PLAINTIFF'S EXHIBIT
UC-143

TECHNICAL SERVICE REPORT

THE EVALUATION OF ASBESTOS T-135 AS A PARTIAL REPLACEMENT FOR TITANIUM DIOXIDE

for

Brown Company
Berlin, New Hampshire
August 9, 1968

by

G. L. Dickson

Group Manager - W. L. Carrick

Project No. 443-N11

September 18, 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 Asbestos T-135 as a partial replacement for titanium dioxide on Brown Company's No. 3 Fourdrinier on August 9, 1968.

TRIAL RESULTS

The evaluation of Asbestos T-135 as a direct substitution for titanium dioxide at subject mill was unsuccessful due to its detrimental effect on the optical brightener present in the furnish. Although no operational problems were encountered, and brightness and opacity specifications were maintained, the replacement of 1-1/2% titanium dioxide in the furnish by the equivalent amount of Asbestos T-135 resulted in a substantial change in sheet coloration. As this was more notceable under ultraviolet light, it must be concluded that the effects were due to the lowered efficiency of the fluorescent dye being utilized in the furnish during the trial. As fluorescent dyes are added to most of this mill's production grades, which also require titanium dioxide as an opacifier, it is felt that T-135 probably cannot be used as an additive in their furnish at the present time.

DISCUSSION

Asbestos T-135 was evaluated as partial replacement for titanium dioxide during the production of 60 and 63-lb. white offset paper. This was preceded by a short pre-trial control period during which time their normal furnish for these grades was used. No problems were encountered during the transitional or trial periods and production appeared normal. However, it became evident from visual observations that a distinct change was developing in the shade of the paper and the decision was made by their quality control personnel to terminate the addition of asbestos to the furnish. To overcome the loss in sheet fluorescence, which was the apparent cause of the change in color, the amount of optical dye being added was increased from 8 quarts per pulper to 16 quarts. An undisclosed amount of this material was also added to the machine chest in order to speed up the recoverance of the desired sheet whiteness.

During the pre-trial period and trial proper, stock samples were obtained from this system's Poirier regulator, headbox, machine tray, and saveall effluent. These samples, plus reel specimens, were subsequently analyzed for consistency and filler concentration. The obtained data are contained in the attached tables (I-V). Also included in Table V are pertinent data on reel samples obtained by

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their quality control laboratory during this time. Although mainly of academic interest at this time, calculated filler retention values have been presented in Table VI (based on three systems of computation). Detailed paper machine and furnish data covering the trial periods are contained in the attached Mill Trial Data sheets.

CONCLUSIONS

The evaluation of Asbestos T-135 in this particular system has indicated that its use is not feasible in many of this mill's production grades. This is based upon its detrimental effect on the optical dyes which are added to most of their high brightness furnishes. Limited usage of T-135 may be possible in lower brightness sheets, or in cases where the optical dye is added as a size press application. Although the practice of incorporating optical dyes in a size press coating has not been adopted by this mill at the present time, it is felt that it will be given serious consideration in the near future.

G. L. Dickson/bsn
September 18, 1968

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TABLE I

Poirier Samples Analyses

Time Sampled	% Ash	% TiO_2	% Asbestos T-135
10:45 a.m.	14.56	7.30	0
11:45 a.m.	12.35	6.31	0
1:15 p.m.	13.32	6.79	0
Average	13.41	6.80	0
2:45 p.m.	13.36	5.29	0.99
4:10 p.m.	12.60	4.27	1 35
Average	12.98	4.78	1.17

TABLE II

Headbox Analyses

Time Sampled	% Consistency	% Ash	% TiO_2	% Asbestos T-135
10:45 a.m.	0.6836	21.97	12.22	0
11:45 a.m.	0.7099	20.98	12.10	0
1:15 p.m.	0.7334	20.38	12.62	0
Average	0.7090	21.11	12.31	0
2:45 p.m.	0.7549	20.98	11.02	1.17
4:10 p.m.	0.7184	20.14	8.33	1.66
5:30 p.m.	0.7901	19.84	8.43	2.59
Average	0.7545	20.32	9.26	1.81

