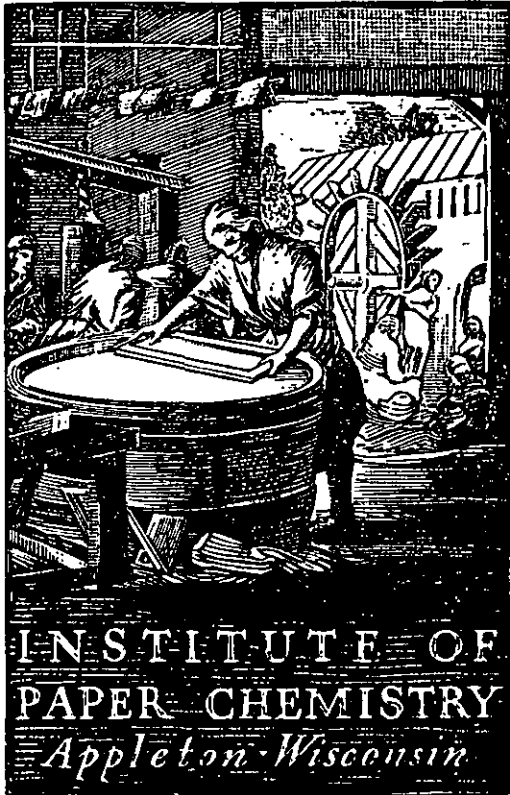


Institute of Paper Science and Technology
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CONTINUOUS BASELINE STUDY

Project 1108-13

Report 166

A Progress Report

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

February 1, 1961

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

CONTINUOUS BASELINE STUDY

Project 1108-13

Report 166

A Progress Report

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FOURDRINIER KRAFT BOARD INSTITUTE, INC.

February 1, 1961

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THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

SUMMARY

The objective of the continuous baseline study on linerboard is twofold. The first objective is to provide an indication of the quality of the 42-lb. fourdrinier kraft linerboard being produced by each of the participating mills and by the industry as a whole. The second objective is to provide a procedure whereby the mills have the opportunity to compare their test results with those obtained at the Institute on similar materials, thus providing a convenient system of instrument verification. The first objective is implemented by the weekly sampling of the product of each machine manufacturing 42-lb. kraft linerboard and submitting these weekly samples to The Institute of Paper Chemistry where they are evaluated for basis weight, caliper, bursting strength, and Elmendorf tearing strength. The second objective of the continuous baseline study--namely, to provide a convenient system of instrument verification--is achieved by the testing of analogous samples by the mill and the Institute. The mill data are sent to the Institute, and a comparison of Institute and mill test results is included in the monthly reports. In addition to fulfilling the two prime objectives described above, the baseline study is accumulating an invaluable ever-growing reserve of background information essential for the intelligent evaluation of specifications of any kind.

During the month of January, seventy-eight sample lots of 42-lb. fourdrinier kraft linerboard representing the production of fifteen mills were evaluated at The Institute of Paper Chemistry. Shown below are the maximum and minimum current mill average for each test (the current mill

average is the average of the results obtained on all sample lots of linerboard submitted from a given mill during the current period); also shown for each test is the current F.K.I. average which is determined by averaging the current mill averages and is indicative of the test level being maintained by the industry as a whole to the degree that the industry is represented by the participating mills:

	Maximum Current Mill Av.	Minimum Current Mill Av.	Current F.K.I. Av.
Basis weight, lb.	43.9	42.2	43.5
Caliper, pt.	13.6	11.7	12.5
Bursting strength, p.s.i. gage	122	105	111
Machine direction Elmendorf Tear, g./sheet	375	277	330
Cross-machine direction Elmendorf tear, g./sheet	426	347	374

As mentioned previously, the study provides a procedure whereby the mills have the opportunity to compare their test results with those obtained on corresponding sample lots of linerboard at the Institute so that a convenient system of instrument verification is readily available to all participants. A summary of the agreement obtained in the comparisons of Institute and mill test results for the current period is shown below. The tabulated data show the number of mills (and the percentage of all mills which this number represents) whose average test results for the month of January fall within the designated percentages from the average test results obtained at the Institute on corresponding materials.

		Average Percentage Difference Between Institute and Mill Test Results									
		+0.5	+1	+2	+3	+4	+5	+7.5	+10	+13	
Basis weight											
Number of mills	5	14	15								
Percentage of all mills	33.3	93.3	100.0								
Caliper											
Number of mills	0	4	9	14	14	14	15				
Percentage of all mills	0.0	26.7	60.0	93.3	93.3	93.3	100.0				
Bursting strength											
Number of mills	1	5	8	11	12	12	14	15			
Percentage of all mills	6.7	33.3	53.3	73.3	80.0	80.0	93.3	100.0			
Tearing strength, in											
Number of mills	0	0	2	2	4	5	8	12	14		
Percentage of all mills	0.0	0.0	14.3	14.3	28.6	35.7	57.1	85.7	100.0		
Tearing strength, across											
Number of mills	2	5	5	9	10	10	10	13	14		
Percentage of all mills	14.3	35.7	35.7	64.3	71.4	71.4	71.4	92.9	100.0		

INTRODUCTION

The objective of the continuous baseline study on linerboard is twofold. One objective is to provide an indication of the quality of the 42-lb. fourdrinier kraft linerboard being produced by each of the participating mills and by the industry as a whole. Another objective is to provide a procedure whereby the mills have the opportunity to compare their test results with those obtained at the Institute on similar materials, thus providing a convenient system of instrument verification. The first objective mentioned above is implemented by the weekly sampling of the product of each machine manufacturing 42-lb. kraft linerboard and submitting these weekly samples to The Institute of Paper Chemistry where they are evaluated for basis weight, caliper, bursting strength, and Elmendorf tearing strength. The second objective of the continuous baseline study--namely, to provide a convenient system of instrument verification--is achieved by the testing of analogous samples by the mill and the Institute. The mill data are sent to the Institute, and a comparison of Institute and mill test results is included in the monthly reports. In addition to fulfilling the two prime objectives which have been described, the baseline study is accumulating an invaluable ever-growing reserve of background information essential for the intelligent evaluation of specifications of any kind.

The dual objectives of the continuous baseline study on linerboard have been described in the preceding paragraph. The remainder of the report presents the test results for the linerboard samples which were evaluated during the month of January. In line with the dual nature of

the study, the presentation is divided into two parts. Part I presents the results obtained at The Institute of Paper Chemistry, and Part II presents a comparison of results obtained at the Institute with those obtained at the mills. It should be noted that the same code letters are not used to identify the same participants in these reports from month to month. Each participant is privately advised of his own code. Attention is directed to the fact that the bursting strength results presented in these reports have been obtained, beginning in April, 1960, with the "new" diaphragm. By "new" diaphragm is meant the composition and style (fillet filled in) introduced by B. F. Perkins and Son, Inc. The same diaphragm distension characteristics, namely, 40-45 p.s.i. at 1.8 cm. distension, were used.

PART I: PRESENTATION AND DISCUSSION OF RESULTS OBTAINED AT
THE INSTITUTE OF PAPER CHEMISTRY

During the month of January, seventy-eight different sample lots were evaluated at The Institute of Paper Chemistry. A tabulation of the number of samples classified according to mill may be seen in Table I.

These sample lots were tested for basis weight, caliper, bursting strength, and Elmendorf tear. The average strength results for each mill may be seen in Table II and are graphically presented in Figures 1 to 5. In addition to a comparison of the current mill averages for the various tests, Table II also shows the current F.K.I. averages, the cumulative F.K.I. averages, and the F.K.I. indexes. The current F.K.I. average represents the average of the current mill averages, whereas the cumulative F.K.I. average represents the average of the current F.K.I. averages for the previous twelve months excluding the current period. Hence, in the case of the current report, the cumulative F.K.I. average covers the period from January 1, 1960, to December 31, 1960. The F.K.I. indexes are obtained as follows:

$$\frac{\text{current F.K.I. average}}{\text{cumulative F.K.I. average}} \times 100 = \text{F.K.I. index (\%)}$$

The F.K.I. index provides a ready means of comparing the current quality with previous results. For example, the current F.K.I. average basis weight is 43.5 lb., and the cumulative F.K.I. average basis weight is 43.6 lb. Hence, the F.K.I. index for basis weight determined in per cent as previously described is 99.8 and indicates that the current F.K.I. average basis weight is lower than the cumulative F.K.I. average.

