



Deepwater Horizon In-situ Burn

April 2010

A large offshore oil rig is shown in a state of emergency, with a massive fire and thick black smoke billowing from the top right. The rig's complex structure of steel beams, pipes, and platforms is silhouetted against the bright fire. The sea is dark blue, and the sky is a hazy, overcast grey. The overall scene is one of a major industrial disaster.

Presented by

Rob Schrader

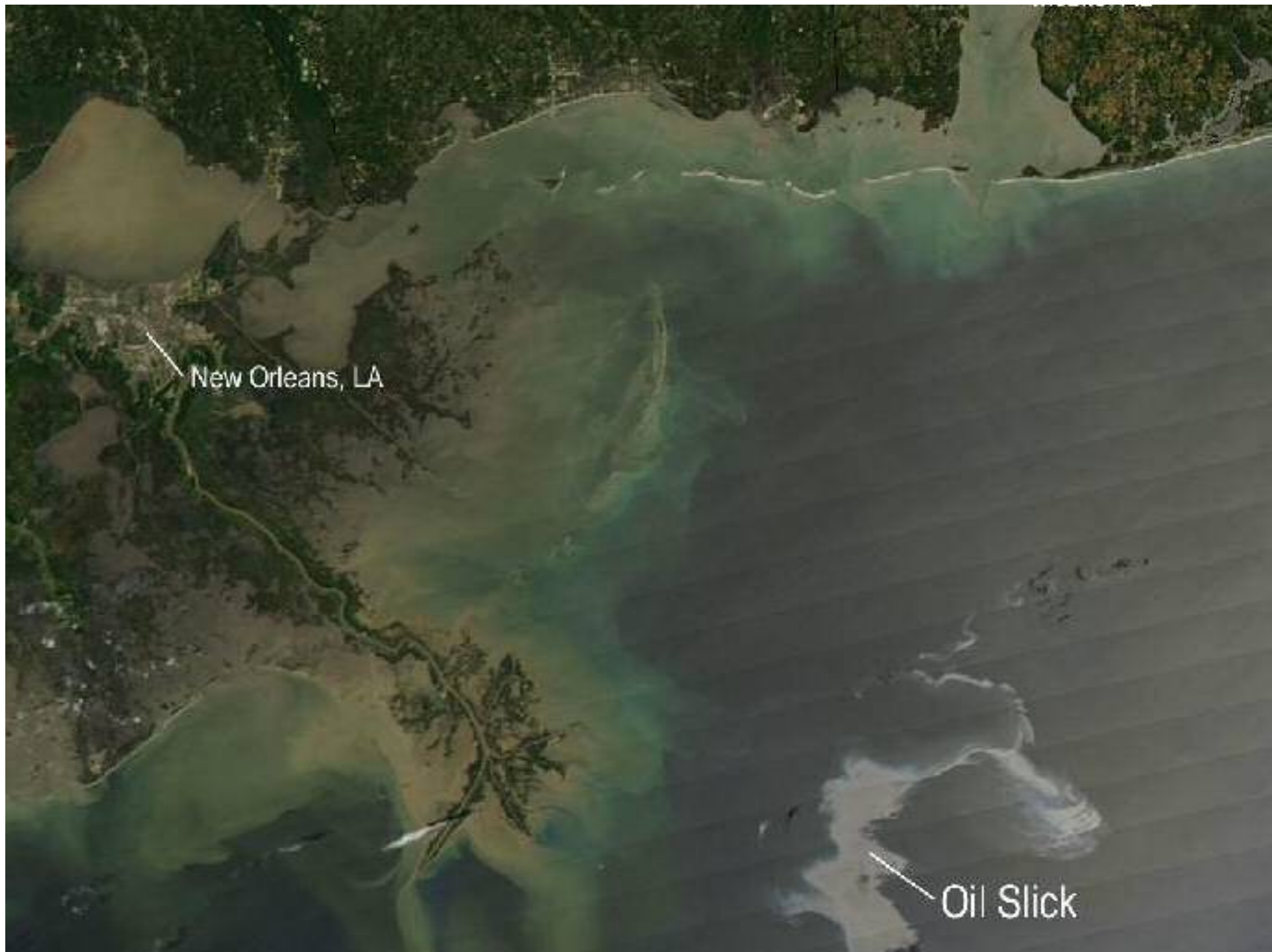
Chief Marine Science Technician

U.S. Coast Guard

Atlantic Strike Team

Background

- Spill Source location: 28°45.23N, 088 °18.89W. Approximately 42 Miles off of Southeast Pass, Louisiana
- The decision to burn by the Incident Command was made due to the fact that:
 - The amount of oil being released was too large for skimmers and dispersants alone.
 - As proven else where in the world, IN-SITU burning when done properly, is safe and an effective way to remove large volumes of oil from the ocean.



New Orleans, LA

Oil Slick



IN-SITU Task Force Fleet

- In the beginning of May 2010 the Burn Task force consists of:
 - One Command Vessel
 - Four Support Vessels
 - Four rigid hull inflatable igniter boats
 - Twenty 65-five foot shrimp vessels (VOOs- Vessels of opportunity or Private Shrimpers)
 - Sixty personnel under the direction of three USCG Strike Team Personnel.
 - Two twin engined air craft.

Tuesday, April 1, 2010

LT Weaver
609-351-7155

In-Situ Burn Group Leader
Rob Schrader 609-309-1740

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Here "NJ" Mobile 281-989-9566

Deputy
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Administration
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Documentation
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Planner/Logistics
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Premier Explorer
ISB Supervisor
DEP David Stevens
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URN Group Leader
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ADMIN
