MI SWACO

M-I L.L.C.

P.O. Box 42842 · Houston, Texas 77242-2842
Tel: 713-739-0222 --www.miswaco.com

May 11, 2010

1. Account from mud engineers as to what was pumped as a spacer for the riser displacement referred to as "FORM-A-SET PILL" but understood to possibly be a tandem pill of FORM-A-SET AK and FORM-A-SQUEEZE. Confirm density and composition - provide formulation of (both?) pills.

    - Leo Linder stated that there were two separate pills on the rig leftover from the drilling operation.
    - 180 bbls of 14.0 ppg FORM-A-SQUEEZE and approximately 200 - 210 bbls of 14.0 ppg FORM-A-SET AK.
    - These pills were in separate pits.
    - The FORM-A-SQUEEZE pill was combined and mixed together with the FORM-A-SET pill in a single pit.
    - The combined pills were then weighted up from a density of 14.0 ppg to a density of 16.0 ppg with Barite.
    - This yielded a total pill volume of approximate 425 bbls.
    - Formulations for each pill are noted in the attached Laboratory report.
    - Both pills on the rig were built with fresh water.

2. The order of the displacement adding up to the 454 bbl reported.

    The +/- 425 bbl pill described above was pumped and then followed with seawater.

3. An account from M-I SWACO as to the communications leading to the decision to use LCM pill(s) as spacer.

    Leo stated that the idea of using the LCM pills as a spacer for the riser displacement was discussed several days prior to the actual displacement. The discussion involved the mud engineers as well as several members of the BP drilling team including the BP fluids specialist, John Lebleu; the BP Drilling Engineer, Brian

Morel; the BP company men; and the BP environmental and waste specialists, James Hoggan and Tracy Dyer.

See email correspondence attached for confirmation.

4. Provide raw materials to recreate/simulate 5 gallons (roughly 55 barrel equivalents) of each of the pills (FORM-A-SET AK and FORM-A-SQUEEZE)

   This was completed on 5/10/10 and picked up from M-I SWACO by Paul Hanson with BP on 5/11/10.

5. Technical Reports concerning contamination sensitivity of FORM-A-SET AK and FORM-A-SQUEEZE, with specific interest in contaminants that could cause FAS AK to cross-link.

   See document attached.

6. Drilling Fluids Reports, Plan Forwards and/or Procedures generated between April 14, 2010 and April 20, 2010.

   See mud reports attached; and Displacement Procedure attached.

Technical Services Laboratory – Houston, Texas
Water-Base Mud Report
ID Code No. 100510F.010
Lab Master No. 20101420

May 10, 2010

Form-A-Set AK and Form-A-Squeeze pills to simulate the pills on the Transocean Horizon

PROJECT OBJECTIVE

To prepare one barrel equivalent samples of the following pills that simulate the pills prepared and pumped for BP on the Transocean Horizon Rig:

1. Form –A- Set AK without the crosslinking component
2. Form – A- Set AK with the crosslinking component
3. Form-A-Squeeze
4. Form-A-Squeeze filter cake

To prepare the components necessary to make 5 gallons of Form-A-Set AK and 5 gallons of Form-A-Squeeze in separate containers.

CONCLUSION

The samples were prepared May 10, 2010 and are ready to be picked up for delivery to BP.

ID Code No. 100510F.010
Lab Master No. 20101420

Form-A-Set AK Formulation

Fluid Composition	*Rig Formulation*	*Lab Formulation*
Water, bbl	175 bbl	.729 bbl (255.15 ml)
Form-A-Set RET, 5 gal pails	21	1% by volume (3.5 ml)
Form-A-Set AK, 25 lb bag	175	18.2 ppb (18.2 g)
DUOVIS, 55 lb sack	3	0.7 ppb (0.7 g)
M-I BAR, 100 lb sack	752	313 ppb (313 g)
*Form-A-Set XL, 12 gal can	17	1.88 ppb (1.88 g)

* Form-A-Set XL was added in the above concentration only to the 1 lab bbl sample. It was not added at the rigsite.

Form-A-Squeeze Formulation

Fluid Composition	*Rig Formulation*	*Lab Formulation*
Water, bbl	175	1 bbl eq. (350 ml)
Form-A-Squeeze, 80 lb bag	175	80 g
Barite, 100 lb sack	750	331 g

Note 1: The “Rig Formulations” above are the actual formulations prepared on the rig. The “Lab Formulations” are the exact respective concentrations as the “Rig Formulations”; just scaled back for laboratory volumes.

Note 2: Note that a bbl equivalent sample of Form-A-Set AK with the crosslinking component Form-A-Set XL was included as part of the one-bbl equivalent samples as requested; however, since Form-a-Set XL was not used on the rigsite, it was not included in the individual samples that will used to prepare the five gallon sample.

Note 3: All samples were prepared in duplicate; one set to be given to BP and the other set to be held by the M-I Swaco Legal department.

Remarks: Components of the Form-A-Set AK pill and the Form-A-Squeeze pills were prepared in separate containers so that they can be quickly mixed to simulate a 5 gal sample (50 bbl equivalent sample)

Report by: Randy Ray, Willy Steward, Jay Forrester
Copies to: Tim Armand, Brad Billon, Jim Bruton, Daryl Cullum, Stan Alford, Mike Freeman

Product	Lab Master No.	Notes
Form-A-set AK	20101421-02	
Form-A-Set Retarder	20101421-01	
Duovis	20101421-03	
Form-A-Squeeze	20101421-04	
Form-A-Set XL	20101421-05	

Subject:	FW: Watrebased FAS pills
Importance:	Low

From: Lindner, Leo T (MI DRILLING FLUIDS, INC) [mailto:leo.lindner@bp.com]
Sent: Saturday, April 17, 2010 2:42 PM
To: Maxie, Doyle
Subject: RE: Watrebased FAS pills
Importance: Low

Doyle,
Talked to Brian Morel about the issue, and he is for using it as a spacer.
Regards,
Leo

From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Friday, April 16, 2010 9:17 AM
To: Lindner, Leo T (MI DRILLING FLUIDS, INC)
Subject: FW: Watrebased FAS pills

Leo,
Had a discussion with John and he ran it by the Environmental group and we cannot dump them. The want to dispose if we cannot use as spacers. I am checking on the possibility of this option. Given the water based nature and the fact that we will T&A, may not want to us as spacer and dump.

Project Engineer
Houston District

Office: 281 . 988 . 1809
Cell: 281 . 686 . 7247
Ritefax: 832 . 351 . 4916

MI SWACO

From: LeBleu, John B [mailto:John.LeBleu@bp.com]
Sent: Friday, April 16, 2010 8:40 AM
To: Maxie, Doyle
Cc: Cocales, Brett W; Morel, Brian P; Hoggan, James L; Dyer, Tracy K
Subject: RE: Watrebased FAS pills

Doyle,

I contacted James Hoggan BP environmental specialist and he said that since it has not been in the well we will have to send it in for disposal. I have left a voice message with Tracy Dyer the BP waste specialist and have copied her on this email.

You will need to contact Tracy to answer her questions about what is in the pill and she will have to send you the paperwork that must follow the waste to the disposal facility.

I have also attached Tracy and James' contact information.

If you have any more questions, or need anything else, let me know.

Thanks,

John

John LeBleu
Drilling Fluids Engineer
BP GOM - Drilling Excellence
BP: 281-366-4015
Cell: 713-503-2257
lebleujb@bp.com
jlebleu@jlebleu.com

From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Friday, April 16, 2010 8:04 AM

Subject: FW: FAS and FAS AK

From: Morel, Brian P [mailto:Brian.Morel@bp.com]
Sent: Friday, April 16, 2010 10:05 AM
To: Maxie, Doyle; LeBleu, John B; Cocales, Brett W; Hafle, Mark E
Subject: RE: FAS and FAS AK

Cement plug will be set with 3-1/2" stinger open ended.

From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Friday, April 16, 2010 10:00 AM
To: LeBleu, John B; Cocales, Brett W; Morel, Brian P; Hafle, Mark E
Subject: FAS and FAS AK

Gentlemen,

There are no environmental restrictions for dumping these pills other than they have not been circulated through the well bore. With this in mind we cannot go straight overboard. I have talked with Armand, Wilde, Manuel, Smith, about the possibility of using the pills as the final displacement spacer prior to cleaning the riser for NILE. We have to clear all operational issues before doing so such as BHA for final displacement, I am assuming it will be a cement stinger. With that tool in hole we do not feel there would be any restriction that would cause the FORM A SQUEEZE to set up and without the XI in the FAS AK there is no cross linking agent to cause it to set up. I do not know the exact tool that will be used but if there are any small restrictions in the assembly this would be a risk. This could be used as the spacer for displacing riser to sea water and then go overboard after Rheliant is displaced. Just a thought to discuss. If we feel this is not an option I will get information to Tracy for disposal.

D Maxie

Project Engineer
Houston District

Subject: FW: Disposal

-----Original Message-----
From: Hoggan, James L [mailto:James.Hoggan@bp.com]
Sent: Sunday, April 18, 2010 7:20 AM
To: LeBleu, John B; Maxie, Doyle; Dyer, Tracy K; Morel, Brian P
Cc: Cocales, Brett W; Lindner, Leo T (MI DRILLING FLUIDS, INC)
Subject: RE: Disposal

Yes, it can be discharged as an interface - you'll need to monitor it as a small volume discharge. Limitations are passing the static sheen test and include it in your ROC totals using the defaults 25% ROC and 10 bbls (and will need the weight).

Thanks,
James

-----Original Message-----
From: LeBleu, John B
Sent: Sat 4/17/2010 5:50 PM
To: Maxie, Doyle; Dyer, Tracy K; Morel, Brian P
Cc: Hoggan, James L; Cocales, Brett W; Lindner, Leo T (MI DRILLING FLUIDS, INC)
Subject: RE: Disposal

From what I know of the make-up of the pills, and what I know of the regulations, this is doable.

But I will defer to James for the definitive answer.

John LeBleu
Drilling Fluids Engineer
BP GOM - Drilling Excellence
BP: 281-366-4015
Cell: 713-503-2257
lebleujb@bp.com
jlebleu@jlebleu.com

-----Original Message-----
From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Saturday, April 17, 2010 4:26 PM
To: LeBleu, John B; Dyer, Tracy K; Morel, Brian P

To: LeBleu, John B
Cc: Cocales, Brett W; Morel, Brian P
Subject: Watrebased FAS pills

John,

We need to have a conversation about these pills. They are water based and they have dumped them on Enterprise but need clarification from bp as to what we can and should do witht hem.

BMorel

Project Engineer
Houston District
Office: 281 . 988 . 1809
Cell: 281 . 686 . 7247
Ritefax: 832 . 351 . 4916

MI SWACO

Subject: FW: FAS and FAS AK

From: Morel, Brian P [mailto:Brian.Morel@bp.com]
Sent: Friday, April 16, 2010 10:05 AM
To: Maxie, Doyle; LeBleu, John B; Cocales, Brett W; Hafle, Mark E
Subject: RE: FAS and FAS AK

Cement plug will be set with 3-1/2" stinger open ended.

From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Friday, April 16, 2010 10:00 AM
To: LeBleu, John B; Cocales, Brett W; Morel, Brian P; Hafle, Mark E
Subject: FAS and FAS AK

Gentlemen,

There are no environmental restrictions for dumping these pills other than they have not been circulated through the well bore. With this in mind we cannot go straight overboard. I have talked with Armand, Wilde, Manuel, Smith, about the possibility of using the pills as the final displacement spacer prior to cleaning the riser for NILE. We have to clear all operational issues before doing so such as BHA for final displacement, I am assuming it will be a cement stinger. With that tool in hole we do not feel there would be any restriction that would cause the FORM A SQUEEZE to set up and without the XI in the FAS AK there is no cross linking agent to cause it to set up. I do not know the exact tool that will be used but if there are any small restrictions in the assembly this would be a risk. This could be used as the spacer for displacing riser to sea water and then go overboard after Rheliant is displaced. Just a thought to discuss. If we feel this is not an option I will get information to Tracy for disposal.

D Maxie

Project Engineer
Houston District

Subject: FW: Disposal

-----Original Message-----
From: Dyer, Tracy K [mailto:Tracy.Dyer@bp.com]
Sent: Friday, April 16, 2010 9:33 AM
To: Maxie, Doyle; Morel, Brian P
Cc: Hoggan, James L; LeBleu, John B; Cocales, Brett W
Subject: RE: Disposal

Doyle I will need the following information to determine how to characterize the waste see where it will go for disposal

Whose waste is it Bp or other ?
What is the total quantity and what is it contained in (i.e. 300 bbls in
7 x 25 bbl cuttings boxes etc.)
How was it used (i.e. not used, used downhole, circulated through mud pits, contaminated by xxx etc.) What is in it, include all MSDS (30 % water, 20 % xxx, > 1% xxx, 5% xxx, 24% xxx) What will it be brought to shore ?
Is there any chance this pill can be held for later use or used at another rig site ?

Tracy Dyer, CHMM
BP - DW Waste Specialist
WL4 497C
Tel. 281-366-1233
Cell. 281-731-1821
Fax 281-366-7078
Email dyertk@bp.com
Waste Procedures Link:
http://docs.bpweb.bp.com/us_wl_dk_gom_hse/website/custom/waste_manual/i
ndex.htm?
Waste SharePoint Site:
https://wss2.bp.com/EP4/GoM_Offshore_Waste/default.aspx

-----Original Message-----
From: Maxie, Doyle [mailto:dmaxie@miswaco.com]
Sent: Friday, April 16, 2010 8:49 AM
To: Dyer, Tracy K
Subject: Disposal

Michael A. Freeman, PhD
Scientific Advisor- R&E Fellow

P.O.Box 42842 · Houston, Texas 77242-2842
Tel: +1.281.561.1303 · mfreeman@miswaco.com

FORM-A-SET* AK and FORM-A-SQUEEZE*

[redacted]

FORM-A-SQUEEZE

FORM-A-SQUEEZE high-fluid loss/high-solids slurry is a cost-effective solution to lost circulation in all types of fractures, vugular formations, matrix and underground blowout events. When placed in and/or across a loss zone, the liquid phase squeezes from the slurry, rapidly leaving a solid plug behind. This process can cure losses instantly, without time or temperature dependency.*

Typical Physical Properties

Physical appearance .... Gray powder
Specific gravity 1.70–1.76
Solubility in water .... Slight
Odor .... None

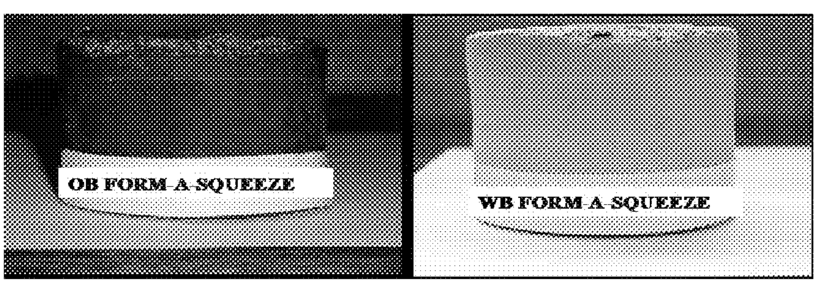
Applications

FORM-A-SQUEEZE lost-circulation (LC) plug can be used to stop losses occurring in any water-base and non-aqueous base fluid and can be easily mixed in freshwater, seawater or base oil/synthetic. It was designed to be used as:

- Openhole remedial and/or preventive lost circulation squeeze
- Plug to run in front of cement squeezes
- Plug to improve casing shoe integrity
- Preventive LC material for seepage losses, up to 20 lb/bbl (57 kg/m^3) in the whole active system
- Cased-hole squeeze for sealing perforations and casing leaks

The recommended concentration of FORM-A-SQUEEZE slurry is 80 lb/bbl (228 kg/m^3) in either water or base oil/synthetic. The slurry can be weighted to the desired density with barite or calcium carbonate.

