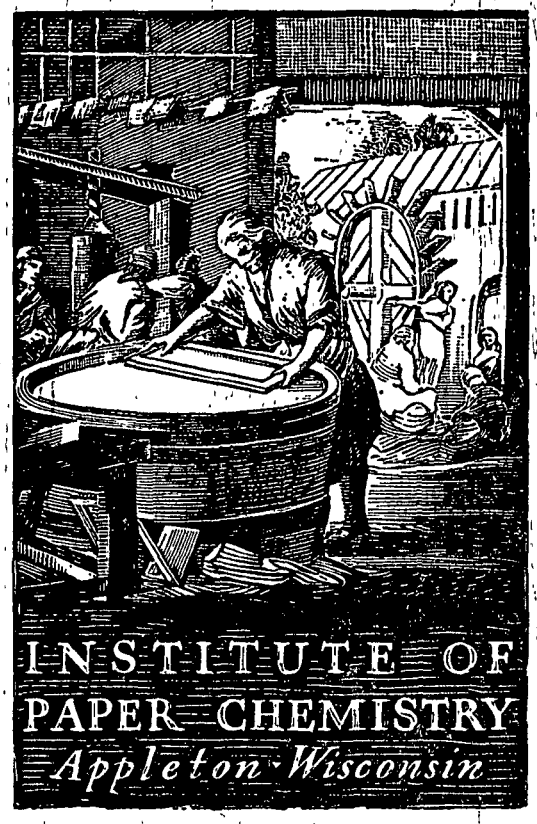

CONTINUOUS EVALUATION OF CORRUGATING MEDIUM

Project 1108-17

Report 105

A Progress Report

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

February 1, 1964

CODE LETTERS FOR PROGRESS REPORT 105
Project 1108-17

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

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

CONTINUOUS EVALUATION OF CORRUGATING MEDIUM

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THE INSTITUTE OF PAPER CHEMISTRY

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 December, 1963 and January, 1964, on 150 rolls of corrugating medium representing the production of twenty-three machines. Each of these 150 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

December, 1963 and January, 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	4	Semichemical	27.2	10.7	36.4	29.5
B	8	Semichemical	26.2	10.1	33.3	28.6
C	8	Bogus	27.3	10.3	33.4	29.3
D	8	Semichemical	27.0	10.7	35.0	29.8
E	8	Bogus	26.8	9.5	33.9	30.8
F	8	Bogus	28.3	10.9	39.8	33.4
G	6	Kraft	27.7	9.5	34.1	29.0
H	7	Semichemical	27.5	10.8	35.2	31.4
I	8	Semichemical	27.0	10.0	37.2	32.5
J	3	Semichemical	26.4	10.6	38.6	34.1
K	7	Semichemical	26.2	8.8	37.8	32.2
L	8	Semichemical	26.2	10.1	34.9	29.9
M	4	Semichemical	27.1	10.3	39.8	35.8
N	8	Semichemical	27.1	10.4	32.7	30.4
O	8	Semichemical	26.2	10.6	32.3	27.9
P	6	Semichemical	27.0	10.7	36.3	32.2
Q	7	Semichemical	26.4	10.1	37.5	33.4
R	6	Semichemical	27.7	10.9	34.3	30.3
S	8	Semichemical	26.9	10.2	38.1	32.9
T	2	Semichemical	See Note [a]			
U	8	Semichemical	27.8	10.7	35.2	30.2
V	8	Semichemical	26.3	10.7	35.3	30.6
W	2	Bogus	See Note [a]			
Total	150					
Current F.K.I. average			27.0	10.3	35.8	31.1
Cumulative F.K.I. average			27.0	10.3	36.3	32.7
F.K.I. index, %			100.0	100.0	98.5	95.4

[a] Current 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.

