

**Rainey, David I**

**From:** Suttles, Doug J  
**Sent:** Friday, May 21, 2010 5:13 PM  
**To:** Morrison, Richard; Fryar, Robert T; Rainey, David I; Button, Robert J; Utsler, Mike J; Seilhan, Keith A; McCleary, Neil (UNKNOWN BUSINESS PARTNER)  
**Subject:** FW: Flow Rate

FYI

Doug

Doug Suttles  
 Chief Operating Officer  
 Exploration & Production  
 BP

**From:** Wells, Kent  
**Sent:** Friday, May 21, 2010 10:46 AM  
**To:** Looney, Bernard; Birrell, Gordon Y; Suttles, Doug J; Auchincloss, Murray M; Dudley, Robert  
**Cc:** Wells, Kent; Inglis, Andy G (UPSTREAM); Dupree, James H  
**Subject:** RE: Flow Rate

Here are the numbers filled out in Bernard's frame.

- Since May 17th, the average daily oil rate has been 2100 BOPD and the average daily gas rate has been 12 MMCFD;
- Over the period, the daily oil rate has ranged from 1400 - 3000 BOPD; the average daily gas rate has ranged from 4 - 17 MMCFD;
- In the last 24 hour period (May 20th), the daily oil rate was 2200 BOPD; the daily gas rate was 15 MMCFD.

Note: May 16th we collected for a partial day and therefore has been excluded from above numbers. (fyi 290 BO and 1 MMCF)

Let me know if there are any issues we these numbers. Thanks

Kent Wells  
 281-366-3340

**From:** Looney, Bernard  
**Sent:** Friday, May 21, 2010 9:30 AM  
**To:** Birrell, Gordon Y; Wells, Kent; Suttles, Doug J; Auchincloss, Murray M; Dudley, Robert  
**Subject:** Flow Rate

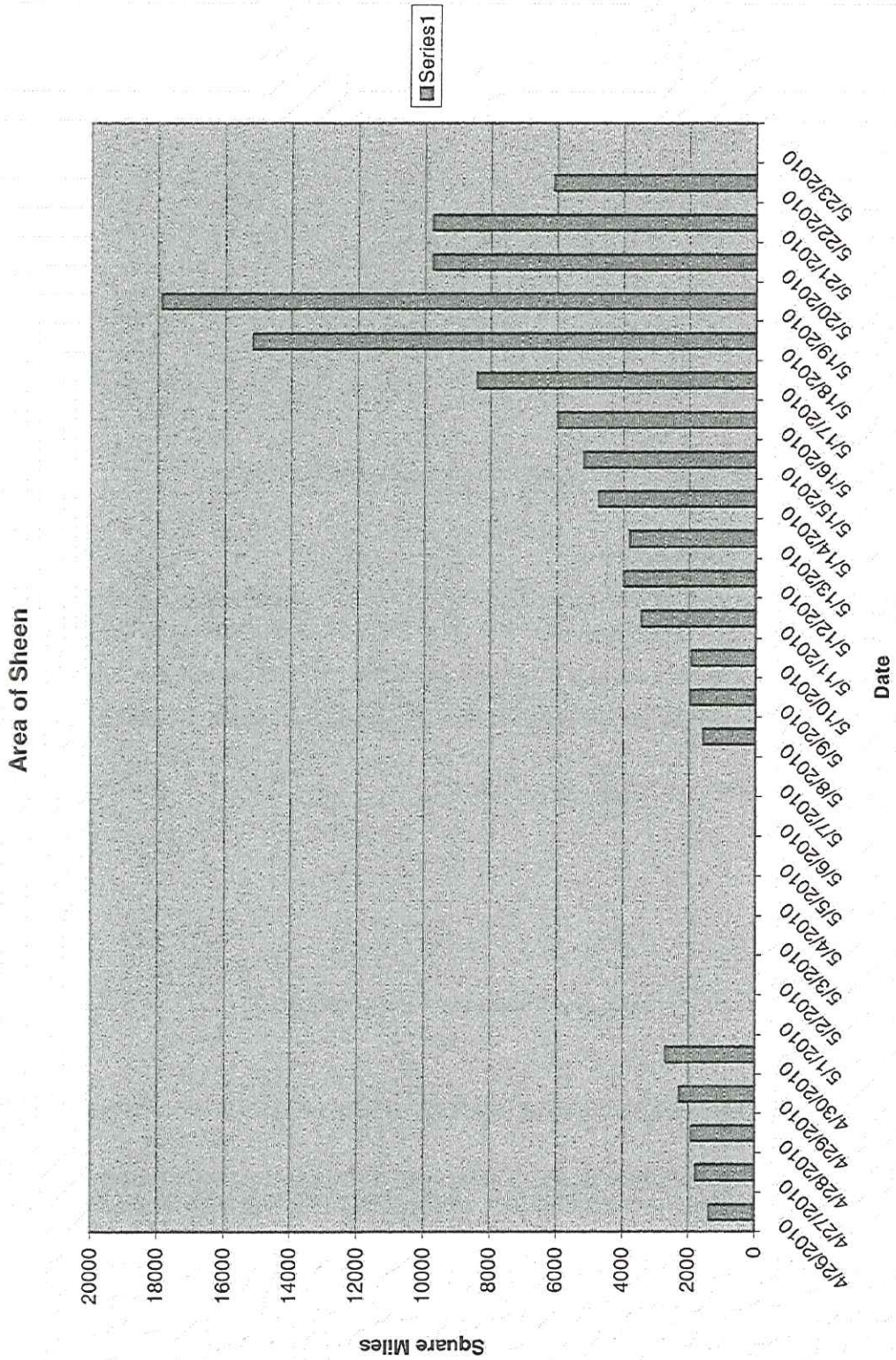
Gents

The following is the suggested consistent wording for all future press releases around flow rate. AGI has agreed. Grateful for any immediate feedback.

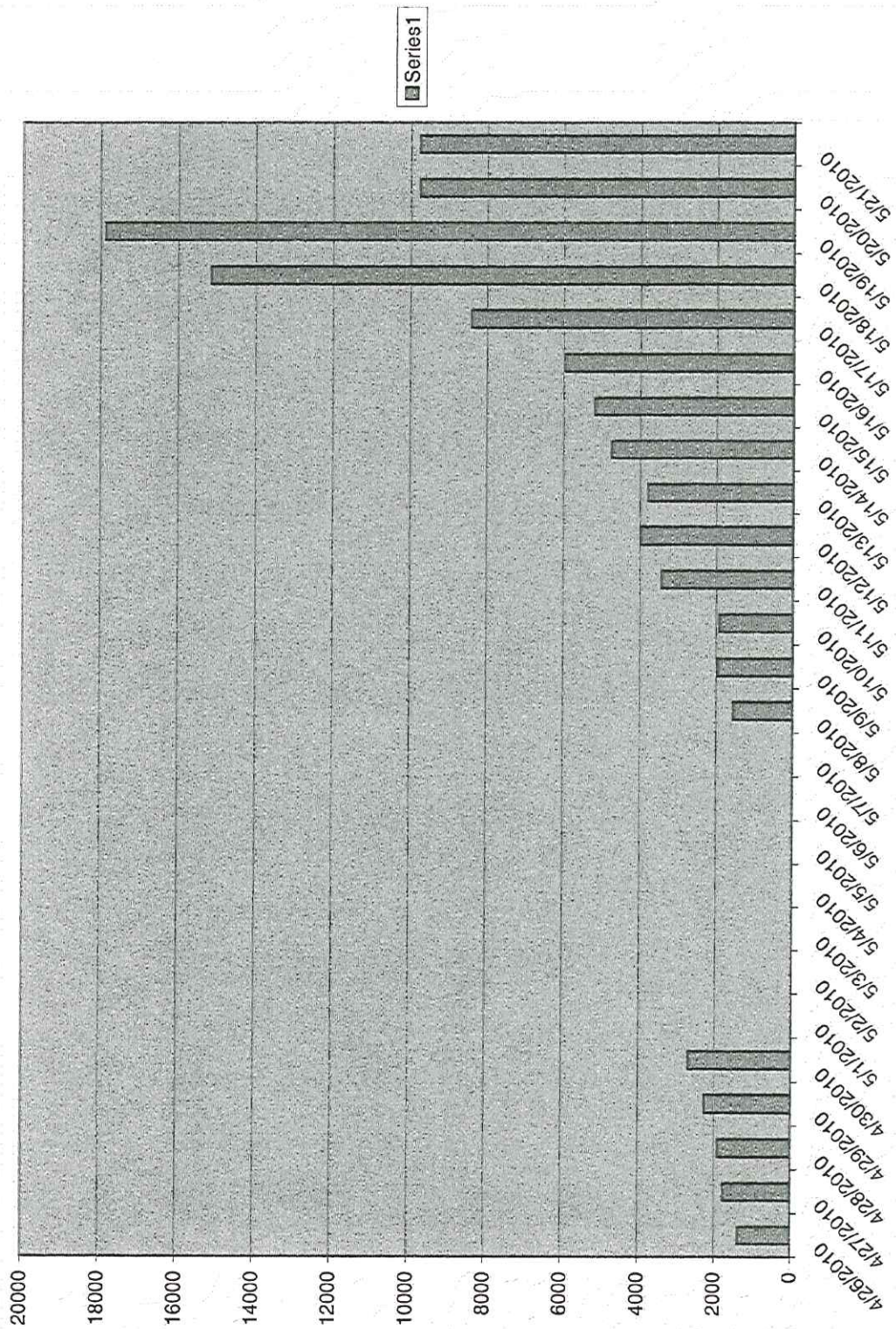
Once we agree this - Murray will subsequently communicate our plan with London. The rates will be confirmed each day at the 0630 hrs meeting and Murray will communicate this with London through his regular 0800 hrs meeting with them. Trust this works.

The suggested language:

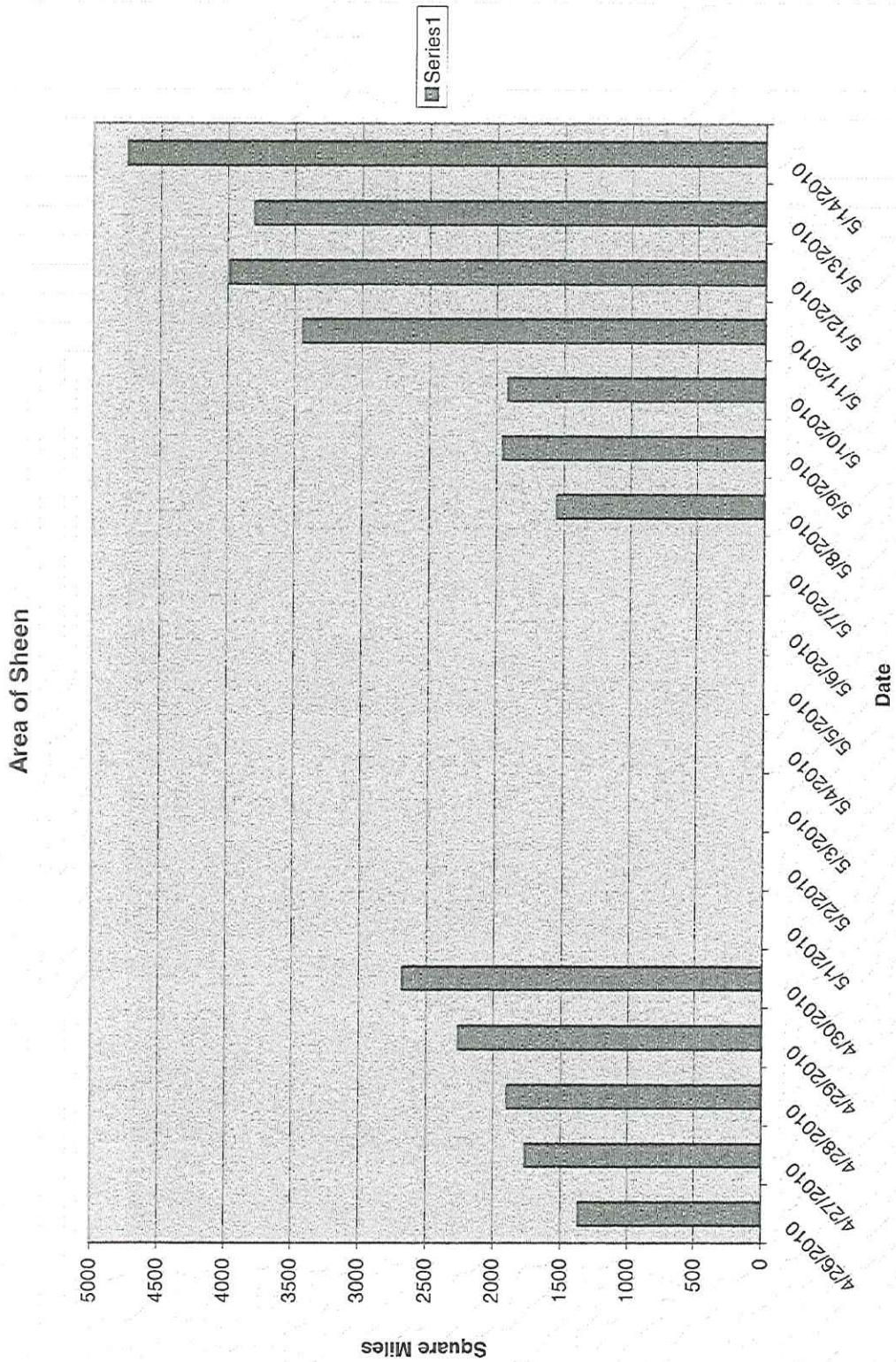
- Since the beginning, the average daily oil rate has been X and the average daily gas rate has been Y;
- Over the period, the average daily oil rate has ranged from A to B; the average daily gas rate has ranged from C to D;
- In the last 24 hour period, the average oil rate was W; the average gas rate was Z.



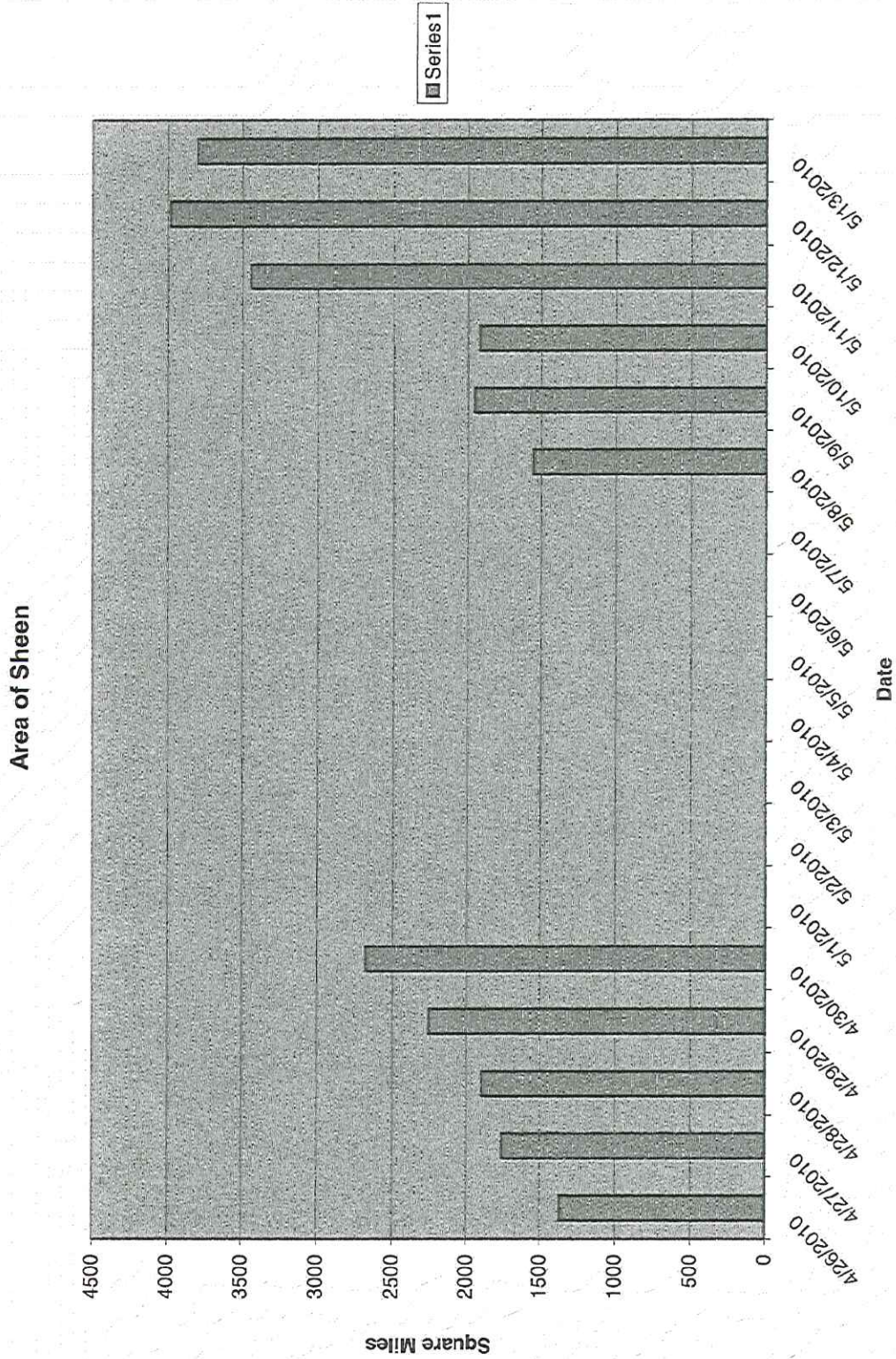




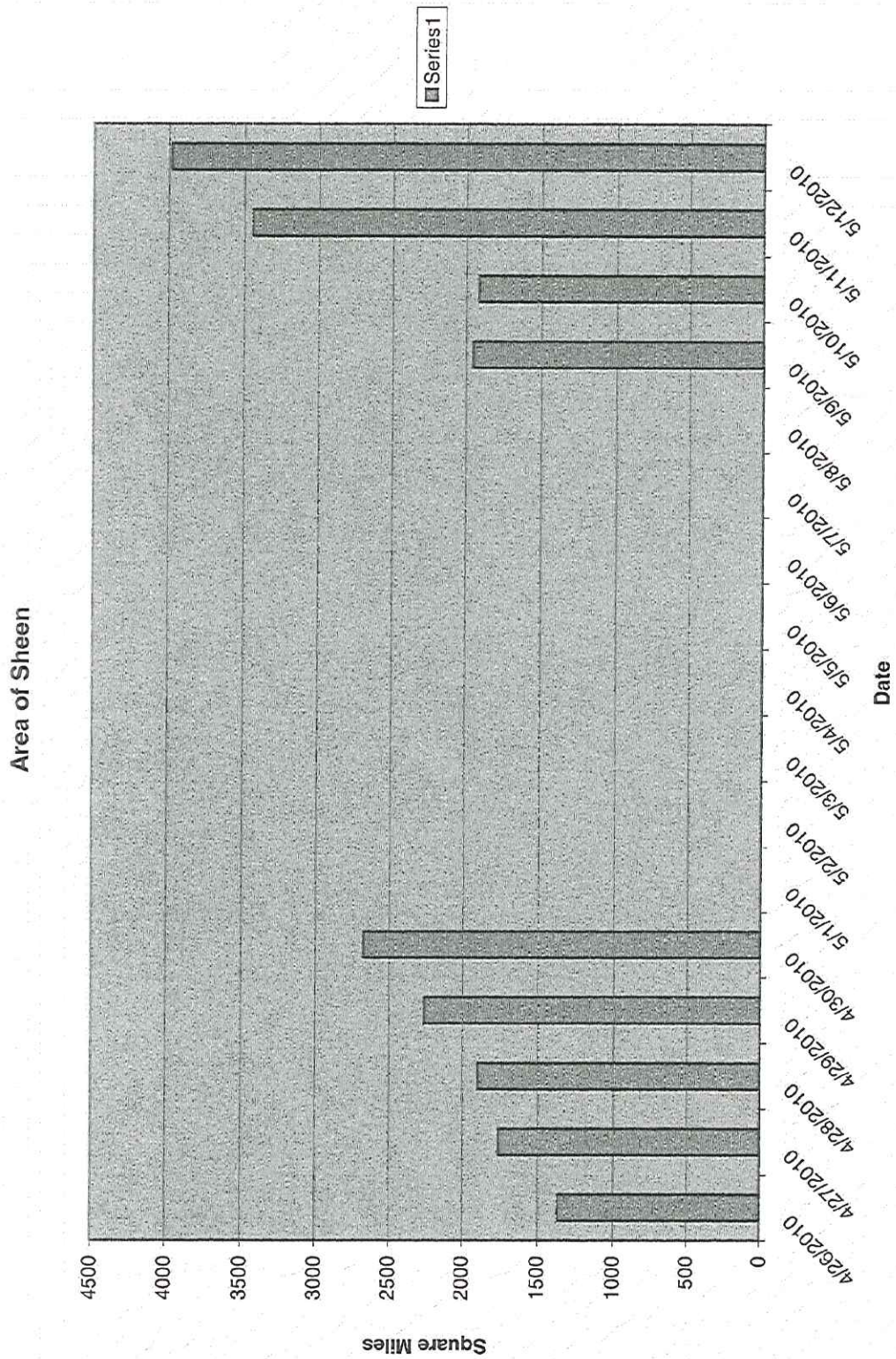














**Rainey, David I**

---

**From:** Carragher, Peter D  
**Sent:** Saturday, June 19, 2010 8:09 AM  
**To:** Steve Lehmann  
**Cc:** Rainey, David I; Mutschler, Jackie C  
**Subject:** FW: some spill response opinions

Steve BP is supporting SINTEF and are working to get all of the inputs into their model.