TABLE I

NUMBER OF SAMPLE LOTS SUBMITTED BY EACH MILL

Mill Code	Number
A	4
B	3
C	4
D	8
E	5
F	1
G	8
H	8
I	0
J	6
K	0
L	0
M	6
N	12
O	3
P	6
Q	1
S	3
T	<u>0</u>
Total	78

TABLE II
SUMMARY OF COMPOSITE MILL AVERAGES--JANUARY 1 THROUGH JANUARY 31, 1961

MILL	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. gage	In Machine	Elmendorf Tear, g./sheet Cross Machine
A	43.3	12.7	108	347	361
B	43.2	13.0	111	317	383
C	43.8	12.3	110	369	426
D	43.2	12.5	111	312	360
E	43.6	11.7	116	357	386
F	43.8	13.1	108	306	361
G	43.6	12.7	114	327	354
H	43.6	12.5	105	363	400
I	No samples submitted.				
J	43.9	12.3	115	312	368
K	No samples submitted.				
L	No samples submitted.				
M	43.5	13.6	110	322	354
N	43.7	12.8	109	316	370
O	43.5	11.9	122	336	364
P	43.8	12.4	112	277	347
Q	42.2	12.0	108	315	371
S	43.6	12.4	107	375	399
T	No samples submitted.				
Current FKI Average:	43.5	12.5	111	330	374
Cumulative FYI Average:	43.6	12.7	110	331	374
FKI Index, %	99.8	98.4	100.9	99.7	100.0

