W. R. GRACE & CO.
RESEARCH DIVISION
Washington Research Center Clarksville, Maryland 21029

CONSOLIDATED MONTHLY SUMMARY
FEBRUARY 1971

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MONTHLY REPORT FOR FEBRUARY 1971

CONSOLIDATED EDITION

GRACE CONFIDENTIAL

NOT TO GO OUTSIDE U.S.

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

INORGANIC RESEARCH

I-1	AUTO EMISSIONS CATALYST
I-2	ACTIVITY OF CLAY-ENZYME COMPLEXES
I-3	BONDED VERMICULITE BOARD
I-4	LEAF AUTOMATION
I-5	ALFALOX CUTTING TOOLS
I-6	KEMALOX ALUMINA POWDERS
I-7	ELECTRONIC SUBSTRATES
I-8	NUCLEAR MATERIALS

ORGANIC RESEARCH

O-1	GLYCINE/LACTAMIDE PROCESSES
O-2	WET STRENGTH RESINS
O-3	SILICA BASED CHELATING MATERIALS
O-4	RELEASE COATINGS - ENDURA
O-5	MISCELLANEOUS
O-6	CAN END ADHESIVES
O-7	SYNTHETIC TACKIFYING RESINS
O-8	PACKAGING MATERIALS - NON-HALOGENATED BARRIER MATERIALS
O-9	ADHESION STUDIES - CRYOVAC COOPERATIVE STUDY
O-10	POLYMER FOAMS - COOPERATIVE STUDY
O-11	EXPLORATORY
O-12	PHOTOACTIVATION OF CONVENTIONAL CURING REACTIONS

CLP TASK FORCE RESEARCH

C-1	CLP OFFSET LITHOGRAPHIC PLATES
C-2	LOW COST POLYTHIOLS FOR CLP TECHNOLOGY
C-3	CLP INK FEASIBILITY STUDY

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CLP TASK FORCE RESEARCH (Continued)

C-4 ULTRAVIOLET CURABLE INKS
C-5 LETTERFLEX B QUALITY CONTROL
C-6 CLP MATERIALS TECHNOLOGY
C-7 CURABLE POLYMERS --- DARK STABILITY
C-8 CLP PRESSURE SENSITIVE ADHESIVES
C-9 CLP PHOTORESISTS
C-10 INSTRUMENTATION FOR CLP's

AGRICULTURAL RESEARCH

A-1 RESEARCH REVIEW MEETING WITH ACG
A-2 COAL DESULFURIZATION
A-3 TENNESSEE VALLEY AUTHORITY TRIP REPORT - FEB. 2 and 3 1971
A-4 FORMULATION AND EVALUATION OF MONO-KOTE

BIOCHEMICAL RESEARCH

B-1 ADAPTED RUMEN MICROBES (ARM)
B-2 CHRON-X
B-3 SALTS OF ISOBUTYRIC ACID AS POULTRY FEED ADDITIVE
B-4 AMMONIUM ISOBUTYRATE AS SILAGE PRESERVATIVE
B-5 RUMINANT GROWTH STIMULANT - COMPOUND 101-6
B-6 SCOURS PREVENTATIVE
B-7 FERMENTATION SCREENING PROGRAM
B-8 L-DOPA
B-9 DIVISIONAL CONSULTATION

OTHER ACTIVITIES

OT-1 THE GRACE CANE SUGAR PROCESS

These items are included in the various editions of the report as shown below:

ACC Edition	A-1 thru 4; B-1 thru 9
Consolidated U.S. Edition	All Items
Consolidated Foreign Edition	All Items except I-6,7, and 8.

A-3 TENNESSEE VALLEY AUTHORITY TRIP REPORT - FEB. 2 and 3 1971

The Tennessee Valley Authority (TVA) has announced gradual phaseout of elemental phosphorus production over the next five years. Their three furnaces are old, small, and expensive to operate. The P_2O_5 required for fertilizer production will be made up by purchase of wet acid. ACG is investigating the possibility of supplying this need.

TVA is continuing their development of products and processes which have been publicized over the last few years:

- A one-ton per day pilot plant is being constructed for producing sulfur coated urea. Equipment improvements have been developed which reduce sulfur consumption and result in a higher nitrogen content (34-35% N) in coated product.