I am a bit perplexed there was no BP person from Unified Command on Bill's industry wide note...

Also I see no containment numbers in Bill's note. So is the context, there is a hurricane and containment ceases? Or a long run mass balance form day one?

Regards

Pete Carragher

O +1 281 366 2789  
C +1 281 450 0446  
H +1 281 531 8304  
UK + 44 777 175 8812  
PA Gigi Juran +1 281 366 7695 gigi.juran@bp.com

---

**From:** Mark Reed [mailto:Mark.Reed@sintef.no]  
**Sent:** Saturday, June 19, 2010 7:19 AM  
**To:** Carragher, Peter D; Page, Paul W  
**Cc:** Tore Aunaas; Ivar Singsaas; Per Johan Brandvik; Per Daling  
**Subject:** RE: some spill response opinions

Peter and Paul,

We have received a request from NOAA to assist them in establishing a mass balance for the spill.

Have you been sending them copies of our reports? Shall we send them a copy of a recent mass balance calculation?

Mark

---

**From:** Bill Lehr [mailto:Bill.Lehr@noaa.gov]  
**Sent:** 18. juni 2010 22:09  
**To:** Lambert, Patrick [NCR]; goodmanr@cia.com; Per Daling; Victoria.Broje@shell.com; Alan@spiltec.com; consultant@alunlewis.demon.co.uk; 'jrpayne@sbcglobal.com'; Thomas.S.Coolbaugh@exxonmobil.com; Ed Overton; David Usher; Merv Fingas; Robert Jones; Ian@slross.com  
**Cc:** Steve Lehmann; Mark W Miller  
**Subject:** some spill response opinions

Dear folks who actually know something about spill response,

6/19/2010

We (NOAA/ERD) have been asked to assist the Incident Command prepare a mass balance for daily operations for this spill. Obviously, a spill originating a mile beneath the ocean is not a typical incident. I would like your comments on the suggestions below. Because of the emergency nature of the request, I need a quick turn around for your responses.

Thanks for your help,

Bill Lehr  
NOAA/ERD  
206 719 1813 (24 hour cell)



<!--[if !vml]--> <!--[endif]--> MASS BALANCE FOR THE DEEPWATER HORIZON SPILL.

Background:

Spill is leaking at least 35,000 bbl/day of 35 API oil, mixed in with produced gas. The source is one mile underwater in the Gulf of Mexico, average water temperature around 32 C. Sea state has generally been low.

Calculating Oil dispersed into the water column:

The oil and gas leaking out at the Deep Horizon oil spill are all buoyant and, therefore would, neglecting other processes, rise to the surface. However, one cannot neglect other processes. Originally, the escaping plume will be a mixture of gas and oil, with additional gas dissolved within the oil. According to the Clarkson University model CDOG, this plume will maintain its integrity for at most a few hundred meters with a strong positive buoyancy. Several competing processes will interfere with this process. The gas will rise faster than the oil, 'slipping' past the droplets but will also form hydrates with the surrounding water. Water will be entrained into the plume by turbulence that will also contribute to changing droplet size distribution of the oil mixed into the plume. These oil droplets will rise to the surface based upon Stokes law, where, for the smallest droplets, the rise velocity can be approximated by the formula

<!--[if !vml]--> 
$$v_r = \frac{g d^2 \Delta \rho}{18 \mu}$$
 <!--[endif]--> where <!--[if !vml]-->  $\mu$  <!--[endif]--> is the water viscosity, <!--[if !vml]-->  $\Delta \rho$  <!--[endif]--> is density difference between oil and water, d is droplet diameter and g is gravitational acceleration constant. For small enough oil droplet size, the rise velocity is so small that competing processes affect it before it can make it to the surface. These processes include dissolution, biodegradation, and particle-oil interaction. These processes will vary in strength depending upon where the oil droplet is located. Field measurement may help to quantify these processes but, as an arbitrary cut-off value, one can take 70 microns as the minimum droplet size below which that droplet is considered permanently dispersed.

The droplet size distributions in the plume are greatly affected by use of dispersant chemicals that lower the surface tension of the oil and produce smaller droplet sizes. There is extremely little data on the droplet size distribution for oil in the water column for this incident. Some limited data exists from the RV Brook McCall Survey LISST measurements performed by the Bedford Institute of Oceanography. If one, extrapolates their results, and dangerous exercise with a high degree of uncertainty, to the entire spill, then one can conclude that perhaps 30% of the oil

6/19/2010



released during non-dispersant operations were dispersed into the water column and up to 60 % were dispersed for oil in contact with dispersant chemicals. However, since the samples were subsurface, they may be preferentially sampling the droplet distribution formed initially. Moreover, the NOAA model, ADIOS2, suggests that if the spill occurred at the surface, less than 8 % of the oil would disperse. Different reports from the Ixtoc 1 blowout in the Gulf of Mexico in 1979 claim that between 3% to 26% of the oil released from a much shallower depth ended up in the water column or on the bottom.

As an operational estimate, we suggest the following values for natural dispersion for the subsurface oil release:

Minimum: 10%

Maximum: 20%

Best Guess: 15 %

Chemical dispersion

Chemical dispersants lower oil surface tension, resulting in smaller droplet sizes. Traditionally, emulsified oil, because of its high viscosity, is difficult to chemically disperse. Much of the surface oil is emulsified. However, SMART Tier 1 and Tier 2 observations suggest that surface dispersant spray operations are at least partially successful. Current assumptions assume a 3 to 1 effectiveness (three gallons of oil dispersed for every gallon of dispersant applied).

Chemical dispersants added to the plume at the source are certainly more effective than surface spraying. In fact, it is almost a perfect situation for dispersant application; fresh oil, direct contact between dispersant and oil, high turbulent energy. Very preliminary subsurface plume observations and modeling suggest that a 20 to 1 effectiveness number is not unreasonable

Suggested operational estimate:

Surface operations (includes problems with hitting the oil):

3 to 1 effectiveness average.

1 to 1 low,

5 to 1 high

Subsurface operations:

15 to 1 effectiveness average,

10 to 1 low,

20 to 1 high

Evaporation

In the process of rising through the water column and weathering on the sea surface, oil loses many constituents to dissolution and evaporation. Since this oil contains a high fraction of volatile compounds, we expect that a large fraction of the oil is lost to evaporation. We used the pseudo-component evaporation model used in ADIOS2, initialized with data on the oil composition provided by BP, to estimate the fraction of oil possibly lost to evaporation over the period on the order of weeks to months. After the more volatile compounds have evaporated, the remaining oil tends to persist without evaporative change for many months. Our models suggest that as much as 46% of the oil can be lost to evaporation over several weeks on the sea surface.

We measured the composition of weathered oil collected from the sea surface on 16 May using GC/MS, and analyzed the results using the pseudo-component evaporation model. We found that the weathered oil sample had lost 38% of its mass to the combination of evaporation and dissolution. This analysis could be improved with a careful simulated evaporation study on the fresh oil, but we have not yet initiated this study.

As an operational estimate, we suggest the following values for evaporation:

1<sup>st</sup> day: 37% of the oil that makes it to the surface

2<sup>nd</sup> day: 4% of surface oil that is less than two days old

6/19/2010

**Burning:**

Al Allen is conducting the burn operations and reporting the amount burned. He is using 0.07 gpm/sqft for un-emulsified oil and 0.05 for the emulsified oil. He notes that these two burn rates have been used for years and are generally accepted as conservative burn rates. We suggest that we simply accept his reported values.

**Skimming:**

Operations are reporting the volume of oily water rather than the volume of oil. The skimmers are of different types, are operated at different skill levels, and in different states of weathered oil. The results are often then blended in common storage tanks. Rather than estimate oil-water ratios, we suggest simple measurements of the barge oil.

VOLUME Loss Due To Gas Breakout 5000' → SURFACE.

6/19/2010

CONFIDENTIAL

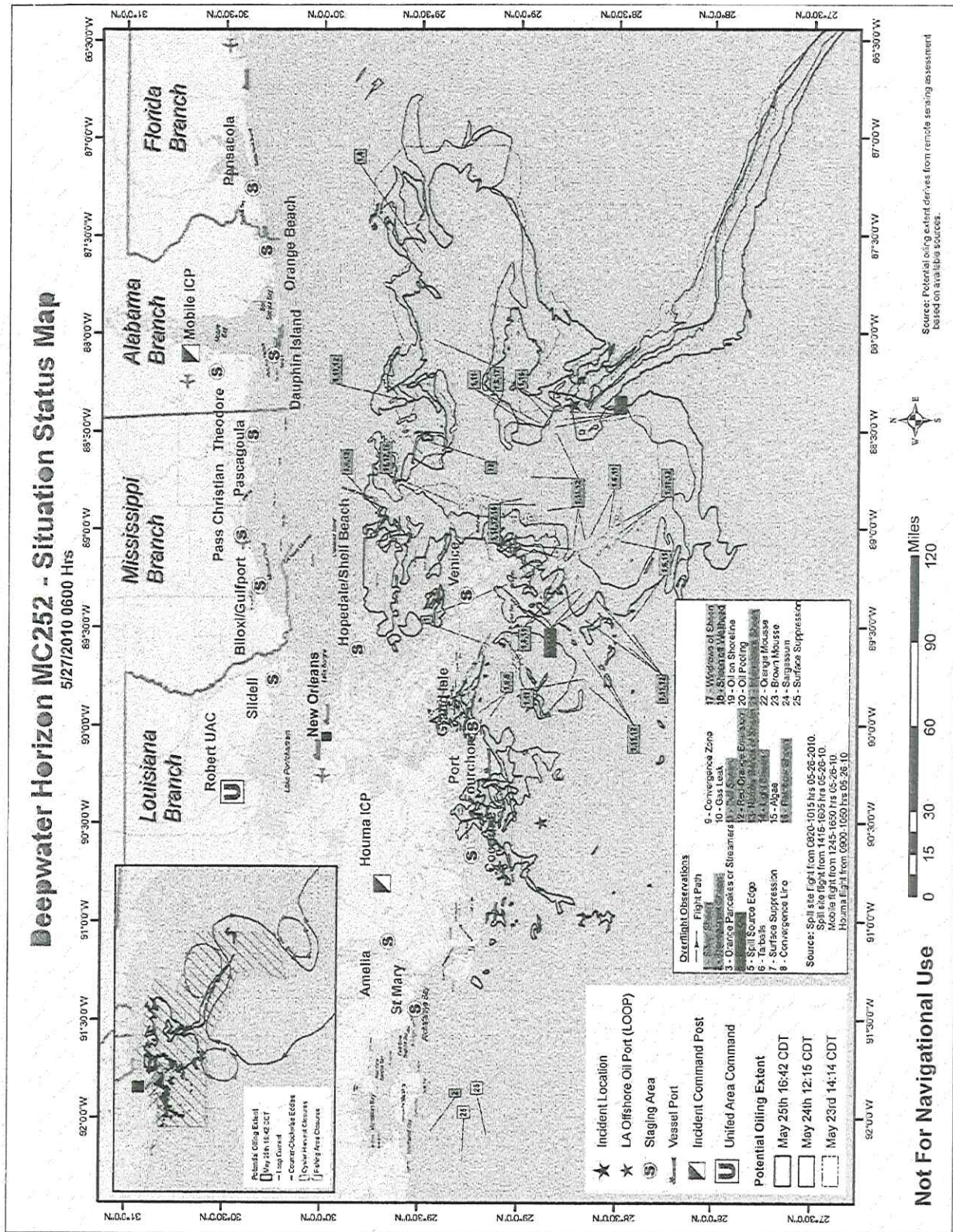
BP-HZN-2179MDL01823859

BPD193-002543



# Deepwater Horizon MC252 - Situation Status Map

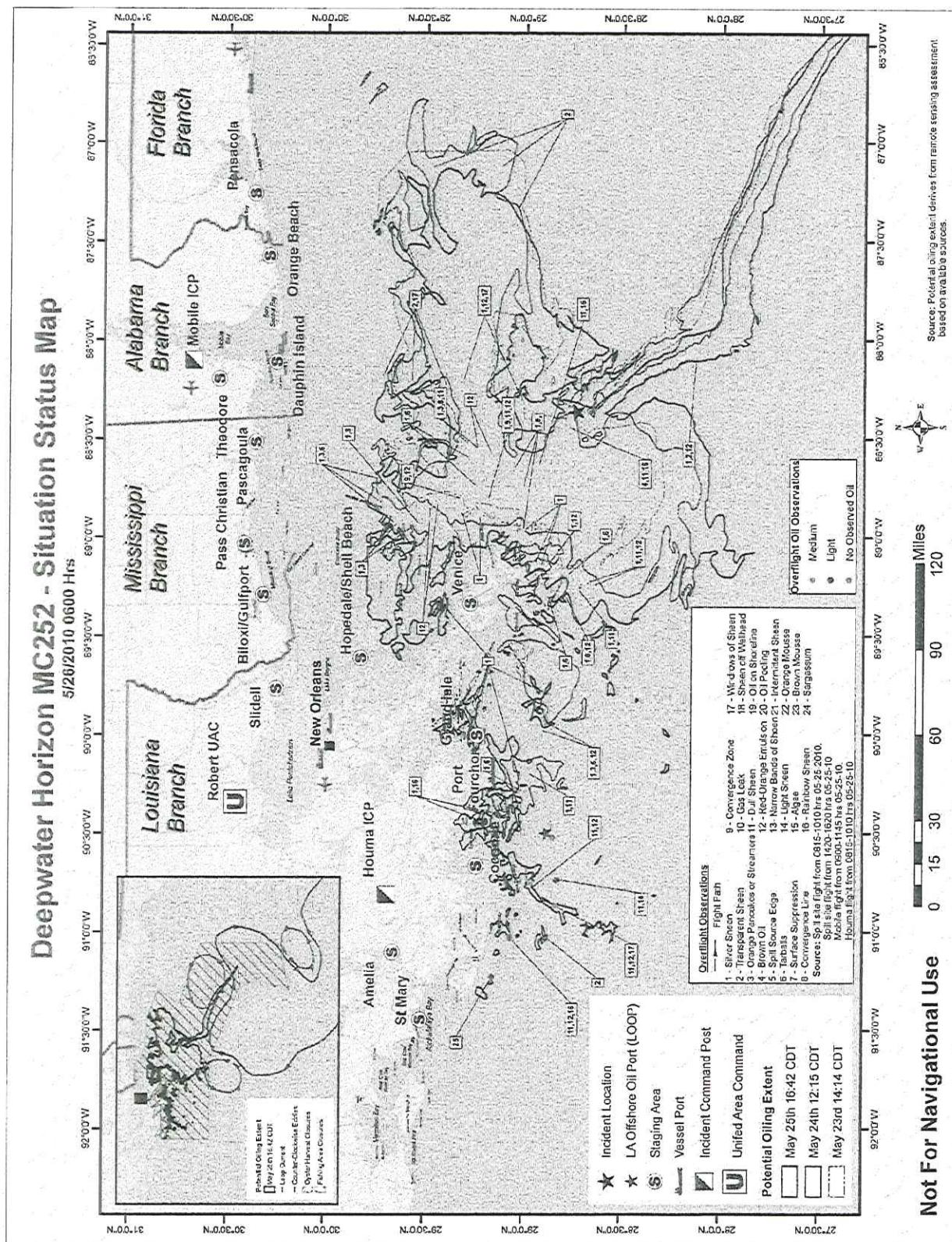
5/27/2010 0600 Hrs





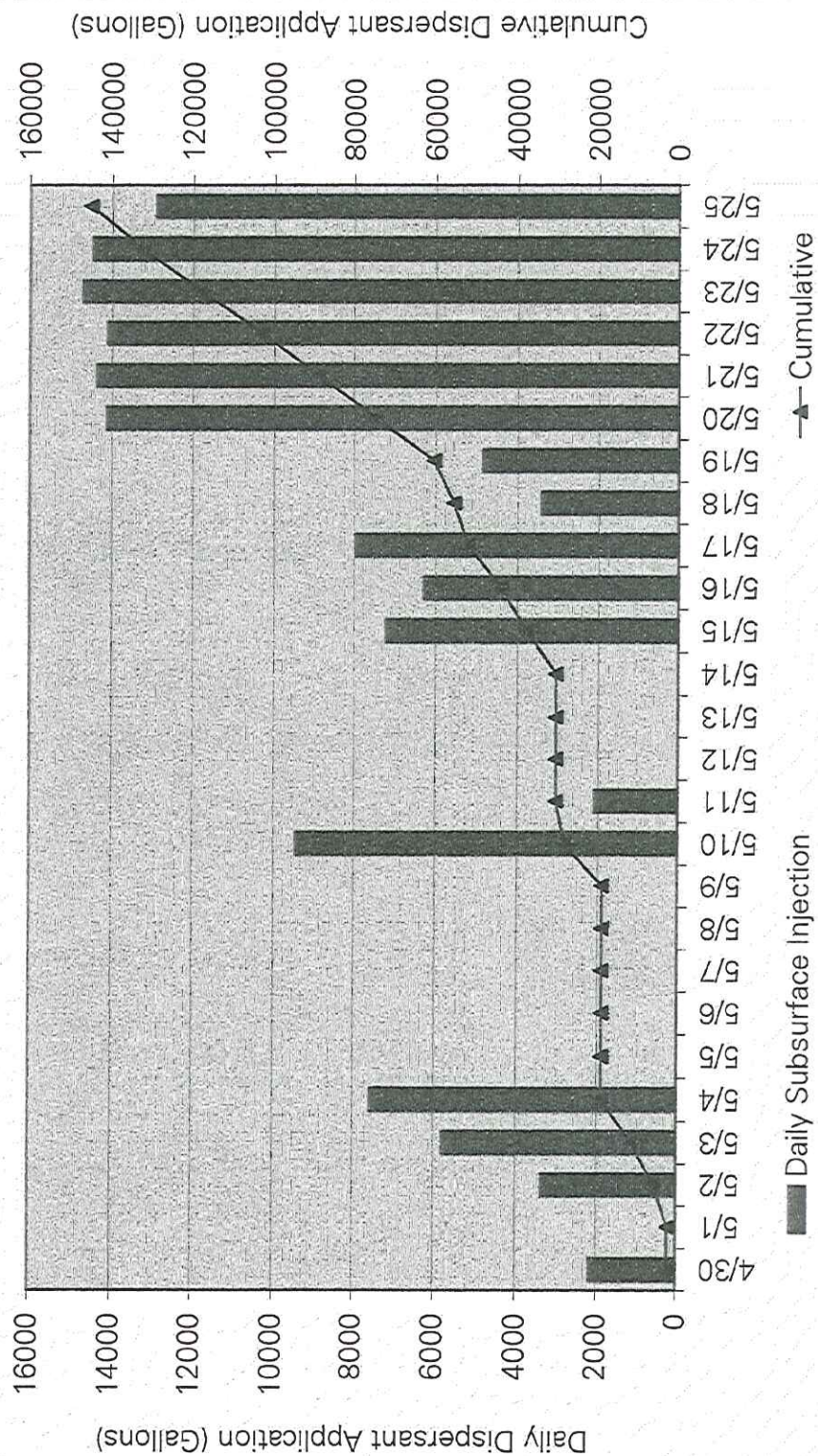
# Deepwater Horizon MC252 - Situation Status Map

