

# WAGNER PETROGRAPHIC

95 South 700 East • AMERICAN FORK, UTAH 84003  
(801) 756-2172

## SAMPLE SUBMITTAL

BY JEFFREY B. HULEN, LURIESL  
391-C CHIPETA WAY, SLC, UT 84108

DATE NOV. 8, 1988

SAMPLE NUMBER	DESCRIPTION	Thin Section	Polished Section	Need Impreg-nation	Polished Thin Section	1.25" Micro-probe Slide	Large Polished Section	K-Spar Stain	Calcite Stain
2,541'	CORE	✓		✓				(1/2) ✓	
2,467.5'	"	✓		✓				" ✓	
2,502.0'	"	✓		✓				" ✓	
2,605.0'	"	✓		✓				" ✓	
2,135.4'	"	✓						" ✓	
2,660.0'	"	✓						" ✓	
2,762.0'	"	✓						" ✓	
2,864.0'	"	✓						" ✓	
2,986.0'	"	✓						" ✓	
3,073.0'	"	✓						" ✓	
3,161.0'	"	✓						" ✓	
3,199.4'	"	✓						" ✓	
3,283.5'	"	✓						" ✓	
3,298.0'	"	✓						" ✓	
3,350.0'	"	✓						" ✓	
3,440.0'	"	✓						" ✓	
3,552.0'	"	✓						" ✓	
3,625.0'	"	✓						" ✓	
3,665.0'	"	✓						" ✓	
3,791.0'	"	✓						" ✓	
3,892.5'	"	✓						" ✓	
3,846.0'	"	✓						" ✓	
3,945.0'	"	✓						" ✓	
3,988.0'	"	✓						" ✓	
4,053.8'	"	✓						" ✓	
4,101.6'	"	✓						" ✓	
4,119.5'	"	✓						" ✓	
4,970.0'-A	"	✓						" ✓	
4,970.0'-B	"	✓						" ✓	
5,187.0'-	"	✓						" ✓	
5,425.4'	"	✓						" ✓	
5,447.6'	"	✓						" ✓	
5,442.0'	"	✓						" ✓	
5,534.0'	"	✓						" ✓	
5,559.0'	"	✓						" ✓	
5,597.0'	"	✓						" ✓	

REMARKS PLEASE STAIN ONLY 1/2 OF SLIDE.







Sample # 721-51a 5073.5'

Description

Interbedded recrystallized limestone and poorly sorted sandstone. Heavily veined and sheared. Alteration gives mottled green appearance. Contains epidote in veins and in matrix. Contains substantial pyrite.

Mineralogy

Veins: Epidote (Fe/Ca .35), wairakite and pyrite

Matrix: mostly a illite group mineral with occasional mixed illite/chlorite. Wairakite and epidote also seen interbedded with pyrite.

Sample 721-51b 5073.5'

Description

Same as above but cut by three large whitish veins at 45 degrees.

Mineralogy

Veins: Wairakite, calcite, fluorite, quartz and epidote (Fe/Ca .37-.39)

Matrix: mixed illite and chlorite

Sample # 722-3b 5084.3'

Description

Recrystallized sandy limestone cut by veins at 45 degrees. Occasional aggregates of brown/red mineral. Contains a layer of moderately bedded siltstone lying unconformable on top.

Mineralogy

Veins: Wairakite, epidote (Fe/Ca .557)

Matrix and grains: chlorite (Fe/Mg 3.0) and mixed chlorite/illite, epidote (Fe/Ca .38 - .423), wairakite (in matrix). Siltstone region also contains wairakite and epidote (Fe/Ca .44) in matrix.

Sample # 723-14a 5110.5'

Description

Sheared mixture of siltstone and limestone. Matrix is quite altered.

Mineralogy

Matrix: Mixed chlorite and illite (Chlorite Fe/Mg .792), locally silicified. Various grungy areas appeared isotropic optically, but seem to be mixed chlorite and illite with chlorite varying between Fe/Mg .75 and 1.0) This is a much less Fe rich than usually seen in these sections. There also appears to be calcite in the matrix and some  $TiO_2$  (sphene or leucosene?) components.

Sample # 723-34b 5123'

Description

Highly altered and sheared porphyritic quartz monzonite. Cut at 30 degrees to horizontal by whitish-pinkish veins. Also cut by fine grained shear zone. Contains scattered aggregates of pyrite.

Mineralogy

Veins: mostly quartz and calcite.

Grains: Biotite, apatite growing in white mica (?)

Matrix: Mostly illite and chlorite (Fe/Mg 2.0-3.0)

Petrographic and Microprobe Results from Preliminary Scan of Thin Sections Between 4970 and 5123 Feet, core hole VC2B

Sample # 715-17a 4970'

Description

Light green, weakly bedded siltstone, cut by sub-horizontal veins; slightly sheared with very light to opaque "porphyroblasts" some of which appear to be rimmed with chlorite or sericite. Veins are dark green chlorite/illite?

Mineralogy

Matrix: illite (illite grp), quartz and mixed chlorite-illite. Spotted with little barrel shaped chlorites (Fe/Mg = 4.8; wt% basis). Some illite/sericite appears dark and contains  $TiO_2$ . Occasional blotches of Cu rich mineral bedded in illite/chlorite matrix. (May be relict drilling fluid. Is not associated with S).

Veins: mixed chlorite and illite envelopes becoming more illite rich toward center.

Porphyroblasts: anhydrite with occasional chlorite (?) boundaries. One grained appeared to be mixed chlorite and anhydrite.

Sample # 715-17b 4970'

Description

Same

Mineralogy

Matrix: Chlorite (Fe/Mg: 4.0 - 5.0), illite group clays, and barrel Chlorite as above (Fe/Mg = 4.5)

Veins: Mostly chlorite (Fe/Mg = 4.5)

Porphyroblasts: anhydrite

✓ = DONE

		To Be Done									
		Bulk, 2-65°		Bulk, 94, 2-10°		Clay, 2-87°		Clay, 94, 2-22°			
20'		✓	✓	✓	✓	✓	✓				
23'		✓	✓	✓	✓	✓	✓				
37'		✓	✓	✓	✓	✓	✓				
80'		✓	✓	✓	✓	✓	✓				
102'		✓	✓	✓	✓	✓	✓				
146.2'		✓	✓	✓	✓	✓	✓				
162'		✓	✓	✓	✓	✓	✓				
164'		✓	✓	✓	✓	✓	✓				
168.5'		✓	✓	✓	✓	✓	✓				
172.'		✓	✓	✓	✓	✓	✓				
172.4'		✓	✓	✓	✓	✓	✓				
173'		✓	✓	✓	✓	✓	✓				
200'	2	✓	✓	✓	✓	✓	✓				
265'	9	✓	✓	✓	✓	✓	✓				
331'	9	✓	✓	✓	✓	✓	✓				
386'	4	✓	✓	✓	✓	✓	✓				
449'		✓	✓	✓	✓	✓	✓				
492.3'	5	✓	✓	✓	✓	✓	✓				
547'		✓	✓	✓	✓	✓	✓				
579.3'	6	✓	✓	✓	✓	✓	✓				
624'		✓	✓	✓	✓	✓	✓				
640'		✓	✓	✓	✓	✓	✓				
740.5'	7	✓	✓	✓	✓	✓	✓				
783.5'	8	✓	✓	✓	✓	✓	✓				

VC-2B XRD





✓ = DONE

To Be Done

		BUK / 2-65°		BUK / 94° / 2-10°		CLAY / 2-37°		CLAY / 94° / 2-92°												
18	1761.3	✓	✓			✓	✓													
	1835.3	✓	✓			✓	✓													
19	1930'	✓	✓			✓	✓													
	1964'	○	○			✓	✓													
20	2000'	✓	✓			✓	✓													
	2036'	○	○			✓	✓													
	2047'	○	○			✓	✓													
	2065'	○	○			✓	✓													
21																				
	2135 (2134.5)	○	○			○	✓													
22	2195'	○	○			○	✓													
	2245'	○	○			✓	✓													
	2275'	○	○			✓	✓													
23																				
	2342	○	○			✓	✓													
24																				
	2452.5'					✓	✓													
	2467.5'	○	○			✓	✓													
25																				
	2502'	○	○			✓	✓													
	2523'	✓	✓			✓	✓													
	2541'	○	○			○	○													
26																				
	2605'	○	○			○	✓													
	2660'	○	○			✓	✓													

