

**CONTINUOUS EVALUATION
OF CORRUGATING MEDIUM**

Project 1108-17

Report 106

A Progress Report

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

April 1, 1964

Code Letters for Progress Report 106 - Project 1108-17

		<u>Code:</u>
The Chesapeake Corporation - West Point		--
Container Corporation of America - Circleville		A
Continental Can Company, Inc. - Hopewell		V
- Hodge		--
Crown Zellerbach Corporation - Baltimore	(1)	G
- Baltimore	(2)	U
- Bogalusa	(4)	J
- Lebanon	(1)	--
- Lebanon	(2)	B
International Paper Company - Bastrop	(1)	F
- Bastrop	(2)	N
- Georgetown	(1)	C
The Mead Corporation - Harriman	(1)	T
- Knoxville	(1)	--
- Lynchburg	(2)	P
- Sylva	(1)	--
Olin Mathieson Chemical Corporation - Monroe	(1)	--
- Monroe	(2)	--
Owens-Illinois Glass Company - Big Island	(3)	O
- Tomahawk	(1)	K
- Tomahawk	(2)	H
- Tomahawk	(3)	Q
Packaging Corporation of America - Filer City	(1)	I
- Filer City	(2)	S
St. Joe Paper Company - Port St. Joe		D
St. Regis Container Corporation		M
Union Bag-Camp Paper Corporation - Savannah	(2)	E
- Monroe	(2)	L
West Virginia Pulp and Paper Company		
- Covington	(6)	R
- Covington	(7)	--
- Charleston	-	--
Weyerhaeuser Company - N. C. Division (Plymouth)	(3)	W

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

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Appleton, Wisconsin

CONTINUOUS EVALUATION OF CORRUGATING MEDIUM

INTRODUCTION

As requested by the Technical Committee of the Fourdrinier Kraft Board Institute, Inc., the reports pertinent to the continuous evaluation of corrugating medium have been prepared by The Institute of Paper Chemistry on a bimonthly instead of monthly basis since August 1, 1961. The current report presents results obtained during the months of February and March, 1964, on 162 rolls of corrugating medium representing the production of twenty-two machines. Each of these 162 rolls of corrugating medium was evaluated for basis weight, caliper, Concora flat crush (conditioned after fluting), H. and D. flat crush on single-faced board, and runnability. Runnability was measured by corrugating each roll under standardized conditions on the Institute's corrugator into A-flute board at 600 feet per minute with minimum tension. If unsatisfactory runnability occurred at this speed, the corrugator was slowed down in increments of 25 f.p.m. until satisfactory runnability was obtained, i.e., no ruptured flutes. If the medium fabricated satisfactorily at 600 f.p.m. with minimum tension, further runs were made at higher tensions to determine when cracking occurred. The higher tensions used were 0.5 lb. per inch, 1.0 lb. per inch, and 1.5 lb. per inch. Flat crush was determined on the single-faced board obtained at a speed of 600 f.p.m. with minimum tension. The flat crush results, in addition to supplying information about quality, will provide data which may be useful in studying the relationship between Concora flat crush and combined board flat crush for each participant's medium.

For each participating machine, the current machine averages associated with the current period are shown for each test in Table I and presented graphically in Fig. 1 to 4. A tabulation of the number of rolls and type of medium

TABLE I
SUMMARY OF CURRENT MACHINE AVERAGES

February and March, 1964

Mill Code	Number of Rolls	Type of Medium	Basis Weight, lb.	Caliper, points	Concora Flat Crush, p.s.i.	Single-Face Flat Crush, p.s.i.
A	6	Semichemical	26.9	10.5	35.6	32.8
B	12	Semichemical	27.7	10.2	32.7	30.1
C	2	Semichemical	See Note ^a			
D	6	Kraft	28.2	9.7	36.0	31.3
E	8	Semichemical	26.3	8.7	37.1	31.7
F	5	Semichemical	26.8	10.9	39.6	35.6
G	8	Bogus	26.5	9.8	33.8	29.1
H	8	Semichemical	26.8	10.6	34.9	29.8
I	8	Semichemical	26.4	10.5	31.9	28.4
J	7	Semichemical	26.7	10.7	36.1	31.7
K	8	Semichemical	26.9	10.3	35.5	30.7
L	6	Semichemical	27.8	9.7	33.2	28.3
M	4	Bogus	27.8	10.7	40.3	34.6
N	5	Bogus	26.6	10.3	39.1	35.2
O	6	Semichemical	25.9	10.2	34.5	30.3
P	8	Semichemical	30.7	12.4	37.1	31.9
Q	8	Semichemical	27.1	10.6	36.0	30.8
R	8	Semichemical	27.4	10.9	34.8	30.1
S	8	Semichemical	26.2	10.3	32.8	28.6
T	8	Semichemical	26.7	10.1	36.2	31.8
U	8	Bogus	25.9	9.5	34.5	31.2
V	8	Semichemical	27.4	11.9	34.8	30.2
W	8	Semichemical	26.1	10.0	36.2	32.9
Total	162					
Current F.K.I. Average			27.0	10.4	35.6	31.2
Cumulative F.K.I. Average			27.0	10.3	36.2	32.3
F.K.I. index, %			100.0	101.0	98.4	96.6

^aCurrent machine averages have been omitted in compliance with the Technical Committee's request that current machine averages based on evaluations of fewer than three rolls of medium should be excluded from the summary table and from the calculation of the current F.K.I. averages.