5/26/2010 0600 Hrs





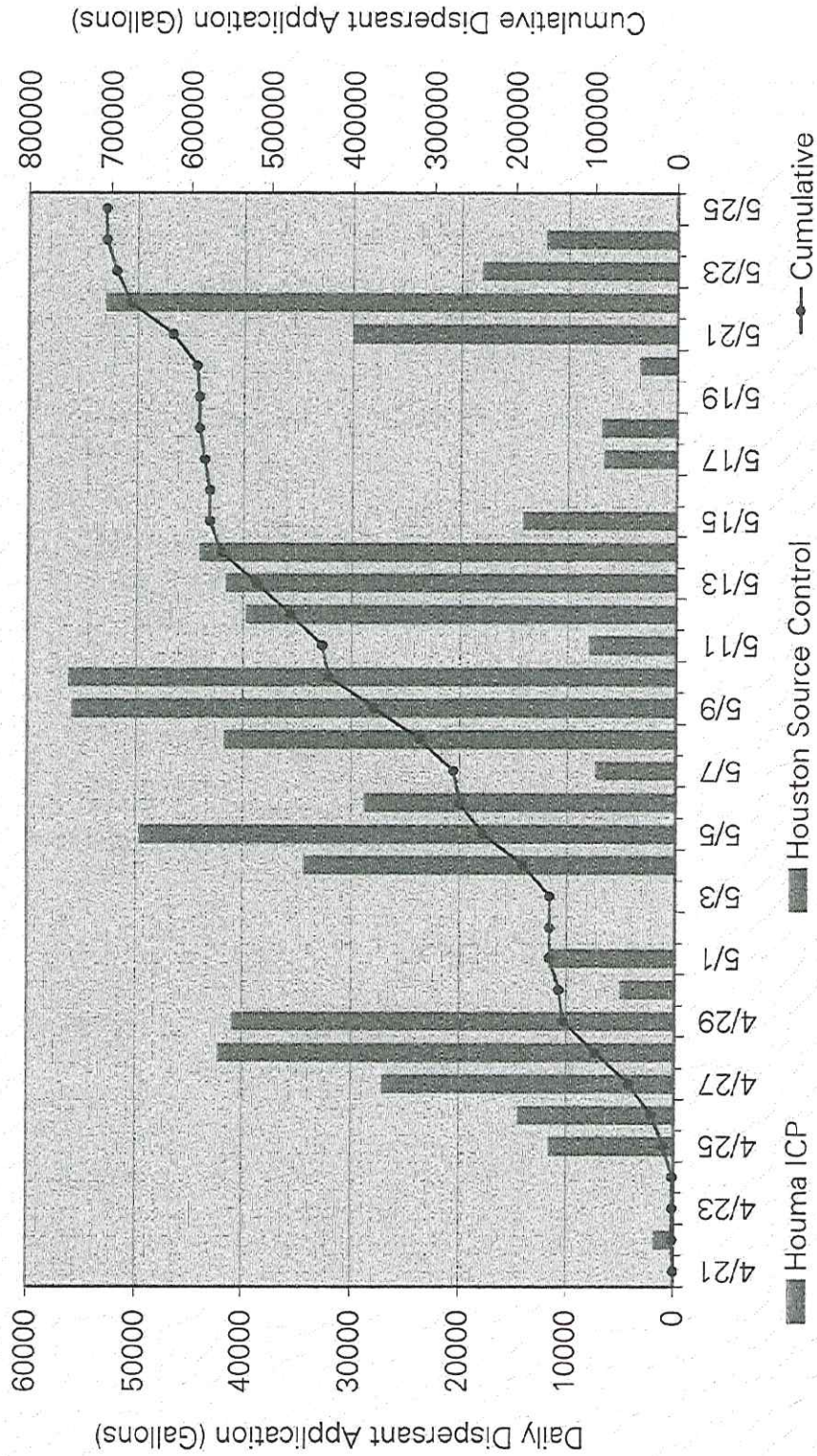
# Subsea Dispersant Timeline



\* Data as of 5/26 00:00 hrs.



# Surface Dispersant Timeline

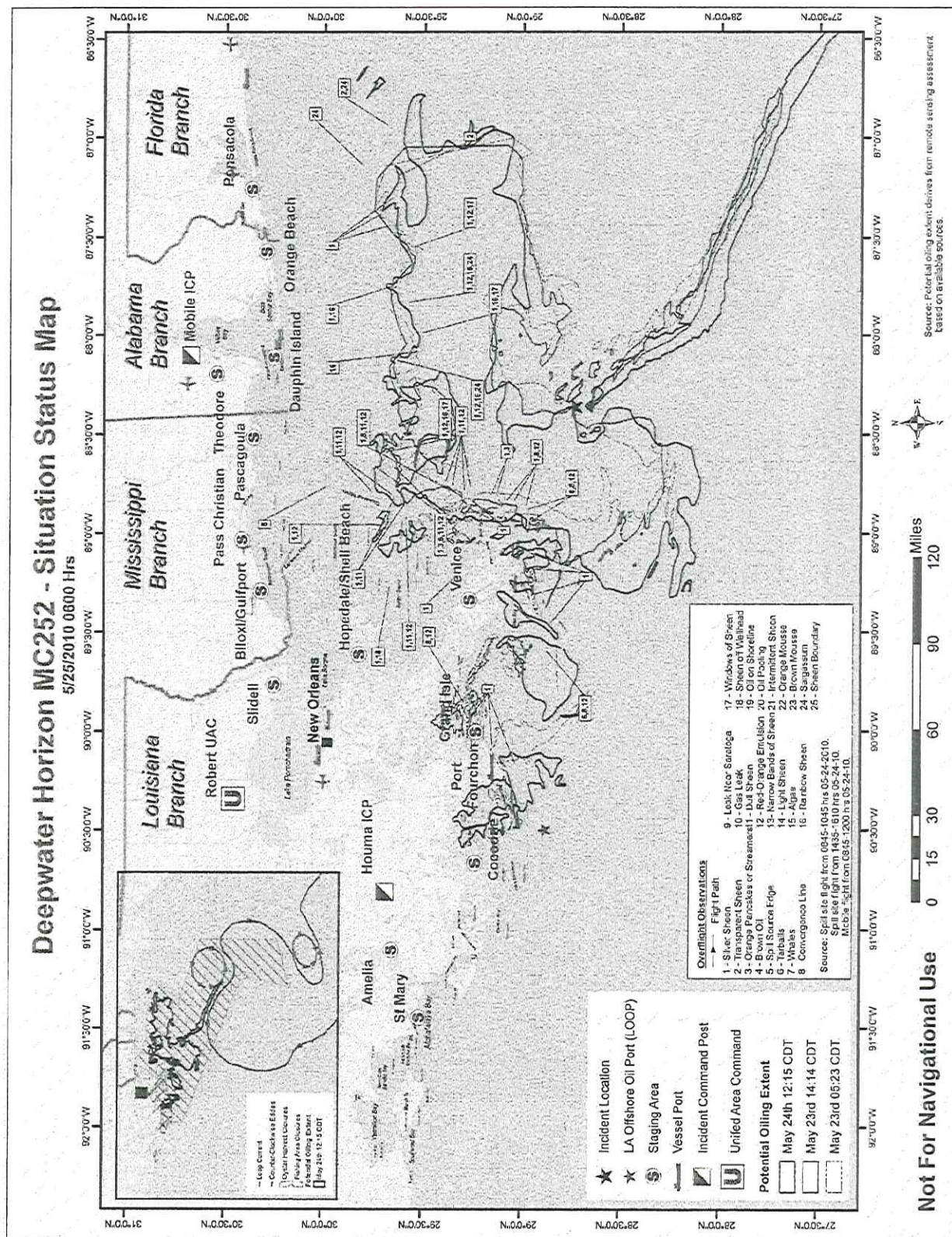


\* Data as of 5/25 22:00 hrs.



# Deepwater Horizon MC252 - Situation Status Map

5/25/2010 0800 Hrs



Not For Navigational Use

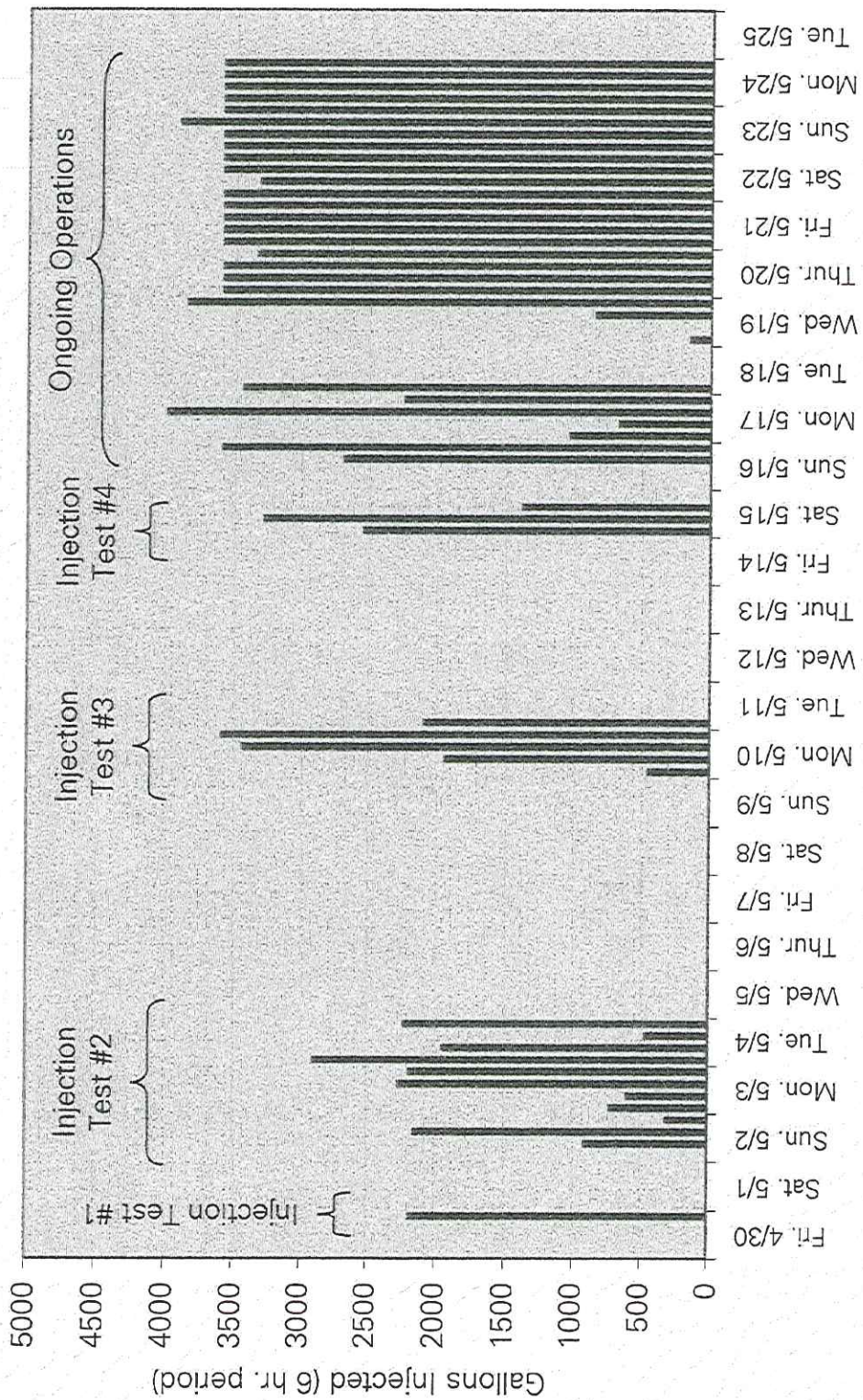
Miles

0 15 30 60 90 120

Source: Potential oiling extent derives from remote sensing assessment based on available sources.



# Subsea Dispersant Timeline

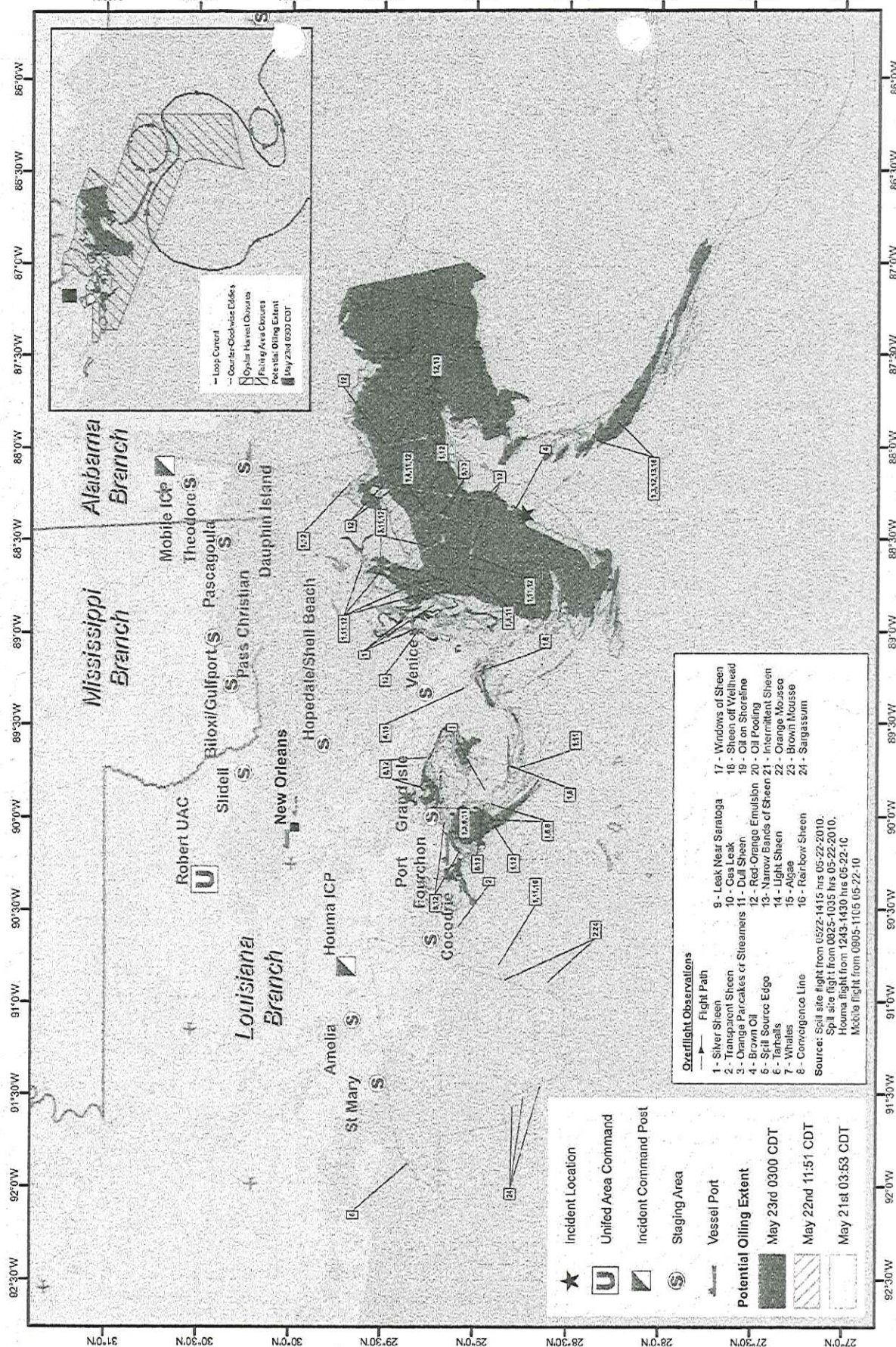


\* Data as of 5/25 00:00 hrs.



