PLAINTIFF'S EXHIBIT

UC-3684

CALIDRIA
ASBESTOS SG-210

...an economical, highly efficient product to strengthen and control viscosity of dry and ready-mix

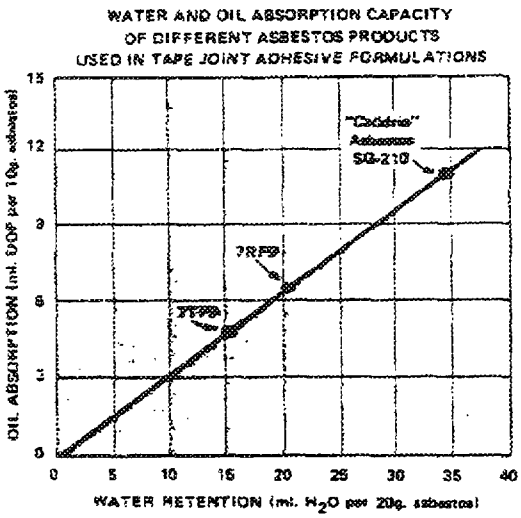
...TAPE-JOINT COMPOUNDS



UCC 005940

Calidria asbestos

SG-210 for TAPE-JOINT COMPOUNDS



The high-purity, finely ground fibers of "Calidria" asbestos SG-210 offer many advantages compared to other types of asbestos including:

MORE EFFICIENT STRENGTHENING

"Calidria" asbestos SG-210 fibers are ground to a fine size, with over 85% of the fibers less than 325 mesh. The product therefore has a large surface area and more active sites to interact with the inert fillers in the compound. Formulators using "Calidria" asbestos therefore need less material to give dimensional strength to the finished joint.

MORE EFFICIENT VISCOSITY CONTROL

The fibers of "Calidria" asbestos SG-210 can absorb vast amounts of water – generally about 400 times their weight. As shown by the graph above, this unique asbestos absorbs from 70 to 125% more water and oil than other types of asbestos. Thus, less "Calidria" asbestos is needed to reach a given viscosity.

40% SMALLER ADDITIONS

This reduction can be made by most users switching to "Calidria" asbestos SG-210 from other types of asbestos. Such a reduction allows substantial savings in the amount of asbestos to be handled and stored. To make up for the weight difference, extra limestone should be added to the system.

LESS CRACKING

The smaller addition needed with "Calidria" asbestos SG-210 reduces shrinkage problems that often occur with large asbestos additions. SG-210 users have reported that cracking over nailholes and along feathered edges has been minimized.

SMOOTHER, WHITER COMPOUNDS

The tiny particles of "Calidria" asbestos SG-210 give very smooth compounds when spread and dried. The absence of rock dust and abrasive fillers in this asbestos also contributes to the smoothness. There are no impurities that can discolor the system, so that a whiter compound can also be obtained.

CONVINCE YOURSELF

To test the effectiveness of "Calidria" asbestos SG-210, make up a small batch of your present formulation. Add 60% of your normal asbestos addition using "Calidria" asbestos SG-210. Then make up for the difference in weight using limestone. Overall water demand should be about the same but sometimes varies according to the ingredients in the formulation. Withhold about 10% of the water for final viscosity adjustment at the end of mixing. Then test the properties of the formulation made with SG-210 . . . and compare.

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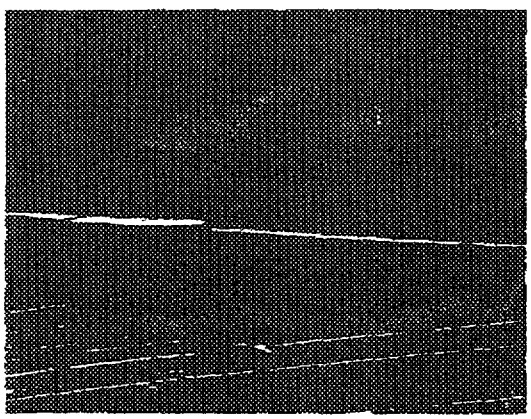
UCC 005941

Why is "Calidria" asbestos different?

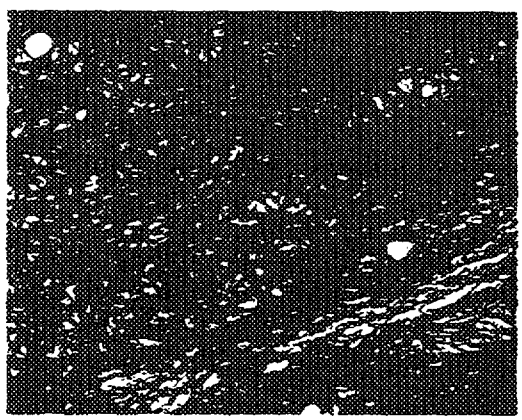
"Calidria" products are made from high-purity, short-fiber chrysotile asbestos obtained from a unique deposit about 160 miles south of San Francisco, California. Unlike conventional deposits that extend through the host rock, this deposit is essentially free of hard, consolidated rock masses. Further, the ore assays up to 60% asbestos compared to conventional deposits which contain from 6 to 10% asbestos.

Special hydraulic beneficiation techniques developed by Union Carbide efficiently break down the fiber bundles and remove the rock and impurities from the asbestos fiber. As a result, all "Calidria" products are over 95% pure asbestos whose fibers are 98% liberated from fiber bundles.

SG-210 is finely ground for use in tape-joint compounds.



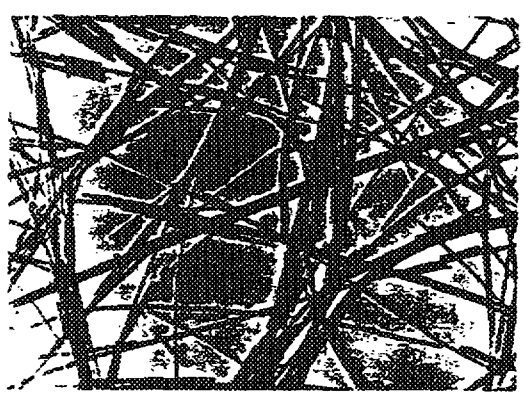
CANADIAN ASBESTOS – AS-MINED – Individual fiber bundles are straight and tightly bonded, surrounded by consolidated rock masses. In this form, the fibers defy separation from each other and from the host rock.



"CALIDRIA" ASBESTOS – AS-MINED – Here the fibers are randomly oriented and essentially free of hard rock masses. Further, the ore assays up to 60% asbestos, considerably more than the Canadian ore.



"CALIDRIA" ASBESTOS – IF DRY-PROCESSED – Even the most exacting dry processes do not completely break down the fiber bundles into individually liberated fibers. Union Carbide technology developed a special wet process to liberate the fibers.



