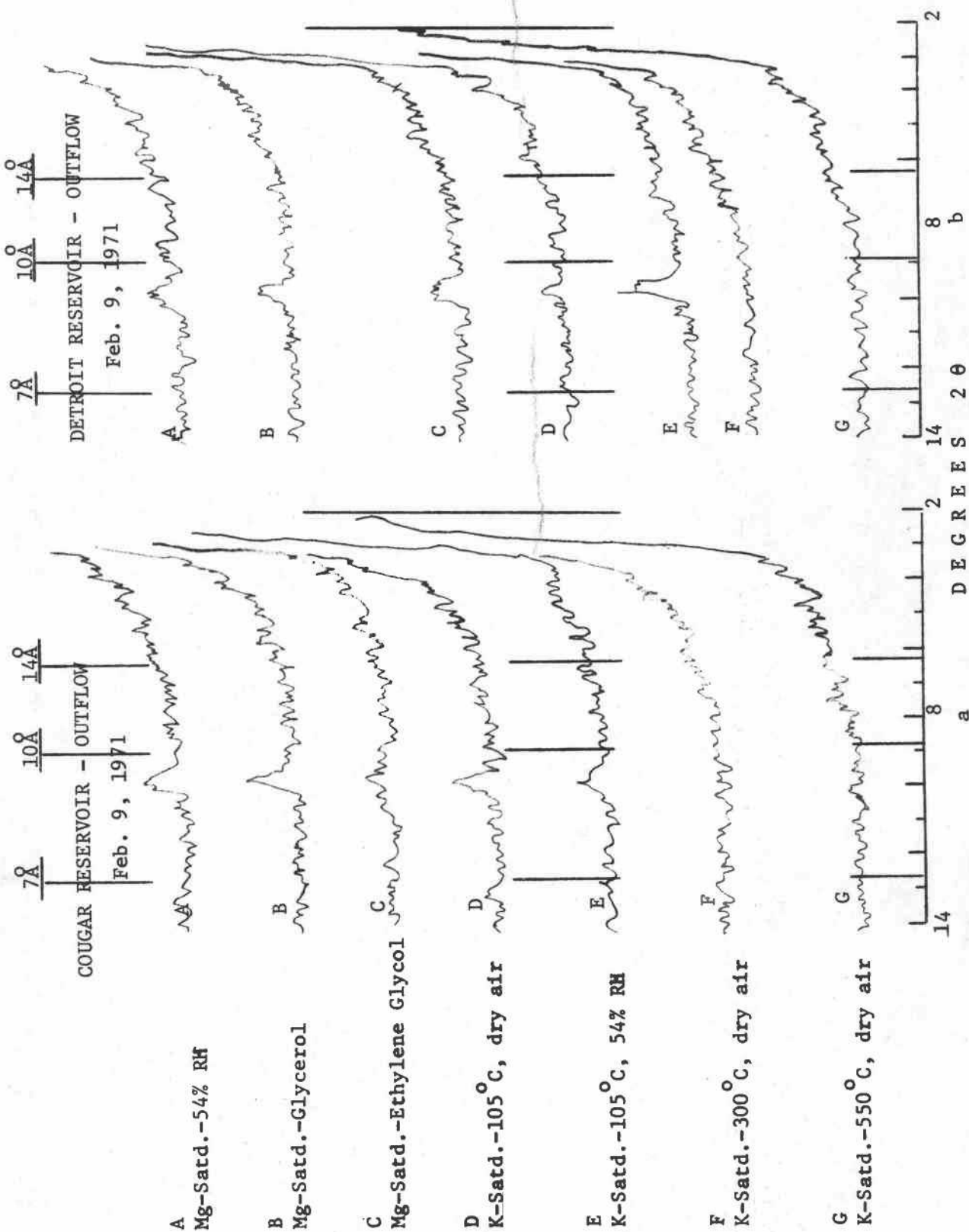


Figure D-11. X-ray diffraction patterns of suspended solids (<50μ) in water samples.

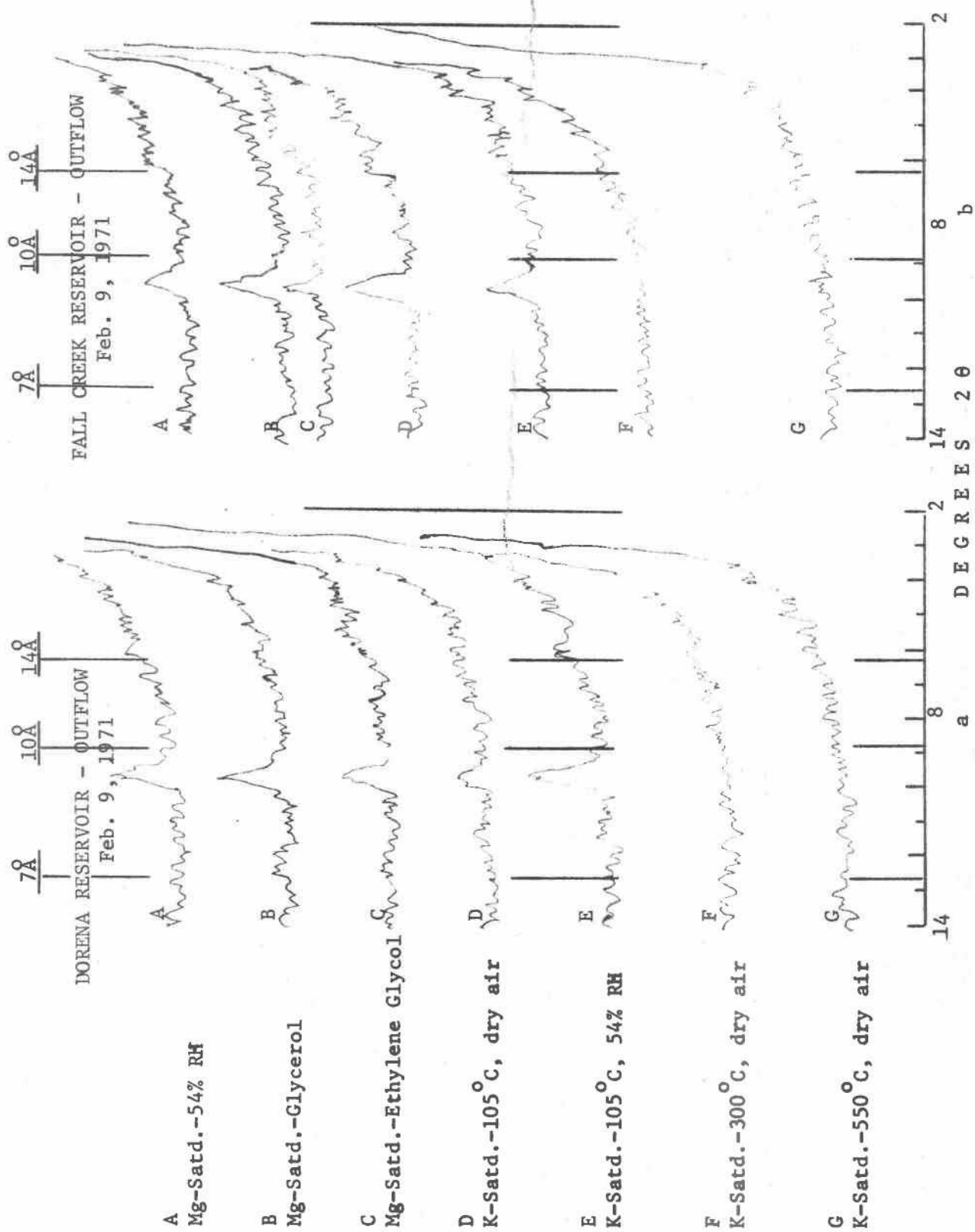


Figure D-12. X-ray diffraction patterns of suspended solids ($<50\mu$) from water samples.

