BUSINESS CONFIDENTIAL

PRELIMINARY INFORMATION - SUBJECT TO LATER VERIFICATION OR REVISION

72511

INFORMAL REPORT

PROJECT NO.: 122A05

DATE: February 19, 1969

AUTHOR(S): R. R. Fields

"CALIDRIA" ASBESTOS: EVALUATION AS VISCOSITY CONTROL AGENT AND OPACIFIER IN LIGHT-DUTY LIQUID FORMULATIONS

As part of a continuing program to investigate potential opacifiers and viscosity control agents, "Calidria" High Purity Open Asbestos, Resin-Grade 144 and Resin-Grade 244 were evaluated in light-duty liquid formulations. Both products were found to be unsuitable, even though they do build viscosity. The asbestos compounds, when added to light-duty liquid formulations, are insoluble and will not give a stable emulsion. Phase separation, marbelization, and sediment were observed in the formulations stored at ambient conditions.

The typical physical properties of "Calidria" asbestos products are shown in Table I. Table II gives the liquid-detergent test formulations used for this study. Further, it is shown that the opacifiers were tested at three levels, which generally covers the accepted level recommended for most commercial opacifiers.

Attachments
2 Tables

R. R. Fields

PLAINTIFF'S EXHIBIT
UC-804

Distribution

Supervisor, Project Manager and
Technology Manager: Dr. R. C. Myerly
Assistant Director: Dr. G. W. Fowler
Director: Dr. F. B. Brown
Mr. E. T. Clayton, TNY
Dr. D. J. Foster
Mr. R. S. Halka, NYO-31
Mr. J. B. Reid, NYO -31
Mr. R. C. Thies, NYO-31
Information Retrieval
Librarian, TNY

RESEARCH AND DEVELOPMENT DEPARTMENT
CHEMICALS AND PLASTICS
UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA

BUSINESS CONFIDENTIAL

DISTRIBUTION

Supervisor: Dr. J. E. Glass
Assistant Director: Dr. J. B. Saunby
Technology Manager: Dr. S. M. Livengood, TNY
Dr. F. H. Ancker, 312
Dr. W. C. Arney
Mr. P. F. Decker
Dr. E. K. Harris
Dr. H. B. Rhodes, Tonawanda

MISCELLANEOUS REQUESTS FOR
FILE ROOM
(INFORMALS - 855'S - ETC.)

REQUESTOR W. W. McGaughy DATE 2-21-75

ADDRESS 770 456

INFORMATION OR TITLE GIVEN

FILE ADDRESS Informal

X DATE OF ITEM ① 10-4-74 ② 11-8-74 ③ 2-4-75

X AUTHOR (S) T. D. Foster (All)

METHOD FOUND ① & ③ got from Author - Information Retrieval was not on distribution ② found by date

FILE NO. ① not Numbered 10-4-74 ② 76346 ③ not no. 2-4-75

RESULT & COMMENTS

DATE COMPLETED 2-21-75

ITEMS MAILED 3 BY

X 6 VIEW

R/D INFORMATION RETRIEVAL 1975

TABLE I

CALIDRIA ASBESTOS PRODUCTS

(TYPICAL PHYSICAL PROPERTIES)

Specific Gravity	2.45
Surface Charge	Electropositive (cationic)
Surface Area	60 square meters per gram
Refractive Index	1.54 - 1.56
Fiber Diameter	0.025 microns
Length/Diameter	200 average (1000 maximum)
Dry Bulk, pounds/foot^3	
Resin-Grade 144	4
Resin-Grade 244	1 - 5

TABLE II

OPACIFIER STABILITY STUDY

TEST FORMULATIONS

Components	Formulation No., per cent by weight 1	2	3	4
Linear Alkylbenzene Sulfonate, Actives, (UCANE 11 Sulfonate, Sodium Salt)	28.0	19.0	24.0	17.0
C_{12}-C_{13} Primary Alcohol Ethoxysulfate, Actives (Ammonium Salt)	4.5	4.0	-	-
TERGITOL Nonionic 15-S-9	2.5	2.0	4.0	3.0
Coconut Diethanolamide	1.0	-	2.0	-
Sodium Xylene Sulfonate, Actives	6.5	1.0	4.0	4.0
Opacifier (Calidria Resin-Grade 144)*	(See Footnote ——————>)			
Opacifier (Calidria Resin-Grade 244)*	(See Footnote ——————>)			
Water, Dye, etc.	To Make ——————>			

* Opacifier tested at three use levels in each formulation (0.1, 0.5, 1.0 per cent).

WV.0010 #8
V76306A

BUSINESS CONFIDENTIAL
PRELIMINARY INFORMATION - SUBJECT TO LATER VERIFICATION OR REVISION

INFORMAL REPORT
PROJECT NO.: 132C40
DATE: October 4, 1974
AUTHOR(S): T. D. Foster, Jr.

10/4/74 P132C40 T. FOSTER, JR.

OIL PRODUCTION CHEMICALS: PHENOLIC RESIN COATED ASBESTOS FOR OIL BASE MUDS

Although oil base muds represent a relatively small fraction of the mud business, they are firmly established for certain specific jobs and as a result profit potential for specialty additives does exist for UCC. At present, UCC has very little business in this area; organic thickeners for the oil muds are usually of the tall oil acid soap type of molecule, together with blown asphalt and gilsonite. Inorganic types are quaternary amine-modified bentonites; e.g. Bentones.

As an outgrowth of work to prepare oleophillic minerals, specifically modification of UCC wet-process asbestos with silane, a suggestion was made to use a phenolic-coated asbestos being manufactured for other end uses. This report summarizes the test data obtained in an attempt to utilize this material for controlling the rheological properties of oil base muds.

Testing was performed in a diesel oil base containing 5 per cent water. The initial phenolic control resin sample, containing 7.0 percent resin, failed to have sufficient oleophillic properties and would not disperse. Two additional samples of material contained 10 and 20 percent phenolic (RG-144-10 and RG-144-20 respectively); these materials were prilled which is a definite aid to minimizing dusting of the fibers. Rheological properties are determined by standard API methods (1). Data are given in Table I. Static heat aging was accomplished in Baroid steel bombs in an air oven.

Both RG-144-10 and -20 (hereafter designated 10 and 20) require high speed shearing (Waring blender) but dispersed and suspended well. Some settling did occur but this is correctable by the customer by proper formulation of other ingredients. However, the settling does complicate the determination of 10 minute gel strength because the determined values are much lower than a well-suspended fluid should yield.

Rheologically, 10 and 20 are not as powerful thickeners as Bentone 34, based on apparent viscosities for a given additive concentration. Plastic viscosities are within the same general range as Bentone 34. The yield points and gel strengths of 10 and 20 exhibit significant difference when compared to Bentone 34. Oil muds have very strong thixotropic properties giving extremely high

RESEARCH AND DEVELOPMENT DEPARTMENT
CHEMICALS AND PLASTICS
UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA

yield points and gel viscosity. This is not a totally desirable characteristic. The high gel viscosity creates problems in restarting the drill string rotation, and when pulling the drill string the strong vacuum created can cause hole collapse. Conversely, sufficient yield and gel are required to lift and suspend cuttings. Fortunately, the yield points and gel viscosity for samples 10 and 20 are in a more favorable range than comparable muds made with Bentone 34. Both materials have sufficient gel viscosity to accept weighting material required to prepare high density muds.

Other laboratories have investigated coated minerals as potential oil mud thickeners and the materials failed because of thermal stability problems resulting from dissolution of the coating by the hot oil solvent. Anticipating this problem muds prepared from samples 10 and 20 were subjected to static heat aging at 200°F for 16 hours then 300°F for 16 hours with viscosity determinations made at intervals.

Under these test conditions, appreciable viscosity losses occurred with the asbestos muds but there are indications that the losses plateau at a usable level. Bentone 34 mud actually increased in viscosity with one sample resulting in an unworkable gel at 300°F. Although no gellation occurred with the asbestos samples, there appeared to be solution of part of phenolic coating; on a very long term basis for use as a packer fluid in hot wells the asbestos thickener may be inadequate.

CONCLUSIONS This preliminary study has shown that phenolic coated asbestos has sufficiently interesting rheological properties to warrant further study. A coating level of about 10 percent resin appears close to optimum. If the cost of the asbestos material can be held to less than Bentone 34, a decided advantage can be realized. The thermal stability of the asbestos-resin is decidedly inferior to silane modified asbestos for oil base muds. Because of our secrecy agreement with Dresser applicable to silane treated asbestos, consideration should be given to introducing the asbestos-resin product to Oil Base, Inc. who specialize in this technology.

