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DRILLING SPECIALTIES COMPANY
BARTLESVILLE, OKLAHOMA 74004

August 23, 1979

Flosal® Health and Safety Data

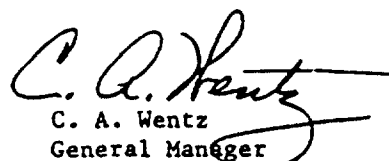
There has been concern within the drilling industry for the health and safety of workers who handle asbestos in drilling muds. In 1975 Drilling Specialties responded to this concern by reformulating our Flosal drilling mud grade asbestos to reduce the airborne asbestos levels at the rig site. In order to confirm our conviction that Flosal meets airborne fiber count standards that are well within those set forth by the United States Occupational Safety and Health Administration, we have monitored airborne fiber counts at numerous rig sites, using Flosal in the United States and Norway.

A summary as well as the actual data for each of these rig site tests is enclosed for your information. Based on these field tests, we believe Flosal may be safely handled by personnel at the rig site, when used in accordance with the also attached recommended Flosal work practices.

As you are aware, Flosal is manufactured from a special length of asbestos fiber, developed by our Research Laboratory, which enables Flosal to have superior carrying capacity in drilling muds. Furthermore, since Flosal has been modified only by the addition of water, it is most easily dispersed in water-based drilling muds.

We have appreciated your use of Flosal in the past and would like to encourage your even greater usage in the future. We believe Flosal is the most cost-effective viscosifier, asbestos or otherwise, available to suspend drilled solids and to maintain a clean hole.

After reviewing the enclosures, you or your personnel may wish to discuss them with us. We would be happy to assist you on this matter.


C. A. Wentz
General Manager

CW:dz
cc:adment

Drilling Specialties Company

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S U M M A R Y

FIBER COUNT TESTS AT DRILLING SITES WHERE FLOSAL® DRILLING MUD GRADE ASBESTOS WAS BEING USED

In the past four years a series of air samples have been collected during drilling operations where Flosal® drilling mud additive (DMA) was being used. These samples represent short-term "length of task" and "ceiling concentrations," as well as 8-hour time-weighted average (TWA) concentrations of airborne fibers, including asbestos, which are greater than five microns in length and which have a length-to-width ratio equal to, or greater than, 3:1. The drilling operations surveyed have included large, intermediate, and small size rigs, drilling both on land (9 sites) and offshore (3 sites).

The results show all samples to be below the permissible ceiling and 8-hour time-weighted average values of 10 and two fibers per cubic centimeter of air (f/cc), respectively.

The highest ceiling concentration monitored was 0.21 f/cc for a 10-minute period. All 8-hour TWA concentrations were less than 0.05 f/cc. These values are far below the levels presently accepted by OSHA (two f/cc greater than five microns on an 8-hour TWA basis, or a ceiling concentration of 10 f/cc for 15 minutes). In fact, they are less than the "current OSHA policy to require medical examinations only when employee exposures to airborne asbestos exceed 0.1 fibers greater than five microns in length per cc of air (f/cc greater than five microns) on an 8-hour time-weighted average basis or exceed a peak level of 0.5 f/cc greater than five microns based on 15-minute sample periods." (From a letter from Richard P. Wilson, Deputy Director Federal Compliance and State Programs, U.S. Dept. of Labor OSHA, dated February 11, 1977 to Mr. Wendell B. Alcorn, Jr.)

*NO RECORD KEEPING OR
MEDICAL EXAMS REQUIRED*

TABLE I

CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT

FLOSAL® FIBER MUD ADDITIVE IN DRILLING MUD SYSTEM

Phillips Petroleum Company - Peter "2", No. 2 Well

Panola County, Texas

H & S Drilling Company

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone, (BZ) Floor Man No. 1	1/3/79	1500	435	0.003
2	BZ, Motorman, as conducts normal duties during shifts	1/3/79	1500	435	0.009
3	BZ, Derrick Man, as conducts normal duties during shift. 22 bags Flosal added during shift	1/3/79	1500	435	0.03
4	BZ, Floor Man No. 2, as conducts normal duties during shift	1/3/79	1500	435	0.006
5	BZ, Driller, as conducts normal duties during shift	1/3/79	1500	435	0.003
6	Area Sample collected during shift	1/3/79	1511	424	0.009
7	Area Sample collected during shift	1/3/79	1515	420	0.02

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

TABLE III

CONCENTRATION OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENTNorwegian North Sea - Edda PlatformPhillips Petroleum Company - Eldfisk 2/7, No. A-21 WellLoffland Bros. North Sea., Inc.

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone (BZ) Derrick Man as added 12, 50-pound sacks Flosal® to mixing hopper	2/11/79	1505	10	0.2
2	NW side of rig floor about BZ height	2/11/79	1315	433	0.02
3.	BZ, Service Engineer, as performs normal duties throughout shift	2/11/79	1305	450	0.006
4	BZ, Derrick Man as performs normal duties during shift including addition of Flosal as indicated in No. 1 above	2/11/79	1255	465	0.005
5	BZ, Driller as performs normal duties	2/11/79	1255	570	*
6	Area Sample, near mixing hopper	2/11/79	1515	435	*

Present U.S. OSHA ceiling concentration: 10 fibers/cc

Present U.S. OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

* Filter loaded with unknown substance which precluded the required analysis.