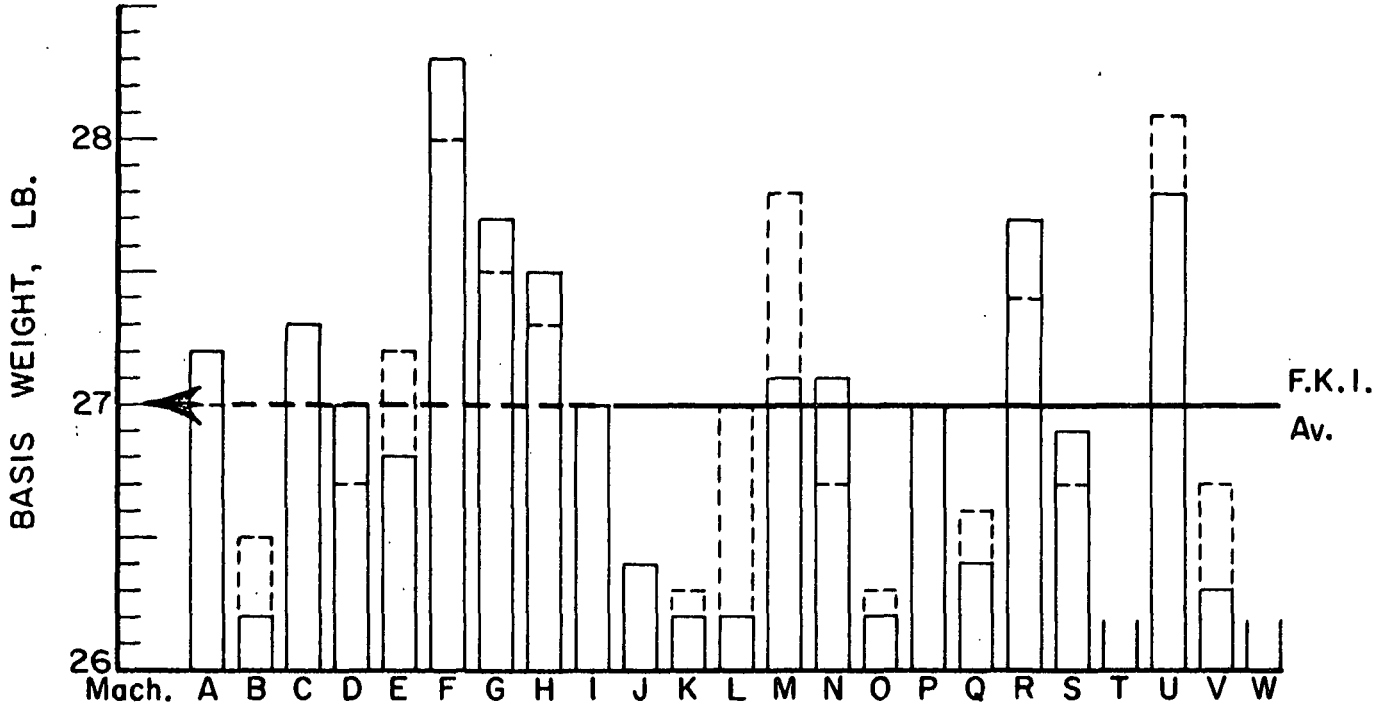

Figure 1. Comparison of Basis Weight Results

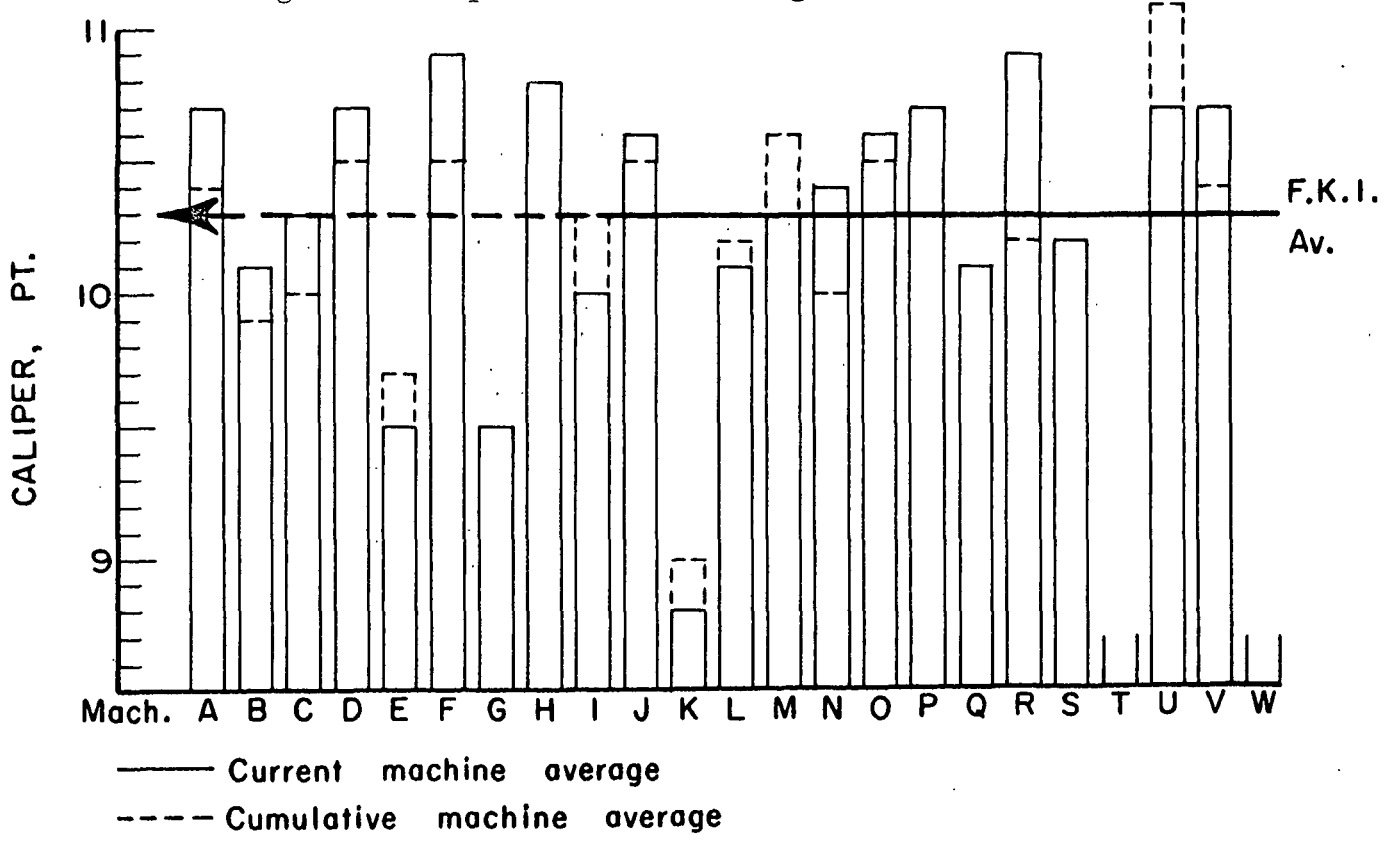

Figure 2. Comparison of Caliper Results

Note: Machine T and W—insufficient data.