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TABLE III

Tray Water Analyses

Time Sampled	% Consistency	% Ash	% TiO_2	% Asbestos T-135
10:45 a.m.	0.1626	60.43	33.39	0
11:45 a.m.	0.1646	59.27	34.42	0
1:15 p.m.	0.1827	61.79	39.41	0
Average	0.1700	60.50	35.74	0
2:45 p.m.	0.1675	62.02	33.71	2.77
4:10 p.m.	0.1555	59.82	28.54	4.31
5:30 p.m.	0.1836	58.01	26.77	6.71
Average	0.1689	59.95	29.67	4.60

TABLE IV

Saveall Effluent Analyses

Time Sampled	% Consistency	% Ash	% TiO_2	% Asbestos T-135
10:45 a.m.	0.0576	66.37	38.37	0
11:45 a.m.	0.0594	73.81	47.22	0
1:15 p.m.	0.0619	80.81	58.73	0
Average	0.0596	73.66	48.11	0
2:45 p.m.	0.0551	82.32	55.15	2.83
4:10 p.m.	0.0413	77.99	45.85	4.93
5:30 p.m.	0.0539	76.77	39.09	8.25
Average	0.0501	79.03	46.70	5.34

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TABLE V

Reel Samples Analyses

Reel Time	% Ash	% TiO_2	% T-135	Basis Weight	Opacity	Brightness
9:20 a.m.	13.21	6.18	0	63.7	97.4	85.8
10:10 "	12.82	6.04	0	59.8	96.3	86.2
11:50 "	11.81	5.74	0	62.2	96.0	86.0
12:55 p.m.	9.92	5.38	0	65.2	96.6	86.0
1:30 "	9.81	4.73	0	64.6	96.9	85.5
Average	11.51	5.61	0	63.1	96.6	85.9
2:30 p.m.	11.54	5.26	0.55	65.8	96.9	86.4
3:30 "	11.54	4.68	0.99	64.7	97.8	85.0
4:30 "	10.58	3.66	1.11	63.8	96.0	84.5
5:30 "	11.30	3.35	1.48	63.6	96.0	85.2
6:05 "	10.13	3.10	1.66	-	-	-
Average	11.02	4.01	1.16	64.5	96.8	85.3

Note: The following specifications cover the two grades of white offset paper made during the trial periods:

Basis weight	56.2-62.2 lb.	60.4-66.8 lb.
Ash	15%	15%
Opacity	95/96	96/97
Brightness	86	86

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TABLE VI

Filler Retention

Time	% Ash	% TiO_2	% Asbestos T-135
I. Overall Retention: (Reel/Poirier) x 100			
10:45 a.m.	-	83	-
11:45 "	-	91	-
1:15 p.m.	-	70	-
Average	-	81	-
2:45 p.m.	-	99	56
4:10 "	-	86	82
Average	-	92	69
II. Machine Retention: (Reel/Headbox) x 100			
10:45 a.m.	58	50	-
11:45 "	56	47	-
1:15 p.m.	48	37	-
Average	54	45	-
2:45 p.m.	55	48	47
4:10 "	53	44	67
5:30 "	57	40	57
Average	55	43	57
III. One-Pass Retention: $1-(Conc_{Tray\ Water}/Conc_{Headbox}) \times 100$			
10:45 a.m.	35	35	-
11:45 "	34	34	-
1:15 p.m.	24	22	-
Average	31	30	-
2:45 p.m.	34	32	47
4:10 "	36	26	44
5:30 "	32	26	40
Average	34	28	43

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UNION CARBIDE CORPORATION
MINING & METALS DIVISION

MILL TRIAL DATA SHEET

I. COMPANY LOCATION AND DATE OF TRIAL Brown Co., Berlin, N.H. August 9, 1968

II. COMPANY REPRESENTATIVES AND TITLES K. H. Phillips, Purchasing Agent, Edward Cornwall, Technical Services Engineer, Robert Dinsmore, Process Engineer