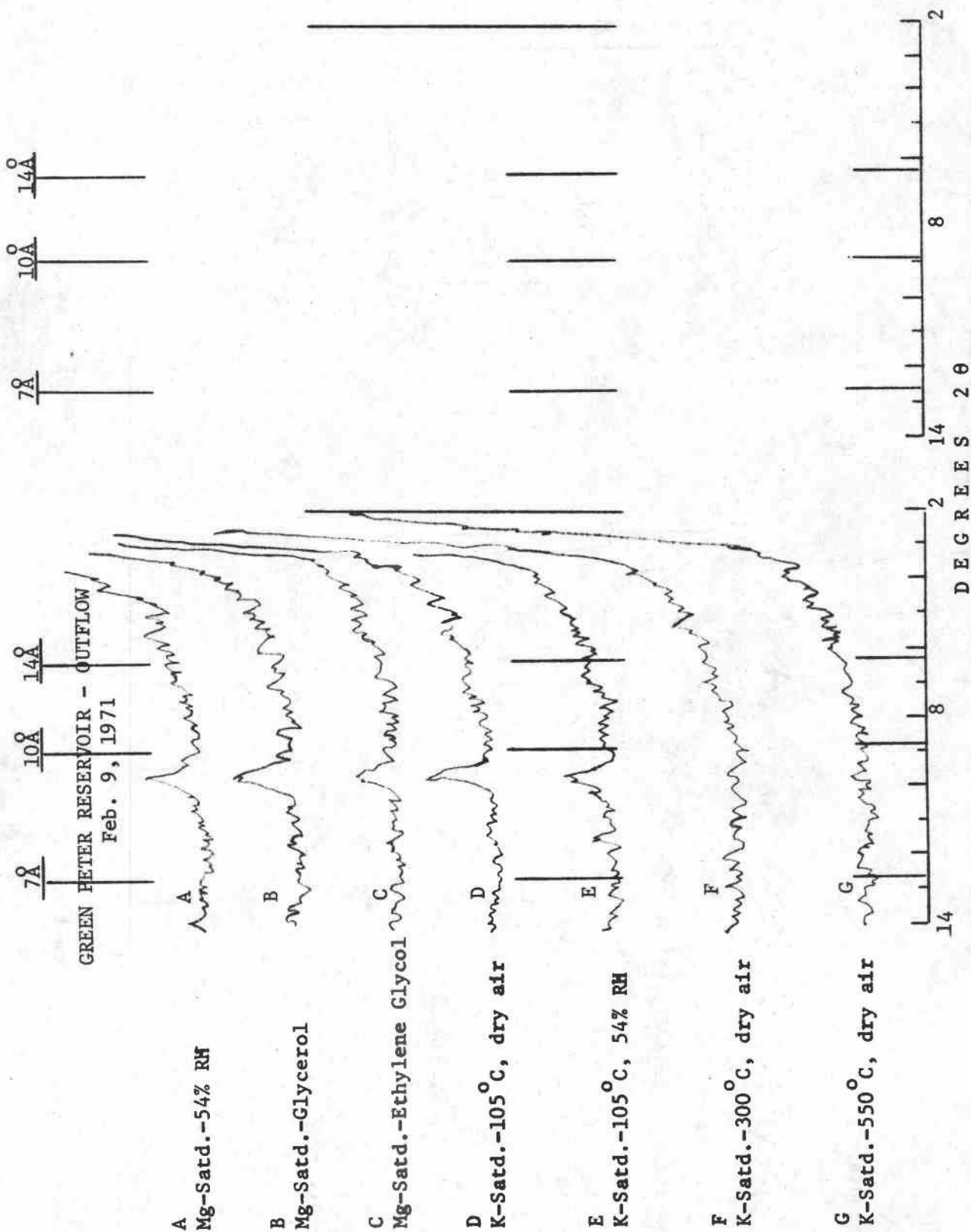
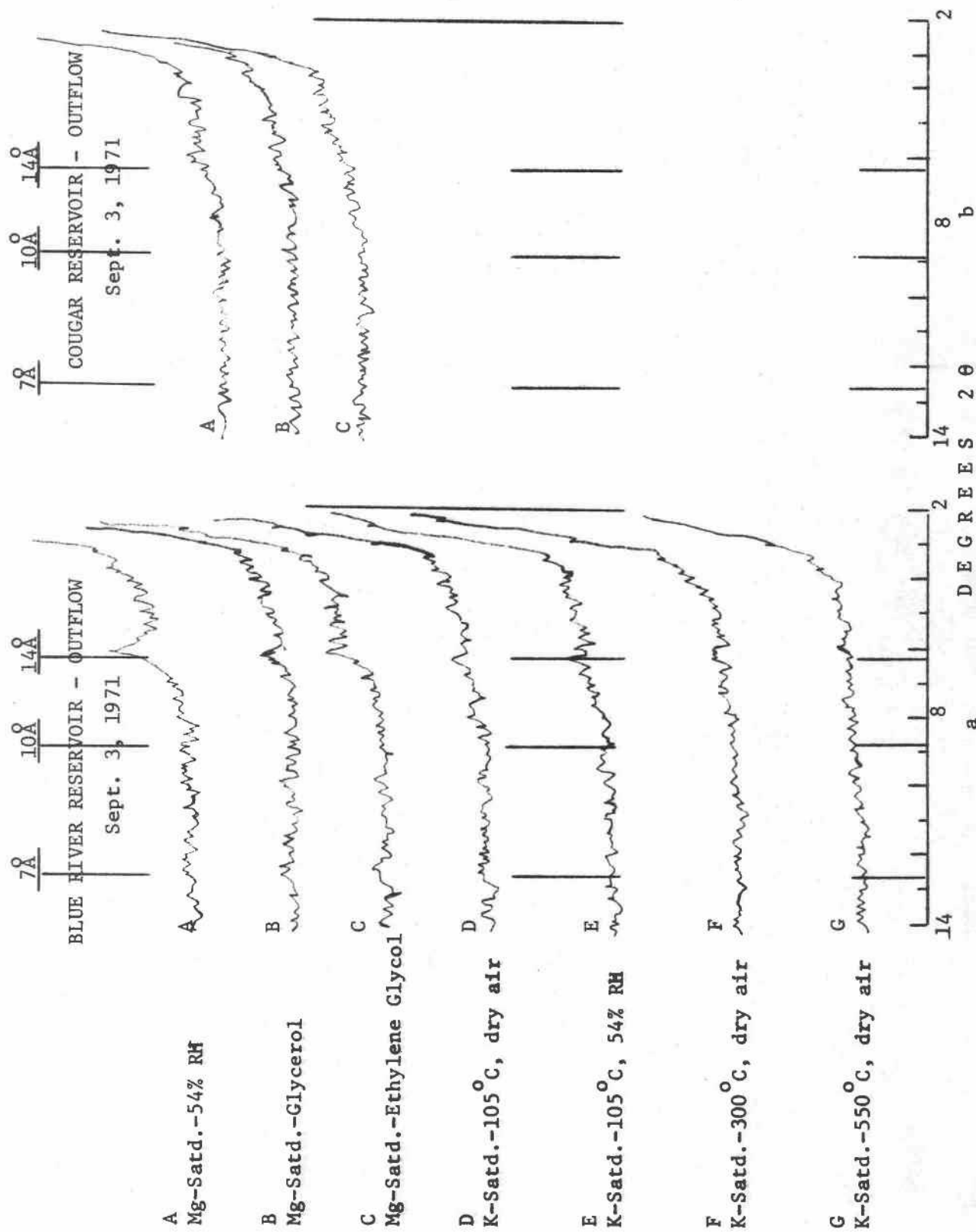


Figure D-13. X-ray diffraction patterns of suspended solids ($<50\mu$) in water sample.



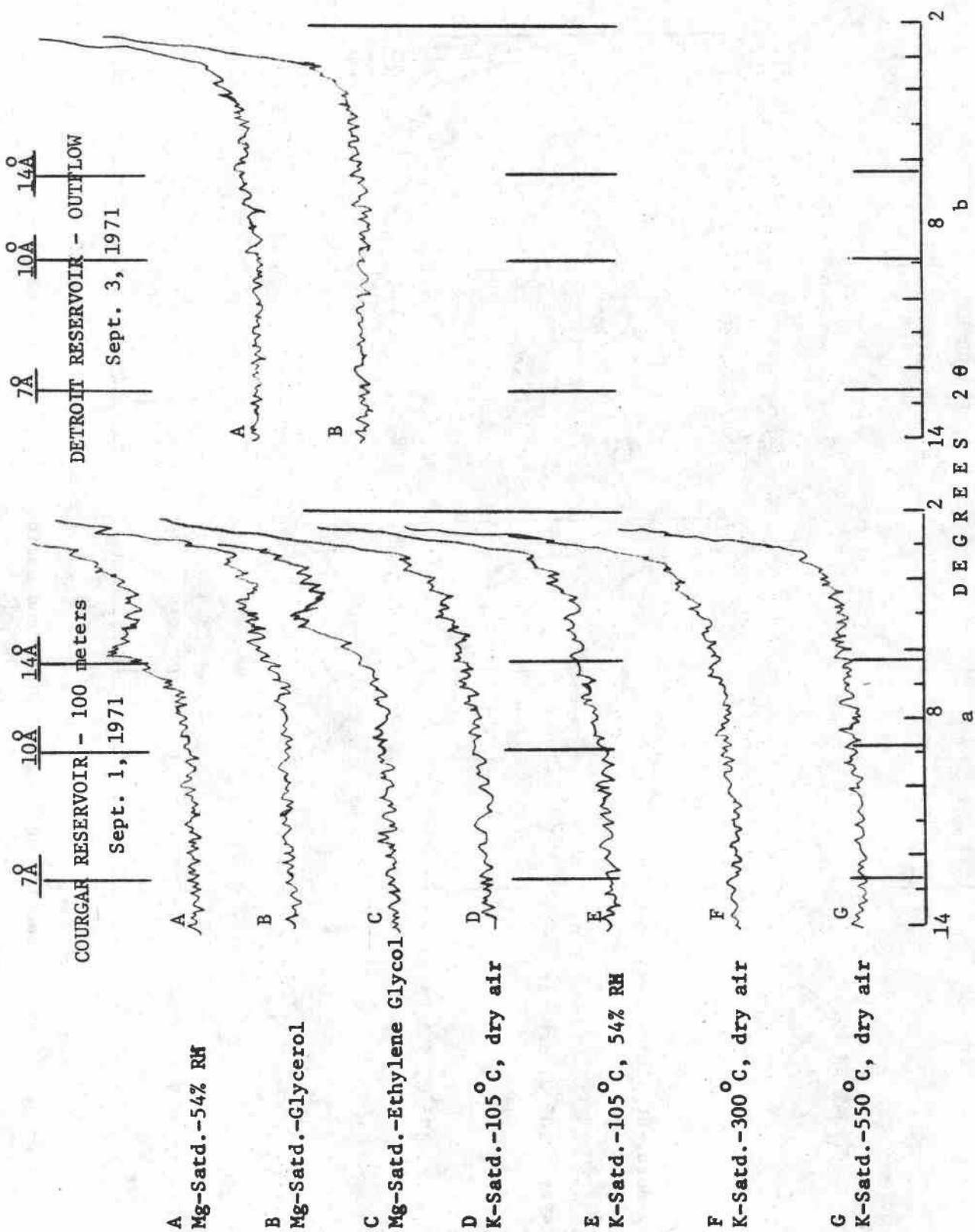


Figure D-15. X-ray diffraction patterns of suspended solids ($<50\mu$) in water samples.