The slurry should be pumped to the annulus, covering at least 50% in excess of the loss zone. The drill string is then pulled slowly 90 ft (27 m) above the pill. The slurry should be gently squeezed in the range of 100-300 psi (6.9 to 20.7 bar) to the maximum of anticipated mud weight required for the interval, holding the pressure for 10 to 20 min.



Alpine
SPECIALTY CHEMICALS

Advantages

- Quick-acting plug for fractured, vugular formations and underground blowout events
- Single-sack product – each 50-sack pallet of FORM-A-SQUEEZE additive makes a 25-bbl pill
- Extremely easy to mix through a standard hopper in both water and base oil/synthetic
- No special equipment required to spot the pill
- No spacer is required – contaminant friendly to both water-base and non-aqueous base fluids
- Not affected by temperature, activator and retarder formulations or pH
- Temperature stable up to 450°F (232°C)
- Environmentally acceptable (complies with LC_{50} requirements)
- Can be mixed in rig slugging pit up to 17 lb/gal (2 kg/L)
- Can be used in whole circulation system up to 10 lb/bbl (28.5 kg/m^3) for seepage loss

Limitations

- Not 100% acid soluble

Toxicity and Handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions described in the Material Safety Data Sheet (MSDS).

Packaging and Storage

FORM-A-SQUEEZE additive is packaged in standard 40-lb (18.18-kg) sacks; one pallet contains 50 sacks or 2000-lb (907.2-kg) super-bags on request.

Store in a dry, well-ventilated area away from sources of heat or ignition. Avoid generating dust. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

Mixing Table (approximately one barrel)

Weight lb/gal (kg/L)	Water (bbl)	FORM-A-SQUEEZE 40-lb (18.1-kg) sacks	Barite 100-lb (45.4-kg) sacks
9 (1.1)	0.88	1.76	0
10 (1.2)	0.84	1.68	0.55
11 (1.3)	0.81	1.62	1.11
12 (1.4)	0.78	1.56	1.68
13 (1.6)	0.74	1.48	2.25
14 (1.7)	0.71	1.42	2.81
15 (1.8)	0.68	1.36	3.38
16 (1.9)	0.65	1.30	3.95

ALPINE, a business unit of M-I LLC

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APB.0602.0806.R4 (E)

FORM-A-SET™ AK

FORM-A-SET AK is a special blend of polymers and fibrous materials designed to plug matrix and fractured zones. When added with DUO-VIS® and activated with a combination of FORM-A-SET XL, time and temperature, FORM-A-SET AK produces a firm, rubbery, ductile plug that effectively prevents loss of fluid to the formation. The lost circulation material in the FORM-A-SET AK package comprises specially sized and concentrated fibrous cellulose containing a fine mixture of particle sizes to plug deep fractures, faults and vugular formations.

TYPICAL PHYSICAL PROPERTIES

Physical appearance	Light tan powder
Specific gravity	0.96
Bulk density	34.5 lb/ft^3 (552.6 kg/m^3)

APPLICATIONS

The FORM-A-SET AK plug may be mixed in freshwater, seawater or saltwater up to saturation. FORM-A-SET AK can be used in any application where a squeeze plug is beneficial and a smaller particle-size distribution of bridging material is desired. This enhances the ability of the material to penetrate a porous or fractured zone.

FORM-A-SET AK is a variation of M-I's FORM-A-SET. The crosslinking agent for FORM-A-SET AK is packaged separately. Thus, the plug can be mixed and stored on location as a contingency. Once losses are encountered, the plug is activated by adding 5 lb/bbl (14.3 kg/m^3) FORM-A-SET XL and after mixing for five minutes, the FORM-A-SET AK is spotted in the loss zone.

Though FORM-A-SET AK is designed as an unweighted plug, densities up to 10.0 lb/gal (28.5 kg/m^3) may be obtained with the addition of sodium chloride (NaCl) in the water phase. In addition, the density of FORM-A-SET AK may be increased up to 16.5 lb/gal with the addition of barite. FORM-A-SET AK may be used to stop losses occurring with any water-, oil- or synthetic-base fluid system.

RETARDER/ACCELERATOR

Two products are available to help control the setting times of the material: FORM-A-SET RET and FORM-A-SET ACC. FORM-A-SET RET, a retarder, is designed for situations requiring longer setting or pumping times and higher squeeze temperatures. FORM-A-SET ACC (accelerator) is engineered for situations where set conditions are faster and lower water temperatures slow the crosslinking process.

FORM-A-SET RET should be used with all applications above 80°F (27°C). A retarder is required when bottom-hole temperature and pumping times increase. The retarder is added to the water prior to the addition of FORM-A-SET AK material. As a guideline, the typical concentration of retarder is shown below. To ensure the time and temperature will not cause the slurry to crosslink prematurely, it is important to pilot test for sufficient retarder concentration.

The FORM-A-SET ACC should be used to speed up the setting time of the slurry. It is used when ambient temperatures or make-up water are below 60°F (15.6°C). To avoid over-treatment, caution must be exercised when adding the accelerator. In colder conditions, **suggested concentration of FORM-A-SET ACC is 0.3 lb/bbl (0.86 kg/m³)**. To ensure full polymer hydration, the FORM-A-SET ACC should be added after the dry material has been mixed. This procedure will allow the dry material to blend thoroughly. Afterwards, the FORM-A-SET ACC can be added to the slurry to guarantee it is well dispersed. It is suggested that the accelerator be diluted in 5 to 10 gallons (18.9 to 37.9 L) of water before adding to the FORM-A-SET AK slurry.

Bottom-hole Temperature		FORM-A-SET RET	
°F	°C	lb/bbl	kg/m³
Up to 80	Up to 26.7	—	—
80 – 120	26.7 – 48.9	4	11.4
120 – 150	48.9 – 65.6	6	17.1
150 – 200	65.6 – 93.3	10	28.5
200 – 250	93.3 – 121	16	45.6

UNWEIGHTED MIXING/PUMPING INSTRUCTIONS

To mix an unweighted pill of FORM-A-SET AK, use a clean pit or blending tank.

- Add the retarder before mixing any polymers.
- Add ½ of the DUO-VIS.
- Add one sack of FORM-A-SET AK.
- Add the remaining DUO-VIS.

Note: The defoamer may be added at any time air entrapment is observed. Use only alcohol-base defoamers such as DEFOAM™-A.

Defoamers containing stearate or glycol might cause changes in the crosslinking mechanism.

Use approximately 20 to 30 bbl (3.2 to 4.8 m³) of viscous water or mud as spacers in front of and behind the pill.

- **Once losses are encountered add 5 lb/bbl (14.3 kg/m³) FORM-A-SET XL to the pill and mix thoroughly for approximately five minutes.**

MIXING PUMPING INSTRUCTIONS (CONTINUED)

Pump the pill to the depth of loss with the pill above the loss zone. Even if losses have stopped, it is important not to leave any pill in the pipe.

Do not shut down pumping while the pill is in the drillstring. Watch for any sign of the pill reaching the loss zone, such as pressure increase or improved return flow.

To begin squeezing, pull above the pill and close the annular preventer. If pressure is noted, hold for at least three hours to obtain a firm set of the pill. Allow about four hours for the pill to obtain maximum strength.

Total time for the job, including blending, pumping and squeezing is about five hours.

WEIGHTED SLURRIES

Table 1 should be followed to mix FORM-A-SET AK slurries heavier than freshwater. Mixing order should be:

1. Add the retarder before the FORM-A-SET AK. The retarder concentration should be proportioned to the water volume.
2. Add one-half of the DUO-VIS.
3. Add one-half the FORM-A-SET AK material.
4. Add the barite.
5. Add the remaining FORM-A-SET AK.
6. Add the remaining DUO-VIS.
7. If needed, add the accelerator concentration in proportion to the water volume.

Note: The defoamer may be added at any time air entrapment is observed.

Density		Water		DUO-VIS		FORM-A-SET AK		M-I BAR®	
lb/gal	s.g.	bbl	m^3	lb/bbl	kg/m^3	lb/bbl	kg/m^3	lb/bbl	kg/m^3
8.36	1.00	.935	0.149	2.8	7.99	21.97	62.68	0.00	0.00
8.5	1.02	.930	0.148	2.79	7.96	21.86	62.37	7.8	22.25
9.0	1.08	.912	0.145	2.74	7.82	21.44	61.17	35.37	100.91
9.5	1.14	.895	0.142	2.68	7.65	21.03	60.00	62.95	179.60
10.0	1.20	.877	0.139	2.63	7.50	20.62	58.83	90.53	258.28
10.5	1.26	.860	0.137	2.15	6.13	20.21	57.66	118.10	336.94
11.0	1.32	.842	0.134	2.11	6.02	19.80	56.49	145.68	415.63
11.5	1.38	.825	0.131	1.65	4.71	19.39	55.32	173.26	494.31
12.0	1.44	.807	0.128	1.61	4.59	18.97	54.12	200.83	572.97
12.5	1.50	.790	0.126	1.18	3.37	18.56	52.95	228.41	651.66
13.0	1.56	.772	0.123	1.16	3.31	18.15	51.78	255.99	730.34
13.5	1.62	.755	0.120	0.75	2.14	17.74	50.61	283.56	809.00
14.0	1.68	.737	0.117	0.74	2.11	17.33	49.44	311.14	887.69
14.5	1.74	.720	0.114	0.54	1.54	16.92	48.27	338.72	966.37
15.0	1.80	.702	0.112	0.53	1.51	16.50	47.07	366.29	1,045.03
15.5	1.86	.685	0.109	0.34	0.97	16.09	45.90	393.87	1,123.71
16.0	1.92	.667	0.106	0.33	0.97	15.68	44.74	421.44	1,202.37

The plug is activated by adding 5 lb/bbl (14.3 kg/m^3) FORM-A-SET XL and mixing for five minutes.

ADVANTAGES

- FORM-A-SET AK contains only the polymer and lost circulation material, therefore it may be mixed on location and stored before the anticipated losses are encountered.
- Owing to its increased polymer loading and the smaller size of the fibrous material, the FORM-A-SET AK has a much firmer set than the conventional FORM-A-SET.
- Because of the firmer set, FORM-A-SET AK has a wide range of applications. These applications range from partial losses (20 to 100 bbl/hr; 3.2 to 15.9 m^3/hr) to severe losses (100 to 500 bbl/hr; 15.9 to 79.5 m^3/hr). Furthermore, the material can be used to shut off water in non-productive zones and gravel consolidation.

LIMITATIONS

- Extended times in the wellbore will not cause a FORM-A-SET AK plug to degrade, caution should be exercised when it is used in or near the production zone.
- Since FORM-A-SET AK is mixed with 3 lb/bbl (8.6 kg/m^3) DUO-VIS, pilot testing for thermal stability is recommended when temperatures exceed 250°F (121°C).
- When premixing the pill, include 0.1 lb/bbl (0.3 kg/m^3) of a 25 percent gluteraldehyde biocide for all plugs to be held for 24 hrs or longer.

TOXICITY AND HANDLING

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the Material Safety Data Sheet (MSDS).

The use of eye and respiration protection is recommended. It should be used in areas with sufficient ventilation to remove airborne particulates. Avoid breathing the vapors.

PACKAGING AND STORAGE

FORM-A-SET AK is packaged in 47-lb (21.3-kg) sacks. FORM-A-SET AK should be stored in a dry location.

FORM-A-SET RET is packaged in 5-gal (18.9-L) cans. Use in a well-ventilated area and avoid breathing vapors. Store in a dry, ventilated place.

FORM-A-SET ACC is packaged in 1-qt (0.946-L) containers. Use in a well-ventilated area and avoid breathing vapors. Store in a clean, dry location.

FORM-A-SET XL is packaged in a 50-lb (22.68-kg) container. Use in a well-ventilated area and avoid breathing vapors. Store in clean dry location.

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MI-10611 2M 12/99 Litho in U.S.A.

FORM-A-SET XL

FORM-A-SET XL crosslinker is the activator for the FORM-A-SET AK and FORM-A-SET AKX systems. When lost returns, high-pressure zones or unconsolidated zones have been encountered, the activator should be added to the FORM-A-SET slurry just prior to pumping. This permits the pill to be mixed ahead of time without the concern of premature activation. The FORM-A-SET XL crosslinker can then be added and the pill pumped immediately into the hole.*

Typical Physical Properties

Physical appearance........................ Dark, blue-green powder
Odor........................ Acetic acid
Bulk density........................23.7 to 24.9 lb/ft^3 (380 to 400 kg/m^3)

Applications

FORM-A-SET XL crosslinker should be added to the FORM-A-SET AK or AKX system after they have been blended, just before pumping downhole.

For unweighted slurries use 5 lb/bbl (14.3 kg/m^3); however, for weighted slurries the FORM-A-SET XL crosslinker must be in proportion to the volume of water used. Refer to the FORM-A-SET AK and FORM-A-SET AKX system bulletin for mixing charts. It is recommended to utilize the FASware software when formulating a FORM-A-SET pill to get the exact volume of FORM-A-SET XL required.

After adding FORM-A-SET XL crosslinker, mix for 5 min to assure that the material is thoroughly blended before pumping the pill into the hole.

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Advantages

- Allows the pre-mixed pill to be available when needed, thereby avoiding unnecessary delays when a loss zone is penetrated
- Is not required in FORM-A-SET systems
- Will activate and cross-link the FORM-A-SET AK and FORM-A-SET AKX pills

Limitations

- Specific formulation must be used when mixing weighted pill

Toxicity and Handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the Material Safety Data Sheet (MSDS).

Packaging and Storage

FORM-A-SET XL crosslinker is packaged in 50-lb (22.7-kg), multi-wall, paper sacks.

Store in a dry location away from sources of heat or ignition, and minimize dust.

M-I SWACO

MIS-10617 2/04

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FORM-A-PLUG RET

FORM-A-PLUG RET additive is a grade of soluble magnesium chloride formulated for delaying the cross-linking reaction of the FORM-A-PLUG II lost circulation pill to avoid premature setting during the mixing stage.*

Typical Physical Properties

Physical appearance..White powder/crystals
Specific gravity 1.57

Applications

FORM-A-PLUG RET agent is used in FORM-A-PLUG II pills to increase the set-up time of the lost circulation slurry. It should be added to the drill water before adding FORM-A-PLUG II and/or FORM-A-PLUG* ACC agent.

FORM-A-PLUG RET retarder will delay chemical reaction which forms a rigid cross-linked gel structure. It is therefore important to carefully control the product concentrations and mixing conditions in order to ensure that the reaction proceeds as expected. The formulation can be adjusted for density up to 2.16 sg (18 lb/gal) by adding barite or other appropriate weighting materials. Barite may also act as a retarder.