TABLE IV
(Continued)

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>DRILLER</u>					
12	BZ, as performs normal duties	4/21/79	0515	125	0.01
13	Same as No. 12 above	4/21/79	0720	130	0.01
14	Same as No. 12 above	4/21/79	0930	175	0.009
TIME-WEIGHTED AVERAGE				430	<u>0.01</u>
<u>ASSISTANT DRILLER</u>					
15	BZ, as performs normal duties	4/21/79	0519	123	0.01
16	Same as No. 15 above	4/21/79	0722	127	0.01
17	Same as No. 15 above	4/21/79	0929	178	0.01
TIME-WEIGHTED AVERAGE				428	0.01

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling Concentration: 10 fibers/cc

TABLE V

(Continued)

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>FLOORMAN</u>					
13	BZ, as performs normal duties	5/29/79	0752	122	0.03
14	Same as No. 13 above	5/29/79	0954	111	0.01
15	Same as No. 13 above	5/29/79	1145	119	0.02
16	Same as No. 13 above	5/29/79	1344	64	0.04
TIME-WEIGHTED AVERAGE				416	<u>0.02</u>
<u>DRILLER</u>					
17	BZ, as performs normal duties	5/29/79	0754	116	0.01
18	Same as No. 17 above	5/29/79	0910	PUMP MALFUNCTION - NO SAMPLE	
19	Same as No. 17 above	5/29/79	1148	108	0.02
20	Same as No. 17 above	5/29/79	1336	72	0.02
TIME-WEIGHTED AVERAGE				296	0.02

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling Concentration: 10 fibers/cc

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RECOMMENDED WORK PRACTICES

for

FLOSAL® DRILLING MUD ASBESTOS

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 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 (f/cc) 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 TWA exposure and 10 fibers longer than five 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 indicate 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 five micrometers per cubic centimeter of air..."
- b. Medical examinations will be required for any 7 to 8-hour TWA 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 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 sack 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 sack, or from a drum into which several sacks 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

When 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. DMA sacks are biodegradable. 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.

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Product Name:

FLCSAL[®] VISCOSIFIER
Refer to D.S.Co. Bulletins #220 & 221

Description: Chrysotile (soft fiber-acid soluble) Asbestos Fiber.

Packaging: 50-pound multiwall bags.

Mud Types: All known water base mud formulations.

Advantages:

Acid soluble	Reduces seepage loss
Lower clay solids	Faster penetration rates
Dust free (by OSHA standard)	Less time spent circulating
Maximum hole cleaning/low viscosity (32-38 sec/qt)	
Reduces hole enlargement (less erosion by lowering "N" Factor)	
Lower ECD as result of cleaner annulus & lower viscosity	

Applications:

Spud Muds

Non or Semi-Dispersed Muds

Sweeps (Periodic Flushing)

Acid Soluble w/o Fluid

Condition Packer Fluids (Any Density) to
Resist Barite Settling & High Temp.
Solidification

Material Needs:

2-4 ppb. Flosal, 15-20 ppb. Bentonite added
to fresh or seawater (Tech. Note #4)

1-3 ppb. Flosal & CEC Below 20 ppb (Tech.
Note #9)

3-5 ppb. Flosal added to 50± bbls of
existing mud (Tech. Note #4)

5 ppb. Flosal + 1 ppb. Drispac[®] added to
water of any salinity. WL = 15-10, FV 35-38
sec/qt (Tech. Note #16)

2-4 ppb. Flosal, CEC Approx. 20 ppb., Ca⁺⁺
below 200 ppm. Up to 2 ppb. Desco[®] in holes
where BHT exceeds 300 F (149° C) (Gel-
Driscose[®] Packer Mud Formula)

Mixing Requirements: Hopper or mud guns.

Desired Solids Control Equipment: Coarse (12 x 12 - 16 x 16) shaker screens unless only
flushes are being used. De-sander on surface hole & de-silter below surface casing.

Cost: Mud cost for interval drilled is usually about the same or less than for con-
ventional clay or flocculated clay base systems. Well cost is almost always less.

Safety & Ecology: Non-polluting and safe to handle when mixed through a conventional
hopper in a conventional manner. Avoid inhalation of asbestos materials.

This bulletin reports accurate and reliable information to the best of our knowledge.
Drilling Specialties Company assumes no obligation or liability for the use of the
information presented herein.

Drilling Specialties Company

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Product Name:

DIASEAL M®

Refer to D.S.Co. Bulletin #200
and Pattern For A Successful Squeeze
wallet size cards & squeeze work sheet



DRISPAC
DRISPAC SUPERLO
DRISCOSE CMC
SOLTEX
DESCO
FLOSAL
DIASEAL M

DIACEL D
DIACEL LWL
DIACEL A

Description: High solids, high fluid loss, lost circulation squeeze material.