T. D. Foster, Jr.

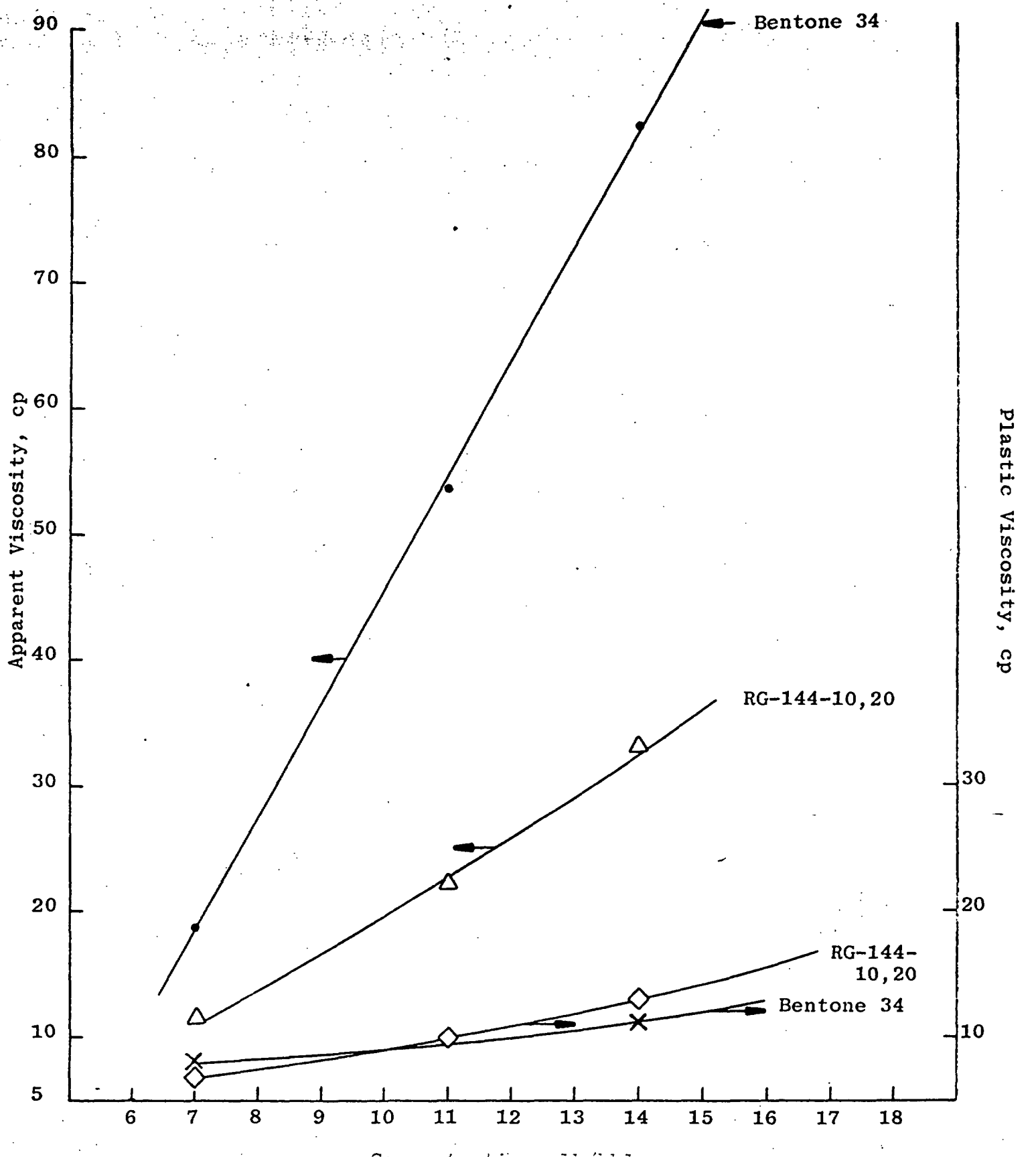
TDF:b

TABLE I

VISCOMETRIC PROPERTIES OF OIL BASE MUDS

Sample Type	Conc. lb/bbl	AP	PV	YP	Gel 10/10
RG-144-10	14	33.5	13	41	12-14
16 hrs/200°F		29.5	12	35	14-13
16 hrs/300°F		26.5	11	31	10-11
RG-144-10	11	22.3	10	24.5	8-11
16 hrs/200°		20	10	20	9-9
16 hrs/300°		18.5	10	17	6-6
RG-144-10	7	11.5	7	9	3.5-4.5
16 hrs/200°		10.5	7	7	3-3
16 hrs/300°		10	6	8	2.5-2.5
Bentone 34	14	82	12	140	95-117
16 hrs/200°F		122	9	226	182-190
16 hrs/300°F		Gelled			
Bentone 34	11	53.5	15	77	105-135
16 hrs/200°		64	6	116	91-91
16 hrs/300°		111	6	210	128-111
Bentone 34	7	18.5	8	21	21-21
16 hrs/200°		19	9	20	20-23
16 hrs/300°		29.5	10	39	28-29

Base Mud - 95% diesel, 5% water.


Bentone 34
RG-144-10,20
RG-144-10,20
Bentone 34
Apparent Viscosity, cp
Plastic Viscosity, cp
90
80
70
60
50
40
30
20
10
5
30
20
10
6
7
8
9
10
11
12
13
14
15
16
17
18
Concentration, lb/bbl