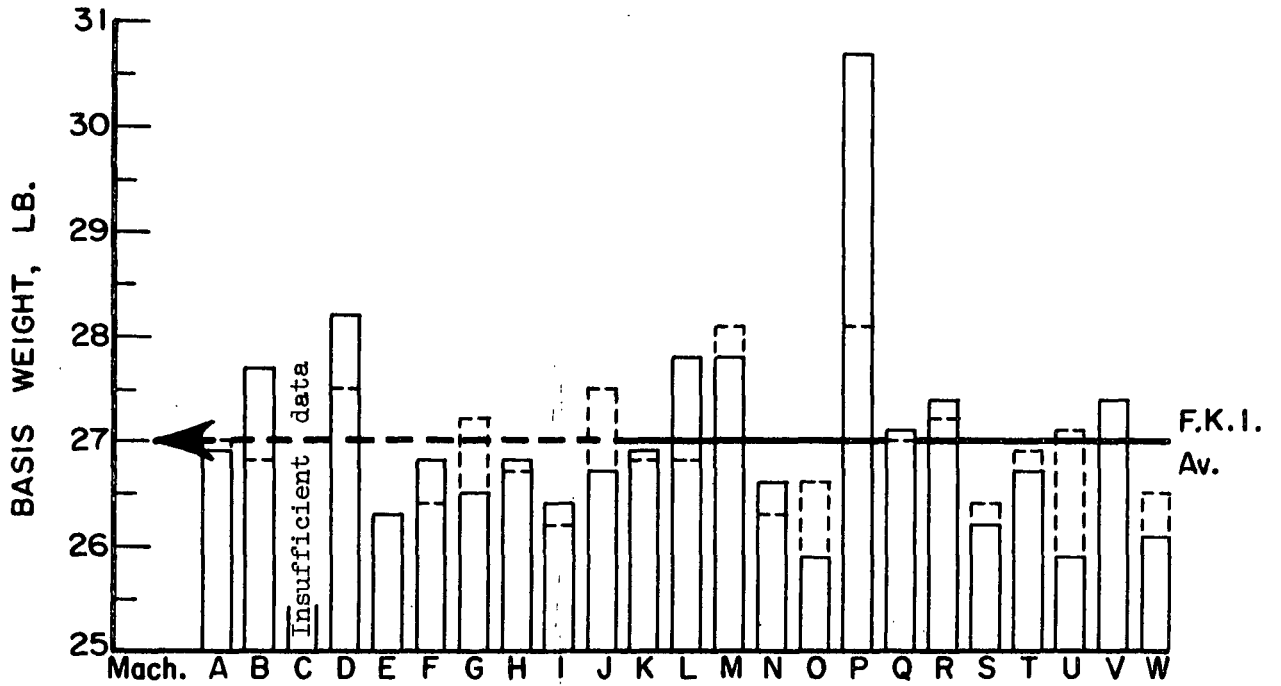


Figure 1. Comparison of Basis Weight Results

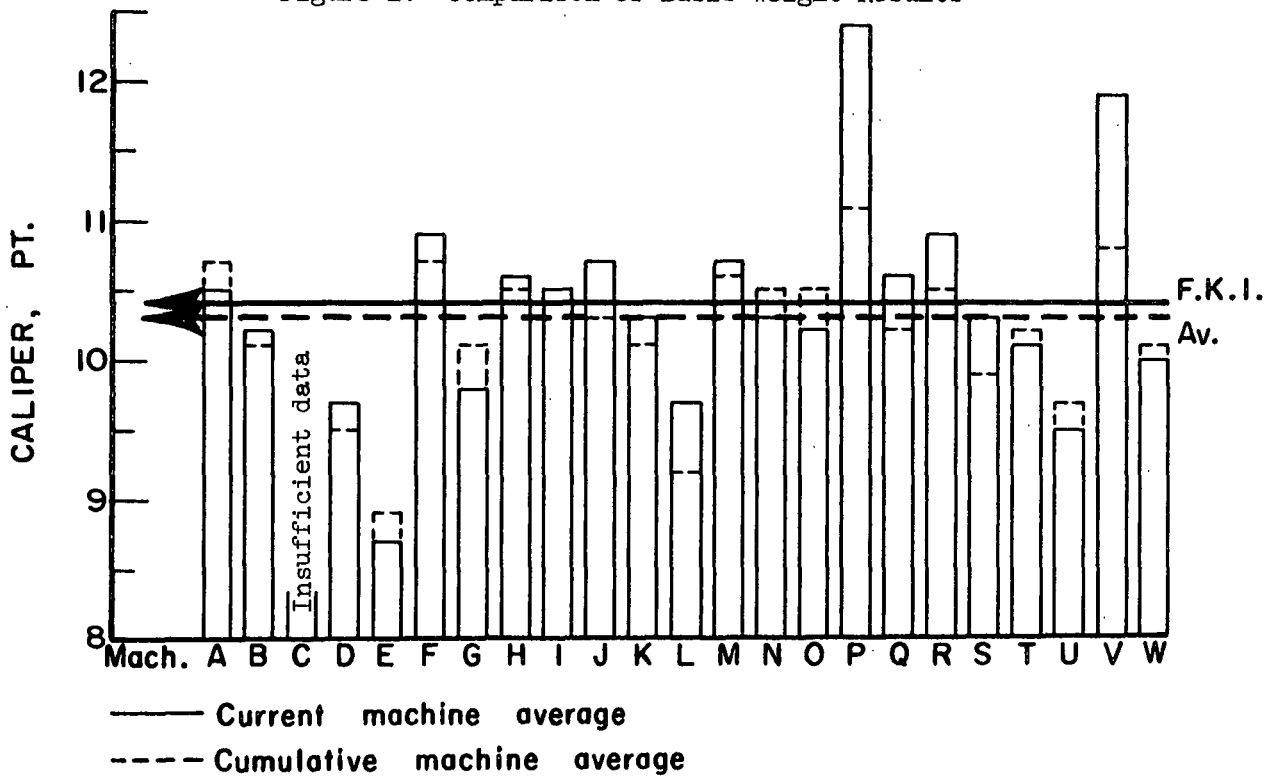


Figure 2. Comparison of Caliper Results

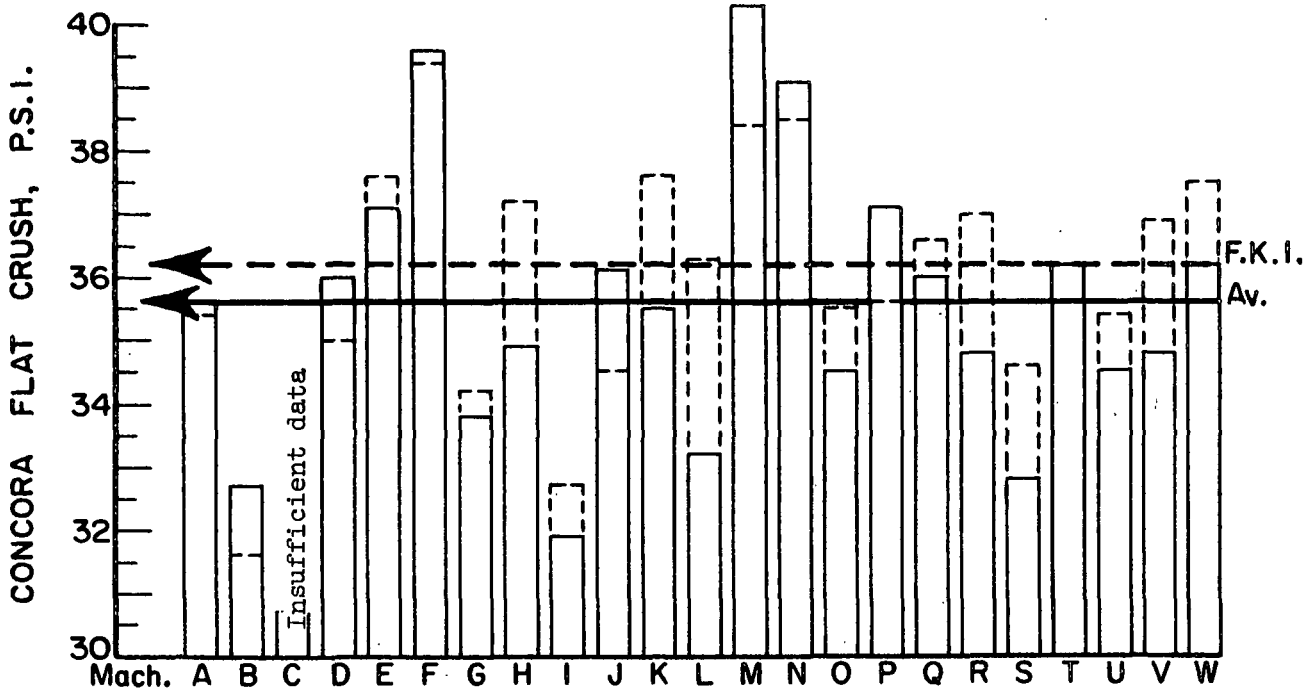
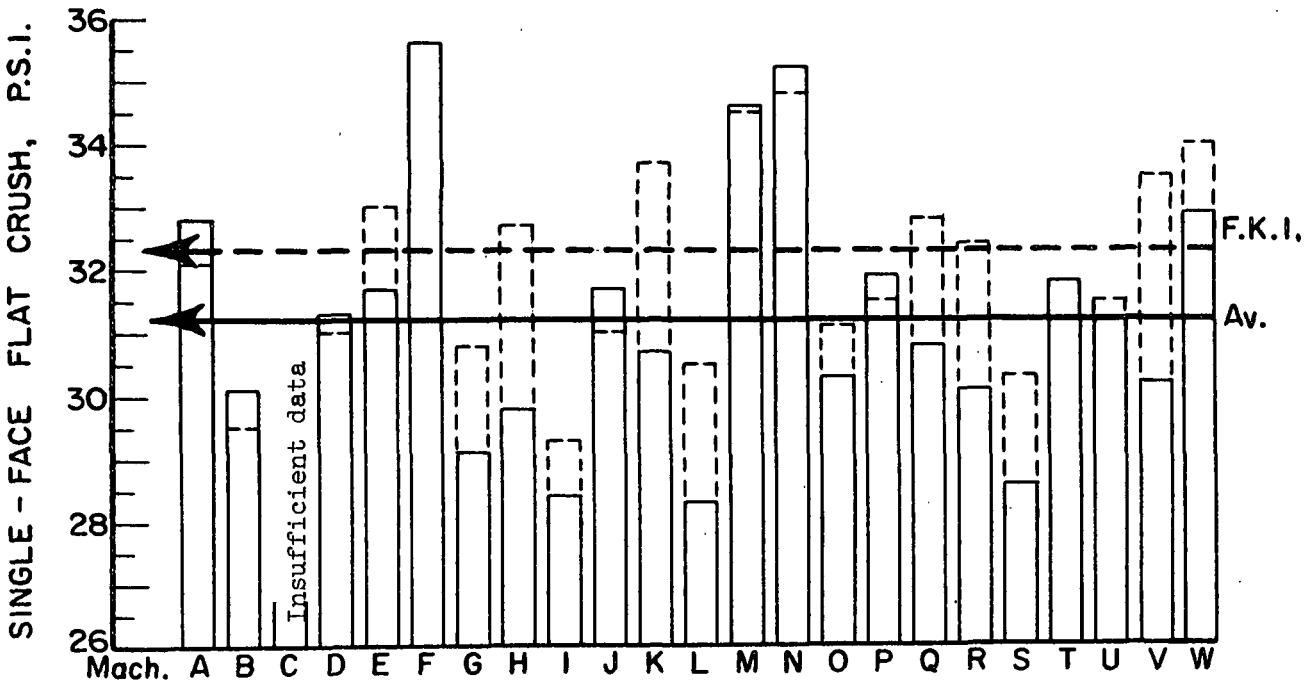


Figure 3. Comparison of Concora Flat Crush Results



— Current machine average
 - - - Cumulative machine average

Figure 4. Comparison of Single-Face Flat Crush Results

evaluated is also given in Table I for each machine. The current machine average is the mean of the test averages obtained on all rolls of corrugating medium evaluated from a given machine during the current period. In addition to the test data obtained for the various machines, Table I also presents the current F.K.I. averages, cumulative F.K.I. averages, and the F.K.I. indexes. The current F.K.I. average for each test is the mean of the current machine averages for all machines participating in the study during a given period (excluding the current machine averages based on the evaluation of fewer than three rolls of corrugating medium as requested by the Technical Committee). The cumulative F.K.I. average for each test is the mean of the current F.K.I. averages for the previous twelve-month period excluding the average for the current period. The F.K.I. index for each test is 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. An index greater than 100% indicates that current quality is higher than the average result for the previous twelve periods; an index below 100% indicates that current quality is lower than the average result for the previous twelve periods.