SK3 McCue
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SM
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nise
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Spotter
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Spotter/Technical Advisor 1

Spotter/Technical Advisor 2
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Spotter/Observer 1
Jason Nolin
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Claude Hebert

Logistics
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Lance Bohn
9858604732
Claude Hebert
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Boat 1 Boat 3
Boat 2 Boat 4
PCSRIB

Crew/Supply Vessel
Gulf Storm
337-442-4242

Boom Repair
Jeff

Ignition Coordinator
Donnie Wilson
812-483-0364

Ignition Coordinator
Donnie Wilson

Ignition Team A

Ignition Team C

Ignition Team E

Ignition Team B

Ignition Team D

Ignition Team A
Donnie

Ignition Team B
Alex

Ignition Team C
Stan

Ignition Team D
Monty

ISB Task Force 1
Premier Explorer
504-569

ISB TF 1
Steve Henne 228-990-2695

M/V Pappa John
Gordon Stephens 251-978-2042

Mariner
Johnell Smith- Tiger Safety
0113

ISB TF 2
Bill Darby 985-774-3446

M/V Coastal Mariner
Clay Evans 985-791-0113

Tony Beebe- Tiger Safety
504-751-0229

Tiger Safety

ISB Task Force 2
Sea Fox
504-620-7577

MV?

M/V Poppa John
251-978-2042
Tiger Safety

Team 1 Leader
Bub-Poot-Nae
Ronald "Chevo" Anderson
881622438001
Johnell Smith- Tiger Safety
BLUE

Team 2 Leader
Gulf Rambler
James "T-James" Billiot
881632512053
Wilson Velasquez- Tiger Safety
GREEN

Team 3
Boat 1
ES&H
Mr. Ronald Ju
881622438001
Swight Stoval
ORANGE

Fire Team 1 Leader
F/V 1
Bub-Poot-Nae
Ronald "Chevo" Anderson
985-709-4384

Fire Team 2 Leader
F/V 3
Gulf Rambler
James "T-James" Billiot
985-232-9355
Safety Wilson Velasquez
Tiger Safety

Fire Team 3 Leader
F/V 5
Mister Jug
Ronald "Jug" Dufrane
504-415-9908
Safety 3

Fire Team 4 Leader
F/V 7
Ramie's Wish
John Winstell
985-637-1476
Safety 4

Team 6
Anthony Ber
Big Bad Brad
Brad Friloux
985-817-1073
Tony Beebe- