

TECHNICAL SERVICE REPORT

THE EVALUATION OF HIGH PURITY ASBESTOS AS A RETENTION AID AND REPLACEMENT FOR MI-SIL 404

for

Boise Cascade Corporation
Salem, Oregon

September 5, 1968

by

G. L. Dickson

Group Manager - W. L. Carrick

Project No. 443-N11

September 24, 1968

UNION CARBIDE CORPORATION
Chemicals & Plastics
Research and Development Department
Niagara Falls, New York 14302

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SUBJECT

This report covers the evaluation of High Purity Asbestos by Boise Cascade on September 5-6, 1968. The objective of this machine trial was to evaluate asbestos as a filler retention aid and as a partial replacement for the titanium dioxide extender (Hi-Sil) which is normally present in their furnish.

TRIAL RESULTS

The results of this evaluation have indicated that High Purity Asbestos can be successfully substituted for a major portion of the titanium dioxide extender normally used in this mill's furnish. Retention, improved significantly by the addition of about 2% asbestos to the furnish, is summarized in the following:

Single-Pass Retention	Without Asbestos	With Asbestos
Total solids	52%	66%
Ash	14	27
Titanium dioxide	13	26
High Purity Asbestos	-	33

The effectiveness of High Purity Asbestos as a replacement for Hi-Sil and as a retention aid is also reflected by the reduction in filler costs as contained in the following schedule:

(Based on 4,000 lb. Mix Cells)

1. Without High Purity Asbestos

250 lb. Hi-Sil @ 7.5¢/lb.	$18.75
450 lb. Clay @ 2.0¢/lb.	9.00
Total	$27.75

2. With High Purity Asbestos

50 lb. Hi-Sil @ 7.5¢/lb.	$ 3.75
350 lb. Clay @ 2.0¢/lb.	7.00
160 lb. Asbestos @ 6.6¢/lb.	10.56
Total	$21.31

3. Filler Savings

Per 4,000 lb. Mix cell	$ 6.44
or, per ton of furnish	$ 3.22

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During the pre-trial period preceding the addition of asbestos to the furnish, it was necessary to add 7 lb. of titanium dioxide per minute in order to maintain the required optical specifications. The amount required during the latter portion of the trial was 5.5 lb. per minute or a saving of $0.33 per minute (1.5 x $0.22). Thus, the reduction in TiO_2 consumption reflects an additional saving of $19.80 per hour or about $4.40 per ton of production.

DISCUSSION

High Purity Asbestos was evaluated in a 50-lb. white offset furnish following an extended production period in which their normal furnish was utilized. The following schedule contains the various changes in filler addition during the several trial periods.(Based on 4,000 lb. of furnish)

	Pre-Trial	Asbestos Trial		
		1	2	3
Hi-Sil	250	100	100	50
Clay	450	450	350	350
Asbestos	0	120	120	160
Total	700	670	570	560

During the pre-trial control period, it was necessary to add 7 pounds per minute of titanium dioxide (3-1/2 gal./min. @ 2 lb./gal.) in order to maintain the required brightness and opacity specifications. Although this was reduced to 4 pounds per minute at one point in the trial, the final TiO_2 addition level approximated 5.5 lb./minute. No operational problems or machine breaks were encountered, and quality production was maintained throughout the trial. Filler retention, based on wet-end samples obtained at that time, increased significantly. The attached tables (I-V) contain the analytical and calculated retention data covering these samples. The attached Mill Trial Data Sheets contain more complete information on furnish and machine operational data in effect during the trial.

CONCLUSIONS

The results of this evaluation have shown that High Purity Asbestos can be utilized as a retention aid and replacement for Hi-Sil in this mill's furnish. Although the exact savings made possible at this time by the substitution of asbestos for Hi-Sil are difficult to calculate, because of the complexity of their stock preparation system (refer Figure 1), it approximated $6.00 per ton of production, or $27.00/hour.

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The decrease in tray water solids, from 0.43% during the control period to 0.23 during the trial, also indicates the improvement in filler retention which can be obtained.