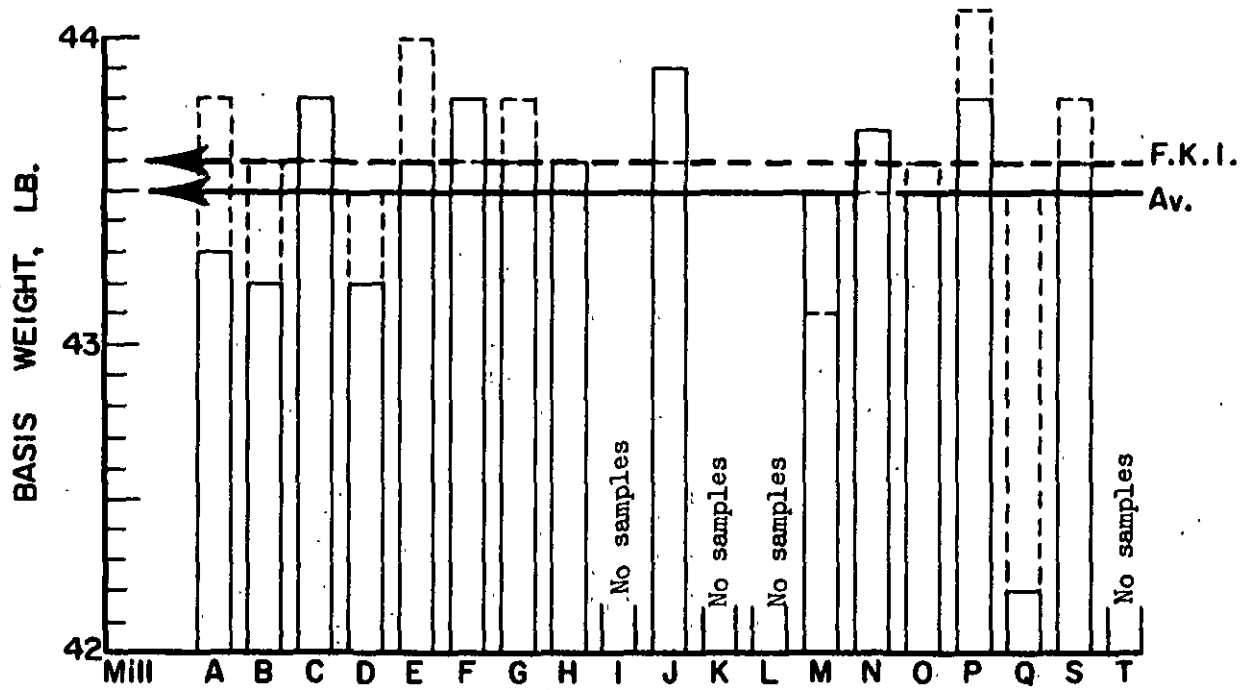


Figure 1. Comparison of Basis Weight Results for January, 1961

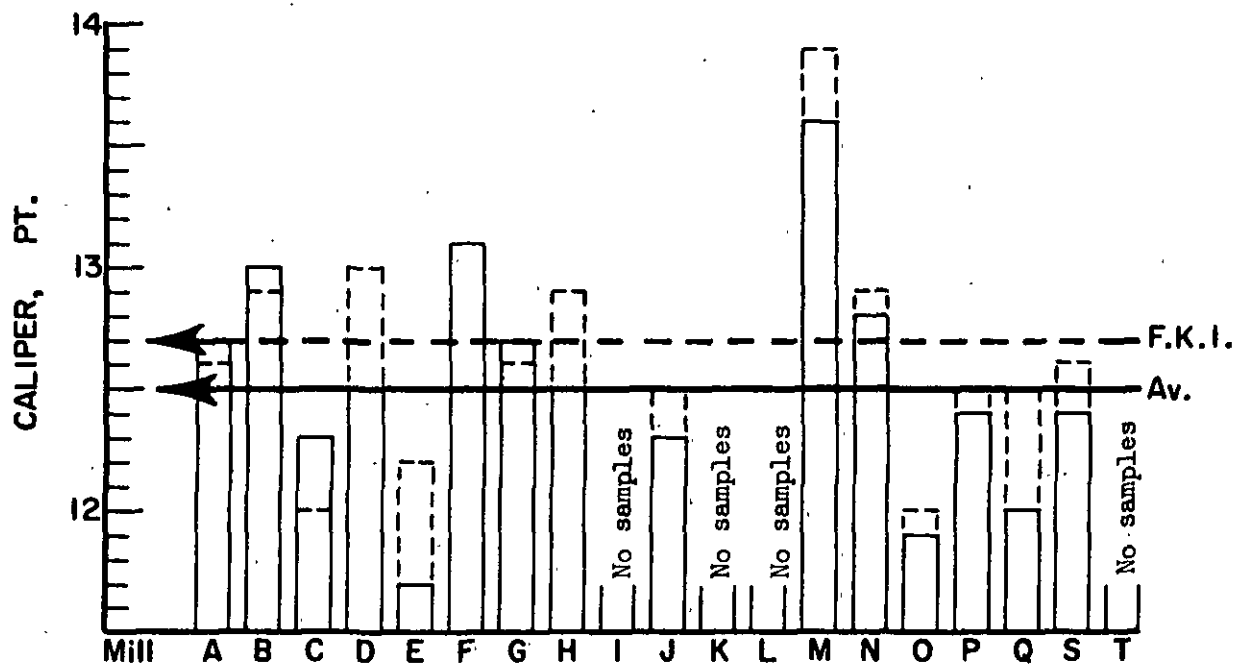


Figure 2. Comparison of Caliper Results for January, 1961

— Current mill average
 - - - Cumulative mill average

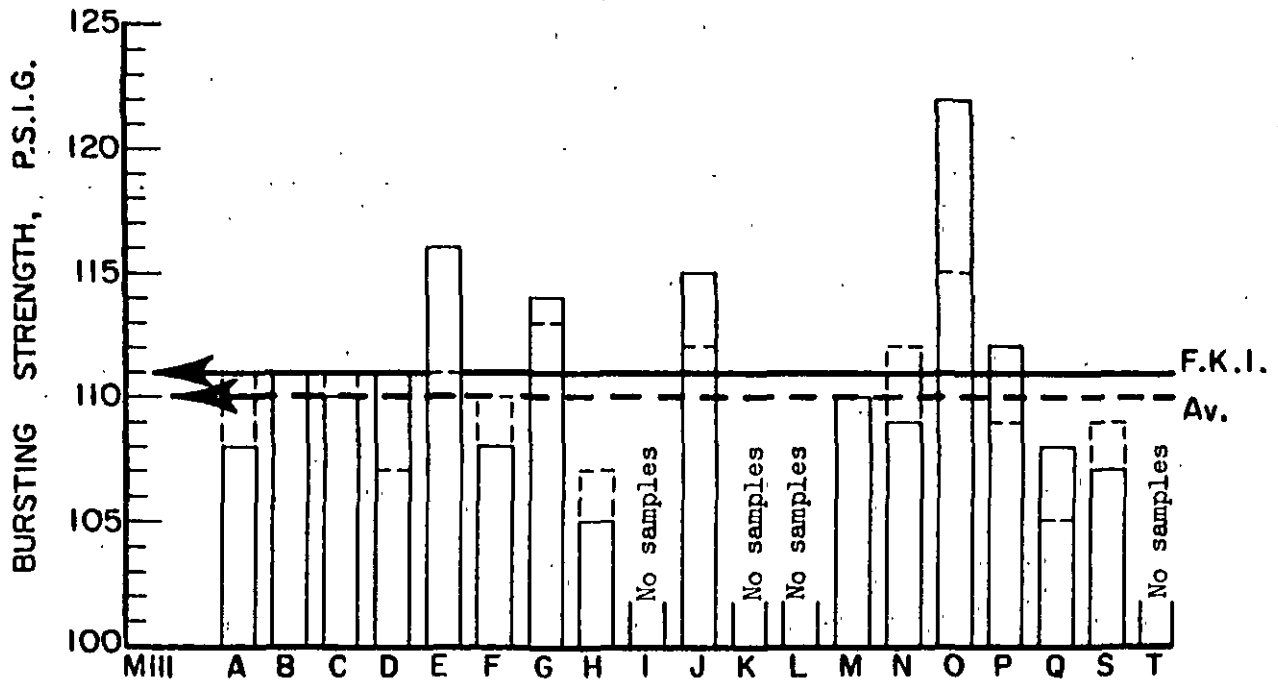


Figure 3. Comparison of Bursting Strength Results for January, 1961

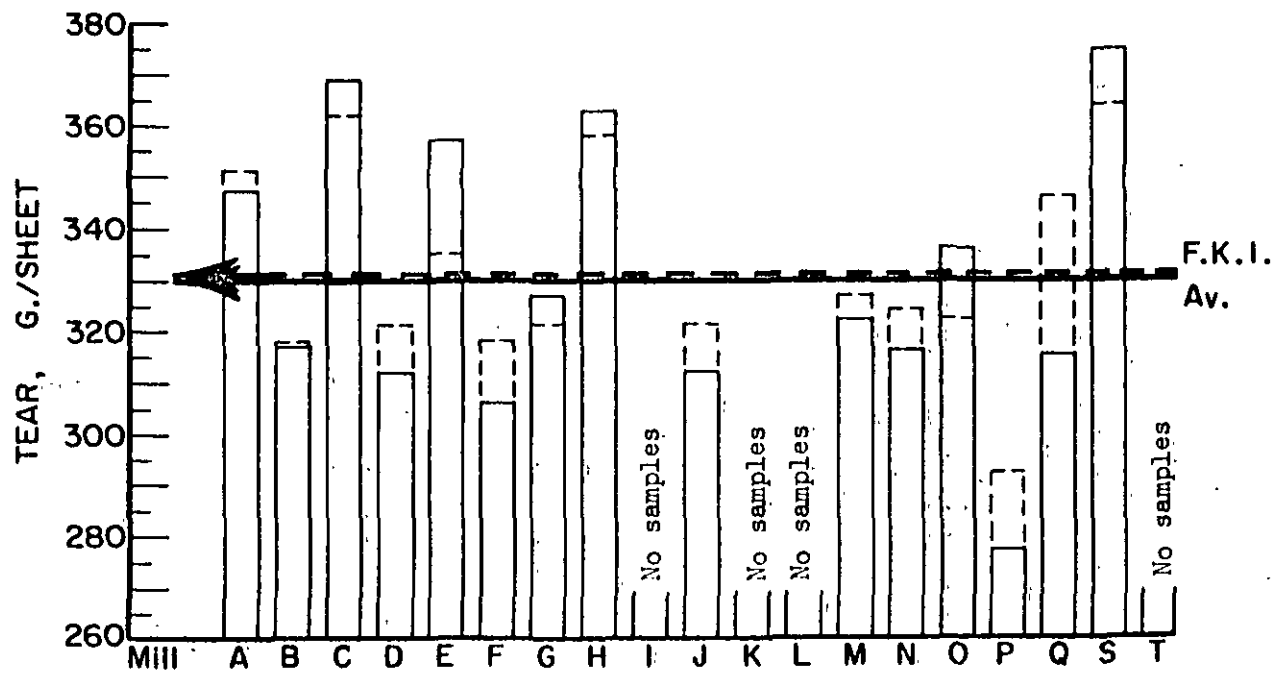


Figure 4. Comparison of Machine-Direction Tear Results for January, 1961

———— Current mill average
 - - - - Cumulative mill average

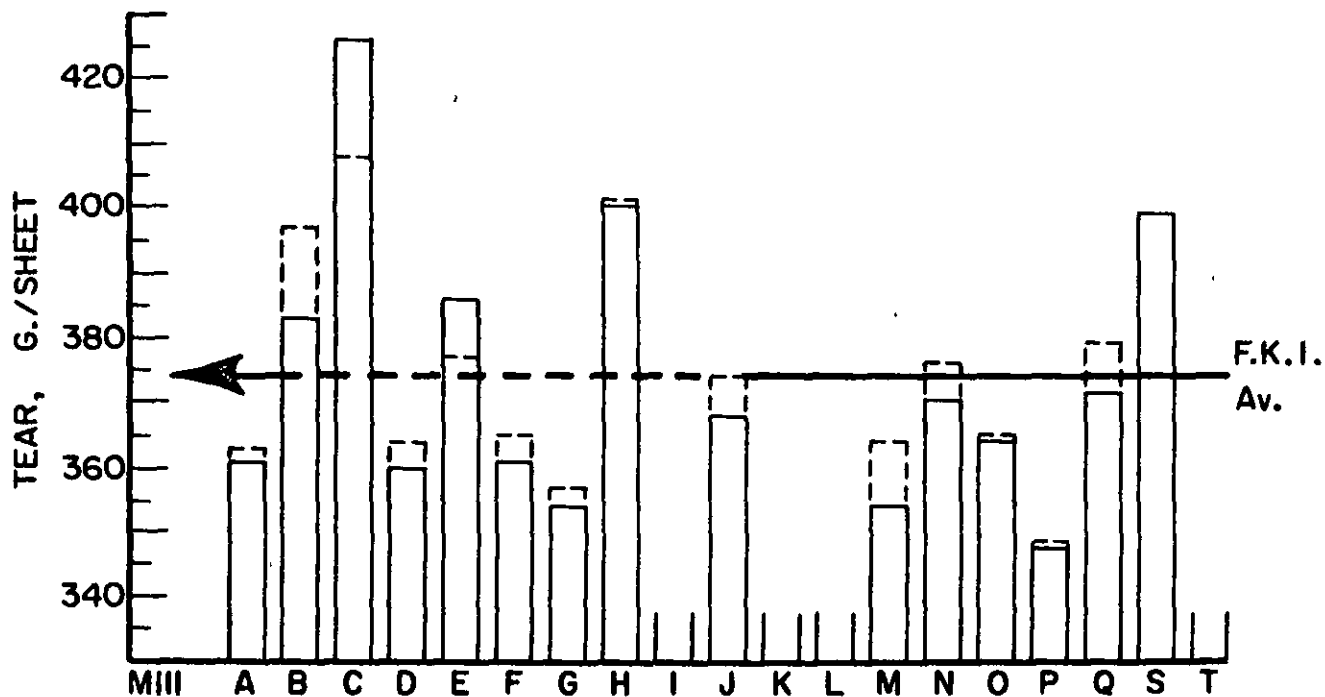


Figure 5. Comparison of Cross-Machine Direction Tear Results for January, 1961

———— Current machine average
----- Cumulative machine average

A comparison of the current mill averages in Table II and Figure 1 shows that the average basis weight results for all mills conform to the 42-lb. specification set forth in Rule 41. Mill J had the highest average basis weight of 43.9 lb., which was approximately 4.5% higher than the 42-lb. specification. The lowest average basis weight of 42.2 lb. was associated with Mill Q and was 0.5% higher than the 42-lb. specification. The amount by which the mills vary from the 42-lb. specification is shown in Table II-A. A comparison of the current F.K.I. basis weight average for this period with that for the previous period shows that basis weight has decreased slightly from 43.8 lb. to 43.5 lb.

A comparison of the average caliper values for the various mills (see Figure 2) shows that the current mill averages varied from a low of 11.7 points for Mill E to a high of 13.6 points for Mill M. The current F.K.I. caliper average was 12.5 points, which was slightly lower than the cumulative F.K.I. average of 12.7 points.

The average bursting strength values given in Table II for each mill are graphically presented in Figure 3. It may be observed in Table II and Figure 3 that the current mill averages for bursting strength ranged from a low of 105 for Mill H to a high of 122 for Mill O. The current F.K.I. bursting strength average was 111 p.s.i. gage, which was slightly higher than the cumulative F.K.I. average of 110 p.s.i. gage.

The Elmendorf tear results shown in Table II for the various mills are presented graphically in Figures 4 and 5. From these presentations it may be observed that Mill S had the highest machine direction

TABLE II-A
PERCENTAGE DEVIATION FROM 42-LB. BASIS WEIGHT
SPECIFICATION

Mill Code	Per Cent
A	+3.1
B	+2.9
C	+4.3
D	+2.9
E	+3.8
F	+4.3
G	+3.8
H	+3.8
I	--
J	+4.5
K	--
L	--
M	+3.6
N	+4.0
O	+3.6
P	+4.3
Q	+0.5
S	+3.8
T	--

tear average of 375 g./sheet, and Mill P had the lowest average of 277 g./sheet. It may be further noted that the highest cross-machine direction tear average of 426 g./sheet was associated with Mill C and that the lowest average of 347 g./sheet was associated with Mill P. It may be observed also in Table 4I and Figures 4 and 5 that the current F.K.I. average for machine direction Elmendorf tear was slightly lower than its cumulative F.K.I. average, whereas the current F.K.I. average for cross-machine direction Elmendorf tear was the same as its cumulative F.K.I. average.

A comparison of the F.K.I. indexes indicates that, for the current period, the current F.K.I. average for cross-machine direction Elmendorf tear is the same as its cumulative F.K.I. average, the current F.K.I. average for bursting strength is higher than its cumulative F.K.I. average, and the current F.K.I. averages for basis weight, caliper, and machine direction Elmendorf tear are lower than their respective cumulative F.K.I. averages.

In order to compare the variation within a given mill, the test results for the participating mills have been tabulated in Tables III to XXI alphabetically. In addition to the current and cumulative average, a mill factor and mill index are given for each mill. The current mill average represents the average test result obtained for all samples evaluated from a given mill during the current period. The cumulative mill average for each test, on the other hand, represents the average of the current mill averages for the previous twelve months excluding the current period. The mill factor and the mill index are obtained as follows:

$$\frac{\text{current mill average}}{\text{cumulative mill average}} \times 100 = \text{mill factor (\%)}$$

$$\frac{\text{current mill average}}{\text{cumulative F.K.I. average}} \times 100 = \text{mill index (\%)}$$

The mill factor and the mill index are a convenient means for comparing the current mill results either with the previous results for that particular mill or with the cumulative F.K.I. results. The reports also present a comparison of the test data obtained at the mills with test data obtained at The Institute of Paper Chemistry. These test data are presented and discussed on subsequent pages of this report.