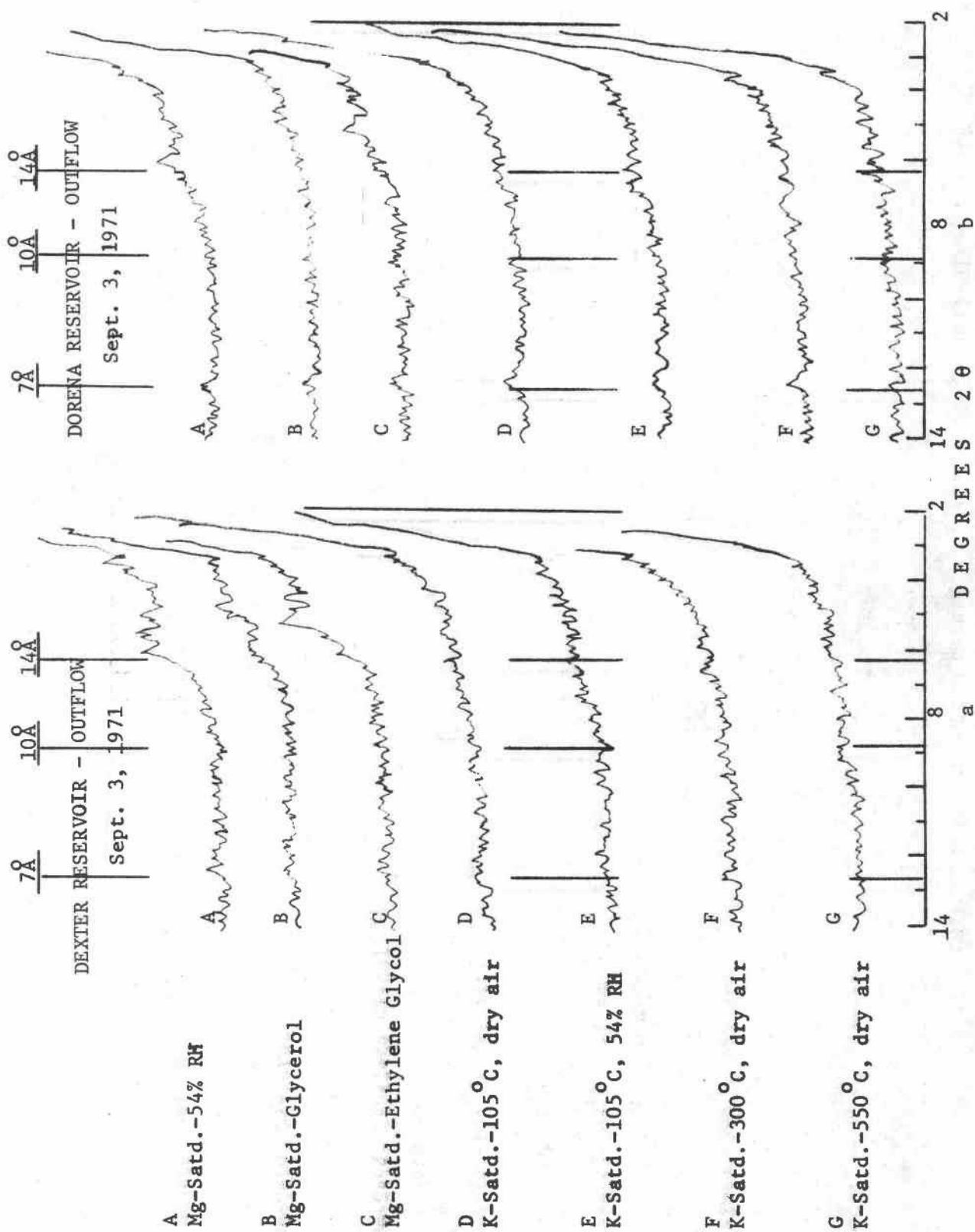


Figure D-16. X-ray diffraction patterns of suspended solids (<50μ) in water samples.

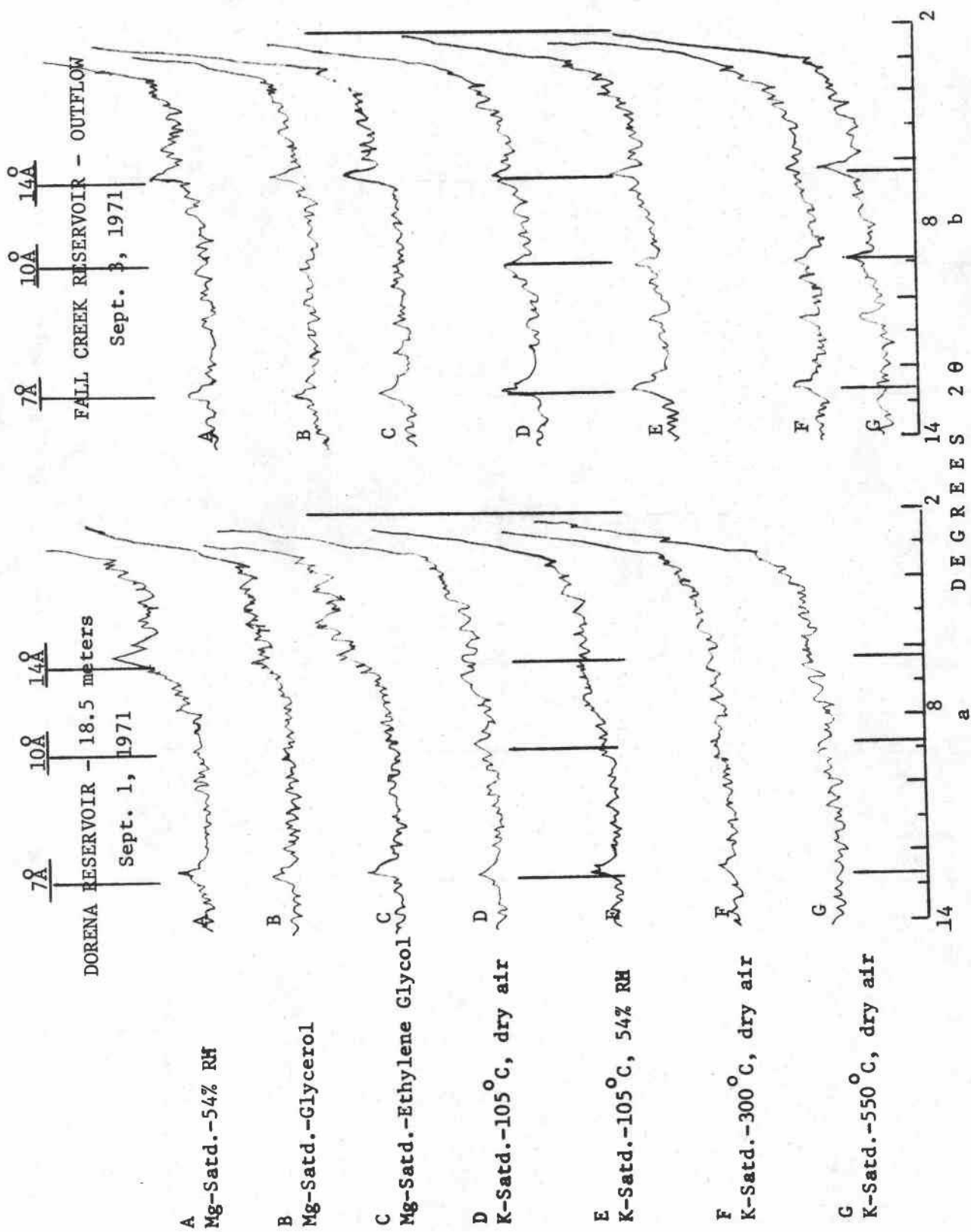


Figure D-17. X-ray diffraction patterns of suspended solids (<50μ) in water samples.