# Deepwater Horizon MC252 - Situation Status Map

5/23/2010 0600 Hrs



Not For Navigational Use

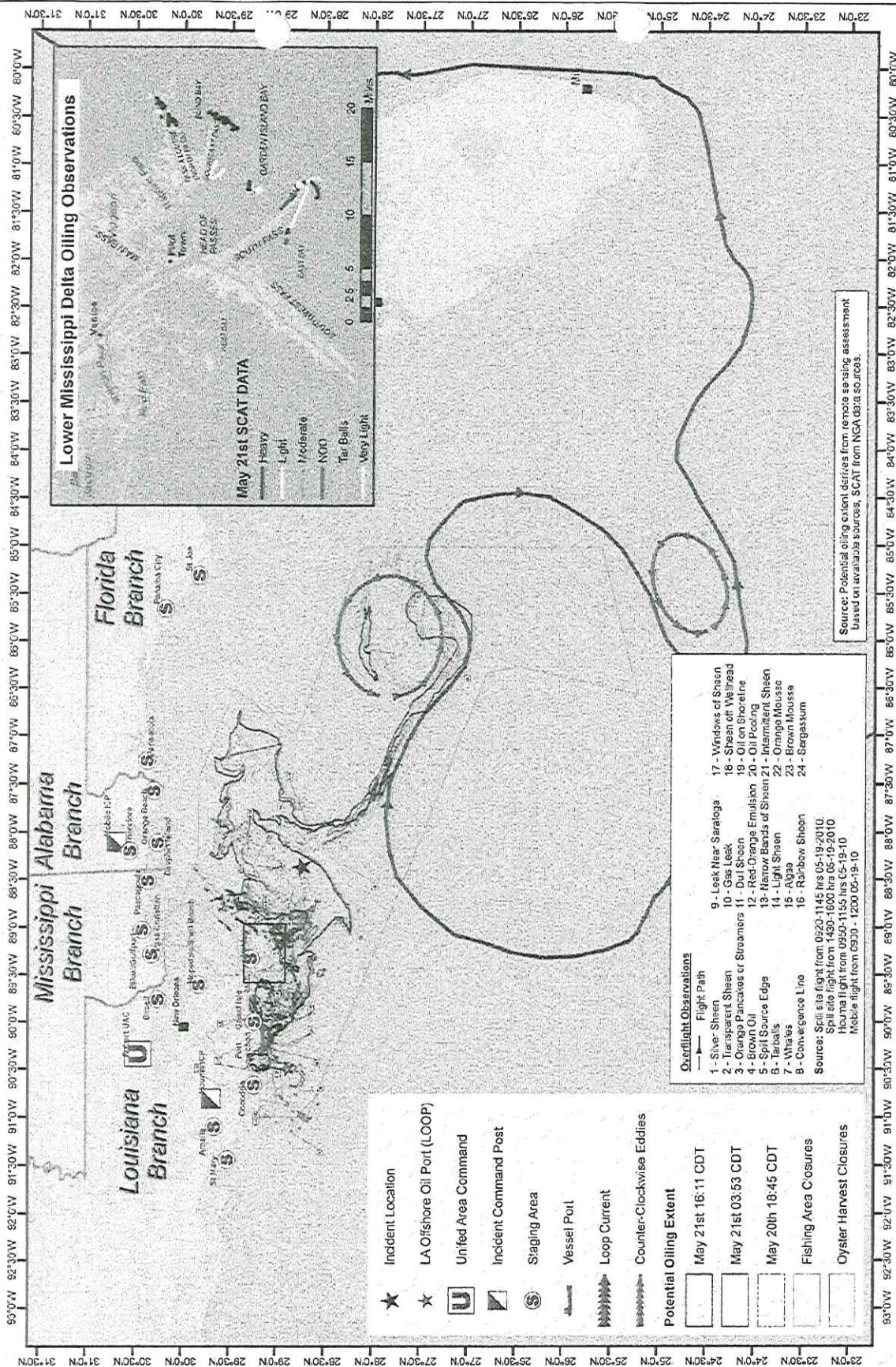
0 20 40 80 120 160 Miles

Source: Potential oiling extent derives from remote sensing assessment based on available sources.



# Deepwater Horizon MC252 - Situation Status Map

5/22/2010 0600 Hrs

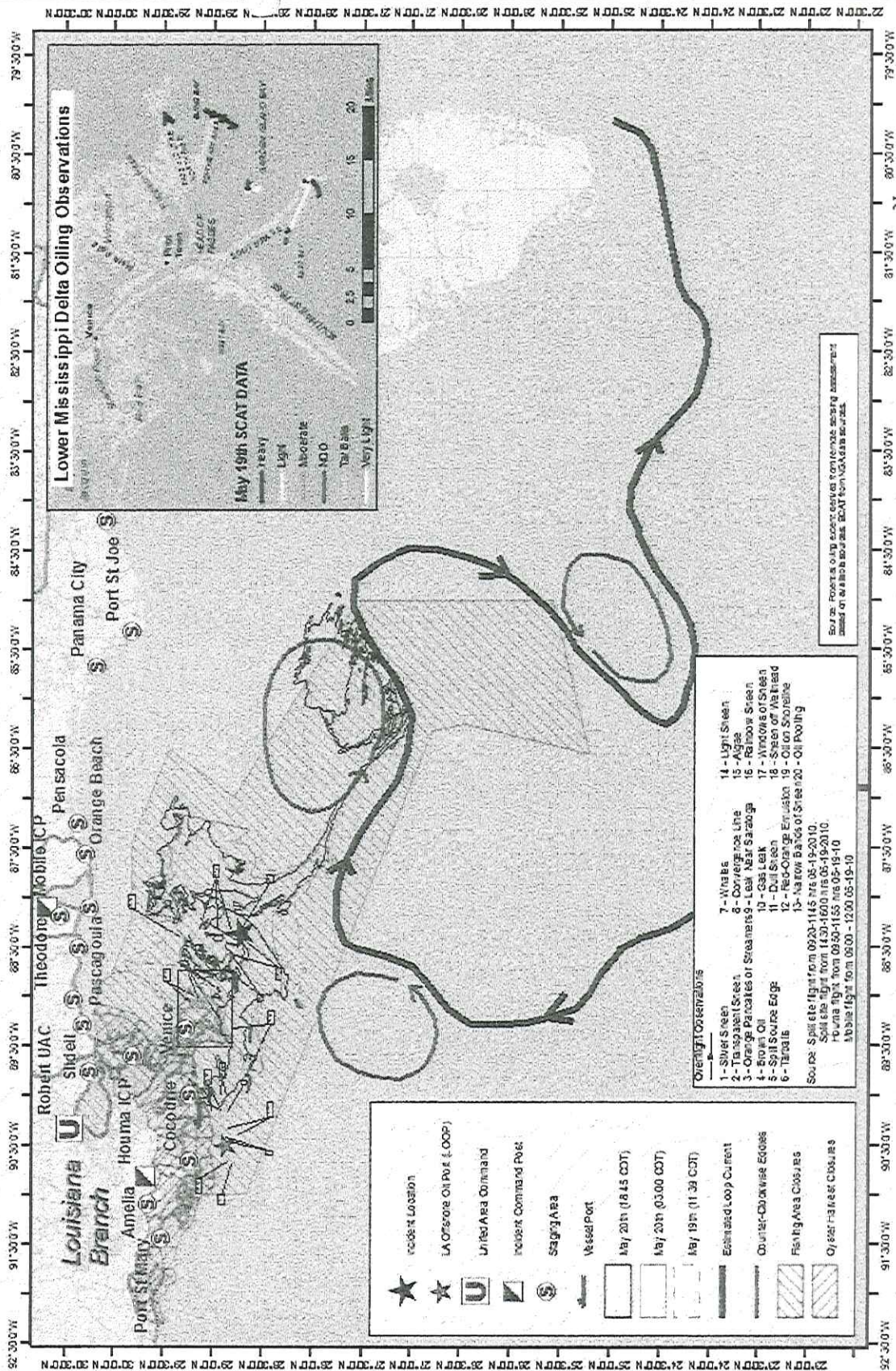


For Official Use Only



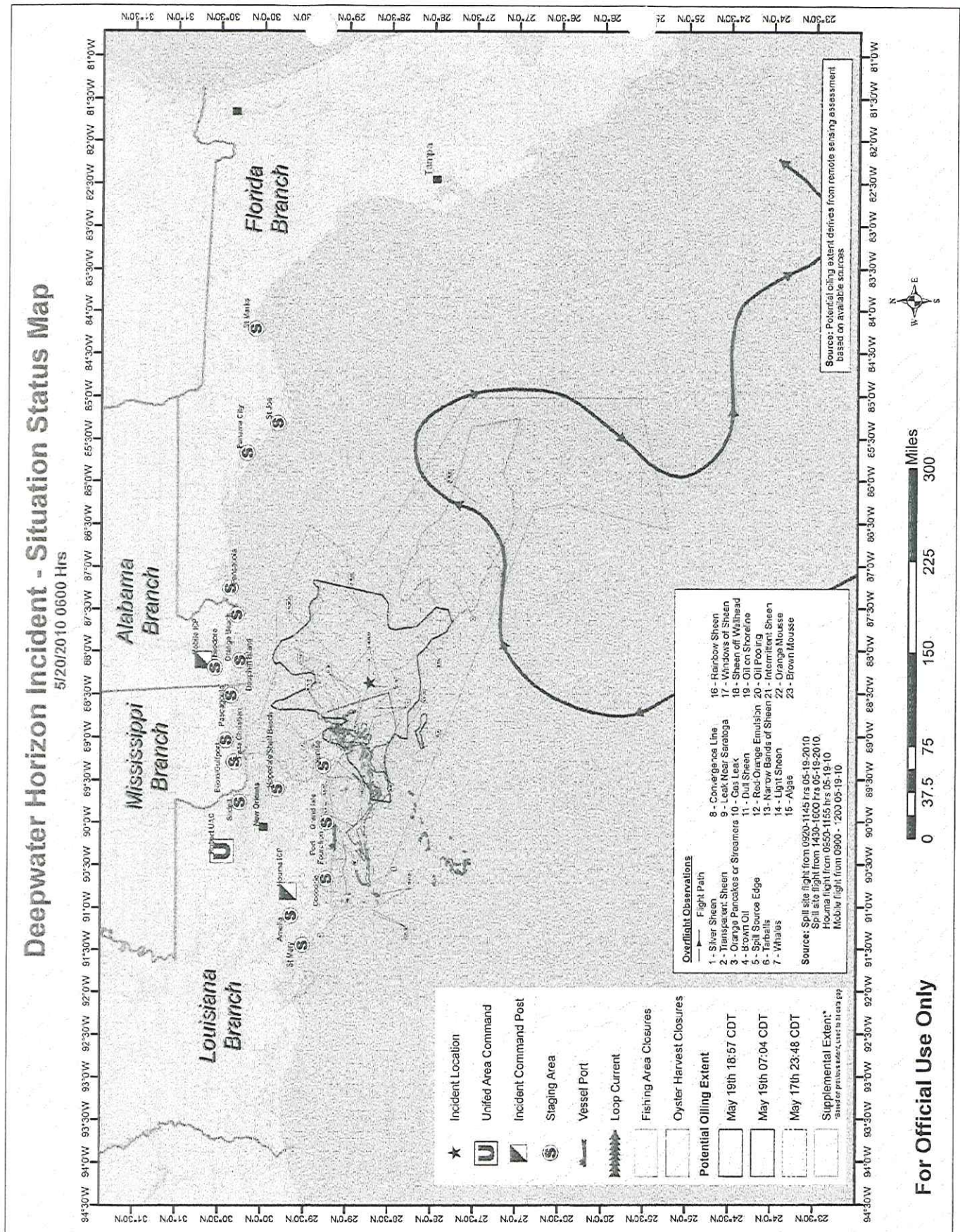
# Deepwater Horizon MC252 - Situation Status Map

05/21/2010 0600 Hrs



For Official Use Only

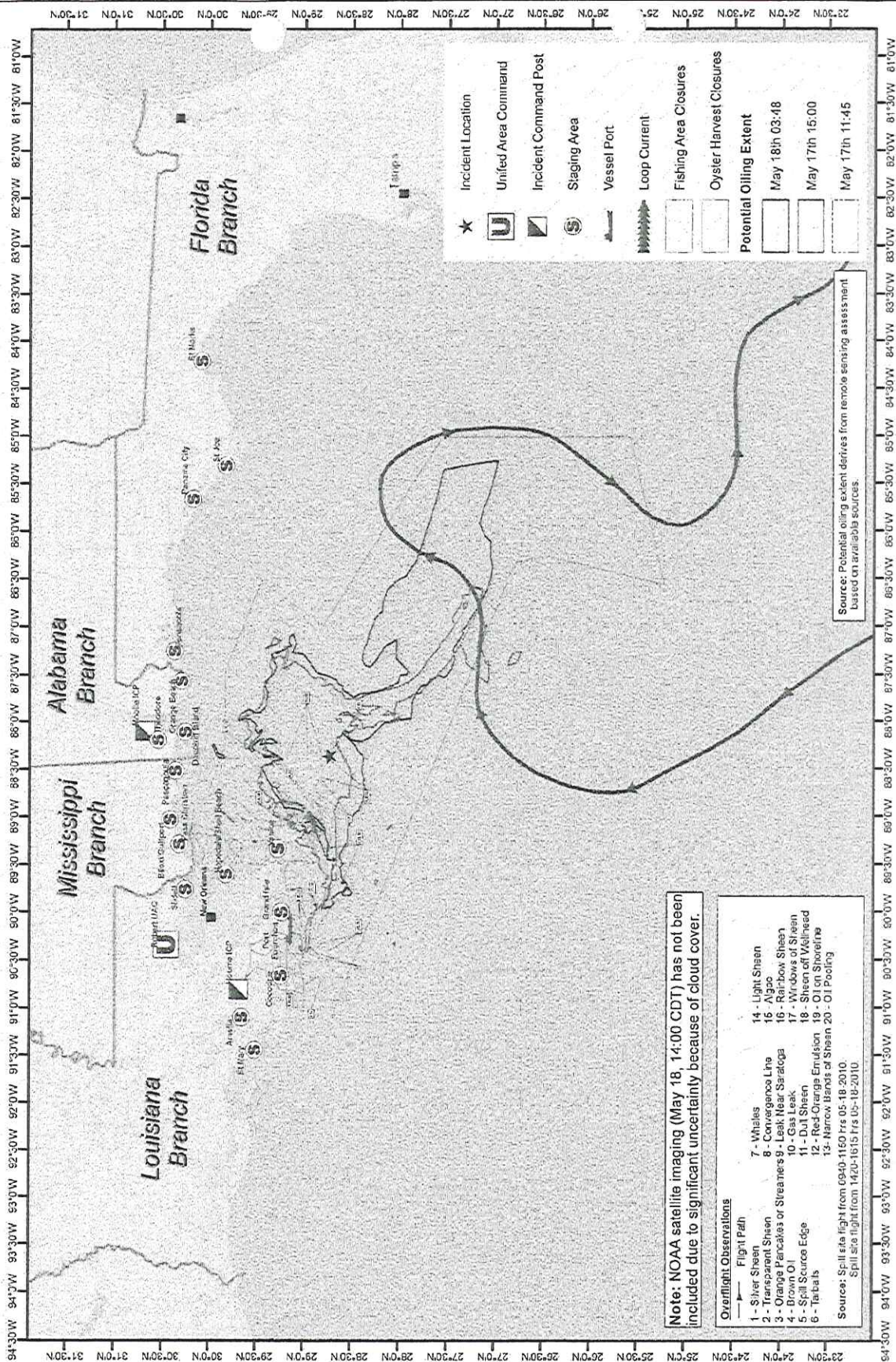






# Deepwater Horizon Incident - Situation Status Map

5/19/2010 0600 Hrs



- ★ Incident Location
- U United Area Command
- Incident Command Post
- Staging Area
- ⚓ Vessel Port
- ~ Loop Current
- - - Fishing Area Closures
- ... Oyster Harvest Closures
- Potential Oiling Extent
- May 18th 03:48
- May 17th 15:00
- May 17th 11:45

Note: NOAA satellite imaging (May 18, 14:00 CDT) has not been included due to significant uncertainty because of cloud cover.

- Overflight Observations**
- 1 - Silver Sheen
  - 2 - Transparent Sheen
  - 3 - Orange Parakees or Shearwaters
  - 4 - Brown Oil
  - 5 - Spill Source Edge
  - 6 - Tarballs
  - 7 - Whales
  - 8 - Convergence Line
  - 9 - Leak Near Sarasota
  - 10 - Gas Leak
  - 11 - Dull Sheen
  - 12 - Red Orange Emulsion
  - 13 - Narrow Bands of Sheen
  - 14 - Light Sheen
  - 15 - Algae
  - 16 - Rainbow Sheen
  - 17 - Wrecks of Sheen
  - 18 - Sheen off Wellhead
  - 19 - Oil on Shoreline
  - 20 - Oil Pooling
- Source: Spill site flight from 0940-1150 Hrs 05-18-2010.  
Spill site flight from 1420-1615 Hrs 05-18-2010.

Source: Potential oiling extent derives from remote sensing assessment based on available sources.

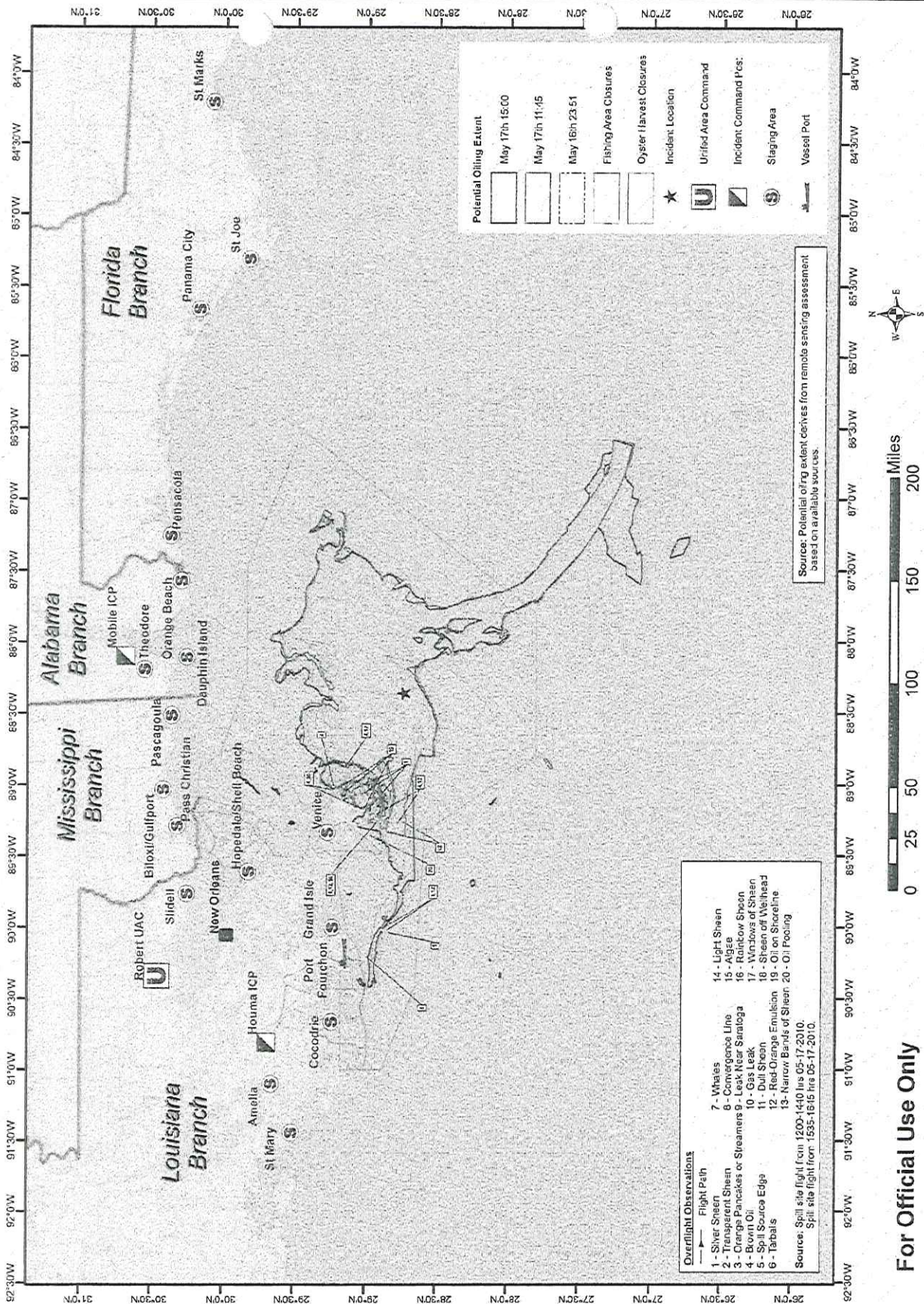


For Official Use Only



# Deepwater Horizon Incident - Situation Status Map

5/18/2010 0600 Hrs



For Official Use Only



Oil on Water Estimate - Low

	sq mi	Cover Factor	gal/sq mi	gals	bbbs
Sheen	5256	0.5	50	131400	3129
Dull oil	597	0.2	666	79520.4	1893
Dark oil	120	0.15	3330	59940	1427