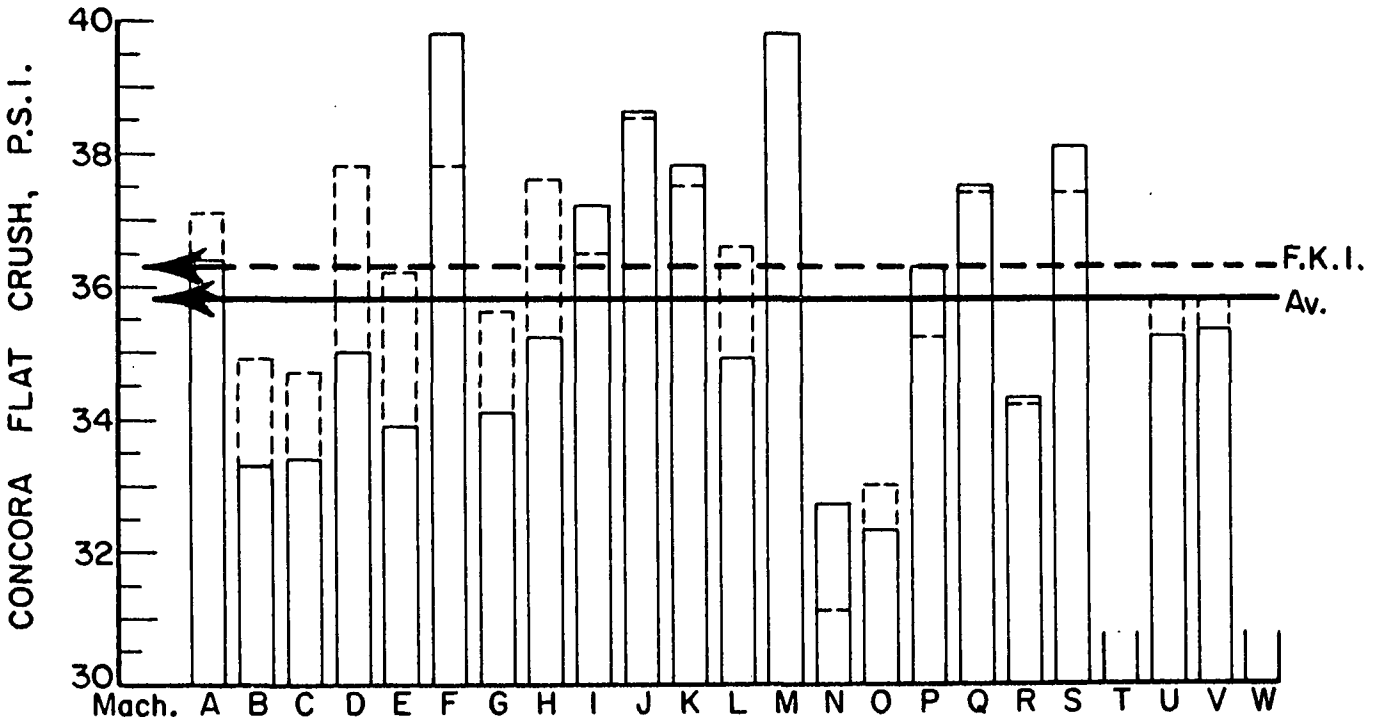

Figure 3. Comparison of Concora Flat Crush Results

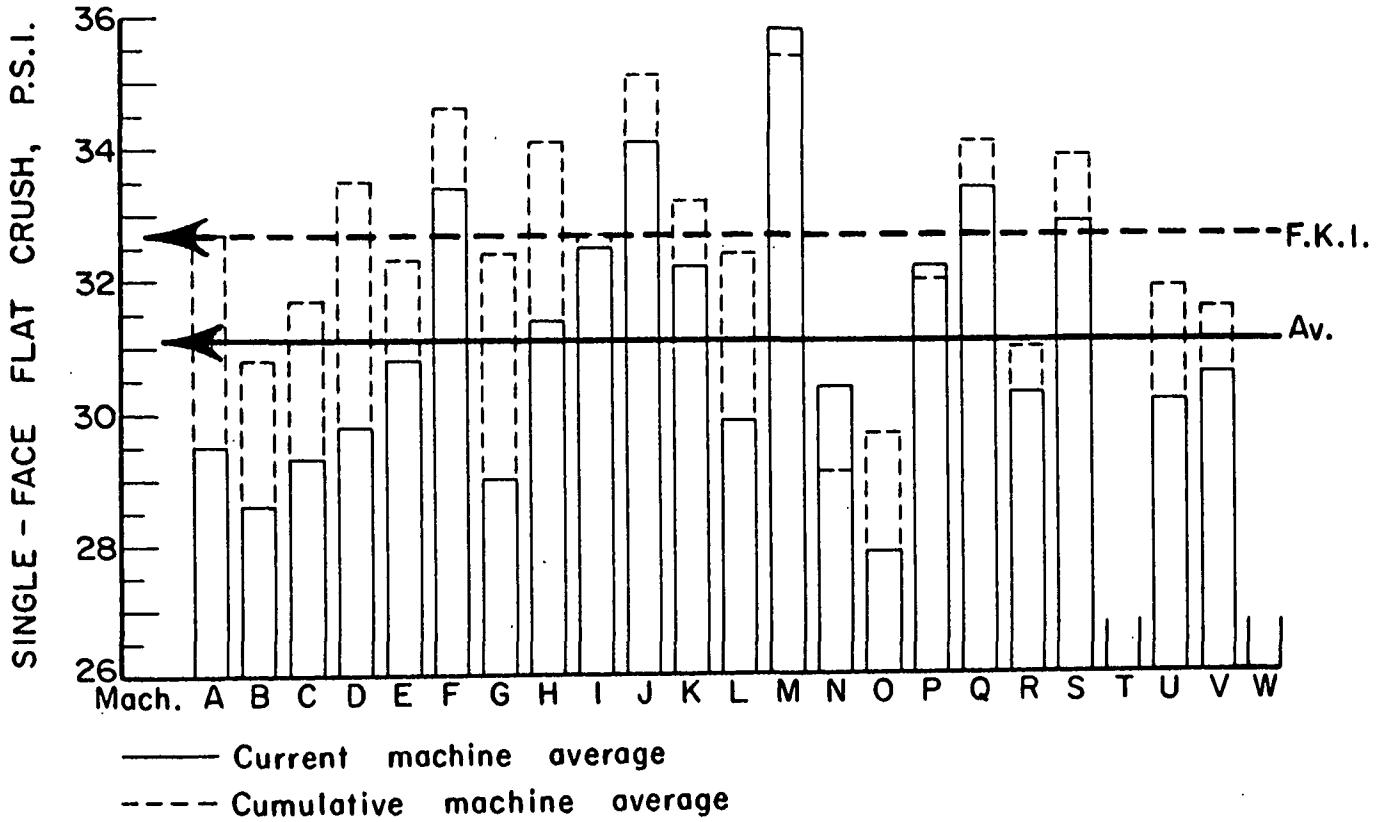

Figure 4. Comparison of Single-Face Flat Crush Results

Note: Machine T and W—insufficient data.

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 sample lots 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 sample lot are shown for all tests except basis weight for which only the average is shown; in addition, the over-all average result for all sample lots submitted from 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

TABLE II

SUMMARY OF TEST RESULTS FOR MACHINE A

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
A-1	[illegible]	12-19-63	253	27.4	10.6	10.0	10.3	40.2	34.2	37.0	32.0	29.8	30.6	1/2
A-2	11-25-63	12-19-63	254	27.4	11.1	10.2	10.9	39.6	34.2	37.1	31.6	29.2	31.0	1
A-3	11-30-63	12-19-63	255	27.2	11.1	10.7	10.9	37.2	33.0	35.6	31.4	27.2	28.8	1
A-4	12- 5-63	12-19-63	256	27.1	11.0	10.2	10.6	37.8	33.6	35.8	28.6	26.4	27.4	1-1/2
Current machine average				27.2			10.7			36.4			29.5	
Cumulative machine average				27.0			10.4			37.1			32.7	
Machine factor, %				100.9			102.3			98.0			90.1	
Machine index, %				101.0			104.0			100.1			90.2	

TABLE III

SUMMARY OF TEST RESULTS FOR MACHINE B

December, 1963 and January, 1964
(Type of Medium: Semichemical)

B-1	11-24-63	11-29-63	92	25.6	10.8	10.0	10.2	35.4	30.0	32.2	28.0	26.8	27.3	1-1/2
B-2	12- 4-63	12-10-63	93	25.8	10.9	9.9	10.4	33.6	28.2	31.1	29.4	26.6	28.2	1-1/2
B-3	12-12-63	12-18-63	94	26.6	10.2	9.2	9.9	34.8	31.2	32.9	27.4	24.6	26.2	1-1/2
B-4	12-18-63	12-26-63	95	26.3	10.2	9.6	9.8	35.4	30.0	32.5	31.6	27.4	29.8	1-1/2
B-5	12-27-63	1- 6-64	96	26.3	10.2	9.5	9.9	39.6	34.8	37.7	33.0	31.0	32.0	1-1/2
B-6		1-13-64	97	26.2	10.3	9.9	10.0	34.8	32.4	33.1	28.0	26.2	27.4	1-1/2
B-7	1-20-64	1-23-64	98	26.4	10.9	9.5	10.2	37.2	27.0	33.4	29.4	26.4	27.8	1-1/2
B-8	1-23-64	1-28-64	99	26.2	10.2	9.3	9.8	34.2	31.8	33.4	32.2	28.6	30.3	1-1/2
Current machine average				26.2			10.1			33.3			28.6	
Cumulative machine average				26.5			9.9			34.9			30.8	
Machine factor, %				98.8			101.7			95.2			93.1	
Machine index, %				97.0			97.9			91.6			87.6	

TABLE IV

SUMMARY OF TEST RESULTS FOR MACHINE C

December, 1963 and January, 1964
(Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
C-1	11- 2-63	12- 4-63	104	26.7	10.7	9.8	10.1	34.8	31.8	33.4	31.4	28.0	29.6	1-1/2
C-2	11- 8-63	12- 4-63	105	26.9	10.3	9.8	10.1	34.2	31.2	33.0	29.4	28.4	28.8	1-1/2
C-3	11-15-63	12- 4-63	106	27.1	10.6	9.8	10.0	34.2	30.0	32.8	31.4	28.8	30.4	1-1/2
C-4	11-23-63	12- 4-63	107	27.0	10.8	9.6	10.1	34.8	31.8	34.0	32.8	30.0	31.0	1-1/2
C-5	12- 2-63	12-27-63	108	27.9	11.2	10.2	10.8	35.4	30.0	32.9	29.4	26.8	28.3	1-1/2
C-6	12-11-63	12-27-63	109	28.4	11.5	10.3	10.9	36.0	33.0	34.0	32.0	28.6	30.5	1-1/2
C-7	12-15-63	12-27-63	110	27.0	10.3	9.8	10.1	37.2	31.8	33.5	29.6	28.0	28.7	1-1/2
C-8	12-18-63	12-27-63	111	26.9	10.7	10.0	10.3	36.0	31.2	33.8	28.0	25.4	26.6	1-1/2
Current machine average				27.3			10.3			33.4			29.3	
Cumulative machine average				27.3			10.0			34.7			31.7	
Machine factor, %				100.0			102.6			96.3			92.4	
Machine index, %				101.0			100.0			92.0			89.6	

TABLE V

SUMMARY OF TEST RESULTS FOR MACHINE D

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
D-1	12-18-63	12-26-63	--	26.5	10.7	10.0	10.3	33.6	31.2	32.4	29.2	27.2	28.5	1-1/2
D-2	12-18-63	12-26-63	--	26.7	10.9	10.2	10.5	34.8	31.8	33.2	30.6	28.0	29.0	1-1/2
D-3	12-20-63	12-30-63	--	27.0	11.0	10.4	10.8	34.8	31.8	33.8	33.0	31.6	32.1	1-1/2
D-4	12-21-63	12-30-63	--	27.4	11.0	10.4	10.8	36.6	34.2	35.4	32.8	30.8	31.9	1-1/2
D-5	1- 5-64	1-17-64	--	26.8	11.0	10.3	10.6	39.0	35.4	37.4	30.8	29.8	30.3	1
D-6	1-10-64	1-17-64	--	27.7	11.0	10.8	11.0	37.8	34.2	35.8	30.2	28.6	29.2	1/2
D-7	1-14-64	1-17-64	--	27.2	11.2	10.7	10.9	37.2	34.2	34.8	29.8	28.4	29.2	1/2
D-8	1-15-64	1-17-64	--	26.5	10.8	10.2	10.5	39.0	34.2	36.8	28.8	27.2	28.0	1/2
Current machine average				27.0			10.7			35.0			29.8	
Cumulative machine average				26.7			10.5			37.8			33.5	
Machine factor, %				101.1			102.1			92.5			88.9	
Machine index, %				100.0			104.0			96.3			91.2	