The test results obtained on the rolls submitted from the production of individual machines during the current period are shown in Tables II through XXIV for Machines A through W, respectively. The maximum, minimum, and average test results obtained on each roll are shown for all tests except basis weight for which only the average is shown; in addition, the over-all average result for all rolls submitted for a given machine is shown for each test. The latter over-all averages are reported as "current machine averages." A cumulative machine average for each test is also shown representing the mean of the current

TABLE II
SUMMARY OF TEST RESULTS FOR MACHINE A

February and March, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.
					Max.	Min.	Max.	Min.	Max.	Min.	
A-1	1-20-64	2-19-64	40	26.9	10.7	9.9	10.1	32.4	29.4	30.6	1/2
A-2	1-29-64	2-19-64	41	27.1	10.8	10.0	10.2	38.4	32.4	34.1	1
A-3	2-3-64	2-19-64	42	26.7	10.7	9.9	10.1	37.2	32.4	31.6	1
A-4	2-17-64	3-19-64	43	26.3	10.2	9.3	9.9	38.4	35.4	34.0	1-1/2
A-5	2-28-64	3-19-64	44	27.6	12.0	10.8	11.4	40.2	33.6	32.4	1/2
A-6	2-29-64	3-19-64	45	27.0	11.2	10.5	10.9	37.8	36.0	34.2	1
Current machine average											
Cumulative machine average											
Machine factor, %											
Machine index, %											

TABLE III
 SUMMARY OF TEST RESULTS FOR MACHINE B

February and March, 1964
 (Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.				
B-1	1-12-64	2- 5-64	A-1	29.0	11.1	9.8	10.4	37.8	33.0	35.0	33.8	31.0	32.5	1-1/2
B-2	1-15-64	2- 5-64	A-3	28.6	11.4	10.2	10.6	38.4	34.2	35.6	35.6	32.2	34.2	Min.
B-3	1-16-64	2- 5-64	A-4	27.9	10.0	9.1	9.6	36.6	34.2	35.2	31.6	30.4	30.8	1-1/2
B-4	1-12-64	2- 5-64	A-5	27.8	11.0	9.5	10.3	38.4	34.2	37.1	35.6	33.4	34.3	1-1/2
B-5	2- 2-64	3- 3-64	B-1	26.8	9.9	9.1	9.5	36.0	30.6	33.1	31.8	30.0	30.8	Min.
B-6	2- 2-64	3- 3-64	B-2	28.4	10.7	9.9	10.2	37.2	31.8	33.8	31.4	29.6	30.6	1
B-7	2-20-64	3- 3-64	B-1	28.6	11.3	9.9	10.6	37.2	32.4	34.8	35.6	32.6	33.8	1/2
B-8	2-21-64	3- 3-64	B-2	27.5	10.8	9.9	10.1	33.0	30.6	31.8	32.4	30.2	31.3	1/2
B-9	3- 3-64	3-18-64	C-1	26.3	11.0	9.8	10.3	29.4	26.4	28.4	26.4	25.2	25.8	Min.
B-10	3- 4-64	3-18-64	C-2	27.1	10.8	10.0	10.3	31.2	29.4	30.2	28.0	26.4	27.2	1
B-11	3- 5-64	3-18-64	C-3	26.8	10.0	9.7	9.9	29.4	27.0	28.4	26.6	25.2	25.9	Min.
B-12	3- 6-64	3-18-64	C-4	27.4	10.2	9.8	10.0	30.6	27.6	28.9	25.0	22.4	23.6	1/2
Current machine average				27.7			10.2	32.7			30.1			
Cumulative machine average				26.8			10.1	31.6			29.5			
Machine factor, %				103.3			100.7	103.6			101.9			
Machine index, %				102.6			98.8	90.5			93.1			

TABLE IV
SUMMARY OF TEST RESULTS FOR MACHINE C

February and March, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.		Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.
				Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
C-1	12-6-63	3-6-64	556	27.1	10.8	10.0	10.4	44.4	39.6	41.8	36.8	34.9
C-2	12-9-63	3-6-64	557	26.7	11.0	10.2	10.5	45.0	36.0	41.4	37.4	35.6
Current machine average				26.9	10.5		10.5	41.6		41.6	35.2	
Cumulative machine average				27.7	10.6		10.6	39.8		39.8	35.4	
Machine factor, %				97.2	99.0		99.0	104.4		104.4	99.5	
Machine index, %				99.8	101.8		101.8	115.0		115.0	109.0	

TABLE V
SUMMARY OF TEST RESULTS FOR MACHINE D

February and March, 1964
(Type of Medium: Kraft)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.		Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.
				Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	
D-1	1-31-64	2-11-64	1	28.5	10.0	9.7	9.9	37.8	34.8	36.1	35.4	33.3
D-2	1-31-64	2-11-64	2	27.8	10.2	9.0	9.7	41.4	33.6	36.4	30.8	30.6
D-3	1-31-64	2-11-64	3	28.3	10.0	9.0	9.7	36.6	34.2	35.2	32.8	31.7
D-4	1-31-64	2-11-64	4	28.2	10.0	9.1	9.7	39.6	34.2	37.2	33.4	31.7
D-5	2-21-64	3-4-64	5	28.1	10.2	9.3	9.7	37.2	35.4	36.5	32.0	30.8
D-6	2-21-64	3-4-64	6	28.0	10.3	9.5	9.8	36.6	33.6	34.7	30.8	29.8
Current machine average				28.2			9.7	36.0		36.0	31.3	
Cumulative machine average				27.5			9.5	35.0		35.0	31.0	
Machine factor, %				102.5			102.8	103.0		103.0	96.9	
Machine index, %				104.4			94.6	99.6		99.6	96.9	

TABLE VI
SUMMARY OF TEST RESULTS FOR MACHINE E

February and March, 1964
(Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	
E-1	1-20-64	1-31-64	576	25.8	8.9	8.4	8.7	39.0	35.4	37.7	32.4	30.4	31.3	1/2
E-2	1-30-64	2-12-64	577	26.6	9.5	8.9	9.1	41.4	38.4	40.1	34.6	33.0	33.9	Min.
E-3	2-7-64	2-20-64	578	25.7	8.8	8.3	8.6	38.4	35.4	37.3	33.0	31.4	32.0	1/2
E-4	2-10-64	2-18-64	579	26.1	9.3	8.9	9.0	37.8	31.8	35.5	32.4	29.2	30.6	Min.
E-5	2-22-64	2-27-64	580	27.1	8.7	8.0	8.4	37.8	33.6	35.6	31.6	30.8	31.2	1-1/2
E-6	2-25-64	3-9-64	581	26.3	8.8	8.3	8.5	40.2	34.2	36.8	32.8	30.4	31.8	1/2
E-7	3-8-64	3-16-64	582	26.5	8.8	8.2	8.6	38.4	34.8	36.5	31.6	29.4	30.4	Min.
E-8	3-17-64	3-25-64	583	26.2	8.9	8.5	8.7	38.4	36.0	37.2	33.2	30.8	32.5	1
Current machine average														
Cumulative machine average														
Machine factor, %														
Machine index, %														

TABLE VII
SUMMARY OF TEST RESULTS FOR MACHINE F

February and March, 1964
(Type of Medium: Semicheical)

F-1	1-27-64	2-3-64	702	26.9	11.5	9.5	10.6	44.4	39.6	41.2	36.6	34.4	35.3	1-1/2
F-2	2-3-64	2-10-64	703	26.8	11.8	9.3	10.6	42.6	35.4	38.9	36.8	35.2	35.9	1
F-3	2-17-64	2-27-64	704	26.9	11.9	10.3	10.9	43.8	38.4	41.3	37.2	34.4	35.8	1
F-4	3-6-64	3-16-64	705	26.8	12.0	10.6	11.2	42.0	36.0	39.0	38.0	33.8	36.2	1/2
F-5	3-17-64	3-25-64	706	26.6	11.5	10.6	10.9	39.0	35.4	37.4	36.0	33.6	34.8	1-1/2
Current machine average														
Cumulative machine average														
Machine factor, %														
Machine index, %														

TABLE VIII
SUMMARY OF TEST RESULTS FOR MACHINE G

February and March, 1964
(Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	
G-1	1- 2-64	2-10-64	112	26.7	10.8	9.5	10.3	36.6	32.4	34.4	30.6	28.0	29.2	1-1/2
G-2	1- 7-64	2-10-64	113	26.9	10.7	9.7	10.2	37.8	31.8	34.3	29.6	27.4	28.6	1-1/2
G-3	1-27-64	2-10-64	114	27.2	10.3	9.3	9.9	39.6	33.6	35.8	30.6	29.0	29.8	1-1/2
G-4	1-31-64	2-10-64	115	27.1	10.8	9.4	10.0	37.8	28.8	32.0	31.4	28.4	29.7	1-1/2
G-5	2- 5-64	2-19-64	116	26.5	10.2	9.5	9.9	35.4	30.0	32.6	28.8	26.4	27.9	1-1/2
G-6	2- 7-64	2-19-64	117	25.8	9.8	9.0	9.4	33.6	30.6	32.4	28.6	28.0	28.3	1-1/2
G-7	2-18-64	3-11-64	118	26.0	10.0	9.0	9.4	35.4	31.8	33.5	30.8	28.0	29.6	1-1/2
G-8	2-24-64	3-11-64	119	25.7	10.1	9.0	9.5	37.2	32.4	34.9	32.6	28.6	30.0	1-1/2
				Current machine average			9.8			33.8			29.1	
				Cumulative machine average			10.1			34.2			30.8	
				Machine factor, %			97.0			98.7			94.7	
				Machine index, %			95.6			93.3			90.1	

TABLE IX
 SUMMARY OF TEST RESULTS FOR MACHINE H
 February and March, 1964
 (Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points			Concora Flat Crush, p.s.i.			Single-Face Flat Crush, p.s.i.			Runnability, maximum tension at 600 f.p.m., lb./in.
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
H-1	2-5-64	2-14-64	--	26.9	11.3	10.7	10.9	34.2	31.8	33.0	27.6	27.0	27.3	1/2
H-2	2-6-64	2-14-64	--	26.3	10.9	10.3	10.7	37.2	32.4	34.7	30.0	28.2	28.8	1/2
H-3	2-8-64	2-14-64	--	26.7	11.2	10.5	10.8	34.2	31.8	32.9	30.0	28.0	29.0	1/2
H-4	2-9-64	2-14-64	--	26.7	10.9	10.3	10.6	34.8	33.0	34.1	30.6	29.0	29.6	1/2
H-5	2-27-64	3-9-64	--	27.1	10.8	10.2	10.6	38.4	34.8	36.8	33.4	29.0	31.7	Min.
H-6	2-29-64	3-9-64	--	26.8	10.7	10.0	10.2	39.6	33.6	36.1	32.6	31.6	32.0	1/2
H-7	3-6-64	3-12-64	--	26.5	10.7	10.1	10.5	36.0	33.6	34.9	30.4	29.2	29.6	Min.
H-8	3-7-64	3-12-64	--	27.1	11.1	10.7	10.8	37.8	35.4	36.4	30.8	29.8	30.3	Min.
Current machine average				26.8			10.6			34.9			29.8	
Cumulative machine average				26.7			10.5			37.2			32.7	
Machine factor, %				100.3			101.2			93.7			91.3	
Machine index, %				99.2			103.5			96.4			92.2	

TABLE X
SUMMARY OF TEST RESULTS FOR MACHINE I

February and March, 1964
(Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m., lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.		
I-1	1-27-64	1-31-64	100	26.5	10.9	10.0	10.4	33.0	30.0	31.7	29.6	26.0	27.6	1-1/2
I-2	1-31-64	2-5-64	101	26.5	10.8	10.3	10.5	31.2	30.0	30.2	26.6	25.2	25.6	1-1/2
I-3	2-11-64	2-17-64	102	26.8	10.8	10.0	10.4	34.2	31.8	32.8	30.6	27.8	29.4	1-1/2
I-4	2-16-64	2-20-64	103	26.1	10.4	9.6	10.1	35.4	31.8	33.5	31.4	27.8	29.7	1-1/2
I-5	2-25-64	3-2-64	104	26.7	10.9	10.4	10.7	34.8	30.6	32.5	29.2	26.8	28.3	1/2
I-6	3-2-64	3-6-64	105	26.1	10.3	9.9	10.1	33.0	30.6	32.0	31.4	30.8	31.2	1/2
I-7	3-10-64	3-16-64	106	26.4	10.9	10.3	10.6	34.2	30.6	33.1	29.4	28.6	28.8	1-1/2
I-8	3-16-64	3-20-64	107	26.4	12.0	10.4	11.0	31.8	27.6	29.3	27.2	26.0	26.6	1-1/2
Current machine average				26.4			10.5			31.9			28.4	
Cumulative machine average				26.2			10.5			32.7			29.3	
Machine factor, %				100.9			100.0			97.4			97.1	
Machine index, %				98.0			102.0			88.2			87.9	

TABLE XI
 SUMMARY OF TEST RESULTS FOR MACHINE J
 February and March, 1964
 (Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.		
J-1	1-20-64	1-29-64	2	27.9	10.9	9.9	10.4	40.2	34.8	37.7	33.0	30.2	31.9	Min. ^a
J-2	2-4-64	2-25-64	3	27.6	12.5	10.9	11.7	42.0	36.6	39.0	34.8	32.0	33.2	Note
J-3	2-18-64	2-26-64	4	26.0	11.4	10.3	10.8	37.2	33.0	34.9	31.8	29.6	30.9	Min.
J-4	2-24-64	3-4-64	5	25.7	11.0	10.0	10.3	34.2	29.4	31.0	28.6	26.8	27.7	Min.
J-5	3-6-64	3-16-64	6	27.1	13.2	10.2	11.6	40.2	34.2	37.1	34.0	29.2	32.1	1/2
J-6	3-11-64	3-23-64	7	26.0	10.5	9.8	10.0	37.8	33.0	35.0	32.8	31.2	31.9	1/2
J-7	3-16-64	3-23-64	8	26.4	10.3	9.7	10.0	39.6	34.8	37.7	35.2	33.4	33.9	1/2
Current machine average				26.7			10.7			36.1				31.7
Cumulative machine average				27.5			10.3			34.5				31.0
Machine factor, %				97.1			103.3			104.6				102.1
Machine index, %				98.9			104.0			99.7				98.0

^aMaximum speed at which this roll could be corrugated with minimum tension was 450 f.p.m.

TABLE XII
SUMMARY OF TEST RESULTS FOR MACHINE K

February and March, 1964
(Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	
K-1	2-5-64	2-14-64	--	26.8	10.4	10.1	10.2	37.2	33.6	35.3	31.4	30.4	30.8	1-1/2
K-2	2-6-64	2-14-64	--	27.0	10.7	10.0	10.5	37.2	34.8	36.2	31.6	30.0	30.8	1-1/2
K-3	2-8-64	2-14-64	--	26.8	10.2	10.0	10.0	34.8	31.8	33.1	30.6	27.4	28.9	1
K-4	2-10-64	2-14-64	--	27.4	10.4	10.0	10.2	34.8	32.4	33.2	28.2	27.2	27.6	1
K-5	2-26-64	3-9-64	--	26.4	10.6	10.1	10.3	37.2	31.8	34.3	30.6	29.0	29.6	1/2
K-6	2-27-64	3-9-64	--	26.3	10.4	10.0	10.1	37.2	33.6	35.0	32.6	31.0	31.9	1
K-7	3-5-64	3-12-64	--	27.4	10.9	10.3	10.7	42.0	37.2	39.8	34.2	32.4	33.2	1
K-8	3-7-64	3-12-64	--	26.8	10.7	10.2	10.4	37.8	35.4	36.7	34.2	31.4	32.6	1
Current machine average				26.9			10.3			35.5			30.7	
Cumulative machine average				26.8			10.1			37.6			33.7	
Machine factor, %				100.3			101.5			94.3			91.1	
Machine index, %				99.5			100.0			98.1			94.9	

TABLE XIII
 SUMMARY OF TEST RESULTS FOR MACHINE L

February and March, 1964
 (Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.	Av.	
L-1	1-24-64	2-11-64	3	26.7	10.0	9.5	9.9	33.0	28.8	31.6	30.4	29.2	29.8	1-1/2
L-2	1-28-64	2-11-64	4	29.4	10.0	9.4	9.7	40.2	33.0	36.5	28.2	26.8	27.2	1
L-3	2-5-64	2-11-64	5	28.1	10.1	9.4	9.8	37.2	31.8	34.6	31.6	29.0	30.2	1-1/2
L-4	2-11-64	3-9-64	6	28.5	10.0	9.4	9.8	33.6	29.4	31.6	28.0	25.2	26.6	1-1/2
L-5	2-21-64	3-9-64	7	26.5	9.8	9.0	9.4	31.8	31.2	31.7	28.8	26.2	27.4	1-1/2
L-6	2-26-64	3-9-64	8	27.3	9.9	9.0	9.5	36.6	29.4	33.6	29.4	27.0	28.4	1-1/2
				Current machine average	27.8			9.7			33.2			28.3
				Cumulative machine average	26.8			9.2			36.3			30.5
				Machine factor, %	103.5			104.7			91.6			92.6
				Machine index, %	102.9			94.1			91.9			87.4

TABLE XIV
 SUMMARY OF TEST RESULTS FOR MACHINE M

February and March, 1964
 (Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.	Av.	
M-1	2-10-64	2-21-64	438	27.5	11.2	10.0	10.8	42.6	36.6	40.4	35.4	32.6	33.7	Note ^a
M-2	2-11-64	2-21-64	439	28.2	10.8	10.1	10.4	43.8	39.0	41.4	38.2	36.0	36.8	1/2
M-3	2-13-64	2-21-64	440	27.9	11.6	10.5	11.1	41.4	38.4	39.5	34.6	32.4	33.6	1-1/2
M-4	2-14-64	2-21-64	441	27.6	11.1	9.9	10.4	42.6	37.2	39.8	35.6	32.2	34.1	1/2
				Current machine average	27.8			10.7			40.3			34.6
				Cumulative machine average	28.1			10.6			38.4			34.5
				Machine factor, %	99.1			100.7			105.1			100.1
				Machine index, %	103.0			103.8			111.4			106.9

^a Maximum speed at which this roll could be corrugated with minimum tension was 375 f.p.m.