Total oil on water 270660.4 8149

x 2 to compensate for evap and disp

12898

recovered

15838

chemically dispersed

16500

burned

5821

Total emitted

51057

Barrels emitted per day

1891

Oil on Water Estimate - Best Guess

	sq mi	Cover Factor	gal/sq mi	gals	bbbs
Sheen	5256	0.66	333	1155164	27504
Dull oil	597	0.35	1332	278321.4	6627
Dark oil	120	0.25	6660	199800	4757

Total oil on water 1633285 38888

x 2 to compensate for evap and disp

77776

recovered

31676

chemically dispersed

33000

burned

11642

Total emitted

164093

Barrels emitted per day

5707

Oil on Water Estimate - High

	sq mi	Cover Factor	gal/sq mi	gals	bbbs
Sheen	5256	0.75	666	2625372	62609
Dull oil	597	0.5	3330	991005	23657
Dark oil	120	0.35	13320	559440	13320

Total oil on water 4178817 99496

x 2 to compensate for evap and disp

198991

recovered

63352

chemically dispersed

66000

burned

23284

Total emitted

351627

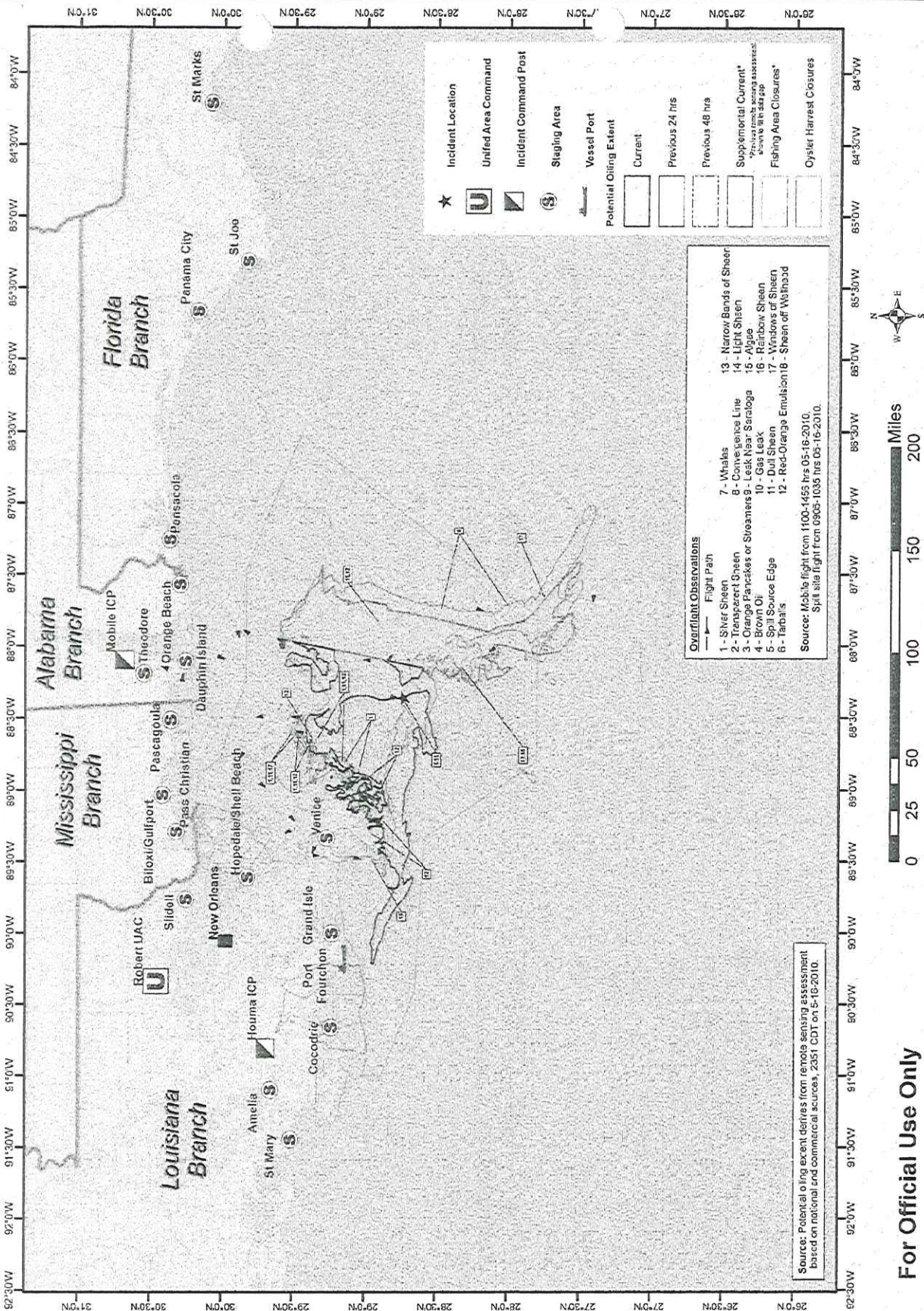
Barrels emitted per day

13023



# Deepwater Horizon Incident - Situation Status Map

5/17/2010 0600 Hrs

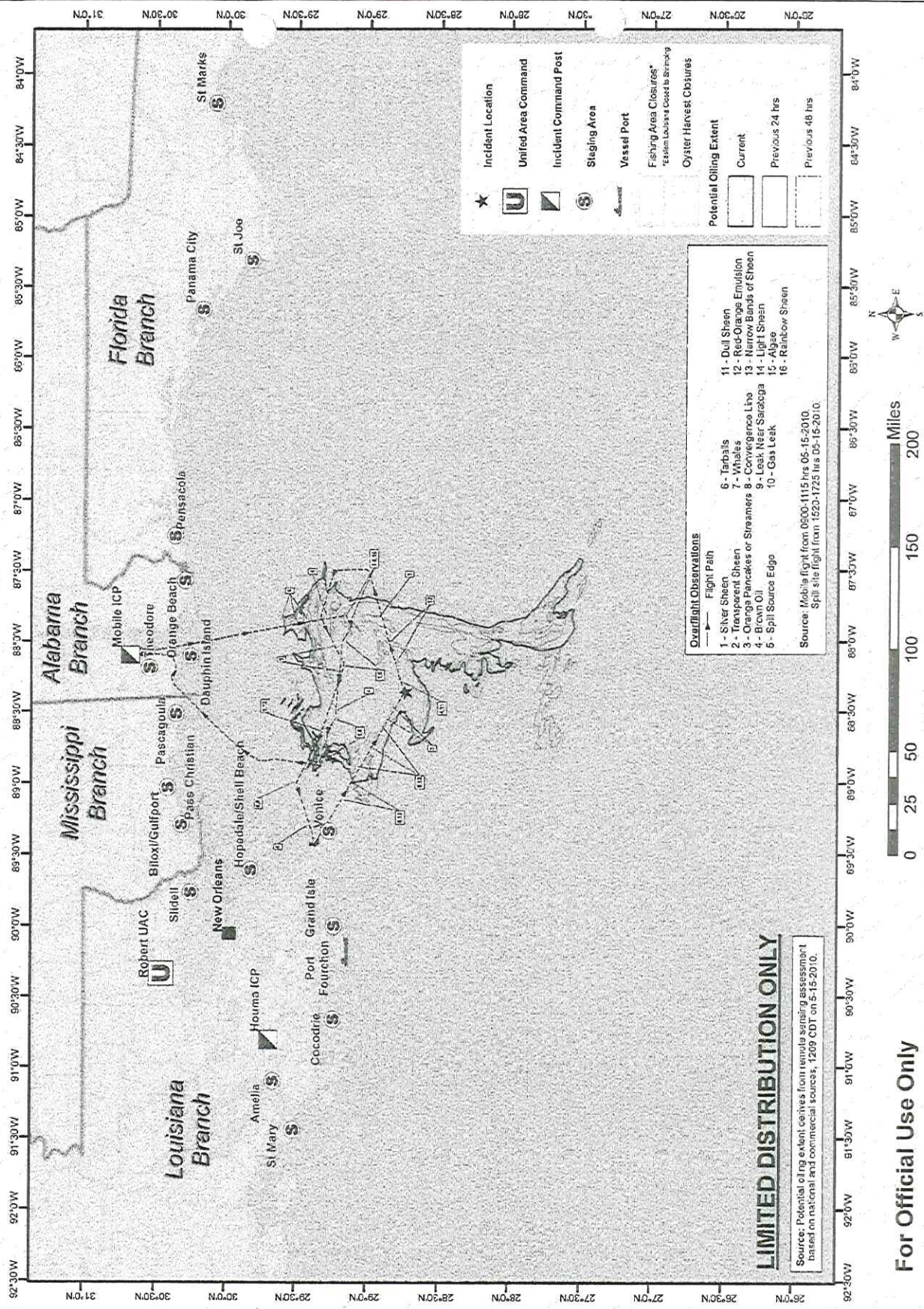


For Official Use Only



# Deepwater Horizon Incident - Situation Status Map

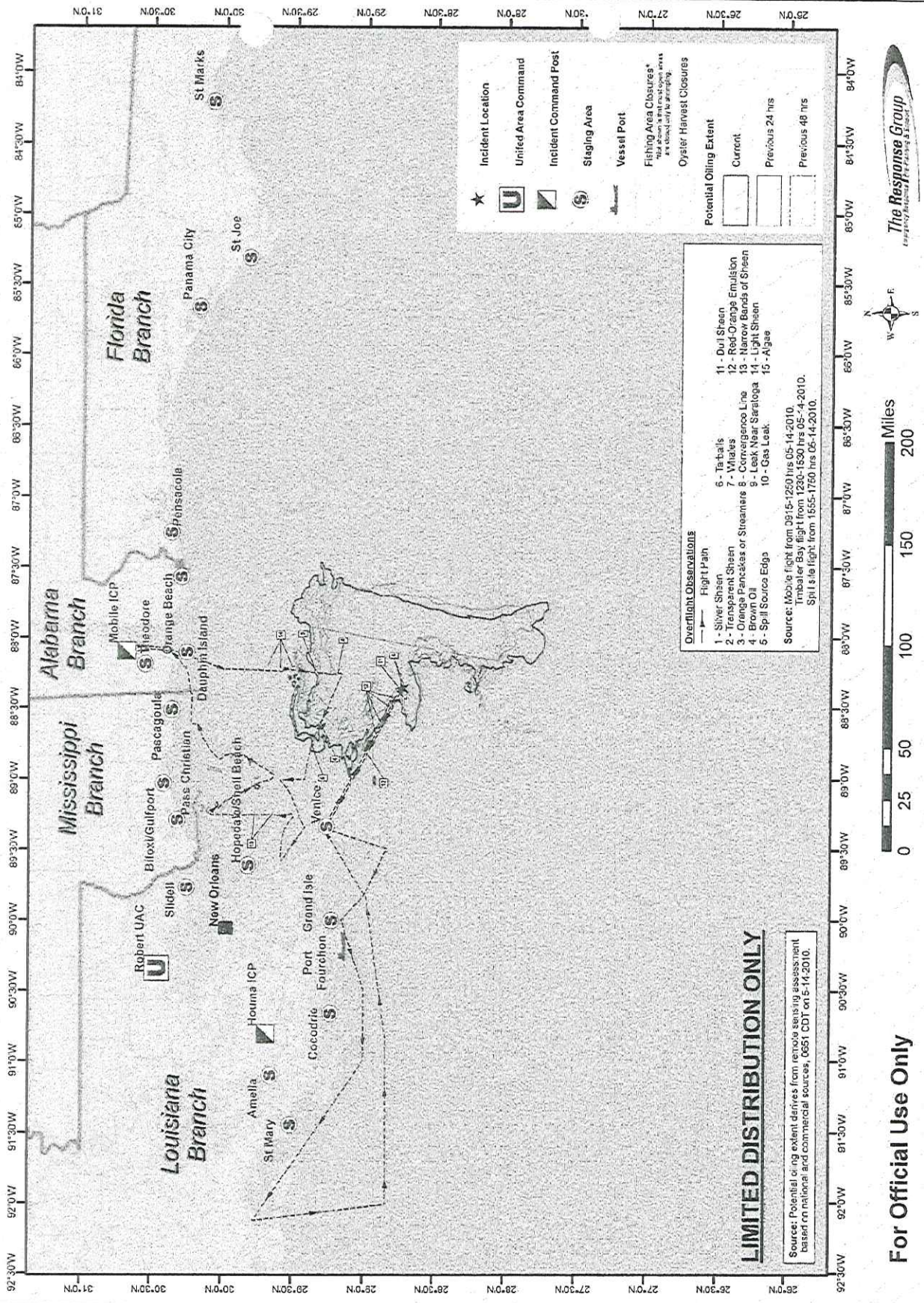