TABLE VI

SUMMARY OF TEST RESULTS FOR MACHINE E

December, 1963 and January, 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.	Av.	Max.	Min.	Av.	Max.	Min.	Av.	
E-1	11- 4-63	12- 4-63	204	27.2	10.0	9.0	9.6	34.8	32.4	33.5	34.4	31.2	32.4	1-1/2
E-2	11-11-63	12- 4-63	205	26.5	10.0	9.1	9.7	37.8	33.0	35.0	33.8	32.2	32.9	1-1/2
E-3	11-15-63	12- 4-63	206	26.5	9.7	8.6	9.2	36.6	33.0	34.7	31.8	30.0	30.8	1-1/2
E-4	11-23-63	12- 4-63	207	25.6	9.8	8.9	9.4	33.6	31.8	32.9	27.8	26.0	27.1	1-1/2
E-5	12- 5-63	12-27-63	208	25.6	9.9	9.0	9.4	34.2	29.4	31.6	27.8	25.2	26.5	1-1/2
E-6	12-14-63	12-27-63	209	26.8	9.9	8.0	9.2	34.2	30.6	32.4	30.4	27.8	29.4	1-1/2
E-7	12-15-63	12-27-63	210	28.3	10.2	9.7	9.9	37.8	34.2	36.1	34.4	32.4	33.2	1-1/2
E-8	12-18-63	12-27-63	211	28.3	10.0	9.4	9.8	36.6	33.6	35.3	35.0	33.0	34.0	1-1/2
Current machine average				26.8			9.5			33.9			30.8	
Cumulative machine average				27.2			9.7			36.2			32.3	
Machine factor, %				98.6			98.3			93.8			95.5	
Machine index, %				99.5			92.7			93.4			94.3	

TABLE VII

SUMMARY OF TEST RESULTS FOR MACHINE F

December, 1963 and January, 1964
(Type of Medium: Bogus)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
F-1		12-20-63	430	28.2	11.2	10.0	10.7	40.2	34.8	38.2	32.4	30.6	32.0	1-1/2
F-2		12-20-63	431	28.2	11.2	10.8	11.0	40.2	35.4	38.3	33.6	30.6	32.5	1
F-3		12-20-63	432	28.2	11.2	10.1	10.8	43.8	34.8	38.3	34.2	31.4	33.0	1-1/2
F-4		12-20-63	433	28.2	11.3	10.1	10.9	42.6	36.6	39.4	35.4	32.4	33.2	1-1/2
F-5		1-23-64	434	28.1	11.3	10.2	10.8	45.6	36.0	41.0	35.8	33.0	34.1	1
F-6		1-23-64	435	28.1	11.2	10.5	10.9	43.8	40.2	41.8	33.6	31.4	32.7	1
F-7		1-23-64	436	28.9	11.3	10.5	10.9	45.6	39.0	42.0	38.0	34.2	36.4	1-1/2
F-8		1-23-64	437	28.7	11.8	10.6	11.0	41.4	37.8	39.5	34.2	32.2	33.0	1-1/2
Current machine average				28.3			10.9			39.8			33.4	
Cumulative machine average				28.0			10.5			37.8			34.6	
Machine factor, %				101.3			103.3			105.2			96.4	
Machine index, %				104.9			106.1			109.6			102.1	

TABLE VIII

SUMMARY OF TEST RESULTS FOR MACHINE G

December, 1963 and January, 1964
(Type of Medium: Kraft)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
G-1	12- 5-63	12-12-63	29	26.8	10.0	8.8	9.3	34.8	33.0	34.1	31.6	28.8	30.3	1-1/2
G-2	12- 5-63	12-12-63	30	27.1	9.5	8.8	9.1	37.2	34.8	35.6	31.0	30.0	30.5	1-1/2
G-3	12- 5-63	12-12-63	31	28.6	10.0	9.3	9.8	35.4	31.8	33.6	28.8	26.0	27.6	1-1/2
G-4	12- 5-63	12-12-63	32	28.3	10.4	9.1	9.8	37.8	31.2	34.1	29.6	28.0	29.0	1-1/2
G-5	12-23-63	1- 7-64	33	27.7	9.5	8.9	9.2	35.4	30.6	33.2	29.4	26.0	27.8	1-1/2
G-6	12-23-63	1- 7-64	34	27.7	10.0	9.2	9.6	37.2	31.8	33.7	30.4	27.6	29.2	1-1/2
Current machine average				27.7			9.5			34.1			29.0	
Cumulative machine average				27.5			9.5			35.6			32.4	
Machine factor, %				100.7			100.0			95.7			89.6	
Machine index, %				102.7			92.2			93.8			88.9	

TABLE IX

SUMMARY OF TEST RESULTS FOR MACHINE H

December, 1963 and January, 1964
(Type of Medium: Semichemical)

H-1	11- 7-63	12- 6-63	433	27.8	11.8	10.7	10.9	37.8	34.8	36.0	33.0	30.4	31.8	1/2
H-2	11-14-63	12- 6-63	434	27.6	11.2	10.9	11.0	37.8	34.2	35.8	32.2	30.2	31.0	1
H-3	11-20-63	12- 6-63	435	27.1	11.4	10.9	11.1	36.6	33.6	35.6	31.8	29.6	30.8	1
H-4	11-25-63	12- 6-63	436	28.2	11.1	10.0	10.8	40.2	34.2	37.1	34.2	30.6	31.9	1
H-5	12- 4-63	12-30-63	437	27.1	11.0	10.6	10.8	34.8	32.4	33.5	33.6	28.6	30.8	1/2
H-6	12- 9-63	12-30-63	438	28.1	10.3	9.8	10.0	36.6	33.0	35.2	31.6	30.0	31.1	1-1/2
H-7	12-18-63	12-30-63	439	26.8	11.0	10.6	10.8	36.0	30.6	33.1	34.2	31.4	32.3	1-1/2
Current machine average				27.5			10.8			35.2			31.4	
Cumulative machine average				27.3			10.8			37.6			34.1	
Machine factor, %				100.8			100.0			93.7			92.0	
Machine index, %				102.1			105.1			96.8			96.1	

TABLE X

SUMMARY OF TEST RESULTS FOR MACHINE I

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
I-1	12- 9-63	12-26-63	--	27.4	10.2	10.0	10.1	43.8	36.6	39.2	36.4	32.8	34.9	1-1/2
I-2	12-10-63	12-26-63	--	26.9	10.6	9.8	10.1	37.8	33.0	35.2	32.6	30.6	31.4	1-1/2
I-3	12-12-63	12-26-63	--	27.6	10.5	9.8	10.1	41.4	36.0	38.4	34.6	33.2	33.9	1-1/2
I-4	12-15-63	12-26-63	--	26.8	10.8	9.5	10.0	37.2	32.4	35.6	32.8	31.2	31.8	1-1/2
I-5	1- 5-64	1-17-64	--	27.2	10.0	9.3	9.8	42.0	37.8	39.7	34.4	33.2	33.9	1-1/2
I-6	1- 6-64	1-27-64	--	26.6	10.1	9.9	10.0	37.8	33.0	36.0	31.6	30.2	30.7	1
I-7	1- 7-64	1-27-64	--	26.5	9.7	9.3	9.6	38.4	35.4	37.3	32.6	30.8	31.6	1-1/2
I-8	1- 9-64	1-27-64	--	27.1	10.1	9.9	10.0	38.4	34.8	36.5	33.0	30.8	31.8	1-1/2
Current machine average				27.0			10.0			37.2			32.5	
Cumulative machine average				27.0			10.3			36.5			32.7	
Machine factor, %				100.0			96.6			102.0			99.3	
Machine index, %				100.0			97.0			102.5			99.5	

TABLE XI

SUMMARY OF TEST RESULTS FOR MACHINE J

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
J-1	12- 3-63	12-17-63	368	26.6	11.1	10.1	10.7	40.2	37.8	39.0	35.4	33.6	34.8	1-1/2
J-2	12-17-63	12-26-63	369	26.7	11.0	10.2	10.6	39.6	34.8	37.1	33.6	32.4	33.0	1-1/2
J-3	1- 9-64	1-17-64	370	25.9	10.9	10.0	10.4	41.4	37.8	39.6	35.4	33.4	34.4	1
Current machine average				26.4			10.6			38.6			34.1	
Cumulative machine average				26.4			10.5			38.5			35.1	
Machine factor, %				100.0			101.0			100.1			97.2	
Machine index, %				97.7			103.2			106.2			104.3	

