SUNSWEEP™

"MECHANICAL HOLE CLEANING AGENT"

SUNSWEEP™ is a hole-cleaning agent that transports drill cuttings, metal shavings and other debris out of the wellbore. A proprietary treated polymerized synthetic fiber; **SUNSWEEP™** exhibits suspension qualities without adversely affecting any drilling fluid properties.

Features or Benefits

- Compatible for use in all drilling fluids.
- Increases carrying capacity of drilling fluids without affecting overall fluid viscosity.
- Cleans and moves cuttings beds.
- Lifts and carries metal shavings debris during milling operations.
- Helps minimize wiper trips.
- Saves time when compared with mixing gel/polymer sweeps.
- Good hole cleaning reduces torque and drag.
- Enhances rate of penetration.
- No blinding of shaker screens.
- Mixes through rig mud-mixing hoppers.
- LC50 – 1 million ppm
- Chemical inert.
- Nontoxic
- When mixed as recommended, no plugging of MWD equipment or mud motors.

Physical Properties

- Appearance: Copper to Tan
- Specific Gravity: 0.9
- Temperature Stable: 350° F (176.6° C)
- Insoluble in water or any drilling fluid

Packaging

- 15 lb. (6.8 kg) **SUNSWEEP™** per 6 gallon (22.7 L) screw top pail
- 24 – 6 gallon (22.7 L) pails/pallet & shirked

Toxicity and Handling

- General safety precautions and use of eye protection devices are recommended when using
- **SUN SWEEP™**.

Suggested Treatment

- Mix through rig mud hopper for pill application 0.25 to 0.50 lbs/bbl (0.71 to 1.43 kg/m^3)
- For mud motor and MWD application, ***Sun*** recommends pills or sweep at 0.10 to 0.15 lbs/bbl (0.28 to 0.43 kg/m^3)

Sun… The Hole Solution Company

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SUN DRILLING PRODUCTS CORP.

SUNSWEEP™

Solution Profile 1

Problem:
An operator was experiencing unconsolidated formation falling into the wellbore while drilling a 20-in. (50.8 cm) surface hole in South Texas area. Offset data revealed this section would prohibit running the 17 ½ in. surface pipe due to an inability to clean the hole.

Solution:
After reaching the 17 ½ in. (44.4 cm) casing point the well was circulated as clean as possible. 15-lbs. (6.8 kg) (one 6-gallon (22.7 L) bucket) of **SUNSWEEP™** blended with 30 bbls (4.7 m^3) drilling fluid in the rig-slugging pit. The **SUNSWEEP™** pill was circulated through wellbore. Large amounts of unconsolidated sands, shale and pea gravel were circulated out. The 17 ½ in. (44.4 cm) casing to be run to bottom and cemented.

Solution Profile 2

Problem:
A major operator decided to re-enter a well, cut a window and re-drill a section of the wellbore. While cutting the window, large amounts of metal shavings were produced which could not be effectively cleaned from the borehole.

Solution:
Sun Drilling Products Corp. suggested using our mechanical hole-cleaning agent, **SUNSWEEP™**. A 30-bbl (4.7 m^3) pill of **SUNSWEEP™** containing ¼ ppb (0.71 kg/m^3) was mixed. This pill was then circulated through the wellbore, cleaning the metal debris, thus allowing the rig shakers to screen out the shavings. As a result, the operator completed this project.

Solution Profile 3

Problem:
While drilling a 7 ½ in. (19.05 cm) hole at 12,000' (3,657.6 m) a major offshore operator experienced excessive torque and drag. It was believed that "cutting beds" could not be moved and effectively cleaned from the borehole. ***Sun Drilling Products Corp***. recommended using **SUNSWEEP™**. The operator was concerned that **SUNSWEEP™** would not be compatible with their mud motor and MWD equipment.

Solution:
Sun recommended using a 60-bbl (9.5 m^3) pill containing 15-lbs. (6.8 kg) (one 6 gallon (22.7 L) bucket) of **SUNSWEEP™**. This pill was circulated through the borehole, where, upon returning to the surface and rig shakers, the wellbore was thoroughly cleaned. The **SUNSWEEP™** pill had no negative effect on either the mud motor or the MWD equipment.