"CALIDRIA" ASBESTOS – UNIQUELY WET-PROCESSED – Union Carbide's process separates 98% of the fibers from the fiber bundles. The fibers contain virtually no rock dust, abrasive fillers, or impurities that can mar tape-joint compounds.

UCC 005942

Use "Calidria" Asbestos T-135 in Acoustical and Texturing Compounds

Containing high-purity asbestos and TiO_2, "Calidria" asbestos T-135 is a low-cost pigment with secondary thickening action. The titanium dioxide particles are uniformly dispersed along the asbestos fibers and are firmly fixed to the fiber surface by electrostatic attraction. These dispersed TiO_2 particles give maximum optical efficiency and allow T-135 to replace TiO_2 on a pound-for-pound basis. The effective thickening ability of the high-purity asbestos fibers also allows removal of asbestos and partial removal of other thickeners. "Calidria" asbestos T-135 therefore provides savings in many spray-ceiling acoustic and wall-texturing compounds.

UNION CARBIDE

UNION CARBIDE CORPORATION
MINING AND METALS DIVISION
270 PARK AVENUE, NEW YORK, N. Y. 10017

MARKETING AND TECHNICAL CENTER: P.O. Box 579, Niagara Falls, N.Y. 14302 Tel.: 716-278-3376

PLANT: P.O. Box K, King City, California 93930 Tel.: 408-385-5961

C1269

"Calidria," "Cellasize," "UCAR," and "Union Carbide" are registered trade marks of Union Carbide Corporation.

F-73-0133
2/74—4M

UCC 005943

Printed in U.S.A.

ORMANCE DATA IN 3 READY-MIX FORMULATIONS

ND ORDER OF ADDITION*	BEDDING-COAT TAPE-JOINT COMPOUND		GENERAL-PURPOSE TAPE-JOINT COMPOUND		TAPE-JOINT TOPPING COMPOUND	
	lbs. per 100 Gal.	% by Weight	lbs. per 100 Gal.	% by Weight	lbs. per 100 Gal.	% by Weight
	424.16	31.39	421.67	31.35	399.81	28.27
ickener	4.41	0.32	4.41	0.32	6.96	0.49
	1.72	0.13	1.73	0.13	1.94	0.13
	14.01	1.04	14.01	1.04	–	–
0	90.94	6.73	–	–	80.47	5.89
1	–	–	97.55	7.25	–	–
	5.23	0.39	–	–	4.62	0.33
	8.74	0.65	8.74	0.65	9.39	0.66
SG-210	39.62	2.92	39.19	2.92	42.17	2.97
	–	–	91.60	6.81	–	–
	184.34	13.66	91.60	6.81	23.36	1.65
	–	–	–	–	93.20	6.60
	35.04	2.60	21.71	1.62	9.24	0.66
No. 1 white	542.17	40.11	–	–	729.53	51.56
	0.88	0.06	–	–	–	–
	–	–	–	–	9.24	0.68
	–	–	4.35	0.32	4.67	0.33
	–	–	8.77	0.65	–	–
No. 1 white	–	–	539.69	40.13	–	–
	1351.26	100.00	1345.02	100.00	1414.50	100.00
TIES						
	35.1%		35.1%		30.66%	
	700 B.U.		600 B.U.		840 B.U.	
ard Tape	100%		100%		100%	
esistance	99%		95%		92%	
	Good		Good		Good	

-gallon mixer at 79 r.p.m.

C1370

UCC 005944

TYPICAL PHYSICAL PROPERTIES

Reflectance (G.E. Photovoltmeter)	69%
Magnetite Content	2% max.
Alkalinity	0.5 to 0.6% of Na_2O
pH in Water (5% slurry)	8.5 to 9.5
Surface Area (BET)	50 to 60 sq. m. per g.
Oil (DOP) Absorption	100 to 110 lb. per 100 lb. asbestos
Water Absorption	62 to 65 weight % in filter cake
Wet Bulk Density (settled volume after 8 hours)	220 ml. for 10 g. asbestos in 250 ml. container
Dry Bulk Density	4 to 5.5 lb. per cu. ft.

SIZE DISTRIBUTION

Cumulative retained on 100 mesh screen	0.6%
Cumulative retained on 200 mesh screen	3 to 6%
Cumulative retained on 325 mesh screen	10 to 15%

PACKAGING AND AVAILABILITY

One Package — Weight (3-ply paper bag)	30 lb.
One Pallet — Weight — Dimensions	1,200 lb. approx. 53 in. x 44 in. x 69 in. high
Full 50-ft. Carload (available from King City, Calif. plant)	52 pallets 62,400 lb.
Full 40-ft. Truckload (available from several locations nationwide)	17 pallets 20,400 lb.

TYPICAL PER

INGREDIENTS
Water
"Cellosize" TJC
Bacteriastat
Anionic Dispers
"UCAR" Latex
"UCAR" Latex
Dibutyl Phthala
Ethylene Glyco
"Calidria" Asbe
Mica, AA
Mica, P-80-F
Mica, Ser-X
Clay, ASP-400
Calcium Carbon
PD #1 Defoame
Talcum Powder
Water Condition
Talc
Calcium Carbon
Tc
TYPICAL PRO
Water Content
Brabender Visc
Adhesion to Wa
Nailhole Crackii
Sandability

*Mixed 1.5 to 2.0 hour

C15572

UCC 005945

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"CALIDRIA" ASBESTOS SG-210
FOR DRY-MIX TAPE JOINT COMPOUNDS

The present T-I sheet F-42258 describes how to substitute CALIDRIA Asbestos for Canadian Grade 7 in ready-mix tape joint compounds. The same general priciples (and cost advantages) also apply to dry-mix compounds but certain precautions are desirable to be sure to arrive at a trouble-free CALADRIA formulation.

In the ready-mix system, the correct amount of water is incorporated into the formulation by the manufacturer. For dry mixes, however, the user adds the amount of water which he judges to be right for his conditions of application. Obviously, this can vary over quite a wide range. If too much water should be added, the joint will shrink excessively on drying and develop cracks. For this poorly controlled situation, it is clearly desirable to market a product which has as wide a range of acceptable water content as is consistnet with its other necessary properties.

The solution to this problem is really quite simple. The formulator must only be careful not to put too much of the "concentrated" CALIDRIA Asbestos and put out a product with too high a water demand. It is suggested that the ready-mix rule-of-thumb where one pound of Canadian Grade 7 is replaced by one-half pound of CALIDRIA Asbestos plus one-half pound of limestone also be taken as the starting point for dry-mix formulation. Adjustments should then be made to minimize the amount of asbestos and maximize the amount of limestone while still giving a product that has satisfactory properties. It is probably also desireable to compare the range of usable water content with the manufacturer's older formulation.