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TABLE I

Jordan Samples Analyses

Time Sampled	% Ash	% TiO_2	% Asbestos
7:45 a.m.	16.35	2.99	0
8:50 a.m.	17.23	3.18	0.48
9:50 "	17.23	3.21	0.82
11:00 "	16.66	3.06	1.28
1:20 p.m.	15.76	2.73	1.88
3:00 "	14.98	2.24	1.92
4:30 "	14.68	2.01	2.08
5:50 "	14.05	1.63	2.12
Average	15.80	2.58	1.51

TABLE II

Headbox Analyses

Time Sampled	% Consistency	% Ash	% TiO_2	% Asbestos
7:45 a.m.	0.880	37.37	11.79	0
8:50 a.m.	0.854	37.92	11.93	0.48
9:50 "	0.814	36.09	12.02	1.32
11:00 "	0.772	33.70	10.50	2.00
1:20 p.m.	0.729	30.18	8.25	2.52
3:00 "	0.686	26.09	6.53	2.68
4:30 "	0.667	25.80	6.19	2.80
5:50 "	0.676	25.27	5.64	2.88
Average	0.743	30.72	8.72	2.10

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TABLE III

Tray Water Analyses

Time Sampled	% Consistency	% Ash	% TiO_2	% Asbestos
7:45 a.m.	0.427	66.11	21.20	0
8:50 a.m.	0.427	64.85	21.39	0.56
9:50 "	0.385	63.55	21.41	2.08
11:00 "	0.361	60.16	19.21	2.92
1:20 p.m.	0.297	59.13	16.43	4.52
3:00 "	0.240	55.09	13.03	5.16
4:30 "	0.241	54.04	12.79	5.40
5:50 "	0.228	54.39	12.38	5.72
Average	0.311	58.74	16.66	3.77

TABLE IV

Reel Samples Analyses

Time Sampled	Set No.	% Ash	% TiO_2	% Asbestos
7:30 a.m.	23-24	12.58	3.80	0
8:20 "	25-26	13.03	4.10	0
Average	-	12.80	3.95	0
9:20 a.m.	27-28	13.65	4.42	0.44
10:20 "	29-30	13.79	3.92	0.84
11:20 "	31-32	14.08	4.18	1.00
12:15 p.m.	33-34	12.48	3.61	1.04
1:30 "	34-35	12.97	3.46	1.28
4:15 "	40-41	12.24	2.78	1.56
5:15 "	42-43	12.20	2.80	1.60
6:15 "	44-45	12.24	2.60	1.64
Average	-	12.96	3.47	1.18

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TABLE V

Calculated Filler Retention
(Single Pass Retention)

$$1-(\text{Conc.}_{\text{Tray Water}}/\text{Conc.}_{\text{Headbox}}) \times 100$$

Time	% Ash	% TiO_2	% Asbestos	% Total Solids
7:45 a.m.	14.2	12.8	-	51.5
8:50 a.m.	14.5	10.4	41.7	50.0
9:50 "	16.7	15.8	25.5	52.7
11:00 "	16.5	14.5	31.7	53.2
1:20 p.m.	20.2	18.9	26.9	59.3
3:00 "	26.1	30.2	32.7	65.0
4:30 "	24.3	25.4	30.3	63.9
5:50 "	27.4	26.0	33.0	66.3
Average	20.8	20.2	31.6	58.2

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UNION CARBIDE CORPORATION
MINING & METALS DIVISION
MILL TRIAL DATA SHEET

I. COMPANY LOCATION AND DATE OF TRIAL Boise Cascade Corp., Salem, Ore. 9/5/68

II. COMPANY REPRESENTATIVES AND TITLES Newell Emery, Technical Director, Kermit Burson, Assistant Beaterroom Superintendent, Tom La Haise, Chief Chemist

III. UCC REPRESENTATIVES Robert T. Larkin and Gordon L. Dickson

IV. TRIAL OBJECTIVES (In order of importance) Evaluation of High Purity Asbestos as a Retention Aid and Replacement for Hi-Sil