VC-2B XRD

J. Hulien

✓ = DONE

		to be done																				
		Bulk, 2-65°		Bulk, 9/100, 2-10°		Clay, 2-37°		Clay, 9/4, 2-22°														
27	2762'	○	○	○	○	✓	✓															
28	2864'	○	○	○	○	✓	✓															
29																						
	2986'	○	○	○	○	✓	✓															
30	3025.5'	✓	✓	○	○	✓	✓															
	3073'	○	○	○	○	✓	✓															
31																						
	3161'	○	○	○	○	✓	✓															
	3199.4'	○	○	○	○	✓	✓															
32	3206.5'	✓	✓	○	○	○	○															
	3220'	○	○	○	○	○	○															
	3283.5'	○	○	○	○	○	✓															
33	3298.0'	○	○	○	○	○	✓															
	3350.0'	○	○	○	○	○	✓															
34																						
	3440.0'	○	○	○	○	○	✓															
35																						
	3552.0'	○	○	○	○	✓	✓															
36																						
	3625.0'	○	○	○	○	✓	✓															

VC-9B XRD

J. Hulen

✓ = DONE

to be done

		bulk, 2-65°		bulk, 94, 2-10°		clay, 2-37°		clay, 94, 2-92°												
	3665'							✓												
37																				
	3731'	✓	✓			○	✓													
38																				
	3832.5'	○	○			✓	○													
	3864.0'	○	○			✓	✓													
39																				
	3945'	○	○			✓	✓													
40																				
	3988'	○	○			✓	✓													
	4053.8'	○	○			○	✓													
41																				
	4101.6'	○	○			○	✓													
	4119.5'	○	○			○	✓													
42																				
	4174'	○	○			○	✓													
	4272'					○	✓													
	4258'					○	✓													
	4246'					○	✓													
43																				
	4294'					○	○													
	4349'						✓													
	4358.5'	○	○			○	✓													
	4375'	○	○			○	✓													
44																				
	4393'	✓	✓			✓	✓													
	4423'					○	✓													
	4444'	○	○			○	✓													
45																				
	4500'					○	✓													
	4521'						✓													
	4530'	○	○			○	✓													

VCL-2B XRD

J. Hulien

✓ = DONE

		to be done										
		bulk, 2-65°		bulk, 9/4, 2-10°		clay, 2-34°		clay, 9/4, 2-22°				
46	4621'	○	○	○	○	○	✓					
47	4682.6'			○	○	○	✓					
	4766'			○	○	○	✓					
	4750.5'	✓	✓			○	✓					
	4761.9'	○	○	○	○	○	○					
48	4812'	✓	○			○	✓					
	4824'	○	○			○	✓					
49	4862.5'	✓	○			○	✓					
	4943.0					○	✓					
	4957.5'					○	✓					
	4991.3'					○	✓					
50	4970-A	○	○			○	✓					
	4970-B	○	○			○	✓					
	5022'					○	✓					
	5055'					○	✓					
	5071'					○	✓					
	5113.5'					○	✓					
51	5124'					○	✓					
	5169'					○	✓					
	5,187'	○	○			○	✓					
	5204'					○	✓					
	5228'					○	✓					
	5254'					○	✓					
52	5279'	✓				○	✓					
	53	5313.6'	✓				○	✓				
		5361.5'					○	✓				
54	5425.4'	○	○			○	✓					
	5442'	○	○			○	✓					
	5447.6'	○	○			○	✓					
	5470.5'	○	○			○	✓					
55	VC-2B XRD											

J. Hulen



	AMEC.	M.L. IL/SM	ILLITE	M.L. CH/SM	GRU	KAOLIN				IL or IL/SM, ADP	IL or IL/SM, ADP <sub>2</sub>	9.5M in IL/SM	
20'										8.02	16		R <sub>3</sub>
23'									2.00	8.00	17		R <sub>3</sub>
37'									1.84	8.01	17		R <sub>3</sub>
80'									2.90	7.60	23		R <sub>1</sub>
102'									2.12	8.26	16		R <sub>3</sub>
146.2'									2.52	7.55	25		R <sub>1</sub>
162'									1.55	7.97	18		
164'													
168.5'													
172.'													
172.4'													
173'													
265'		100							1.66	7.87	19		
331'									1.74	8.10	16		
386'									1.26	8.20	15		
492.3'									1.22	8.13	15		
579.9'									0.70	8.65	8		
648'									0.69	8.73	8		
740.5'									10.35	8.82	6		
783.5'									10.3	<del>8.82</del>	6		

APPROX. WEIGHT PER CENT

	SMECTITE	ML IL/SM	ILLITE	ML CHL/SM	CHLORITE	KAOLIN			IL or IL/SM LAB	IL or IL/SM LAB	% SM in IL/SM
8	827.0'										
	865.8'								8.85	≤5	
9	904'								8.85	≤5	
	990.5'								8.85	≤5	
10	1053'								8.86	≤5	
11	1105'								8.70		
	1141.5'								8.73	≤5	
	1156.0'								8.81	≤5	
	1187.5'								9.10	≤5	
12	1200'							0.60	8.60	8	
	1215.6' (5g)	97		3				0.78	8.25	13	
	1218.0' (5g)							0.75	8.65	8	
13	1297.3'							?	8.70	≤5	
	1313.'							0.67	8.43	10	
14	1423'								8.9	≤5	
	1463'								8.83	≤5	
15	1483'										
	1573'							?	?	≤5	
16	1649'							°	8.80	≤5	
	1671'							?	?	≤5	
17	1746'									≤5	

1201-  
1179







		SMECTITE	M.L. IL/SM	ILLITE	M.L. CH/SM	CHLORITE	KAOLIN			IL or IL/SM 2252	IL or IL/SM 2252	% SM in IL/SM	
	3665'								0.78	8.5	9	(R <sub>3</sub> )	
87													
	3731'												
98													
	3832.5'												
	3864'								0.78	8.92	12		
99													
	3945'												
40	3988'		98		2				1.04	8.22	13		
	4053.8'												
41									~2.0	~8	18		
	4101.6'								~1.9	~8.0	18		
	4119.5'												
42	4174.0'								~2.1	~7.8	23		
	4246.0'								2.75	7.5	30	(R <sub>1</sub> )	
	4258'												
	4272'								~2.0	~8?	18?	(R <sub>1</sub> )	USELESS - NO CLAY BOTH IL & IL/SM
43	4349								-	-	-		NO IL or IL/SM
	4358.5'								2.75	7.45	26	(R <sub>1</sub> )	
	4375'								2.55	7.25	30	(R <sub>1</sub> )	
44	4393'								3.3	6.82	43	(R <sub>1</sub> )	
	4444								3.1	7.2	40	(R <sub>1</sub> )	
45	4500												?
	4521								2.55	7.0	37	(R <sub>1</sub> )	
	4530								2.65	7.7	25	(R <sub>1</sub> )	

	SMECTITE	ML IL/SM	ILLITE	ML CH/SM	CHLORITE	KAOLIN			IL or IL/SM 225%	IL or IL/SM 225%	98 SM in IL/SM	
46	4621'								8.0	1.4	17	(R <sub>9</sub> )
47	4682.6'								8.1	1.6	17	(R <sub>9</sub> )
48	4824'								-	-	-	Y. little clay bit 27% super/att. ice peak
49	4943								8.1	1.6	17	(R <sub>9</sub> )
	4957.5'								8.1	1.8	17	(R <sub>9</sub> )
	4968'								8.0	1.7	17	(R <sub>9</sub> )
50	4970-A 4970-B 4991'								7.95	1.8	18	(R <sub>9</sub> )
	5022'											?
	5055'								8.1	1.7	17	(R <sub>9</sub> )
												BOTH IL (MICA?) IL/SM
51	5113.5'								8.5	1.0	9	(R <sub>9</sub> )
	5124								8.6	1.0	8	(R <sub>9</sub> )
	5169								8.8	-	≤5	
	5,187'								9.0	-	≤5	
52	5203'								9.0	-	≤5	
	5228'								8.95	-	≤5	
	5254'								8.85	-	≤5	
53												
	5361.7								8.9	-	≤5	
54												
	5425.4'								8.9	-	≤5	
	5442'											
	5447.6'								8.9	-	≤5	
	5470.5'											
55												

4991' - mostly illite, but 1/2 is super-fine

WRIR.