Packaging: 50-pound multiwall bags.

Mud Types: All water base, oil base & invert emulsion muds.

Advantages:

Does not contaminate drilling mud
Not necessary to by-pass shale shaker
No risk of side tracking hole as with cement
Less time lost to lost circulation problems

No risk of cementing up drill pipe.

Applications:

Open hole lost circulation squeeze when
open hole volume is 50 bbls or less

Open hole lost circulation squeeze when
open hole volume exceeds 50 bbls

Lost circulation squeeze through per-
forations & casing leaks

Material Needs:

Mix specified amounts of water or Diesel oil,
Diaseal M, barite & LCM for 100 bbls of
slurry volume

Mix specified amounts of water or Diesel oil,
Diaseal M, barite & LCM for an amount of
slurry equal to twice the open hole volume

Mix specified amounts of water or Diesel oil,
Diaseal M, barite & LCM for 50-100 bbls of
slurry volume

Follow recommended mixing, displacing &
squeezing procedures for best results

Mixing Requirements: Clean mixing tank at rig or liquid mud plant. Cement company pump truck is usually needed for low volume pump rates.

Desired Solids Control Equipment: No special requirements.

Cost: Less than the cost for building new mud volume in most instances. Rig time spent on lost circulation problems is usually reduced. An extremely cost-effective material and procedure for remedying lost circulation.

Safety & Ecology: Non-polluting and safe to handle.

No longer contains Asbestos

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Flosal® Health and Safety Data

C. A. Wentz
C. A. Wentz
General Manager

DRILLING MUD ADDITIVES AND CEMENT SYSTEMS

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S U M M A R Y

FIBER COUNT TESTS AT DRILLING SITES WHERE FLOSAL® DRILLING MUD GRADE ASBESTOS WAS BEING USED

In the past four years a series of air samples have been collected during drilling operations where Flosal® drilling mud additive (DMA) was being used. These samples represent short-term "length of task" and "ceiling concentrations," as well as 8-hour time-weighted average (TWA) concentrations of airborne fibers, including asbestos, which are greater than five microns in length and which have a length-to-width ratio equal to, or greater than, 3:1. The drilling operations surveyed have included large, intermediate, and small size rigs, drilling both on land (9 sites) and offshore (3 sites).

The results show all samples to be below the permissible ceiling and 8-hour time-weighted average values of 10 and two fibers per cubic centimeter of air (f/cc), respectively.

The highest ceiling concentration monitored was 0.21 f/cc for a 10-minute period. All 8-hour TWA concentrations were less than 0.05 f/cc. These values are far below the levels presently accepted by OSHA (two f/cc greater than five microns on an 8-hour TWA basis, or a ceiling concentration of 10 f/cc for 15 minutes). In fact, they are less than the "current OSHA policy to require medical examinations only when employee exposures to airborne asbestos exceed 0.1 fibers greater than five microns in length per cc of air (f/cc greater than five microns) on an 8-hour time-weighted average basis or exceed a peak level of 0.5 f/cc greater than five microns based on 15-minute sample periods." (From a letter from Richard P. Wilson, Deputy Director Federal Compliance and State Programs, U.S. Dept. of Labor OSHA, dated February 11, 1977 to Mr. Wendell B. Alcorn, Jr.)

TABLE I
CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT

FLOSAL® FIBER MUD ADDITIVE IN DRILLING MUD SYSTEM

Phillips Petroleum Company - Peter "2", No. 2 Well

Panola County, Texas

H & S Drilling Company

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone, (BZ) Floor Man No. 1	1/3/79	1500	435	0.003
2	BZ, Motorman, as conducts normal duties during shifts	1/3/79	1500	435	0.009
3	BZ, Derrick Man, as conducts normal duties during shift. 22 bags Flosal added during shift	1/3/79	1500	435	0.03
4	BZ, Floor Man No. 2, as conducts normal duties during shift	1/3/79	1500	435	0.006
5	BZ, Driller, as conducts normal duties during shift	1/3/79	1500	435	0.003
6	Area Sample collected during shift	1/3/79	1511	424	0.009
7	Area Sample collected during shift	1/3/79	1515	420	0.02

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

TABLE II

CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT DURING

THE ADDITION OF FLOSAF® DRILLING MUD ADDITIVE

Phillips Petroleum Company - Black "A" No. 1 Well

Canadian County, Oklahoma

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	BZ, Driller, as performs normal duties	1/15/79	0805	480	*
2	BZ, Derrickman, as performs normal duties	1/15/79	0806	479	*
3.	BZ, Floorman, as performs normal duties	1/15/79	0808	480	*
4	BZ, Derrickman, during addi- tion of 3, 50-pound bags Flosaf® and 12, 50-pound bags Milgel	1/15/79	0945	30	1.3

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling concentration: 10 fibers/cc

* Filter loaded with unknown substance which precluded the required analysis.