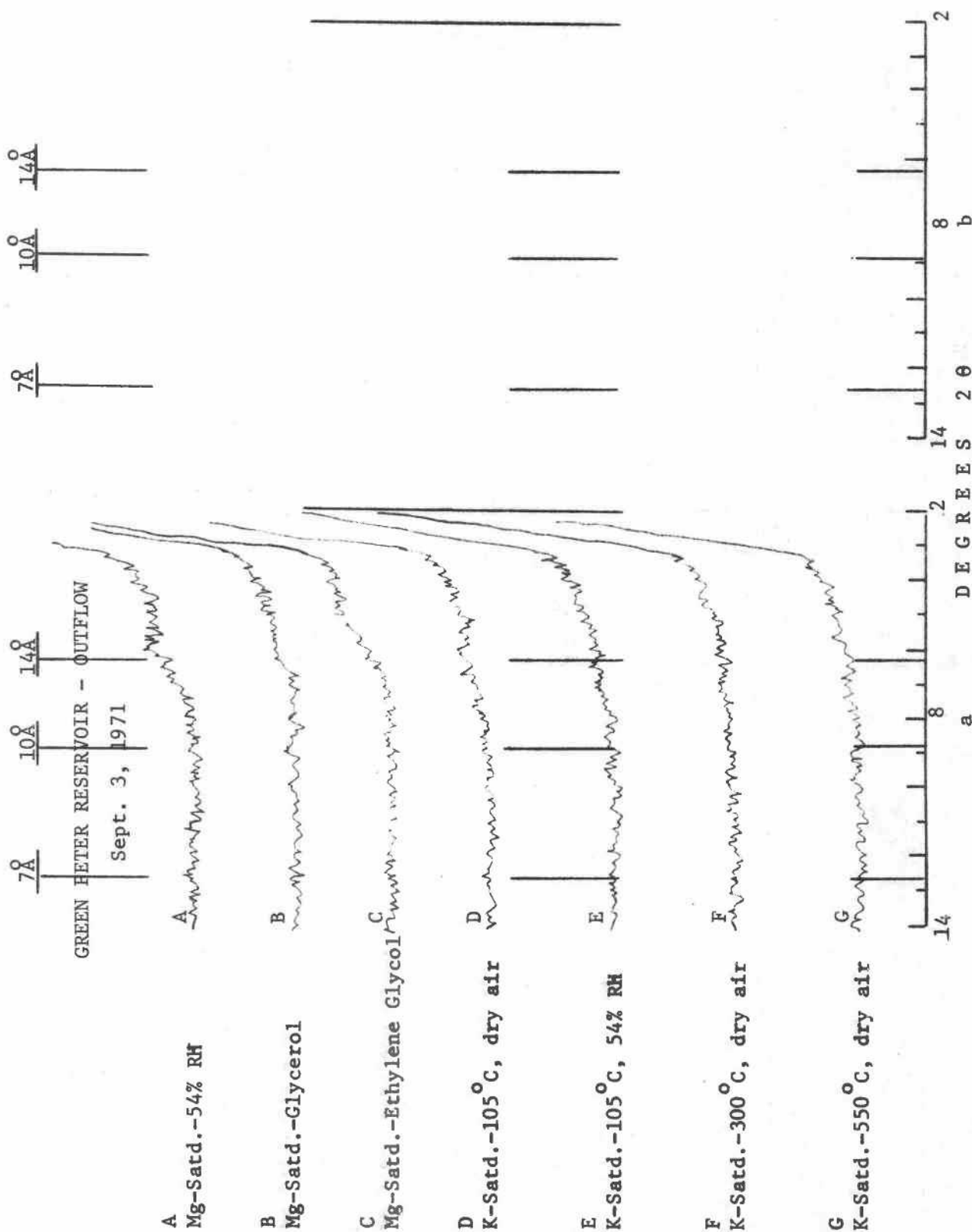


Figure D-18. X-ray diffraction patterns of suspended solids (<50μ) in water sample.

APPENDIX E

PHYTOPLANKTON ENUMERATIONS FOR HILLS CREEK
RESERVOIR, SUMMER 1971

Table E1. Phytoplankton counts expressed as estimated number per milliliter for Hills Creek Reservoir, Summer 1971.

Depth in Meters	Sampling date, phytoplankton counts and stations															
	5/27				6/21				7/4				7/11			
	station	→	3	5	3	5	4	5	3	5	4	5	3	5	4	5
<i>Anabaena spiroides</i>																
0	0	83	673	529	443	1477	789	0	9	8	0	19	0	62	15	11
1	0	73	264	296	386	549	546	0	0	-	-	-	-	-	-	-
2	0	95	155	117	574	1186	540	0	10	17	8	0	9	29	0	11
3	-	-	-	-	-	-	-	-	-	8	10	18	8	155	0	10
5	-	71	127	11	830	1214	587	0	0	0	0	68	0	23	0	23
7½	-	-	-	-	-	170	-	-	-	0	0	-	-	-	-	11
10	-	0	6	62	0	-	-	0	0	-	-	-	-	-	-	-
12	-	32	0	232	0	-	-	0	0	0	8	0	6	17	6	0
18	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-
<i>Anabaena flos-aquae</i>																
0	0	1951	4559	4864	9881	506	200	122	273	0	0	0	0	0	0	0
1	0	4390	7066	3525	4788	335	79	106	363	-	-	-	-	-	-	-
2	0	3781	3328	2808	5773	461	274	73	98	0	0	0	0	0	0	0
3	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
5	-	1780	2657	153	5980	318	131	25	227	0	0	0	0	0	0	0
7½	-	-	-	-	-	81	-	-	-	0	0	-	-	-	-	0
10	-	174	19	21	36	-	-	0	25	-	-	-	-	-	-	-
12	-	32	624	457	7	-	-	8	0	0	0	0	0	0	0	0
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Aphanizomenon flos-aquae</i>																
0	0	0	0	0	0	17	0	24	70	593	32	0	242	5	5	0
1	0	0	0	0	0	0	0	9	8	-	-	-	-	-	-	-
2	0	0	0	0	0	0	0	0	0	664	141	0	284	0	10	0
3	-	-	-	-	-	-	-	-	-	583	216	0	292	0	11	0
5	-	0	0	0	0	0	0	0	0	311	158	0	207	6	0	0
7½	-	-	-	-	-	0	-	-	-	622	84	-	-	-	-	0
10	-	0	0	0	0	-	-	0	0	-	-	-	-	-	-	-
12	-	0	0	0	0	-	-	0	0	97	0	0	33	0	0	0
18	-	-	-	-	-	-	-	-	-	-	-	-	0	0	4	-

Table E1. (cont.)

Depth in Meters		Sampling date, phytoplankton counts and stations														
		5/27	6/21	7/4	7/11	7/23	8/6	8/17	8/26	9/6						
station →		3	3	5	4	5	3	5	3	5	3	5	3	5	3	
<i>Asterionella formosa</i>																
0	155	75	61	0	29	25	0	0	23	0	304	217	96	80	68	
1	192	32	53	14	27	65	18	0	-	-	-	-	-	-	-	
2	255	19	52	0	33	10	83	0	8	0	365	215	172	115	85	
3	-	-	-	-	-	-	-	-	0	0	455	308	180	74	96	
5	-	9	36	11	10	15	83	8	0	0	513	0	234	60	29	
7½	-	-	-	-	-	22	-	-	52	0	-	-	-	-	43	
10	-	91	68	28	36	-	-	0	8	-	-	-	-	-	-	
12	-	24	0	0	8	-	-	16	35	0	76	149	138	74	46	
18	-	-	-	-	-	-	-	-	-	-	60	0	68	34	-	
<i>Synedra ulna</i>																
0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	13	0	0	0	-	-	-	-	-	-	-	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	
5	-	0	0	0	0	0	0	0	0	0	11	0	0	0	0	
7½	-	-	-	-	-	0	-	-	0	0	-	-	-	-	0	
10	-	0	0	0	0	-	-	0	-	-	-	-	-	-	-	
12	-	0	0	0	0	-	-	0	0	0	0	0	0	0	0	
18	-	-	-	-	-	-	-	-	-	-	9	0	0	4	-	
<i>Fragilaria crotonensis</i>																
0	0	0	0	0	0	0	0	0	0	0	67	0	552	170	4064	
1	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	
2	0	0	0	0	0	0	0	0	0	0	61	0	815	340	4002	
3	-	-	-	-	-	-	-	-	8	8	73	8	605	171	5774	
5	-	0	0	0	0	0	0	0	0	0	68	7	1055	230	3032	
7½	-	-	-	-	-	0	-	-	0	0	-	-	-	-	2705	
10	-	0	0	0	0	-	-	0	-	-	-	-	-	-	-	
12	-	0	0	0	0	-	-	0	0	0	0	0	644	212	2972	
18	-	-	-	-	-	-	-	-	-	-	17	0	143	21	-	

Table E1. (cont.)