5/16/2010 0600 Hrs





# Deepwater Horizon (MC-252) - Situation Status Map

5/15/2010 0600 Hrs

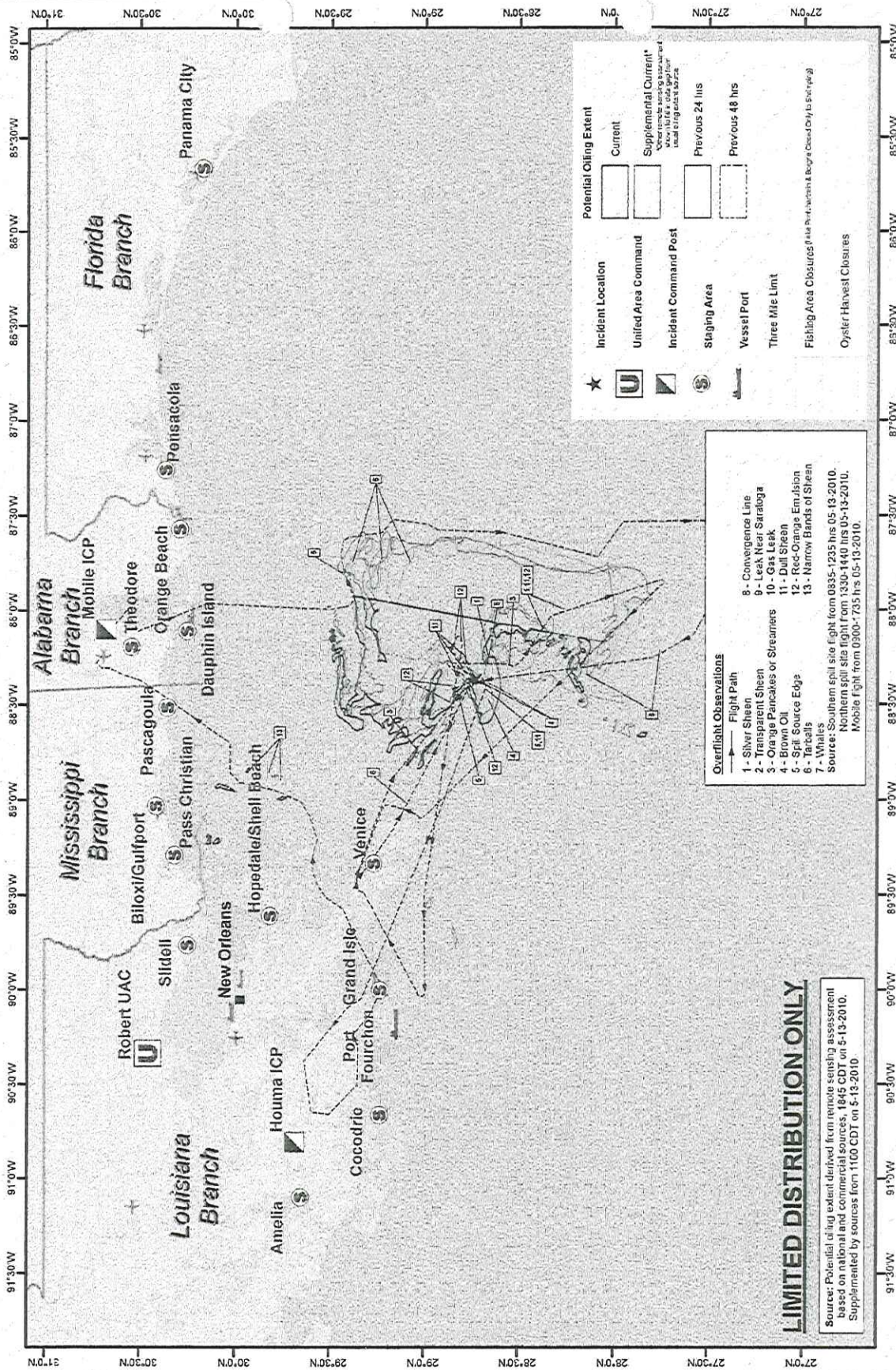




# Deepwater Horizon (MC-252) - Situation Status Map

5/14/2010 0600 Hrs

3799



The Response Group

Miles  
0 20 40 80 120 160

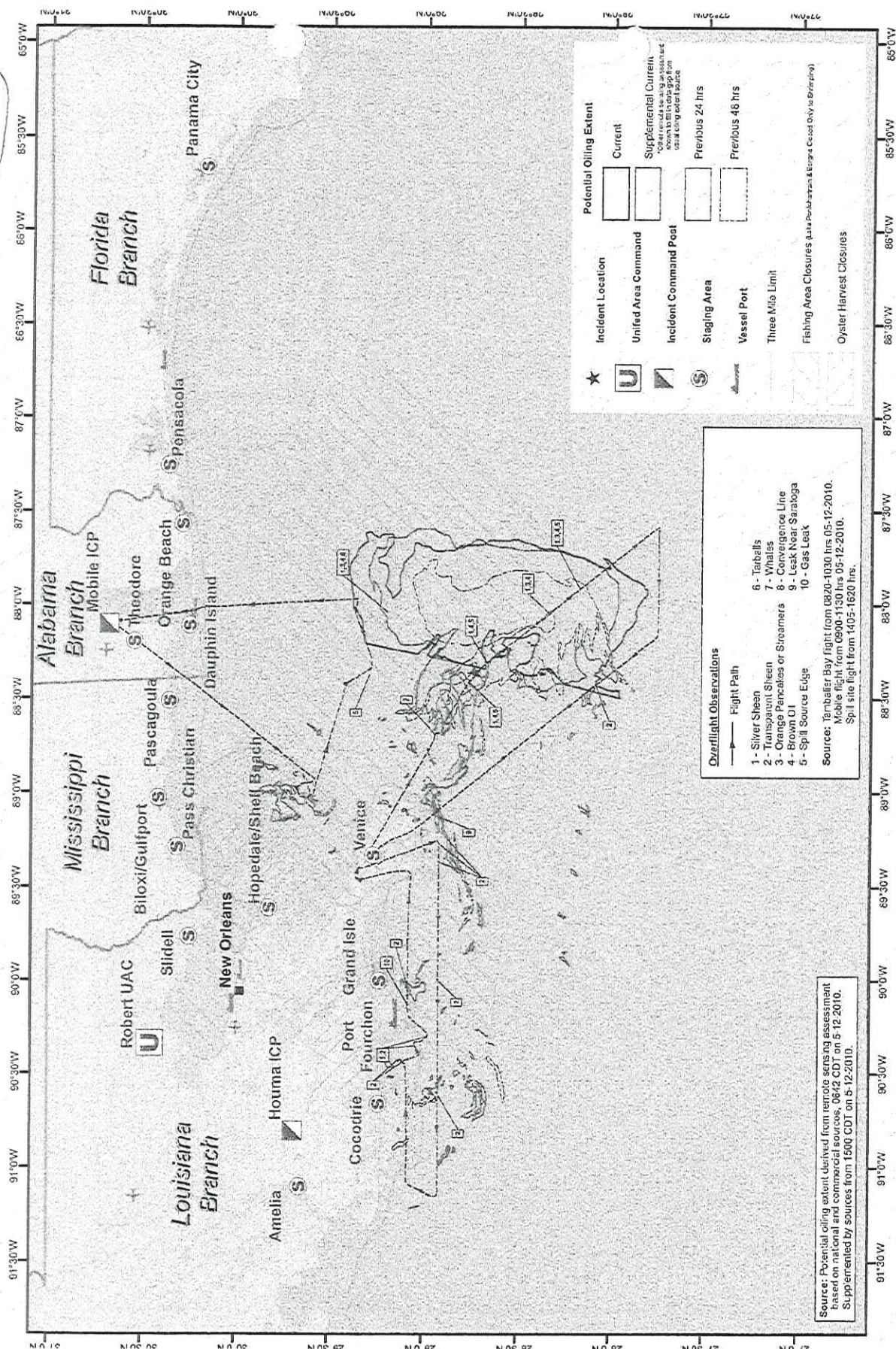
For Official Use Only



# Deepwater Horizon (MC-252) - Situation Status Map

5/13/2010 0600 Hrs

3983



For Official Use Only

0 20 40 80 120 160 Miles



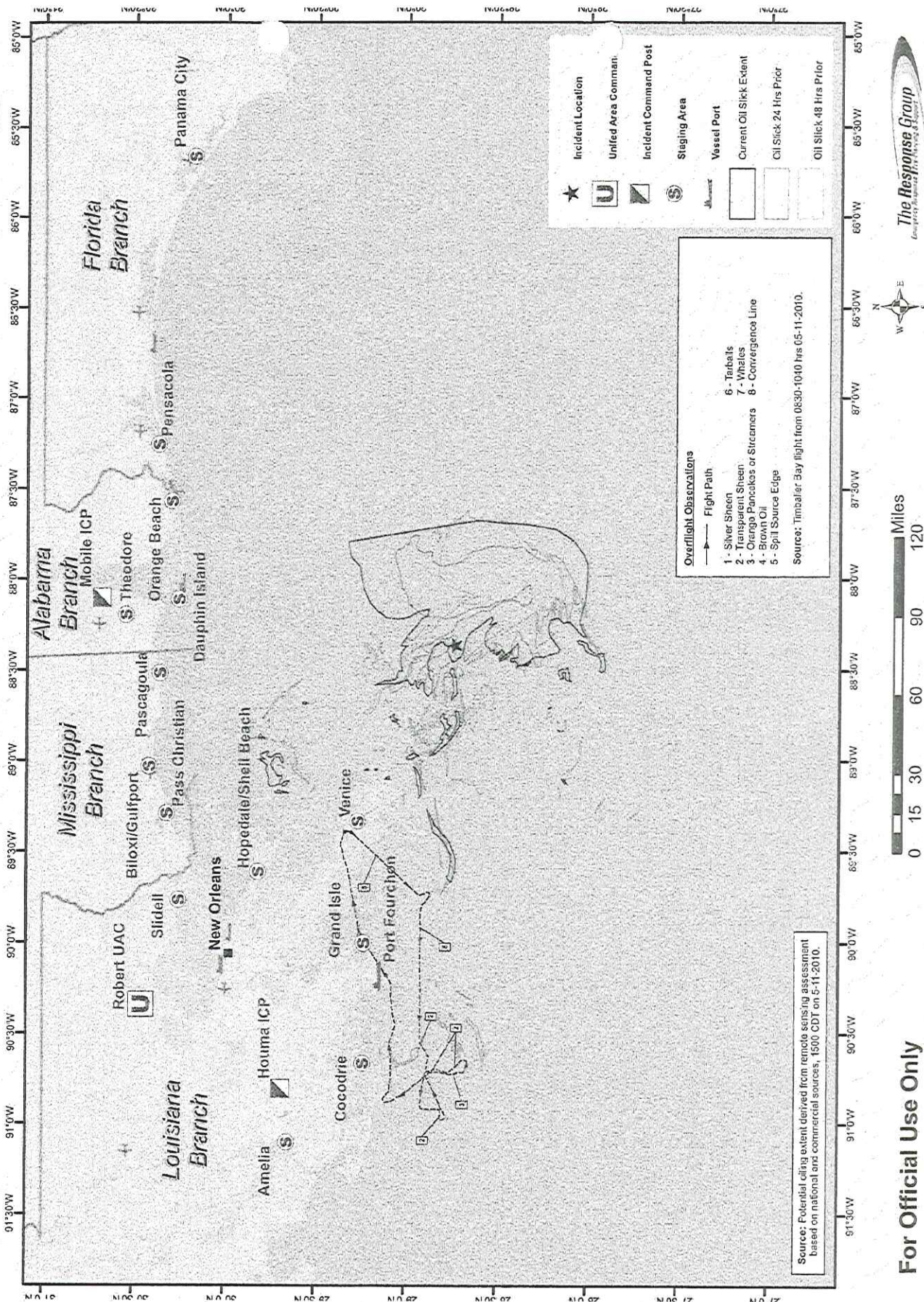
The Response Group



# Deepwater Horizon (MC-252) - Situation Status Map

5/12/2010 0600 Hrs

3441

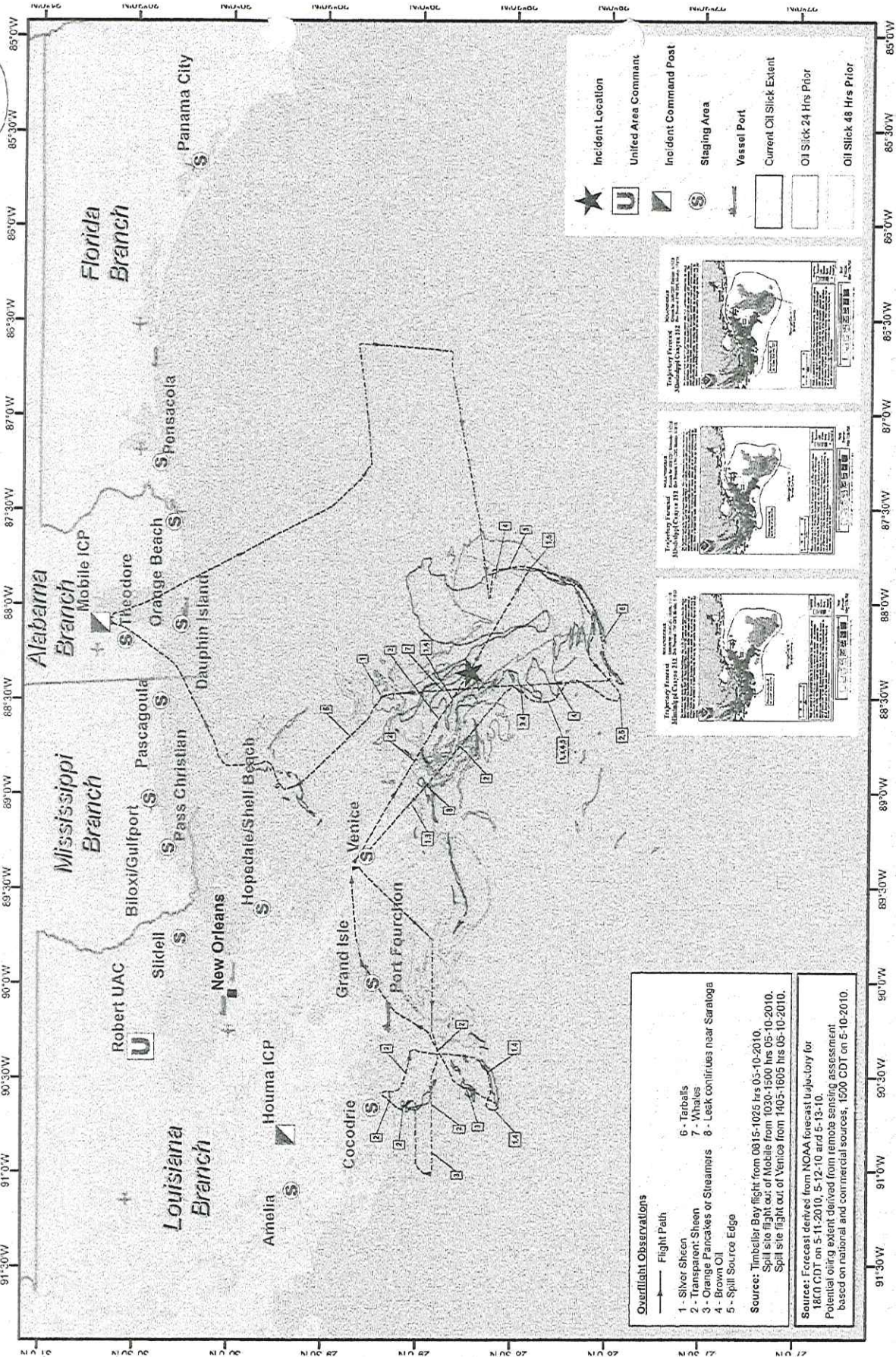




# Deepwater Horizon (MC-252) - Situation Status Map

5/11/2010 0600 Hrs

1914



For Official Use Only

Miles  
0 20 40 80 120 160

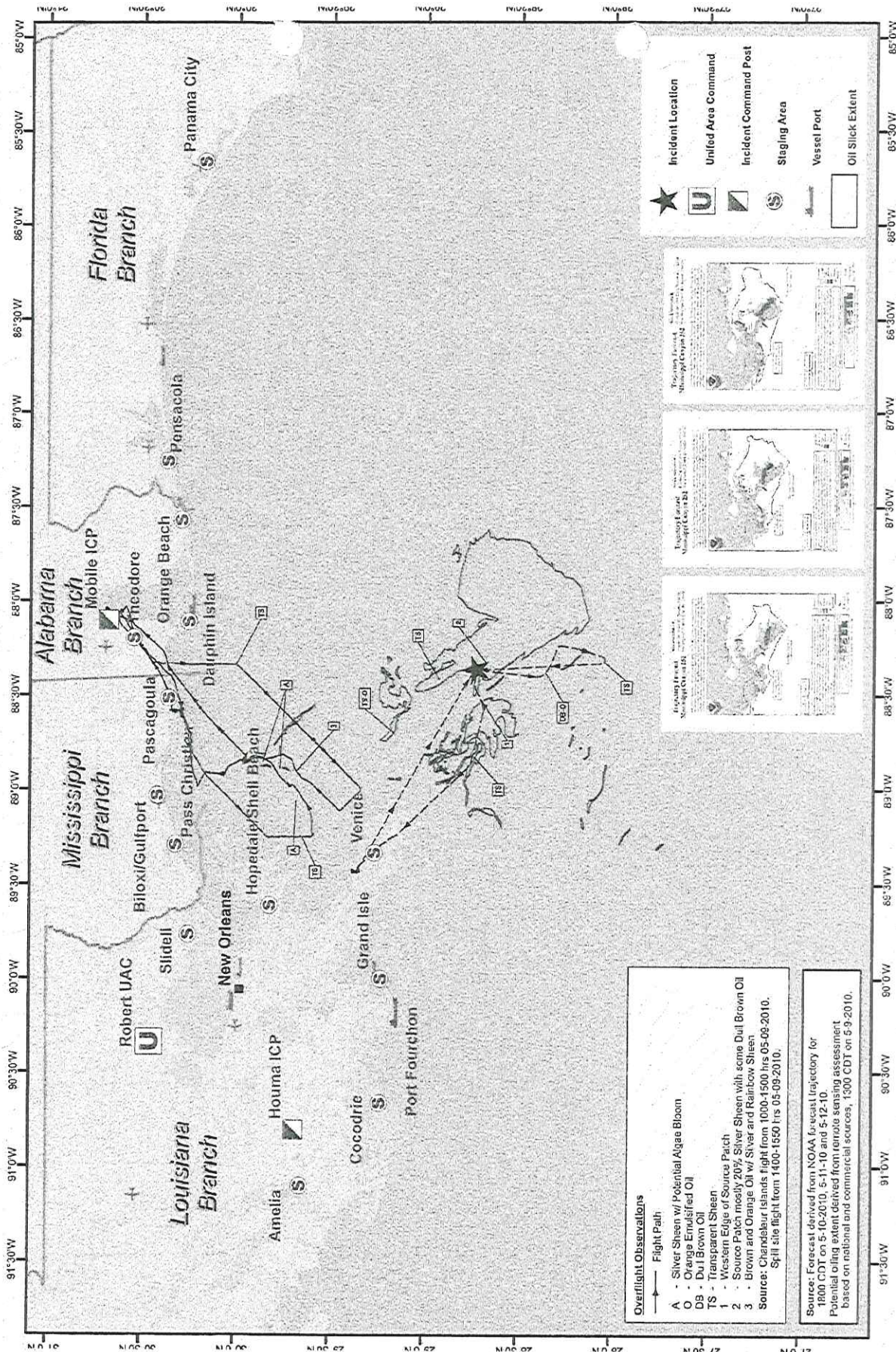


The Response Group



# Deepwater Horizon (MC-252) - Situation Status Map

5/10/2010 0600 Hrs

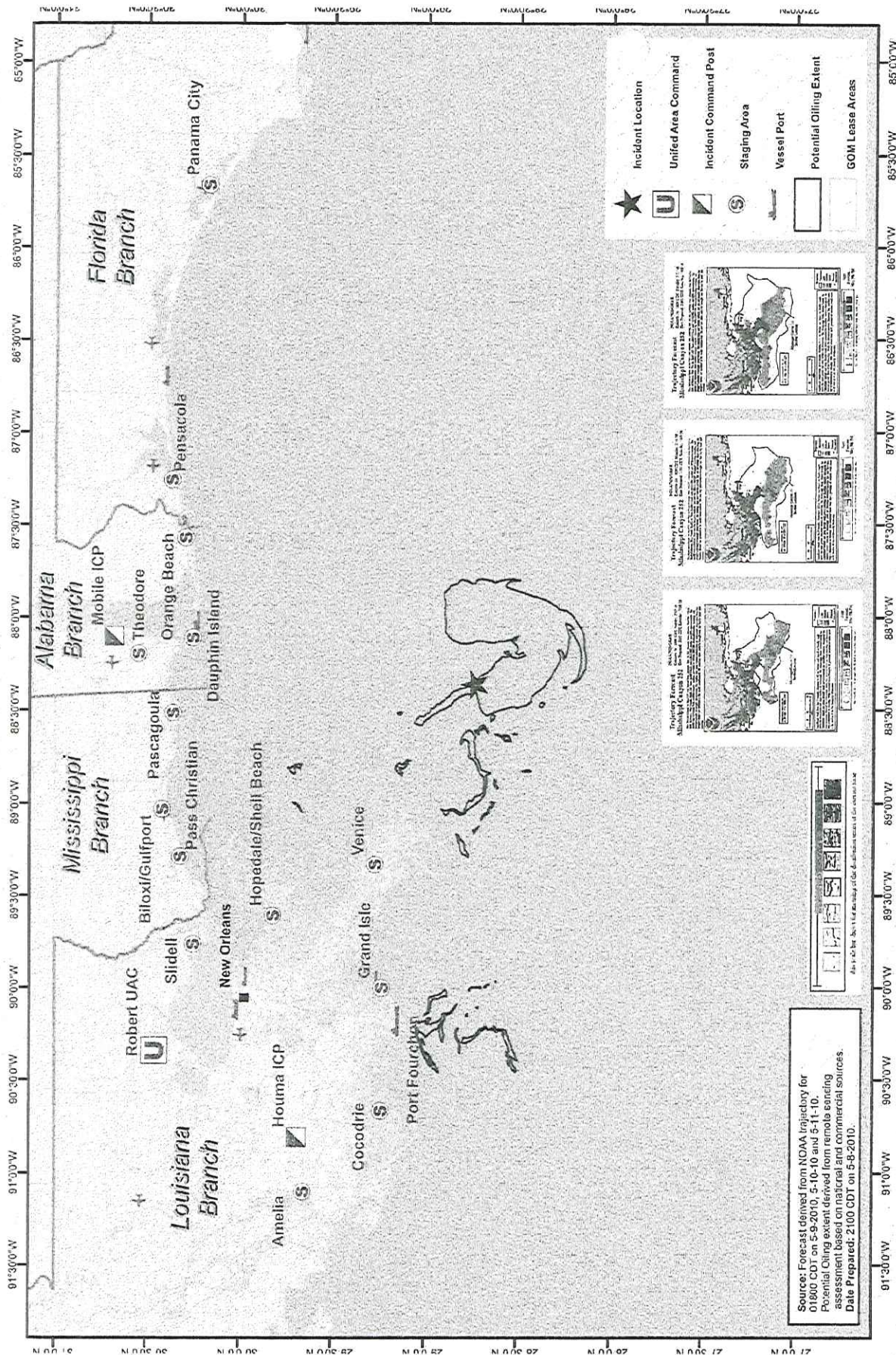


For Official Use Only



# Deepwater Horizon (MC-252) - Situation Status Map

5/9/2010 1800 Hrs



For Official Use Only

0 20 40 80 120 160 Miles



The Response Group



Using "Standard Guide for Visually Estimating Oil Spill Thickness on Water, ASTM F 2534 - 06."

