UC 149-2

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PLAINTIFF'S EXHIBIT
UC-362

UNION CARBIDE INTERNAL CORRESPONDENCE

METALS DIVISION

P.O. BOX 579 - 4625 ROYAL AVE., NIAGARA FALLS, NEW YORK 14302

To (Name) T. P. Norris
Division
Location 100 Oceangate, Long Beach, CA 90802

Date November 8, 1982

Originating Dept. TECHNOLOGY - Product Development

Answering letter date

B-3

Copy to R. E. Byrne, G. L. Dickson, B. L. Ingalls, R. J. Klotzbach, G. M. Lincoln, F. L. Smith, W. C. Thurber, J. E. Walsh

Subject Asbestos-Blend Project for Asphaltic Products: Status and Direction

10904

In your note dated October 28, you asked for a status report on the subject project. This project has been assigned to Fred Smith. A copy of the first status report prepared by Fred for the project is attached for your perusal.

After discovering how to make the asphaltic cement mixtures in August, seven formulations were prepared and sent to Gardner Asphalt Company for evaluation. Variations were made in terms of blends of SG-130 with Calavaros 6 D, including changes in percent asbestos, types of solvent cutbacks, and limestone sizing. While the breadth of submitted samples did not cover all possible variations, the following conclusions and observations have been made:

Conclusions

1. We can use SG-130 all by itself (no blending of long fibers) and make an acceptable roof cement that readily passes penetrometer and sag tests. See test results for sample 44 versus 37 and 45.

2. Changes in the size distribution of limestone in the asphaltic mix materially affects asphalt performance. See test 44 compared to 49.

Observations

1. With only one series of tests under our belts it is exciting to note that SG-130, without long fiber additives, produces a comparable quality cement while using 20% less asbestos (8.5% vs. 10.5%) than used in the manufacturer's normal mix.

2. SG-130 takes comparatively more mixing energy for addition to asphalt cement mixtures than other long fiber asbestos on the market. This may pose a problem to some manufacturers if they tried to substitute SG-130 for what they are currently using. This possibility is being investigated further.

The progress on this project has been affected by the number of Customer Service jobs tackled by Fred in the last three months. Since the July meeting where we discussed scheduling we have done monitoring and analysis jobs for Roppe Rubber, U.S. Tennis, Futura, U.S. Paint, Lawrence Cannon Drilling and Pyramid Drilling. We plan to expend about another 3 man weeks on asphaltics before year-end, however, accomplishing most of the program described herein.

Based on the favorable results using SG-130 alone in asphaltic cement formulations it is our intention to leave the fiber blend issue aside for the moment and concentrate on finding the least costly material available at King City that will make acceptable asphaltic cements. We have initiated a program wherein we are characterizing asbestos values in certain screen fractions of overburden, ore and tailings. An Action Plan for this program will be distributed within the week under separate cover.

Because of our success with SG-130, we are hopeful that several of the screen fractions will be suitable for use in asphaltic cements, as is, without further processing. The implications are obvious, i.e. cheaper additives, and increased equivalent plant capacity by bypassing the main plant circuitry. A more detailed description of the characterization program as it relates to asphaltic cements will be included with the action plan.

It is our intention to pursue blended product applications for asphaltic coatings and sealers following the characterization program. The first step will be meeting with Gardner Asphalt personnel to discuss their normal mix proportions for sealers and coatings, and to obtain a description of acceptability tests for these products. An Action Plan will be issued for this activity most likely after the meeting with Gardner Asphalt Corp. scheduled for the first part of December.

For our continuing asphaltic cement program it would be helpful to have a target price for an asbestos material which would be commercially attractive to the users. Knowing this upper value we could direct our efforts to materials that would still be within the target price range once additional processing costs and margins were added to the as-is, where-is value of the material. Your best guess at such a target price would be appreciated.

D. F. Kapral

/jl

Attach.

INTERNAL
CORRESPONDENCE

UNION CARBIDE CORPORATION P O BOX 579 4625 ROYAL AVE
METALS DIVISION NIAGARA FALLS NEW YORK 14302

To (Name) Mr. D. F. Kapral
Division UCC - Metals Division
Location Niagara Falls, NY
Area

Date October 29, 1982
Originating Dept
Area

Copy to Mr. B. L. Ingalls

Subject Asphalt Roof Cement Samples

[redacted]

The following is an update of our investigations regarding substituting UCC "Calidria" asbestos products for short fiber Canadian asbestos in asphalt roof cements.