Depth in Meters	Sampling date, phytoplankton counts and stations															
	5/27	6/21	7/4	7/11	7/23	8/6	8/17	8/26	9/6							
	Station →	3	5	4	5	3	5	4	5	3	5	3	5	3	5	3
<u>Actinastrum</u> sp.																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7½	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-	0
10	-	0	0	-	-	-	-	0	-	-	-	-	-	-	-	-
12	-	0	0	-	-	-	-	0	0	0	0	0	0	0	0	0
18	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	-
<u>Sphaerocystis</u> sp.																
0	0	0	0	0	0	0	0	0	0	15	38	62	58	30	34	-
1	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-
2	0	0	0	0	0	0	0	0	0	0	38	17	105	20	21	21
3	-	-	-	-	-	-	-	-	-	0	73	8	90	29	130	130
5	-	0	0	0	0	0	0	16	0	0	34	74	51	5	57	57
7½	-	-	-	-	-	-	-	-	-	0	-	-	-	-	22	22
10	-	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	0	0	0	-	-	-	0	0	0	0	6	6	14	18	18
18	-	-	-	-	-	-	-	-	-	-	9	0	0	4	-	-
<u>Staurostrum longiradiatum</u>																
0	0	0	0	0	0	0	0	0	0	0	10	25	86	80	274	274
1	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-
2	0	0	0	0	0	0	0	0	0	0	15	9	71	45	260	260
3	-	-	-	-	-	-	-	-	-	0	27	8	135	167	360	360
5	-	0	0	0	0	0	0	0	0	0	11	0	137	90	211	211
7½	-	-	-	-	-	-	-	-	-	-	-	-	-	-	216	216
10	-	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
12	-	0	0	0	-	-	-	-	-	0	0	0	44	23	216	216
18	-	-	-	-	-	-	-	-	-	-	0	0	6	13	-	-

Table El. (cont.)

Sampling date, phytoplankton counts and stations																
Depth in Meters	5/27	6/21	7/4	7/11	7/23	8/6	8/17	8/26	9/6							
Station →	3	3	5	4	5	3	5	3	5	3	5	3	5	3	5	3
<u>Eudorina elegans</u>																
0	0	0	0	14	8	19	0	0	0	23	16	38	6	24	10	23
1	0	0	0	0	0	18	0	0	0	-	-	-	-	-	-	-
2	9	0	0	23	0	66	0	0	0	17	0	8	17	17	15	5
3	-	-	-	-	-	-	-	-	-	8	0	46	8	95	17	24
5	-	9	0	20	7	0	8	8	8	21	0	11	30	57	10	0
7½	-	-	-	-	15	-	-	-	-	22	0	-	-	-	-	5
10	-	0	6	9	-	-	0	0	0	-	-	-	-	-	-	-
12	-	0	0	7	-	-	0	0	0	0	0	22	28	22	9	0
18	-	-	-	-	-	-	-	-	-	0	-	0	16	11	4	-
<u>Ceratium hirundinella</u>																
0	0	0	0	0	0	0	0	0	0	0	0	10	0	125	30	0
1	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-
2	0	0	0	0	0	0	0	8	0	0	0	30	0	109	20	0
3	-	-	-	-	-	-	-	0	0	0	0	36	0	135	63	0
5	-	0	0	0	0	0	0	0	0	0	0	80	0	154	60	6
7½	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	0
10	-	0	0	0	-	-	0	-	0	-	-	-	-	-	-	-
12	-	0	0	0	-	-	0	0	0	0	0	22	0	44	37	0
18	-	-	-	-	-	-	-	-	-	-	-	0	0	17	4	-
<u>Total Units^a</u>																
0	155	2109	5308	5393	10364	2033	1008	146	352	662	48	486	551	1008	420	4474
1	192	4495	7383	3835	5214	949	661	133	379	-	-	-	-	-	-	-
2	264	3895	3535	2948	6380	1657	963	89	108	714	149	517	551	1318	565	4384
3	-	-	-	-	-	-	-	-	-	607	226	728	640	1395	532	6394
5	-	1869	2820	175	6840	1554	801	41	259	332	158	796	318	1717	455	3358
7½	-	-	-	-	-	288	-	-	-	696	84	-	-	-	-	3002
10	-	265	99	111	81	-	-	0	33	-	-	-	-	-	-	-
12	-	88	624	689	22	-	-	32	16	132	8	120	202	915	375	3252
18	-	-	-	-	-	-	-	-	-	-	-	95	16	245	88	-

a. Total number of filamentous colonial forms (counted as individual filaments). Colonial forms (counted as individual colonies). Individual cells (counted as single organisms).

Table E2. Phytoplankton species counts from the waters of Hills Creek Reservoir, Summer 1971.

Date	Station	Species	number per 0.1 milliliter at indicated depth in meters									
			0	1	2	3	5	7	1 1/2	10	12	18
27 May	3	<i>Asterionella formosa</i> (diatom) ²	15	17	29							
		<i>Eudorina elegans</i> (green) ²			1							
		Volume of concentrated subsample(mls)	195	215	170							
21 June	3	<i>Anabaena spiroides</i> (blue-green) ¹	10	9	10	8					4	
		<i>Anabaena flos-aquae</i> (blue-green) ¹	235	542	398	200				21	4	
		<i>Asterionella formosa</i> (diatom) ²	9	4	2	1				11	3	
		<i>Eudorina elegans</i> (green) ²				1						
		Volume of concentrated subsample(mls)	175	170	200	187				175	170	
21 June	5	<i>Anabaena spiroides</i> (blue-green) ¹	44	30	18	14				1		
		<i>Anabaena flos-aquae</i> (blue-green) ¹	298	803	387	292				3	79	
		<i>Asterionella formosa</i> (diatom) ²	4	6	6	4				11		
		<i>Synedra ulna</i> (diatom) ³	1									
		<i>Eudorina elegans</i> (green) ²								1		
		Volume of concentrated subsample(mls)	320	185	180	190				130	165	
4 July	4	<i>Anabaena spiroides</i> (blue-green) ¹	42	21	10	1				9	28	
		<i>Anabaena flos-aquae</i> (blue-green) ¹	386	250	240	14				3	55	
		<i>Asterionella formosa</i> (diatom) ²		1		1				4		
		<i>Eudorina elegans</i> (green) ²			2							
		Volume of concentrated subsample(mls)	265	295	245	230				145	175	
4 July	5	<i>Anabaena spiroides</i> (blue-green) ¹	31	29	35	83						
		<i>Anabaena flos-aquae</i> (blue-green) ¹	691	360	352	598				4	1	
		<i>Asterionella formosa</i> (diatom) ²	2	2	2	1				4	2	
		<i>Synedra ulna</i> (diatom) ³		1								
		<i>Eudorina elegans</i> (green) ²	1			2				1	1	
		Volume of concentrated subsample(mls)	300	280	345	210				190	145	

Table E2 (cont.)

Date	Station	Species	number per 0.1 milliliter at indicated depth in meters										
			0	1	2	3	5	7	1/2	10	12	18	
11 July	3	<i>Anabaena spiroides</i> (blue-green) ¹	178	59	121		164	23					
		<i>Anabaena flos-aquae</i> (blue-green) ¹	61	36	47		43	11					
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	2										
		<i>Asterionella formosa</i> (diatom) ²	3	7	1		2	3					
		<i>Eudorina elegans</i> (green) ²	1				1	2					
		Volume of concentrated subsample (mls)	175	195	205		155	155					
11 July	5	<i>Anabaena spiroides</i> (blue-green) ¹	83	62	65		85						
		<i>Anabaena flos-aquae</i> (blue-green) ¹	21	9	33		19						
		<i>Asterionella formosa</i> (diatom) ²		2	10		12						
		<i>Eudorina elegans</i> (green) ²	2	2	8								
		Volume of concentrated subsample (mls)	200	185	175		145						
23 July	4	<i>Anabaena flos-aqua</i> (blue-green) ¹	15	12	9		3			1			
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	3	1									
		<i>Asterionella formosa</i> (diatom) ²		2	1		1			3			
		<i>Actinastrum</i> sp. (green) ³			1								
		<i>Eudorina elegans</i> (green) ²					1						
		Volume of concentrated subsample (mls)	170	185	170		175		190	165			
23 July	5	<i>Anabaena spiroides</i> (blue-green) ¹	1		1								
		<i>Anabaena flos-aquae</i> (blue-green) ¹	31	46	10		28		3				
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	8	1									
		<i>Asterionella formosa</i> (diatom) ²					1		1		2		
		<i>Sphaerocystis</i> sp. (green) ²		1			2						
		<i>Eudorina elegans</i> (green) ²					1						
		Volume of concentrated subsample (mls)	185	165	205		170		175	165			

Table E2. (cont.)

Date	Station	Species	number per 0.1 milliliter at indicated depth in meters										
			0	1	2	3	5	7	1 1/2	10	12	18	
6 Aug.	3	<i>Anabaena spiroides</i> (blue-green) ¹	1		2	1							
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	77		80	72	45	84			11		
		<i>Asterionella formosa</i> (diatom) ²	3		1			7			4		
		<i>Fragilaria crotonensis</i> (diatom) ²				1							
		<i>Sphaerocystis</i> sp. (green) ²	2										
		<i>Eudorina elegans</i> (green) ²	3		2	1	3	3					
		<i>Ceratium hirundinella</i> (dinoflagellate) ³			1								
		Volume of concentrated subsample (mls)	162		175	170	145	155				185	
6 Aug.	5	<i>Anabaena spiroides</i> (blue-green) ¹		1		1					1		
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	4		17	22	15	9					
		<i>Eudorina elegans</i> (green) ²	2										
		Volume of concentrated subsample (mls)	170		175	205	220	195				175	
17 Aug.	3	<i>Anabaena spiroides</i> (blue-green) ¹	2			2	6					7	
		<i>Asterionella formosa</i> (diatom) ²	32		48	50	45				1	1	
		<i>Synedra ulna</i> (diatom) ³					1					2	
		<i>Fragilaria crotonensis</i> (diatom) ²	7		8	8	6					1	
		<i>Sphaerocystis</i> sp. (green) ²	4		5	8	3						
		<i>Staurastrum longiradiatum</i> (green) ³	1		2	3	1						
		<i>Eudorina elegans</i> (green) ²	4		1	5	1				2		
		<i>Ceratium hirundinella</i> (dinoflagellate) ³	1		4	4	7				2		
		Volume of concentrated subsample (mls)	200		160	190	240				230	180	
17 Aug.	5	<i>Anabaena spiroides</i> (blue-green) ¹		1		1					1		
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	39		33	36	28				6		
		<i>Asterionella formosa</i> (diatom) ²	35		25	38					27		
		<i>Fragilaria crotonensis</i> (diatom) ²				1	1						
		<i>Sphaerocystis</i> sp. (green) ²	10		2	1	10				1		
		<i>Staurastrum longiradiatum</i> (green) ³	4		1	1							
		<i>Eudorina elegans</i> (green) ²	1		2	1	4				5	3	
		Volume of concentrated subsample (mls)	130		180	170	155				115	110	

Table E2. (cont.)