Oil on Water Estimate - Low

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	2481	0.5	50	62025	1477
Dull oil	160	0.2	666	21312	507
Dark oil	35	0.15	3330	17483	416

Total oil on water 100820 2400

x 2 to compensate for evap and disp 4801

recovered 500

chemically dispersed 1600

Total emitted 6901

Barrels emitted per day 920

4/26 15000 3500  
 4/27 27000 3500  
 4/28 42000 4200  
 4/29 41000 4900

Oil on Water Estimate - Best Guess

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	2481	0.68	333	545274	12983
Dull oil	160	0.35	1332	74592	1776
Dark oil	35	0.25	6660	56275	1388

Total oil on water 678141 16146

x 2 to compensate for evap and disp 32292

recovered 2000

chemically dispersed 4900

Total emitted 39192

Barrels emitted per day 5226

Oil on Water Estimate - High

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	2481	0.75	666	1239260	29506
Dull oil	160	0.5	3330	266400	6343
Dark oil	35	0.35	13320	163170	3885

Total oil on water 1666830 39734

x 2 to compensate for evap and disp 79468

recovered 4000

chemically dispersed 7200

Total emitted 90668

Barrels emitted per day 12089



Using "Extended Guidelines for the Use of the Bonn Agreement Oil Appearance Code (BAOAC)"

Oil on Water Estimate - Low

	sq mi	sq km	Cover Factor	litres/sq km	litres	gals	bbbl
Shore	2491	6426	0.5	40	125515	33050	626
Drill oil	163	414	0.2	5000	414386	108472	2626
Dark oil	35	91	0.15	50000	67872	178503	4276
Total oil on water							
x 2 to compensate for evap and disp							
recovered					1222166	323026	7631
chemically dispersed							15332
							500
							1600
Total emitted							17432
Barrels emitted per day							
2311							

Oil on Water Estimate - Best Guess

	sq mi	sq km	Cover Factor	litres/sq km	litres	gals	bbbl
Shore	2491	6426	0.65	300	1272301	334106	8000
Drill oil	163	414	0.35	20000	226217	769307	18245
Dark oil	35	91	0.25	100000	2262400	598877	14254
Total oil on water							
x 2 to compensate for evap and disp							
recovered					6436327	1701060	40502
chemically dispersed							81004
							2000
							4000
Total emitted							87004
Barrels emitted per day							
11721							

Oil on Water Estimate - High

	sq mi	sq km	Cover Factor	litres/sq km	litres	gals	bbbl
Shore	2491	6426	0.75	5000	24566200	6505249	151593
Drill oil	163	414	0.5	50000	10555552	2788910	55192
Dark oil	35	91	0.35	200000	6345471	1576566	39512
Total oil on water							
x 2 to compensate for evap and disp							
recovered					40600225	1078155	256037
chemically dispersed							51274
							4000
							7200
Total emitted							514474
Barrels emitted per day							
69930							



Mass Balance	Best Guess - ASTM	Last 24 hrs	Cumulative
Oil emitted		1000 - 6000	38,397
Oil dispersed naturally		200 - 1200	1235 - 7420
Oil dispersed chemically		500 - 3000	200 - 12000
Oil burned		0	0
Oil evaporated		300 - 1800	2100 - 12600
Oil recovered		120 - 360	470 - 1410
Oil on water		180 - 1440	16,343

Time 0.00  
Date 4.29.2010

Mass Balance	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	8000 - 36000
Oil dispersed naturally	200 - 1200	1035 - 6220
Oil dispersed chemically	500 - 3000	1500 - 9000
Oil burned	0	0
Oil evaporated	300 - 1800	1800 - 10800
Oil recovered	120 - 360	350 - 1050
Oil on water	180 - 1440	1680 - 11440

Time 0.00  
Date 4.28.2010

Mass Balance	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	5000 - 30000
Oil dispersed naturally	200 - 1200	835 - 5020
Oil dispersed chemically	500 - 3000	1000 - 6000
Oil burned	0	0
Oil evaporated	300 - 1800	1500 - 9000
Oil recovered	120 - 360	230 - 690
Oil on water	180 - 1440	1500 - 10000

Time 10.01  
Date 4.27.2010

Mass Balance	Best Guess - ASTM	Last 24 hrs	Cumulative
Oil emitted		1000 - 6000	30,192
Oil dispersed naturally		200 - 1200	7,838
Oil dispersed chemically		500 - 3000	4,900
Oil burned		0	0
Oil evaporated		300 - 1800	11,800
Oil recovered		120 - 360	2,000
Oil on water		180 - 1440	13,000

Time 6:00:00 AM  
Date 4.30.2010

based on 20% of oil emitted

need to refine this number

based on 30% of oil emitted

based on 20% of recovered liquids



Oil on Water Estimate - Low

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1929	0.5	50	48225	1148
Dull oil	238	0.2	666	31702	755
Dark oil	91	0.15	3330	45455	1082

85  
16  
4

Total oil on water	125381	2385
x 2 to compensate for evap and disp		5971
recovered		400
chemically dispersed		1400
Total emitted		7771
Barrels emitted per day		1195

Oil on Water Estimate - Best Guess

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1929	0.66	333	423950	10084
Dull oil	238	0.35	1332	110958	2642
Dark oil	91	0.25	6660	151515	3608

Total oil on water	686428	18343
x 2 to compensate for evap and disp		32687
recovered		1500
chemically dispersed		4200
Total emitted		38387
Barrels emitted per day		5908

Oil on Water Estimate - High

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1929	0.75	666	963536	22941
Dull oil	238	0.5	3330	396270	9435
Dark oil	91	0.35	13320	424242	10101

Total oil on water	1784048	42477
x 2 to compensate for evap and disp		84055
recovered		3000
chemically dispersed		6000
Total emitted		93955
Barrels emitted per day		14455

4/29



Using "Extended Guidelines for the Use of the Bonn Agreement Oil Appearance Code (BAOAC)"

Oil on Water Estimate - Low

	eq ml	eq km	Cover Factor	liters/eq km	liters	gals	lbs
Sheen	1528	4935	0.3	40	59720	24327	623
Oil oil	238	616	0.2	5000	61642	167840	3777
Dark oil	91	238	0.15	6000	176738	469598	11119
Total oil on water					248476	632205	15224
x2 to compensate for evap and disp							31248
recovered							400
chemically disposed							1400
Total emitted							33048
Barrels emitted per day							6009

Oil on Water Estimate - Best Guess

	eq ml	eq km	Cover Factor	liters/eq km	liters	gals	lbs
Sheen	1641	4750	0.66	300	84150	222310	4993
Oil oil	235	609	0.35	2000	466950	1225519	26995
Dark oil	21	54	0.25	19000	159744	386238	8593
Total oil on water					846103	170709	40244
x2 to compensate for evap and disp							81287
recovered							1500
chemically disposed							4000
Total emitted							66287
Barrels emitted per day							15616

Oil on Water Estimate - High

	eq ml	eq km	Cover Factor	liters/eq km	liters	gals	lbs
Sheen	1700	4403	0.75	500	1651174	4351791	103852
Oil oil	152	394	0.5	5000	891055	2295539	61604
Dark oil	21	54	0.35	20000	3507233	1005718	22347
Total oil on water					3015419	7667638	189703
x2 to compensate for evap and disp							378407
recovered							3000
chemically disposed							6000
Total emitted							389407
Barrels emitted per day							70618



Mass Balance

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	5000 - 30000
Oil dispersed naturally	200 - 1200	835 - 5020
Oil dispersed chemically	500 - 3000	1000 - 6000
Oil burned	0	0
Oil evaporated	300 - 1800	1500 - 9000
Oil recovered	120 - 360	230 - 690
Oil on water	180 - 1440	1500 - 10000

Time 10:01  
Date 4.27.2010

Mass Balance

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	6000 - 36000
Oil dispersed naturally	200 - 1200	1035 - 6220
Oil dispersed chemically	500 - 3000	1500 - 9000
Oil burned	0	0
Oil evaporated	300 - 1800	1800 - 10800
Oil recovered	120 - 360	350 - 1050
Oil on water	180 - 1440	1880 - 11440

Time 0:00  
Date 4.28.2010

Mass Balance t Guess - ASTM

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	38,387
Oil dispersed naturally	200 - 1200	1235 - 7420
Oil dispersed chemically	500 - 3000	200 - 12000
Oil burned	0	0
Oil evaporated	300 - 1800	2100 - 12600
Oil recovered	120 - 360	470 - 1410
Oil on water	180 - 1440	19,343

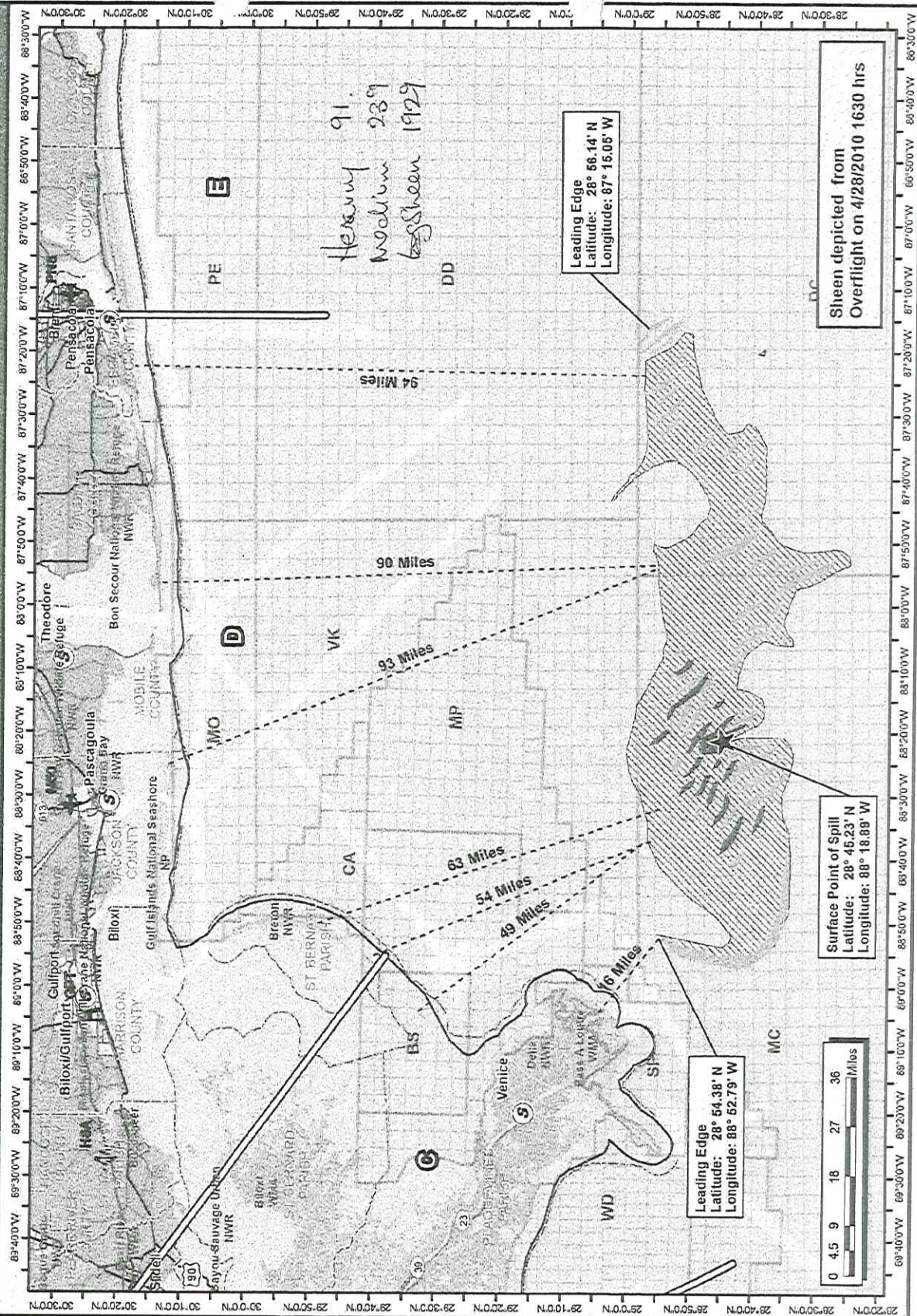
Time 0:00  
Date 4.29.2010



Used for Spreadsheet

MISSISSIPPI CANYON 252  
SITUATION MAP  
4/28/2010 19:00

The Response Group  
Emergency Response  
281-882-0000





Oil on Water Estimate - Low

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1641	0.5	50	41025	977
Dull oil	235	0.2	666	31302	745
Dark oil	21	0.15	3330	10490	250

Total oil on water 82817 1972

x 2 to compensate for evap and disp 3944

recovered 200

chemically dispersed 1000

Total emitted 5144

Barrels emitted per day 935

Oil on Water Estimate - Best Guess

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1641	0.66	333	360559	8587
Dull oil	235	0.35	1332	109557	2609
Dark oil	21	0.25	6660	34965	833

Total oil on water 505181 12028

x 2 to compensate for evap and disp 24056

recovered 450

chemically dispersed 3500

Total emitted 28006

Barrels emitted per day 6092

Oil on Water Estimate - High

	sq mi	Cover Factor	gal/sq m	gals	bbls
Sheen	1641	0.75	666	819680	19516
Dull oil	235	0.5	3330	381275	9316
Dark oil	21	0.35	13320	97902	2331

Total oil on water 1308857 31163

x 2 to compensate for evap and disp 62327

recovered 700

chemically dispersed 6000

Total emitted 69027

Barrels emitted per day 12550



Using "Extended Guidelines for the Use of the Bonn Agreement Oil Appearance Code (BAOAC)"

Oil on Water Estimate - Low

	sq mi	sq km	Cover Factor	thicksq km	liters	gals	bbls
Screen	1611	4250	0.5	46	65003	22453	535
Dull oil	205	535	0.2	6000	60000	160768	3828
Dark oil	21	54	0.15	5000	40753	107762	2566
Total oil on water							6979
x 2 to compensate for evap and cap							13857
recovered							200
chemically disposed							1000
Total emitted							15657
Barrels emitted per day							2738

Oil on Water Estimate - Best Guess

	sq mi	sq km	Cover Factor	thicksq km	liters	gals	bbls
Screen	1611	4250	0.6	300	841534	223310	5231
Dull oil	235	609	0.35	2000	4280550	1125313	28788
Dark oil	21	54	0.25	10000	1359744	356206	8553
Total oil on water							42644
x 2 to compensate for evap and cap							85287
recovered							450
chemically disposed							3500
Total emitted							85237
Barrels emitted per day							14598

Oil on Water Estimate - High

	sq mi	sq km	Cover Factor	thicksq km	liters	gals	bbls
Screen	1720	4409	0.75	5000	1651174	4361791	103352
Dull oil	152	394	0.5	5000	5541955	2558062	61304
Dark oil	21	54	0.55	20000	3607283	1005773	23247
Total oil on water							187703
x 2 to compensate for evap and cap							375407
recovered							700
chemically disposed							6200
Total emitted							6900
Barrels emitted per day							70201



**Mass Balance**

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	5000 - 30000
Oil dispersed naturally	200 - 1200	835 - 5020
Oil dispersed chemically	500 - 3000	1000 - 6000
Oil burned	0	0
Oil evaporated	300 - 1800	1500 - 9000
Oil recovered	120 - 360	230 - 690
Oil on water	180 - 1440	1500 - 10000

Time 10:01  
Date 4.27.2010

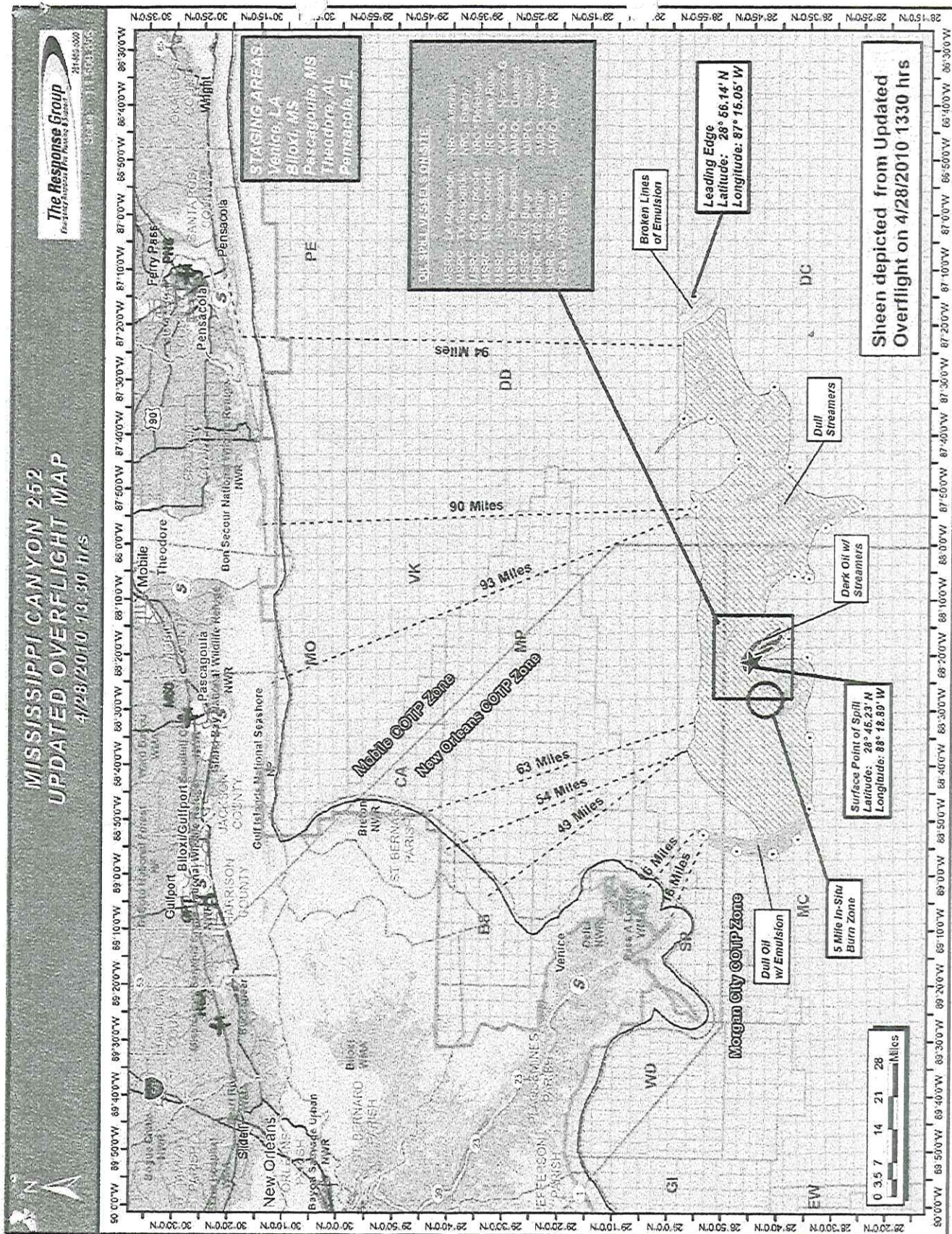
20%  
50% ?  
0  
30%  
12%  
18%

**Mass Balance**

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	6000 - 36000
Oil dispersed naturally	200 - 1200	1035 - 6220
Oil dispersed chemically	500 - 3000	1500 - 9000
Oil burned	0	0
Oil evaporated	300 - 1800	1800 - 10800
Oil recovered	120 - 360	350 - 1050
Oil on water	180 - 1440	1680 - 11440

Time 0:00  
Date 4.28.2010







Polygon Sheen = 1897

Darks = 21

Null = 235

Sheen = 1641



Using "Standard Guide for Visually Estimating Oil Spill Thickness on Water, ASTM F 2534 - 06."