		PTZ	PLAG	KFSR	CALCITE	POLOMITE	PYRITE	HEMATITE	SPHENE	ANATASE	SMEC.	IL/SM	IL	CH/SM	CH	KA
8	827.0'															
	869.8'															
9	904'	50	30		2			TR			7					
	990.5'															
10	1093'															
11	1105'	25	8	5	21						13		19			
	1141.5'	32	17	16	1					5			2			
	1156.0'															
12	1200'															
	1215.6'	60	TR	14		1				21			3		1	GYPSUM
13	1297.3'	46	2	28		1				7			3		13	
	1313.'	47	5	20		1				7			3		5	FLUORITE
14																
15	1463'	34	25	18	3						6		3			
	1483'															
16	1573'	38	24	18						3			2			
17	1649'															
	1671'															
	1746'															

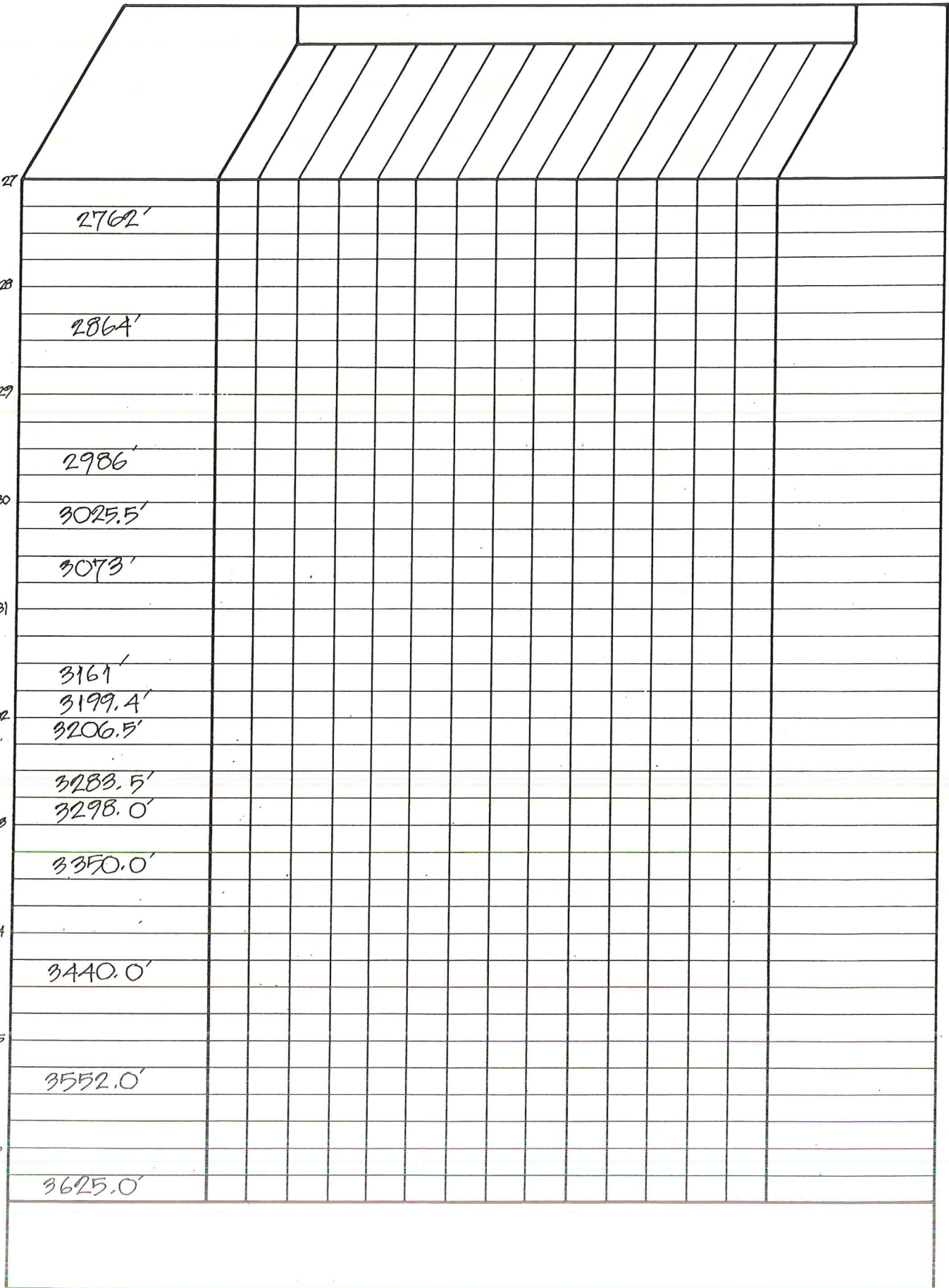
GLASS

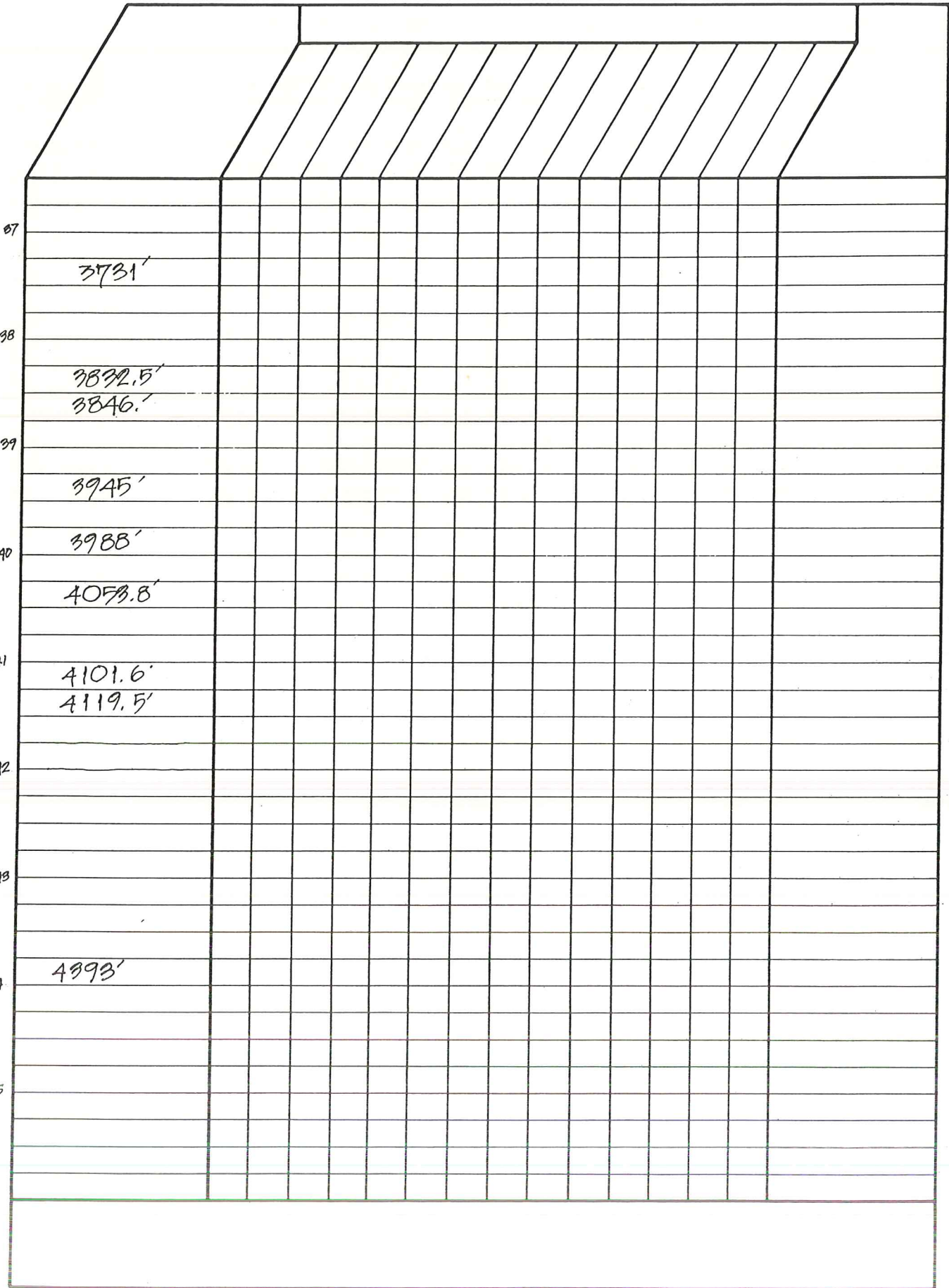
APPROX. WT. PERCENT

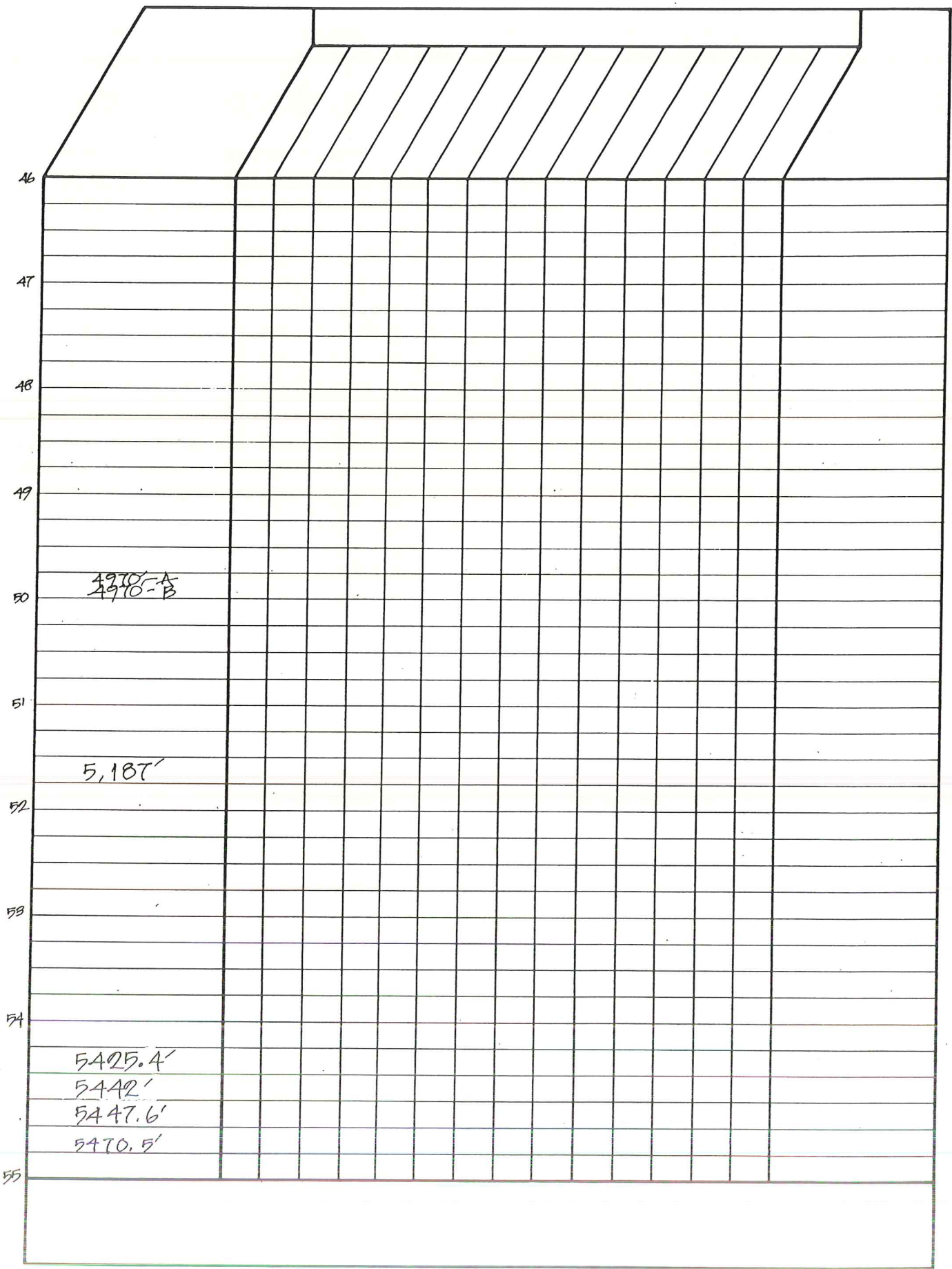
	QTZ	PLAGIOCL.	KFELDSPAR	CALCITE	DOLOMITE	PIRYTE	HEMATITE	MAGNETITE	LEUCOXENE	SMEC.	IL/SM	IL	CH/SM	CH	KA
1761.3	37	24	18	3						3			2		
1835.3	37	28	21	2						4			2		
1990' 1964'	16	36	23	3						8			3		
2000' 2026' 2045' 2065'	36	31	17	-						10			3		
2135'															
2467'	61	15	12	1		- 1/2	1			7			2		
<del>2502.0'</del> <del>2510.3'</del> <del>2523.0'</del>	<del>23</del>	<del>3</del>	<del>6</del>	<del>54</del>						<del>7</del>			<del>2</del>		
2605'	61	14	10	1			2			3			1		
2660'															

VC-2B BULK XRD









46

47

48

49

50

1970-A  
1970-B

51

5,187'

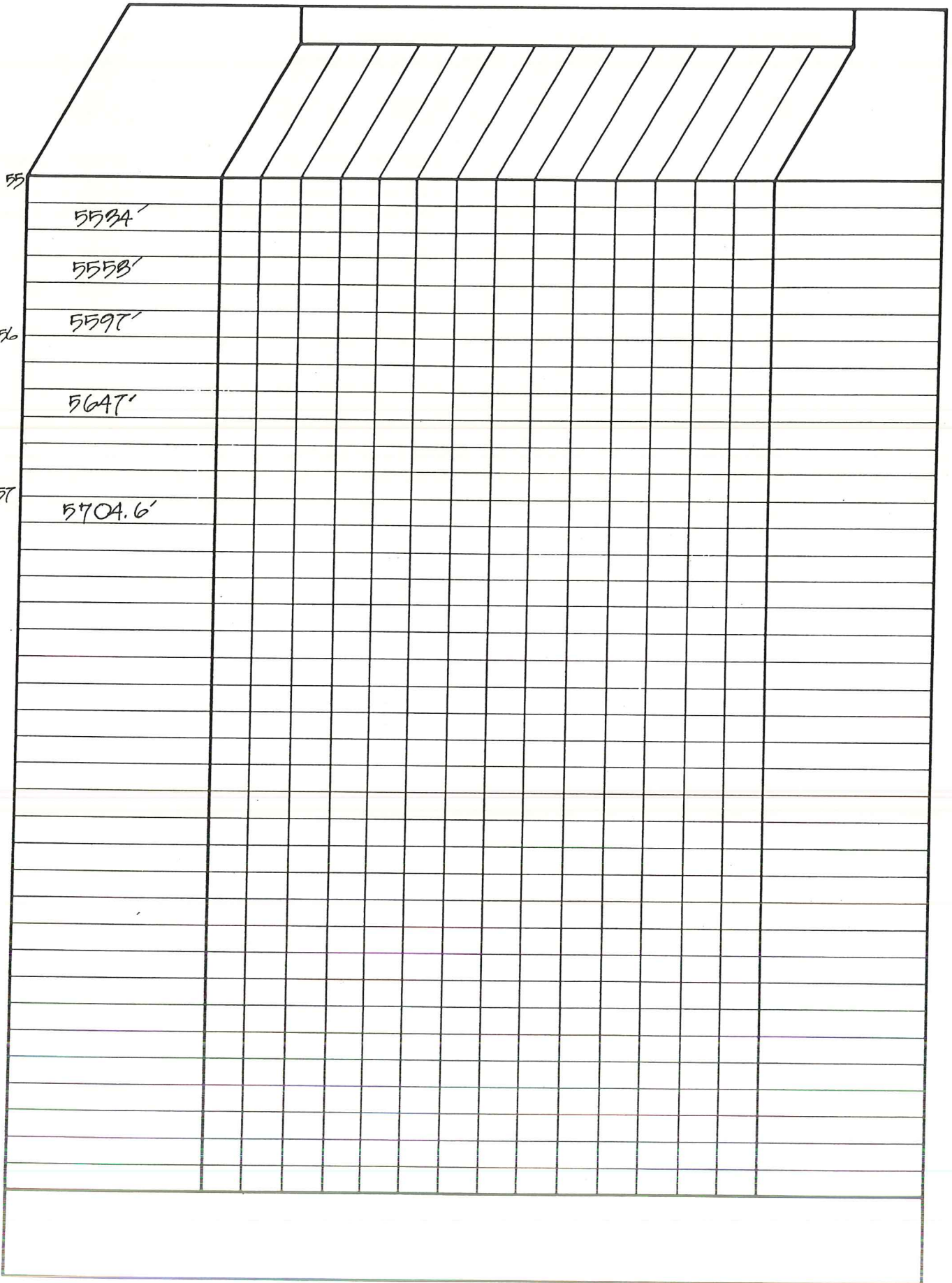
52

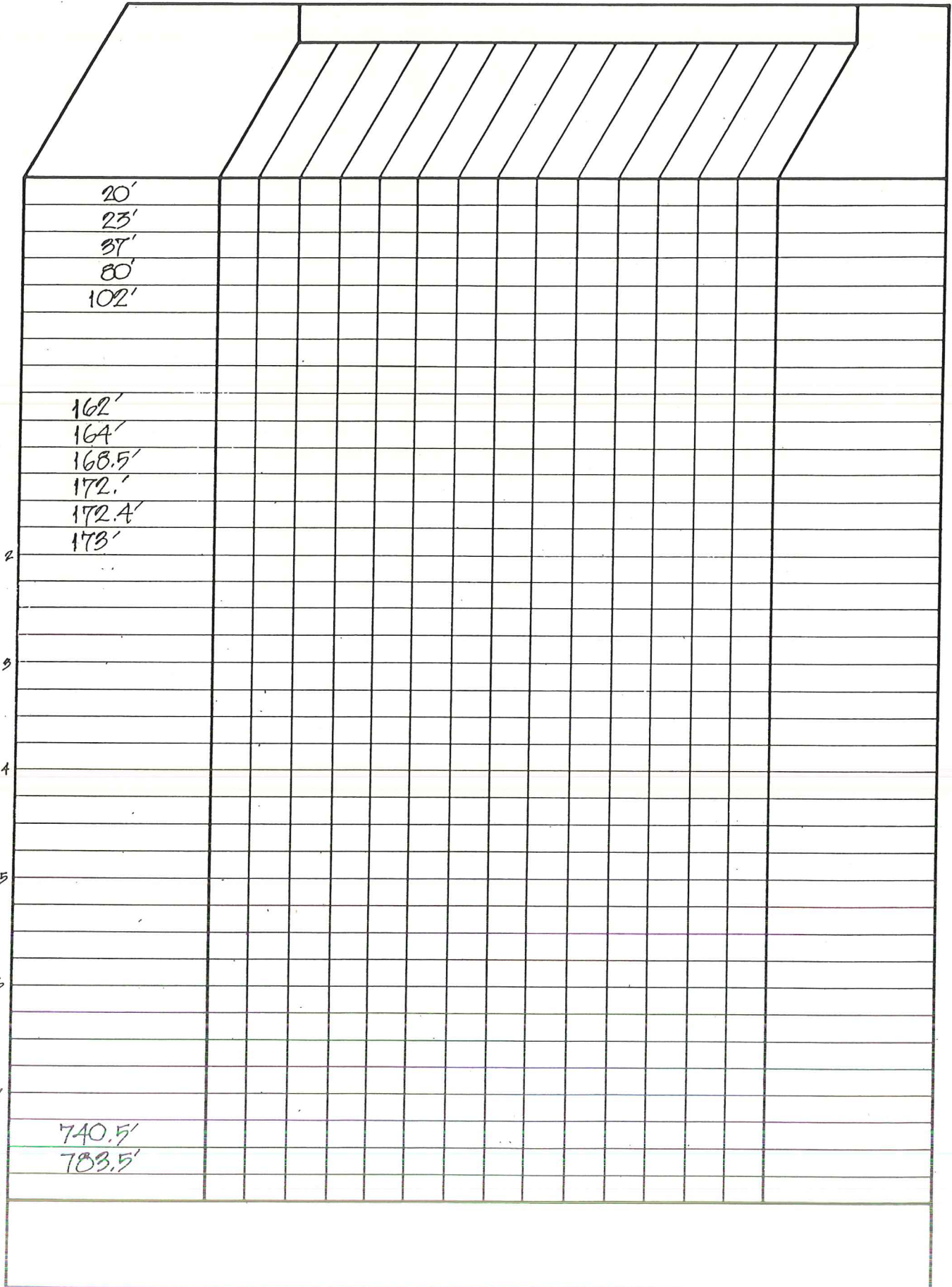
53

54

5425.4'  
5442'  
5447.6'  
5470.5'