V. PRODUCT IDENTIFICATION

Type of Product White offset Coated ~~Yes~~/No

Grade Name DSGA White Government offset

Basis Weight 50 lb. (25x38-500)

Daily Production 110 tons Lb./hour 9,000

Total Daily Production of Mill 200-240 tons

(Tissue and Board) No. of Plys -

VI. MACHINE DESCRIPTION

Type of Machine Fourdrinier, pressurized headbox, Dandy roll

Machine No. 1 (Cylinder) No. of Cylinders -

Machine Speed 1050 FPM (Tissue) Reel Speed -

(Tissue) % Crepe - Wire Mesh 75/56

Wire Width 136 inches Machine Trim 120 inches

Size Press Vertical (9-10%) (Tapioca Starch) Calenders Single @ 3 nips

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VII. AUXILIARY EQUIPMENT

Refiners	Type	Location	Loading (amp.)

Saveall (Type) Disc (Jones) Flow Rate --

VIII. STOCK PREPARATION - Continuous or Batch

Type Beater and Capacity

No. of Beater Chests and Capacity

Machine Chest Capacity

Stock Freeness (Mach. Chest and Stuff Box)

Headbox Consistency 0.8%

Makeup pH Machine pH

IX. FURNISH MAKEUP* Basis (lb./ton, etc.) 4,000 lb. Mix cell

Furnish Constituent	%	Pounds Pre-trial	Trial
Bleached softwood sulfite	70		
Broke	30		
Clay		450	450-350
Hi-Sil 404		250	100-50
High Purity Asbestos		-	120-160
Rosin Size		38	38
Alum		60-70	36-50
Titanium Dioxide*		3-3-1/2 GPM	2-3-1/2 GPM
Cato 15**		200 GPH	200 GPH
Tinting Dyes (Three)		Unchanged during pre-trial & tri periods	

*TiO_2 added to fan pump in slurry form @ 2 lb./gal.

* For board systems include furnish for each medium - topliner, underliner, filler, and backliner.

** Cato 15 added to fan pump (0.2 lb./gal. or 40 lb./hr.)

Note: Unknown amount of Nalco 633H added to headbox. Addition level remained unchanged during trial.

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X. ASBESTOS ADDITION - Pellet Repulper (Type) None

Asbestos Grade High Purity Opened Lot No. 6599-1

Point of Addition Mix Cell

Pounds of Asbestos Added _____ per ton BDF _____ per beater

_____ per hour

Per cent asbestos addition on BDF _____

XI. SUPPLEMENTARY INFORMATION

Quality Control Data Record

Stock Prep. Log

Sampling (in order of importance)

Pitch & Retention Trials	Board Trials	Tissue and Towel
*Reel	Tray Water	Stuff box
*Stuff box (Jordan)	Vat	Reel
*Headbox	Stuff box	Headbox
*Tray	Reel	
Saveall effluent	Saveall effluent	
Saveall influent	Saveall influent	

Identify samples by name, date, time

Wet samples should approximate 500 ml.

Weight of BD filter pad is required for all vat, tray, and saveall samples.

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XII. TRIAL LOG (Comments including changes in furnish and operating conditions)

	Time	Comments
9/4/68	4:30 p.m.	Pre-trial control initiated. 250 lb. Hi-Sil 404 added to blend chest. Titanium dioxide addition ranged from 5 to 7 lb. per minute.
9/5/68	8:10 a.m.	160 lb. High Purity Asbestos added to mix chest. In error. Intended amount was 120 lb. Hi-Sil addition decreased by 150 lb.
	9:00 a.m.	120 lb. High Purity Asbestos added to blend chest. Hi-Sil addition maintained at 100 lb.
	11:00 "	Clay reduced from 450 lb. per mix chest to 350 lb. Titanium dioxide reduced from 7 lb. per minute to 5 lb. per minute.
	2:50 p.m.	Titanium dioxide reduced to 4 lb. per minute.
9/6/68		High Purity Asbestos increased to 160 lb., Hi-Sil reduced to 50 lb., titanium dioxide increased to 5.5 lb. per minute.