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UNION CARBIDE CORPORATION • METALS DIVISION • P. O. BOX 579 • NIAGARA FALLS, N.Y. 14302 • TEL: 716-278-3376

TYPICAL PRODUCT CHARACTERISTICS
FOR
STANDARD GRADE 200 (SG-200)
AND
STANDARD GRADE 200X (SG-200X)

SG-200 and SG-200X are wet sheared, moderately-liberated fiber products for use as general purpose fillers. These dust-free pellets, which contain no binder are idealy suited for bulk handling and economical shifting and storage. SG-200 is approximately 1/4" in diameter and SG-200X is 1/8" in diameter for optimum dry blending.

Property	Typical Value
Reflectance (GE Brightness), %	68
Moisture Content, %	2
Magnetite, %	1.7
pH	9.5
Surface Area, m^2/g	60
Available Fiber Content, %	71
Ultimate Fiber Content, %	88
Packaged Density, $lbs./ft^3$	44
Single Bag Weight, lbs.	50
Single Pallet Weight, lbs.	2,000
50' Carload (60 pallets), lbs.	120,000
40' Truckload (20 pallets), lbs.	40,000

C1373

7/73
Revised

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Calidria® ASBESTOS



January 1, 1981

STANDARD GRADES

MODERATELY LIBERATED FIBERS USED AS LOW-COST FILLERS AND FLOW CONTROL AGENTS IN ASPHALTICS, CAULKS, SEALANTS AND SIMILAR APPLICATIONS. AVAILABLE AS EITHER OPEN FIBER OR ESSENTIALLY DUST-FREE PELLETS, WHICH ARE ABOUT 1/4-INCH DIAMETER FOR OPTIMUM DRY BLENDING.

NET PRICES - CENTS PER LB. - F.O.B. KING CITY, CALIF. PLANT -
SOLD ONLY IN FULL-PALLET MULTIPLES

	GRADE	CARLOAD	TRUCKLOAD	LESS THAN TRUCKLOAD
SEE NOTE BELOW	SG-130 (OPEN FIBER)	9.7	9.7	13.0
	SG-200 (PELLETS)	8.8	8.8	11.0
	SG-210 (OPEN FIBER)	12.5	12.5	18.0
	F.O.B. WAREHOUSES - SG-210 ONLY			
	ATLANTA, GA & HAMMOND, IN		22.5	28.0

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

NOTE: INDIVIDUAL BAGS ARE SHRINK-FILMED AND PALLETIZED AT NO EXTRA CHARGE. IF SPECIAL PACKAGING, SUCH AS PALLET SHRINK-WRAP, IS REQUIRED FOR EX-PLANT SHIPMENTS, ADD 1.0¢/LB. TO THE PRICES LISTED ABOVE.

PACKAGING INFORMATION

	NET WEIGHT, LBS.			
GRADE	PER BAG	PER PALLET	PER TRUCKLOAD*	PER CARLOAD
SG-130	40	Truck-2,000 Rail -1,600	34,000 (17)	83,200 (52)
SG-200	50	2,000	40,000 (20)	120,000 (60)
SG-210	35	1,400	23,800 (17)	72,800 (52)

*Truckload pricing is based on these minimum quantities; however, to facilitate compliance with DOT regulations, Union Carbide reserves the right to load trucks to full volume or weight capacity and to adjust customer orders accordingly.

( ) Number of pallets

TO ORDER . . . OR ASK A TECHNICAL QUESTION — call or write the nearest "Calidria" asbestos office below:

Northeast: P.O. Box 579, Niagara Falls, N.Y. 14302 — Tel.: 716-278-3371
South: 17 Executive Park Drive, Atlanta, Ga. 30329 — Tel.: 404-321-6600
Midwest: P.O. Box 579, Niagara Falls, N.Y. 14302 — Tel.: 716-278-3365
West: 100 Oceangate, Long Beach, Calif. 90802 — Tel.: 213-435-3721
Plant: P.O. Box K, King City, Calif. 93930 — Tel.: 408-385-5961

COMBINED SHIPMENTS — Shipments of one or more pallets of any "Calidria" asbestos product may be combined with one or more pallets of any other "Calidria" product for total quantity price, based on the total number of pallets ordered.

IMPORTANT — Terms are net cash 30 days from invoice date. Prices apply within continental U.S.A. Union Carbide reserves the right to adjust customer's orders to comply with the ordering quantities shown above.

C1571

UNION CARBIDE CORPORATION • METALS DIVISION • 270 PARK AVENUE, NEW YORK, N.Y. 10017

UCC 005948

UCC 14 8-2

UNION CARBIDE INTERNAL CORRESPONDENCE

MINING AND METALS DIVISION

P O BOX 579, NIAGARA FALLS, NEW YORK 14302

To (Name) Mr. F. H. Larrison
Division Union Carbide Corporation
Location P.O. Box K
King City, California 93930

Date December 8, 1971

Originating Dept. Research and Development Department
CALIDRIA Asbestos

Answering letter date

Subject Product Specifications
SG-130

Copy to Messrs. R. E. Byrne
G. L. Dickson
B. L. Ingalls
R. O. Marsten
J. L. Myers
J. W. Rawlings
E. Saunders

Dear Larry:

As we have discussed several times recently, Sherwin-Williams has included SG-130 asbestos in a new formulation for exterior texture paint. They have, therefore, asked us to supply purchase specifications for SG-130. In preparing these specifications, the SG-130 product quality data obtained at King City and Niagara Falls over the past four years have been reviewed. The review showed that the product was generally well within specifications but that the specifications were so broadly drawn that it could, and sometimes did, vary quite widely in important properties. This letter presents the data and recommends updated product specifications.

The data from Niagara Falls "composite" samples are listed in Table I. The corresponding King City quality control data as provided by Dick Marsten in his letter of 10/21/71 are given in Figure 1. It is useful to examine and compare these results as a background for selecting appropriate specifications.

Percent Reflectance (Test 1, Table I) is only run at Niagara Falls on this product. Table I shows that reflectance has always been very constant in the 70-71 range.

The magnetics results from Table I and Figure 1 are summarized on Page 2 for convenience in comparison. Since some of the samples were marked with dates and some with lot numbers, Figure 1 has been used to get what appears to be a generally good matchup. The lot designations or dates obtained by matching are shown in parentheses in the Table.

