

FLOSAL*—versatile viscosifier

DRILLING SPECIALTIES COMPANY

Technical Services Division • Bartlesville, Oklahoma 74003

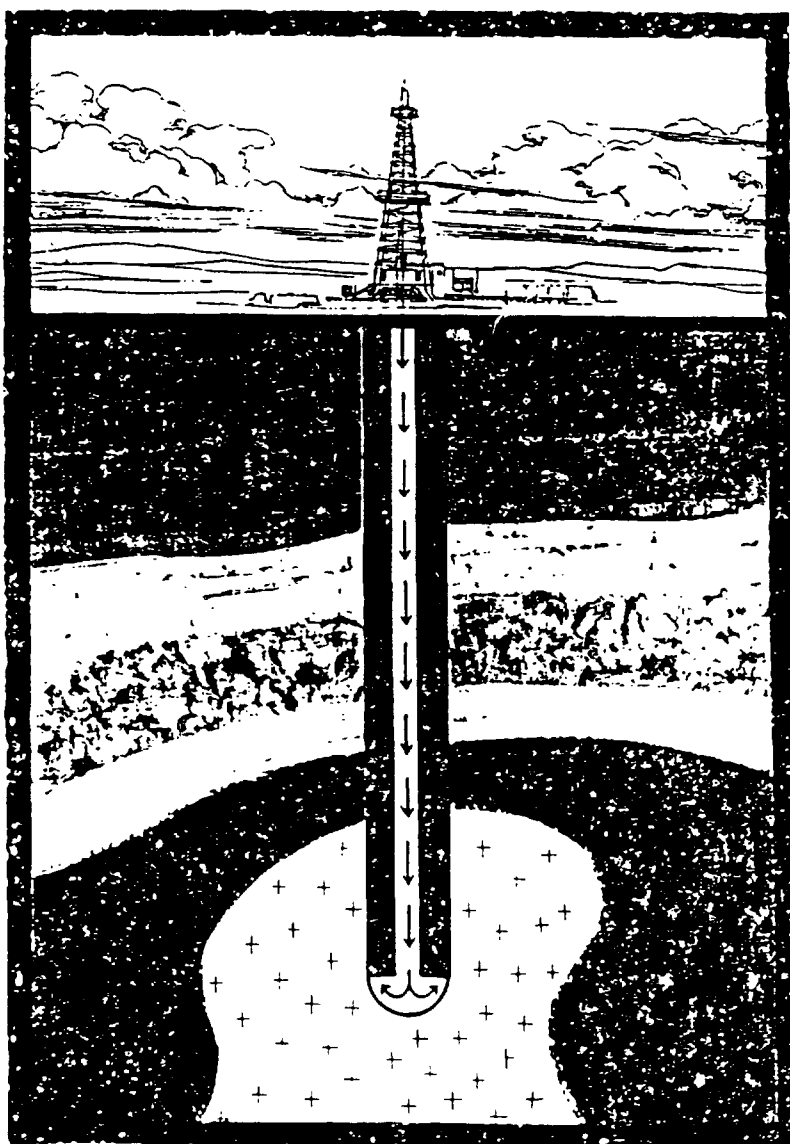
Properties, Uses and Applications

FLOSAL

For years the oil industry generally acknowledged that wells could be drilled safer with relatively high viscosity drilling muds. The drilling rates were very low. It was several years before a mud additive was developed that permitted the use of true low solids mud. The material was marketed by Drilling Specialties Company under the trade name Driscose*. Normally this material was used in combination with bentonite which, in itself, tended to limit the amount of solids reduction that could be achieved. In addition, experience proved Driscose to be more effective when used in combination with fresh water drilling muds or those of relatively low concentrations of salts.

Drilling Specialties Company has now developed a new material which effectively replaces bentonite or clay as a mud additive at a significant reduction in total solids content of the mud. This material, called Flosal, is an inorganic mineral used to increase the carrying capacity and suspending ability of drilling muds. It can be used in fresh or salt water with a minimum of solids, but does not control water loss in the mud system.