Generally, roof cements are made by mixing an asphalt cut-back (approximately 20-35% solvent), short fiber asbestos (7 M5 grade) and limestone (approximately 37% -200 mesh) in a low shear type of mixer. The resultant plastic roof cements are most often evaluated by a penetrometer (a device that measures penetration distance by time) and sag tests (smears of the cement hung vertically in an oven to measure run off). Typically, the proportions are 56% asphalt cut-back, 33.5% limestone and 10.5% asbestos.

To date we have made these formulations:

1. Ashalt cut-back (∿ 30% solvent), SG 130 asbestos and James River limestone.

2. Asphalt cut-back (∿30% solvent), SG-130 with 10% Calavaras 6D fiber, and James River limestone.

3. Asphalt cut-back (∿ 30% solvent), Canadian 7R5 asbestos and James River limestone.

4. Asphalt cut-back (∿ 25% solvent), Canadian 7R5 asbestos and James River limestone.

5. Asphalt cut-back (∿ 30% solvent), SG-130 asbestos and a finer limestone (∿ 85% -200 mesh).

6. Asphalt cut-back (∿30% solvent), SG-130 asbestos (6.0 by total wt.) and James River limestone.

Table I outlines these samples where the penetrometer and sag tests were done by Gardner Asphalt Corp. The first was simply the finished product sent to us by Gardner where the asbestos level was at 10.5%. The rest are attempts to isolate any significant variables. Notice that with the asbestos at 8.5% all the short fibered products and the blend would be passing material except the sample with the finer limestone. With asbestos at 6.0% the product failed. We were limited in using the Gardner asphalt cut-back and the Lake 7M asbestos by the sample size sent to us, but significant quantities have since arrived to make further mixtures using the Gardner formula.

Some rheological characteristics of these samples were determined with a Burrel extrusion rheometer. This instrument allows viscous fluids to be measured with different extrusion pressures and orifices. The equation to calculate viscosity here is the direct relationship between shear stress and shear rate, but since it is not used in the industry, the results are limited.

Viscosity (poise) =

$$\frac{(\text{Pressure in dynes/cm}^2)\ (\pi)\ (\text{Radius of orifice})^4}{(8)\ (\text{length of orifice})\ (\text{Quantity extruded})}$$

Table II shows a decreasing viscosity with decreasing penetration values except 2417-49 and 2417-37. 2417-49 is the sample with the finer limestone and 8.5% SG-130 asbestos. 2417-37 is the Gardner finished product supplied from the manufacturer. This seems to indicate that a significant change in the percent of asbestos in the system or particle size of the limestone affects viscosity. Although the minerals and asphalt are all variables that can be looked at regarding performance, the most efficient use of time can probably be made by limiting the asbestos substitutions (type and percent) to the existing formula and specifications.

We should begin to narrow down the variables we want to look at next. Perhaps using some coarser asbestos materials and staying with the same asphalt and limestone would be helpful. We can now evaluate samples with our own penetrometer and can conduct sag tests. Also, Gardner is willing to continue to look at samples for us. Any comments would be appreciated.

Regards,

F. L. Smith

/jl

Attach.

TABLE I

General Characterization of Samples

Sample No.	Asbestos Type	Asbestos % by Wt.	Asphalt Cut-Back Type	Asphalt Cut-Back % Solvent	Limestone Type	Limestone % -200 Mesh	Penetrometer Reading (sec) Passing Range = 2-5 sec.	Sag Test Results
2417-37	Lake 7M	10.5	Gardner	25	James River	37	3.2	Passed
2417-44	SG-130	8.5	APOC	31	"	37	2.6	Passed
2417-45	90% SG-130 10% 6D	8.5	APOC	31	"	37	2.6	Passed
2417-43	7R5	8.5	APOC	31	"	37	2.0	Passed
2417-47	7R5	8.5	Gardner	25	"	37	1.8 (marginal)	Passed
2417-49	SG-130	8.5	APOC	31	GLD	85	1.0	Passed
2417-48	SG-130	6.0	APOC	31	James River	37	too thin to read	Failed

TABLE II

Burrel Rheometer Measurements

Sample No.	Viscosity (Poise)	Extrusion Rate	Density gr./cc.
2417-37	3.0×10^3	1.35 cc/sec.	1.11
2417-44	4.2×10^3	0.96 cc/sec.	1.19
2417-45	4.0×10^3	1.0 cc/sec.	1.07
2417-43	3.0×10^3	1.33 cc/sec.	1.17
2417-47	2.7×10^3	1.49 cc/sec.	1.18
2417-49	3.6×10^3	1.12 cc/sec.	1.18
2417-48	2.2×10^3	1.82 cc/sec.	1.17