Recommended concentrations are 3.5 - 17.5 lb/bbl (10 - 50 kg/m^3) depending on the temperature and the desired setting time. Pilot testing is recommended before mixing to estimate the time to create a well-set plug.

MI SWACO

Customer-focused, solutions-driven

Advantages

- Delays cross-linking to avoid premature setting during mixing and displacement

Limitations

- Must be added to the drill water before the FORM-A-PLUG II additive

Toxicity and Handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the Material Safety Data Sheet (MSDS).

Packaging and Storage

FORM-A-PLUG RET additive is packaged in 50-lb (22.7-kg), multi-wall, paper sacks.

Store at moderate temperatures in dry, well ventilated area.

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United States Patent [19]

Sydansk

[11] Patent Number: 4,989,673

[45] Date of Patent: Feb. 5, 1991

[54] LOST CIRCULATION FLUID FOR OIL FIELD DRILLING OPERATIONS

[75] Inventor: Robert D. Sydansk, Littleton, Colo.

[73] Assignee: Marathon Oil Company, Findlay, Ohio

[21] Appl. No.: 380,565

[22] Filed: Jul. 14, 1989

[51] Int. Cl.[5] C09K 7/02; E21B 21/06; E21B 21/08; E21B 33/138

[52] U.S. Cl. 166/250; 166/294; 166/295; 175/48; 175/65; 175/72; 252/8.512; 252/8.514

[58] Field of Search 166/294, 295, 250; 175/48, 72, 65; 252/8.512, 8.51, 8.511, 8.514; 523/130

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[57] ABSTRACT

A flowing crosslinked polymer gel is employed as a lost circulation fluid in a process for reducing lost circulation during an oil field drilling operation. The lost circulation fluid comprises a carboxylate-containing polymer, a chromic carboxylate crosslinking agent, and an aqueous solvent.

18 Claims, No Drawings

LOST CIRCULATION FLUID FOR OIL FIELD DRILLING OPERATIONS

BACKGROUND OF THE INVENTION

1. Technical Field

The invention relates to a process for drilling into a subterranean hydrocarbon-bearing formation and more particularly to a process for minimizing lost circulation of a drilling fluid when drilling into a subterranean hydrocarbon-bearing formation.

2. Background Information

A drilling fluid is a fluid which is circulated from an earthen surface down through a drilled out wellbore to a drilling face and back to the surface when drilling into a subterranean formation which contains hydrocarbons. Drilling fluids are specifically designed to perform a number of functions, including cooling and lubricating the drill bit, removing drill cuttings from the wellbore, supporting the weight of the drill pipe and drill bit, providing a hydrostatic head to maintain the integrity of the wellbore walls, preventing significant flow of fluids across the wellbore face into the wellbore and vice versa.

The most common conventional drilling fluids known in the art are termed "drilling muds", which are dispersions of solid particles in a liquid. Examples of drilling muds are aqueous dispersions of clays (e.g. bentonite) and/or gypsum. Drilling muds also commonly contain one or more polymeric additives in an effort to control "lost circulation", which is the excessive flow of drilling fluids across the wellbore face out of the wellbore and into the formation. See, for example, U.S. Pat. Nos. 4,740,319 to Patel et al, 4,726,906 to Chen et al, 4,675,119 to Farrar et al and 4,282,928 to McDonald et al. Solutions containing materials, such as polymeric additives, which inhibit the flow of drilling fluids from the wellbore into the formation, are termed "lost circulation fluids".

The drilling art reflects an on-going evolution to develop lost circulation fluids which effectively control lost circulation under a broad range of operating conditions. Many lost circulation fluids known in the art are unsatisfactory because of operational limitations restricting their utility. For example, some lost circulation fluids are ineffective in the presence of high salt concentration brines. Others undergo thermal degradation when subjected to high operational temperatures. The most significant shortcoming is the lack of lost circulation fluids in the art, which effectively control lost circulation encountered when drilling through voids occurring in the formation.

Thus, a need exists for a lost circulation fluid which effectively prevents or reduces lost circulation of drilling fluid under the broadest range of operating conditions encountered. Specifically, a need exists for a lost circulation fluid which not only minimizes lost circulation into competent formation rock, but which has sufficient strength and integrity to minimize lost circulation into voids in direct communication with the wellbore, such as fractures and fracture networks.

SUMMARY OF THE INVENTION

The present invention provides a process for preventing or reducing lost circulation when drilling by conventional methods into a subterranean hydrocarbon-bearing formation. The process employs a continuous, flowing, crosslinked, polymer gel, as a lost circulation fluid. Lost circulation is undesirable from an economic standpoint because it requires one to continually replenish the wellbore with costly drilling fluid. Lost circulation is also undesirable from an operational and safety standpoint because it can damage the pay zone and in extreme cases it can result in a blowout of the hydrocarbon zone followed by a well fire.

A gel is employed in the present invention according to several embodiments. In one embodiment the gel is placed in the wellbore at the outset of the drilling operation as a single wellbore fluid performing the dual role of a drilling fluid and a lost circulation fluid. Alternatively, the gel is placed in the wellbore as an additive of a conventional drilling fluid also present in the wellbore. The gel functions in the single role of a lost circulation fluid. Finally, the gel can function in a remedial role by placing it in the wellbore only after lost circulation has been detected.

The utility of the present process is attributable to the specific composition of the gel used as lost circulation fluid. The polymer gel composition comprises a carboxylate-containing polymer, a chromic carboxylate complex crosslinking agent and an aqueous solvent. The gel constituents are premixed at the surface and crosslinked to form a continuous flowing gel, which effectively inhibits the flow of drilling fluid into the formation when placed in a wellbore during a drilling operation. The gel is nondamaging to the formation and is reversible if any residual gel undesirably accumulates near the wellbore face.

The gel employed in the present invention has utility over a broad range of operating conditions. The gel is effective in the presence of high salt concentration brines and is resistant to thermal degradation at temperatures generally encountered during drilling operations. Furthermore, the gel can be formulated over a very broad range of onset times, rheologies, strengths, and viscosities. Nevertheless, the gel is relatively insensitive to minor variations in conditions under which it is formulated. Thus, the gel is readily suited for on-site preparation in the field where process controls are often imprecise, such as remote hostile onshore and offshore locations.

In addition to the above recited operational advantages, the gel employed in the present invention can offer practical advantages over lost circulation fluids known in the art. The present process is cost effective because the gel components are readily available and relatively inexpensive. The gel can be applied with conventional oil field equipment. Finally, the gel composition is relatively nontoxic in the environment and safe to handle.

Gels similar to those used in the process of the present invention have known utility in conformance improvement treatment (CIT) processes as shown in U.S. Pat. Nos. 4,683,949 and 4,744,499 to Sydansk et al, which are incorporated herein by reference. However, the performance requirements of lost circulation gels are different from those of CIT gels. The composition and resulting properties of the lost circulation fluid must be specific to the performance requirements of the drilling operation. The present invention fills a need in the art for a process, which utilizes a polymer gel composition to control lost circulation when drilling hydrocarbon-related wellbores under a broad range of conditions.

DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention is a process to minimize lost circulation when conducting drilling operations in accordance with methods known to those skilled in the art. One initiates the process of the present invention either as a lost circulation preventative or as a remedy when lost circulation has already occurred. Lost circulation is indicated by the entry of drilling fluids into a newly drilled formation, a significantly reduced volume of drilling fluids returning to the surface, or an inability to maintain a column of drilling fluid in the wellbore.

The process is initiated by formulating a crosslinked polymer gel composition at the surface for placement in the wellbore being drilled. The term "crosslinked polymer gel" as used herein is directed to a continuous three-dimensional crosslinked polymeric network having a high molecular weight. The gel contains a liquid medium such as water which is contained within the solid polymeric network. The fusion of a liquid and a solid component into a single-phase system provides the gel with a unique phase behavior.

The gel composition used in the present process comprises a polymer, a crosslinking agent and an aqueous solvent. The polymer is a carboxylate-containing polymer which is a crosslinkable water-soluble polymer having one or more carboxylate groups or, alternatively, having one or more groups capable of being hydrolyzed to carboxylate groups (e.g., amide groups). The carboxylate-containing polymer satisfying these criteria may be either a synthetic polymer or a biopolymer. The average molecular weight of the polymer is in the range of about 10,000 to about 50,000,000, preferably about 100,000 to about 20,000,000 and most preferably about 200,000 to about 15,000,000.

The preferred polymer of the present invention is an acrylamide polymer, which is defined herein as a crosslinkable, water-soluble, synthetic polymer containing one or more acrylamide groups. Useful acrylamide polymers include polyacrylamide, partially hydrolyzed polyacrylamide and terpolymers containing acrylamide, acrylate, and a third species. As defined herein, polyacrylamide (PA) is an acrylamide polymer having substantially less than 1% of the acrylamide groups in a carboxylate form. Partially hydrolyzed polyacrylamide (PHPA) is an acrylamide polymer having at least 1%, but not 100%, of the acrylamide groups in a carboxylate form. The acrylamide polymer may be prepared according to any conventional method known in the art, but preferably has the specific properties of an acrylamide polymer prepared according to the method disclosed by U.S. Pat. No. Re. 32,114 to Argabright et al incorporated herein by reference.

The crosslinking agent of the present invention is a chromic carboxylate complex. The term "complex" is defined herein as an ion or molecule containing two or more interassociated ionic, radical or molecular species. A complex ion as a whole has a distinct electrical charge while a complex molecule is electrically neutral. The term "chromic carboxylate complex" encompasses a single complex, mixtures of complexes containing the same carboxylate species, and mixtures of complexes containing differing carboxylate species.

The complex of the present invention includes at least one or more electropositive chromium III species and one or more electronegative carboxylate species. The complex may advantageously also contain one or more electronegative hydroxide and/or oxygen species. It is believed that, when two or more chromium III species are present in the complex, the oxygen or hydroxide species may help to bridge the chromium III species. Each complex optionally contains additional species which are not essential to the polymer crosslinking function of the complex. For example, inorganic mono- and/or divalent ions, which function merely to balance the electrical charge of the complex, or one or more water molecules may be associated with each complex. Representative formulae of such complexes include:

$[Cr_3(CH_3CO_2)_6(OH)_2]^{1+}$;

$[Cr_3(OH)_2(CH_3CO_2)_6]NO_3 \cdot 6H_2O$;

$[Cr_3(H_2O)_2(CH_3CO_2)_6]^{3+}$;

$[Cr_3(H_2O)_2(CH_3CO_2)_6](CH_3CO_2)_3 \cdot H_2O$;

etc.

"Trivalent chromium" and "chromic ion" are equivalent terms encompassed by the term "chromium III" species as used herein.

The carboxylate species are advantageously derived from water-soluble salts of carboxylic acids, especially low molecular weight mono-basic acids. Carboxylate species derived from salts of formic, acetic, propionic, and lactic acid, substituted derivatives thereof and mixtures thereof are especially preferred. The carboxylate species include the following water-soluble species: formate, acetate, propionate, lactate, substituted derivatives thereof, and mixtures thereof. Examples of optional inorganic ions include sodium, sulfate, nitrate and chloride ions.

A host of complexes of the type described above and their method of preparation are well known in the leather tanning art. These complexes are described in Shuttleworth and Russel, *Journal of the Society of Leather Trades' Chemists*, "The Kinetics of Chrome Tannage Part I.," United Kingdom, 1965, v. 49, p. 133–154; "Part III.," United Kingdom, 1965, v. 49, p. 251–260; "Part IV.," United Kingdom, 1965, v. 49, p. 261–268; and Von Erdman, *Das Leder*, "Condensation of Mononuclear Chromium (III) Salts to Polynuclear Compounds," Eduard Roether Verlag, Darmstadt Germany, 1963, v. 14, p. 249; and incorporated herein by reference. Udy, Marvin J., *Chromium, Volume 1: Chemistry of Chromium and its Compounds*, Reinhold Publishing Corp., N.Y., 1956, pp. 229–233; and Cotton and Wilkinson, Advanced Inorganic Chemistry 3rd Ed., John Wiley and Sons, Inc., N.Y., 1972, pp. 836–839, further describe typical complexes which may be within the scope of the present invention and are incorporated herein by reference. The present invention is not limited to the specific complexes and mixtures thereof described in the references, but may include others satisfying the above-stated definition.

Salts of chromium and an inorganic monovalent cation, e.g., $CrCl_3$, may also be combined with the crosslinking agent complex to accelerate gelation of the polymer solution, as described in U.S. Pat. No. 4,723,605, which is incorporated herein by reference.

The gel is formed by admixing the polymer, the crosslinking agent and aqueous solvent at the surface. Surface admixing broadly encompasses inter alia mixing the gel components in bulk at the surface prior to injection or simultaneously mixing the components at or near the wellhead by in-line mixing means while injecting them.

Admixing is accomplished, for example, by dissolving the starting materials for the crosslinking agent in an appropriate aqueous solvent. Exemplary starting materials include solid $CrAc_3 \cdot H_2O$, solid $Cr_3Ac_7(OH)_2$, or a solution labeled "Chromic Acetate 50% Solution" commercially available, for example, from McGean-Rohco Chemical Co., Inc., 1250 Terminal Tower, Cleveland, Ohio 44113, U.S.A. The crosslinking agent solution is then mixed with an aqueous polymer solution to produce the gel. Among other alternatives, the starting materials for the crosslinking agent can be dissolved directly in the aqueous polymer solution to form the gel in a single step.

The present process enables the practitioner to customize or tailor-make a gel having a predetermined gelation rate and predetermined gel properties of strength and thermal stability from the above-described composition. The gelation rate is defined as the degree of gel formation as a function of time or, synonymously, the rate of crosslinking in the gel. The degree of crosslinking may be quantified in terms of several variables including gel viscosity, strength and plugging efficiency. Plugging efficiency is defined as the normalized reduction in flow rate through a narrow constriction or porous media exhibited by a crosslinked polymer gel relative to a non-gel fluid such as an uncrosslinked polymer solution having the same polymer concentration as the gel. Gel strength of a flowing gel is defined as the resistance of the gel to filtration or flow. Thermal stability is the ability of a gel to withstand temperature extremes without degradation.

Tailor-making or customizing a gel in the manner of the present invention to meet the performance requirements of a particular drilling operation is provided in part by correlating the independent gelation parameters with the dependent variable of gelation rate and resultant gel strength and stability. The independent gelation parameters are the surface and in situ gelation conditions including: temperature, pH, ionic strength and specific electrolytic makeup of the aqueous solvent, polymer concentration, ratio of the weight of polymer to the combined weight of chromium III and carboxylate species in the mixture, degree of polymer hydrolysis, and average molecular weight of the polymer.

The operable ranges of the gelation parameters are correlated with the dependent variables of gelation rate and resultant gel properties by means including qualitative bottle testing, quantitative viscosimetric analysis, filtration tests and core flooding experiments. The operable ranges of a number of gelation parameters and their correlation with the dependent variable are described below.

The lower temperature limit of the gel at the surface is its freezing point and the upper limit is essentially the thermal stability limit of the polymer. The gel is generally maintained at ambient temperature or higher at the surface. The temperature may be adjusted by heating or cooling the aqueous solvent. Increasing the temperature within the prescribed range increases the gelation rate.

The initial pH of the gel is within a range of about 3 to 13 and preferably about 6 to 13. Although gelation can occur at an acidic pH, lowering the initial pH below 7 does not favor gelation. The initial pH is most preferably alkaline, i.e., greater than 7 to about 13. When the polymer is PHPA, increasing the pH within the prescribed range increases the rate of gelation.

