FILE NAME: WR Grace (WRG)

DATE: March 28, 1972

DOC#: WRG010

DOCUMENT DESCRIPTION: 1972 Memo from HA Brown regarding Mono-Kote with attached summaries

GRACE

CONSTRUCTION PRODUCTS DIVISION

TO: H. C. Duecker
A. M. Rosenberg

DATE: March 28, 1972

FROM: H. A. Brown

SUBJ: Mono-Kote

For your information, when Veltman went to Europe he planned to have discussions with Dr. Ambrose, and the attached are summaries he was going to use for discussing Mono-Kote with him.

H. A. Brown

HAB/cgr
Attachments

Problems - Detailed

1. MK-3 contains asbestos, declared toxic by Federal Government and many state governments - sales banned in many cities. Grace has reformulated Mono-Kote to MK-4, without asbestos. Two new formulations have substituted fiberglas for asbestos.
2. Bond strength of Mono-Kote has been determined by test methods developed at WRC and CPD. Cohesive bond is evaluated by means of tensile strength (800°F) and cup test (800°F). Adhesive bond is evaluated by tensile adhesion (75°F), adhesive shear (800°F), high temperature flexural tests (600°F), and small simulated-deck fire tests ($\simeq$ 2000°F).

   Critical Bonding of Two Types
   A. Cured green bond
   B. High temperature bond (@ T > 600°F)

3. Underwriters' Laboratories (UL) fire rating is a measure of time elapsed (hours) for unexposed deck temperature to exceed 250°F above ambient temperature, while temperature rise on the flame exposed surface follows E-119 (ASTM designate) thermal profile. Test composite consists of Mono-Kote, of a specified thickness, on galvanized steel backed by lightweight reinforced concrete.

The cost of each test at UL is ~$10,000.00. The time for completion of test is 2-3 months, minimum, once scheduling has been set by UL.

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3/17/72

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Problem Attack - Personnel Assigned

CPD/Cambridge	5 Professionals	2 Technicians
CPD/TR	2 Professionals	1 Technician
WRC	1-1/2 Professionals	2-1/2 Technicians
Total	8-1/2 Professionals	5-1/2 Technicians

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Present Status (Detailed)

1. Two new formulations that have obtained 4 hour fire test ratings at UL and full equivalency to MK-3.

	UL-16A	UL-66A
Composition:	Vermiculite	Vermiculite
	Gypsum	Gypsum
	Fiberglas (0.5%)	Fiberglas (1%)
	Polystyrene (2%) (Chopped Foam)	Cellulose Fiber (4%)
	Air Entraining Agent	Air Entraining Agent
	Verm./Gypsum $\simeq$ 1:1.9	1:1.6

2. MK-3 has an accepted UL fire rating of 3-4 hours on various structural steel members which encompass decks, columns and beams. Actual fire test performance of the 2 new formulations, on similar structural members, was equivalent to or greater than MK-3.

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Future Program - Detailed

A. Present Product

1. Reduce costs by ¼¢/ft² through manipulation of formulation and costs of raw materials.
2. Improve predictability of product performance by defining effects of environmental curing conditions and quality control.
3. Improve quality control of product Mono-Kote by in depth understanding of component properties and their effects on Mono-Kote placement and cure.

B. Advanced System

1. Dry hose spraying of Mono-Kote has been demonstrated to be technically feasible by both steam and atomized water. Operational parameters for commercial application need to be quantified.
2. Expected improvements in commercial application of Mono-Kote by dry hose spraying are:
   - The envisaged system could achieve, in a single pass, a coating several inches in thickness.
   - Greater adhesion of Mono-Kote-to-galvanized steel in thicker coatings (up to 8") which set in 15 minutes is the result of using 75% less water and control of the water-Mono-Kote ratio.
   - Waste material is estimated at 10% of that for conventional wet-sprayed Mono-Kote, thus requiring less clean-up.

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MONO-KOTE® RESEARCH & DEVELOPMENT PROGRAM

WASHINGTON RESEARCH CENTER

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1. VERMICULITE BASED PRODUCT

a. MK-3

ONE WEIGHT PART VERMICULITE
TWO WEIGHT PARTS GYPSUM
ASBESTOS & AIR ENTRAINING AGENT
TWO WEIGHT PARTS WATER TO ONE WEIGHT
PART OF DRY MATERIAL.

b. MK-4

CELIF WOOD FIBER SUBSTITUTING FOR
ASBESTOS.

2. USES

a. FIRE PROTECTION OF MODERN STRUCTURAL
STEEL BUILDINGS.

3. $7-$8MM/YR.