TABLE III

CONCENTRATION OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENTNorwegian North Sea - Eldfisk PlatformPhillips Petroleum Company - Eldfisk 2/7, No. A-21 WellLoffland Bros. North Sea., Inc.

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone (BZ) Derrick Man as added 12, 50-pound sacks Flosal® to mixing hopper	2/11/79	1505	10	0.2
2	NW side of rig floor about BZ height	2/11/79	1315	433	0.02
3.	BZ, Service Engineer, as performs normal duties throughout shift	2/11/79	1305	450	0.006
4	BZ, Derrick Man as performs normal duties during shift including addition of Flosal as indicated in No. 1 above	2/11/79	1255	465	0.005
5	BZ, Driller as performs normal duties	2/11/79	1255	570	*
6	Area Sample, near mixing hopper	2/11/79	1515	435	*

Present U.S. OSHA ceiling concentration: 10 fibers/cc

Present U.S. OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

* Filter loaded with unknown substance which precluded the required analysis.

TABLE IV

CONCENTRATION OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT DURINGOFFSHORE DRILL SHIP OPERATIONPhillips Petroleum Company - Mississippi Canyon Block No. 282Well No. 1 - OCS-3819Louisiana Gulf Coast

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>MUD ENGINEER</u>					
1	BZ, as performs normal duties primarily in mud pit room	4/21/79	0445	138	0.03
2	Same as No. 1 above	4/21/79	0703	167	0.01
3	Same as No. 1 above	4/21/79	0950	137	0.05
TIME-WEIGHTED AVERAGE				442	<u>0.03</u>
<u>DERRICK MAN</u>					
4	BZ, as performs normal duties	4/21/79	0500	125	0.01
5	Same as No. 4 above	4/21/79	0705	135	*
6	Same as No. 4 above	4/21/79	0920	105	0.02
7	BZ, as performs normal duties, also began addition of Flosal [®] (4,50-pound sacks added 1015 to 1200 hours)	4/21/79	1105	81	0.02
TIME-WEIGHTED AVERAGE				311	<u>0.02</u>
<u>MUD ROOM</u>					
8	Area sample, near mud additive hopper	4/21/79	0505	122	0.03
9	Same as No. 8 above	4/21/79	0707	135	0.04
10	Same as No. 8 above	4/21/79	0922	106	0.02
11	Same as No. 8 above	4/21/79	1108	76	0.02
TIME-WEIGHTED AVERAGE				439	<u>0.03</u>

* Filter loaded with unknown substance which precluded the required analysis.

TABLE IV
(Continued)

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>DRILLER</u>					
12	BZ, as performs normal duties	4/21/79	0515	125	0.01
13	Same as No. 12 above	4/21/79	0720	130	0.01
14	Same as No. 12 above	4/21/79	0930	175	0.009
TIME-WEIGHTED AVERAGE				430	<u>0.01</u>
<u>ASSISTANT DRILLER</u>					
15	BZ, as performs normal duties	4/21/79	0519	123	0.01
16	Same as No. 15 above	4/21/79	0722	127	0.01
17	Same as No. 15 above	4/21/79	0929	178	0.01
TIME-WEIGHTED AVERAGE				428	0.01

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling Concentration: 10 fibers/cc

TABLE V

CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENTFLOSAI® FIBER MUD ADDITIVE IN DRILLING MUD SYSTEM

Phillips Petroleum Company

Burnhoff C No. 1

Canadian County, Oklahoma

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration	
<u>DOGHOUSE</u>					
1	Area Sample, located across doghouse from door near driller's console.	5/29/79	0727	118	0.01
2	Same as No. 1 above	5/29/79	0925	133	0.01
3	Same as No. 1 above	5/29/79	1138	116	0.01
4	Same as No. 1 above	5/29/79	1334	70	0.02
TIME-WEIGHTED AVERAGE				437	<u>0.02</u>
<u>MUD HOUSE</u>					
5	Area Sample, located about 1 foot above cone-jet hopper apron, even with outside edge.	5/29/79	0729	119	0.02
6	Same as No. 5 above	5/29/79	0928	133	0.03
7	Same as No. 5 above	5/29/79	1141	93	0.04
8	Same as No. 5 above	5/29/79	1340	70	0.04
TIME-WEIGHTED AVERAGE				415	<u>0.03</u>
<u>DERRICK MAN</u>					
9	BZ, as performs normal duties. Began addition of bentonite.	5/29/79	0747	120	0.01
10	BZ, continued bentonite addition and 3 sx Flosal	5/29/79	0947	116	0.01
11	BZ, 1 sk Flosal added	5/29/79	1143	119	0.01
12	BZ, as performs normal duties	5/29/79	1342	69	0.02
TIME-WEIGHTED AVERAGE				424	<u>0.02</u>

TABLE V

(Continued)

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>FLOORMAN</u>					
13	BZ, as performs normal duties	5/29/79	0752	122	0.03
14	Same as No. 13 above	5/29/79	0954	111	0.01
15	Same as No. 13 above	5/29/79	1145	119	0.02
16	Same as No. 13 above	5/29/79	1344	64	0.04
TIME-WEIGHTED AVERAGE				416	<u>0.02</u>
<u>DRILLER</u>					
17	BZ, as performs normal duties	5/29/79	0754	116	0.01
18	Same as No. 17 above	5/29/79	0910	PUMP MALFUNCTION - NO SAMPLE	
19	Same as No. 17 above	5/29/79	1148	108	0.02
20	Same as No. 17 above	5/29/79	1336	72	0.02
TIME-WEIGHTED AVERAGE				296	0.02

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling Concentration: 10 fibers/cc

Drilling Specialties Company

TECHNICAL SERVICES DIVISION • BARTLESVILLE, OKLAHOMA 74004



DRISPAC
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DIACEL A

RECOMMENDED WORK PRACTICES

for

FLOSAL® DRILLING MUD ASBESTOS

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 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 (f/cc) 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 TWA exposure and 10 fibers longer than five 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 indicate 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 five micrometers per cubic centimeter of air..."
- b. Medical examinations will be required for any 7 to 8-hour TWA 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.

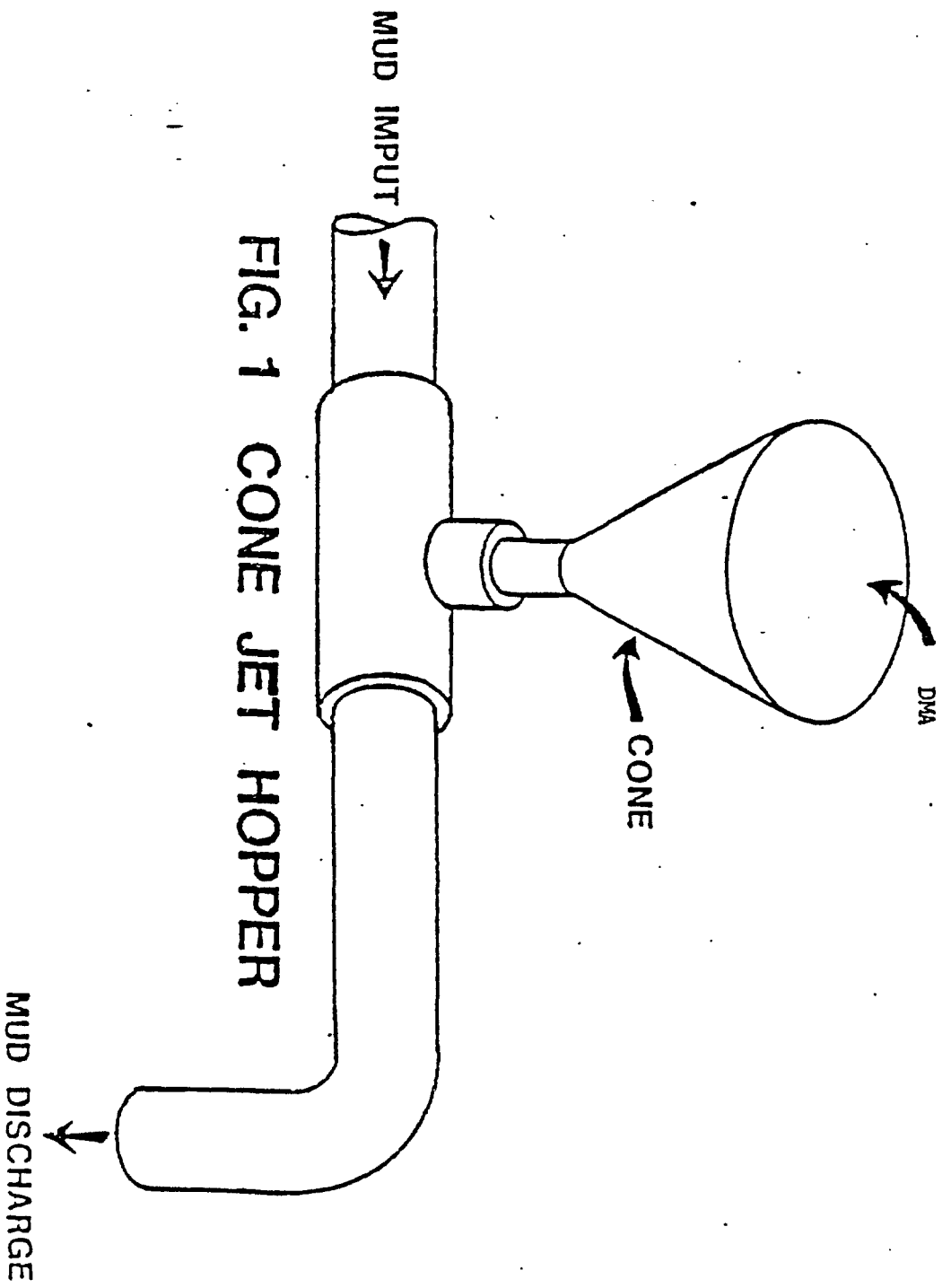


FIG. 1 CONE JET HOPPER

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.