- TVA predicts a great future for ammonium polyphosphate produced by direct reaction of ammonia and hot orthophosphoric acid. A pilot plant is being operated to produce granulated material containing 30-35% polyphosphate. TVA states that this is the greatest single area of interest to the fertilizer industry.

- TVA is continuing to develop liquid fertilizers as well as urea combinations with ammonium sulfate, ammonium phosphate and ammonium polyphosphate.

  Powdered monoammonium phosphate (MAP is attracting interest from small fertilizer producers. They report higher production rates and reduced atmospheric pollution with MAP vs H_3PO_4 in manufacturing mixed fertilizers, e.t., 6-24-24.

A-4 FORMULATION AND EVALUATION OF MONO-KOTE (Project 2659)

Approximately sixty samples of Mono-Kote have been tested by the Cup Fire Test. Both MK-3 and MK-4 have been tested with and without bond promoters. All results show that MK-3 is two to three times stronger than MK-4 at all test temperatures and the prime cause of failure during the Fire Test is cohesive bond rupture. At test temperature of 800°F, the best value for bond strength of MK-3 is 16.3 lbs., whereas MK-4 has a value of 6.2 lbs. equivalent to a 63% decrease in bond strength. The work at the Washington Research Center is directed toward improving the bond strength of MK-4 by addition of bond strength promoters.

MK-4 bond strengths have been improved (in the laboratory) by the addition of sodium borate, No. 74 Sauereisen cement, cobaltous sulfate, and a commercial product containing mineral fiber (Cafco). However, no bond promoter improves MK-4 to the equivalent strength of MK-3 At the very best, the cohesive bond strength of MK-4 is approximately two-thirds that of MK-3.

The Construction Products Division has taken the best of the bond promoters mentioned above and is testing these in 7' x 9' panels at United States Gypsum Testing Laboratories in Des Plaines, Illinois. Research Personnel were present during the fabrication of three test panels. Samples of the test materials were taken for comparative testing by WRC procedures.

BIOCHEMICAL RESEARCH

B-1 ADAPTED RUMEN MICROBES (ARM) (Project 4623)

Farr Better Feeds was unable to arrange for additional tests on ARM in feedlots during the month. There are three tests in progress in which a total of 350 head have been treated with ARM and there are a similar number of controls. We are planning to make attempts to line up tests in feedlots outside of the Farr area.

B-2 CHRON-X (Project 4640)

A meeting was held with FDA on February 17th for an informal review of the New Drug Application on "Chron-X" prior to the official submission. Acting on FDA's advice and suggestions, a number of revisions are being made in the Application to insure it meets procedural requirements. The Application will be submitted March 12th.

A review meeting was held February 26th between Messrs Gibian, McCall, Sergeys, Geurin, Hahn and Myrick to discuss the status of the research program and possible routes to commercialization. ACG is preparing an analysis of the commercial and economic factors associated with the distribution and sale of Chron-X and ARM which they expect to complete by mid-March.

B-3 SALTS OF ISOBUTYRIC ACID AS POULTRY FEED ADDITIVE (Project 4639-

In the test now in progress at A. W. Perdue & Son, the chicks on starter rations containing AIB showed an improved efficiency of about 5% over the controls after 28 days (99.9% confidence level). At this point the chicks were switched to growing rations and, at the end of 2-1/2 weeks, there was no discernable difference between the treated and the control lots. This phenomenon has been observed in some of the trials conducted at WRC and leads to the speculation that AIB acts as a growth stimulant during the initial growth stage of the chicken, but has a reverse effect later on. If this is the case, AIB should be added to the ration during the first 28 days only. The trials at Perdue are scheduled for completion on March 18th at which time the chickens will be weighed, slaughtered and compared for quality. The FDA has granted permission to sell the birds treated with AIB.

Microbiological assays of the poultry litter from the pens used in the trials show a heavy infestation of Salmonella in the litter from the control pens, whereas the litter from the treated pend is Salmonella free. This has prompted Perdue to consider conducting a test in which the antibiotic normally used in the