TABLE XII

SUMMARY OF TEST RESULTS FOR MACHINE K

December, 1963 and January, 1964
(Type of Medium: Semichemical)

K-1	11-21-63	12- 3-63	569	27.1	10.0	9.1	9.6	43.2	38.4	40.7	37.4	35.8	36.6	1
K-2	12- 6-63	12-16-63	570	25.2	8.3	8.0	8.1	37.8	35.4	37.1	31.8	28.6	30.4	1-1/2
K-3	12-19-63	12-31-63	571	26.4	8.9	8.7	8.8	39.0	33.6	36.2	33.2	31.6	32.2	1/2
K-4	12-19-63	12-30-63	572	25.1	8.7	8.0	8.3	35.4	31.8	33.7	28.6	26.4	27.2	Min.
K-5	1-10-64	1-20-64	573	26.7	9.0	8.9	9.0	40.8	36.0	39.6	34.8	32.4	33.6	1-1/2
K-6	1-11-64	1-20-64	574	26.9	9.3	9.0	9.0	41.4	37.8	39.8	35.0	32.4	33.8	1/2
K-7	1-17-64	1-27-64	575	25.9	9.0	8.4	8.7	39.0	37.2	37.7	32.4	29.6	31.7	Min.
Current machine average				26.2			8.8			37.8			32.2	
Cumulative machine average				26.3			9.0			37.5			33.2	
Machine factor, %				99.5			98.0			100.8			97.1	
Machine index, %				97.1			85.6			104.2			98.6	

TABLE XIII

SUMMARY OF TEST RESULTS FOR MACHINE L

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
L-1	11-20-63	11-27-63	1037	26.5	10.7	10.1	10.4	39.0	33.0	36.1	35.0	31.6	32.8	1-1/2
L-2	11-20-63	11-27-63	1038	26.2	10.8	10.0	10.5	41.4	30.0	34.6	33.0	30.8	31.8	1-1/2
L-3	12-13-63	12-26-63	1045	26.8	11.2	10.0	10.4	38.4	31.8	34.3	30.8	25.0	28.3	1-1/2
L-4	12-13-63	12-26-63	1046	27.0	10.9	10.2	10.6	39.6	28.8	34.2	30.0	27.4	28.8	1-1/2
L-5	12-31-63	1- 7-64	1053	26.3	10.4	9.7	10.0	40.8	33.0	36.2	31.4	28.6	29.9	1-1/2
L-6	12-31-63	1- 7-64	1054	26.0	10.7	9.2	9.9	39.0	30.6	34.9	30.4	26.8	29.0	1-1/2
L-7	1-16-64	1-22-64	1061	26.0	9.8	8.7	9.4	34.8	33.0	33.8	32.6	27.0	29.7	1-1/2
L-8	1-16-64	1-22-64	1062	25.1	10.0	8.7	9.4	37.2	33.0	35.0	30.8	35.2	28.7	1-1/2
Current machine average				26.2			10.1			34.9			29.9	
Cumulative machine average				27.0			10.2			36.6			32.4	
Machine factor, %				97.1			99.2			95.3			92.2	
Machine index, %				97.3			98.2			96.1			91.5	

TABLE XIV

SUMMARY OF TEST RESULTS FOR MACHINE M

December, 1963 and January, 1964
(Type of Medium: Semichemical)

M-1	10-16-63	1- 8-64	552	27.8	10.9	10.3	10.6	42.6	37.8	41.0	37.8	34.0	35.7	Min.
M-2	10-18-63	1- 8-64	553	27.3	10.6	10.0	10.3	42.6	36.0	39.6	36.6	33.6	35.6	Min.
M-3	11-10-63	1- 8-64	554	27.1	11.0	9.0	10.0	43.8	37.8	41.5	37.6	34.2	35.3	1
M-4	11- 9-63	1- 8-64	555	26.3	10.8	10.0	10.4	38.4	34.2	37.0	39.0	34.8	36.5	1
Current machine average				27.1			10.3			39.8			35.8	
Cumulative machine average				27.8			10.6			39.8			35.4	
Machine factor, %				97.4			97.6			100.0			101.1	
Machine index, %				100.5			100.0			109.5			109.5	

TABLE XV

SUMMARY OF TEST RESULTS FOR MACHINE N

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
N-1	11-21-63	12- 5-63	K-17	26.5	10.3	9.9	10.1	33.6	30.0	31.2	28.8	26.8	27.8	1-1/2
N-2	11-22-63	12- 5-63	K-18	27.4	10.3	9.7	10.0	31.8	28.8	30.5	31.2	28.8	29.8	1-1/2
N-3	11-22-63	12- 5-63	K-19	26.9	10.8	9.9	10.5	32.4	30.0	31.4	31.0	28.8	30.0	1-1/2
N-4	11-22-63	12- 5-63	K-20	27.0	10.2	9.5	9.9	31.8	30.6	31.3	31.2	29.6	30.4	1-1/2
N-5	12- 5-63	12-30-63	L-1	27.0	11.0	10.0	10.6	33.0	30.0	31.7	31.4	29.4	30.4	1-1/2
N-6	12- 6-63	12-30-63	L-3	27.1	11.4	10.5	11.0	34.2	30.6	32.4	31.0	29.0	29.9	1
N-7	12-16-63	12-30-63	L-4	27.6	12.7	9.2	10.5	42.6	37.8	40.4	38.2	35.0	37.1	Note [a]
N-8	12-17-63	12-30-63	L-5	26.9	12.0	9.3	10.7	34.8	30.6	32.6	28.6	27.2	27.8	Min.
Current machine average				27.1			10.4			32.7			30.4	
Cumulative machine average				26.7			10.0			31.1			29.1	
Machine factor, %				101.5			104.0			105.2			104.3	
Machine index, %				100.2			101.5			90.0			93.0	

[a]Maximum speed at which this roll could be corrugated with minimum tension was 525 f.p.m.

TABLE XVI

SUMMARY OF TEST RESULTS FOR MACHINE O

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
0-1	11-24-63	11-29-63	92	26.0	10.9	10.1	10.3	32.4	30.0	31.2	27.8	25.8	26.5	1-1/2
0-2	12- 4-63	12-10-63	93	26.5	11.9	10.8	11.2	33.6	31.2	32.5	31.0	28.8	29.9	1-1/2
0-3	12-12-63	12-18-63	94	26.5	11.5	11.0	11.1	33.6	30.6	31.9	30.4	28.0	29.0	1-1/2
0-4	12-18-63	12-26-63	95	26.5	11.1	10.8	10.9	31.8	28.2	30.4	27.8	26.2	27.1	1-1/2
0-5	1- 2-64	1- 6-64	96	25.7	11.0	10.5	10.8	31.2	28.2	28.9	25.6	24.4	25.0	1-1/2
0-6		1-13-64	97	26.6	10.8	9.7	10.3	37.2	34.8	36.0	31.8	30.0	30.8	1-1/2
0-7	1-19-64	1-23-64	98	25.3	10.8	10.0	10.4	37.2	28.8	33.1	28.0	26.2	26.8	1-1/2
0-8	1-22-64	1-28-64	99	26.4	10.1	9.8	10.0	36.0	33.6	34.7	29.2	27.4	28.4	1-1/2
Current machine average				26.2			10.6			32.3			27.9	
Cumulative machine average				26.3			10.5			33.0			29.7	
Machine factor, %				99.7			101.2			98.0			94.2	
Machine index, %				97.0			103.5			89.0			85.6	