C1375

UCC 005949

Sample Designation	Weight % Magnetics Niagara Falls	King City	Difference
Nov. 68 (6789)	1.8	1.5	+0.3
Oct. 69 (7132 and/or 7134)	1.8	1.5	+0.3
(April 70) 108	1.5	1.4	+0.1
(Aug. 70) 199	1.6	1.4	+0.2
(Sept. 70) 201	1.6	1.3	+0.3
May 71 (304?)	1.8	-	-
(Nov. 70-July 71) 304	1.8	-	-
(Sept. 71) 598	1.4	1.4	0.0
		Av.	+0.24

It is immediately evident that the current specification of 2.5% max. is far above the level of any SG-130 product we have ever made. There also is a consistent bias of +0.2 to 0.3 between the laboratories. It would probably be desirable to determine why this difference exists but as long as it stays this consistent it is hard to justify much effort to this end.

Continuing with the results in Table I, the Dry Bulk varies from 5.7 to 10.2. We feel that this is not a particularly reliable or reproducible test so we will not be concerned with this variation.

The two types of Wet Bulk tests, Nos. 4 and 5 in Table I, are related to fiber openness and fineness of grind of the asbestos product after it has been subjected to very low or to high shear, respectively. There has been some drop in these properties in late 1970 and early 1971, particularly in the 2 g./l test. The latest material, Lot 598, is back over 400, however. The Oct. 1969 material also appears to be quite different from any other SG-130 that we have ever made. It is our judgment that these Wet Bulk values should be around 175-180 for the 10 g./250 ml. test and about 400 for the 2 g./l. procedure. We will continue to monitor this property via the Niagara Falls composites but no specification limit will be suggested at this time.

Next comes a key measure of product properties, the two types of wet screening. The present specifications require 28-32% on 325 mesh by the tap water technique. There are no "coarse end" requirements.

The +325 mesh data from both laboratories and both types of procedure are plotted in Figure 2. The tap water data show a very consistent pattern with the specifications met nicely by the King City data while Niagara Falls results are consistently high by around 4%. This difference between laboratories is generally characteristic and no attempt will be made at this time to resolve it. Note that the tap water screening data from each laboratory in themselves show that the various lots of product are pretty much the same in this property.

In contrast, the dispersed screening data, indicate that the Oct. 69 product is much finer than any other material tested. This distinction is borne

C1C76

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out, but not as sharply, by the screening data at other mesh sizes (see Table I both screening procedures), the high 2 g./l. Wet Bulk of 460 and the higher Available Fiber and Ultimate Fiber results. For other than this sample, however, the results cluster quite closely around the 15% level.

Dispersed screening is actually a more reliable method than tap water (flocculated) screening to characterize asbestos. It is our opinion that in the longer run we should switch to this type of screening for quality control but the attendant interlaboratory checking and standardization work is beyond both of our present manpower capabilities.

The corresponding +35 mesh data obtained by Niagara Falls are shown in Figure 3. King City does not run a +35 mesh test on this product since it is not now specified. The tap water data show that the material made in 1970 had +35 values of 1.5 to 2.5. The amount of the "coarse" has declined steadily over 1971 and is now down to about 0.5%. The dispersed screening results show very similar trends. Over the past year, values have ranged from over 1% to as little as 0.1%.

Excessive coarse material can cause problems in tape joint compounds and in certain paints where SG-130 has so far found limited usage and, hopefully, will be much larger in the future. We feel that observed variation is too large and that a "coarse end" specification is needed to ensure that a product with consistent properties is manufactured.

The last tests in Table I, Available and Ultimate Fiber, have in the past been somewhat controversial. Available Fiber is intended to show the amount of fibrous material that is available to the user with very little shearing in his process. The Ultimate Fiber represents fiber availability if the product is subjected to high shear by the user. It is, in addition, a measure of product purity. Although these tests may not be accurately named, it has been our experience that they represent a reproducible and valuable measurement of fundamental product quality. It is beyond the scope of this letter to argue the point so it should only be noted that the range of values since Aug. 1970 to the present has been only 55-58.6 for Available Fiber and 82.4-84 for Ultimate Fiber. The '68-69 samples differ appreciably.

This quite extensive background on product properties makes it a fairly straightforward job to select realistic updated specifications. In essence, it is proposed that we set up Plant Control specifications which the product as now manufactured meets but does not exceed substantially. These would be supplemented with a set of Manufacturing specifications which are more liberal and would be the ones used with customers. Both sets of specifications would be based on the three tests presently run, i.e., moisture, magnetite, and +325 mesh wet screen, plus 35 mesh wet screen test and reflectance.

The dual specification approach which has been used to a limited extent in the past has several important advantages. It allows for analytical uncertainties

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and differences between laboratories. It permits the plant operators to push as close as practical to the Plant Control limits to reduce costs without serious danger of reject product. It also gives us the flexibility to ship material that falls between the two specification limits at our discretion and under control.

It is our understanding that the present specifications for SG-130 are those given in a 12/3/70 summary by Mr. R. Rivera as listed below. Test frequency is one per 52 ton composite. There are no "Plant Control" specifications.

Determination	Specification	
	Manufacturing	Plant Control
Moisture	3% max.	-
Magnetite (%)	2.5% max.	-
Wet Screen +325 M	28-32%	-

Referring first to Moisture Content, Figure 1, since June of 1969 there has been one lot (199) at 1.9%, one lot (598) at 1.6% and everything else has been 1.5% or less. The 3% maximum level is so high it is hardly relevant. It is suggested, therefore, that we set a Plant Control Specification of 2.0 maximum and a Manufacturing Specification of 2.5% maximum as packaged. The "as packaged" limitation is not intended to give us a license to store the material under water but does provide negotiating flexibility for an "as delivered" basis, for polyethylene overwrap, and/or for moisture picked up while stored in the customers' plant.

The magnetite contents were summarized previously on page 2. The tests at King City over the entire four years show a range of 1.3 to 1.5% while the Niagara Falls are generally 0.2 to 0.3% higher with a range of 1.4 to 1.8. In the present applications for SG-130, the magnetics effect the users product as grittyness and via their effect on product whiteness. The grit is more important in tape joints while the whiteness is one of our main advantages over Canadian for paints. Accordingly, it is recommended that we change the present Manufacturing Specification from 2.5% to 2.0% with a corresponding Plant Control of 1.6% At the same time, we should add a reflectance specification. Since the magnetics analysis requires both special standards and interlaboratory standardization we will emphasize "whiteness" when talking to paint customers and if this "sells" we can possibly drop the magnetics testing at King City in a few months. Niagara Falls could continue to monitor it as a precaution.

Based on the data in Table I, a Plant Control limit of 70 minimum and a Manufacturing Specification of 69 minimum for Reflectance would appear reasonable. These values will have to be tentative since the only historical data on this product have been obtained at Niagara Falls. Where comparable data are available, the two laboratories generally check reasonably closely on this property, but occasionally there have been some differences. Adjustments in the values can be made as King City data accumulate. It should be noted, in this connection, that all specifications must obviously be written in terms of King City data.