Flosal has been proved to be a superior additive. It can be used



* Trademark

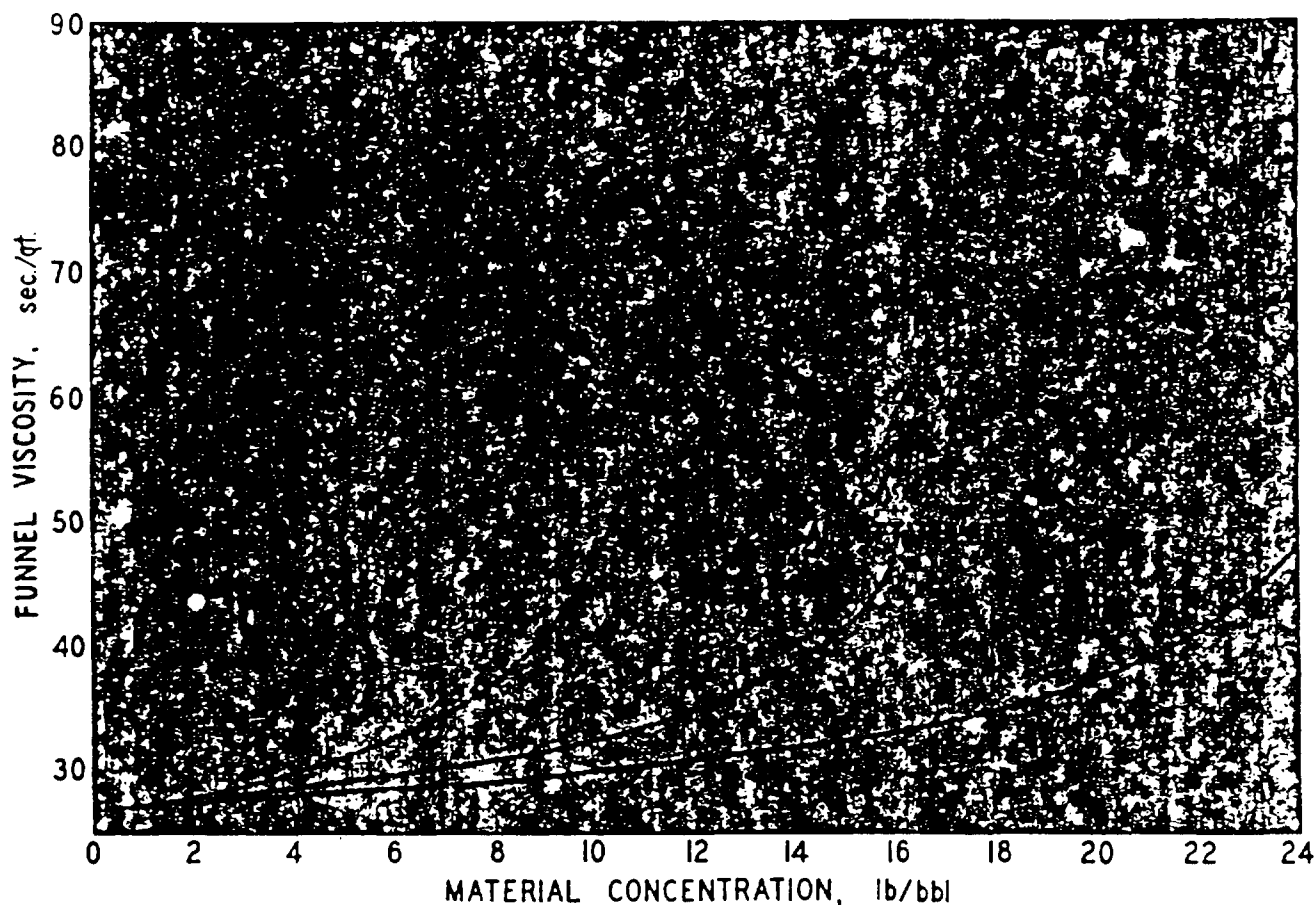


FIG. 1, MATERIALS IN 9.2 lb/gal. FIELD BRINE (32:40)

with fresh water in the early stages of drilling to keep the hole clean and seal seepage losses, or in the latter stages of drilling as the well nears completion. In the interim stages of drilling, when salt formations are often encountered, Flosal continues to be useful because its presence eliminates the problem of gelling. Thus it plays an important role in the entire drilling program, providing opportunities for savings in both labor and material costs.