III. UCC REPRESENTATIVES T. E. Dougherty and G. L. Dickson

IV. TRIAL OBJECTIVES (In order of importance) Evaluation of Asbestos T-135 as a partial replacement for titanium dioxide

V. PRODUCT IDENTIFICATION

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

Grade Name Eagle A opaque

Basis Weight 59.2 and 63.6 lb. (24x36-500)

Daily Production 72 tons Lb./hour 6,000

Total Daily Production of Mill -

(Tissue and Board) No. of Plys -

VI. MACHINE DESCRIPTION

Type of Machine Fourdrinier, with open headbox, shake, and dandy roll

Machine No. 3 (Cylinder) No. of Cylinders -

Machine Speed 440 FPM (Tissue) Reel Speed -

(Tissue) % Crepe - Wire Mesh -

Wire Width - Machine Trim 144

Size Press Horizontal* Calenders Single @ 3 nips

*Size press: 9% chlorinated starch plus Parez 707.

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VII. AUXILIARY EQUIPMENT

Refiners	Type	Location	Loading (amp.)
	2 Hydrafiners		25 & 40 amps
	Machine Jordan		240 amps

Saveall (Type)_____ Flow Rate_____

VIII. STOCK PREPARATION - Continuous or Batch

Type Beater and Capacity 3,400-lb. Hydrapulper

No. of Beater Chests and Capacity_____

Machine Chest Capacity_____

Stock Freeness (Mach. Chest and Stuff Box)_____

Headbox Consistency_____

Makeup pH_____ Machine pH 4.5-4.6

IX. FURNISH MAKEUP* Basis (lb./ton, etc.) 3400 lb.

Furnish Constituent	%	Pounds
Bleached hardwood kraft	50	
Bleached softwood kraft	20	
Machine broke	20	
Dry broke	10	
Arobond starch		50
Hi-Sil		50
Titanium dioxide (Finnitan)		250
Leucophor (optical dye)		8 qts.
Rosin size		18.4 lb.
Alum		18.4 lb.
Clay		300 lb/hour

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

Separan added to paper machine headbox @ 0.5 lb./ton

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X. ASBESTOS ADDITION - Pellet Repulper (Type) None

Asbestos Grade T-135 pellets Lot No. 5312

Point of Addition Hydrapulper

Pounds of Asbestos Added _____ per ton BDF 50-100 per ~~beater~~ pulper

_____ per hour

Per cent asbestos addition on BDF 1-1/2 & 3

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	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
August 9, 1968	
8:05 a.m.	Furnish change for 60-lb. offset
9:00 a.m.	Pre-trial control on machine
12:50 p.m.	Asbestos T-135 trial initiated. 50 lb. T-135 substituted for equal amount of titanium dioxide. (Grade change to 63-lb. paper).
4:30 p.m.	T-135 increased to 100 lb./pulper (3%). Titanium dioxide reduced by similar amount.
5:00 p.m.	Trial terminated due to decrease in sheet fluorescence. Production from 2:30-5:30 down graded because of off-color. Optical dye increased to 16 quarts per pulper to overcome loss in efficiency.

Recorded by Gordon L. Dickson Date 9-19-68

Witnessed and Understood by _____ Date _____

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Mr. T. E. Dougherty (4)
349 Spring Avenue
Ridgewood, N.J. 07450

September 20, 1968

See Attached Distribution

Brown Company, Berlin, N.H.
Asbestos T-135 Evaluation

The attached Technical Service Report covers the results of the Asbestos T-135 mill trial at subject mill on August 9, 1968. Although T-135 was indicated to be a successful replacement for a portion of the titanium dioxide in the trial grade of paper, its deleterious effect on the fluorescent dye present negated any possible cost savings. Based on these results, and those obtained during a similar trial at the Brown Company mill in Holyoke, Massachusetts on July 25, 1968, it is recommended that asbestos not be incorporated in furnishes which contain any appreciable amount of optical brighteners. However, if fluorescent dye is added in a size press application, asbestos, either High Purity or T-135, can still be considered as a possible wet-end additive. It should be recognized that even under these conditions some loss in fluorescence may result but that it will not be as drastic as in these two cases.

G. L. Dickson

GLD/bsn
Attach.

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