C1378

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Finally, we get to one of the most critical measurements of product properties, the wet screen analysis. The present Manufacturing Specifications for 28-32% on +325 mesh by the tap water technique fit the product as manufactured quite well. In view of your comments that there were some problems meeting the 28% minimum on the recent run where a low +35 mesh was made, it is suggested that we make these Plant Control Specifications and widen the range slightly to 27-32%. In view of interlaboratory differences a Manufacturing Specification of 25-35% is suggested.

The desirability of a +35 mesh specification has been discussed previously. Again, in view of your recent plant experience, a value of 0.7% maximum is suggested for Plant Control limits. This should give us a typical value around 0.5% which should be satisfactory for this product without pushing you too hard on the +325 end. The corresponding Manufacturing Specification would be 1% maximum.

This completes the recommended changes in specifications. For convenience they are summarized in Table II attached. There is one additional area, sample frequency, however, where I would like to make some comments for your consideration. We have discussed several times the standard procedure of setting a lot size at 52 tons and manufacturing it in several parts often separated by a month or more. Analysis are then run on a mixed composite from the entire lot.

It seems to us that a 52 ton lot is much too large to be reasonably confident that one composite is representative of the entire lot. This is particularly a concern when parts of the lot are made at different times separated by a month or more. Our feeling is that it would be much better to reduce the lot size to about 20 pallets (16 tons) or whatever is made in a contiguous or closely related manufacturing run if the latter is less than 16 tons. It is also suggested, if this is not already your procedure, that a sample be collected for each pallet during the bagging operation and the composite be prepared from these by the man in your laboratory. This would help to assure that representations taken evenly across the lot make up the overall composite.

Your comments on the suggestions contained herein are solicited.

Regards,

H. B. Rhodes

HBR/bsn
Attach.

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TABLE II

RECOMMENDED SPECIFICATIONS FOR SG-130

Test	Manufacturing Specification	Plant Control Specification
Moisture Content (wt. %) (As packaged)	2.5 OK	2.0 OK
Magnetics (wt. %)	2.0 OK	1.6 OK
Reflectance[1] %	69 OK	70 OK
+325 Mesh Wet Screen (Wt. % Retained)	25-35 OK	27-32 OK
+35 Mesh Wet Screen (Wt. % Retained)	1% max.	0.7% max.

[1]Tentative

C1070

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UCC 005955

TABLE I

SG-130

NIAGARA FALLS ANALYSIS OF MONTHLY COMPOSITES

Test No.		Nov. 69 (6789)	Oct. 69 (7132 & 7134) As Run(2)	Oct. 69 (7132 & 7134) Repeat(2)	(Apr. 70) 108-1-52	(Aug. 70) 199-1-52	(Sept. 70) 201-1-52	May 71 (3047) As Run(2)	May 71 (3047) Repeat(2)	(Nov. 70-July 71) 304-(1-40)	(Sept. 71) 598-(1-15)
1	Reflectance (%)	71	71	N.A.	70	70.5	71	71	N.A.	70.5	71
2	Magnetics (Wt. %)	1.8	1.8	N.A.	1.5	1.6	1.6	1.8	N.A.	1.8	1.4
3	Dry Bulk Density (lb./ft.^{3})	10.2	5.7	N.A.	N.A.	6.5	7.1	10.2	N.A.	6.3	6.1
4	Wet Bulk-10g./250 ml. (ml.)	183	182	N.A.	176	186	161	175	N.A.	157	177
5	Wet Bulk-2g./1. (ml.)	N.A.	460	N.A.	405	365	330	315	N.A.	335	405
6	Wet Screen (Tap Water)										
	Mesh 20 Cum. % Ret.	N.A.	N.A.	Trace	N.A.	0.2 0.1	0.2 0.2	N.A.	0.1	0.1	Trace
	35	N.A.	N.A.	0.4	~1.6(4)	2.0 2.0	2.3 2.5	N.A.	1.5	1.3	0.5
	65	5.0	4.6	4.5	6.1	7.1	8.1	7.3	6.7	6.7	3.3
	100	8.8	9.1	7.6	9.5	11.5	13.5	10.1	10.3	9.1	6.7
	200	20.8	20.4	19.6	20.9	23.0	24.1	21.9	22.7	19.7	17.4
	325	35.6	31.0	34.1	34.3	36.1	37.0	34.4	36.3	32.7	31.3
7	Wet Screen (Dispersed)										
	Mesh 20 Cum. % Ret.	N.A.	N.A.	Trace	N.A.	Tr.0.3	0.3 Tr.	N.A.	Trace	Trace	Trace
	35	N.A.	N.A.	Trace	~0.4-0.8(3)	0.5-0.8	1.3-1.1	N.A.	0.3	0.3	0.1
	65	1.0	0.3	0.4	2.3	2.1	2.7	1.7	1.5	1.7	1.1
	100	1.6	0.6	1.1	3.6	3.4	4.1	3.0	3.0	2.9	1.8
	200	5.0	3.8	3.6	8.7	8.4	8.8	8.8	8.8	8.2	6.9
	325	13.5	8.3	7.9	16.5	14.2	17.8	15.8	15.7	15.5	14.2
8	Available Fiber (Wt. %)	42	64.9	N.A.	52.4	56.8	55.0	56.2	N.A.	56.7	58.6
9	Ultimate Fiber (Wt. %)	78	86.0	N.A.	82.6	83.6	82.4	83.3	N.A.	83.6	84.0

(1) Some samples marked with date, others with lot number. These can be correlated quite well using graph from R. O. Marstan letter of 10/21/71 attached. Items shown in parentheses were obtained via correlation.

(2) As run tests were made about one month after manufacture. Repeat was run on 10/8/71.

(3) Estimated from 1.3 g. sample, usual technique uses 5 grams.

(4) Estimated from size distribution curves.

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Wet Screening
SG-130 +35 Mesh

Figure 3
12/6/71 MBC

N.F. Tap Water

304

N.F. Distilled

304

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UCC 005957

K&E 5 YEARS BY MONTHS X 100 DIVISIONS 46 3650
MADE IN U.S.A.
KEUFFEL & ESSER CO.