TABLE XV
SUMMARY OF TEST RESULTS FOR MACHINE N

February and March, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.		
N-1	1-27-64	2- 5-64	371	26.4	10.4	9.7	10.0	39.6	37.2	38.6	34.6	32.4	33.9	1-1/2
N-2	2- 4-64	2-10-64	372	26.1	10.5	9.8	10.2	42.0	37.8	39.7	38.0	33.6	35.9	1-1/2
N-3	2-17-64	2-27-64	373	26.1	11.1	9.9	10.3	39.0	36.0	37.6	35.2	33.0	34.1	1/2
N-4	3- 5-64	3-16-64	374	26.9	10.9	9.9	10.4	39.6	36.0	38.2	34.6	32.2	33.0	1/2
N-5	3-17-64	3-25-64	375	27.7	12.2	9.9	10.8	43.8	37.8	41.4	41.6	37.6	39.0	1-1/2
Current machine average														
Cumulative machine average														
Machine factor, %														
Machine index, %														

TABLE XVI
SUMMARY OF TEST RESULTS FOR MACHINE O

February and March, 1964
(Type of Medium: Semichemical)

O-1	2- 4-64	3-17-64	679	26.4	10.9	10.0	10.5	37.8	34.2	36.1	30.8	28.8	29.9	1/2
O-2	2-11-64	3-17-64	2171	25.6	10.5	9.8	10.1	36.6	34.2	35.2	29.0	27.8	28.5	1/2
O-3	2-18-64	3-17-64	3692	25.4	10.4	9.9	10.2	34.2	30.6	32.0	31.4	30.2	30.6	1/2
O-4	2-25-64	3-17-64	5101	25.7	10.3	10.0	10.1	37.2	33.0	34.8	32.6	30.8	31.6	1/2
O-5	3- 3-64	3-17-64	568	25.7	10.8	9.9	10.1	37.8	34.2	35.9	30.8	29.0	30.1	1
O-6	3-11-64	3-17-64	1318	26.5	10.4	9.9	10.2	35.4	31.2	33.0	31.4	30.8	31.2	1/2
Current machine average														
Cumulative machine average														
Machine factor, %														
Machine index, %														

TABLE XVII
 SUMMARY OF TEST RESULTS FOR MACHINE P

February and March, 1964
 (Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. lb./in.			
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	
P-1	2- 2-64	2-11-64	1082	29.3	12.8	12.0	12.4	39.0	34.2	37.2	32.4	27.6	29.8	1/2
P-2	2- 2-64	2-11-64	1083	28.7	12.8	12.1	12.5	37.2	34.2	35.8	30.2	27.6	28.9	Min.
P-3	2-13-64	2-20-64	1090	33.6	13.0	12.4	12.7	42.0	38.4	40.9	34.2	32.8	33.2	1/2
P-4	2-13-64	2-20-64	1091	32.8	13.1	12.8	13.0	39.0	37.2	37.9	36.4	33.0	34.7	1/2
P-5	2-27-64	3- 9-64	1098	33.3	13.5	13.0	13.3	40.2	36.6	38.3	34.2	33.0	33.7	1/2
P-6	2-27-64	3- 9-64	1099	33.1	13.5	13.0	13.3	40.2	35.4	37.6	34.6	32.4	33.4	1/2
P-7	3-17-64	3-25-64	1106	27.4	11.0	11.0	11.0	36.6	32.4	34.4	31.4	30.6	30.9	1/2
P-8	3-17-64	3-25-64	1107	27.5	11.0	10.7	10.9	36.6	33.0	34.9	31.2	29.2	30.4	1/2
Current machine average														
Cumulative machine average														
Machine factor, %														
Machine index, %														
				30.7			12.4			37.1			31.9	
				28.1			11.1			35.6			31.5	
				109.1			112.1			104.3			101.1	
				113.8			120.6			102.7			98.6	

TABLE XVIII
SUMMARY OF TEST RESULTS FOR MACHINE Q

February and March, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. in./lb.		
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.
Q-1	2-5-64	2-14-64	--	27.2	10.7	10.0	10.4	37.2	31.2	31.2	28.0	29.1	1
Q-2	2-6-64	2-14-64	--	27.4	10.9	10.3	10.6	37.8	34.2	32.8	29.8	30.8	1
Q-3	2-8-64	2-14-64	--	26.9	10.9	10.0	10.3	37.2	34.8	30.2	28.0	29.2	1
Q-4	2-11-64	2-14-64	--	26.5	10.8	9.9	10.2	34.8	32.4	29.0	27.6	28.3	1-1/2
Q-5	2-26-64	3-9-64	--	27.1	10.9	10.1	10.6	37.8	33.0	33.8	30.0	31.2	Min.
Q-6	2-27-64	3-9-64	--	27.8	11.3	10.8	10.9	37.2	34.8	34.2	31.8	33.3	Min.
Q-7	2-29-64	3-9-64	--	27.4	11.1	10.8	11.0	42.0	35.4	34.2	32.4	33.2	1/2
Q-8	3-2-64	3-9-64	--	26.9	11.0	10.3	10.7	39.0	35.4	31.6	31.0	31.3	1/2
Current machine average													
Cumulative machine average													
				27.1			10.6			36.0			30.8
				27.0			10.2			36.6			32.8
Machine factor, %				100.4			104.1			98.3			94.1
Machine index, %				100.6			103.1			99.4			95.3

TABLE XIX
 SUMMARY OF TEST RESULTS FOR MACHINE R

February and March, 1964
 (Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. in./lb.		
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.
R-1		2-14-64	252	27.0	11.2	10.1	10.6	39.6	33.0	32.8	29.2	31.2	1/2
R-2	12-22-63	2-14-64	257	27.3	11.9	10.8	11.0	36.0	31.8	32.2	29.0	30.8	Min.
R-3	1-27-64	2-14-64	258	27.4	10.9	10.4	10.7	38.4	34.2	32.6	29.8	30.8	1
R-4	2-1-64	2-14-64	259	27.8	10.8	10.4	10.7	37.8	34.2	34.4	30.8	32.1	1
R-5	2-7-64	2-14-64	260	27.9	11.7	11.0	11.2	32.4	30.0	29.4	26.6	27.8	1/2
R-6	2-16-64	3-16-64	261	26.5	10.9	10.2	10.6	34.2	31.8	29.6	26.8	27.9	1/2
R-7	2-24-64	3-16-64	262	27.6	11.7	10.9	11.2	35.4	33.0	30.0	27.8	28.9	1/2
R-8	3-4-64	3-16-64	263	27.6	11.0	10.3	10.8	37.8	33.6	31.8	30.2	31.2	1/2
Current machine average				27.4			10.9					30.1	
Cumulative machine average				27.2			10.5					32.4	
Machine factor, %				100.8			103.3					92.8	
Machine index, %				101.6			105.7					93.1	

TABLE XX
SUMMARY OF TEST RESULTS FOR MACHINE S

February and March, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points			Concora Flat Crush, p.s.i.			Single-Face Flat Crush, p.s.i.			Runnability, maximum tension at 600 f.p.m. in./lb.		
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.			
S-1	1-27-64	1-31-64	100	26.2	11.0	10.0	10.4	34.2	31.2	32.8	29.6	26.8	27.8	1-1/2		
S-2	1-31-64	2-5-64	101	26.1	10.6	9.7	10.0	35.4	29.4	32.6	27.6	26.0	26.9	1-1/2		
S-3	2-11-64	2-17-64	102	26.7	10.6	9.3	10.0	37.8	29.4	33.4	31.8	30.6	31.2	1-1/2		
S-4	2-13-64	2-20-64	103	26.3	10.8	9.8	10.2	34.8	31.8	33.1	28.8	27.6	28.2	1-1/2		
S-5	2-25-64	3-2-64	104	26.8	11.1	10.2	10.7	34.8	31.2	33.1	31.2	27.0	29.0	1/2		
S-6	3-2-64	3-6-64	105	26.1	10.9	9.8	10.2	34.2	31.8	33.5	29.4	26.8	28.4	1		
S-7	3-10-64	3-16-64	106	25.4	11.3	9.9	10.2	34.8	31.2	33.4	30.4	28.2	29.2	1-1/2		
S-8	3-16-64	3-20-64	107	26.3	11.0	10.2	10.6	33.6	28.8	30.5	29.6	26.8	28.2	1-1/2		
				Current machine average				10.3				32.8				28.6
				Cumulative machine average				9.9				34.6				30.3
				Machine factor, %				104.0				94.8				94.4
				Machine index, %				100.0				90.7				88.6