### Oil on Water Estimate - Low

	sq mi	Cover Factor	gal/sq m	gals	bbbls
Sheen	1500	0.5	50	37500	893
Dull oil	250	0.2	666	33300	793
Dark oil	9	0.15	3300	4495.5	107

Total oil on water 75296 1793

x 2 to compensate for evap and disp 3586

recovered 200

chemically dispersed 1000

Total emitted 4786

Barrels emitted per day 1063

### Oil on Water Estimate - Best Guess

	sq mi	Cover Factor	gal/sq m	gals	bbbls
Sheen	1500	0.66	333	329670	7849
Dull oil	250	0.35	1332	116550	2775
Dark oil	9	0.25	6660	14985	357

Total oil on water 461205 10981

x 2 to compensate for evap and disp 21962

recovered 450

chemically dispersed 3500

Total emitted 25912

Barrels emitted per day 5758

### Oil on Water Estimate - High

	sq mi	Cover Factor	gal/sq m	gals	bbbls
Sheen	1500	0.75	666	749250	17839
Dull oil	250	0.5	3330	416250	9911
Dark oil	9	0.35	13320	41958	999

Total oil on water 1E+06 28749

x 2 to compensate for evap and disp 57498

recovered 700

chemically dispersed 6000

Total emitted 64198

Barrels emitted per day 14266

BP Confidential

4/27/2010

Page 1



Using "Extended Guidelines for the Use of the Bonn Agreement Oil Appearance Code (BAOAC)"

Oil on Water Estimate - Low

	sq mi	sq km	Cover Factor	liters/sq km	liters	gals	bbls
Shore	1500	3895	0.5	40	77700	23226	489
Off oil	250	647	0.2	500	64737	17151	4073
On oil	9	23	0.15	5000	17524	45184	1100

Total oil on water 90321 23750 5661

x2 to compensate for evap and disp

recovered

chemically dispersed

Total emitted

Barrels emitted per day

	11122						
	200						
	1000						
	12522						
	2783						

Oil on Water Estimate - Best Guess

	sq mi	sq km	Cover Factor	liters/sq km	liters	gals	bbls
Shore	1500	3895	0.65	300	76328	20028	4833
Off oil	250	647	0.35	20000	453219	1197354	28503
On oil	9	23	0.25	100000	582747	153946	3663

Total oil on water 582413 1554508 37012

x2 to compensate for evap and disp

recovered

chemically dispersed

Total emitted

Barrels emitted per day

	74024						
	450						
	3500						
	77674						
	17328						

Oil on Water Estimate - High

	sq mi	sq km	Cover Factor	liters/sq km	liters	gals	bbls
Shore	1500	3895	0.75	5000	1156883	3011559	97634
Off oil	250	647	0.5	50000	16187423	4278865	137816
On oil	9	23	0.35	200000	1631693	431048	10253

Total oil on water 3238701 8555562 220713

x2 to compensate for evap and disp

recovered

chemically dispersed

Total emitted

Barrels emitted per day

	437426						
	700						
	6000						
	414126						
	92028						

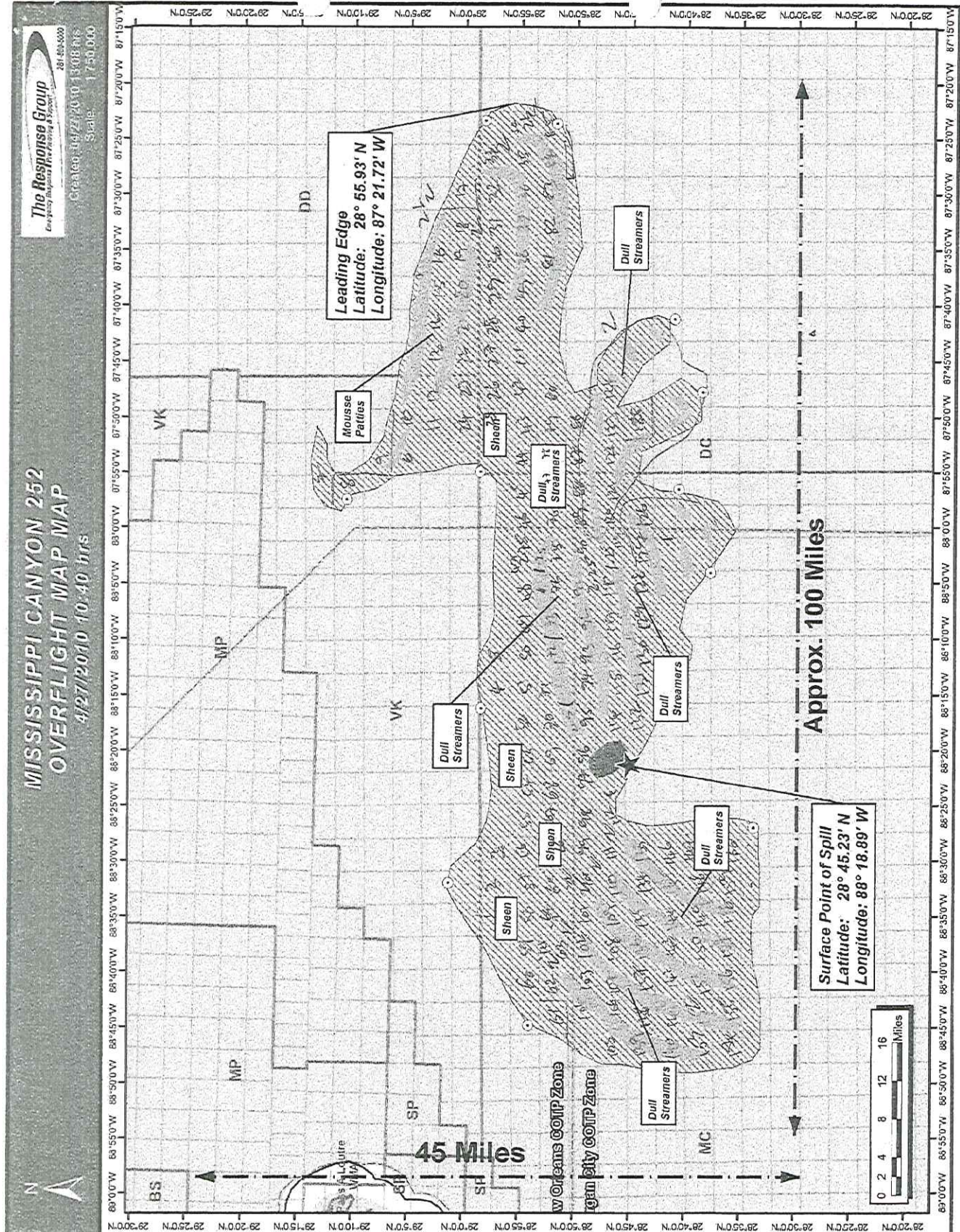


## Mass Balance

	Last 24 hrs	Cumulative
Oil emitted	1000 - 6000	5000 - 30000
Oil dispersed naturally	200 - 1200	835 - 5020
Oil dispersed chemically	500 - 3000	1000 - 6000
Oil burned	0	0
Oil evaporated	300 - 1800	1500 - 9000
Oil recovered	120 - 360	230 - 690
Oil on water	180 - 1440	1500 - 10000

Time 10:01  
Date 4.27.2010







## IC 209 - Incident Status Summary (Oil Spill)

ICS 209 - Incident Status Summary (Oil Spill)																																																																																																																																	
Incident: Mississippi Canyon 252					Prepared By: Salmen, Angelique at 4/27/2010 10:01																																																																																																																												
Period: Period 7 Working (4/27/2010 06:00 - 4/28/2010)					Version Name: 4/27/2010 09:00 MC 252 Response																																																																																																																												
Spill Status (Estimated)					Equipment Resources																																																																																																																												
Source Status: Remaining potential: Unknown <input type="radio"/> Secured Rate of spillage: 42 -250 bbls/hr <input checked="" type="radio"/> Unsecured Amounts below measured in:					<table border="1"> <thead> <tr> <th>Type</th> <th>Ordered</th> <th>Available /Staged</th> <th>Assigned</th> <th>Out-Of-Service</th> </tr> </thead> <tbody> <tr><td>Boom</td><td>400,080</td><td>109,120</td><td>62,780</td><td></td></tr> <tr><td>Dispersant</td><td></td><td>119,734</td><td>29,140</td><td></td></tr> <tr><td>Boom: Fire</td><td>1,000</td><td>2,000</td><td></td><td></td></tr> <tr><td>Sorbent: Pads</td><td></td><td>300</td><td>3</td><td></td></tr> <tr><td>Vessel</td><td>26</td><td>33</td><td>30</td><td></td></tr> <tr><td>Skimmer</td><td>32</td><td>35</td><td>11</td><td></td></tr> <tr><td>Vehicle</td><td>21</td><td>3</td><td>5</td><td></td></tr> <tr><td>Barge: Inland</td><td></td><td>13</td><td>1</td><td></td></tr> <tr><td>OSRV</td><td>1</td><td>1</td><td>11</td><td></td></tr> <tr><td>Storage: Solid</td><td>4</td><td>4</td><td>4</td><td></td></tr> <tr><td>Aircraft: Helo</td><td>3</td><td>2</td><td>6</td><td></td></tr> <tr><td>Aircraft: Fixed Wing</td><td></td><td>2</td><td>8</td><td></td></tr> <tr><td>Storage: Liquid</td><td>5</td><td>1</td><td>4</td><td></td></tr> <tr><td>ROV</td><td></td><td>2</td><td>6</td><td></td></tr> <tr><td>Trailer</td><td>4</td><td>3</td><td>1</td><td></td></tr> <tr><td>Tug</td><td></td><td>1</td><td>6</td><td></td></tr> <tr><td>Dispersant: AppSystem</td><td></td><td></td><td>5</td><td></td></tr> <tr><td>Vacuum Truck</td><td>4</td><td></td><td></td><td></td></tr> <tr><td>Barge: Offshore</td><td></td><td></td><td>3</td><td></td></tr> <tr><td>Crane</td><td>2</td><td></td><td></td><td></td></tr> <tr><td>Generator</td><td>1</td><td></td><td>1</td><td></td></tr> <tr><td>OSRB</td><td></td><td></td><td>2</td><td></td></tr> <tr><td>Sorbent: Boom</td><td></td><td></td><td>2</td><td></td></tr> </tbody> </table>					Type	Ordered	Available /Staged	Assigned	Out-Of-Service	Boom	400,080	109,120	62,780		Dispersant		119,734	29,140		Boom: Fire	1,000	2,000			Sorbent: Pads		300	3		Vessel	26	33	30		Skimmer	32	35	11		Vehicle	21	3	5		Barge: Inland		13	1		OSRV	1	1	11		Storage: Solid	4	4	4		Aircraft: Helo	3	2	6		Aircraft: Fixed Wing		2	8		Storage: Liquid	5	1	4		ROV		2	6		Trailer	4	3	1		Tug		1	6		Dispersant: AppSystem			5		Vacuum Truck	4				Barge: Offshore			3		Crane	2				Generator	1		1		OSRB			2		Sorbent: Boom			2	
Type	Ordered	Available /Staged	Assigned	Out-Of-Service																																																																																																																													
Boom	400,080	109,120	62,780																																																																																																																														
Dispersant		119,734	29,140																																																																																																																														
Boom: Fire	1,000	2,000																																																																																																																															
Sorbent: Pads		300	3																																																																																																																														
Vessel	26	33	30																																																																																																																														
Skimmer	32	35	11																																																																																																																														
Vehicle	21	3	5																																																																																																																														
Barge: Inland		13	1																																																																																																																														
OSRV	1	1	11																																																																																																																														
Storage: Solid	4	4	4																																																																																																																														
Aircraft: Helo	3	2	6																																																																																																																														
Aircraft: Fixed Wing		2	8																																																																																																																														
Storage: Liquid	5	1	4																																																																																																																														
ROV		2	6																																																																																																																														
Trailer	4	3	1																																																																																																																														
Tug		1	6																																																																																																																														
Dispersant: AppSystem			5																																																																																																																														
Vacuum Truck	4																																																																																																																																
Barge: Offshore			3																																																																																																																														
Crane	2																																																																																																																																
Generator	1		1																																																																																																																														
OSRB			2																																																																																																																														
Sorbent: Boom			2																																																																																																																														
<table border="1"> <thead> <tr> <th></th> <th>Last 24 Hours</th> <th>Total</th> </tr> </thead> <tbody> <tr><td>Tot. Vol. (1000-6000) (4950-29500)</td><td></td><td></td></tr> </tbody> </table>						Last 24 Hours	Total	Tot. Vol. (1000-6000) (4950-29500)																																																																																																																									
	Last 24 Hours	Total																																																																																																																															
Tot. Vol. (1000-6000) (4950-29500)																																																																																																																																	
Mass Balance/Oil Budget																																																																																																																																	
Rcvrd Product (120-360) (230-690)*																																																																																																																																	
Evap. (300-1800) ;(1500-8900)*																																																																																																																																	
Nat. Disp. (200-1200); (835-5020)*																																																																																																																																	
Chem Disp. (500-3000) (1000-5900)																																																																																																																																	
Burned																																																																																																																																	
Floating, Contained																																																																																																																																	
Fltg,Uncont.(180-1440)(1490-10020)*																																																																																																																																	
Onshore																																																																																																																																	
Total spilled product accounted for:					0																																																																																																																												
Waste Management (Estimated)																																																																																																																																	
<table border="1"> <thead> <tr> <th>Type</th> <th>Recovered</th> <th>Stored</th> <th>Disposed</th> </tr> </thead> <tbody> <tr><td>Oil</td><td></td><td></td><td></td></tr> <tr><td>Oily Liquid</td><td>2409</td><td>2409</td><td></td></tr> <tr><td>Liquid</td><td></td><td></td><td></td></tr> <tr><td>Oily Solid</td><td></td><td></td><td></td></tr> <tr><td>Solid</td><td></td><td></td><td></td></tr> </tbody> </table>					Type	Recovered	Stored	Disposed	Oil				Oily Liquid	2409	2409		Liquid				Oily Solid				Solid																																																																																																								
Type	Recovered	Stored	Disposed																																																																																																																														
Oil																																																																																																																																	
Oily Liquid	2409	2409																																																																																																																															
Liquid																																																																																																																																	
Oily Solid																																																																																																																																	
Solid																																																																																																																																	
Shoreline Impacts																																																																																																																																	
<table border="1"> <thead> <tr> <th>Degree of Oiling</th> <th>Affected</th> <th>Cleaned</th> <th>Remaining to be Cleaned</th> </tr> </thead> <tbody> <tr><td>Very Light</td><td></td><td></td><td></td></tr> <tr><td>Light</td><td></td><td></td><td></td></tr> <tr><td>Medium</td><td></td><td></td><td></td></tr> <tr><td>Heavy</td><td></td><td></td><td></td></tr> <tr><td>Total</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>					Degree of Oiling	Affected	Cleaned	Remaining to be Cleaned	Very Light				Light				Medium				Heavy				Total	0	0	0																																																																																																					
Degree of Oiling	Affected	Cleaned	Remaining to be Cleaned																																																																																																																														
Very Light																																																																																																																																	
Light																																																																																																																																	
Medium																																																																																																																																	
Heavy																																																																																																																																	
Total	0	0	0																																																																																																																														
Wildlife Impacts																																																																																																																																	
<table border="1"> <thead> <tr> <th>Type</th> <th>Captured</th> <th>Cleaned</th> <th>Released</th> <th>DOA</th> <th colspan="2">Died in Facility</th> </tr> <tr> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Euth.</th> <th>Other</th> </tr> </thead> <tbody> <tr><td>Bird</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Mammal</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Reptile</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Fish</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Other</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </tbody> </table>					Type	Captured	Cleaned	Released	DOA	Died in Facility							Euth.	Other	Bird							Mammal							Reptile							Fish							Other							Total	0	0	0	0	0	0																																																																					
Type	Captured	Cleaned	Released	DOA	Died in Facility																																																																																																																												
					Euth.	Other																																																																																																																											
Bird																																																																																																																																	
Mammal																																																																																																																																	
Reptile																																																																																																																																	
Fish																																																																																																																																	
Other																																																																																																																																	
Total	0	0	0	0	0	0																																																																																																																											
Safety Status																																																																																																																																	
<table border="1"> <thead> <tr> <th>Type</th> <th>Last 24 Hours</th> <th>Total</th> </tr> </thead> <tbody> <tr><td>Responder Injury</td><td>2</td><td>0</td></tr> <tr><td>Public Injury</td><td>0</td><td>0</td></tr> <tr><td>Other</td><td>0</td><td>17</td></tr> </tbody> </table>					Type	Last 24 Hours	Total	Responder Injury	2	0	Public Injury	0	0	Other	0	17																																																																																																																	
Type	Last 24 Hours	Total																																																																																																																															
Responder Injury	2	0																																																																																																																															
Public Injury	0	0																																																																																																																															
Other	0	17																																																																																																																															
Safety Status as of 4/27/2010 0900hrs. 17 Injured from 4/20/2010 Initial incident, 11 Missing, 2 responder injuries as of 0900 4/27/2010.					Mass Balance Information based on 4/26/2010 Overflight. * Ranges included in left column of Mass Balance/Oil Budget * Total spilled product accounted for: 4950-29500 bbls Dispersant availability summary can be obtained from Operations Section Chief. 10 Vessels conducting on-going skimming operations Personnel Resources will be updated with the 1400 ICS 209 Report																																																																																																																												
Personnel Resources <table border="1"> <thead> <tr> <th>Organization</th> <th>People in the Field</th> <th>People in Cmd. Post</th> <th>Total People On Scene</th> </tr> </thead> <tbody> <tr><td>Federal</td><td>3</td><td>110</td><td>113</td></tr> <tr><td>State</td><td></td><td>5</td><td>5</td></tr> <tr><td>Local</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>RP</td><td>1</td><td>196</td><td>197</td></tr> <tr><td>Contract Personnel</td><td>545</td><td>137</td><td>682</td></tr> <tr><td>Volunteers</td><td></td><td></td><td>0</td></tr> <tr><td></td><td></td><td></td><td>0</td></tr> <tr><td></td><td></td><td></td><td>0</td></tr> <tr><td></td><td></td><td></td><td>0</td></tr> </tbody> </table>					Organization	People in the Field	People in Cmd. Post	Total People On Scene	Federal	3	110	113	State		5	5	Local	0	0	0	RP	1	196	197	Contract Personnel	545	137	682	Volunteers			0				0				0				0	Total Response Personnel: 997																																																																																				
Organization	People in the Field	People in Cmd. Post	Total People On Scene																																																																																																																														
Federal	3	110	113																																																																																																																														
State		5	5																																																																																																																														
Local	0	0	0																																																																																																																														
RP	1	196	197																																																																																																																														
Contract Personnel	545	137	682																																																																																																																														
Volunteers			0																																																																																																																														
			0																																																																																																																														
			0																																																																																																																														
			0																																																																																																																														
Special Notes																																																																																																																																	

ICS 209 - Incident Status Summary (Oil Spill)

Printed: 4/27/2010 11:59

Page 1 of 1

© 1997-2010 dbSoft, Inc.