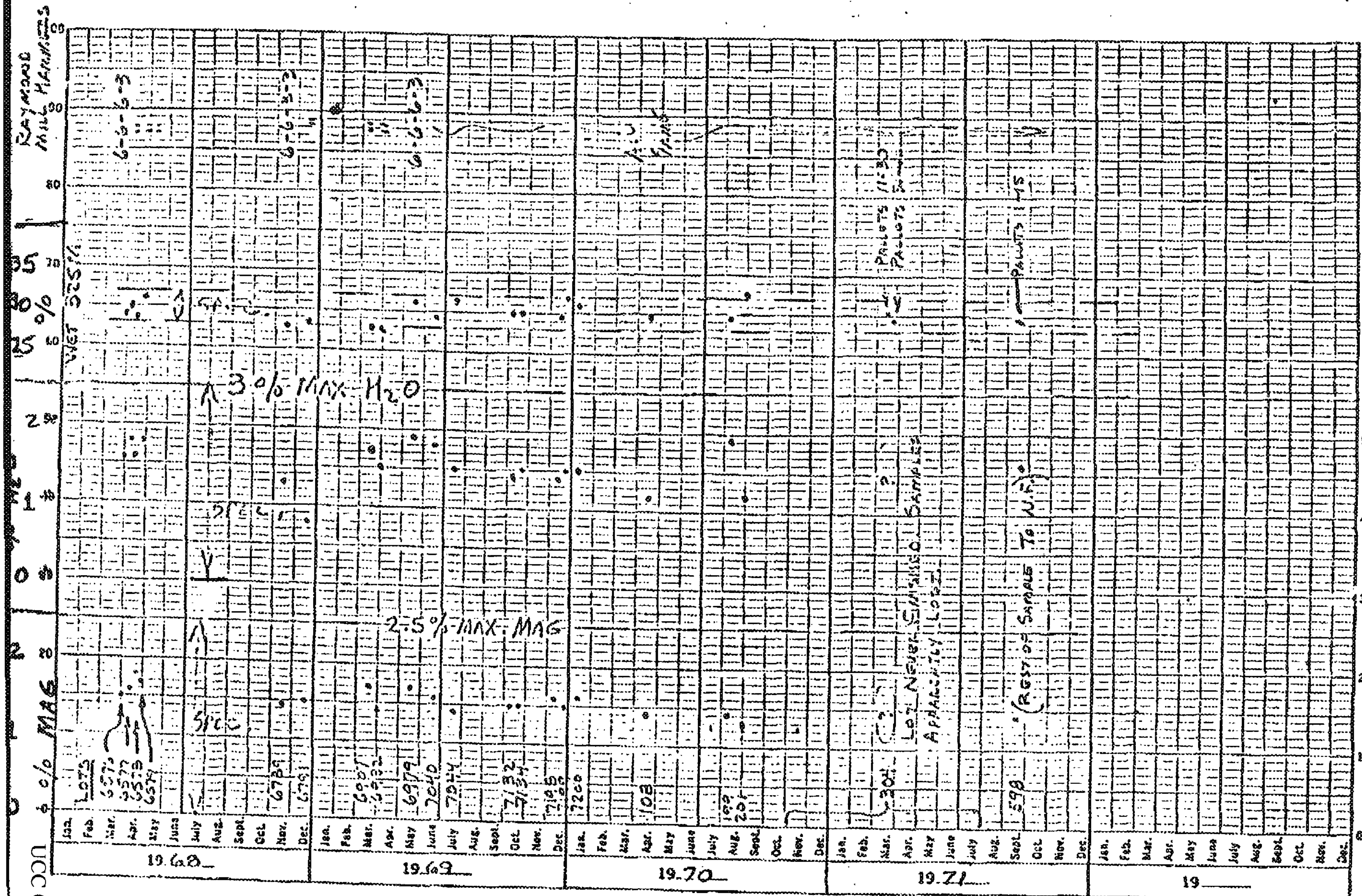


Figure 1

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F. H. Larison

TECHNICAL SERVICE REPORT

by

D. H. Reed

RECEIVED
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The Use of Calidria SG-210 Asbestos in Dry or Ready-Mix Tape Joint Compounds

Union Carbide Corporation
Chemicals and Plastics
Research and Development Department
South Charleston, West Virginia

July 19, 1971

C1585

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What Asbestos Fibers Do in Tape Joint Compound

Asbestos performs a number of functions in commercial ready and dry-mix tape joint compounds. The primary function is to form the backbone or "web" for the inert fillers and film formers to associate with. Upon drying, or film cure, the asbestos adds a significant amount of dimensional strength to the applied materials. The influence of asbestos on other formulated performance properties depends upon the particle size and concentration level with respect to the other inert fillers.

Asbestos functions as a secondary bodying and thickening agent, in wet formulations, via the water absorption capacity of the fiber. In this capacity, it contributes to the reduction of product density in relationship to the concentration level employed in the formulation. This comes about as a result of the increased water demand. The water absorption efficiency is a function of the particle size and other physical properties of the asbestos.

Finally, perhaps more than any other filler, asbestos contributes significantly to the formulated compound smoothness, cratering, and "wet edge" properties. This is because of the fibrous nature of asbestos particles. In like manner, both the asbestos particle size and concentration level will determine, to a large extent, the smoothness of the feathered edges.

On the negative side, of the variety of inert fillers employed in a joint compound, asbestos and clays contribute most to the nailhole cracking problems. In the process of water absorption, asbestos particles swell. On drying, these particles shrink with the release of water. Although the swelling is necessary for good product body, asbestos at too high a level can be the single largest contributor to thick layer joint compound shrinkage cracks. Product particle size uniformity is therefore of utmost importance in regard to reproducible built-in properties of a formulated tape joint compound.

Special Properties of "Calidria" Asbestos

Most asbestos materials, marketed commercially for use in tape joint compounds, contain rock dust and other abrasive type fillers, that have no specific desirable effects on joint compound performance. "Calidria" SG-210 and SG-130 asbestos are produced by a proprietary manufacturing process that yields essentially a pure asbestos fiber content. The SG-210 product is preferred for ready-mix smoothness and water absorption efficiency. Another feature is the unique shape and physical structure of the "Calidria" asbestos fibers. The micro-size particles are actually "fibrils" and the respective stems are hollow; hence, the fibers have a tremendous water absorption capacity. In like manner, there are more "active sites" for other inert fillers to associate with, in formulated film formation. As a result, "Calidria" asbestos generally goes twice as far, on a pound for pound basis, as the Canadian and other commercial types used in tape joint compounds. It is these physical properties that enhance the wet joint compound workability and performance properties mentioned above.

How to Use "Calidria" Asbestos in Tape Joint Compounds

"Calidria" asbestos can be used in dry or ready-mix compounds, with very little change in formulation parameters. Since "Calidria" SG-210 will go twice as far as similar Canadian types, a good substitution starting point is

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one-half as much. The formulation weight difference is best made up with mica or calcium carbonate dry filler.

The typical product characteristics of "Calidria" SG-210 and SG-130 are listed in Table I. The SG-130 is shown, because it can be used in formulations where surface smoothness is not as desirable as that obtained with SG-210 asbestos.