TABLE XXI

SUMMARY OF TEST RESULTS FOR MACHINE T

February and March, 1964

(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. in./lb.				
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.		
T-1	1-20-64	1-29-64	1069	26.8	10.7	9.5	10.2	42.0	29.4	34.9	34.9	32.8	27.0	30.2	1-1/2
T-2	1-20-64	1-29-64	1070	26.0	10.0	9.0	9.8	38.4	31.2	34.7	34.7	33.6	30.4	32.0	1-1/2
T-3	2-3-64	2-10-64	1077	25.7	10.0	8.9	9.4	36.6	31.8	34.4	34.4	33.0	26.8	30.4	1-1/2
T-4	2-3-64	2-10-64	1078	26.8	10.5	9.0	9.7	40.2	32.4	36.2	36.2	35.2	31.0	32.5	1-1/2
T-5	2-19-64	2-26-64	1085	27.1	10.8	10.3	10.6	36.6	31.2	34.3	34.3	30.6	27.6	29.7	1-1/2
T-6	2-19-64	2-26-64	1086	26.9	10.8	10.0	10.4	38.4	33.0	36.7	36.7	32.2	27.6	31.0	1-1/2
T-7	3-6-64	3-13-64	1093	26.8	10.8	10.1	10.3	42.0	36.6	39.4	39.4	36.0	32.4	33.7	1
T-8	3-6-64	3-13-64	1094	27.2	10.5	10.0	10.2	43.2	33.6	39.1	39.1	36.6	33.8	35.1	1-1/2
Current machine average												36.2	31.8		
Cumulative machine average												36.2	31.8		
Machine factor, %												99.3	100.0	100.0	
Machine index, %												98.1	100.0	98.5	

TABLE XXII
SUMMARY OF TEST RESULTS FOR MACHINE U

February and March, 1964
(Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points			Concora Flat Crush, p.s.i.			Single-Face Flat Crush, p.s.i.			Runnability, maximum tension at 600 f.p.m. in./lb.
					Max.	Min.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
U-1	1- 2-64	2-10-64	212	25.6	10.3	8.8	9.4	30.6	24.0	27.7	25.4	24.4	24.9	1
U-2	1- 7-64	2-10-64	213	25.1	10.5	9.0	9.6	33.6	28.2	30.6	27.4	24.4	25.9	1
U-3	1-27-64	2-10-64	214	25.0	9.8	8.9	9.2	39.0	35.4	36.8	34.4	31.4	33.0	1-1/2
U-4	1-31-64	2-10-64	215	25.1	10.0	8.9	9.3	36.0	32.4	34.3	31.0	29.4	30.2	1-1/2
U-5	2- 7-64	2-19-64	216	27.1	10.0	9.2	9.6	36.6	33.0	34.3	34.6	32.0	33.3	1-1/2
U-6	2-11-64	2-19-64	217	26.5	9.9	8.8	9.3	38.4	36.0	37.2	34.8	32.8	33.6	1-1/2
U-7	2-12-64	3-11-64	218	26.8	10.0	9.4	9.8	38.4	34.8	36.5	35.8	32.0	33.5	1-1/2
U-8	2-20-64	3-11-64	219	26.2	10.1	8.0	9.3	42.6	35.4	38.3	36.6	33.6	35.5	1
Current machine average				25.9			9.5							
Cumulative machine average				27.1			9.7							
Machine factor, %				95.7			97.4							
Machine index, %				96.1			92.0							

TABLE XXIII
 SUMMARY OF TEST RESULTS FOR MACHINE V
 February and March, 1964
 (Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. in./lb.			
					Max.	Min.	Max.	Min.	Max.	Min.		Av.		
V-1	1-6-64	2-12-64	440	27.2	12.1	11.0	11.7	36.6	32.4	34.3	31.4	28.0	29.7	1/2
V-2	1-14-64	2-12-64	441	28.3	12.5	11.5	12.0	38.4	32.4	35.9	32.6	28.6	31.3	1
V-3	1-24-64	2-12-64	442	28.0	12.2	11.4	11.9	36.6	32.4	34.9	32.6	28.0	29.8	1/2
V-4	1-28-64	2-12-64	443	26.2	12.0	11.4	11.7	35.4	30.0	32.6	31.0	28.4	30.0	1/2
V-5	2-5-64	2-28-64	444	27.6	12.5	11.5	12.1	38.4	33.6	35.8	34.6	30.0	31.8	1/2
V-6	2-11-64	2-28-64	445	27.4	12.5	11.5	11.9	37.8	33.0	35.3	31.4	28.4	29.5	1/2
V-7	2-18-64	3-13-64	446	27.8	12.2	11.7	12.0	37.2	31.2	35.5	31.0	27.8	29.7	1/2
V-8	2-25-64	3-13-64	447	26.4	12.0	11.3	11.6	36.6	32.4	33.7	32.6	27.2	30.2	1/2
				Current machine average			11.9			34.8			30.2	
				Cumulative machine average			10.8			36.9			33.5	
				Machine factor, %			110.0			94.3			90.4	
				Machine index, %			115.4			96.1			93.6	

TABLE XXIV
SUMMARY OF TEST RESULTS FOR MACHINE W

February and March, 1964
(Type of Medium: Semicheical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points		Concora Flat Crush, p.s.i.		Single-Face Flat Crush, p.s.i.		Runnability, maximum tension at 600 f.p.m. in./lb.			
					Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	
W-1	1-15-64	1-30-64	445	25.7	9.9	9.2	9.4	37.8	34.2	36.2	32.8	30.0	31.4	Min.
W-2	1-20-64	1-30-64	571	25.7	10.2	9.8	10.0	39.6	36.0	37.6	34.6	31.6	32.6	Min.
W-3	2-3-64	2-14-64	69	26.7	10.0	9.3	9.7	38.4	34.2	35.9	34.8	32.8	33.8	Min.
W-4	2-5-64	2-14-64	142	26.9	11.1	10.2	10.8	36.6	34.2	35.3	32.4	30.8	31.7	<100 ^a
W-5	2-17-63	3-10-63	485	25.4	10.2	9.2	9.8	36.6	33.0	34.3	35.0	30.6	32.8	Min.
W-6	2-28-63	3-10-63	855	25.8	10.2	9.2	9.8	39.0	33.0	36.4	36.6	33.2	34.8	Min. ^b
W-7	3-3-64	3-13-64	62	26.4	11.1	9.8	10.6	38.4	37.2	37.8	36.6	33.2	34.8	Note
				Current machine average	26.1			10.0			36.2			32.9
				Cumulative machine average	26.5			10.1			37.5			34.0
				Machine factor, %	98.3			98.7			96.7			96.7
				Machine index, %	96.7			97.4			100.0			101.7

^aMaximum speed at which this roll could be corrugated with minimum tension was less than 100 f.p.m.

^bMaximum speed at which this roll could be corrugated with minimum tension was 275 f.p.m.

machine averages for the previous twelve periods (excluding the current period).

Also shown for each machine in Tables II to XXIV are the machine factor and machine index which are defined as follows:

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

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

The machine factor and machine index provide a means for comparing the current machine average with either the previous results for that particular machine or with the cumulative results for all machines, i.e., the cumulative F.K.I. average.

DISCUSSION OF RESULTS

Shown below from Table I are the maximum and minimum current machine averages noted for each test during the current period (February and March, 1964); the current machine average represents the mean of the averages for a given test obtained on all rolls submitted from a given machine during the current period. Also shown for each test is the current F.K.I. average which represents the mean of the current machine averages for the current period and is indicative of the test level being maintained by the industry as a whole to the extent that the industry is represented by the participating machines:

	Maximum Current Machine Average	Minimum Current Machine Average	Current F.K.I. Average
Basis wt., lb.	30.7	25.9	27.0
Caliper, pt.	12.4	8.7	10.4
Concora flat crush, p.s.i.	40.3	31.9	35.6
Single-face flat crush, p.s.i.	35.6	28.3	31.2

The runnability data for the 162 rolls evaluated during the current period are summarized as follows:

Runnability	Number of Rolls	Percentage of Total Rolls
Less than 600 f.p.m. with minimum tension	4	2.5
600 f.p.m. - minimum tension	26	16.0
600 f.p.m. - 1/2 lb. per in. tension	52	32.1
600 f.p.m. - 1 lb. per in. tension	26	16.0
600 f.p.m. - 1-1/2 lb. per in. tension	54	33.3

In Table XXV a comparison of Institute and mill Concora flat crush test results obtained on conditioned specimens is given for each machine for the current period. The inclusion of these comparisons is made possible by the fact that interested participants submit their Concora flat crush test results to The Institute of Paper Chemistry. This affords each participant the opportunity to review the level of agreement for his data with the levels shown for the other participants. Data sheets for supplying this information may be obtained from the Institute. Comparisons of this kind are a helpful adjunct to other calibration procedures. Shown in Table XXV are (1) the Institute and mill Concora averages for each roll included in these comparisons, (2) the difference between the roll average based on Institute data and that based on mill data, (3) the Institute and mill averages based on all rolls included in the comparison, and (4) the difference between these over-all averages.