TABLE XVII

SUMMARY OF TEST RESULTS FOR MACHINE P

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
P-1	11- 9-63	12-13-63	34	26.9	11.2	10.2	10.7	39.0	35.4	37.1	34.4	32.4	33.7	1
P-2	11-21-63	12-13-63	35	27.0	11.2	10.9	11.0	36.6	34.2	35.0	33.2	31.6	32.3	1
P-3	11-26-63	12-13-63	36	26.9	11.1	10.6	10.9	37.2	33.0	35.3	33.4	32.2	33.0	1
P-4	12- 6-63	1-16-64	37	26.8	10.8	10.2	10.5	38.4	35.4	36.6	31.2	29.6	30.4	1/2
P-5	12- 9-63	1-16-64	38	27.0	10.9	10.2	10.6	39.6	34.8	36.5	32.0	29.4	31.2	1
P-6	12-17-63	1-16-64	39	27.4	10.7	10.0	10.1	38.4	35.4	37.3	33.2	31.8	32.6	1-1/2
Current machine average				27.0			10.7			36.3			32.2	
Cumulative machine average				27.0			10.7			35.2			32.0	
Machine factor, %				100.0			100.0			103.0			100.5	
Machine index, %				100.0			103.8			100.0			98.6	

TABLE XVIII

SUMMARY OF TEST RESULTS FOR MACHINE Q

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
Q-1	11-28-63	12-13-63	758	26.2	10.2	9.6	9.9	38.4	36.6	37.8	33.4	31.6	32.4	Min.
Q-2	12- 6-63	12-19-63	154	26.7	10.0	9.0	9.7	40.2	38.4	39.0	35.4	34.2	34.9	Min.
Q-3	12- 9-63	12-19-63	243	26.3	10.0	9.0	9.6	37.8	34.2	36.5	37.2	33.0	34.5	Note [a]
Q-4	12-16-63	12-26-63	459	26.3	10.7	9.5	10.0	36.0	30.6	34.4	30.8	29.8	30.4	1/2
Q-5	12-30-63	1-13-64	723	27.3	11.3	10.5	10.9	42.0	37.8	40.1	36.4	34.4	35.4	Note [b]
Q-6	1- 1-64	1-17-64	6	25.8	10.9	10.0	10.4	41.4	34.8	38.2	35.4	29.2	33.3	Note [c]
Q-7	1- 6-64	1-17-64	178	26.5	10.9	10.0	10.4	39.6	34.8	36.8	34.8	32.2	33.2	Min.
Current machine average				26.4			10.1			37.5			33.4	
Cumulative machine average				26.6			10.1			37.4			34.1	
Machine factor, %				99.2			100.0			100.3			98.1	
Machine index, %				98.0			98.6			103.4			102.4	

[a] Maximum speed at which this roll could be corrugated with minimum tension was 475 f.p.m.

[b] Maximum speed at which this roll could be corrugated with minimum tension was 525 f.p.m.

[c] Maximum speed at which this roll could be corrugated with minimum tension was 450 f.p.m.

TABLE XIX

SUMMARY OF TEST RESULTS FOR MACHINE R

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
R-1	11-20-63	12- 3-63	38	27.1	12.0	9.8	11.0	34.8	30.0	33.1	30.6	28.8	29.5	Min.
R-2	11-27-63	12- 6-63	39	28.0	13.6	12.3	12.8	40.8	31.2	35.4				Note [a]
R-3	12- 3-63	12-16-63	40	27.0	10.0	9.5	9.9	37.8	34.8	36.1	31.0	29.4	30.1	1/2
R-4	12-17-63	12-31-63	41	27.5	10.8	9.0	9.6	38.4	32.4	35.2	31.8	30.4	31.2	1-1/2
R-5	12-31-63	1-14-64	42	28.7	10.9	10.0	10.6	32.4	28.8	31.1	32.8	29.6	30.7	1-1/2
R-6	1- 8-64	1-14-64	1	28.2	12.8	10.7	11.6	37.8	33.6	35.0	30.8	28.2	29.9	Min.
Current machine average				27.7			10.9			34.3			30.3	
Cumulative machine average				27.4			10.2			34.2			31.0	
Machine factor, %				101.4			106.4			100.4			97.7	
Machine index, %				102.8			106.1			94.5			92.7	

[a] Maximum speed at which this roll could be corrugated with minimum tension was 100 f.p.m.

TABLE XX

SUMMARY OF TEST RESULTS FOR MACHINE S

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
S-1	12- 9-63	12-26-63	--	26.3	10.2	9.8	10.0	37.8	34.2	36.8	34.0	33.0	33.5	1-1/2
S-2	12-15-63	12-26-63	--	26.8	10.0	9.6	9.9	40.8	36.0	38.4	34.4	32.8	33.6	1-1/2
S-3	12-18-63	12-26-63	--	26.9	10.5	9.8	10.0	42.0	39.0	40.4	36.2	33.6	34.4	1-1/2
S-4	12-20-63	12-30-63	--	28.2	10.8	10.4	10.6	42.0	37.2	40.1	33.8	32.2	33.1	1-1/2
S-5	1- 4-64	1-17-64	--	26.8	10.7	10.0	10.2	42.6	37.8	39.2	34.4	32.2	33.3	1-1/2
S-6	1- 5-64	1-17-64	--	26.8	10.3	10.0	10.2	39.0	36.0	37.4	32.8	30.8	32.0	1
S-7	1- 6-64	1-17-64	--	26.4	10.7	9.8	10.4	37.2	34.2	35.8	33.6	31.4	32.5	1-1/2
S-8	1-10-64	1-17-64	--	27.0	10.8	10.2	10.5	37.8	35.4	36.5	32.0	30.0	30.9	1
Current machine average				26.9			10.2			38.1			32.9	
Cumulative machine average				26.7			10.2			37.4			33.9	
Machine factor, %				100.6			100.0			101.7			97.2	
Machine index, %				99.7			99.6			104.8			100.8	

TABLE XXI

SUMMARY OF TEST RESULTS FOR MACHINE T

December, 1963 and January, 1964
(Type of Medium: Semichemical)

T-1	12- 3-63	12-16-63	701	26.8	11.0	10.0	10.6	40.8	36.0	38.6	38.0	34.6	36.4	1
T-2	1- 9-64	1-17-64	701	26.3	10.8	10.0	10.5	42.0	36.0	40.2	37.0	35.4	36.4	1-1/2
Current machine average				26.5			10.5			39.4			36.4	
Cumulative machine average				26.4			10.7			39.4			35.5	
Machine factor, %				100.5			98.7			100.0			102.5	
Machine index, %				98.3			102.6			108.5			111.4	

TABLE XXII

SUMMARY OF TEST RESULTS FOR MACHINE U

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
U-1	11-21-63	12- 4-63	1043	27.3	11.3	10.7	10.9	37.2	31.2	34.1	30.4	28.6	29.6	1
U-2	11-21-63	12- 4-63	1044	27.6	11.0	10.7	10.8	36.6	33.6	34.7	32.6	30.0	31.0	1-1/2
U-3	12-11-63	12-23-63	1051	27.6	10.8	10.2	10.5	34.8	32.4	33.5	29.0	26.4	27.8	1-1/2
U-4	12-11-63	12-23-63	1052	27.8	10.9	10.3	10.7	34.8	33.0	33.7	29.8	26.4	27.8	1-1/2
U-5	1- 7-64	1-15-64	1066	28.0	11.3	10.8	11.0	37.8	33.6	36.0	33.4	30.0	31.4	1
U-6	1- 7-64	1-15-64	1067	28.3	11.3	10.8	11.1	37.8	35.4	36.1	33.0	32.0	32.4	1
U-7	1-14-64	1-21-64	1074	28.1	10.7	10.2	10.4	41.4	36.0	38.2	32.6	31.4	31.8	1-1/2
U-8	1-14-64	1-21-64	1075	28.0	10.7	10.2	10.5	37.8	33.0	35.2	30.8	28.6	29.5	1-1/2
Current machine average				27.8			10.7			35.2			30.2	
Cumulative machine average				28.1			11.1			35.8			31.9	
Machine factor, %				99.0			96.8			98.2			94.7	
Machine index, %				103.2			104.6			96.8			92.4	

TABLE XXIII

SUMMARY OF TEST RESULTS FOR MACHINE V

December, 1963 and January, 1964
(Type of Medium: Semichemical)