It may be noted in Tables III through XXI that information is included about the sheet finish. A review of the tables for the mills which supplied this information indicates that some kind of water finish is being used by all.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961

TABLE III

MILL A -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. page		Elmendorf Tear, g./sheet								
					Max.	Av.	Max.	Av.	Max.	Av.	Max.	Min.	Av.	In	Across				
188384	W.F.	1/ 5/61	12/22/60	-	44.0	42.0	42.9	13.1	12.1	12.8	125	82	106	400	288	343 ^a	424	320	361 ^a
188385	W.F.	1/ 5/61	12/22/60	-	44.2	42.0	43.3	13.0	11.9	12.5	130	90	109	384	304	339 ^a	416	296	359 ^a
188567	W.F.	1/23/61	1/ 9/61	-	44.8	43.0	43.8	13.2	12.2	12.8	128	85	107	400	320	357 ^a	416	320	367 ^a
188568	W.F.	1/23/61	1/ 9/61	-	44.2	42.8	43.3	13.2	12.2	12.8	127	95	110	368	320	347 ^a	384	320	353 ^a
Current Mill Average:							43.3			12.7	108				347				
Cumulative Mill Average:							43.8			12.6	111				351				
Mill Factor, %							98.9			100.8	97.3				98.9				
Mill Index, %							99.3			100.0	98.2				104.8				

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE IV

MILL B -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Caliper, points			Bursting Strength, P.s.i. gage			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188575	WF1S	1/24/61	1/10/61	1	44.0	42.0	43.3	13.5	12.5	13.1	126	87	110	352	288	319	448	344	391 ^a
188576	WF1S	1/24/61	1/17/61	1	44.0	43.0	43.4	13.5	12.4	12.9	133	94	112	384	288	321	408	352	384 ^a
188601	WF1S	1/27/61	1/19/61	1	43.8	42.2	43.0	13.1	12.2	12.9	142	87	113	360	272	310 ^a	424	344	373 ^a
Current Mill Average:					43.2		13.0		111		317		383						
Cumulative Mill Average:					43.6		12.9		111		318		397						
Mill Factor, %					99.1		100.8		100.0		99.7		96.5						
Mill Index, %					99.1		102.4		100.9		95.8		102.4						

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE V
MILL C -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, P.S.I. Gauge		Elmendorf Tear, g./sheet								
					Max.	Av.	Max.	Av.	Max.	Av.	In	Across	Max.	Min.	Av.				
188543	W.B.	1/20/61	12/23/60	-	45.0	43.6	44.3	13.0	12.0	12.5	140	90	112	392	320	364	472	408	439 ^a
188544	W.B.	1/20/61	12/29/60	-	43.8	42.0	42.9	12.2	11.2	11.8	130	95	111	400	296	339 ^a	440	384	411 ^a
188545	W.B.	1/20/61	1/ 1/61	-	44.0	42.4	43.6	13.1	11.8	12.5	119	92	106	464	328	385 ^a	480	368	427 ^a
188546	W.B.	1/20/61	1/ 3/61	-	44.8	43.4	44.2	13.1	12.1	12.6	137	89	112	432	328	389 ^a	464	392	428 ^a
Current Mill Average:							43.8			12.3			110			369			426
Cumulative Mill Average:							43.6			12.0			111			362			408
Mill Factor, %							100.5			102.5			99.1			101.9			104.4
Mill Index, %							100.5			96.9			100.0			111.5			113.9

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE VI
MILL D -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Caliper, Points			Bursting Strength, P.s.i. gage			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188399	W.F.	1/10/61	12/21/60	1	45.0	43.0	43.9	13.0	12.1	12.5	133	88	110	376	272	327 ^a	432	336	389 ^a
188400	W.F.	1/10/61	12/7/60	1	43.8	42.2	43.2	12.7	11.8	12.1	128	98	112	384	256	315 ^a	432	328	372 ^a
188401	W.F.	1/10/61	12/22/60	1	44.2	42.0	43.2	13.1	12.0	12.4	128	87	107	392	272	334	408	344	374 ^a
188402	W.F.	1/10/61	12/23/60	1	44.2	42.0	43.5	12.9	12.0	12.5	124	95	108	368	280	331	400	320	357 ^a
188596	W.F.	1/27/61	1/8/61	1	45.4	41.6	43.5	13.1	12.0	12.7	127	93	112	360	232	314	400	312	361 ^a
188597	W.F.	1/27/61	1/11/61	1	44.0	42.0	42.8	13.1	12.1	12.7	124	89	107	336	256	291 ^a	376	312	334 ^a
188598	W.F.	1/27/61	1/12/61	1	43.2	41.8	42.3	13.2	12.0	12.6	128	86	108	336	232	274 ^a	352	304	325 ^a
188599	W.F.	1/27/61	1/14/61	1	44.4	42.6	43.6	12.9	12.0	12.4	139	99	120	344	272	310	448	328	372 ^a
Current Mill Average:					43.2			12.5			111			312			360		
Cumulative Mill Average:					43.5			13.0			107			321			364		
Mill Factor, %					99.3			96.2			103.7			97.2			98.9		
Mill Index, %					99.1			98.4			100.9			94.3			96.3		

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE VII
MILL E -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet								
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
188396	W.F.	1/ 9/61	12/18/60	3	44.8	43.8	44.1	12.7	11.5	12.1	135	91	114	408	304	357 ^a	448	352	400 ^a
188397	W.F.	1/ 9/61	12/19/60	3	44.6	42.4	43.8	12.3	11.4	12.0	130	92	113	392	264	333	440	352	385 ^a
188443	W.F.	1/13/61	12/30/60	3	43.6	42.0	42.8	11.9	11.0	11.4	132	93	115	424	320	355	424	328	367 ^a
188444	W.F.	1/13/61	12/31/60	3	44.0	43.6	43.8	12.0	11.2	11.6	139	101	121	416	320	373	440	352	387 ^a
188600	W.F.	1/27/61	1/ 6/61	3	44.0	43.0	43.7	11.8	11.3	11.6	130	95	116	432	328	368	456	352	393 ^a
Current Mill Average:							43.6			11.7			116			357			386
Cumulative Mill Average:							44.0			12.2			111			335			377
Mill Factor, %							99.1			95.9			104.5			106.6			102.4
Mill Index, %							100.0			92.1			105.5			107.9			103.2

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA --JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE VIII

MILL F -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Caliper, points			Bursting Strength, p.s.i. gage			Elmendorf Tear, g./sheet					
					Max.	Av.	Min.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188355	F1S	1/3/61	12/17/60	2	44.0	43.0	43.8	13.5	12.5	13.1	122	82	108	336	288	306	400	320	361 ^a
Current Mill Average:					43.8			13.1			108			306					361
Cumulative Mill Average:					43.6			13.1			110			318					365
Mill Factor, %					100.5			100.0			98.2			96.2					96.9
Mill Factor, %					100.5			103.1			98.2			92.4					96.5

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE IX

MILL G -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Caliper, points			Bursting Strength, P.S.I. Edge			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188393	W.F.	1/ 9/61	1/ 4/61	-	44.2	43.6	43.9	13.1	12.2	12.8	131	99	115	400	288	342 ^a	400	312	356 ^a
188394	W.F.	1/ 9/61	1/ 5/61	-	44.0	43.0	43.8	13.0	12.5	12.9	132	96	115	392	304	349 ^a	392	320	363 ^a
188395	W.F.	1/ 9/61	1/ 6/61	-	44.0	42.8	43.4	13.0	11.6	12.4	125	85	106	368	280	329 ^a	424	336	379 ^a
188470	J.F.	1/16/61	1/11/61	-	44.2	43.8	43.9	13.5	12.9	13.3	133	94	110	368	264	328 ^a	432	296	346 ^a
188471	W.F.	1/16/61	1/12/61	-	44.2	43.6	44.0	13.2	12.6	13.0	133	98	116	320	288	309	408	328	356 ^a
188472	W.F.	1/16/61	1/13/61	-	43.6	42.0	42.6	12.8	12.0	12.2	135	105	119	352	288	316	360	272	333 ^a
188561	W.F.	1/23/61	1/19/61	-	43.8	43.0	43.3	12.4	11.4	12.0	132	109	120	336	272	309 ^a	368	336	344 ^a
188562	W.F.	1/23/61	1/20/61	-	44.2	43.6	44.0	13.2	12.4	12.8	132	93	110	368	280	336 ^a	384	320	354 ^a
Current Mill Average.						43.6		12.7		12.7		114				327		354	
Cumulative Mill Average.						43.8		12.6		12.6		113				321		357	
Mill Factor, %						99.5		100.8		100.8		100.9				101.9		99.2	
Mill Index, %						100.0		100.0		100.6		103.6				98.8		94.7	

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE X

MILL H -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, P.S.I. gage		In		Across					
					Max.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.			
188434	WFIS	1/11/61	1/4/61	2	47.0	44.0	14.0	12.8	13.2	131	88	110	400	304	349	400	352	375 ^a
188435	WFIS	1/11/61	1/4/61	1	44.2	42.2	13.0	11.9	12.5	127	88	103	504	320	402 ^a	448	352	402 ^a
188436	WFIS	1/11/61	1/5/61	1	44.4	42.0	13.0	12.0	12.6	123	84	103	408	328	365	464	368	413 ^a
188437	WFIS	1/11/61	1/5/61	2	45.6	43.8	12.9	12.0	12.5	120	82	101	496	344	402 ^a	440	360	405 ^a
188479	WFIS	1/16/61	1/6/61	2	45.6	42.2	13.4	12.3	12.8	120	78	105	432	328	367	464	376	419 ^a
188493	WFIS	1/17/61	1/9/61	2	44.6	42.8	13.5	12.1	12.7	125	75	102	432	272	351 ^a	464	376	416 ^a
188565	WFIS	1/23/61	1/13/61	1	44.2	42.2	12.3	11.3	12.0	125	95	109	384	296	334	424	336	380 ^a
188566	WFIS	1/23/61	1/16/61	1	42.6	41.4	12.2	11.2	11.7	122	86	110	368	288	335	416	352	387 ^a
Current Mill Average.					43.6		12.5		105		363		400					
Cumulative Mill Average:					43.6		12.9		107		358		401					
Mill Factor, %					100.0		96.9		98.1		101.4		99.8					
Mill Index, %					100.0		98.4		95.5		109.7		107.0					

TABLE XI

MILL I -- 42-LB. LINERBOARD

No samples submitted.