The Concora flat crush data shown in Table XXV are summarized in Part I of Table XXVI where for each machine the following information is given:

(1) Current machine average based on Institute data, (2) current machine average based on mill data, (3) the average differences - that is, the difference between the current machine average based on Institute data and that based on mill data, and (4) the maximum difference encountered in comparing Institute and mill test averages for individual rolls. In Part II of Table XXVI the average differences given in Part I have been converted to per cent. Comparative data from the previous two reports are also included in Part II of Table XXVI. It may be seen in Part II of Table XXVI that, for the current period, the highest average difference of 11.7% was associated with Machine L and the lowest of 0.0% with Machine F.

In Table XXVII a summary of the agreement between Institute and mill Concora flat crush data is given for the current period, and comparative data

TABLE XXV
INSTITUTE AND MILL CONCORDA FLAT CRUSH TEST RESULTS ON INDIVIDUAL ROLLS FOR FEBRUARY AND MARCH, 1964

Machine A					Machine B					Machine C							
Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.				
			Insti- tute	Mill				Differ- ence	Insti- tute				Mill	Differ- ence	Insti- tute	Mill	Differ- ence
A-1	40	1-20-64	30.8	29.2	-1.6	B-1	A-1	1-12-64	35.0	34.7	-0.3	C-1	556	12-6-64	41.8	41.4	-0.4
A-2	41	1-29-64	36.4	32.8	-3.6	B-2	A-3	1-15-64	35.6	38.4	+2.8	C-2	557	12-9-64	41.4	40.2	-1.2
A-3	42	2-3-64	35.2	30.7	-4.5	B-3	A-4	1-16-64	35.2	36.6	+1.4						
A-4	43	2-17-64	36.8	34.6	-2.2	B-4	A-5	1-12-64	37.1	34.8	-2.3						
A-5	44	2-28-64	37.2	35.5	-1.7	B-5	B-1	2-2-64	33.1	36.1	+3.0						
A-6	45	2-29-64	37.0	34.6	-2.4	B-6	B-2	2-2-64	33.8	34.6	+0.8						
						B-7	B-1	2-20-64	34.8	36.8	+2.0						
						B-8	B-2	2-21-64	31.8	33.8	+2.0						
Current Machine Av.			35.6	32.9	-2.7	Current Machine Av.			34.6	35.7	+1.1	Current Machine Av.			41.6	40.8	-0.8

Machine D					Machine E					Machine F							
Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.				
			Insti- tute	Mill				Differ- ence	Insti- tute				Mill	Differ- ence	Insti- tute	Mill	Differ- ence
D-1	1	1-31-64	36.1	33.8	-2.3	E-1	576	1-20-64	37.7	36.9	-0.8	F-1	702	1-27-64	41.2	42.0	+0.8
D-2	2	1-31-64	36.4	35.8	-0.6	E-2	577	1-30-64	40.1	40.8	+0.7	F-2	703	2-3-64	38.9	39.5	+0.6
D-3	3	1-31-64	35.2	35.8	+0.6	E-3	578	2-7-64	37.3	40.0	+2.7	F-3	704	2-17-64	41.3	38.5	-2.8
D-4	4	1-31-64	37.2	35.2	-2.0	E-4	579	2-10-64	35.5	35.7	+0.2	F-4	705	3-6-64	39.0	39.6	+0.6
D-5	5	2-21-64	36.5	34.4	-2.1	E-5	580	2-22-64	35.6	36.2	+0.6	F-5	706	3-17-64	37.4	38.2	+0.8
D-6	6	2-21-64	34.7	35.0	+0.3	E-6	581	2-25-64	36.8	37.1	+0.3						
						E-7	582	3-8-64	36.5	36.2	-0.3						
						E-8	583	3-17-64	37.2	38.5	+1.3						
Current Machine Av.			36.0	35.0	-1.0	Current Machine Av.			37.1	37.7	+0.6	Current Machine Av.			39.6	39.6	0.0

Machine G					Machine H					Machine I							
Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.		Code	Mill Roll No.	Date Made	Concorda Flat Crush, P.s.i.				
			Insti- tute	Mill				Differ- ence	Insti- tute				Mill	Differ- ence	Insti- tute	Mill	Differ- ence
G-1	112	1-2-64	34.4	31.8	-2.6	H-1	--	2-5-64	33.0	35.0	+2.0	I-1	100	1-27-64	31.7	33.8	+2.1
G-2	113	1-7-64	34.3	31.3	-3.0	H-2	--	2-6-64	34.7	35.5	+0.8	I-2	101	1-31-64	30.2	31.8	+1.6
G-3	114	1-27-64	35.8	32.3	-3.5	H-3	--	2-8-64	32.9	35.4	+2.5	I-3	102	2-11-64	32.8	34.1	+1.3
G-4	115	1-31-64	32.0	33.5	+1.5	H-4	--	2-9-64	34.1	35.3	+1.2	I-4	103	2-16-64	33.5	35.0	+1.5
G-5	116	2-5-64	32.6	32.7	+0.1	H-5	--	2-27-64	36.8	35.9	-0.9	I-5	104	2-25-64	32.5	31.9	-0.6
G-6	117	2-7-64	32.4	33.8	+1.4	H-6	--	2-29-64	36.1	35.2	-0.9	I-6	105	3-2-64	32.0	31.2	-0.8
G-7	118	2-18-64	33.5	32.9	-0.6	H-7	--	3-6-64	34.9	37.8	+2.9	I-7	106	3-10-64	33.1	32.5	-0.6
G-8	119	2-24-64	34.9	31.7	-3.2	H-8	--	3-7-64	36.4	39.6	+3.2	I-8	107	3-16-64	29.3	31.8	+2.5
Current Machine Av.			33.8	32.5	-1.3	Current Machine Av.			34.9	36.2	+1.3	Current Machine Av.			31.9	32.8	+0.9

³Please see end of table for footnote.

TABLE XXV (Continued)
INSTITUTE AND MILL CONCORA FLAT CRUSH TEST RESULTS ON INDIVIDUAL ROLLS FOR FEBRUARY AND MARCH, 1964

Machine J Concora Flat Crush,				Machine K Concora Flat Crush,				Machine L Concora Flat Crush,								
Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference		
J-1	2	1-20-64	37.7	+0.6	K-1	--	2-5-64	35.3	37.9	+2.6	L-1	3	1-24-64	31.6	40.8	+9.2
J-2	3	2-4-64	36.8	-2.2	K-2	--	2-6-64	36.2	40.1	+3.9	L-2	4	1-28-64	36.5	34.8	-1.7
J-3	4	2-18-64	34.9	-1.1	K-3	--	2-8-64	33.1	35.0	+1.9	L-3	5	2-5-64	34.6	37.8	+3.2
J-5	6	3-6-64	37.1	-1.1	K-4	--	2-10-64	33.2	35.0	+1.8	L-4	6	2-11-64	31.6	35.4	+3.8
J-6	7	3-11-64	35.0	+0.3	K-5	--	2-26-64	34.3	35.0	+0.7	L-5	7	2-21-64	31.7	39.0	+7.3
J-7	8	3-16-64	37.7	-0.9	K-6	--	2-27-64	35.0	35.0	0.0	L-6	8	2-26-64	33.6	34.8	+1.2
					K-7	--	3-5-64	39.8	41.2	+1.4						
					K-8	--	3-7-64	36.7	39.6	+2.9						
Current Machine Av.			36.9	-0.7	Current Machine Av.			35.5	37.4	+1.9	Current Machine Av.			33.2	37.1	+3.9
Machine N				Machine O				Machine P								
Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference		
N-1	371	1-27-64	38.6	+0.5	O-1	679	2-4-64	36.1	31.3	-4.8	P-1	1082	2-2-64	37.2	32.9	-4.3
N-2	372	2-4-64	39.7	-1.3	O-2	2171	2-11-64	35.2	34.6	-0.6	P-2	1083	2-2-64	35.8	31.9	-3.9
N-3	373	2-17-64	37.6	+1.2	O-3	3692	2-18-64	32.0	35.6	+3.6	P-3	1090	2-13-64	40.9	39.5	-1.4
N-4	374	3-5-64	38.2	+1.3	O-4	5101	2-25-64	34.8	34.7	-0.1	P-4	1091	2-13-64	37.9	39.4	+1.5
N-5	375	3-17-64	41.4	+0.4	O-5	568	3-3-64	35.9	34.3	-1.6	P-5	1098	2-27-64	38.3	32.2	-6.1
					O-6	1318	3-11-64	33.0	30.0	-3.0	P-6	1099	2-27-64	37.6	31.9	-5.7
Current Machine Av.			39.1	+0.4	Current Machine Av.			34.5	33.4	-1.1	Current Machine Av.			37.1	34.8	-2.3
Machine Q				Machine R				Machine S								
Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference	Code	Mill Roll No.	Date Made	P.s.i. Mill	Difference		
Q-1	--	2-5-64	34.2	+1.0	R-2	257	12-22-63	34.2	39.2	+5.0	S-1	100	1-27-64	32.8	33.8	+1.0
Q-2	--	2-6-64	36.6	+1.7	R-3	258	1-27-64	37.0	35.9	-1.1	S-2	101	1-31-64	32.6	33.0	+0.4
Q-3	--	2-8-64	35.6	+0.4	R-4	259	2-1-64	36.2	39.5	+3.3	S-3	102	2-11-64	33.4	34.6	+1.2
Q-4	--	2-11-64	33.8	+2.0	R-6	261	2-16-64	33.1	37.1	+4.0	S-4	103	2-13-64	33.1	34.8	+1.7
Q-5	--	2-26-64	35.3	+0.5	R-7	262	2-24-64	34.6	37.4	+2.8	S-5	104	2-25-64	33.1	34.0	+0.9
Q-6	--	2-27-64	36.0	+0.5						S-6	105	3-2-64	33.5	34.9	+1.4	
Q-7	--	2-29-64	38.9	-2.8						S-7	106	3-10-64	33.4	32.9	-1.5	
Q-8	--	3-2-64	37.2	-0.7						S-8	107	3-16-64	30.5	32.9	+2.4	
Current Machine Av.			36.0	+0.3	Current Machine Av.			35.0	37.8	+2.8	Current Machine Av.			32.8	33.9	+1.1