55



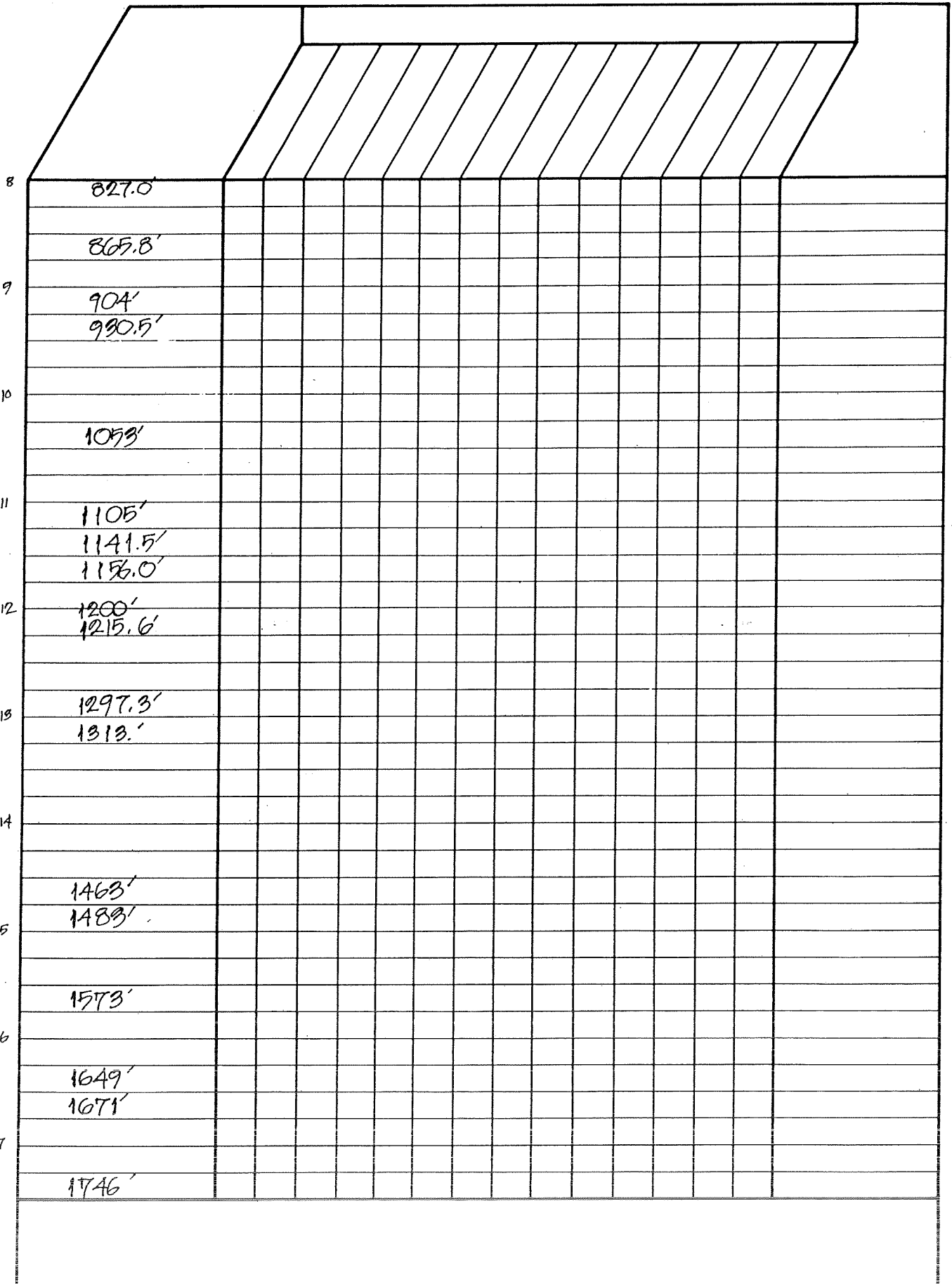


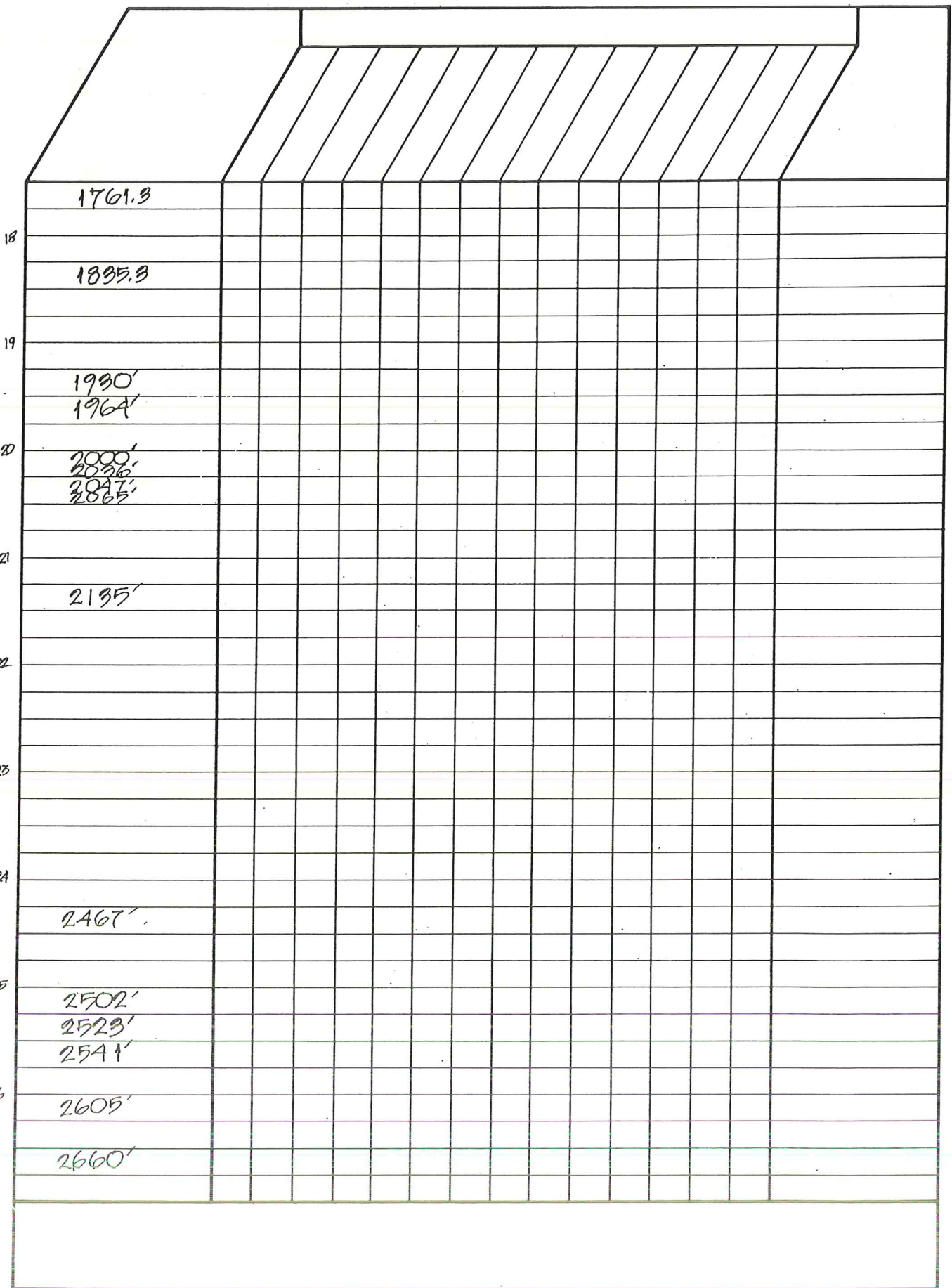
20'  
23'  
37'  
80'  
102'

162'  
164'  
168.5'  
172.'  
172.4'  
173'

2  
3  
4  
5  
6  
7  
8

740.5'  
783.5'





1761.3

18

1835.3

19

1930'  
1964'

20

2000'  
2036'  
2041'  
2065'

21

2135'

22

23

24

2467'

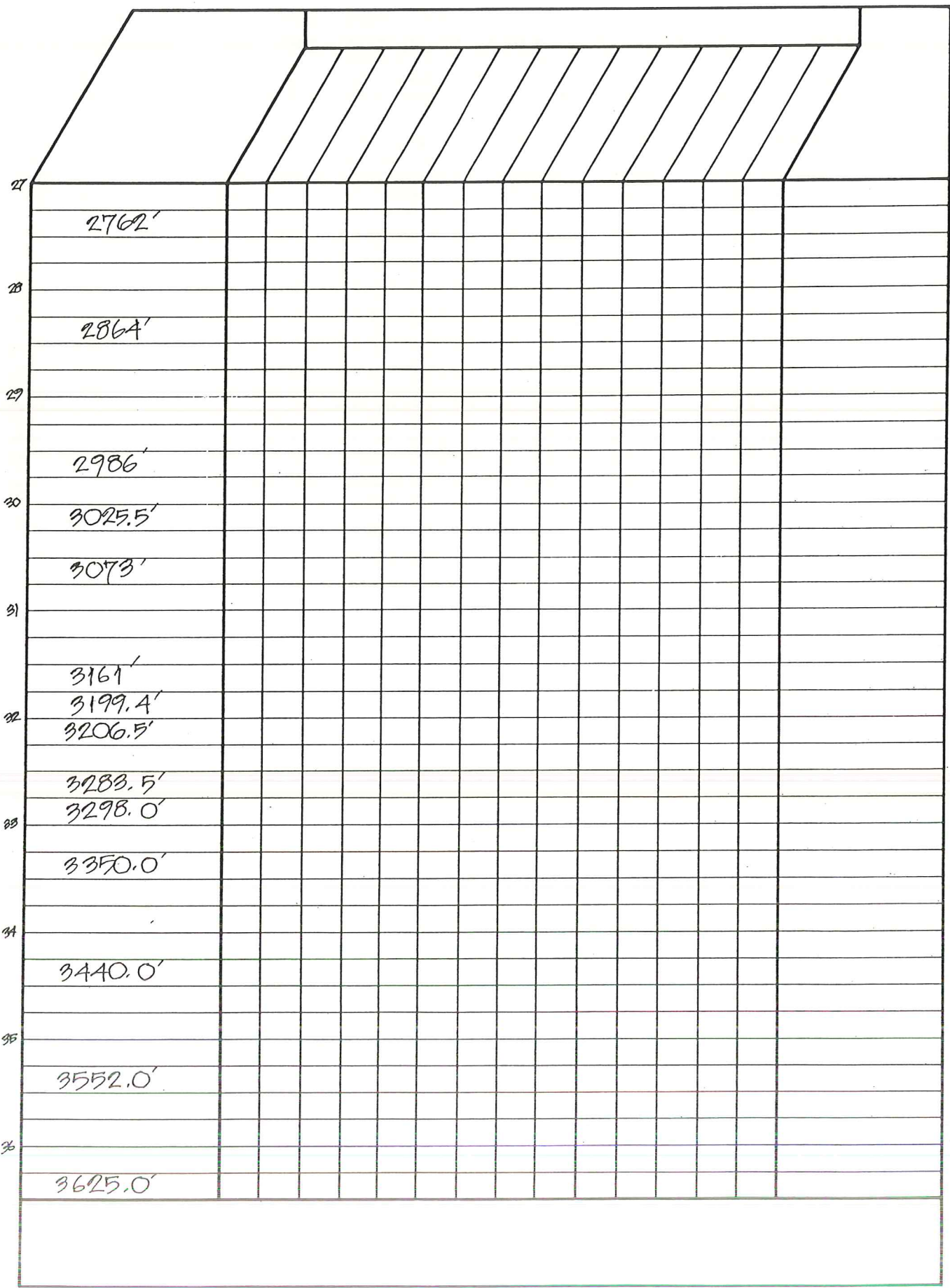
25

2502'  
2523'  
2541'