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MECHANICAL HOLE CLEANING AGENT

Area:
Washington County, Texas

Problem:

An Austin Chalk operator was cutting a window in S95 7" (17.8 cm), 25 #/ft. (37.25 kg/m) casing at 9330' (2,843.8 m). On two previous attempts, the operator was unable to circulate. With 2.875" (7.3 cm) drill pipe, 6.25" (15.87 cm) section mill, 130 gpm (29.5 m^3/hr) circulating rate, 43 funnel viscosity, 9.1 ppg (1092.7 kg/m^3) drilling fluid the metal cuttings were not being effectively removed from the wellbore.

Solution:

With a **Sun** representative on location, the operator mixed a 20 bbl pill containing .25 #/bbl (0.71 kg/m^3) of **SUNSWEEP™** with the existing drilling fluid. There was no increase in viscosity and the pill was mixed in less than 5 minutes before pumping downhole. There was an increase of 300 psi (21.09 kg/cm^2) in pump pressure as the pill entered the BHA. The standpipe pressure returned to normal pressures, 1100 psi (77.33 kg/cm^2), as the pill cleared the BHA.

Results and Benefits:

As the pill surfaced the two magnets in the possum belly of the shaker had to be cleaned of metal cuttings repeatedly and the shaker screens disposed of the remaining metal shavings. The operator successfully completed cutting the window without any further problems. Todd Carter, the operator representative, on location said "I'm impressed", "**Sun Drilling Products Corp.** has something here", and "a little dab will do you".

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Area
Galveston County, Texas, Alto Loma Field

Problem

Hunt Exploration was drilling an S curve well and ROP while sliding was not to expectations and excessive drag was encountered. ROP while sliding was measured at 10'/hr. The S curve was 45º dropped back to 2º and operational depth at the time of the SunSweep pill was 9400'/8791' MD/TVD. The drilling fluid properties were 9.2 ppg, 40 FV, 10/12 PV/YP at 140º F. Circulating rate was 767 gpm in a 12.25" hole. Previous high and low viscosity sweeps containing Nut Plug were ineffective in cleaning the hole.

Solution
Drilling with a MWD and M1XL, 1.7 mud motor **Sun Drilling Products Corp.** recommended a 50 bbl pill consisting of .15 ppb of **SUNSWEEP™** and existing drilling fluid.

Results and Benefits
As the pill surfaced, the Brandt King Cobra shakers equipped with API 210 mesh screens disposed of the **SUNSWEEP™** pill. Within the pill were large amounts of coffee grind sized cuttings, fresh drilled cuttings and nut plug from previous sweeps. Drag was reduced 30% and the ROP while sliding increased to 104 '/hr from 10 '/hr.

Tony Cosenza, Hunt Exploration representative, observed the pill as it crossed the shakers. Tony said, "A bunch of stuff came across the shakers and loaded them up with coffee grind cuttings and a little nut plug". "Our rate of penetration increased from 10' to 12' /hr. to over 100'/hr. OJ Dilly, H&P Tool-pusher, said "The **SUNSWEEP™** worked, period" "There was no increase in pump pressure"

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"SUNSWEEP™ WORKS GREAT IN EUGENE ISLAND AREA"

Area

Eugene Island Block 238

Well Information

Location:	Eugene Island Block 238
Date:	June 2003
Last Casing:	7 5/8" casing
Deviation:	25°
Open Hole:	6 ¾" PDC Bit
Drilling Fluid:	12.5 oil base

Problem

A major offshore operator was experiencing hole cleaning problems during a hole opener run.

Solution

Sun recommended a 50-75 bbl pill containing 0.25 to 0.50 ppb of **SUNSWEEP™** is circulated through the well bore to mechanically clean excess cuttings build up.

Results and Benefits

" Brought everything out of the hole, worked perfectly".

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"SUN SWEEP™ AIDS CHEVRON TEXACO IN HOLE CLEANING"

Area

South Timbalier 200

Well Information

Area:	South Timbalier 200
Formation/Depth:	Shale/Sand
Hole Profile:	14,700' MD/14.114' TVD
Casing Depth:	12,658' MD/12,291' TVD
Hole Size:	12-1/4" BC
Angle:	41°
Fluid Type:	Synthetic
Density:	15.2 ppg
Directional Co.:	Baker
Tool Type:	Under-reamer on conditioning trip
Size of Tool:	12- ¼" UR

Problem

ChevronTexaco had run 9-5/8" liner and tagged up in open-hole due to hole wash out's and potential insufficient hole cleaning. The liner was pulled and hole under-reamed to help assure a subsequent run would be successful.

Solution

Sun Drilling Products Corp. recommended the blend of 0.15 to 0.25 ppb of **SUN SWEEP™** in 60 bbl sweeps of existing drilling fluids.