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XII
MILL J -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Calliper, points			Bursting Strength, p.s.i. base			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188473	W.F.	1/16/61	1/10/61	2	44.2	43.6	43.9	12.5	11.5	12.2	128	100	113	352	272	313	392	352	373 ^a
188474	W.F.	1/16/61	1/10/61	2	44.4	43.2	43.9	12.9	11.4	12.1	141	94	111	352	224	307 ^a	400	320	358 ^a
188475	W.F.	1/16/61	1/11/61	2	44.4	43.2	43.9	12.8	12.0	12.2	139	91	115	344	272	310 ^a	400	328	365 ^a
188476	W.F.	1/16/61	1/11/61	2	45.0	44.0	44.4	12.9	12.0	12.5	143	100	118	392	272	321 ^a	496	352	400 ^a
188477	W.F.	1/16/61	1/12/61	2	43.8	42.4	43.1	12.5	12.0	12.2	127	89	109	352	256	313	408	328	352 ^a
188478	W.F.	1/16/61	1/12/61	2	44.4	44.0	44.2	12.8	12.0	12.5	139	109	122	368	256	307	392	336	362 ^a
Current Mill Average.					43.9			12.3			115			312			368		
Cumulative Mill Average.					43.6			12.5			112			321			374		
Mill Factor, %					100.7			98.4			102.7			97.2			98.4		
Mill Index, %					100.7			96.9			104.5			94.3			98.4		

TABLE XIII
MILL K -- 42-LB. LINERBOARD

No samples submitted.

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XIV

MILL L -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, Points		Bursting Strength, P.S.I. Gage		Elmendorf Tear, g./sheet	
					Max.	Av.	Max.	Av.	Max.	Min.	Max.	Min.

No samples submitted.

TABLE XV

MILL M -- 42-LB. LINERBOARD

188538	WFLS	1/18/61	1/3/61	2	43.6	42.4	43.1	13.9	13.0	13.3	127	76	105	344	280	312 ^a	376	304	342 ^a
188539	WFLS	1/18/61	1/4/61	2	43.6	41.2	42.4	13.5	12.6	13.1	122	91	108	336	272	310	368	328	349 ^a
188583	WFLS	1/26/61	1/12/61	2	43.8	42.6	43.4	14.0	13.2	13.6	125	86	114	344	272	309 ^a	392	344	357 ^a
188584	WFLS	1/26/61	1/13/61	2	44.0	42.4	43.4	13.9	12.6	13.3	125	92	109	352	296	325	400	328	364 ^a
188585	WFLS	1/26/61	1/19/61	2	45.2	43.2	44.4	14.6	13.5	14.2	138	92	111	416	296	347 ^a	400	312	359 ^a
188586	WFLS	1/26/61	1/20/61	2	45.2	43.0	44.2	14.8	13.0	13.9	130	96	114	368	280	328 ^a	400	328	355 ^a
Current Mill Average:							43.5		13.6							322			354
Cumulative Mill Average:							43.1		13.9							327			364
Mill Factor, %							100.9		97.8							98.5			97.3
Mill Index, %							99.8		107.1							97.3			94.7

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XVI
MILL N -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Calliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet													
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
188346	----	12/28/60	11/6/60	1	44.4	42.2	43.8	13.2	12.0	12.8	146	83	114	352	296	318 ^a	440	328	379 ^a					
188347	----	12/28/60	11/6/60	1	44.8	42.0	43.2	14.1	12.8	13.3	123	84	103	336	272	307 ^a	408	296	353 ^a					
188348	----	12/28/60	11/23/60	1	44.0	42.2	43.1	13.2	12.2	12.9	128	72	104	360	248	315	408	344	373 ^a					
188349	----	12/28/60	11/16/60	1	46.0	44.0	44.5	13.5	12.1	12.8	125	96	110	352	272	310 ^a	400	320	369 ^a					
188350	----	12/28/60	11/17/60	1	45.0	43.6	44.2	14.1	12.5	13.3	123	83	106	352	280	315 ^a	432	328	381 ^a					
188351	----	12/28/60	11/26/60	1	44.2	42.2	43.6	13.8	11.5	12.8	127	79	104	368	272	309 ^a	384	320	352 ^a					
188398	----	1/9/61	11/13/60	1	43.8	42.2	43.1	13.7	12.1	12.9	132	86	106	400	224	328 ^a	400	328	371 ^a					
188347	----	1/20/61	12/5/60	1	44.6	43.6	44.0	12.8	11.6	12.1	152	81	117	320	248	297 ^a	424	320	369 ^a					
188348	----	1/20/61	12/11/60	1	43.8	42.0	43.2	13.0	12.0	12.5	123	89	106	408	264	321	384	320	366 ^a					
188349	----	1/20/61	12/15/60	1	44.0	42.4	43.2	13.3	11.8	12.6	138	89	115	376	272	326 ^a	416	336	375 ^a					
188350	----	1/20/61	12/16/60	1	44.4	42.8	43.7	13.7	11.9	12.9	128	81	109	384	240	319	416	328	373 ^a					
188351	----	1/20/61	12/16/60	1	45.4	44.0	44.7	13.3	12.0	12.8	143	75	111	376	280	323 ^a	416	328	378 ^a					
Current Mill Average.							43.7			12.8	109				316			370						
Cumulative Mill Average.							43.5			12.9	112				324			376						
Mill Factor, %							100.5			99.2	97.3				97.5			98.4						
Mill Index, %							100.2			100.8	99.1				95.5			98.9						

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XVII

MILL 0 -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Calliper, points			Bursting Strength, P.S.I. Gage			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188537	W.F.	1/18/61	1/1/61	2	43.6	42.8	43.3	12.1	11.0	11.5	138	93	121	440	312	357	400	320	355 ^a
188594	W.F.	1/26/61	1/16/61	2	44.2	43.0	43.6	12.5	11.8	12.1	142	109	122	352	304	326 ^a	400	328	363 ^a
188595	W.F.	1/26/61	1/16/61	2	44.2	42.8	43.5	12.8	11.8	12.0	143	106	122	336	296	323	408	328	375 ^a
Current Mill Average							43.5			11.9		122			336				364
Cumulative Mill Average							43.6			12.0		115			322				365
Mill Factor, %							99.8			99.2		106.1			104.3				99.7
Mill Index, %							99.8			93.7		110.9			101.5				97.3

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XVIII
MILL P -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.			Caliper, points			Bursting Strength, P.S.I. Page			Elmendorf Tear, g./sheet					
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.
188353	W.F.	1/3/61	12/12/60	1	45.6	43.8	44.3	13.5	12.0	12.5	134	85	105	360	240	320 ^a	432	304	373 ^a
188442	W.F.	1/13/61	12/19/60	1	45.6	42.0	43.7	13.1	11.9	12.5	127	95	111	272	224	248	368	312	336 ^a
188480	W.F.	1/16/61	12/28/60	1	45.0	42.8	43.8	12.9	11.9	12.4	128	91	113	320	216	270 ^a	360	320	337 ^a
188563	W.F.	1/23/61	1/2/61	1	44.4	41.8	43.5	13.0	11.9	12.4	142	88	112	320	240	272	384	320	351 ^a
188564	W.F.	1/23/61	1/5/61	1	45.0	41.8	43.7	12.8	11.8	12.3	138	86	112	328	240	282 ^a	360	320	341 ^a
188574	W.F.	1/24/61	1/10/61	1	45.0	42.0	43.8	12.9	12.0	12.4	131	95	116	328	224	268 ^a	376	304	343 ^a
Current Mill Average:					43.8			12.4			112			277			347		
Cumulative Mill Average:					44.1			12.5			109			292			348		
Mill Factor, %					99.3			99.2			102.8			94.9			99.7		
Mill Index, %					100.5			97.6			101.8			83.7			92.8		

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XIX

MILL Q -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet								
					Max.	Av.	Max.	Av.	Max.	Min.	Av.	Max.	Min.	Av.					
168354	S.F.	1/3/61	12/22/60	7	43.2	41.8	42.2	12.5	11.2	12.0	128	92	108	368	272	315	432	336	371 ^a
Current Mill Average:							42.2			12.0			108			315			371
Cumulative Mill Average:							43.5			12.5			105			346			379
Mill Factor, %							97.0			96.0			102.9			91.0			97.9
Mill Index, %							96.8			94.5			98.2			95.2			99.2

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

SUMMARY OF INSTITUTE DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XX
MILL S -- 42-LB. LINERBOARD

File No.	Finish	Date Recd.	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, P.S.I. gage		Elmendorf Tear, g./sheet		Across				
					Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
188580	W.F.	1/25/61	1/12/61	-	44.2	43.6	13.2	12.0	12.7	87	108	448	304	376 ^a	448	360	396 ^a
188581	W.F.	1/25/61	1/12/61	-	44.0	42.4	12.8	11.7	12.3	126	81	416	344	377 ^a	432	368	392 ^a
188582	W.F.	1/25/61	1/13/61	-	44.4	42.4	13.0	11.2	12.1	131	82	432	320	371 ^a	496	368	409 ^a
Current Mill Average:						43.6		12.4		107		375		399		399	
Cumulative Mill Average:						43.8		12.6		109		364		399		399	
Mill Factor, %						99.5		98.4		98.2		103.0		100.0		100.0	
Mill Index, %						100.0		97.6		97.3		113.3		106.7		106.7	

TABLE XXI
MILL T -- 42-LB. LINERBOARD

No samples submitted.

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

PART II: COMPARISON OF RESULTS OBTAINED AT THE INSTITUTE OF
PAPER CHEMISTRY WITH THOSE OBTAINED AT THE MILLS

As a supplementary part of the Continuous Baseline Study, comparisons of the mill test results with those obtained at The Institute of Paper Chemistry on corresponding samples have been included in this report. Mill test conditions are shown in Table XXII, where it may be noted that the atmospheric conditions used prior to and during the testing period were relatively uniform for the mills which reported this information. However, the preconditioning and conditioning time periods varied considerably.

A summary of the Institute and mill test results for the current period is shown in Table XXIII, and a comparison of percentage differences between Institute and mill test results is given in Table XXIV for the current period and the two previous periods.

A comparison of the test data in Tables XXIII and XXIV reveals the level of agreement between mill and Institute data for basis weight, caliper, bursting strength, and Elmendorf tear. In Table XXIII the over-all average difference between Institute and mill results is shown for each of these tests based on the current mill averages--i.e., based on the data for all sample lots submitted by each mill for the current period. In addition, the maximum difference encountered in comparing the Institute and mill test results for a given sample lot is shown. In Table XXIV, the over-all average differences shown for each test in Table XXIII have been calculated on a percentage basis for each mill. In addition, for purposes of comparison, the average percentage differences for the preceding two periods are shown.

TABLE XXII
 PRECONDITIONING AND CONDITIONING DATA FOR MILL TESTS

Mill Code	Preconditioning		Conditioning		Time, hr.
	Relative Humidity, %	Temperature, °F.	Relative Humidity, %	Temperature, °F.	
A		None	50	73	24
B	55-56	70-71	56	72	--
C		None	45	71	48
D	50	73	50	73	24
E		None	50	73	24
F	50	72	50	72	120
G	33-34	77	48-52	71-72	16
H		None	50	73	24
I					
J	50	73	No samples submitted.	73	24
K			No samples submitted.		
L			No samples submitted.		
M	50	72		None	3
N	50	73	50	73	24
O		None	50	73	24-48
P	36-76	72-77	50	73	
Q	50	73		None	--
S	50	72-73	50	73	
T			No samples submitted.		

TABLE XXIII
SUMMARY OF TEST RESULT COMPARISONS (Average Mill and Institute Results)

Mills*	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	S	T
No. of Samples Compared	4	3	4	8	5	1	8	8	0	6	0	0	6	12	3	6	1	3	0
Institute	43.3	43.2	43.8	43.2	43.6	43.8	43.6	43.6	43.9	43.9	43.5	43.7	43.5	43.7	43.5	43.8	42.2	43.6	
Mill	43.1	42.7	43.2	43.2	43.6	43.2	43.2	43.0	43.4	43.4	43.1	43.5	43.2	43.5	43.3	43.2	41.9	42.6	
Av. Diff.**	-0.2	-0.5	-0.6	0.0	0.0	-0.6	-0.4	-0.6	-0.5	-0.5	-0.4	-0.2	-0.6	-0.2	-0.2	-0.6	-0.3	-1.0	
Max. Diff.***	-0.6	-0.6	-0.7	-0.5	+0.5	-0.6	-0.9	-1.1	-0.6	-0.6	-0.9	-0.7	-0.5	-0.7	-0.5	-1.1	-0.3	-1.2	
Institute	12.7	13.0	12.3	12.5	11.7	13.1	12.7	12.5	12.3	12.3	13.6	12.8	11.9	12.4	12.4	12.0	12.0	12.4	
Mill	12.6	12.7	11.9	12.4	11.3	13.0	12.4	11.8	12.0	12.0	13.3	12.4	11.8	12.0	11.8	12.0	11.6	12.1	
Av. Diff.**	-0.1	-0.3	-0.4	-0.1	-0.4	-0.1	-0.3	-0.7	-0.3	-0.3	-0.3	-0.4	-0.1	-0.4	-0.1	-0.4	-0.4	-0.3	
Max. Diff.***	-0.2	-0.5	-0.5	-0.2	-0.6	-0.1	-0.4	-1.0	-0.5	-0.5	-0.4	-0.6	-0.1	-0.6	-0.1	-0.6	-0.4	-0.6	
Institute	108	111	110	111	116	108	114	105	115	115	110	109	122	112	122	112	108	107	
Mill	106	108	111	113	114	109	115	109	111	111	107	116	114	112	114	112	117	106	
Av. Diff.**	-2	-3	+1	+2	-2	+1	+1	+4	-4	-4	-3	+7	-8	0	-8	0	+9	-1	
Max. Diff.***	-6	-6	+3	+6	-2	+1	+13	+9	-9	-9	-10	+10	-9	-7	-9	-7	+9	-2	
Institute	347	317	369	312	357	306	327	363	312	312	322	316	336	277	336	277	315	375	
Mill	315	322	337	331	344	294	289	--	279	279	302	288	360	272	360	272	282	358	
Av. Diff.**	-32	+5	-32	+19	-13	-12	-38	--	-33	-33	-20	-28	+24	-5	+24	-5	-33	-17	
Max. Diff.***	-36	+10	-36	+34	-28	-12	-75	--	-54	-54	-39	-43	+34	-31	+34	-31	-33	-42	
Institute	361	383	426	360	386	361	354	400	368	368	354	370	364	347	364	347	371	399	
Mill	376	380	359	392	391	360	342	--	357	357	365	375	396	358	396	358	324	398	
Av. Diff.**	+15	-3	-37	+32	+5	-1	-12	--	-11	-11	+11	+5	+32	+11	+32	+11	-47	-1	
Max. Diff.***	+29	-8	-64	+44	+19	-1	-32	--	-44	-44	+41	+19	+36	-26	+36	-26	-47	+20	

* Comparison based on averages involved only those samples on which mill test data were submitted.
 ** Average difference is the difference between the Institute mill average and the mill average based on mill test data.
 *** Maximum difference encountered in comparing the Institute average and the mill averages for any sample submitted by that particular mill.

TABLE XXIV
COMPARISON OF INSTITUTE-MILL DIFFERENCES BY PERIODS
Average Difference, Per cent

Mill	Period	Basis Weight	Calli-per	Bursting Strength	Tear, in	Tear, across	Mill	Period	Basis Weight	Calli-per	Bursting Strength	Tear, in	Tear, across	
A	Current	-0.5	-0.8	-2	-9	+4	K	Current	--	--	--	--	--	
	165th	-0.5	-0.8	-2	-3	+0.5		165th	--	--	--	--	--	--
	164th	-0.9	+0.8	-4	-5	-3		164th	--	--	--	--	--	--
B	Current	-1	-2	-3	+2	-0.8	L	Current	-2	-2	-2	-9	+3	
	165th	-2	-2	-4	-1	-3		165th	-2	-2	-2	-13	+2	
	164th	-0.9	0	-3	+7	+4		164th	-2	-2	0	-6	+3	
C	Current	-1	-3	+0.9	-9	-9	M	Current	-0.9	-2	-3	-6	+3	
	165th	-1	-3	+3	-10	-2		165th	-0.9	-2	-2	-13	-3	
	164th	-1	-3	+2	-8	-1		164th	-0.2	-1	-2	-2	+3	
D	Current	0	-0.8	+2	+6	+9	N	Current	-0.5	-3	+6	-9	+1	
	165th	-0.7	+2	+0.9	+4	+8		165th	0	-3	+6	-8	0	
	164th	-1	+0.8	+2	+4	+11		164th	-2	-4	+10	-10	-0.6	
E	Current	0	-3	-2	-4	+1	O	Current	-0.5	-0.8	-7	+7	+9	
	165th	-2	-2	-2	+1	+5		165th	-2	-2	-2	-4	-5	
	164th	--	--	--	--	--		164th	-3	-2	-0.9	-0.6	+1	
F	Current	-1	-0.8	+0.9	-4	-0.3	P	Current	-1	-3	0	-2	+3	
	165th	-2	+2	-2	-10	+4		165th	-2	-2	+3	+1	0	
	164th	-2	+2	-0.9	-7	+4		164th	-2	-2	+5	-3	+4	
G	Current	-0.9	-2	+0.9	-12	-3	Q	Current	-0.7	-3	+8	-10	-13	
	165th	-0.9	-4	+2	-13	-8		165th	-0.9	-2	+6	-7	-7	
	164th	-2	-2	0	-12	-6		164th	-0.7	-2	+11	-8	-4	
H	Current	-1	-6	+4	--	--	S	Current	-2	-2	-0.9	-5	-0.3	
	165th	-2	-7	+4	--	--		165th	-2	-3	+2	+0.3	-1	
	164th	-2	-6	+3	--	--		164th	-2	-2	+3	-0.5	-0.5	
I	Current	--	-4	+3	-2	-0.3	T	Current	--	--	--	--	--	
	165th	-2	-4	+3	-2	+2		165th	--	--	--	--	--	
	164th	-2	-2	+3	+3	+2		164th	--	--	--	--	--	
J	Current	-1	-2	-3	-11	-3		Current	--	--	--	--	--	
	165th	-2	-2	+0.9	+0.6	+4		165th	--	--	--	--	--	
	164th	-1	+0.8	0	-6	-4		164th	--	--	--	--	--	

It may be noted in Table XXIV that for the current period the largest average percentage difference between the average basis weight results of the Institute and those of a given mill on corresponding samples was two per cent. By comparison, the largest average percentage difference noted for the previous two periods was three per cent. Further, it may be noted that the average basis weight results for Mills D and E were the same as those for the Institute, whereas the average basis weight results for the other mills were lower than the corresponding results for the Institute. In general, agreement between Institute and mill basis weight results was good.

The maximum variation in caliper for the current period was six per cent. This was lower than the maximum variation of seven per cent for the previous two periods. Compared with the Institute's results, the average test results for all mills were lower. Agreement was very good for the majority of comparisons of Institute and mill caliper results. Only the variation for Mill H appeared to be excessive.

It may be noted in Table XXIV that the bursting strength results exhibited a maximum variation of eight per cent for the current period. The maximum variation for the two preceding periods was eleven per cent. The average bursting strength results for Mills C, D, F, G, H, N, and Q were higher than those for the Institute, the average result for Mill P was the same as that for the Institute, and the average results for the other mills were lower. Agreement between Institute and mill results was very good with the exception of the variations noted for Mills N, O and Q.

It may be seen in Tables XXIII and XXIV that the average machine direction tear results for Mills B, D, and O were higher than those for the Institute, and the average results for the other mills were lower. The maximum variation for the current period was twelve per cent which was slightly lower than the maximum variation of thirteen per cent associated with the two preceding periods. Agreement between the Institute and mill results was generally good. However, the variations for Mills G, J, and Q appeared to be excessive.

With regard to the cross-machine direction tear results, it may be noted that the average results for Mills A, D, E, M, N, O, and P were higher than those for the Institute, and the average results for the other mills were lower. The maximum variation for the current period was thirteen per cent, which was higher than the maximum variation of eleven per cent for the two preceding periods. As in the case of the machine direction results, agreement between Institute and mill results was generally good with the exception of the variation for Mill Q which appeared to be excessive.

The comparisons of Institute and mill data for individual sample lots are given alphabetically in Tables XXV to XLIII for the various mills. In all the comparisons given in Tables XXV to XLIII, the Institute's test values have been used as the reference line.

The reader's attention is directed to page 3 of this report where the comparison of Institute and mill test data is summarized to show the number of mills (and the percentage of all mills which this number represents) whose average test results for the month of January fall within designated percentages from the average test results obtained at the Institute.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961

TABLE XXV

MILL A -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet				
				IPC	Mill Diff.	IPC	Mill Diff.	IPC	Mill Diff.	In	Across	IPC	Mill Diff.	
183384	W.F.	12/22/60	-	42.9	43.2 +0.3	12.8	12.7 -0.1	106	106 0	343 ^a	313	364 ^a	389	+25
183385	W.F.	12/22/60	-	43.3	42.7 -0.6	12.5	12.3 -0.2	109	106 -3	339 ^a	305	359 ^a	362	+3
183567	W.F.	1/9/61	-	43.8	43.5 -0.3	12.8	12.7 -0.1	107	106 -1	357 ^a	321	367 ^a	373	+6
183568	W.F.	1/9/61	-	43.3	43.1 -0.2	12.8	12.8 0.0	110	104 -6	347 ^a	322	333 ^a	382	+29
Current Mill Average:				43.3	43.1 -0.2	12.7	12.6 -0.1	108	106 -2	347	315	361	376	+15

TABLE XXVI

MILL B -- 42-LB. LINERBOARD

183575	W.F.S	1/10/61	1	43.3	42.8 -0.5	13.1	12.6 -0.5	110	110 0	319	329	391 ^a	397	+6
183576	W.F.S	1/17/61	1	43.4	42.8 -0.6	12.9	12.8 -0.1	112	107 -5	321	330	384 ^a	376	-8
183601	W.F.S	1/19/61	1	43.0	42.4 -0.6	12.9	12.6 -0.3	113	107 -6	310 ^a	309	373 ^a	366	-7
Current Mill Average:				43.2	42.7 -0.5	13.0	12.7 -0.3	111	108 -3	317	322	383	380	-3

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTRUMENT AND MILL DATA—JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXVII

MILL C -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet							
				IPC Mill	Diff.	IPC Mill	Diff.	IPC Mill	Diff.	In	Across	IPC Mill	Diff.				
182543	V.B.	12/23/60	-	44.3	43.6	-0.7	12.5	12.1	-0.4	112	115	+3	364 ^a	331	439 ^a	407	-32
189544	V.B.	12/29/60	-	42.9	42.3	-0.6	11.8	11.4	-0.4	111	111	0	339 ^a	304	411 ^a	347	-64
188545	V.B.	1/ 1/61	-	43.6	43.1	-0.5	12.5	12.2	-0.3	106	108	+2	385 ^a	361	427 ^a	409	-18
193546	V.B.	1/ 3/61	-	44.2	43.8	-0.4	12.6	12.1	-0.5	112	110	-2	389 ^a	353	428 ^a	395	-33
Current Mill Average:				43.8	43.2	-0.6	12.3	11.9	-0.4	110	111	+1	369	337	426	389	-32

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXVIII

MILL D -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, Points		Bursting Strength, p.s.i. Gage		Elmendorf Tear, g./sheet			
				IPC Mill	Diff.	IPC Mill	Diff.	IPC Mill	Diff.	In Mill	Diff.	IPC Mill	Diff.
183399	W.F.	12/21/60	1	43.9	+0.1	12.5	+0.1	110	+5	327 ^a	+16	389 ^a	+30
183400	W.F.	12/7/60	1	43.2	-0.1	12.1	0.0	112	+1	315 ^a	+30	372 ^a	+32
183401	W.F.	12/22/60	1	43.2	+0.4	12.4	-0.1	107	+6	334	+19	374 ^a	+34
183402	W.F.	12/23/60	1	43.5	-0.4	12.5	-0.2	108	+3	331	+15	357 ^a	+44
188596	W.F.	1/3/61	1	43.5	0.0	12.7	-0.1	112	-3	314	+9	361 ^a	+19
188597	W.F.	1/11/61	1	42.8	0.0	12.7	-0.2	107	0	291 ^a	+8	334 ^a	+25
188598	W.F.	1/12/61	1	42.3	-0.1	12.6	-0.1	108	+2	274 ^a	+34	325 ^a	+41
188599	W.F.	1/14/61	1	43.6	-0.5	12.4	-0.1	120	+2	310	+23	372 ^a	+24
Current Mill Average:				43.2	0.0	12.5	-0.1	111	+2	312	+19	360	+32

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXIX

MILL E -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mcn. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet		Across						
				IPC	Mill Diff.	IPC	Mill Diff.	IPC	Mill Diff.	In	IPC	Mill Diff.	IPC	Mill Diff.				
133396	M.F.	12/13/60	3	44.1	44.2	+0.1	12.1	11.5	-0.6	114	113	-1	357 ^a	351	-6	400 ^a	403	+3
133397	M.F.	12/19/60	3	43.8	44.3	+0.5	12.0	11.6	-0.4	113	112	-1	333	332	-1	385 ^a	387	+2
133443	M.F.	12/30/60	3	42.8	42.7	-0.1	11.4	11.0	-0.4	115	113	-2	355	345	-10	367 ^a	386	+19
133444	M.F.	12/31/60	3	43.8	43.5	-0.3	11.6	11.2	-0.4	121	119	-2	373	345	-28	387 ^a	390	+3
133500	M.F.	1/ 6/61	3	43.7	43.3	-0.4	11.6	11.1	-0.5	116	116	0	368	346	-22	393 ^a	389	-4
Current Mill Average:				43.6	43.6	0.0	11.7	11.3	-0.4	116	114	-2	357	344	-13	386	391	+5

TABLE XXX

MILL F -- 42-LB. LINERBOARD

133355	M.F.	12/17/60	2	43.8	43.2	-0.6	13.1	13.0	-0.1	108	109	+1	306	294	-12	361 ^a	360	-1
Current Mill Average:				43.8	43.2	-0.6	13.1	13.0	-0.1	103	109	+1	306	294	-12	361	360	-1

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXI

MILL G -- 42-LB. LINERBOARD

File No	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet		Across Mill Diff.					
				IPC	Mill	IPC	Mill	IPC	Mill	IPC	Mill	IPC	Mill	IPC	Mill		
188393	W.F.	1/4/61	-	43.9	43.6	-0.3	12.8	12.5	-0.3	115	116	+1	342 ^a	267	356 ^a	327	-29
188394	W.F.	1/5/61	-	43.8	43.3	-0.5	12.9	12.7	-0.2	115	114	-1	349 ^a	283	363 ^a	331	-32
188395	W.F.	1/6/61	-	43.4	43.7	+0.3	12.4	12.3	-0.1	106	119	+13	329 ^a	277	379 ^a	348	-31
188470	J.F.	1/11/61	-	43.9	43.7	-0.2	13.3	12.9	-0.4	110	107	-3	328 ^a	323	346 ^a	367	+21
188471	J.F.	1/12/61	-	44.0	43.3	-0.7	13.0	12.7	-0.3	116	116	0	309	303	356 ^a	355	-1
188472	W.F.	1/13/61	-	42.6	42.3	-0.3	12.2	11.9	-0.3	119	118	-1	316	304	333 ^a	332	-1
188561	J.F.	1/19/61	-	43.3	42.9	-0.4	12.0	12.0	0.0	120	119	-1	309 ^a	268	344 ^a	335	-9
188562	W.F.	1/20/61	-	44.0	43.1	-0.9	12.8	12.5	-0.3	110	114	+4	336 ^a	291	354 ^a	343	-11
Current Mill Average:				43.6	43.2	-0.4	12.7	12.4	-0.3	114	115	+1	327	289	354	342	-12

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXII

MILL H -- 42-LB. LINERSBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Calliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet				
				IPC Mill	Diff.	IPC Mill	Diff.	IPC Mill	Diff.	In Mill	Diff.	Across Mill	Diff.	
188434	WFIS	1/ 4/61	2	45.5	44.7	-0.8	13.2	12.5	-0.7	110	114	+4	349	375 ^a
188435	WFIS	1/ 4/61	1	43.2	42.5	-0.7	12.5	11.7	-0.8	103	102	-1	402 ^a	402 ^a
188436	WFIS	1/ 5/61	1	43.2	42.1	-1.1	12.6	11.6	-1.0	103	107	+4	365	413 ^a
188437	WFIS	1/ 5/61	2	44.4	43.9	-0.5	12.5	11.8	-0.7	101	105	+4	402 ^a	405 ^a
188479	WFIS	1/ 6/61	2	43.8	43.2	-0.6	12.3	12.0	-0.3	105	109	+4	367	419 ^a
188493	WFIS	1/ 9/61	2	43.7	43.2	-0.5	12.7	12.0	-0.7	102	111	+9	351 ^a	416 ^a
188565	WFIS	1/13/61	1	43.0	42.6	-0.4	12.0	11.4	-0.6	109	113	+4	334	383 ^a
188566	WFIS	1/16/61	1	41.9	41.6	-0.3	11.7	11.3	-0.4	110	112	+2	335	387 ^a
Current Mill Average:				43.6	43.0	-0.6	12.5	11.8	-0.7	105	109	+4	363	400