The relationship of "Calidria" asbestos fiber physical properties to subsequent oil or water demand characteristics are depicted in Figure 1. In Figure 1, these absorption characteristics are compared to typical commercial grades regularly employed in joint compounds. The data, in Figure 1, show that a good "Calidria" asbestos substitution starting point is at about 50 percent, by weight, less than other typical commercial asbestos, without changing significantly the original formulation water demand (i.e. one-half the amount of other sources). The weight differences can be made up with either additional amounts of calcium carbonate or mica fillers. The latter is preferred with respect to ready-mix water demand and good nailhole cracking resistance. No other changes are necessary in the formulation.

Three suggested tape joint compound ready-mix formulations are listed here to depict the use of Calidria SG-210 asbestos. These are listed in Tables II, III, and IV. These formulations differ in both the ratio and types of additives, to introduce desired formulation end-use properties. For example, the suggested bedding coat material, Table II, does not have as smooth a dry surface, but should fill the primary requirements of good tape adhesion and a minimum amount of thick layer cracking. The general purpose formulation, Table III, should depict good overall working properties and have better wet edge and surface smoothness than the bedding coat material. A topping coat product, Table IV, should exhibit a minimum amount of volume shrinkage, (note the higher density), have exceptional surface smoothness, and wet edge. In addition, a minimum amount of sanding is desirable for topcoat materials. In actual practice, the bedding and top-coat materials are giving away to the general purpose types.

If Canadian or other types of asbestos were used in these suggested formulations, it would be at double the concentration level indicated to achieve essentially the same water demand. In like manner, the higher asbestos level dry compound surface smoothness would not be as evident with everything else being equal.

The formulations listed here are merely suggested ones. Experienced tape joint compound formulators have their own source of fillers and usually employ other ingredients to fit particular geographic conditions and subsequent end-use requirements. In the case of asbestos, the choice is generally between the Canadian and "Calidria" types. It is a matter of grades employed, efficiency, and effect on compound workability and dry-film cratering. In these important areas, "Calidria" SG-210 asbestos shows extremely good properties in either dry or ready-mix tape joint compounds.

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TABLE I

UNION CARBIDE CALIDRIA ASBESTOS

Typical Product Characteristics		
	SG-130	SG-210
Reflectance (G.E. Photovolt)	68%	
Contained magnetite	2% Max.	
Alkalinity (as % of Na_2O)	0.05-0.06	
pH (5% aqueous slurry)	8.5-9.5	
Surface area (BET)	50-60 m^2/g.	
Oil Adsorption (DOP #/100# asbestos)	90-100	110-120
Wet Bulk, settled vol. (ml.)		
10g/250 ml./1 hr.	200	220
Dry Bulk (#/ft.^{3})	7-8	5-6
Water absorption (wt. % in filter cake)	55-60	62-65
Size distribution (Cumulative % retained)		
Wet Screen mesh size		
100	5	Trace
200	17	3
325	28-32	10-15

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TABLE II

UCAR LATEX WC-130 OR 131

SUGGESTED BEDDING COAT TAPE JOINT COMPOUND

(13-DHR-18)

Ingredients and Order of Addition(a)	Pounds	Gallons	Lbs/100 Gal	% by Wt
1. Water	1932	232.43	424.16	31.39
2. CELLOSIZE TJC Thickener, Union Carbide	20	1.72	4.41	0.32
3. Bacteriastat "Dowicide" A or similar	8	0.74	1.72	0.13
4. Dispersant, "Daxad"-30, (25% ₹), Dewey and Almy	64	6.53	14.01	1.04
5. UCAR Latex WC-130, (58% ₹), Union Carbide	414	44.66	90.94	6.73
6. Dibutyl Phthalate, Union Carbide	24	2.75	5.23	0.39
7. Ethylene Glycol, Union Carbide	40	4.30	8.74	0.65
8. Calidria Asbestos SG-210, Union Carbide	180	8.45	39.62	2.92
9. Mica P-80-F, Western Mica	840	36.68	184.34	13.66
10. Clay, ASP-400, Minerals and Chemicals, Phillip	160	7.44	35.04	2.60
11. Calcium Carbonate, No. 1 White Thompson-Weinman	2468	109.20	542.17	40.11
12. NOPCO PD #1 Antifoam Nopco Chemical Company	4	0.55	0.88	0.06
	6154	455.45	1351.26	100.00

Note (a) Mixed 1.5 to 2.0 hours in a one-gallon Baker-Perkins, Sigma Blade Type Mixer, at 79 r.p.m.

Typical Properties

Water Content	35.1%
Pounds/Gallon	13.51
Brabender Viscosity	700 B.U.
Adhesion to Wallboard Tape	100%
Nailhole Cracking Resistance	99%
Sandability	Good

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TABLE III

UCAR LATES WC-130 OR 131

SUGGESTED GENERAL PURPOSE TAPE JOINT COMPOUND

(13-DHR-68)

Ingredients and Order of Addition(a)	Pounds	Gallons	Lbs/100 Gal	% by Wt
1. Water	1932	232.43	421.67	31.35
2. CELLOSIZE TJC Grade Thickener, Union Carbide	20	1.72	4.41	0.32
3. "Dowicide" A, or similar bacteriastat	8	0.74	1.73	0.13
4. "Daxad"-30, dispersant (25% T)	64	6.53	14.01	1.04
5. UCAR Latex 131 preplasticized (59% T), Union Carbide	447	48.48	97.55	7.25
6. Ethylene Glycol, Union Carbide	40	4.30	8.74	0.65
7. Calidria SG-210 Asbestos, Union Carbide	180	8.45	39.19	2.92
8. Mica, AA, Thompson-Weinman	420	18.34	91.60	6.81
9. Mica, P-80-F, Western Mica	420	18.34	91.60	6.81
10. Clay, ASP-400	100	4.65	21.71	1.62
11. Calgon, Water Conditioner	20	3.12	4.35	0.32
12. Talc, Asbestol or A-200	40	1.69	8.77	0.65
13. No. 1 White Calcium Carbonate	2472	109.38	539.69	40.13
	6163	458.17	1345.02	100.00

Note: (a) Mixed 1.5 to 2.0 hours in a one-gallon Baker-Perkins, Sigma Blade Type Mixer, at 79 r.p.m.