The effectiveness of Flosal in both fresh and salt water systems is demonstrated in Table I. In many instances, it can achieve the same results with as little as 1/4 the ma-

terial requirements when bentonite or attapulgite is used. A more common method of determination is the funnel viscosity check. Figure 1 plots funnel viscosity versus material requirements for several materials. It is fairly evident that Flosal achieves the best results for the least amount of material added.

Another important feature of Flosal is its effect on mud properties with regard to weight and viscosity. It has already been mentioned that Flosal will increase viscosity without significant increase in mud weight. Generally speaking, it does not contribute to progressive gel strength nor is it affected noticeably by variations

in pH. Flosal is not affected by mud contaminants and it is stable at high temperature.

In every respect then, this material is very stable and is compatible with all drilling muds.

There are many different ways in which Flosal has been used economically in conjunction with fresh or salt water drilling muds. These include:

Spud muds
Sample muds
Emulsion muds
Workover muds
Brine or Fresh Water-
Flosal muds

Flosal has been used in spud muds to replace bentonite. It has also been used on a number of wells, in both fresh water and brine, to improve sample size and reduce fill-up. In a recent test, Flosal was used to increase sample size on a well drilling at 17,500 feet. The results were successful: the samples were obtained with a 31 viscosity fluid, without change in rate of penetration.

Flosal has been used on a number of wells in a 5 to 15% oil emulsion in fresh water or brine. In these instances, Flosal is an effective emulsifier. As previously discussed, it has also been used successfully in weighted muds, workover muds and clear water muds.

There are many economics that can be realized through the use of Flosal. Its versatility in fresh or salt water eliminates the need for stocking different types of materials. Table I and Figure I both show clearly that economics can be achieved with less material. Another important feature of Flosal is its synergistic relationship to water loss controllers. Table II shows the reduction in polymer requirements that can be realized using Flosal as compared to polymer requirements for comparable materials. These benefits are direct; there are others of a more indirect nature which result in more economical drilling operations. An example of this is reduced drilling time that is realized through lower solids muds.

Handling and mixing instructions for Flosal are relatively simple. It is a chemically inert material which requires no special storage or handling techniques. It should be added slowly to the mud system through a conventional hopper. Insofar as mixing of Flosal is concerned, generally, increased shear will result in increased yield.

TABLE I

FRESH WATER

CONC lb/bbl	FLOSAL			
	AV	PV	YP	Gels
5	8	7	1	3/5
10	24	10	29	31/44
Bentonite				
10	4	3	2	1/1
20	26	16	19	7/36

4000 ppm CHLORIDES

CONC lb/bbl	FLOSAL			
	AV	PV	YP	Gels
5	10.5	8	5	5/7
10	31.5	9	45	53/51
Bentonite				
20	14	9	14	18/33
30	46.5	10	73	80/144

SATURATED BRINE

CONC lb/bbl	FLOSAL			
	AV	PV	YP	Gels
2.5	12	8	8	4/5
Attapulgit Clay				
5	4	2	4	1/4
10	8	4	8	4/8