Code	Date Made	Date Received	Mill Roll No.	Basis Weight, lb./M. sq. ft.	Caliper, points Max.	Caliper, points Min.	Caliper, points Av.	Concora Flat Crush, p.s.i. Max.	Concora Flat Crush, p.s.i. Min.	Concora Flat Crush, p.s.i. Av.	Single-Face Flat Crush, p.s.i. Max.	Single-Face Flat Crush, p.s.i. Min.	Single-Face Flat Crush, p.s.i. Av.	Runnability, maximum tension at 600 f.p.m., lb./in.
V-1	12- 4-63	1-22-64	764	26.1	10.9	10.3	10.6	36.0	34.8	35.2	30.8	29.2	29.9	1-1/2
V-2	12- 8-63	1-22-64	1669	26.4	10.9	10.2	10.6	36.6	33.6	35.5	32.4	30.4	31.6	1-1/2
V-3	12-16-63	1-22-64	3696	26.1	10.7	10.0	10.4	36.0	34.8	35.4	31.6	29.4	30.6	1-1/2
V-4	12-29-63	1-22-64	6049	26.4	11.0	10.3	10.6	38.4	34.2	36.4	31.4	29.6	30.4	1-1/2
V-5	1- 2-64	1-22-64	411	26.4	11.0	10.6	10.8	38.4	34.2	36.0	31.8	29.0	30.2	1-1/2
V-6	1- 5-64	1-22-64	1170	25.9	10.9	10.3	10.6	34.8	32.4	33.8	33.8	28.0	31.3	1-1/2
V-7	1-13-64	1-22-64	2959	26.7	11.2	10.7	10.9	36.0	34.8	35.2	31.8	29.6	30.8	1-1/2
V-8	1-14-64	1-22-64	3141	26.6	11.0	10.2	10.7	36.6	33.0	34.9	31.0	29.6	30.3	1-1/2
Current machine average				26.3			10.7			35.3			30.6	
Cumulative machine average				26.7			10.4			35.8			31.6	
Machine factor, %				98.7			102.6			98.6			96.9	
Machine index, %				97.5			103.8			97.2			93.8	

TABLE XXIV

SUMMARY OF TEST RESULTS FOR MACHINE W

December, 1963 and January, 1964
(Type of Medium: Bogus)

W-1	1-10-64	1-24-64	1	25.7	9.8	9.0	9.4	38.4	34.2	35.2	29.6	25.2	26.8	1-1/2
W-2	1-15-64	1-24-64	2	28.0	9.3	8.7	9.0	38.4	36.6	37.4	35.0	33.6	34.2	1-1/2
Current machine average				26.8			9.2			36.3			30.5	
Cumulative machine average				--			--			--			--	
Machine factor, %				--			--			--			--	
Machine index, %				99.4			90.0			100.0			93.4	

the current 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 (December, 1963 and January, 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.	28.3	26.2	27.0
Caliper, pt.	10.9	8.8	10.3
Concora flat crush, p.s.i.	39.8	32.3	35.8
Single-face flat crush, p.s.i.	35.8	27.9	31.1

The runnability data for the 150 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	5	3.3
600 f.p.m.—minimum tension	10	6.7
600 f.p.m.—1/2 lb. per in. tension	11	7.3
600 f.p.m.—1 lb. per in. tension	25	16.7
600 f.p.m.—1-1/2 lb. per in. tension	99	66.0

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 11.6% was associated with Machine W and the lowest of 0.5% with Machines J and Q.

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 CONCORA FLAT CRUSH TEST RESULTS ON INDIVIDUAL ROLLS FOR DECEMBER, 1963 AND JANUARY, 1964

Machine A

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
A-3	255	11-30-63	35.6	36.5	+0.9
A-4	256	12- 5-63	35.8	38.9	+3.1
Current Machine Av.			35.7	37.7	+2.0

Machine B

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
B-1	92	11-24-63	32.2	31.7	-0.5
B-2	93	12- 4-63	31.1	36.0	+4.9
B-4	95	12-18-63	32.5	35.6	+3.1
B-5	96	12-27-63	37.7	37.9	+0.2
Current Machine Av.			33.4	35.3	+1.9

Machine D

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
D-1	--	12-18-63	32.4	36.6	+4.2
D-2	--	12-18-63	33.2	37.4	+4.2
D-3	--	12-20-63	33.8	35.4	+1.6
D-4	--	12-21-63	35.4	40.3	+4.9
D-5	--	1- 5-64	37.4	35.2	-2.2
D-6	--	1-10-64	35.8	35.0	-0.8
D-7	--	1-14-64	34.8	35 9	+1.1
D-8	--	1-15-64	36.8	35.3	-1.5
Current Machine Av.			35.0	36.4	+1.4

Machine G

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
G-1	29	12- 5-63	34.1	38.2	+4.1
G-2	30	12- 5-63	35.6	37.4	+1.8
G-3	31	12- 5-63	33.6	34.1	+0.5
G-4	32	12- 5-63	34.1	35.2	+1.1
G-5	33	12-23-63	33.2	36.7	+3.5
G-6	34	12-23-63	33.7	35.9	+2.2
Current Machine Av.			34.1	36.2	+2.1

Machine H

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
H-1	433	11- 7-63	36.0	36.0	0.0
H-2	434	11-14-63	35.8	35.8	0.0
H-3	435	11-20-63	35.6	35.2	-0.4
H-4	436	11-25-63	37.1	33.5	-3.6
H-5	437	12- 4-63	33.5	33.5	0.0
H-6	438	12- 9-63	35.2	33.0	-2.2
H-7	439	12-18-63	33.1	33.5	+0.4
Current Machine Av.			35.2	34.4	-0.8

Machine I

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
I-1	--	12- 9-63	39.2	37.7	-1.5
I-2	--	12-10-63	35.2	36.6	+1.4
I-3	--	12-12-63	38.4	38.8	+0.4
I-4	--	12-15-63	35.6	37.8	+2.2
I-5	--	1- 5-64	39.7	39.7	0.0
I-6	--	1- 6-64	36.0	36.5	+0.5
I-7	--	1- 7-64	37.3	38.5	+1.2
I-8	--	1- 9-64	36.5	37.6	+1.1
Current Machine Av.			37.2	37.9	+0.7

Machine J

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
J-1	368	12- 3-63	39.0	38.4	-0.6
J-2	369	12-17-63	37.1	38.0	+0.9
J-3	370	1- 9-64	39.6	40.0	+0.4
Current Machine Av.			38.6	38.8	+0.2

Machine K

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
K-1	569	11-21-63	40.7	41.1	+0.4
K-2	570	12- 6-63	37.1	37.4	+0.3
K-3	571	12-19-63	36.2	38.8	+2.6
K-4	572	12-19-63	33.7	35.0	+1.3
K-5	573	1-10-64	39.6	39.5	-0.1
K-6	574	1-11-64	39.8	40.0	+0.2
K-7	575	1-17-64	37.7	37.3	-0.4
Current Machine Av.			37.8	38.4	+0.6

Machine L

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
L-1	1037	11-20-63	36.1	36.7	+0.6
L-2	1038	11-20-63	34.6	35.1	+0.5
L-3	1045	12-13-63	34.3	39.6	+5.3
L-4	1046	12-13-63	34.2	39.4	+5.2
L-5	1053	12-31-63	36.2	36.3	+0.1
L-6	1054	12-31-63	34.9	36.1	+1.2
L-7	1061	1-16-64	33.8	35.5	+1.7
L-8	1062	1-16-64	35.0	35.1	+0.1
Current Machine Av.			34.9	36.7	+1.8

[a]Please see page 27 for footnote.