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXIII

MILL I -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, P.s.i. Gage		Elmendorf Tear, g./sheet	
				IPC Mill	Diff.	IPC Mill	Diff.	IPC Mill	Diff.	In	IPC Mill

No Samples Submitted

TABLE XXXIV

MILL J -- 42-LB. LINERBOARD

188473	W.F.	1/10/61	2	43.9	43.4	-0.5	12.2	12.0	-0.2	113	113	0	313	290	-23	373 ^a	352	-21
188474	W.F.	1/10/61	2	43.9	43.3	-0.6	12.1	12.0	-0.1	111	111	0	307 ^a	281	-26	358 ^a	349	-9
188475	W.F.	1/11/61	2	43.9	43.4	-0.5	12.2	12.0	-0.2	115	110	-5	310 ^a	284	-26	365 ^a	374	+9
188476	W.F.	1/11/61	2	44.4	43.9	-0.5	12.5	12.0	-0.5	118	114	-4	321 ^a	281	-40	400 ^a	356	-44
188477	W.F.	1/12/61	2	43.1	42.5	-0.6	12.2	11.8	-0.4	109	107	-2	313	259	-54	352 ^a	342	-10
188478	W.F.	1/12/61	2	44.2	43.8	-0.4	12.5	12.0	-0.5	122	113	-9	307	276	-31	362 ^a	368	+6
Current Mill Average.				43.9	43.4	-0.5	12.3	12.0	-0.3	115	111	-4	312	279	-33	368	357	-11

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXV

MILL K -- 42-LB. LINERBOARD

File No	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, P.S.I. Gage		Elmendorf Tear, g./sheet	
				IPC	Mill Diff.	IPC	Mill Diff.	IPC	Mill Diff.	In	IPC

No Samples Submitted

TABLE XXXVI

MILL L -- 42-LB. LINERBOARD

No Samples Submitted

TABLE XXXVII

MILL M -- 42-LB. LINERBOARD

188538	WFIS	1/3/61	2	43.1	43.3	+0.2	13.3	13.2	-0.1	105	106	+1	312 ^a	294	-18	342 ^a	383	+41
188539	WFIS	1/4/61	2	42.4	42.0	-0.4	13.1	12.8	-0.3	108	108	0	310	294	-16	349 ^a	332	-17
188583	WFIS	1/12/61	2	43.4	43.0	-0.4	13.6	13.3	-0.3	114	110	-4	309 ^a	278	-31	357 ^a	332	-25
188584	WFIS	1/13/61	2	43.4	43.0	-0.4	13.3	13.0	-0.3	109	106	-3	325	286	-39	364 ^a	369	+5
188585	WFIS	1/19/61	2	44.4	44.0	-0.4	14.2	13.8	-0.4	111	106	-5	347 ^a	338	-9	359 ^a	391	+32
188586	WFIS	1/20/61	2	44.2	43.3	-0.9	13.9	13.5	-0.4	114	104	-10	328 ^a	324	-4	355 ^a	381	+26
Current Mill Average:				43.5	43.1	-0.4	13.6	13.3	-0.3	110	107	-3	322	302	-20	354	365	+11

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXVIII

MILL N -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. Page		Elmendorf Tear, G./sheet								
				IPC Mill	Daff.	IPC Mill	Diff.	IPC Mill	Diff.	In	Across	IPC Mill	Daff.					
188346	----	11/ 6/60	1	43.8	43.9	+0.1	12.8	12.4	-0.4	11.4	119	+ 5	318 ^a	292	-26	379 ^a	375	- 4
188347	----	11/ 6/60	1	43.2	43.1	-0.1	13.3	12.9	-0.4	103	109	+ 6	307 ^a	291	-16	353 ^a	370	+17
188348	----	11/23/60	1	43.1	42.8	-0.3	12.9	12.6	-0.3	104	110	+ 6	315	307	- 8	373 ^a	390	+17
188349	----	11/16/60	1	44.5	43.8	-0.7	12.8	12.2	-0.6	110	120	+10	310 ^a	270	-40	369 ^a	359	-10
188350	----	11/17/60	1	44.2	43.8	-0.4	13.3	12.8	-0.5	106	115	+ 9	315 ^a	290	-25	381 ^a	380	- 1
188351	----	11/26/60	1	43.6	43.3	-0.3	12.8	12.3	-0.5	104	113	+ 9	309 ^a	290	-19	352 ^a	370	+18
188398	----	11/13/60	1	43.1	42.6	-0.5	12.9	12.6	-0.3	106	116	+10	328 ^a	300	-28	371 ^a	387	+16
188347	----	12/ 5/60	1	44.0	44.1	+0.1	12.1	11.8	-0.3	117	123	+ 6	297 ^a	279	-18	369 ^a	373	+ 4
188348	----	12/11/60	1	43.2	43.2	0.0	12.5	12.4	-0.1	106	113	+ 7	321	286	-35	366 ^a	385	+19
188349	----	12/15/60	1	43.2	43.4	+0.2	12.6	12.3	-0.3	115	119	+ 4	326 ^a	283	-43	375 ^a	368	- 7
188350	----	12/16/60	1	43.7	43.6	-0.1	12.9	12.5	-0.4	109	116	+ 7	319	282	-37	373 ^a	365	- 8
188351	----	12/16/60	1	44.7	44.8	+0.1	12.8	12.5	-0.3	111	117	+ 6	323 ^a	290	-33	378 ^a	375	- 3
Current Mill Average:				43.7	43.5	-0.2	12.8	12.4	-0.4	109	116	+ 7	316	288	-28	370	375	+ 5

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XXXIX

MILL O -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. gage		Elmendorf Tear, g./sheet							
				IPC	Mill Diff.	IPC	Mill Diff.	IPC	Mill Diff.	In	Across	IPC	Mill Diff.				
188537	M.F.	1/1/61	2	43.3	-0.5	11.5	11.5	0.0	121	112	-9	357	382	+25	355 ^a	391	+36
188594	M.F.	1/16/61	2	43.6	-0.1	12.1	12.0	-0.1	122	115	-7	326 ^a	341	+15	363 ^a	394	+31
188595	M.F.	1/16/61	2	43.5	+0.1	12.0	11.9	-0.1	122	115	-7	323	357	+34	375 ^a	403	+28
Current Mill Average:				43.5	-0.2	11.9	11.8	-0.1	122	114	-8	336	360	+24	364	396	+32

TABLE XL

MILL P -- 42-LB. LINERBOARD

188533	M.F.	12/12/60	1	44.3	-0.7	12.5	12.2	-0.3	105	110	+5	320 ^a	289	-31	373 ^a	347	-26
188442	M.F.	12/19/60	1	43.7	-1.1	12.5	11.9	-0.6	111	115	+4	248	271	+23	336 ^a	352	+16
188430	M.F.	12/28/60	1	43.8	-0.6	12.4	12.0	-0.4	113	111	-2	270 ^a	265	-5	337 ^a	346	+9
188563	M.F.	1/2/61	1	43.5	-0.4	12.4	12.1	-0.3	112	112	0	272	263	-9	351 ^a	372	+21
188564	M.F.	1/5/61	1	43.7	-0.4	12.3	12.0	-0.3	112	112	0	282 ^a	271	-11	341 ^a	365	+24
188574	M.F.	1/10/61	1	43.8	-0.4	12.4	12.0	-0.4	116	109	-7	268 ^a	273	+5	343 ^a	363	+20
Current Mill Average:				43.8	-0.6	12.4	12.0	-0.4	112	112	0	277	272	-5	347	358	+11

^aThis average includes the readings for one or more specimens which tore beyond the 3/8-inch limit.

Note: All "current mill average" data are calculated from the totals of the individual readings.

COMPARISON OF INSTITUTE AND MILL DATA--JANUARY 1 THROUGH JANUARY 31, 1961 (continued)

TABLE XII

MILL Q -- 42-LB. LINERBOARD

File No.	Finish	Date Made	Mch. No.	Basis Weight, lb.		Caliper, points		Bursting Strength, p.s.i. base		Elmendorf Tear, g./sheet				
				IPC Mill	Diff.	IPC Mill	Diff.	IPC Mill	Diff.	In	Across	IPC Mill	Diff.	
188354	S.F.	12/22/60	7	42.2	-0.3	12.0	-0.4	108	+9	315	-33	371 ^a	324	-47
Current Mill Average:				42.2	-0.3	12.0	-0.4	108	+9	315	-33	371	324	-47

TABLE XIII

MILL S -- 42-LB. LINERBOARD

188580	W.F.	1/12/61	-	44.0	-0.8	12.7	-0.6	108	107	-1	376 ^a	360	396 ^a	416	+20
188581	W.F.	1/12/61	-	43.4	-1.2	12.3	-0.3	106	104	-2	377	335	392 ^a	376	-16
188582	W.F.	1/13/61	-	43.5	-0.9	12.1	0.0	108	109	+1	371 ^a	380	409 ^a	401	-8
Current Mill Average:				43.6	-1.0	12.4	-0.3	107	106	-1	375	358	399	398	-1

TABLE XLIII

MILL T -- 42-LB. LINERBOARD

No Samples Submitted

^aThis average includes the readings for one or more specimens which tore, beyond the 3/8-inch limit.
Note: All "current mill average" data are calculated from the totals of the individual readings.

THE INSTITUTE OF PAPER CHEMISTRY



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