Recorded by G L Dickson Date 9-24-68

Witnessed and Understood by _____ Date _____

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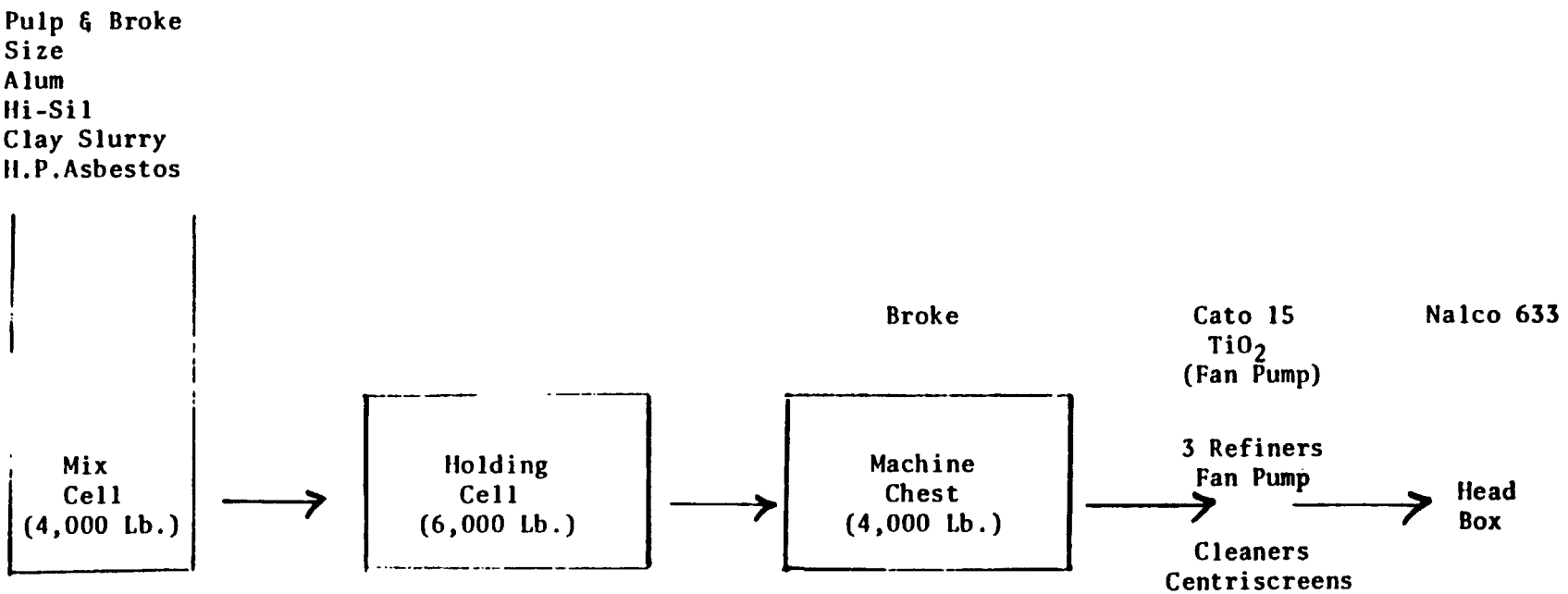


FIGURE 1

Schematic of Stock Preparation System

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September 25, 1968

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See Attached Distribution

Boise Cascade Corp.
Salem, Oregon
High Purity Asbestos Trial

The attached report covers the evaluation of High Purity Asbestos at subject mill on September 5. From all indications, it appears to have been a very successful trial. The use of asbestos as a partial replacement for Hi-Sil 404 saved them about $6.00 per ton of paper. It's difficult to determine the exact amount because of the way their pigments and broke are added to the furnish. But $6.00 a ton saving is a good approximation. The increase in retention was also quite significant, and the last tray water sample obtained during the trial showed that the solids were still decreasing.

G. L. Dickson

GLD/bsn
Attach.

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