26

2605'

2660'



2762'

2864'

2986'

3025.5'

3073'

3161'

3199.4'

3206.5'

3283.5'

3298.0'

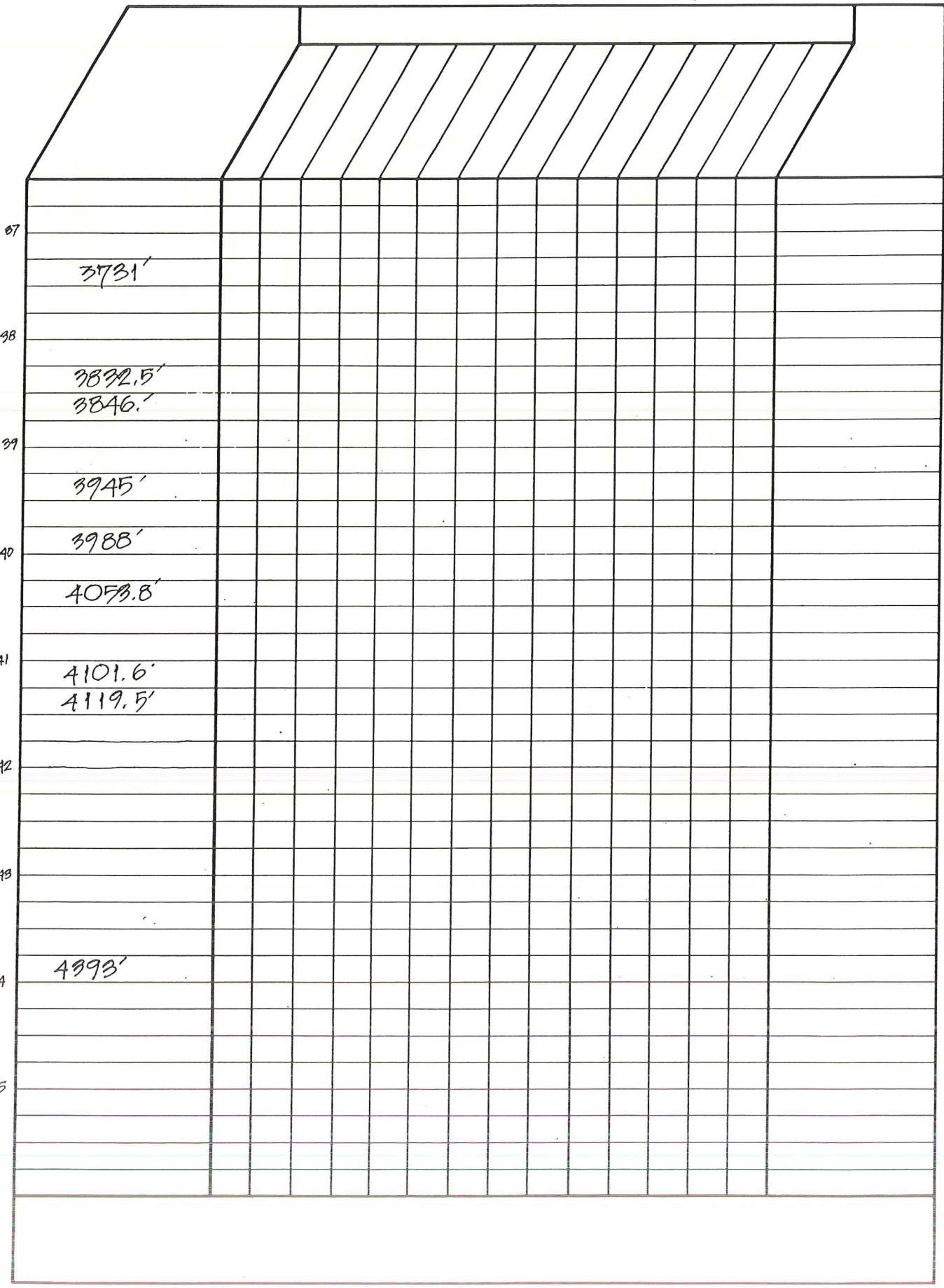
3350.0'

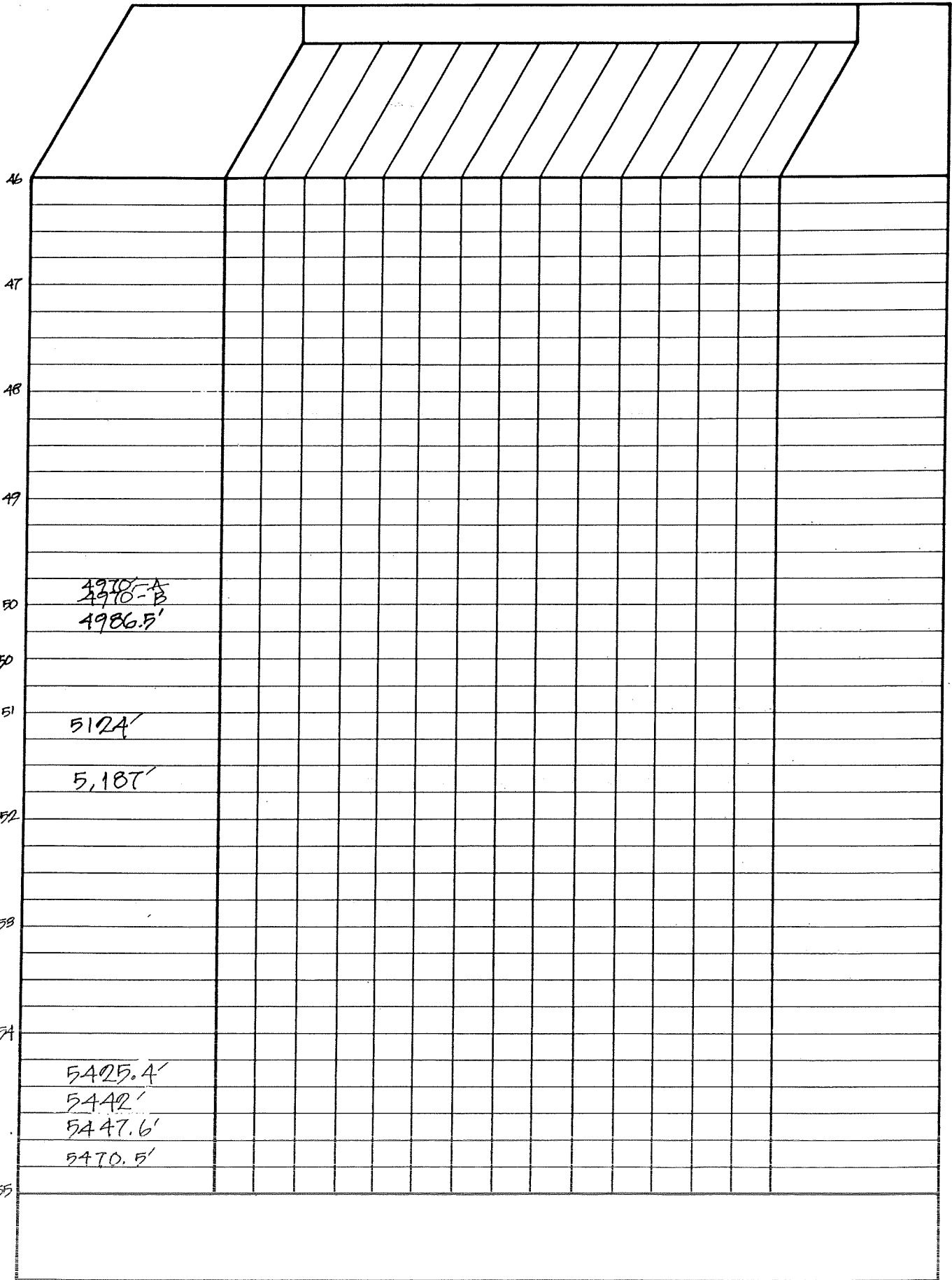
3440.0'