The polymer concentration in the gel is about 500 ppm up to the solubility limit of the polymer in the solvent or the rheological constraints of the polymer solution, preferably about 750 to about 200,000 ppm, and most preferably about 1000 to about 50,000 ppm. Increasing the polymer concentration increases the gelation rate and ultimate gel strength at a constant ratio of polymer to crosslinking agent.

The ionic strength of the aqueous solvent can be from that of deionized distilled water to that of a brine having an ion concentration approaching the solubility limit of the brine. Generally, fresh water has a total dissolved solids concentration below 500 ppm and a produced brine has total dissolved solids concentration above 500 ppm. Thus, fresh water and produced brines fall within the useful range of the present invention. Increasing the ionic strength of the solution can increase the gelation rate.

The weight ratio of polymer to chromium III and carboxylate species comprising the mixture is about 1:1 to about 500:1, preferably about 2.5:1 to about 100:1, and most preferably about 5:1 to about 40:1. Decreasing the ratio generally increases the gelation rate and up to a certain point generally increases the gel strength, especially at a constant high polymer concentration.

The degree of hydrolysis for an acrylamide polymer is about 0 to 60% and preferably about 0 to 30%. Within the preferred range, increasing the degree of hydrolysis in most cases increases the gelation rate. Increasing the molecular weight of the polymer increases the gel strength.

It is apparent from these correlations that one can produce gels across a very broad range of gelation rates and gel properties as a function of the gelation conditions. Thus, to produce an optimum gel according to the present process, the practitioner predetermines the gelation rate and properties of the resultant gel which meet the performance requirements of a given situation and thereafter produces a gel having these predetermined characteristics. The performance requirements include in situ conditions such as temperature, drilling operating parameters, and formation geology. Analytical methods known to one skilled in the art are used to determine the performance requirements.

Generally, the gel is required to have sufficient strength to substantially eliminate or reduce lost circulation of a drilling fluid when an appropriate amount of the gel is placed in the wellbore. By "reducing lost circulation", it is meant that the degree of lost circulation experienced when using the gel is less than the degree of lost circulation experienced when a conventional drilling fluid is used in the absence of the gel. The gels of the present invention satisfying these criteria typically have a dynamic oscillatory viscosity at 0.1 radians per second between about 5×10^2 and about 10^9 cp and preferably between about 5×10^3 and about 4×10^7 cp. The strength of the gel can be enhanced by the suspension of inert solids in the gel, including inert insoluble inorganic solids such as sand and fiberglass or inert insoluble organic solids such as cellulosic and plastic fibers.

The amount of gel employed in the present process is dependent on the geological properties of the formation as well as the drilling operating conditions. Where large voids are encountered during drilling which are in communication with the wellbore, large volumes of gel may be required to fill the voids and plug the wellbore face. In such cases, gel volumes on the order of 500 barrels or more can be necessary to practice the process of the present invention. However, if no large voids are encountered during drilling, one generally only requires a volume of gel approximately equal to the volume of the drilled out bore hole to practice the invention.

It is believed the gel functions as a lost circulation fluid by coating and plugging the wellbore face to prevent flow of fluids across the face. Substantially all of the permeability reduction caused by the gel in the formation occurs immediately adjacent the wellbore face, i.e., within about 1 centimeter of the wellbore face. The gel does not significantly penetrate the formation matrix beyond this distance. As a result, the gel is non-damaging to the formation in the sense that it does not substantially inhibit subsequent recovery of hydrocarbon fluids from the formation or injection of fluids into the formation.

As used herein, the term "wellbore face" is meant to include not only the face of the drilled out bore hole, but the face of any void spaces in direct communication with the drilled out bore hole, including the face of fractures, fracture networks, caverns, and other voids. These voids may extend far out into the formation away from the bore hole, but are distinguished from the formation matrix by having a permeability substantially equal to that of the bore hole while the permeability of the matrix is much lower than either.

The present invention can be practiced according to a number of different embodiments. In one embodiment of the invention, the gel is placed in the wellbore at the outset of a conventional drilling operation. The gel is circulated through the drilled out bore hole during the drilling operation to perform as both a drilling fluid and a lost circulation preventative.

In another embodiment, the gel is a lost circulation fluid additive to a conventional drilling fluid which is most typically a drilling mud. The term "drilling mud" as used herein is any drilling mud known in the art which does not contain the gel used in the present process. The gel is added to the drilling mud in a manner which uniformly mixes the two without substantially physically degrading the gel. The drilling operation is carried out with the drilling mud performing in a conventional manner while the gel acts as a preventative for lost circulation. In this case the gel may also beneficially enhance the rheological properties of the drilling mud.

In yet another embodiment of the present invention, the gel is employed in a remedial role. When lost circulation is detected during a drilling operation using a conventional drilling fluid, the gel is substituted for the entire volume of drilling fluid, either while continuing the drilling operation or suspending drilling in the wellbore. If drilling has not been suspended during placement of the gel in the wellbore, drilling is continued with the gel functioning as both a drilling fluid and a lost circulation fluid. If drilling has been suspended, drilling can be resumed after placement of the gel in the wellbore, while utilizing the gel as both a drilling fluid and a lost circulation fluid or by utilizing the gel as a lost circulation fluid and placing additional conventional drilling fluid in the wellbore to act as a drilling fluid.

In all of the embodiments of the present invention described above, the lost circulation fluid can be injected into the wellbore as a completely gelled composition or, alternatively, as a partially gelled composition. If the fluid is injected as a partial gel, complete gelation subsequently occurs in situ. Injection of partial gels offers the feature of increasing gel viscosity in situ over time which may be advantageous in some instances.

A "partial gel" as referred to herein is at least somewhat crosslinked, but is capable of further crosslinking to completion resulting in the desired gel without the addition of more crosslinking agent. Partial gels have a viscosity and/or plugging efficiency greater than an uncrosslinked polymer solution. "Complete gelation" means that the gel composition is incapable of further crosslinking because one or both of the required reactants in the initial solution are consumed. Further crosslinking is only possible if either polymer, crosslinking agent, or both are added to the gel composition.

In any case, all gels employed in the process of the present invention are reversible. Thus, if it is desired to enhance the removal of residual gel from the wellbore after the drilling operation, this can be accomplished by reversing the gel with a conventional breaker, such as peroxides, hypochlorites or persulfates. The breaker can be incorporated into the initial gel composition at the surface to break the gel over time or the breaker can be placed in the wellbore separately to and reverse the gel on contact at the desired time.

The following examples demonstrate the practice and utility of the present invention, but are not to be construed as limiting the scope thereof

The following table is useful in interpreting the qualitative data set forth in the examples below.

GEL STRENGTH CODE

Code

A. No detectable gel formed: the gel appears to have the same viscosity as the original polymer solution and no gel is visually detectable.

B. Highly flowing gel: the gel appears to be only slightly more viscous than the initial polymer solution.

C. Flowing gel: most of the detectable gel flows to the bottle cap upon inversion.

D. Moderately flowing gel: only a small portion (about 5 to 15%) of the gel does not readily flow to the bottle cap upon inversion; this gel is characterized as a "tonguing" gel.

E. Barely flowing gel: the gel can barely flow to the bottle cap or a significant portion (>15%) of the gel does not flow upon inversion.

The polymer solutions of the following examples are prepared by diluting an aqueous acrylamide polymer solution with an aqueous solvent and combining the diluted polymer solution with a crosslinking agent solution in a 0.12 liter wide mouth bottle to form a 0.05 liter sample. The sample is gelled in the capped bottle and the qualitative gel strength is determined by periodically inverting the bottle.

Where quantitative viscosity data are obtained, the gel is placed in a variable pressure and temperature rheometer (viscometer), having an oscillatory mode of 0.1 rad/sec and 100% strain. The apparent viscosity at a shear rate of 0.1 sec^{-1} is recorded as function of time.

In all of the examples, the acrylamide polymer is partially hydrolyzed polyacrylamide (PHPA), which is 30% hydrolyzed. The crosslinking agent solution is a complex or mixture of complexes comprising chromium III and acetate ions prepared by dissolving solid $CrAc_3 \cdot H_2O$ or $Cr_3Ac_7(OH)_2$ in water or diluting a solution obtained commercially under the label of "Chromic Acetate 50% Solution". The aqueous solvent is Denver, Colorado U.S.A. tap water unless stated otherwise.

EXAMPLE 1

The PHPA has a molecular weight of 11,000,000 and the aqueous solvent is an NaCl brine having a concentration of 5,000 ppm. The pH of the gelation solution is 8.6, the temperature is 22° C. and the ratio of PHPA to chromium III is 44:1. The data table below shows that the gel strength can be varied by varying the polymer concentration in the gelation solution while holding the ratio of polymer to crosslinking agent constant.

TABLE 1

	Run No.			
	1	2	3	4
	ppm PHPA			
	5,000	3,000	2,000	1,500
	ppm Cr^{III}			
	114	68	45	34
Time (hr)	Gel Code			
1.0	A	A	A	A
2.0	B	A	A	A
3.0	B	A	A	A
4.0	B	A	A	A
5.0	C	B	A	A
6.0	C	B	A	A
24	C	B	B	A
48	C	B	B	A
72	C	B	B	A
96	D	B	B	A
168	E	B	B	A
300	E	B	B	A
600	E	B	B	A
1200	E	C	B	A
2400	E	C	B	A

EXAMPLE 2

The PHPA has a molecular weight of 5,000,000 and has a concentration of 8400 ppm in the gelation solution. The aqueous solvent is an NaCl brine having a concentration of 5000 ppm. The pH of the gelation solution is 12.5, the temperature is 22° C., and the ratio of PHPA to chromium III is 40:1. The data table below shows that a utilitarian gel can be produced even at a relatively high pH.

TABLE 2

Time (hr)	Gel Code
0.5	A
1.0	A
1.5	A
2.0	A
2.5	B
4.0	B
5.0	B
6.0	B
7.0	B
8.0	B
24	B
28	C
48	C
80	C
168	C
600	D
2040	D

EXAMPLE 3

A series of gels are prepared under the same conditions as Example 2, but at a neutral pH of 7. Common oil field salts are added to the gelation solutions during formulation. The data table below shows that gels can be formed which are relatively insensitive to a number of common oil field salts.

TABLE 3

	Run No.		
	1	2	3
	Salt		
	none (control)	$NaNO_3$	$MgCl_2$
	ppm Salt		
	—	2000	2000
Time (hr)	Gel Code		
1.0	A	A	A
4.0	A	A	A
5.0	B	B	B
6.0	B	B	B
7.0	B	B	B
8.0	C	C	C
24	C	C	C
72	D	D	D
120	E	E	E
264	E	E	E
288	E	E	E
408	E	E	E

EXAMPLE 4

The PHPA has a molecular weight of 11,000,000. The ratio of polymer to crosslinking agent is 66:1. The aqueous solvent is a synthetic oil field brine at a pH of 7.5 and a temperature of 22° C. The composition of the synthetic brine is set forth below. The data table below shows that utilitarian gels can be formed in oil field brines.

TABLE 4

	Run No.	
	1	2
	ppm PHPA	
	3,000	5,000
	ppm Cr^{III}	
	45	76
Time (hr)	Gel Code	
0.25	A	A
0.5	A	A
4.0	A	A
5.0	A	A
6.0	A	B
7.0	A	C
24	B	D
96	C	D
150	D	D
197	D	D
936	D	D

Synthetic Brine Composition

	g/l
Na_2CO_3	0.249
NH_4Cl	0.086
$CaCl_2$	0.821
$MgCl_2 \cdot 6H_2O$	1.78
Na_2SO_4	1.09
NaCl	6.89

EXAMPLE 5

The PHPA has a molecular weight of 5,000,000 and the aqueous solvent is an oil field brine having an H_2S concentration greater than 100 ppm and a total dissolved solids concentration of 0.33% by weight. The composition of the solvent is shown below. The pH of the gelation solution is 8.5 and the temperature is 60° C. The data table below shows that utilitarian gels can be formed in the presence of H_2S and at an elevated temperature.

TABLE 5

	Run No.		
	1	2	3
	ppm PHPA		
	3000	4000	5000
	ppm Cr^{III}		
	55	73	65
	Weight Ratio/PHPA:Cr		
	55	55	77
Time (hr)	Gel Code		
0.5	A	A	A
1.0	A	A	A
1.5	A	B	C
2.0	B	C	D
3.0	C	D	D
4.0	D	D	D
5.0	D	D	E
7.0	D	E	E
12	D	E	E
27	D	E	E
75	D	E	E
173	D	E	E
269	D	E	E
605	D	E	E

Synthetic Brine Composition

	ppm
Na^+	252
Mg^{2+}	97
Ca^{2+}	501
Cl^-	237
SO_4^{2-}	1500
HCO_3^-	325

EXAMPLE 6

The PHPA has a molecular weight of 5,000,000 and the aqueous solvent is an NaCl brine having a concentration of 3,000 ppm. The concentration of PHPA in the gelation solution is 5,000 ppm and the ratio of PHPA to chromium III is 32:1. The pH of the solution is 10.2 and the temperature is 22° C.

Three experiments are conducted to determine the effects of shear on the gel. The gel of Run 1 is aged without agitation. The gel of Run 2 is stirred for five minutes at 1750 rpm with a 4cm propeller in a 6cm ID capped bottle after one hour of aging. The gel of Run 3 is forced through a 10cm long nylon tube with a 0.16 cm ID at a rate of 100 cm^3 in 7.2 sec. and at a pressure drop of 410 kPa (a shear rate of about 50,000 sec^{-1}) after one hour of aging. The data table below shows that the gels maintain their integrity even after undergoing shear during gelation.

TABLE 6

	Run No.		
	1	2	3
Time (hr)	Gel Code		
1.0	A	A	A
1.5	B	B	B
4.0	D	D	D
17	E	E	E
24	E	E	E
96	E	E	E
	Apparent Viscosity at 50 sec^{-1}		
96	1400	2000	2300

EXAMPLE 7

Two gel samples are prepared from PHPA having a molecular weight of 5,000,000 in the aqueous solvent of Example 5. The gel of the first sample is crosslinked with a chromium VI redox crosslinking system. The ratio of PHPA to crosslinker is optimized for each gel system.

The thixotropic loops are steady shear experiments performed at 22° C. on a Rheometric Pressure Rheometer. The data table below shows that the gel of the present invention has a much greater ability to withstand shear than a comparable gel prepared with a different crosslinking agent system.

TABLE 7

	Run No.	
	1	2
	Crosslinker	
	Cr^{III}	Cr^{VI} Redox
	ppm PHPA	
	2500	3000
	PHPA:Crosslinker	
	12.5	30
Shear Rate (sec^{-1})	Viscosity (cp)	
5	5300	1800
10	3800	1400
20	1900	800
40	1200	500
60	900	400
80	800	300
100	600	200
80	800	200
60	900	200
40	1000	200
20	1400	200
10	2000	200
5	3100	200

EXAMPLE 8

The PHPA has a molecular weight of 5,000,000 and the aqueous solvent is an NaCl brine having a concentration of 3,000 ppm. The concentration of PHPA in the gelation solution is 5,000 ppm, the pH of the gelation solution is 10.2, the temperature is 105° F. and the ratio of PHPA to chromium III is 32:1. The gelation solution is aged for one hour after mixing at which time no gel is visually detected by bottle testing. 50 cm^3 of gel sample is placed in a Millipore filter holder. A pressure of 50 psi is applied to the gel in an effort to drive the gel through an 8 micron cellulose-acetate Millipore filter having a 47 mm diameter. Only 0.8 cm^3 of gelation solution passes through the filter after 10 minutes of applied pressure. An entire 50 cm^3 of polymer solution without crosslinking agent passes through the filter in 2.6 minutes under identical experimental conditions.