Typical Properties

Water Content	35.1%
Pounds/Gallon	13.45
Adhesion to Wallboard Tape	100%
Brabender Viscosity	600 F
Nailhole Cracking Resistance	95%
Sandability	Good

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TABLE IV

SUGGESTED TAPE JOINT TOPPING COMPOUND
(13-DHR-48)

Ingredients and, Order of Addition[a]	Pounds	Gallons	Lbs/100 Gal.	% by Wt.
Water	1714	206.21	399.81	28.27
CELLOSIZE TJC Grade	30	2.59	6.96	0.49
Dowicide "A", Bacteriastat	8	0.74	1.84	0.13
UCAR Latex WC-130 (58% S)	345	37.26	80.47	5.69
Dibutyl Phthalate	20	2.29	4.62	0.33
Ethylene Glycol	40	4.30	9.39	0.66
Calidria SG-210 Asbestos	180	8.45	42.17	2.97
Mica (P-80-F)	100	4.37	23.36	1.65
Mica (Ser-X)	400	17.47	93.20	6.60
Clay, ASP-400	40	1.86	9.24	0.66
No. 1 White Calcium Carbonate	3127	138.36	729.53	51.56
Talcum Powder (Mallinkrodt)	40	1.69	9.24	0.66
Calgon, Regular	20	3.12	4.67	0.33
	6064	428.71	1414.50	100.00

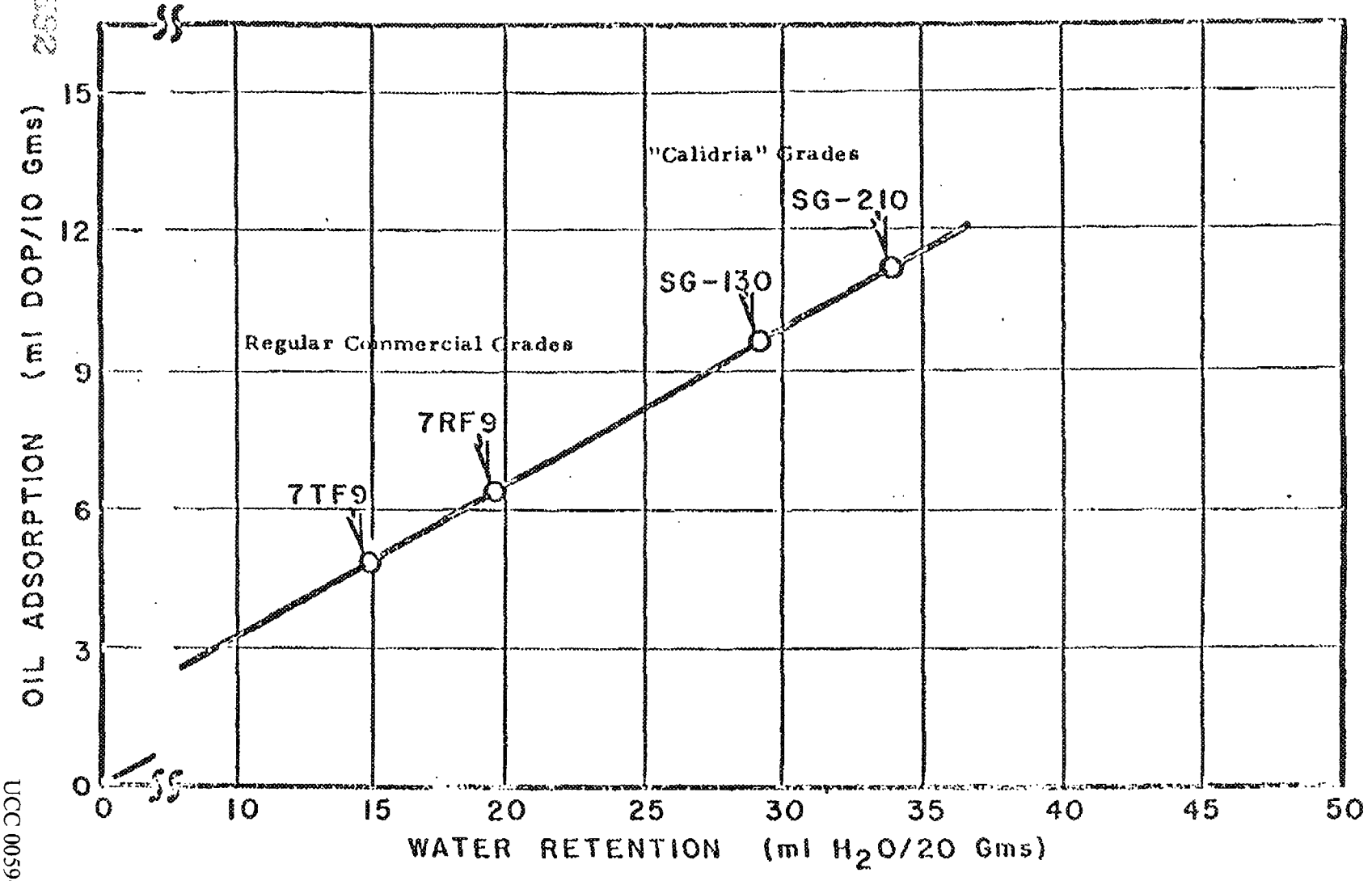
Water Content	30.66%
Pounds/Gallon	14.14
Brabender Viscosity	840 B.U.
Adhesion to Wallboard Tape	100%
Nailhole Crack Resistance	92%
Sandability	Good

NOTE: (a) Mixed 1.5-2.0 hours in a one-gallon Baker-Perkins, Sigma Blade Type Mixer, at 79 r.p.m.

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FIGURE 1



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RELATIONSHIP BETWEEN WATER & OIL ADSORPTION CAPACITY OF SOME ASBESTOS PRODUCTS FOR TAPE JOINT ADHESIVE FORMULATIONS

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UC 149-2

UNION CARBIDE

INTERNAL CORRESPONDENCE

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METALS DIVISION

P. O. BOX 579 · 4625 ROYAL AVE., NIAGARA FALLS, NEW YORK 1430

To (Name) Mr. R. E. Byrne, Jr.
Division UCC-Metals Division
Location Niagara Falls, NY

Date October 4, 1978

Originating Dept. "Calidria" Asbestos

Answering letter date

Subject Daubert Chemical

Copy to Messrs. G. L. Dickson
E. J. Kleber
T. P. Norris
H. B. Rhodes
[redacted]
F. J. Shortsleeve
J. E. Walsh
File

I called Bill Houghton in Oak Brook today to check on orders for RG-110-EX for Holland.

He advised me that "upper management" decided last week to discontinue all asbestos-filled products, with a target date of 12/31/78. He said this applies to domestic and export requirements and was caused primarily by union pressure at their plants and their customers. Their insurance company is also insisting that they stop using asbestos.

I told him we had a similar situation at one of his competitors, but that they were at least giving us a chance to present our side to their board of directors. I offered to do the same but he doesn't think Daubert will accept the offer.

Bill says they have substitute formulations without asbestos which are lower quality and higher cost. He also indicated their filled asphalt business was declining due to higher use of plastisol corrosion coatings which "don't contain asbestos". I chose not to correct him on this.

Daubert has been threatening to stop using asbestos for several years so this may not be the end, but this is the first time I have heard a target date.

John L. Myers

JLM:dal

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