TABLE II

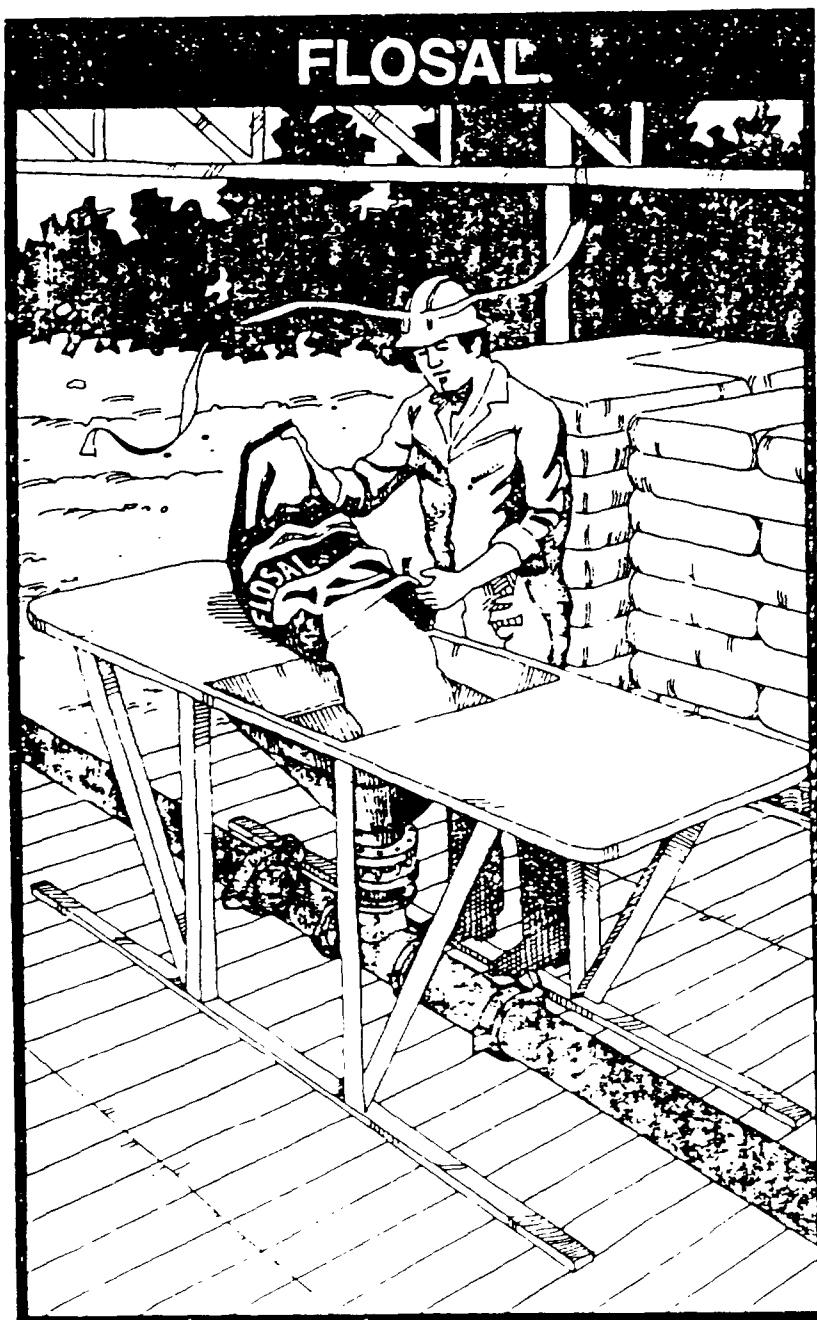
FLOSAL lb/bbl	ATTAPULGITE lb/bbl	AV	PV	YP	GELS	WL
Base Mud: Natural saturated brine treated with soda ash to reduce hardness; 1.0 lb/bbl Polymer added with FLOSAL OR attapulgit						
5	—	17.5	13	9	3/5	14.9
—	20	17.5	7	21	6/19	78

FLOSAL[®] Drilling Mud Asbestos Additive


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**RECOMMENDED
WORK PRACTICES**