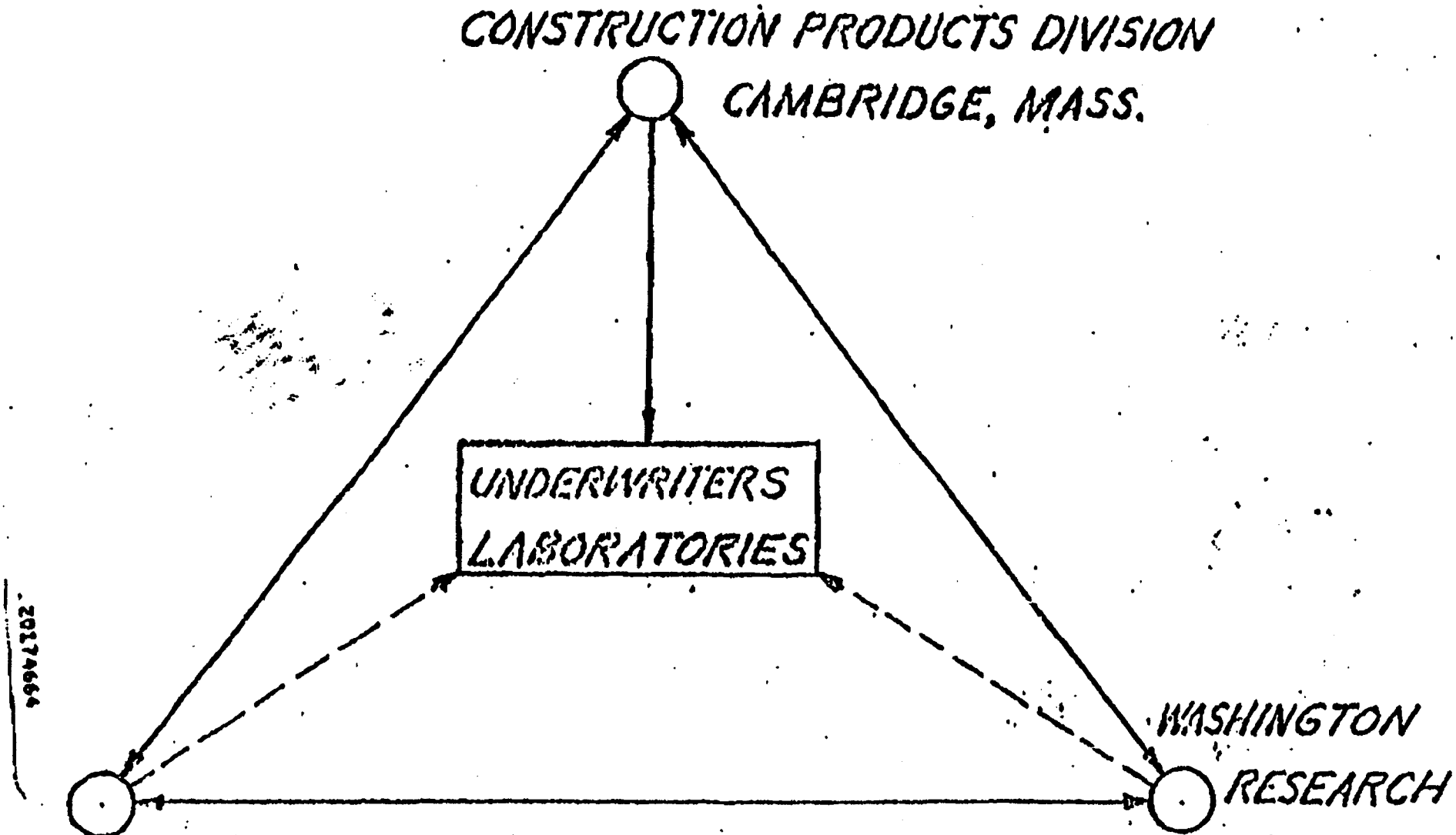
4. GROWING - PROJECTED $11MM - 1975

PROBLEM

1. ASBESTOS TOXICITY
2. BOND STRENGTH
   a. COHESION
   b. ADHESION
3. FIRE RATINGS

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PROBLEM ATTACK



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PRESENT STATUS

1. TWO NEW FORMULATIONS APPROVED BY U.L.

2. FULL EQUIVALENCY TO MK-3

FUTURE PROGRAM

A. PRESENT PRODUCT

1. IMPROVE COSTS

2. IMPROVE PERFORMANCE

3. IMPROVE QUALITY CONTROL

B. ADVANCED SYSTEM

1. DRY HOSE SPRAYING

a. TECHNIQUE

STEAM, WATER, AIR

2. EXPECTED IMPROVENTS

a. IMPROVED BONDING

b. LESS CLEAN-UP

c. SINGLE PASS APPLICATION

d. QUICKER CURING

e. WATER HYDRATION CONTROL

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