Results and Benefits

SUN SWEEP™ was run at 0.15 -0.25 ppb in a 60 bbl pill. Byron Sketchler Sr. Operation Superintendent of ChevronTexaco stated that 300 psi spike in pump pressure was noted as the **SUN SWEEP™** entered the BHA. Once the BHA was cleared, the pressure dropped off, and no discernable fluid losses were noted. When the **SUN SWEEP™** treated pill reach the surface, the scalper (upper) shale shaker screens had large amounts of larger cuttings trapped by **SUN SWEEP™** fibers that had not been seen in prior circulations. Also, the finer (primary) screens indicated that **SUN SWEEP™** had brought up large amounts of sand as well. Since subsequent sweeps treated with **SUN SWEEP™** did not recover many cuttings, it was felt the hole was clean. After the well bore was circulated clean then 10 ppb of **LUBRA-GLIDE® BEADS** pill was spotted, and the 9-5/8" liner run successfully to bottom.

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HISTORICAL
SOLUTION PROFILE

SUN SWEEP™

Horizontal Drilling

SUN SWEEP™ fibrous suspension sweeps are routinely being used in lateral drilling to prevent the buildup of cutting beds. These suspensions in low concentrations are able to maintain a clean hole without negative effects on measurement while drilling tools or mud motors.

In a horizontal re-entry in Texas, after milling a window at 6,300' with fresh water, a sweep was ran using one 15-pound bucket of **SUN SWEEP™** to remove any metal fragments left in the hole. The mill was tripped out and the hole was re-entered with slim hole drilling assembly that included a 1.875" MWD tool and 3.5" mud motor. The fresh water used for milling was displaced with Field crude to drill the lateral in the Ellenberger formation. The 4.75" bit was kicked out and drilling began.

While building radius to the horizontal section, 60 barrels of fluid was treated with 0.25 pound/bbl (15 pounds) of **SUN SWEEP™**. Twenty barrel sweeps were pumped from the premix pit to maintain hole cleanliness. The **SUN SWEEP™** were run with no adverse effects on the MWD tool or mud motor, and the shaker with no blinding of the screen removed the fiber and cuttings. As the lateral section progressed, the concentration of **SUN SWEEP™** was increased to a 0.5 pound/bbl with no ill effects to the MWD tool or mud motor.

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HISTORICAL SOLUTION PROFILE

SUN SWEEP™

WEIGHTED DRILLING FLUIDS

The ability to remove fibrous suspensions with a conventional shale shaker makes **SUN SWEEP™** especially useful in weighted drilling fluids. Conventional high-viscosity sweeps used for hole cleaning become entrained in the fluid system and can result in excessive increases in drilling fluid viscosity. This can result in having to dilute the system back to a desired viscosity, which may require the additional expense of reconditioning the fluid.

A South Louisiana land well required hole cleaning without increasing the viscosity of the heavily weighted mud system. A sweep was needed on this 15,200' deep well with 5.0" liner before logging, after drilling out a cement float collar. The operator applied a pill of **SUN SWEEP™** at the rate of 0.25 pound/bbl of 60 bbls mud. Upon reaching the surface, the fiber material was easily screened out over the shaker screens with no resulting mud losses, blinding or sticking. Several pieces of the float collar, along with additional cuttings, were recovered. Pump pressure, which had increased from 2,850 to 2,970 psi during circulation, returned to normal after the sweep. The **SUN SWEEP™** proved a safe and effective alternative to a high-viscosity polymer sweep.

The ability of **SUN SWEEP™** to perform in low doses allows for cost-effective transportation to remote rig sites. A 15-pound Bucket of **SUN SWEEP™** can do the work of hundreds of pounds of clay viscosifiers, and result in significant savings in mixing time. The **SUN SWEEP™** can be used to add strength to weak gel fluids such as PHPAs or guars. In areas prone to lost circulation, synthetic fiber sweeps can be utilized to allow the use of lower-viscosity fluids, reducing equivalent circulation densities and resulting in less fluid loss.

Maintaining a clean hole with routine **SUN SWEEP™** helps reduce the density of fluid in the well bore, lowering hydrostatic pressure and reducing fluid loss. Highly propelled by the fluid, the **SUN SWEEP™** can be used to measure bottoms-up lag time. When hole cleaning problems show themselves in the form of high torque or drag, **SUN SWEEP™** can be mixed, circulated and have the hole unloaded long before the viscosity of the mud system can be increased. In addition, a **SUN SWEEP™** can be used at total depth to determine hole cleanliness, or the simply improve the odds of getting a logging tool or a long string of casing to bottom.