INTRODUCTION

The following recommended work practices are intended as general guides respecting the handling of Flosal[®] drilling mud grade asbestos (hereafter referred to as DMA). We believe that this booklet will be helpful to engineers, superintendents, contractors, foremen and drilling crews in understanding and explaining such procedures. Field tests conducted to date indicate that the recommended work practices set forth in this booklet, if followed, should result in an employee's 8-hour time-weighted average (TWA) exposure being below 0.1 fibers per cubic centimeter of air. (Such exposure would be well below OSHA's currently prescribed limits of two fibers longer than five micrometers per cubic centimeter of air as an 8-hour time-weighted average exposure and 10 fibers longer than 5 micrometers per cubic centimeter of air, as a ceiling concentration.) However, since field conditions do vary, these recommended work practices do not purport to be exclusive, and adherence to these recommended work practices does not guarantee an exposure level (8-hour TWA) the same as that shown by the aforementioned field tests, nor compliance with applicable federal, state or local health and/or safety laws or regulations.

On October 11, 1978, OSHA issued Program Directive #300-16 which provides uniform inspection and compliance procedures for medical examination requirements of the asbestos standard. The principal actions taken by OSHA in this directive were to clarify the term "exposed to airborne concentrations of asbestos fibers" and to indi-

cate the scope and applicability of medical examination requirements under the asbestos standards as follows:

- a. The term "...exposed to airborne concentrations of asbestos fiber..." is administratively interpreted to mean "exposed to a minimum of 0.1 asbestos fibers longer than 5 micrometers per cubic centimeter of air..."
- b. Medical examinations will be required for any 7 to 8-hour time-weighted average concentration of 0.1 f/cc, or for a greater concentration.

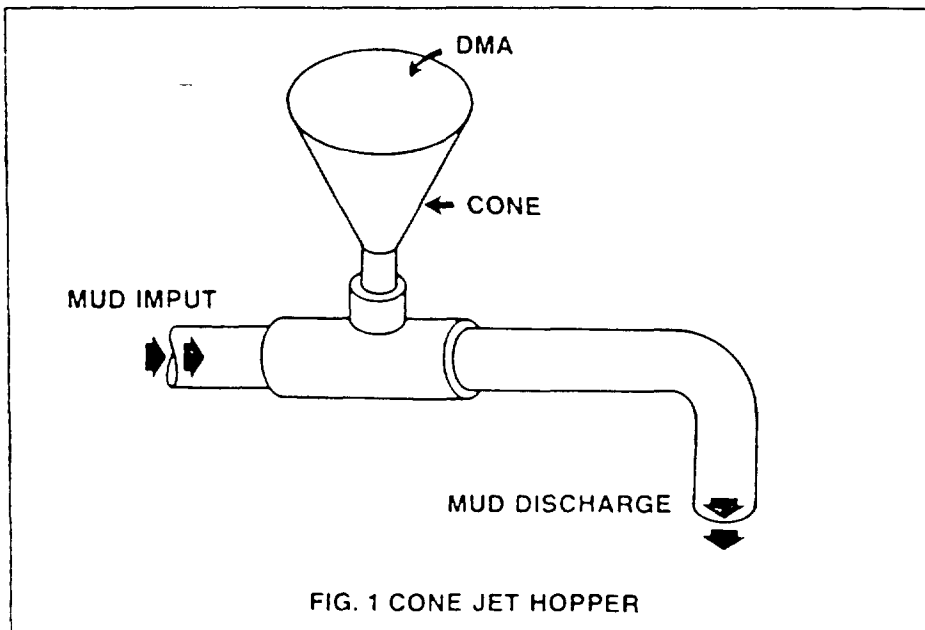
We believe that if the following work practices are followed one might reasonably expect 8-hour TWA exposure levels to be below those specified by OSHA Program Directive #300-16. If, however, there is reasonable cause to believe that airborne asbestos concentrations exceed 0.1 f/cc greater than five microns on an 8-hour TWA basis, or have peak levels above 0.5 f/cc greater than five microns based on 15-minute sample periods, then the site should be monitored for airborne asbestos, and appropriate action taken as required by applicable safety or health laws and/or regulations.

PRODUCTS AND OPERATIONS

DMA is furnished in flake form.