Date	Station	Species	number per 0.1 milliliter at indicated depth in meters									
			0	1	2	3	5	7	1 1/2	10	12	18
26 Aug.	3	<i>Anabaena spiroides</i> (blue-green) ¹	13		7	31	4				3	
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	1				1					
		<i>Asterionella formosa</i> (diatom) ²	20		41	36	41				25	12
		<i>Fragilaria crotonensis</i> (diatom) ²	115		194	121	185				117	25
		<i>Sphaerocystis</i> sp. (green) ²	12		25	18	9				1	
		<i>Staurastrum longiradiatum</i> (green) ³	18		17	27	24				8	1
		<i>Eudorina elegans</i> (green) ²	5		4	19	10				4	2
		<i>Ceratium hirundinella</i> (dinoflagellate) ³	26		26	27	27				8	3
		Volume of concentrated subsample (mls)	100		88	105	120				115	120
26 Aug.	5	<i>Anabaena spiroides</i> (blue-green) ¹	3								1	
		<i>Aphanizomenon flos-aquae</i> (blue-green) ¹	1		2	2						1
		<i>Asterionella formosa</i> (diatom) ²	16		23	13	12				16	8
		<i>Synedra ulna</i> (diatom)										1
		<i>Fragilaria crotonensis</i> (diatom) ²	34		68	30	46				46	5
		<i>Sphaerocystis</i> sp. (green) ³	6		4	5	1				3	1
		<i>Staurastrum longiradiatum</i> (green) ³	16		9	17	18				5	3
		<i>Eudorina elegans</i> (green) ²	2		3	3	2				2	1
		<i>Ceratium hirundinella</i> (dinoflagellate) ³	6		4	11	12				8	1
		Volume of concentrated subsample (mls)	105		105	120	105				96	88
6 Sept.	3	<i>Anabaena spiroides</i> (blue-green) ¹	2		2	2	4		2			
		<i>Asterionella formosa</i> (diatom) ²	12		16	20	5		8		10	
		<i>Fragilaria crotonensis</i> (diatom) ²	713		755	1203	532		501		646	
		<i>Sphaerocystis</i> sp. (green) ²	6		4	27	10		4		4	
		<i>Staurastrum longiradiatum</i> (green) ³	48		49	75	37		40		47	
		<i>Eudorina elegans</i> (green) ²	4		1	5			1			
		<i>Ceratium hirundinella</i> (dinoflagellate) ³										
		Volume of concentrated subsample (mls)	120		112	100	120		115		97	

Note: 1. filamentous colonial forms - counted as individual filaments.

2. colonial forms - counted as individual colonies.

3. individual cells - counted as single organisms.

Note: *Anabaena spiroides* had approximately 40 cells per 200 micron-long filament. All filaments counted. *Anabaena flos-aquae* had approximately 250 cells per 700 micron-long filament. Counted all filaments greater than 100 microns in length. The average filament was about 200 to 300 microns long.

Fragilaria sp. colonies contained, on the average, 10-15 individual cells. Variation was small among colonies. Colonies that consisted of three or fewer cells were ignored.

Note: the counted volume (0.1 mls) was pipetted from the concentrated subsample.

APPENDIX F

X-RAY DIFFRACTION PATTERNS FOR SAMPLES
FROM LOST CREEK AND ELK CREEK RESERVOIR SITES

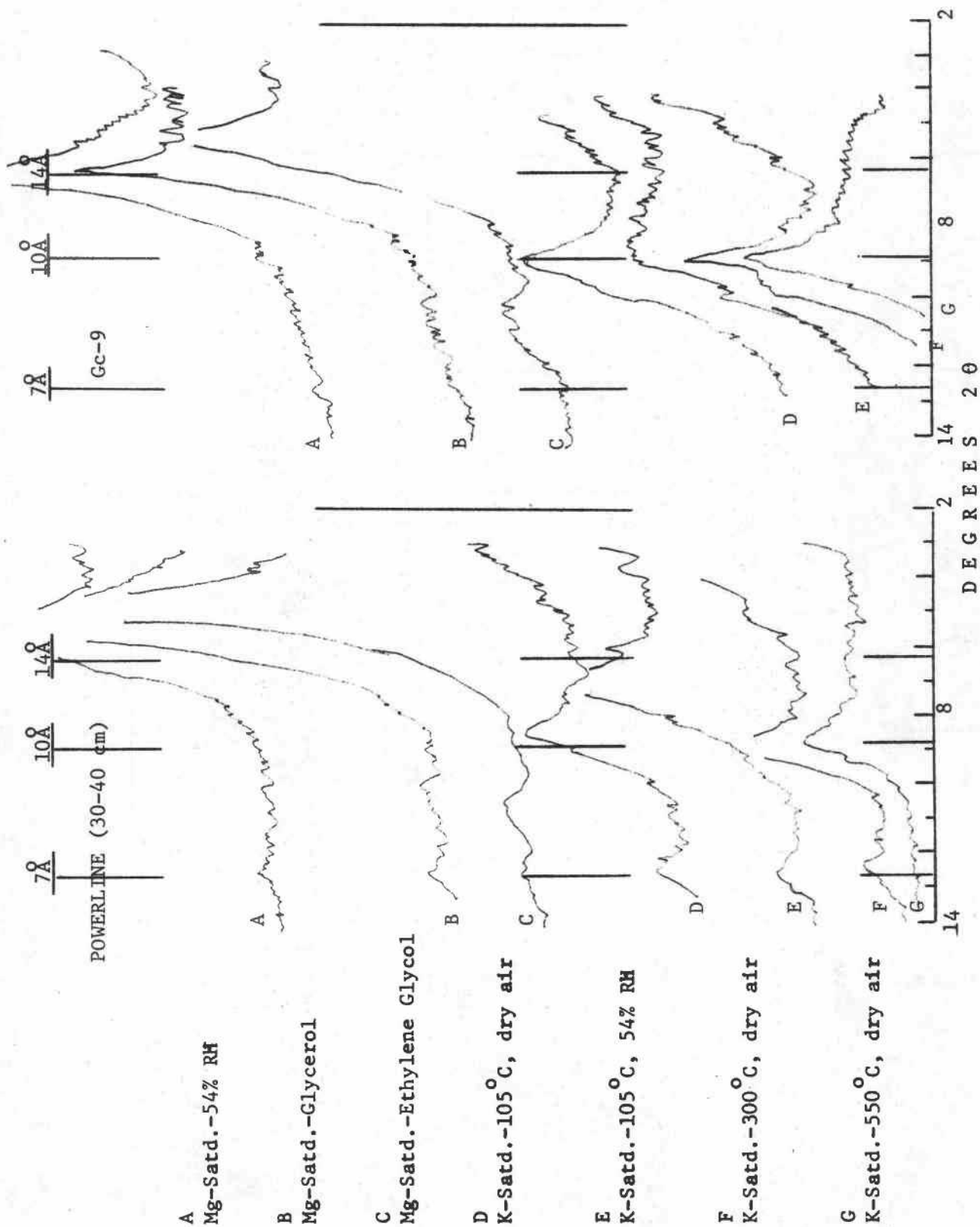


Figure F-1. X-ray diffraction patterns of clay from Lost Creek Reservoir soil samples.