^aPlease see end of table for footnote.

TABLE XXV (Continued)
INSTITUTE AND MILL CONCORA FLAT CRUSH TEST RESULTS ON INDIVIDUAL ROLLS FOR FEBRUARY AND MARCH, 1964

Machine T				Machine U				Machine V						
Concora Flat Crush,				Concora Flat Crush,				Concora Flat Crush,						
Mill Roll No.	Date Made	Insti- tute	P.s.i. Mill	Differ- ence	Mill Roll No.	Date Made	Insti- tute	P.s.i. Mill	Differ- ence	Mill Roll No.	Date Made	Insti- tute	P.s.i. Mill	Differ- ence
T-1	1069	1-20-64	34.9	+5.2	U-1	212	1-2-64	27.7	+1.0	V-1	440	1-6-64	34.3	+4.6
T-2	1070	1-20-64	34.7	+2.1	U-2	213	1-7-64	30.6	-1.4	V-2	441	1-14-64	35.9	+1.4
T-3	1077	2-3-64	34.4	-1.4	U-3	214	1-27-64	36.8	-1.3	V-3	442	1-24-64	34.9	+2.1
T-4	1078	2-3-64	36.2	-2.0	U-4	215	1-31-64	34.3	-0.8	V-4	443	1-28-64	32.6	+4.7
T-5	1085	2-19-64	34.3	-0.3	U-5	216	2-7-64	34.3	+0.4	V-5	444	2-5-64	35.8	0.0
T-6	1086	2-19-64	36.7	-4.4	U-6	217	2-11-64	37.2	-2.5	V-6	445	2-11-64	35.3	+6.0
T-7	1093	3-6-64	39.4	+0.5	U-7	218	2-12-64	36.5	-0.7	V-7	446	2-18-64	35.5	-0.5
T-8	1094	3-6-64	39.1	+1.5	U-8	219	2-20-64	38.3	-3.0	V-8	447	2-25-64	33.7	+3.5
Current Machine Av.			36.2	+0.2	Current Machine Av.			34.5	-1.1	Current Machine Av.			34.8	+2.7

Machine W			
Mill Roll No.	Date Made	Insti- tute	P.s.i. Mill
W-1	445	1-15-64	36.2
W-2	571	1-20-64	37.6
W-3	69	2-3-64	35.9
W-4	142	2-5-64	35.3
W-5	485	2-17-64	34.3
W-6	855	2-28-64	36.4
W-7	62	3-3-64	37.8
Current Machine Av.			36.2

^aThis difference is the amount in p.s.i. units by which the mill result is higher or lower than the Institute result.

TABLE XXVI
 PART I: A COMPARATIVE SUMMARY FOR EACH MACHINE OF THE CONCORA FLAT CRUSH AVERAGES BASED ON INSTITUTE DATA AND THOSE BASED ON MILL DATA

Machine Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Number of Rolls Compared	6	8	2	6	8	5	8	8	8	6	8	6	0	5	6	8	8	5	8	8	8	8	7
Concora Flat Crush, p.s.i.																							
Current Machine Av. (Institute) ^a	35.6	34.6	41.6	36.0	37.1	39.6	33.8	34.9	31.9	36.9	35.5	33.2	--	39.1	34.5	37.1	36.0	35.0	32.8	36.2	34.5	34.8	36.2
Current Machine Av ₆ (Mill)	32.9	37.7	40.8	35.0	37.7	39.6	32.5	36.2	32.8	36.2	37.4	37.1	--	39.5	33.4	34.8	36.3	37.8	33.9	36.4	33.4	37.5	37.1
Average Difference	-2.7	+1.1	-0.8	-1.0	+0.6	0.0	-1.3	+1.3	+0.9	-0.7	+1.9	+3.9	--	+0.4	-1.1	-2.3	+0.3	+2.8	+1.1	+0.2	-1.1	+2.7	+0.9
Maximum Difference	-4.5	+3.0	-1.2	-2.3	+2.7	-2.8	-3.5	+3.2	+2.5	-2.2	+3.9	+9.2	--	+1.3	-4.8	-6.1	-2.8	+5.0	+2.4	+5.2	-3.0	+6.0	+3.3

PART II: A TABULATION FOR EACH MACHINE OF THE AVERAGE DIFFERENCE (PER CENT) BETWEEN THE CONCORA FLAT CRUSH BASED ON INSTITUTE DATA AND THAT BASED ON MILL DATA

Average Difference, % ^d	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Current Report (Feb.-March)	-7.6	+3.2	-1.9	-2.8	+1.6	0.0	-3.8	+3.7	+2.8	-1.9	+5.4	+11.7	--	+1.0	-3.2	-6.2	+0.8	+8.0	+5.4	+0.6	-3.2	+7.8	+2.5
105th Report (Dec.-Jan.)	-7.7	+4.6	-2.0	+6.2	+1.6	-3.6	--	+4.0	+5.2	+5.8	-1.0	+11.6	--	+0.5	+7.6	-6.5	+1.9	+5.6	+5.7	+5.2	--	-2.3	-0.5
104th Report (Oct.-Nov.)	-7.3	+3.9	+0.5	+5.6	+3.8	-1.8	+8.6	+3.9	-1.9	+4.0	+2.9	--	--	+1.0	+7.1	-8.8	+0.3	+12.4	-4.5	+2.8	+1.9	+2.3	-5.9

^a Comparisons based on current machine average include only those rolls for which mill data were submitted.
^b Average difference is the difference between the current machine average based on Institute test results and that based on mill test results with the Institute test results used as the reference. See Table XXV.
^c Maximum difference is the greatest difference encountered in comparing Institute and mill test averages for individual rolls. See Table XXV.
^d Average difference (per cent) is computed by dividing the average difference in p.s.i. (shown above in Part I of this table) by the Institute current machine average and multiplying the result by 100.

from the previous bimonthly period are also included. The data shown for the current period indicate that agreement between Institute and mill Concora data was good. For example, it may be seen in Table XXVII that, for the current period, 18.2% of the comparisons of Institute and mill data differed by 1% or less, 36.4% of the comparisons differed by 2.5% or less, and 72.7% of the comparisons differed by 5% or less. It may be further noted that agreement for the current period at the 1 and 2.5% levels was about the same as the satisfactory levels of agreement for the previous period at these levels, whereas agreement for the current period at the 5% level was somewhat better than the agreement obtained during the previous period at this level. The maximum difference of 11.7% noted for the current period was approximately the same as the maximum difference of 11.6% noted for the previous period.

TABLE XXVII

SUMMARY OF AGREEMENT BETWEEN INSTITUTE AND MILL
CONCORA FLAT CRUSH DATA

Average Percentage Difference Between Institute and Mill Concora ^a Flat Crush Test Results	Percentage of All Machines Included Within the Indicated Range	
	Previous Period ^b	Current Period ^c
+ 1.0	15.0	18.2
+ 2.5	35.0	36.4
+ 5.0	50.0	72.7
+ 10.0	95.0 ^d	95.5
+ 11.7	100.0	100.0

^aThe average obtained at the Institute was used as the reference in the calculation of the percentage differences.

^bDecember, 1963, and January, 1964.

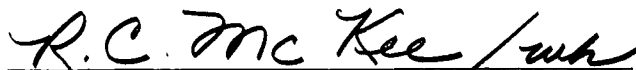
^cFebruary and March, 1964.

^dMaximum percentage difference was 11.6.

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