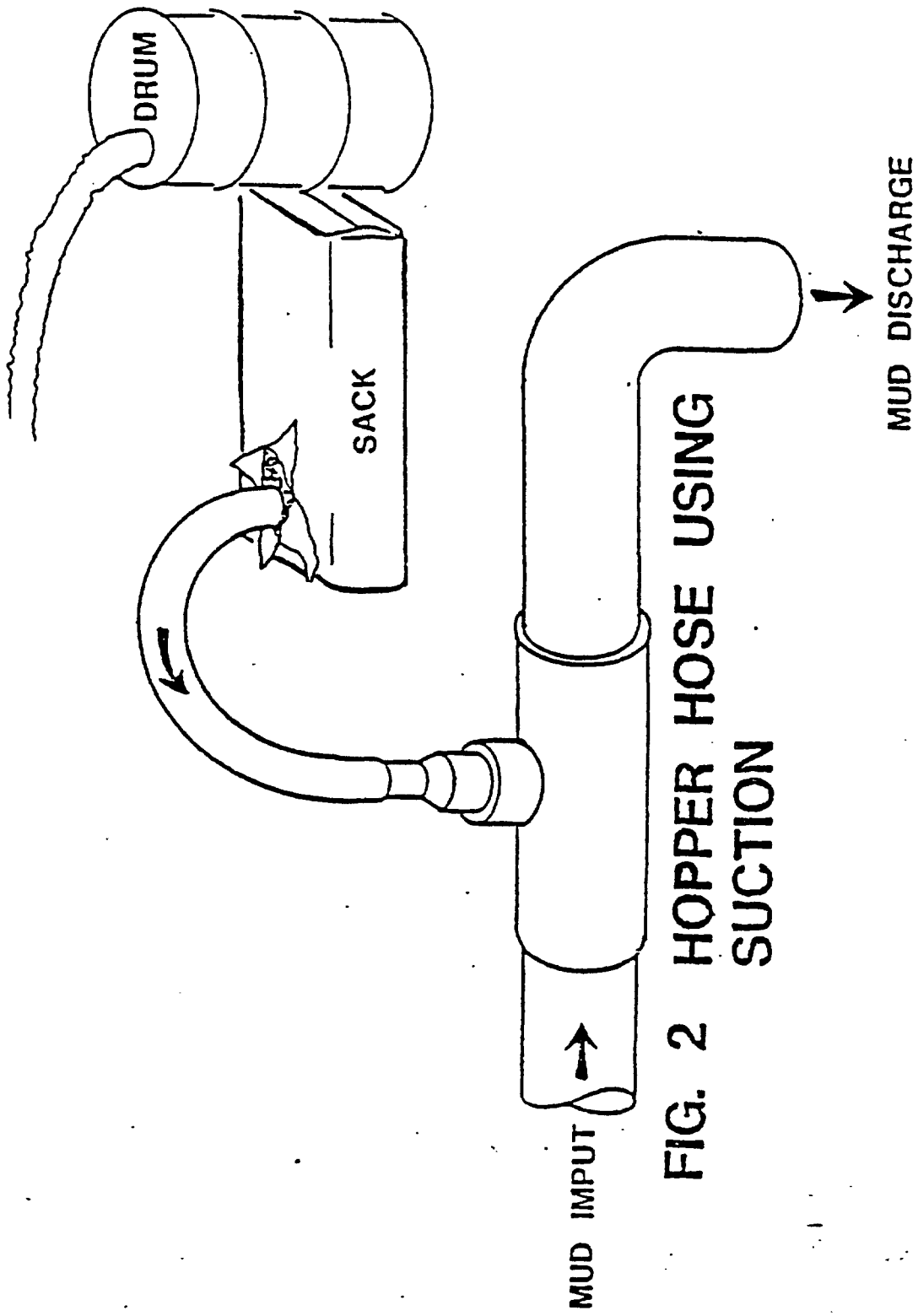
Precautions must be taken if a sack is broken, torn or punctured. The sack should be sealed with heavy duty tape or placed in a slip-over sack (over-sized, open-mouthed bag) to prevent spillage. The slip-over sack should be securely sealed, preferably by a twist wire. Any spillage should be cleaned up with a vacuum sweeper equipped with a disposable bag. Unless additional protection is required under applicable federal or other regulations, a certified, reusable 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 sack 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 sack, or from a drum into which several sacks 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).



**FIG. 2 HOPPER HOSE USING
SUCTION**

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

When 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. DMA sacks are biodegradable. 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.