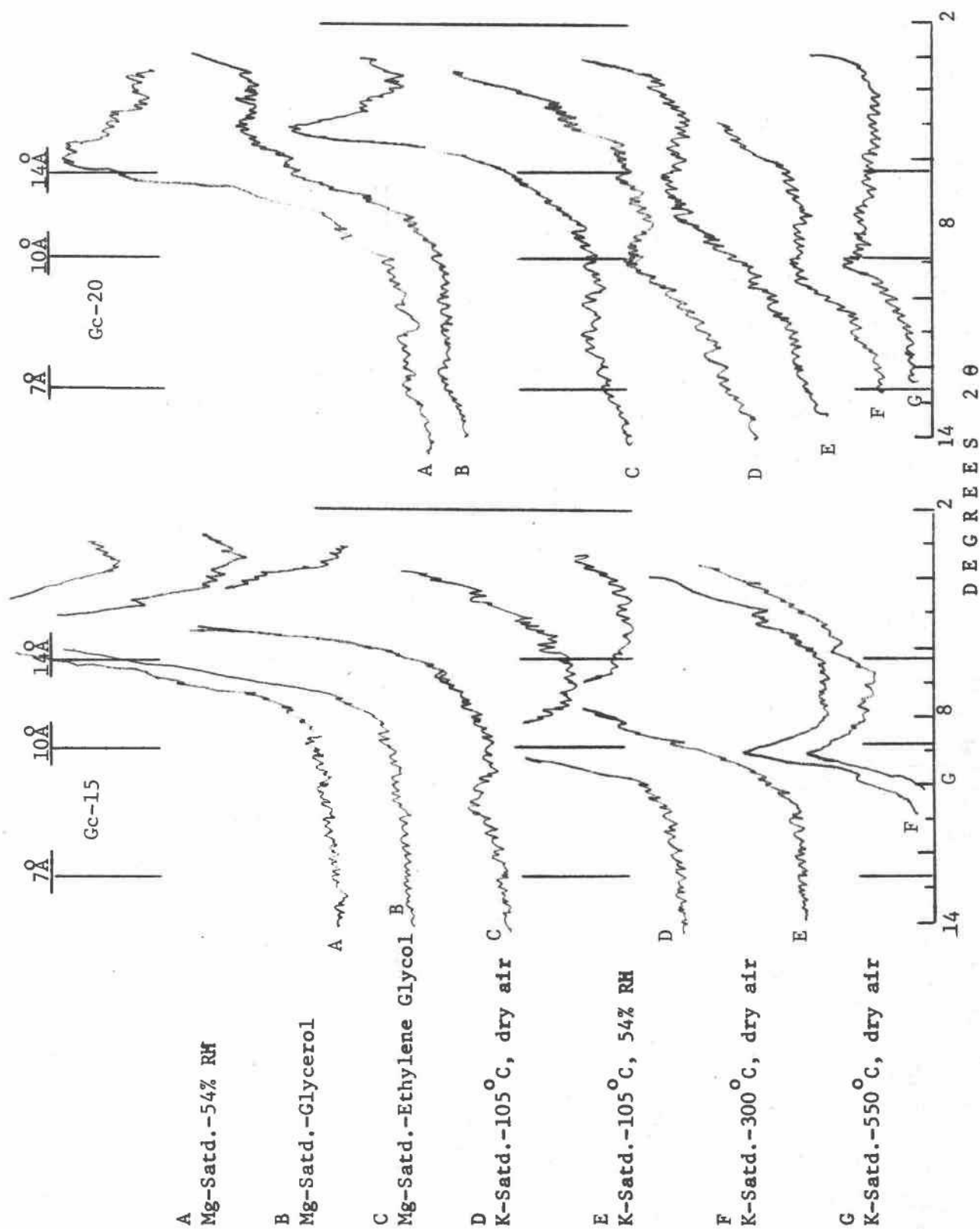


Figure F-2. X-ray diffraction patterns of clay from Lost Creek Reservoir soil samples.

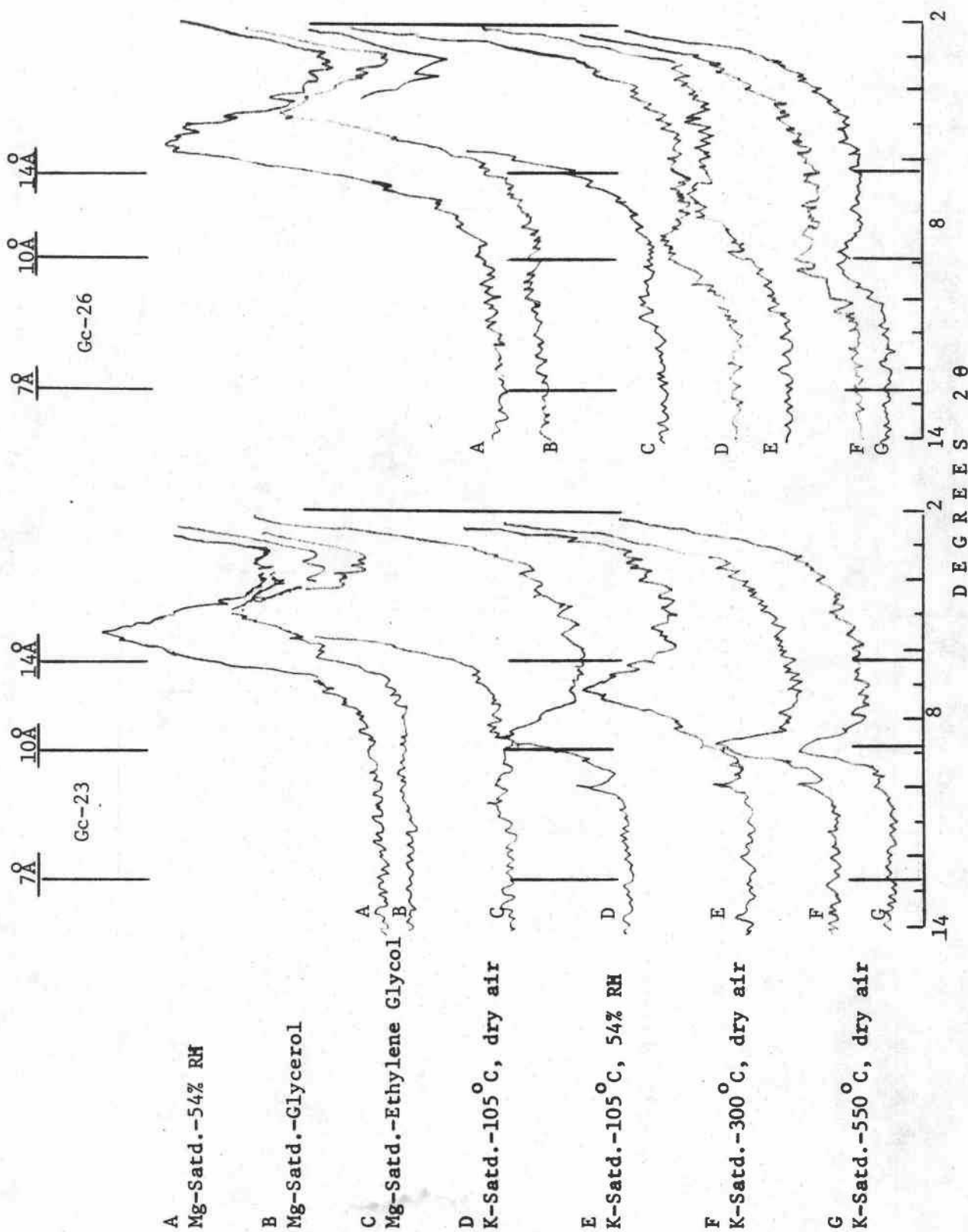


Figure F-3. X-ray diffraction patterns of clay from Lost Creek Reservoir soil samples.