3552.0'

3625.0'







46

47

48

49

50

50

51

52

53

54

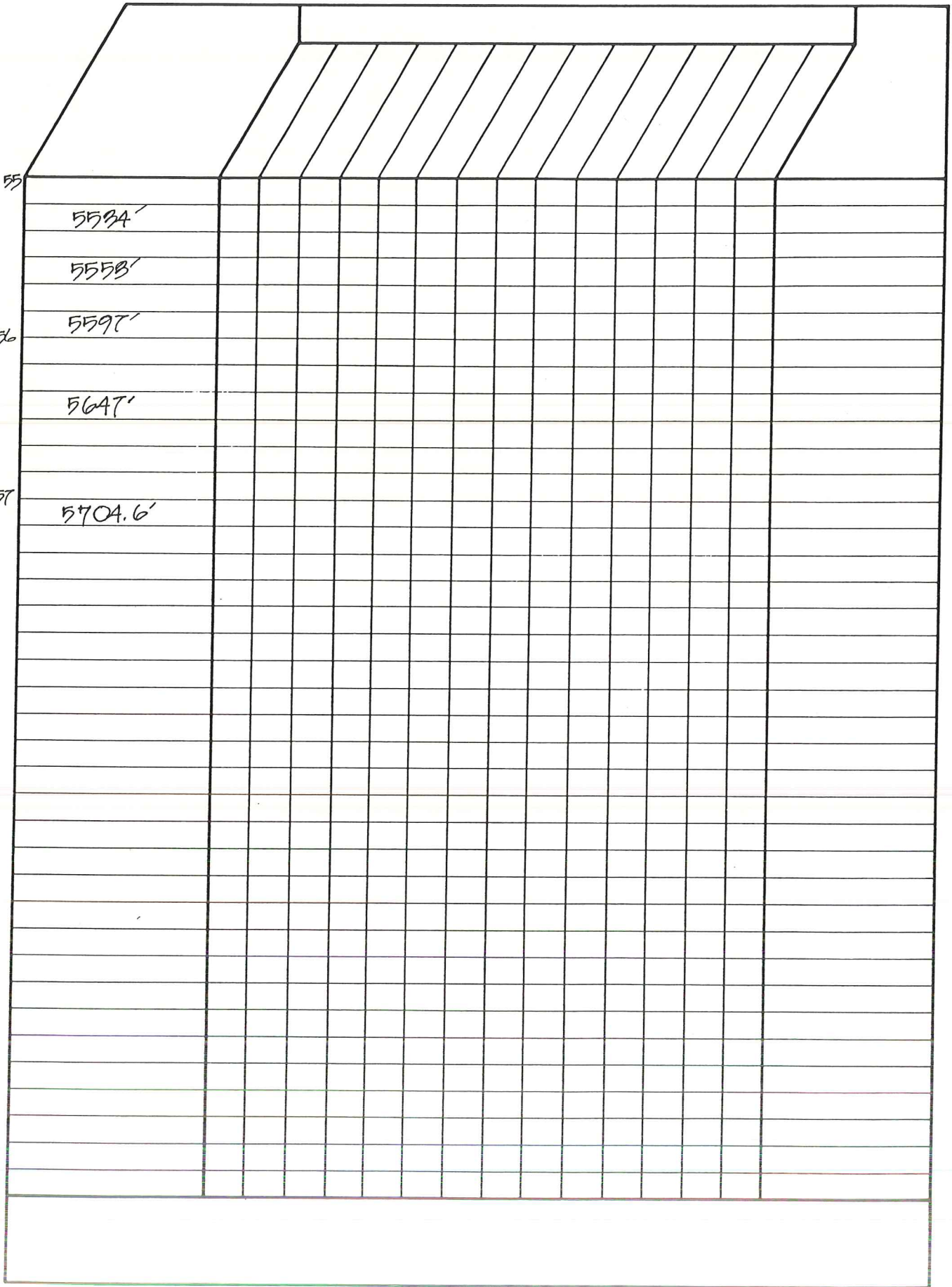
55

4910-A  
4910-B  
4986.5'

5124'

5,187'

5425.4'  
5442'  
5447.6'  
5470.5'



CATEGORY	INTENSITY		
	WEAK (W)	MODERATE (M)	STRONG (S)
QUARTZ-SERICITE (PHYLLIC) ALTERATION	ORIGINAL PLAGIOCLASE PARTIALLY SERICITIZED. ORIGINAL K-FELDSPAR $\leq 10\%$ SERICITIZED. GROUNDMASS $\leq 10\%$ ALTERED TO MICROCRYSTALLINE QUARTZ-SERICITE AGGREGATE.	ORIGINAL PLAGIOCLASE $> 50\%$ SERICITIZED. ORIGINAL K-FELDSPAR 10-50% SERICITIZED. GROUNDMASS 10-50% ALTERED TO MICROCRYSTALLINE QUARTZ-SERICITE AGGREGATE.	ORIGINAL PLAGIOCLASE COMPLETELY SERICITIZED. ORIGINAL K-FELDSPAR $> 50\%$ SERICITIZED. GROUNDMASS $> 50\%$ ALTERED TO MICROCRYSTALLINE QUARTZ-SERICITE AGGREGATE.
SILICIFICATION	GROUNDMASS $\leq 10\%$ ALTERED TO ESSENTIALLY MONOMINERALIC MICROCRYST. QUARTZ.	GROUNDMASS $> 10-50\%$ ALTERED TO ESSENTIALLY MONOMINERALIC MICROCRYSTALLINE QTZ.	GROUNDMASS $> 50\%$ ALTERED TO ESSENTIALLY MONOMINERALIC MICROCRYSTALLINE QTZ.
CHLORITE-SERICITE ALTERATION	ORIGINAL PLAGIOCLASE $< 10\%$ ALTERED TO SERICITE, MINOR CHLORITE AND PHENGITE. ORIGINAL K-FELDSPAR UNALTERED. ORIGINAL MAFICS ALTERED TO CHLORITE $\pm$ CALCITE, PHENGITE, LEUCOXENE. GROUNDMASS $< 10\%$ ALTERED TO MICROCRYSTALLINE AGGREGATE OF SERICITE WITH CHLORITE, PHENGITE, CALCITE, AND (BELOW 420M) ALBITE.	SAME AS WEAK COUNTERPART EXCEPT PLAGIOCLASE 10-50% ALTERED, GROUNDMASS 10-50% ALTERED, ORIGINAL K-FELDSPAR FRESH OR $< 10\%$ SERICITIZED.	SAME AS WEAK. COUNTERPART EXCEPT PLAGIOCLASE $> 50\%$ ALTERED, GROUNDMASS $> 50\%$ ALTERED, ORIGINAL K FELDSPAR $< 20\%$ SERICITIZED.
CALCITE AFTER PLAGIOCLASE	$\leq 10\%$ OF ORIGINAL PLAGIOCLASE ALTERED TO CALCITE.	10-50% OF ORIGINAL PLAGIOCLASE ALTERED TO CALCITE.	$> 50\%$ OF ORIGINAL PLAGIOCLASE ALTERED TO CALCITE.
DISSEMINATED PYRITE	$\leq 1\%$	1-5%	$> 5\%$
FRACTURING	$\leq 10$ FRACTURES / M	10-30 FRACTURES / M	$> 30$ FRACTURES / M
VEINING AND VUG-FILLING	$\leq 10$ VEINLETS / M $\pm$ $\leq 1\%$ (VOL) VUG-FILLING* PHASES	10-30 VEINLETS / M $\pm$ 1-5% VUG-FILLING* PHASES.	$> 30$ VEINLETS / M $\pm$ $> 5\%$ VUG-FILLING* PHASES

\* HYDROTHERMAL

VC-2A: EXPLANATION OF ALTERATION, FRACTURING, AND VEINLET INTENSITY LOGS.