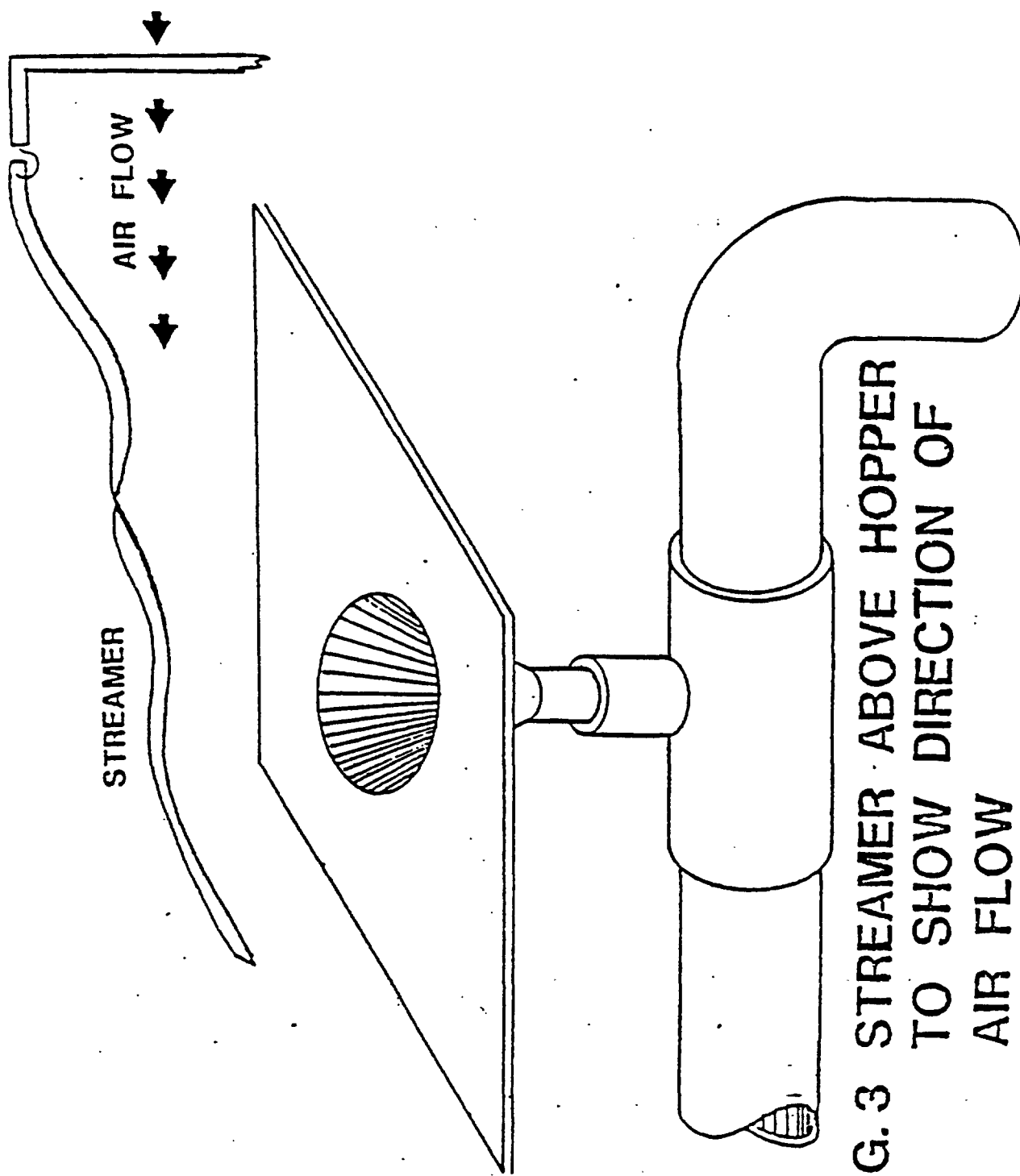


FIG. 3 STREAMER ABOVE HOPPER
TO SHOW DIRECTION OF
AIR FLOW

TABLE I
CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT

FLOSAL® FIBER MUD ADDITIVE IN DRILLING MUD SYSTEM

Phillips Petroleum Company - Peter "2", No. 2 Well

Panola County, Texas

H & S Drilling Company

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone, (BZ) Floor Man No. 1	1/3/79	1500	435	0.003
2	BZ, Motorman, as conducts normal duties during shifts	1/3/79	1500	435	0.009
3	BZ, Derrick Man, as conducts normal duties during shift. 22 bags Flosal added during shift	1/3/79	1500	435	0.03
4	BZ, Floor Man No. 2, as conducts normal duties during shift	1/3/79	1500	435	0.006
5	BZ, Driller, as conducts normal duties during shift	1/3/79	1500	435	0.003
6	Area Sample collected during shift	1/3/79	1511	424	0.009
7	Area Sample collected during shift	1/3/79	1515	420	0.02

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

TABLE II

CONCENTRATIONS OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT DURING
THE ADDITION OF FLOSAI® DRILLING MUD ADDITIVE

Phillips Petroleum Company - Black "A" No. 1 Well
 Canadian County, Oklahoma

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	BZ, Driller, as performs normal duties	1/15/79	0805	480	*
2	BZ, Derrickman, as performs normal duties	1/15/79	0806	479	*
3.	BZ, Floorman, as performs normal duties	1/15/79	0808	480	*
4	BZ, Derrickman, during addition of 3, 50-pound bags Flosai® and 12, 50-pound bags Milgel	1/15/79	0945	30	1.3

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc
 Ceiling concentration: 10 fibers/cc

* Filter loaded with unknown substance which precluded the required analysis.

TABLE III

CONCENTRATION OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENTNorwegian North Sea - Edda PlatformPhillips Petroleum Company - Eldfisk 2/7, No. A-21 WellLoffland Bros. North Sea., Inc.

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
1	Breathing Zone (BZ) Derrick Man as added 12, 50-pound sacks Flosal® to mixing hopper	2/11/79	1505	10	0.2
2	NW side of rig floor about BZ height	2/11/79	1315	433	0.02
3.	BZ, Service Engineer, as performs normal duties throughout shift	2/11/79	1305	450	0.006
4	BZ, Derrick Man as performs normal duties during shift including addition of Flosal as indicated in No. 1 above	2/11/79	1255	465	0.005
5	BZ, Driller as performs normal duties	2/11/79	1255	570	*
6	Area Sample, near mixing hopper	2/11/79	1515	435	*

Present U.S. OSHA ceiling concentration: 10 fibers/cc

Present U.S. OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/

* Filter loaded with unknown substance which precluded the required analysis.

TABLE IV

CONCENTRATION OF ASBESTIFORM FIBERS IN THE WORK ENVIRONMENT DURING
OFFSHORE DRILL SHIP OPERATION

Phillips Petroleum Company - Mississippi Canyon Block No. 282
Well No. 1 - OCS-3819
Louisiana Gulf Coast

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>MUD ENGINEER</u>					
1	BZ, as performs normal duties primarily in mud pit room	4/21/79	0445	138	0.03
2	Same as No. 1 above	4/21/79	0703	167	0.01
3	Same as No. 1 above	4/21/79	0950	137	0.05
TIME-WEIGHTED AVERAGE				442	<u>0.03</u>
<u>DERRICK MAN</u>					
4	BZ, as performs normal duties	4/21/79	0500	125	0.01
5	Same as No. 4 above	4/21/79	0705	135	*
6	Same as No. 4 above	4/21/79	0920	105	0.02
7	BZ, as performs normal duties, also began addition of Flosal® (4, 50-pound sacks added 1015 to 1200 hours)	4/21/79	1105	81	0.02
TIME-WEIGHTED AVERAGE				311	<u>0.02</u>
<u>MUD ROOM</u>					
8	Area sample, near mud additive hopper	4/21/79	0505	122	0.03
9	Same as No. 8 above	4/21/79	0707	135	0.04
10	Same as No. 8 above	4/21/79	0922	106	0.02
11	Same as No. 8 above	4/21/79	1108	76	0.02
TIME-WEIGHTED AVERAGE				439	<u>0.03</u>

* Filter loaded with unknown substance which precluded the required analysis.

TABLE IV
(Continued)

Sample No.	Location and Description	Sampling Time			Concentration (Fibers/cc)
		Date	Hour	Duration (min)	
<u>DRILLER</u>					
12	BZ, as performs normal duties	4/21/79	0515	125	0.01
13	Same as No. 12 above	4/21/79	0720	130	0.01
14	Same as No. 12 above	4/21/79	0930	175	0.009
TIME-WEIGHTED AVERAGE				430	<u>0.01</u>
<u>ASSISTANT DRILLER</u>					
15	BZ, as performs normal duties	4/21/79	0519	123	0.01
16	Same as No. 15 above	4/21/79	0722	127	0.01
17	Same as No. 15 above	4/21/79	0929	178	0.01
TIME-WEIGHTED AVERAGE				428	<u>0.01</u>

Present OSHA 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

Ceiling Concentration: 10 fibers/cc

TABLE V

(Continued)

Location and Description	Sampling Time			Concentration (Fibers/cc)
	Date	Hour	Duration (min)	
is performs normal duties	5/29/79	0752	122	0.03
as No. 13 above	5/29/79	0954	111	0.01
as No. 13 above	5/29/79	1145	119	0.02
as No. 13 above	5/29/79	1344	64	0.04
TIME-WEIGHTED AVERAGE			416	<u>0.02</u>
is performs normal duties	5/29/79	0754	116	0.01
as No. 17 above	5/29/79	0910	PUMP MALFUNCTION - NO SAMPLE	
as No. 17 above	5/29/79	1148	108	0.02
as No. 17 above	5/29/79	1336	72	0.02
TIME-WEIGHTED AVERAGE			296	<u>0.02</u>

A 8-hr time-weighted average permissible exposure limit: 2 fibers/cc

concentration: 10 fibers/cc