TABLE XXV (Continued)

INSTITUTE AND MILL CONCORA FLAT CRUSH TEST RESULTS ON INDIVIDUAL ROLLS FOR DECEMBER, 1963 AND JANUARY, 1964

Machine M

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
M-1	552	10-16-63	41.0	40.2	-0.8
M-2	553	10-18-63	39.6	38.2	-1.4
M-3	554	11-10-63	41.5	39.7	-1.8
M-4	555	11- 9-63	37.0	37.8	+0.8
Current Machine Av.			39.8	39.0	-0.8

Machine N

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
N-1	K-17	11-21-63	31.2	34.0	+2.8
N-2	K-18	11-22-63	30.5	32.0	+1.5
N-3	K-19	11-22-63	31.4	33.0	+1.6
N-4	K-20	11-22-63	31.3	34.2	+2.9
N-5	L-1	12- 5-63	31.7	32.8	+1.1
N-6	L-3	12- 6-63	32.4	33.0	+0.6
N-7	L-4	12-16-63	40.4	39.0	-1.4
N-8	L-5	12-17-63	32.6	35.9	+3.3
Current Machine Av.			32.7	34.2	+1.5

Machine O

Code	Mill Roll No.	Date Made	Concora Flat Crush, p.s.i. Institute	Mill	Difference[a]
O-1	92	11-24-63	31.2	32.4	+1.2
O-2	93	12- 4-63	32.5	34.2	+1.7
O-3	94	12-12-63	31.9	32.9	+1.0
O-4	95	12-18-63	30.4	32.2	+1.8
O-5	96	1- 2-64	28.9	31.4	+2.5
Current Machine Av.			31.0	32.6	+1.6

Machine P

P-1	34	11- 9-63	37.1	36.0	-1.1
P-2	35	11-21-63	35.0	33.1	-1.9
P-3	36	11-26-63	35.3	33.2	-2.1
P-4	37	12- 6-63	36.6	33.7	-2.9
P-5	38	12- 9-63	36.5	32.0	-4.5
P-6	39	12-17-63	37.3	32.9	-4.4
Current Machine Av.			36.3	33.5	-2.8

Machine Q

Q-1	758	11-28-63	37.8	37.8	0.0
Q-2	154	12- 6-63	39.0	40.3	+1.3
Q-3	243	12- 9-63	36.5	37.7	+1.2
Q-4	459	12-16-63	34.4	35.0	+0.6
Q-5	723	12-30-63	40.1	39.2	-0.9
Q-6	6	1- 1-64	38.2	36.2	-2.0
Q-7	178	1- 6-64	36.8	34.7	-2.1
Current Machine Av.			37.5	37.3	-0.2

Machine R

R-1	38	11-20-63	33.1	36.2	+3.1
R-2	39	11-27-63	35.4	36.7	+1.3
R-3	40	12- 3-63	36.1	37.6	+1.5
R-4	41	12-17-63	35.2	38.5	+3.3
R-5	42	12-31-63	31.1	31.7	+0.6
R-6	1	1- 8-64	35.0	37.0	+2.0
Current Machine Av.			34.3	36.3	+2.0

Machine S

S-1	--	12- 9-63	36.8	37.2	+0.4
S-2	--	12-15-63	38.4	38.6	+0.2
S-3	--	12-18-63	40.4	43.7	+3.3
S-4	--	12-20-63	40.1	38.0	-2.1
S-5	--	1- 4-64	39.2	38.3	-0.9
S-6	--	1- 5-64	37.4	35.6	-1.8
S-7	--	1- 6-64	35.8	35.2	-0.6
S-8	--	1-10-64	36.5	35.0	-1.5
Current Machine Av.			38.1	37.7	-0.4

Machine T

T-1	701	12- 3-63	38.6	37.7	-0.9
T-2	701	1- 9-64	40.2	38.3	-1.9
Current Machine Av.			39.4	38.0	-1.4

Machine V

V-1	764	12- 4-63	35.2	37.1	+1.9
V-2	1669	12- 8-63	35.5	38.0	+2.5
V-3	3696	12-16-63	35.4	38.1	+2.7
V-4	6049	12-29-63	36.4	38.7	+2.3
V-5	411	1- 2-64	36.0	37.4	+1.4
V-6	1170	1- 5-64	33.8	36.5	+2.7
V-7	2959	1-13-64	35.2	39.5	+4.3
V-8	3141	1-14-64	34.9	38.7	+3.8
Current Machine Av.			35.3	38.0	+2.7

Machine U

U-3	1051	12-11-63	33.5	34.2	+0.7
U-4	1052	12-11-63	33.7	33.2	-0.5
U-5	1066	1- 7-64	36.0	32.4	-3.6
U-6	1067	1- 7-64	36.1	31.9	-4.2
U-7	1074	1-14-64	38.2	32.2	-6.0
U-8	1075	1-14-64	35.2	34.8	-0.4
Current Machine Av.			35.4	33.1	-2.3

Machine W

W-1	1	1-10-64	35.2	40.8	+5.6
W-2	2	1-15-64	37.4	40.2	+2.8
Current Machine Av.			36.3	40.5	+4.2

[a]This 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	2	4	0	8	0	0	6	7	8	3	7	8	4	8	5	6	7	6	8	2	6	8	2
Concora Flat Crush, p.s.i.																							
Current Machine Av. (Institute)[a]	35.7	33.4	--	35.0	--	--	34.1	35.2	37.2	38.6	37.8	34.9	39.8	32.7	31.0	36.3	37.5	34.3	38.1	39.4	35.4	35.3	36.3
Current Machine Av. (Mill)[a]	37.7	35.3	--	36.4	--	--	36.2	34.4	37.9	38.8	38.4	36.7	39.0	34.2	32.6	33.5	37.3	36.3	37.7	38.0	33.1	38.0	40.5
Average Difference[b]	+2.0	+1.9	--	+1.4	--	--	+2.1	-0.8	+0.7	+0.2	+0.6	+1.8	-0.8	+1.5	+1.6	-2.8	-0.2	+2.0	-0.4	-1.4	-2.3	+2.7	+4.2
Maximum Difference[c]	+3.1	+4.9	--	+4.9	--	--	+4.1	-3.6	+2.2	+0.9	+2.6	+5.3	-1.8	+3.3	+2.5	-4.5	-2.1	+3.3	+3.3	-1.9	-6.0	+4.3	+5.6

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]																							
Current Report (Dec. and Jan.)	+5.6	+5.7	--	+4.0	--	--	+6.2	-2.3	+1.9	+0.5	+1.6	+5.2	-2.0	+4.6	+5.2	-7.7	-0.5	+5.8	-1.0	-3.6	-6.5	+7.6	+11.6
104th Report (Oct. and Nov.)	+12.4	-4.5	+8.6	+3.9	+1.9	--	+5.6	+2.3	+0.3	+1.0	+3.8	+2.8	+0.5	+3.9	-1.9	-7.3	-5.9	+4.0	+2.9	-1.8	-8.8	+7.1	--
103rd Report (Aug. and Sept.)	+8.9	-9.6	--	+0.6	--	--	--	-1.3	+4.5	+0.8	+1.8	+1.3	+0.7	+6.2	-10.7	-9.4	-3.5	+3.9	+1.4	-0.3	-7.4	+4.3	--

[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 roll. 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. It may be seen in Table XXVII that, for the current period, 15.0% of the comparisons of Institute and mill data differed by 1% or less, 35.0% of the comparisons differed by 2.5% or less, and 50.0% 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 agreement for the previous period at these levels, whereas agreement for the current period at the 5% level was somewhat poorer than the agreement obtained during the previous period at this level. The somewhat poorer agreement at the 5% level appears to be explained by the observation that five mills were associated with average percentage differences in the 5.1 to 5.8 range. A relatively small shift downward in these percentages would have placed most of these mills in the ± 5% range. The maximum difference of 11.6% noted for the current period was slightly lower than the maximum difference of 12.4% 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 Flat Crush Test Results[a]	Percentage of All Machines Included Within the Indicated Range	
	Previous Period[b]	Current Period[c]
± 1.0	14.3	15.0
± 2.5	33.3	35.0
± 5.0	66.7	50.0
± 10.0	95.2	95.0
± 12.4	100.0	100.0[d]

[a]The average obtained at the Institute was used as the reference in the calculation of the percentage differences.
[b]October and November, 1963.
[c]December, 1963 and January, 1964.
[d]Maximum percentage difference was 11.6.

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