The results show that the gelation solution is sufficiently crosslinked after only one hour of aging to render it essentially unfilterable. Likewise a gelation solution that cannot pass through an 8 micron filter would not be expected to significantly permeate competent formation matrix rock having a permeability less than 1000 md. Nevertheless, bottle testing indicates that the gelation solution remains highly fluid for use as a drilling fluid.

EXAMPLE 9

A mature gel is prepared by crosslinking PHPA with a chromic acetate complex. The PHPA has a molecular weight of 11,000,000 and is diluted to a concentration of 5000 ppm in a synthetic injection water. About 0.5 l of the gel is injected for 14 hours across the face of a 35 md Midcontinent Field carbonate core plug while a 42 psi differential pressure is applied to the length of the plug. The core plug is 2.7 cm long and has a diameter of 2.5

cm. A clear filtrate having essentially the viscosity of water is produced from the core plug.

After gel injection, the core plug is flooded for two days with about 8 pore volumes of brine until the permeability of the core plug stabilizes at 4.1 microdarcies ($k_{final}/k_{initial}=0$ 00012). Thereafter, the first 4 mm of core material from the injection face are cut away from the core. The permeability of the remaining plug slightly exceeds the initial permeability of the plug (35 md).

The results indicate that permeability reduction is confined to the core material in the first 4 mm from the injection face. Thus, the gel does not substantially invade formation rock and does not cause permeability reduction in the matrix a significant distance from the wellbore face.

While the foregoing preferred embodiments of the invention have been described and shown, it is understood that the alternatives and modifications, such as those suggested and others, may be made thereto and fall within the scope of the invention.

I claim:

1. A process for preventing significant lost circulation while drilling a wellbore in a hydrocarbon-bearing formation having a formation matrix below an earthen surface, the process comprising:

admixing components of a continuous flowing gel at the surface comprising a water-soluble carboxylate-containing polymer, a complex capable of crosslinking said polymer and formed of at least one electropositive chromium III species and at least one electronegative carboxylate species, and an aqueous solvent for said polymer and said complex; and

circulating said gel through said wellbore while said wellbore is being drilled to prevent significant lost circulation.

2. The process of claim **1** wherein said complex is additionally formed of at least one species selected from the group consisting of electronegative oxygen species, electronegative hydroxide species, inorganic monovalent ions, inorganic divalent ions, water molecules and mixtures thereof.

3. The process of claim **1** wherein said gel is circulated through said wellbore in a mixture with a drilling mud.

4. The process of claim **1** wherein said aqueous solvent is a produced brine.

5. The process of claim wherein said carboxylate-containing polymer is an acrylamide polymer.

6. The process of claim **1** wherein said carboxylate-containing polymer is selected from the group consisting of polyacrylamide and partially hydrolyzed polyacrylamide.

7. The process of claim **1** wherein said gel does not substantially penetrate said formation matrix.

8. A process for preventing significant lost circulation while drilling a wellbore in a hydrocarbon-bearing formation having a formation matrix below an earthen surface, the process consisting essentially of:

admixing component of a continuous flowing gel at the surface comprising a water-soluble acrylamide polymer, a chromic-carboxylate complex crosslinking agent capable of crosslinking said acrylamide polymer, and an aqueous solvent; and

circulating said gel through said wellbore while said wellbore is being drilled without significant lost circulation of said gel from said wellbore.

9. A process for substantially reducing lost circulation of a drilling mud when drilling a wellbore in a formation having a formation matrix below an earthen surface, the process comprising:

monitoring the circulation of said drilling mud while drilling said wellbore in said formation,

placing a continuous flowing gel having an initial pH of about to about 13 and comprising a water soluble carboxylate-containing polymer, a complex capable of crosslinking said polymer and formed of at least one electropositive chromium III species and at least one electronegative carboxylate species, and an aqueous solvent for said polymer and said complex, all mixed at the surface, in said wellbore when lost circulation of said drilling mud is detected, wherein placement of said gel substantially reduces lost circulation of said drilling mud.

10. The process of claim **9** further comprising interrupting drilling of said wellbore when lost circulation is detected and prior to placement of said gel in said wellbore.

11. The process of claim **10** further comprising resuming drilling of said wellbore after placement of said gel in said wellbore.

12. The process of claim **10** further comprising:

injecting said drilling mud into said wellbore after placement of said gel in said wellbore; and

resuming drilling of said wellbore.

13. The process of claim **10** wherein said gel has an initial pH of about 6 to about 13.

14. The process of claim **13** wherein said gel has an initial pH greater than 7 to about 13.

15. The process of claim **9** wherein said complex is additionally formed of at least one species selected from the group consisting of electronegative oxygen species, electronegative hydroxide species, inorganic monovalent ions, inorganic divalent ions, water molecules and mixtures thereof.

16. The process of claim **9** wherein said aqueous solvent is a produced brine.

17. The process of claim **9** wherein said carboxylate-containing polymer is an acrylamide polymer.

18. The process of claim **9** wherein said carboxylate-containing polymer is selected from the group consisting of polyacrylamide and partially hydrolyzed polyacrylamide.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,989,673

DATED : February 5, 1991

INVENTOR(S) : Robert D. Sydansk

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 13, line 49: After "claim", insert --1--.
Col. 14, line 18: After the first occurrence of "about", insert --3--.

Signed and Sealed this

Seventh Day of July, 1992

Attest:

DOUGLAS B. COMER

Attesting Officer *Acting Commissioner of Patents and Trademarks*

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[redacted]

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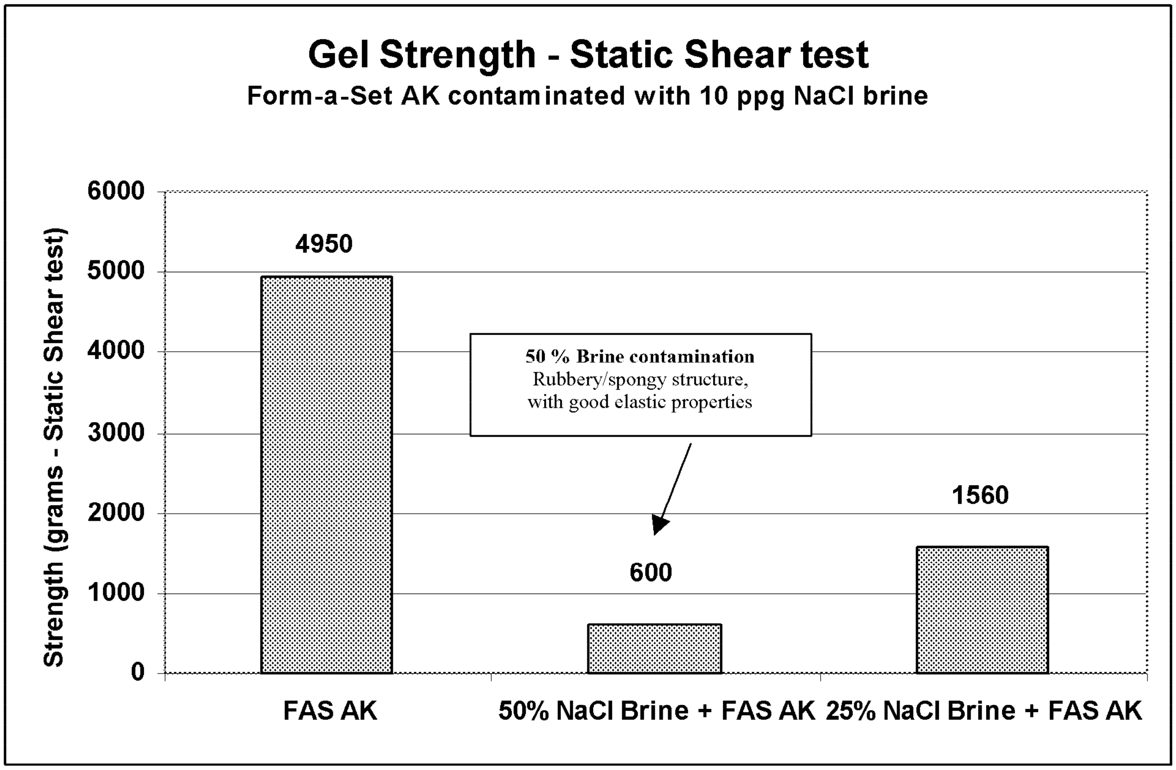
[redacted]



F. High viscosity water-based Spacer contamination test

In order to evaluate the **Spacer/FAS AK contamination** the high viscosity/XCD-based spacer (2 ppb XCD) was mixed. The results are as follows:

- **50% Spacer + FAS AK** - The Static Shear test indicated 400 grams and with a real rubbery/elastic structure. It was like a loose gel, but with well defined elastic properties. The test was done after four hours aging at 93 deg C.

- **25% Spacer + FAS AK** - 1,600 grams for the Static Shear test and well set/rubbery structure.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

SYNTHETIC-BASED MUD REPORT No. 74

Operator :	**BP Exploration**	**Field/Area :**	MC 252 #1	**Depth/TVD :**	18360 ft / 18349 ft
Report For :	R.Sepulvado/V.Price/M.Sepulvad	**Description :**	OCS-G 32306	**Date :**	4/14/2010
Well Name :	MACONDO	**Location :**	MC 252 #1	**Spud Date :**	
Contractor:	Transocean	**Water Depth :**	4992 ft	**Mud Type :**	Rheliant
Report For :	J.Harrel	**Rig Name :**	Horizon	**Activity :**	SIDEWALL CORES

DRILLING ASSEMBLY	CASING (*TVD)
ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)
ft, -in	18.-in L @8969 ft (8969 TVD)
ft, -in	16.-in @11585 ft (11585 TVD)
ft, -in	13.625-in L @13145 ft (13134 TVD)
ft, -in	11.875-in L @15113 ft (15103 TVD)
ft, -in	9.875-in L @17173 ft (17162 TVD)
Nozzles 0 1/32"	
Bit 8.5-in 0	

MUD VOLUME (bbl)	
Hole	Active Pits
3888	1137
Total Circulating Volume	
1137	
Depth Drilled Last 24hr	
ft	
Volume Drilled Last 24hr	
bbl	

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate	gal/min	
Pump Pressure	psi	
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 23:00	Active 8:00	Active 8:00	Active 8:00
FlowLine Temp	°F	NA	NA	NA	NA
Depth/TVD	ft	18360/18349	18360/18349	18360/18349	18360/18349
Mud Weight	lb/gal	14.0@80	14.0@80	14.0@80	14.0@80
Funnel Viscosity	s/qt	90	90	90	90
Rheology Temp	°F	150	150	100	40
R600/R300		62/37	62/37	96/56	185/105
R200/R100		26/19	27/18	41/27	75/44
R6/R3		9/7	8/7	8/7	10/9
PV	cP	25	25	40	80
YP	lb/100ft²	12	12	16	25
10s/10m/30m Gel	lb/100ft²	12/23/27	13/23/27	13/25/26	13/25/33
API Fluid Loss	cc/30min	--	--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	--/1	--/1	/	/
Unc Ret Solids	%Vol	27.5	27.5		
Correct Solids	%Vol	27.5	26.56		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20	20		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		1.3	1.3		
Cl- Whole Mud	mg/L	26000	26000		
Salt	%Wt	16.91	16.91		
Lime	lb/bbl	1.69	1.69		
Emul Stability		324	321		
Current Angle	degrees				
MWD Tool Temp	deg F				
PWD ECD	ppg				
Riser Boost	gpm				
LC50/Lepto	Y/N				
Calib Scales	Y/N	Yes	Yes		
SST	ppb	20	20		
PPT	spurt/ml	.5/4.5	.5/4.5		
Reserve Volume	bbl	6483			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	2
NAFROC COMPLIANCE EN	1. EA	1
CLEAN-UP	1. GA	1650

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS		Actual
Weight	14	14.0
Viscosity	80-110	90
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 60 Cumulative Man Hours: 4264 Start Cards: 1 Cumulative Start Cards: 94 Max bbls discharged per hour: 0 bbls VSST: .32 Pumped columns to the boat.

REMARKS

Problems with side wall cores--ran VSP log. Attempt more sidewall cores.

TIME DISTRIBUTION Last 24 hrs	
Rig Up/Service	
Drilling	
Tripping	
Non-Productive Tim	
Wireline Logs	24
Condition Hole	
Wash down	

MUD VOL ACCTG (bbl)	
Synthetic Added	
Water Added	
Mud Received	
Mud Returned	
Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Tripping	
Boat Tank Bottoms	

SOLIDS ANALYSIS	
Salt Wt%	16.91
Salt Conc	14.25
Adjusted Solids	26.56
Synthetic/Water Ratio	72/28
Average SG Solids	3.9
Low Gravity %	5.6
Low Gravity Wt.	51.21
High Gravity %	20.9
High Gravity Wt.	307.48

RHEOLOGY & HYDRAULICS	
np/na	
Kp/Ka	
Bit Pressure Loss/%	
Bit HHP/HSI	
Jet Velocity	
Va Pipe	
Va Collars	
Cva Pipe	
Cva Collars	
ECD at Shoe	
ECD at TD	

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
L.Lindner/A.Sollberger 0 B. Hardy	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING

Daily Report

Operator : BP Exploration **Date :** 4/14/2010
Well Name: MACONDO **Report No.:** 74

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	674		Active
Reserve 1	10000	14.1	1171		Reserve
C,K,&B	500	14	275		Active
Sandtraps	1000	14			Active
LCM Pits	1000	14	188		Active
Pumps On/Off	100	14.3			Active
Bankston	10000		5312		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1137
Reserve	6483
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume			3888	3888
Volume Not Mud				
Mud Volume			3888	3888

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5422	6086		11508
Oil Added				
Water Added				
Vol Chem Added				
Chem Not For Mud				
Total Volume Built				
Received				
Return				
From Active To		585		
From Reserve To	188			
From Premix To				
Daily Loss				
Final Volume	5025	6483		11508

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Total Loss	

WELLSITE CHEMICAL INVENTORY

Daily Report

MI SWACO

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/14/2010
Report No: 74
Page 1

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax: [redacted]

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	240		1045	120	1200			360	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	160		562	300	650			460	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]	3000		147000		150000			3000	[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]		1650	3300	1650	3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGiNEERING SERVICE	1. EA	[redacted]		2	169						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	1155		1215		2370			1155	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	523		2973	164	3370			687	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	275		1525		1200			275	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
MI BAR 2	1. TN BK	[redacted]	812		390		1202			812	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINI	1. EA	[redacted]		1	74						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	556		404				200	556	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998		3949	12049	[redacted]
RHETHIK	1. GA	[redacted]	952		1529		1100			952	[redacted]
SAFE-CARB 250	1. LB	[redacted]	9000		153000	9000	171000			18000	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	150		630	60	720			210	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]
SPERSENE	50. LB BG	[redacted]									[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/14/2010
Report No: 74
Page 2