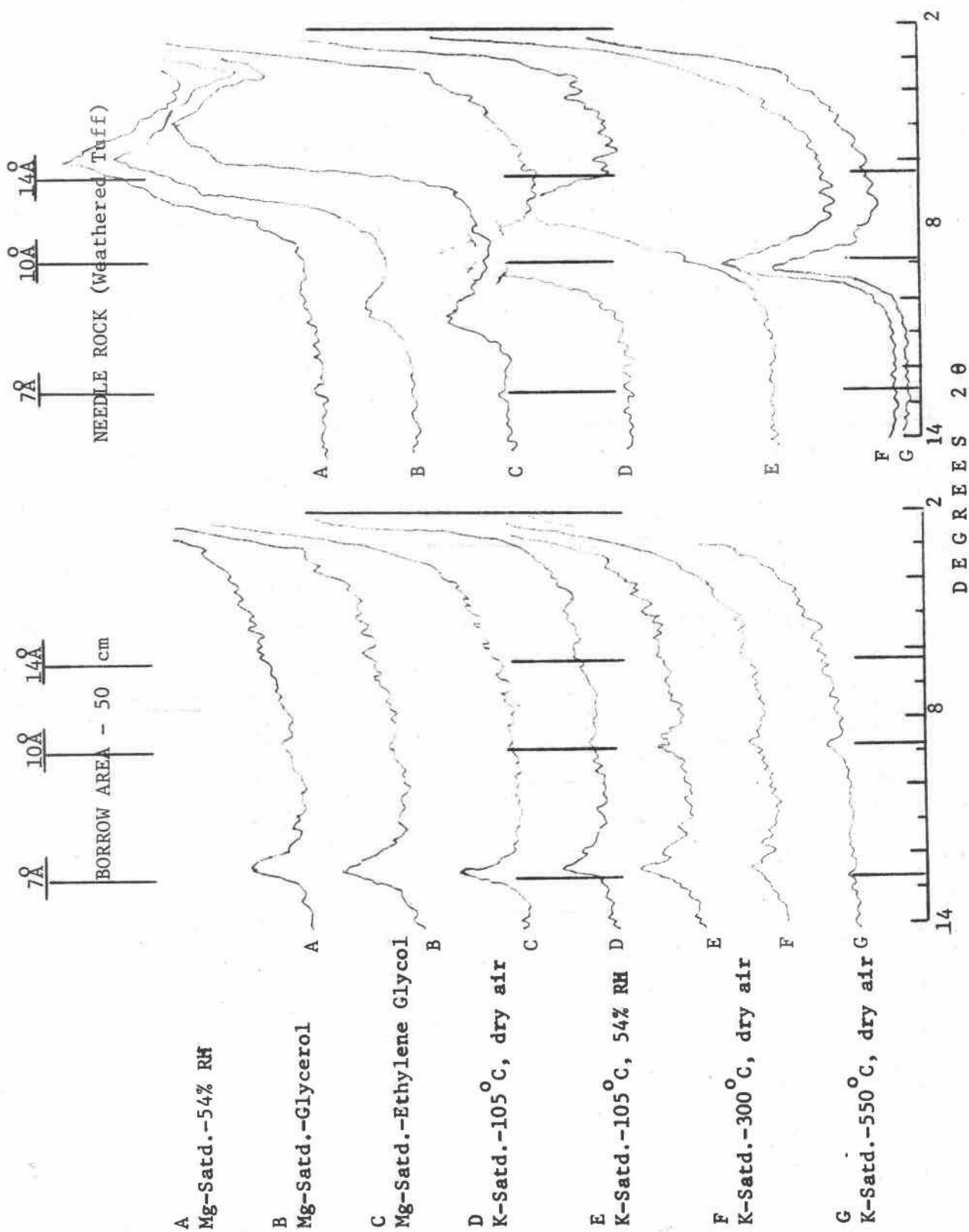


Figure F-4. X-ray diffraction patterns of clay from Lost Creek Reservoir soil samples.

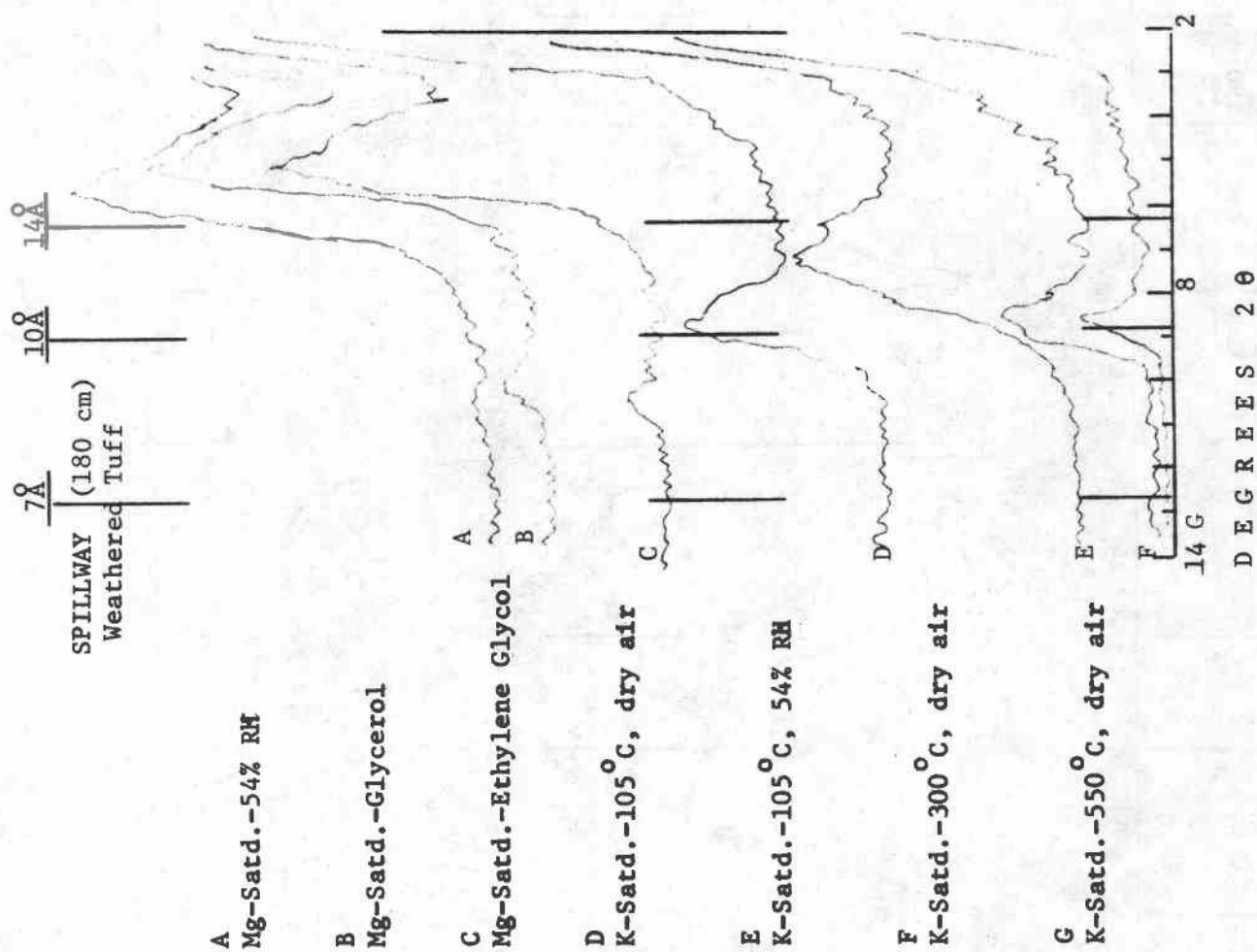


Figure F-5. X-ray diffraction patterns of clay from Lost Creek Reservoir soil samples.

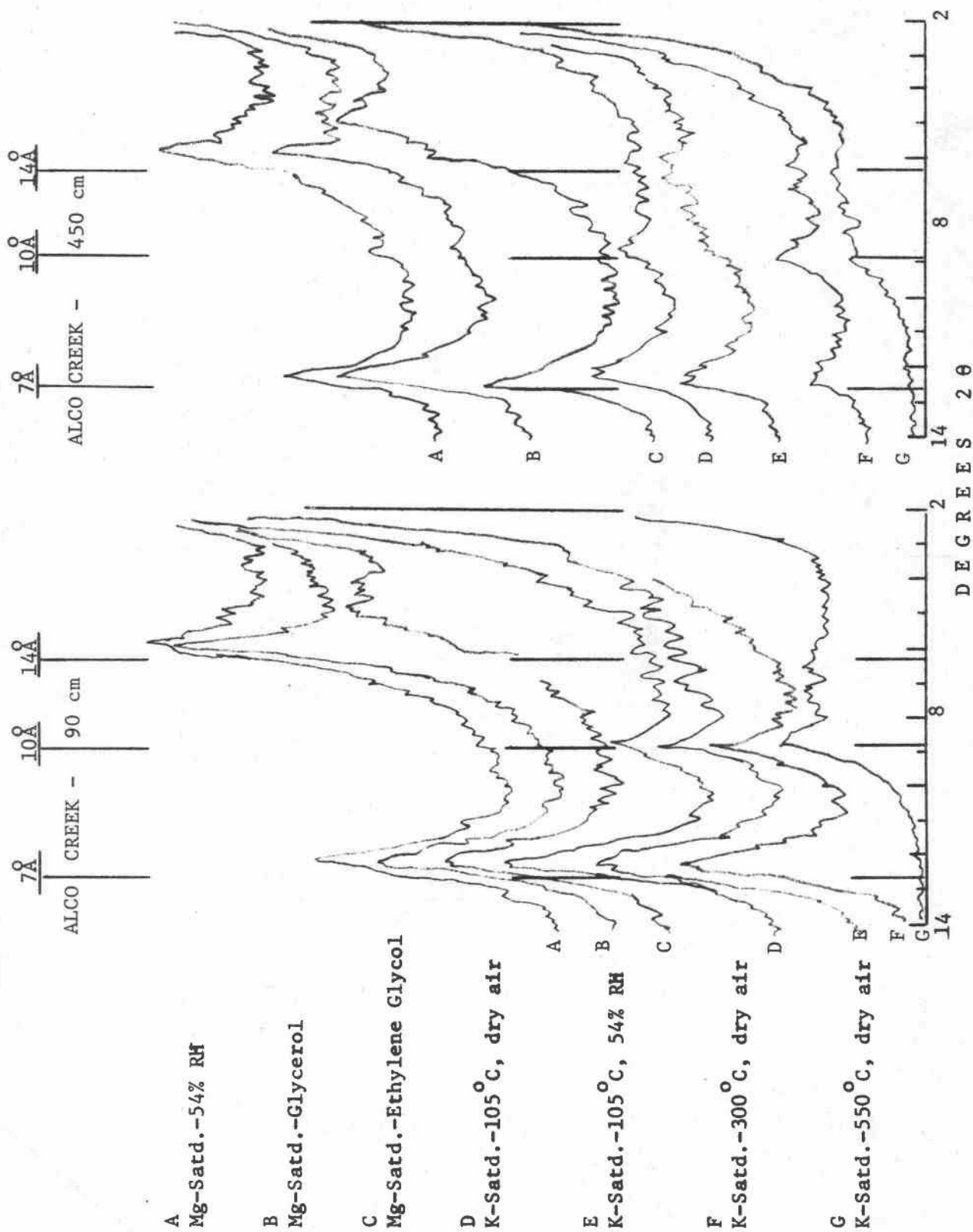


Figure F-6. X-ray diffraction patterns of clay from Elk Creek Reservoir soil samples.