

GRACE CONFIDENTIAL

CONSOLIDATED MONTHLY REPORT

SEPTEMBER 1972

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W. R. GRACE & CO.

RESEARCH DIVISION



Washington Research Center, Clarksville, Maryland 21029

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MONTHLY REPORT FOR SEPTEMBER 1972

CONSOLIDATED EDITION

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This report contains information on the following activities at the Washington Research Center:

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Appendix A - Research Division Activity Report		

Two of the more promising polymers tested in the laboratory are Fibberger FA 50H (80/20 CONH₂/COOH, MW 10⁷) and American Cyanamid's Cyanamer P-26 (82/18 CONH₂/COOH, MW 2 X 10⁵). Of the two, Cyanamer P-26 is more desirable from a practical standpoint because of its greater solubility and because there is no decrease in performance when overdosing. For these reasons, Cyanamer P-26 (DAREX 42) was field tested at the Grapetree Bay Hotel, St. Croix, Virgin Islands. Good results were obtained during the period of the test (~3 weeks) i.e., very little scaling after the small amount of scale expected during the initial scaling period. Further tests are planned at Key West and the Middle East.

Samples of scale from a desalination plant in the Virgin Islands were characterized for organic content by infrared, mass spectrometry, and elemental analysis. The samples proved to be largely inorganic. Calcium and magnesium were the major constituents by emission spectroscopic analysis. (McKinney-Killinger-Peters-Ensing)

This past month we have established the incompatibility of both DAREX 41 and DAREX 42 with the high level of copper ions which occur during a plant start-up after operating on acid. Fortunately, this period of high copper levels is short-lived, as the copper level decreases to less than 0.5 ppm after about 20 hours of operation on DAREX 46. We have also shown that acrylamide homopolymers have a threshold effect on Mg(OH)₂ precipitation. Thus, the threshold effect has now been established over the complete range of acrylamide-acrylic acid polymers from molecular weight 1 X 10⁵ to 1 X 10⁷.

(Block)

REFORMULATION AND EVALUATION OF MONO-KOTE (Project 2659)

The purpose of the current Mono-Kote program is threefold:

- (1) Determine the effect of environmental conditions on curing of MK-IV and MK-V.
- (2) Determine the factors that promote shrink-crack.
- (3) Determine the effects that gypsum manufacturing techniques have on Mono-Kote properties to include retarders, stabilizers, and aridizers.

Item (1) is a continuing program and is scheduled for completion December 1, 1972. Previous data have shown that curing and aging behavior is dependent on drying rate which is inversely proportional to relative humidity, temperature, and thickness; and directly proportional to air velocity. No further information available at this time.

Mono-Kotes III, IV, and V have been tested for shrink-crack properties. MK-III and MK-IV have shown this phenomena; MK-V does not. Water content and geometry of the supporting structure appear to be the governing factors. Drying conditions do not appear to be a factor.

Small differences in gypsum quality can have an important effect on Mono-Kote properties. Increasing retarder content from 0.02% to 0.1% will change set time from 3-1/2 to 10-3/4 hours. The result is a somewhat weaker product. There are differences in gypsum quality obtained from different manufacturers and plant locations. These differences are being resolved with the purpose of implementing a quality-control program to arrive at a standard product.

(Kraus, Legal)

MUFFLER CEMENT (Project 2264)

The objective of this project is to develop and test high-temperature cements and devise a cementing system for sealing the auto-exhaust monolith structure into a stainless-steel casing using a vermiculite-sodium silicate based formula. Two variations of the basic formula using (1) sodium silicofluoride, and (2) calcium carbonate hardners are being tested. Laboratory results have been successful where the monolith-cement combination is tested at 70°-1800°F under cyclic conditions. Up to 1000-lb pressure has been required to press the fired monolith from the steel container. Tests in auto-exhaust systems have all failed. The differences in test conditions follow:

	<u>Auto System</u>	<u>Lab System</u>
"Live" Monolith	Yes	No
Temperature Range	70°-1200°F	70°-1800°F
Fuel	Gasoline	Natural Gas
Vibration	Yes	No

Steps have been taken to determine which factor(s) may be controlling.

(Legal, Kolbe, Herrera)

ZIC PRODUCT IMPROVEMENT (Project 2681)

The objective of this project is to determine the usefulness of the Allentown Pneumatic Gun for commercial application of Zonolite insulating concrete at a wet density below 50 pcf and a dry density below 28 pcf. It has been demonstrated the Allentown Pneumatic Gun can be used to apply ZIC as a lightweight roof-insulating concrete, but present techniques have not met the dry-density specification