Cost Summary

Total Daily Cost:
Total Daily Tax:
Cumulative Cost:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SULFATREAT DFS	50. LB BG	[redacted]									
SUPER SATURATED SALT MUI	1. BL	[redacted]									
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	
SUREMUL	1. GA	[redacted]	550		6600	1100	6600			1650	
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		
SYNTHETIC B 2	1. GA	[redacted]	93973		43115		137088			93973	
TANNATHIN	50. LB BG	[redacted]									
VG-PLUS	50. LB BG	[redacted]									
VG-SUPREME	50. LB BG	[redacted]	10		25					10	
VINSEAL COARSE	25. LB BG	[redacted]			360	60	300			60	
VINSEAL FINE	25. LB BG	[redacted]									
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	

SYNTHETIC-BASED MUD REPORT No. 75

MI SWACO — bp

Operator :	BP Exploration	Field/Area :	MC 252 #1	Depth/TVD :	18360 ft / 18349 ft
Report For :	R.Sepulvado/D.Vidrine	Description :	OCS-G 32306	Date :	4/15/2010
Well Name :	MACONDO	Location :	MC 252 #1	Spud Date :	
Contractor:	Transocean	Water Depth :	4992 ft	Mud Type :	Rheliant
Report For :	J.Harrel	Rig Name :	Horizon	Activity :	Tripping in the Hole

DRILLING ASSEMBLY	CASING (*TVD)
9979 ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)
5512 ft, 5.5-in DP	18.-in L @8969 ft (8969 TVD)
894 ft, 5.5-in HWDP	16.-in @11585 ft (11585 TVD)
186 ft, 6.5-in DC	13.625-in L @13145 ft (13134 TVD)
70 ft, 6.75-in MWD	11.875-in L @15113 ft (15103 TVD)
ft, -in	9.875-in L @17173 ft (17162 TVD)
Nozzles 14x4 1/32"	
Bit 8.5-in Hughs HC408XC	

MUD VOLUME (bbl)	
Hole	Active Pits
3656	1573
Total Circulating Volume	
5107	
Depth Drilled Last 24hr	
ft	
Volume Drilled Last 24hr	
bbl	

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate	gal/min	
Pump Pressure	psi	
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 23:00	Active 8:00	Active 8:00	Active 8:00
FlowLine Temp	°F	NA	NA	NA	NA
Depth/TVD	ft	18360/18349	18360/18349	18360/18349	18360/18349
Mud Weight	lb/gal	14.0@75	14.0@80	14.0@80	14.0@80
Funnel Viscosity	s/qt	90	89	89	89
Rheology Temp	°F	150	150	100	40
R600/R300		71/43	69/42	73/46	187/106
R200/R100		32/19	32/21	35/22	76/44
R6/R3		10/9	10/9	10/9	10/9
PV	cP	28	27	27	81
YP	lb/100ft²	15	15	19	25
10s/10m/30m Gel	lb/100ft²	16/24/30	15/25/29	16/26/29	15/25/32
API Fluid Loss	cc/30min	--	--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	--/1	--/1	/	/
Unc Ret Solids	%Vol	27.5	27.5		
Correct Solids	%Vol	26.6	26.6		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20	20		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		1.3	1.3		
Cl- Whole Mud	mg/L	25000	25000		
Salt	%Wt	16.36	16.36		
Lime	lb/bbl	1.69	1.69		
Emul Stability		315	311		
Current Angle	degrees				
MWD Tool Temp	deg F				
PWD ECD	ppg				
Riser Boost	gpm				
LC50/Lepto	Y/N				
Calib Scales	Y/N	Yes	Yes		
SST	ppb	20	20		
PPT	spurt/ml	.5/4.5	.5/4.5		
Reserve Volume	bbl	6279			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	2
NAFROC COMPLIANCE ENG	1. EA	1
RHETHIK	1. GA	40

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Brandt Shale Shaker	40/165/165	16.0
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS

	Spec	Actual
Weight	14	14.0
Viscosity	80-110	90
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 60 Cumulative Man Hours: 4324 Start Cards: 1 Cumulative Start Cards: 95 Max bbls discharged per hour: 0 bbls VSST: .32 Built Hi-Vis pill 270 bbls Pre-treated pits with 30/50, 250, and G-Seal Plus. Adding LCM at 1000 #'s an hour with premix and at the hopper.

REMARKS

Finished sidewall cores. P/U 8.5 BHA and TIH. Breaking circulation while TIH.

TIME DISTRIBUTION Last 24 hrs

Rig Up/Service	
Drilling	
Tripping	16
Non-Productive Tim	
Wireline Logs	8
Condition Hole	
Wash down	

MUD VOL ACCTG (bbl)

Synthetic Added	
Water Added	
Mud Received	
Mud Returned	
Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Tripping	
Boat Tank Bottoms	

SOLIDS ANALYSIS

Salt Wt%	16.36
Salt Conc	13.7
Adjusted Solids	26.6
Synthetic/Water Ratio	72/28
Average SG Solids	3.9
Low Gravity %	5.6
Low Gravity Wt.	51.31
High Gravity %	21.
High Gravity Wt.	307.92

RHEOLOGY & HYDRAULICS

np/na	0.723/0.213
Kp/Ka	0.504/6.783
Bit Pressure Loss/%	/ 1.
Bit HHP/HSI	/ 1.
Jet Velocity	
Va Pipe	
Va Collars	
Cva Pipe	271
Cva Collars	284
ECD at Shoe	
ECD at TD	14

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
L.Lindner/A.Sollberger 0 B. Hardy	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING

Daily Report

Operator : BP Exploration **Date :** 4/15/2010
Well Name: MACONDO **Report No.:** 75

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	750		Active
Reserve 1	10000	14.1	967		Reserve
C,K,&B	500	14	350		Active
Sandtraps	1000	14	285		Active
LCM Pits	1000	14	188		Active
Pumps On/Off	100	14.3			Active
Bankston	10000		5312		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1573
Reserve	6279
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume	3128	406	122	3656
Volume Not Mud				
Mud Volume	3128	406	122	3656

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5025	6483		11508
Oil Added				
Water Added				
Vol Chem Added				
Chem Not For Mud				
Total Volume Built				
Received				
Return				
From Active To				
From Reserve To	204			
From Premix To				
Daily Loss				
Final Volume	5229	6279		11508

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Total Loss	

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/15/2010
Report No: 75
Page 1

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	360		1045		1200			360	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	460		562		650			460	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]	3000		147000		150000			3000	[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]			3300		3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGiNEERING SERVICE	1. EA	[redacted]		2	171						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	1155		1215		2370			1155	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	687		2973		3370			687	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	275		1525		1200			275	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
M-I SEAL COARSE	40. LB BG	[redacted]				60	60			60	[redacted]
MI BAR 2	1. TN BK	[redacted]	812		390		1202			812	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINI	1. EA	[redacted]		1	75						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	556		404				200	556	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998		3949	12049	[redacted]
RHETHIK	1. GA	[redacted]	952	40	1569		1100			912	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 250	1. LB	[redacted]	18000		153000		171000			18000	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	210		630		720			210	[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/15/2010
Report No: 75
Page 2

Cost Summary

Total Daily Cost:
Total Daily Tax:
Cumulative Cost:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SPERSENE	50. LB BG	[redacted]									
SULFATREAT DFS	50. LB BG	[redacted]									
SUPER SATURATED SALT MUI	1. BL	[redacted]									
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	
SUREMUL	1. GA	[redacted]	1650		6600		6600			1650	
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		
SYNTHETIC B 2	1. GA	[redacted]	93973		43115		137088			93973	
TANNATHIN	50. LB BG	[redacted]									
VG-PLUS	50. LB BG	[redacted]									
VG-SUPREME	50. LB BG	[redacted]	10		25					10	
VINSEAL COARSE	25. LB BG	[redacted]	60		360		300			60	
VINSEAL FINE	25. LB BG	[redacted]									
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/15/2010
Report No: 75
Page 3

Cost Summary

Total Daily Cost:
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost

Before Taxes (Include Not Print Products)

[redacted]

MI SWACO — SYNTHETIC-BASED MUD REPORT No. 76

bp

Operator :	**BP Exploration**	**Field/Area :**	MC 252 #1	**Depth/TVD :**	18360 ft / 18349 ft
Report For :	R.Sepulvado/D.Vidrine	**Description :**	OCS-G 32306	**Date :**	4/16/2010
Well Name :	MACONDO	**Location :**	MC 252 #1	**Spud Date :**	
Contractor:	Transocean	**Water Depth :**	4992 ft	**Mud Type :**	Rheliant
Report For :	J.Harrel	**Rig Name :**	Horizon	**Activity :**	POOH

DRILLING ASSEMBLY	CASING (*TVD)	MUD VOLUME (bbl)	
8036 ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)	Hole	Active Pits
5512 ft, 5.5-in DP	18.-in L @8969 ft (8969 TVD)	3688	1854
894 ft, 5.5-in HWDP	16.-in @11585 ft (11585 TVD)	Total Circulating Volume	
186 ft, 6.5-in DC	13.625-in L @13145 ft (13134 TVD)	5277	
70 ft, 6.75-in MWD	11.875-in L @15113 ft (15103 TVD)	Depth Drilled Last 24hr	
ft, -in	9.875-in L @17173 ft (17162 TVD)	ft	
Nozzles 14x4 1/32"		Volume Drilled Last 24hr	
Bit 8.5-in Hughs HC408XC		bbl	

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate	gal/min	
Pump Pressure	psi	
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 17:00	Active 5:30	Active 5:30	Active 5:30
FlowLine Temp	°F	58	58	58	58
Depth/TVD	ft	18360/18349	18360/18349	18360/18349	18360/18349
Mud Weight	lb/gal	14.0@65	14.0@65	14.0@65	14.0@65
Funnel Viscosity	s/qt	93	93	93	93
Rheology Temp	°F	150	150	100	40
R600/R300		71/43	69/42	83/48	186/104
R200/R100		33/22	30/19	36/22	71/40
R6/R3		9/8	8/7	8/7	10/9
PV	cP	28	27	35	82
YP	lb/100ft²	15	15	13	22
10s/10m/30m Gel	lb/100ft²	15/24/29	12/23/27	13/24/28	12/25/29
API Fluid Loss	cc/30min	--	--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	--/1	--/1	/	/
Unc Ret Solids	%Vol	27	27		
Correct Solids	%Vol	26.06	26.14		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20.5	20.5		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		1.1	1		
Cl- Whole Mud	mg/L	26000	27000		
Salt	%Wt	16.56	17.09		
Lime	lb/bbl	1.43	1.3		
Emul Stability		243	237		
Current Angle	degrees				
MWD Tool Temp	deg F				
PWD ECD	ppg	14.32	14.31		
Riser Boost	gpm		373.		
LC50/Lepto	Y/N	No/No			
Calib Scales	Y/N	Yes	Yes		
SST	ppb	21	21		
PPT	spurt/ml	.6/4.6	.6/4.6		
Reserve Volume	bbl	5960			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	2
NAFROC COMPLIANCE EN(	1. EA	1
SUREMUL	1. GA	550
LIME	50. LB BG	35
G-SEAL PLUS	25. KG BG	55
CALCIUM CARBONATE 30-5	1. LB	3000
SAFE-CARB 250	1. LB	3000
MI BAR 2	1. TN BK	17
SYNTHETIC B 2	1. GA	2352

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS

MUD PROPERTY SPECS		Actual
Weight	14	14.0
Viscosity	80-110	93
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 72 Cumulative Man Hours: 4396 Start Cards: 1 Cumulative Start Cards: 96 Max bbls discharged per hour: 0 bbls VSST: .32 Currently POOH.

REMARKS

No losses while TIH and staging up the pumps. Washed and reamed from 18,127' to 18,360'. Slight drag at 18,272 and 18,280'. Once ECD fell, pumped 100 bbls HiVis sweep. Lowered rheology and gels to run casing. 1120 max gas during circulation--13.8 at the flowline--14.0 behind the degasser (2 point cut). Circulated sweep around--no increase when it came back. No sign of Set/Squeeze in cuttings.

TIME DISTRIBUTION Last 24 hrs		MUD VOL ACCTG (bbl)	
Rig Up/Service		Synthetic Added	
Drilling		Water Added	
Tripping		Mud Received	
Non-Productive Tim		Mud Returned	
Wireline Logs		Shakers	
Condition Hole		Centrifuge	
Wash down		Formation	
		Left in Hole	
		Adjustment	75
		Cuttings Retention	
		Displacement	
		Running Casing	
		Cementing	
		Left Behind Pipe	
		Tripping	
		Boat Tank Bottoms	

SOLIDS ANALYSIS		RHEOLOGY & HYDRAULICS	
Salt Wt%	16.56	np/na	0.723/0.288
Salt Conc	14.25	Kp/Ka	0.504/5.332
Adjusted Solids	26.06	Bit Pressure Loss/%	/ 1.
Synthetic/Water Ratio	72/28	Bit HHP/HSI	/ 1.
Average SG Solids	3.9	Jet Velocity	
Low Gravity %	4.6	Va Pipe	
Low Gravity Wt.	42.2	Va Collars	
High Gravity %	21.4	Cva Pipe	268
High Gravity Wt.	314.74	Cva Collars	278
		ECD at Shoe	
		ECD at TD	14

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
L.Lindner/B.Manuel 0 B. Hardy	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING

Daily Report

Operator : BP Exploration **Date :** 4/16/2010
Well Name: MACONDO **Report No.:** 76

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	966		Active
Reserve 1	10000	14.1	648		Reserve
C,K,&B	500	14	375		Active
Sandtraps	1000	14	285		Active
LCM Pits	1000	14	188		Active
Pumps On/Off	100	14.3	40		Active
Bankston	10000		5312		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1854
Reserve	5960
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume	3070	353	265	3688
Volume Not Mud				
Mud Volume	3070	353	265	3688

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5229	6279		11508
Oil Added				
Water Added				
Vol Chem Added	69			69
Chem Not For Mud				
Total Volume Built	69			69
Received				
Return				
From Active To				
From Reserve To	319			
From Premix To				
Daily Loss	75			75
Final Volume	5542	5960		11502

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	75
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Total Loss	75

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/16/2010
Report No: 76
Page 1

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax: [redacted]

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	360		1045		1200			360	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	460		562		650			460	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]	3000	3000	150000		150000				[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]			3300		3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGiNEERING SERVICE	1. EA	[redacted]		2	173						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	1155		1215		2370			1155	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	687	55	3028		3370			632	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	275	35	1560		1200			240	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
M-I SEAL COARSE	40. LB BG	[redacted]	60				60			60	[redacted]
MI BAR 2	1. TN BK	[redacted]	812	17	407		1202			795	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINI	1. EA	[redacted]		1	76						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	556		404				200	556	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998		3949	12049	[redacted]
RHETHIK	1. GA	[redacted]	912		1569		1100			912	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 250	1. LB	[redacted]	18000	3000	156000		171000			15000	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	210		630		720			210	[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/16/2010
Report No: 76
Page 2

Cost Summary

Total Daily Cost:
Cumulative Cost:
Total Daily Tax: [redacted]

