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UNION CARBIDE
THE DISCOVERY COMPANY

December 10, 1974

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Attached is a copy of "The Usefulness of RG-144 in Butyl Rubber Caulk". This was prepared for us by Fred Stark of Rubber Research Elastomerics, Inc. Fred is very knowledgeable in this field and his company manufactures butyl rubber solutions for use in this application.

The paper provides a brief background and discusses some of the problems (and solutions) in making butyl rubber caulks and sealants. It should be useful to you in promoting both RG-144 and RG-244 for these applications.

Very truly yours,

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The Usefulness of RG-144 in Butyl Rubber Caulk.

When you consider RG-144 asbestos for butyl caulk a slight background in the development of butyl rubber caulk is helpful. The formulation of butyl rubber caulk is best considered with some historical background. In the late 1950's the use of gum butyl rubber solutions began to be used. The butyl rubber solutions were used more as an additive to a polybutene and vegetable oil vehicle. The polybutene far outweighed the butyl rubber content. The vegetable oil was used as a film former that oxidized. The intent was to use the rubber as a nonmigratory plasticizer and improve adhesion and flexibility. The filler systems were high oil absorption calcium carbonates and talcs which were the same as used in the caulk formulas without the butyl rubber. The use of thixotrapes was important, but the talcs, carbonates and clays were adequate for the system.

Butyl rubber caulks evolved to using some petroleum resins in the formulations. The amount of polybutene remained high and the caulk exhibited a minimum of elasticity. The clay thixotrapes still proved to be adequate. In short, until butyl rubber caulks began to be formulated with higher percentages of butyl rubber the usefulness of the RG-144 was not as pronounced.

In the early 1960's butyl caulk formulations began to appear using a cured or cross linked rubber. At this point butyl caulk began to really develop an identity of its own. The cured rubber or cross linked rubber overcame a number of distinct problems with the butyl caulk. The need for a drying oil or skinning agent was removed. There was more rubber present so that the rubber content actually contributed properties to the drying characteristics of the caulk. The caulk could now have a very short tack free time with no after tack and problems with vegetable oil skin wrinkling, alligatoring and cracking. Other problems that were overcome in the same manner related to adhesion and peel strength, elasticity and tensile.

The demands on the thixotrape were greatly increased because the caulk vehicle system was predominantly that of rubber. The RG-144 and RG-244 were found to provide several advantages. First of all the RG-144 and RG-244 were easier to incorporate from a dust and dispersion viewpoint. They could be added at any time and incrementally. The addition of the RG-144 and RG-244 was not as sensitive an addition. There is approximately a 3 to 1 ratio of effectiveness between the two. RG-144 is about 1/3 as effective as RG-244. This allows the formulator wide latitude for balancing operator errors, equipment problems, cost, and performance. Few thixotrapes can offer this latitude and versatility.

The RG-144 and RG-244 minimized the side effects of using a thixotrape in the areas of adhesion loss, package stability, and channel cracking. This is due in part to their mechanism but also the the greater ease of balancing. The salient feature of these products is their ability to actually increase gunning ease or extrusion rate. When the asbestos is added to the caulk batch you can see the caulk take something of a "puff" or whipped cream

texture. This does not affect the porosity of the compound. We have not found a tendency for the asbestos to wet in and pack causing gunning problems with cartridges.

A typical starting point formulation would be :

10	parts	V-2001
1	"	TiO_2
15	"	$CaCO_3$
1/2	"	RG-244
2	"	VM & P

The $CaCO_3$ should be a grade similar to Q-3 from Calcium Carbonate Co. or Marble Dust from Thompson Weinman Co. Many modifications can be made to this. Some polybutenes can be added along with an adjustment of $CaCO_3$ and asbestos.

The V-2001 is an 80% solids butyl rubber compound with 20% mineral spirits.