Operations to which these work practices apply include:

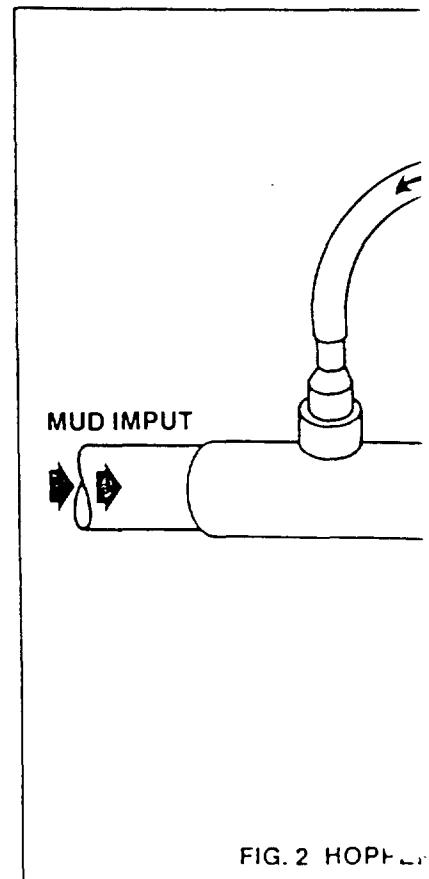
- Shipping, Receiving, Handling, Warehousing, and Storage
- Additions of DMA to the mud
- Handling of empty sacks
- Disposing of empty sacks
- Disposing of mud



SHIPPING, RECEIVING, HANDLING, WAREHOUSING, AND STORAGE

DMA is furnished in loose or palletized sacks. (With palletized DMA, the pallets are sometimes shrink wrapped). The sealed, unopened sacks should be handled by normal warehouse practices.

Precautions must be taken if a sack is broken, torn or punctured. The sack should be sealed with heavy duty tape or placed in a slip-over sack (over-sized, open mouthed bag) to prevent spillage. The slip-over sack should be securely sealed, preferably by a twist wire. Any spillage should be cleaned up with a vacuum sweeper equipped with a disposable bag. Unless additional protection is required under applicable federal or other regulations, a certified, reusable or single use air purifying respirator should be worn by the person cleaning up. **DO NOT BLOW MATERIAL WITH COMPRESSED AIR, NOR DRY SWEEP.** The material in broken or damaged sacks should be used first. In storing DMA it is recommended that it be stacked no more than 10 sacks high.



ADDITIONS OF DMA TO THE MUD

DMA should be added to the mud in the same manner as other dry mud additives. The DMA should be added directly to the mud system, preferably by emptying the bag at a uniform rate into the hopper of a cone type jet mixer (eductor system). (Figure 1).

Other systems in use are also suitable for the addition of DMA, such as an eductor with suction hose attached to withdraw the DMA directly from the bag, or from a drum into which several bags have been emptied. (Figure 2). Care should be used in pouring the DMA into another container to reduce the amount of "fines" generated when air is displaced from the receiving hopper or drum.

In adding DMA to the mud, it is a recommended practice to position oneself so that any air currents present are moving from the individual's back toward the receiving container, rather than blowing into the face. A light weight streamer or "air sock" above the hopper may be used to determine wind direction (Figure 3).

HANDLING OF EMPTY SACKS

After a sack is emptied, it should be discarded in accordance with current federal regulations. Normally, sacks of all types should be carried away for disposal as soon as time permits.

DISPOSING OF EMPTY SACKS

Unless an adequate precipitator is attached to the incinerator, onshore burial or incineration is the preferred method of disposing of empty DMA sacks from offshore sites. **DO NOT BURN DMA SACKS WITHOUT A PRECIPITATOR.** The empty sacks should be accumulated in sealed impermeable bags until a sufficient number is on hand to require burning or burial.

It is preferable to bury empty DMA sacks onshore. An incinerator with an adequate precipitator can be used. **DO NOT BURN DMA SACKS WITHOUT A PRECIPITATOR.**

DISPOSING OF MUD

When a well is finished, there is usually little or no DMA left in the mud. Any accepted method of storing the mud for reuse or disposing of it can be used.