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SPERSENE	50. LB BG	[redacted]									[redacted]
SULFATREAT DFS	50. LB BG	[redacted]									[redacted]
SUPER SATURATED SALT MUI	1. BL	[redacted]									[redacted]
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	[redacted]
SUREMUL	1. GA	[redacted]	1650	550	7150		6600			1100	[redacted]
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	[redacted]
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		[redacted]
SYNTHETIC B 2	1. GA	[redacted]	93973	2352	45467		137088			91621	[redacted]
TANNATHIN	50. LB BG	[redacted]									[redacted]
VG-PLUS	50. LB BG	[redacted]									[redacted]
VG-SUPREME	50. LB BG	[redacted]	10		25					10	[redacted]
VINSEAL COARSE	25. LB BG	[redacted]	60		360		300			60	[redacted]
VINSEAL FINE	25. LB BG	[redacted]									[redacted]
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	[redacted]

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration

Well Name : MACONDO

Location: MC 252 #1

Date : 4/16/2010

Report No: 76

Page 3

Cost Summary

Total Daily Cost:

Total Daily Tax: [redacted]

Cumulative Cost:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost

SYNTHETIC-BASED MUD REPORT No. 77

MI SWACO

Operator :	**BP Exploration**	**Field/Area :**	MC 252 #1	**Depth/TVD :**	18360 ft / 18349 ft
Report For :	R.Sepulvado/D.Vidrine	**Description :**	OCS-G 32306	**Date :**	4/17/2010
Well Name :	MACONDO	**Location :**	MC 252 #1	**Spud Date :**	
Contractor:	Transocean	**Water Depth :**	4992 ft	**Mud Type :**	Rheliant
Report For :	J.Harrel	**Rig Name :**	Horizon	**Activity :**	

DRILLING ASSEMBLY	CASING (*TVD)
ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)
5512 ft, 5.5-in DP	18.-in L @8969 ft (8969 TVD)
894 ft, 5.5-in HWDP	16.-in @11585 ft (11585 TVD)
186 ft, 6.5-in DC	13.625-in L @13145 ft (13134 TVD)
70 ft, 6.75-in MWD	11.875-in L @15113 ft (15103 TVD)
ft, -in	9.875-in L @17173 ft (17162 TVD)
Nozzles 14x4 1/32"	
Bit 8.5-in Hughs HC408XC	

MUD VOLUME (bbl)	
Hole	Active Pits
3888	1739
Total Circulating Volume	
1739	
Depth Drilled Last 24hr	
ft	
Volume Drilled Last 24hr	
bbl	

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate	gal/min	
Pump Pressure	psi	
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 20:00	Active 8:00	Active 8:00	Active 8:00
FlowLine Temp	°F	NA	NA	NA	NA
Depth/TVD	ft	18360/18349	18360/18349	18360/18349	18360/18349
Mud Weight	lb/gal	14.0@75	14.0@75	14.0@75	14.0@75
Funnel Viscosity	s/qt	93	93	93	93
Rheology Temp	°F	150	150	100	40
R600/R300		72/42	71/42	84/50	186/105
R200/R100		33/22	32/21	37/23	72/40
R6/R3		10/9	10/9	9/8	11/10
PV	cP	30	29	34	81
YP	lb/100ft²	12	13	16	24
10s/10m/30m Gel	lb/100ft²	15/23/30	15/24/29	14/25/29	15/27/30
API Fluid Loss	cc/30min		--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	/1	--/1	/	/
Unc Ret Solids	%Vol	27	27		
Correct Solids	%Vol	26.06	26.06		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20.5	20.5		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		0.8	0.8		
Cl- Whole Mud	mg/L	26000	26000		
Salt	%Wt	16.56	16.56		
Lime	lb/bbl	1.04	1.04		
Emul Stability		225	219		
Current Angle	degrees				
MWD Tool Temp	deg F				
PWD ECD	ppg				
Riser Boost	gpm				
LC50/Lepto	Y/N				
Calib Scales	Y/N	Yes	Yes		
SST	ppb	21	21		
PPT	spurt/ml	.6/5.5	.6/5.5		
Reserve Volume	bbl	5960			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	3
NAFROC COMPLIANCE EN(	1. EA	1
RHEDUCE	1. GA	86
LIME	50. LB BG	14
CALCIUM CARBONATE 30-5	50. LB BG	60
G-SEAL PLUS	25. KG BG	35
BLOK R 750	50. LB BG	60
SYNTHETIC B 2	1. GA	3586

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS

MUD PROPERTY SPECS		Actual
Weight	14	14.0
Viscosity	80-110	93
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 72 Cumulative Man Hours: 4468 Start Cards: 1 Cumulative Start Cards: 97 Max bbls discharged per hour: 0 bbls VSST: .32 Continue to clean column tanks with Offshore cleaning crew.

REMARKS

As rig POOH, could not retrieve wear bushing. POOH and P/U multi-purpose tool. TIH to retrieve wear bushing. Retrieved wear bushing. Rigging up rig floor to run casing.

TIME DISTRIBUTION Last 24 hrs	
Rig Up/Service	
Drilling	
Tripping	
Non-Productive Tim	
Wireline Logs	
Condition Hole	
Wash down	

MUD VOL ACCTG (bbl)	
Synthetic Added	
Water Added	
Mud Received	
Mud Returned	
Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Tripping	
Boat Tank Bottoms	

SOLIDS ANALYSIS	
Salt Wt%	16.56
Salt Conc	14.25
Adjusted Solids	26.06
Synthetic/Water Ratio	72/28
Average SG Solids	3.9
Low Gravity %	4.6
Low Gravity Wt.	42.2
High Gravity %	21.4
High Gravity Wt.	314.74

RHEOLOGY & HYDRAULICS	
np/na	
Kp/Ka	
Bit Pressure Loss/%	
Bit HHP/HSI	
Jet Velocity	
Va Pipe	
Va Collars	
Cva Pipe	
Cva Collars	
ECD at Shoe	
ECD at TD	

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
L.Lindner/B.Manuel 0 B. Hardy	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING
Daily Report

MI SWACO

Operator : BP Exploration **Date :** 4/17/2010
Well Name: MACONDO **Report No.:** 77

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	891		Active
Reserve 1	10000	14.1	648		Reserve
C,K,&B	500	14	375		Active
Sandtraps	1000	14	285		Active
LCM Pits	1000	14	188		Active
Pumps On/Off	100	14.3			Active
Bankston	10000		5312		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1739
Reserve	5960
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume			3888	3888
Volume Not Mud				
Mud Volume			3888	3888

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5542	5960		11502
Oil Added				
Water Added				
Vol Chem Added	85			85
Chem Not For Mud				
Total Volume Built	85			85
Received				
Return				
From Active To				
From Reserve To				
From Premix To				
Daily Loss				
Final Volume	5627	5960		11587

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Total Loss	

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/17/2010
Report No: 77
Page 1

Cost Summary

Total Daily Cost: [redacted] **Total Daily Tax:** [redacted]
Cumulative Cost: [redacted]

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	360	60	1105		1200			300	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	460	60	622		650			400	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]			150000		150000				[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]			3300		3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGiNEERING SERVICE	1. EA	[redacted]		3	176						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	1155		1215		2370	360	360	795	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	632	35	3063		3370			597	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	240	14	1574		1200			226	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
M-I SEAL COARSE	40. LB BG	[redacted]	60				60			60	[redacted]
MI BAR 2	1. TN BK	[redacted]	795		407		1202			795	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINI	1. EA	[redacted]		1	77						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	556	86	490				200	470	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998		3949	12049	[redacted]
RHETHIK	1. GA	[redacted]	912		1569		1100			912	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 250	1. LB	[redacted]	15000		156000		171000			15000	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	210		630		720			210	[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/17/2010
Report No: 77
Page 2

Cost Summary

Total Daily Cost:
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SPERSENE	50. LB BG	[redacted]									[redacted]
SULFATREAT DFS	50. LB BG	[redacted]									[redacted]
SUPER SATURATED SALT MUI	1. BL	[redacted]									[redacted]
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	[redacted]
SUREMUL	1. GA	[redacted]	1100		7150		6600			1100	[redacted]
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	[redacted]
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		[redacted]
SYNTHETIC B 2	1. GA	[redacted]	91621	3586	49053		137088			88035	[redacted]
TANNATHIN	50. LB BG	[redacted]									[redacted]
VG-PLUS	50. LB BG	[redacted]									[redacted]
VG-SUPREME	50. LB BG	[redacted]	10		25					10	[redacted]
VINSEAL COARSE	25. LB BG	[redacted]	60		360		300			60	[redacted]
VINSEAL FINE	25. LB BG	[redacted]									[redacted]
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/17/2010
Report No: 77
Page 3

Cost Summary

Total Daily Cost:
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost

SYNTHETIC-BASED MUD REPORT No. 78

Operator :	**BP Exploration**	**Field/Area :**	MC 252 #1	**Depth/TVD :**	18360 ft / 18349 ft
Report For :	R.Sepulvado/D.Vidrine	**Description :**	OCS-G 32306	**Date :**	4/18/2010
Well Name :	MACONDO	**Location :**	MC 252 #1	**Spud Date :**	
Contractor:	Transocean	**Water Depth :**	4992 ft	**Mud Type :**	Rheliant
Report For :	J.Harrel	**Rig Name :**	Horizon	**Activity :**	RUNNING CASING

DRILLING ASSEMBLY	CASING (*TVD)
6246 ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)
ft, 9.875-in CSG	18.-in L @8969 ft (8969 TVD)
2908 ft, 7.-in CSG	16.-in @11585 ft (11585 TVD)
ft, -in	13.625-in L @13145 ft (13134 TVD)
ft, -in	11.875-in L @15113 ft (15103 TVD)
ft, -in	9.875-in L @17173 ft (17162 TVD)
Nozzles 14x4 1/32"	7.-in L @18312 ft (18301 TVD)
Bit 8.5-in Hughs HC408XC	

MUD VOLUME (bbl)	
Hole	Active Pits
3754	1873
Total Circulating Volume	4486
Depth Drilled Last 24hr	ft
Volume Drilled Last 24hr	bbl

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate	gal/min	
Pump Pressure	psi	
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 21:00	Active 8:00	0:00	0:00
FlowLine Temp	°F	NA	NA		
Depth/TVD	ft	18360/18349	18360/18349	/	/
Mud Weight	lb/gal	14.0@77	14.0@78	.0@	.0@
Funnel Viscosity	s/qt	92	93		
Rheology Temp	°F	150	150		
R600/R300		71/42	70/42	/	/
R200/R100		33/21	32/21	/	/
R6/R3		10/9	10/9	/	/
PV	cP	29	28		
YP	lb/100ft²	13	14		
10s/10m/30m Gel	lb/100ft²	15/25/29	15/24/29	//	//
API Fluid Loss	cc/30min		--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	/1	--/1	/	/
Unc Ret Solids	%Vol	27	27		
Correct Solids	%Vol	26.06	26.06		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20.5	20.5		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		0.8	0.8		
Cl- Whole Mud	mg/L	26000	26000		
Salt	%Wt	16.56	16.56		
Lime	lb/bbl	1.04	1.04		
Emul Stability		220	205		
Current Angle	degrees				
MWD Tool Temp	deg F				
PWD ECD	ppg				
Riser Boost	gpm				
LC50/Lepto	Y/N				
Calib Scales	Y/N	Yes	Yes		
SST	ppb	21	21		
PPT	spurt/ml	.6/5.4	.6/5.4		
Reserve Volume	bbl	5960			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	2
NAFROC COMPLIANCE EN	1. EA	1

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS		Actual
Weight	14	14.0
Viscosity	80-110	92
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 72 Cumulative Man Hours: 4540 Start Cards: 1 Cumulative Start Cards: 98 Max bbls discharged per hour: 0 bbls VSST: .32 OCS finished cleaning column tanks--rig down and move to surface pit 8.

REMARKS

Retrieve wearbushing. R/U to run 7"x 9 7/8" casing. Run casing.

TIME DISTRIBUTION Last 24 hrs	
Rig Up/Service	
Drilling	
Tripping	
Non-Productive Tim	
Wireline Logs	
Condition Hole	
Wash down	

MUD VOL ACCTG (bbl)	
Synthetic Added	
Water Added	
Mud Received	
Mud Returned	
Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	

SOLIDS ANALYSIS	
Salt Wt%	16.56
Salt Conc	14.25
Adjusted Solids	26.06
Synthetic/Water Ratio	72/28
Average SG Solids	3.9
Low Gravity %	4.6
Low Gravity Wt.	42.2
High Gravity %	21.4
High Gravity Wt.	314.74

RHEOLOGY & HYDRAULICS	
np/na	0.757/0.242
Kp/Ka	0.398/6.475
Bit Pressure Loss/%	/ 1.
Bit HHP/HSI	/ 1.
Jet Velocity	
Va Pipe	
Va Collars	
Cva Pipe	251
Cva Collars	252
ECD at Shoe	
ECD at TD	14

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
.Lindner/B.Manuel B. Hardy	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING

Daily Report

Operator : BP Exploration **Date :** 4/18/2010
Well Name: MACONDO **Report No.:** 78

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	1025		Active
Reserve 1	10000	14.1	648		Reserve
C,K,&B	500	14	375		Active
Sandtraps	1000	14	285		Active
LCM Pits	1000	14	188		Active
Pumps On/Off	100	14.3			Active
Bankston	10000		5312		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1873
Reserve	5960
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume	2333	280	1141	3754
Volume Not Mud				
Mud Volume	2333	280	1141	3754

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5627	5960		11587
Oil Added				
Water Added				
Vol Chem Added				
Chem Not For Mud				
Total Volume Built				
Received				
Return				
From Active To				
From Reserve To				
From Premix To				
Daily Loss				
Final Volume	5627	5960		11587

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	
Total Loss	

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/18/2010
Report No: 78
Page 1

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	300		1105		1200			300	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	400		622		650			400	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]			150000		150000				[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]			3300		3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGINEERING SERVICE	1. EA	[redacted]		2	178						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	795		1215		2370		360	795	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	597		3063		3370			597	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	226		1574		1200			226	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
M-I SEAL COARSE	40. LB BG	[redacted]									[redacted]
MI BAR 2	1. TN BK	[redacted]	795		407		1202			795	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINI	1. EA	[redacted]		1	78						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	470		490				200	470	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998		3949	12049	[redacted]
RHETHIK	1. GA	[redacted]	912		1569		1100			912	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 250	1. LB	[redacted]	15000		156000		171000			15000	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	210		630		720			210	[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/18/2010
Report No: 78
Page 2

Cost Summary

Total Daily Cost:
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SPERSENE	50. LB BG	[redacted]									
SULFATREAT DFS	50. LB BG	[redacted]									
SUPER SATURATED SALT MUI	1. BL	[redacted]									
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	
SUREMUL	1. GA	[redacted]	1100		7150		6600			1100	
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		
SYNTHETIC B 2	1. GA	[redacted]	88035		49053		137088			88035	
TANNATHIN	50. LB BG	[redacted]									
VG-PLUS	50. LB BG	[redacted]									
VG-SUPREME	50. LB BG	[redacted]	10		25					10	
VINSEAL COARSE	25. LB BG	[redacted]	60		360		300			60	
VINSEAL FINE	25. LB BG	[redacted]									
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	