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HISTORICAL SOLUTION PROFILE

SUN SWEEP™

CLEAR WATER DRILLING

The ability of **SUN SWEEP™** to disperse and suspend in water or brines without the need of a viscosifier makes it useful in maintaining a clean hole while drilling with fast drilling fluids. Reducing valuable rotating hours, the **SUN SWEEP™** allows for greater depths on water prior to mud up. Unlike clay viscosifiers, **SUN SWEEP™** fibers unaffected by common contaminates or strong inhibitive flocculants. In the proper concentrations, these **SUN SWEEP™** fibers are able to continually suspend solids for extended periods (days, weeks and even months) in static conditions.

A large development drilling programs in Texas, used the **SUN SWEEP™** wells to a depth of 3,400'. While drilling with a clarified inhibitive brine the **SUN SWEEP™** was used to total depth to flush the bore hole free of cuttings, enabling the operator to avoid any additions of expensive viscosifiers that retain solids and slow the rate of penetration. The operator averaged 70 rotating hours on these wells, versus 120 hours on previous drilling programs in the same field. With the inhibition of the floculant treated brine and the hole cleaning of **SUN SWEEP™**, it became routine to come out of the hole "laying down" at total depth prior to logging or running pipe. Savings on brine, cement and rig time were well in excess of the investment in drilling fluid additives required to achieve these results.

Another Texas operator encountered severe drag and hole fill at 3,600' while making pipe connections during the drilling of an a 8.75" hole. This was several hundred feet prior to the scheduled mud up depth. With a penetration rate of 40' an hour and pump output of 7.8 barrels a minute a sweep was performed by mixing 30 pounds of **SUN SWEEP™** with cut brine through the mud hopper directly into the suction pit over a four minute period. After approximately 30 minutes of circulating, the hole began to unload heavily. The **SUN SWEEP™** continued to bring large volumes of cuttings, fines and silvers of shale for 15 minutes, before gradually tapering off. As a result of the sweep, the problem with tight connections and hole fill were alleviated, allowing the drilling to continue to mud up depth with brine.

Hole fill had been experienced on another West Texas well in previous 17.5" hole drilled with brine while logging intermediate sections at 4,200'. This resulted in the intermediate casing string having to be washed to bottom. On a subsequent well, the 17.5" diameter, 4,200' section was swept with 30 pounds of **SUN SWEEP™** mixed with 100 barrels of brine. As a result, several logging runs were successfully completed and casing was set to bottom with none of the hole fill problems associated with the previous wells.

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SUN SWEEP™

MILLING OPERATIONS

SUN SWEEP™ fiber sweeps allows for milling with drilling fluids as opposed to high yield point milling mud. The jagged edges of metal fragments, silvers and burrs generated during milling operations become mated within **SUN SWEEP™** fiber suspensions, greatly enhancing the transport of this debris to the surface. **SUN SWEEP™** used in an oil based or synthetic fluid eliminate the need to displace the drilling fluid with a high yield point mud to cut simple window, only to switch back to an oil-based or synthetic fluid to resume drilling. **SUN SWEEP™** can be used in low yield point water-based fluids for milling without having to water back a milling mud to a drilling mud, reducing mud product cost as well as rig time.

In a milling operation offshore Louisiana, **SUN SWEEP™** pills were required to remove metal fragments cut from a window at 5,800' using a 6.125" mill of the 7.0" casing before going in the hole with a PDC bit. Several 60 bbl **SUN SWEEP™** pills were circulated during milling, with an additional 60 bbl sweep after the milling was completed. The sweeps successfully cleaned the hole of metal fragments, and the magnets were cleaned and left in place for three additional days with no additional metal recovered.

SUN SWEEP™ was also required to recover metal fragments after milling a portion of an 11.75" intermediate casing section in a well onshore Louisiana. The hole had been previously circulated using a high-viscostiy xanthan polymer sweep, and was presumed to be clean. The magnets were removed, cleaned and replaced. A trail of the **SUN SWEEP™** additive was then performed in the hopes of eliminating the viscosity increases and backwatering that occur from conventional high-viscostiy sweeps. A 30 bbl pill with **SUN SWEEP™** at 0.25 pound/bbl was circulated in the hole. More metal fragments were recovered with the sweep, and the magnets were packed with additional fragments upon removal. The **SUN SWEEP™** additive proved to be a more efficient hole-cleaning agent than the polymer sweep, even at a depth of 11,200 feet in dense fluids.

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