SYNTHETIC-BASED MUD REPORT No. 79

Operator :	**BP Exploration**	**Field/Area :**	MC 252 #1	**Depth/TVD :**	18360 ft / 18349 ft
Report For :	B.Kalhuza/D.Vidrine	**Description :**	OCS-G 32306	**Date :**	4/19/2010
Well Name :	MACONDO	**Location :**	MC 252 #1	**Spud Date :**	
Contractor:	Transocean	**Water Depth :**	4992 ft	**Mud Type :**	Rheliant
Report For :	J.Harrel	**Rig Name :**	Horizon	**Activity :**	Displace Cement

DRILLING ASSEMBLY	CASING (*TVD)
5068 ft, 6.625-in DP	22.-in @8001 ft (8001 TVD)
ft, -in	18.-in L @8969 ft (8969 TVD)
ft, -in	16.-in @11585 ft (11585 TVD)
ft, -in	13.625-in L @13145 ft (13134 TVD)
ft, -in	11.875-in L @15113 ft (15103 TVD)
ft, -in	9.875-in L @17173 ft (17162 TVD)
Nozzles 14x4 1/32"	7.-in L @18312 ft (18301 TVD)
Bit 8.5-in Hughs HC408XC	

MUD VOLUME (bbl)	
Hole	Active Pits
2538	1859
Total Circulating Volume	
3647	
Depth Drilled Last 24hr	
ft	
Volume Drilled Last 24hr	
bbl	

CIRCULATION DATA		
Pump Make	EMSCO 2200	EMSCO 2200
Pump Liner x Stk	6x15 in	6x15 in
Pump Capacity gal/stk	5.342	5.342
Pump stk/min	0@97%	0@97%
Flow Rate		gal/min
Pump Pressure		psi
Bottoms Up		
Total Circulation		

MUD PROPERTIES

Sample From		Active 21:00	Active 8:00	0:00	0:00
FlowLine Temp	°F	NA	NA		
Depth/TVD	ft	18360/18349	18360/18349	/	/
Mud Weight	lb/gal	14.0@80	14.0@78	.0@	.0@
Funnel Viscosity	s/qt	94	93		
Rheology Temp	°F	150	150		
R600/R300		71/43	70/42	/	/
R200/R100		32/20	32/21	/	/
R6/R3		10/9	10/9	/	/
PV	cP	28	28		
YP	lb/100ft²	15	14		
10s/10m/30m Gel	lb/100ft²	14/23/29	15/24/29	//	//
API Fluid Loss	cc/30min	--	--		
HTHP Fluid Loss	cc/30min	2.4@250	2.4@250	.0@	.0@
Cake APT/HT	1/32"	--/1	--/1	/	/
Unc Ret Solids	%Vol	27	27		
Correct Solids	%Vol	26.15	26.06		
Synthetic	%Vol	52.5	52.5		
Uncorr Water	%Vol	20.5	20.5		
Synthetic/Water Ratio		72/28	72/28	/	/
Alkal Mud (Psm)		0.9	0.8		
Cl- Whole Mud	mg/L	27000	26000		
Salt	%Wt	17.09	16.56		
Lime	lb/bbl	1.17	1.04		
Emul Stability		248	205		
Current Angle	degrees	--			
MWD Tool Temp	deg F	--			
PWD ECD	ppg	--			
Riser Boost	gpm	--			
LC50/Lepto	Y/N	No/No			
Calib Scales	Y/N	Yes	Yes		
SST	ppb	21	21		
PPT	spurt/ml	.6/5.4	.6/5.4		
Reserve Volume	bbl	2011			

PRODUCTS USED Last 24 hr

Products	Size	Amount
ENGINEERING SERVICE	1. EA	4
NAFROC COMPLIANCE ENGINEERING	EA	1
SYNTHETIC B 2	1. GA	675

SOLIDS CONTROL EQUIPMENT Last 24 hr

Type	Model/Size	Hrs Used
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Brandt Shale Shaker	40/165/165	
Mud Cleaner		
5500 Centrifuge		
Verti g Dryer	24	
75 HP Vacuum Unit		

MUD PROPERTY SPECS		Actual
Weight	14	14.0
Viscosity	80-110	94
Filtrate	<4	2.4

REMARKS AND TREATMENT

MISwaco Man Hours: 60 Cumulative Man Hours: 4600 Start Cards: 1 Cumulative Start Cards: 99 Max bbls discharged per hour: 0 bbls No losses while running casing. No losses while landing casing. No losses while circulating. No losses while cementing. No losses while displacing cement. 1033 bbls left behind pipe.

REMARKS

Run casing with no losses and got on landing string. RIH. RIH to 18312' with no losses. Problems with converting floats. Pressure up to 3150 psi and convert floats. Circulate with no losses. Flush choke and kill lines. R/U and perform cement job with no losses. Displace cement with SBM with no losses.

TIME DISTRIBUTION Last 24 hrs	
Rig Up/Service	
Drilling	
Tripping	
Non-Productive Tim	
Running Casing	14
Condition Hole	3
Cementing	7

MUD VOL ACCTG (bbl)	
Synthetic Added	
Water Added	150
Mud Received	
Mud Returned	4260
Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	1033
Tripping	
Boat Tank Bottoms	52

SOLIDS ANALYSIS	
Salt Wt%	17.09
Salt Conc	14.8
Adjusted Solids	26.02
Synthetic/Water Ratio	72/28
Average SG Solids	3.9
Low Gravity %	4.6
Low Gravity Wt.	42.09
High Gravity %	21.4
High Gravity Wt.	314.3

RHEOLOGY & HYDRAULICS	
np/na	0.723/0.228
Kp/Ka	0.504/6.623
Bit Pressure Loss/%	/ 1.
Bit HHP/HSI	/ 1.
Jet Velocity	
Va Pipe	
Va Collars	
Cva Pipe	232
Cva Collars	296
ECD at Shoe	
ECD at TD	14

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
L.Lindner/B.Manuel 0 B. Hardy/G.Jones/J.Quibedaux	(281)366-7749	800-391-3147	[redacted]	[redacted]

MUD VOLUME ACCOUNTING

Daily Report

MI SWACO

Operator : BP Exploration **Date :** 4/19/2010
Well Name: MACONDO **Report No.:** 79

TANK	CAPACITY bbl	WEIGHT lb/gal	VOLUME bbl	REMARKS	CLASS
Active	5000	14	1013		Active
Reserve 1	10000	14.1	1011		Reserve
C,K,&B	500	14	285		Active
Sandtraps	1000	14	375		Active
LCM Pits	1000	14	186		Active
Pumps On/Off	100	14.3			Active
Bankston	10000		1000		Reserve

SUM PIT VOLUMES

MUD VOLUME	bbl
Active	1859
Reserve	2011
Premix	
OTHER VOLUME	

MUD IN HOLE (bbls)

MUD IN HOLE:	ANNULUS	PIPE	BELOW BIT	TOTAL
Total Hole Volume	1648	140	750	2538
Volume Not Mud				
Mud Volume	1648	140	750	2538

VOLUME BALANCE (bbls)

IN/TO:	ACTIVE	RESERVE	PREMIX	TOTAL
Start Volume	5627	5960		11587
Oil Added				
Water Added	150			150
Vol Chem Added	16			16
Chem Not For Mud				
Total Volume Built	166			166
Received				
Return		4260		4260
From Active To		363		
From Reserve To				
From Premix To				
Daily Loss	1033	52		1085
Final Volume	4397	2011		6408

LOSS BREAKDOWN (bbls)

Shakers	
Centrifuge	
Formation	
Left in Hole	
Adjustment	
Cuttings Retention	
Displacement	
Running Casing	
Cementing	
Left Behind Pipe	1033
Boat Tank Bottoms	52
Total Loss	1085

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/19/2010
Report No: 79
Page 1

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
BLOK R 750	50. LB BG	[redacted]	300		1105		1200			300	[redacted]
CALCIUM CARBONATE 30-50	50. LB BG	[redacted]	400		622		650			400	[redacted]
CALCIUM CARBONATE 30-50	1. LB	[redacted]			150000		150000				[redacted]
CALCIUM CHLORIDE POWDER	50. LB BG	[redacted]	74		801		784			74	[redacted]
CAUSTIC SODA	50. LB BG	[redacted]									[redacted]
CLEAN-UP	1. GA	[redacted]			3300		3300				[redacted]
DEFOAM X	5. GA CN	[redacted]	3		9					3	[redacted]
DEUTERIUM OXIDE	20. KG CN	[redacted]	2				2			2	[redacted]
DUO-VIS	25. LB BG	[redacted]									[redacted]
DUO-VIS	25. KG BG	[redacted]	53		52		70			53	[redacted]
ECOTROL RD	25. KG BG	[redacted]	24							24	[redacted]
ENGINEERING SERVICE	1. EA	[redacted]		4	182						[redacted]
FORM-A-SET AK	25. LB BG	[redacted]	169		691		644			169	[redacted]
FORM-A-SET AK	47. LB BG	[redacted]	16						20	16	[redacted]
FORM-A-SET RET	5. GA CN	[redacted]	22		37		11			22	[redacted]
FORM-A-SET XL	12. GA CN	[redacted]	36		52		111		45	36	[redacted]
FORM-A-SQUEEZE	40. LB BG	[redacted]	795		1215		2370		360	795	[redacted]
G-SEAL PLUS	25. KG BG	[redacted]	597		3063		3370			597	[redacted]
GCMS TESTING	1. EA	[redacted]									[redacted]
KWIK SEAL COARSE	40. LB BG	[redacted]			348		268				[redacted]
KWIK SEAL FINE	40. LB BG	[redacted]									[redacted]
KWIK SEAL MEDIUM	40. LB BG	[redacted]	55		303		308			55	[redacted]
LIME	50. LB BG	[redacted]	226		1574		1200			226	[redacted]
LIQUID MUD SYSTEM	1. BL	[redacted]									[redacted]
M-I BAR BULK	1. TN BK	[redacted]			2035		2436		401		[redacted]
M-I GEL	100. LB BG	[redacted]	5							5	[redacted]
M-I SEAL COARSE	40. LB BG	[redacted]									[redacted]
MI BAR 2	1. TN BK	[redacted]	795		407		1202			795	[redacted]
MIXING CHARGE	1. EA	[redacted]									[redacted]
MIXING CHARGE WBM	1. EA	[redacted]									[redacted]
MYACIDE GA25	5. GA CN	[redacted]	1		1					1	[redacted]
NAFROC COMPLIANCE ENGINEERING	1. EA	[redacted]		1	79						[redacted]
PAD MUD (WATERBASE)	0. BL BL	[redacted]									[redacted]
POLYPAC UL	50. LB BG	[redacted]									[redacted]
RHEBUILD	1. GA	[redacted]	415							415	[redacted]
RHEDUCE	1. GA	[redacted]	470		490				200	470	[redacted]
RHEFLAT	1. GA	[redacted]	579		105					579	[redacted]
RHELIANT SYSTEM	1. BL	[redacted]			8702		21001		12299		[redacted]
RHELIANT SYSTEM 2	1. BL EA	[redacted]	12049				15998	4260	8209	7789	[redacted]
RHETHIK	1. GA	[redacted]	912		1569		1100			912	[redacted]
SAFE-CARB 250	50. LB BG	[redacted]	320		601		420			320	[redacted]
SAFE-CARB 250	1. LB	[redacted]	15000		156000		171000			15000	[redacted]
SAFE-CARB 40	1. LB	[redacted]									[redacted]
SAFE-CARB 40	50. LB BG	[redacted]	210		630		720			210	[redacted]
SAFE-COR	55. GA DM	[redacted]	1							1	[redacted]
SAFE-SCAV CA	15. LB BG	[redacted]	2							2	[redacted]
SAFE-SOLV OM	55. GA DM	[redacted]	1		1					1	[redacted]
SAFE-SOLV OM	1. GA	[redacted]	550				550			550	[redacted]
SAFE-SURF O	55. GA DM	[redacted]	1				1			1	[redacted]
SAFE-SURF O	1. GA	[redacted]	1100		1314		1100			1100	[redacted]

MI SWACO

WELLSITE CHEMICAL INVENTORY

Daily Report

Operator : BP Exploration
Well Name : MACONDO
Location: MC 252 #1

Date : 4/19/2010
Report No: 79
Page 2

Cost Summary

Total Daily Cost: [redacted]
Cumulative Cost:
Total Daily Tax:

Product	Unit Size	Unit Price	Start Amt.	Daily Used	Cum Used	Daily Rec'd	Cum Rec'd	Daily Return	Cum. Return	Final Stock	Daily Cost
SPERSENE	50. LB BG	[redacted]									[redacted]
SULFATREAT DFS	50. LB BG	[redacted]									[redacted]
SUPER SATURATED SALT MUD	1. BL	[redacted]									[redacted]
SUPER SWEEP FIBER	15. LB BX	[redacted]	2							2	[redacted]
SUREMUL	1. GA	[redacted]	1100		7150		6600			1100	[redacted]
SUREWET	1. GA	[redacted]	1100		4950		5500			1100	[redacted]
SYNTHETIC B	1. GA	[redacted]			151200		115500		53382		[redacted]
SYNTHETIC B 2	1. GA	[redacted]	88035	675	49728		137088			87360	[redacted]
TANNATHIN	50. LB BG	[redacted]									[redacted]
VG-PLUS	50. LB BG	[redacted]									[redacted]
VG-SUPREME	50. LB BG	[redacted]	10		25					10	[redacted]
VINSEAL COARSE	25. LB BG	[redacted]	60		360		300			60	[redacted]
VINSEAL FINE	25. LB BG	[redacted]									[redacted]
VINSEAL MEDIUM	25. LB BG	[redacted]	100		763		780			100	[redacted]

BP / Deepwater Horizon
Rheliant Displacement Procedure
"Macondo" OCS-G 32306

1. Before displacing to seawater, conduct a THINK DRILL with all.
2. *Remember it's very important that we must avoid trapping SBM in pits, pumps, lines and hole. We will displace SBM from all four mud pumps, both stand pipes, choke, kill, boost lines, casing and riser.*
3. Pump excess volume to Bankston, and have boat on starboard with mud hose on her.
4. Line up on sea chest.
5. Build 450 bbl **WBM spacer** in pit # 5, and use Duo Vis to thicken up.
6. Capacities:
   Choke 100 bbls/794 strokes; **Kill 100 bbls/794 strokes;**
   Boost 73 bbls/579 strokes; **Drill pipe 170 bbls/1349 strokes;**
   Casing/Riser w/drill pipe 2334 bbls/18,523 stks
   Total displaced volume for hole and drill string, 2504 bbls/19,873 strokes
   Pump Output 0.126 bbls/stk.

Displacement

1. Line up for all SBM returns to go to the pits and bypass sandtraps. Function test dump valve.
2. Displace choke, kill, and boost lines, and close lower valves after each. Zero stroke counter. (Note: when displacing choke line, over displace 8 bbls (63 strokes) for surface lines.
3. Pump 450 bbl **WBM spacer** from **pit # 5** down drill pipe.
4. Continue displacement up casing until spacer is 500ft past BOP stack (992 bbls 7873 strokes). After the mud has past the stack, we can boost riser.
5. Do not shut down until displacement is complete.
6. When WBM spacer returns, over-displace until interface is incorporated. When interface is incorporated, take sample for Static Sheen test and ROC and shut down pumps. Switch to overboard discharge.
7. If static sheen is an apparent pass, discharge remaining spacer and seawater down overboard line._Mud Engineer will advise.

NOTE: Good communication will be necessary to accomplish a successful displacement. If you are not sure, stop and ask.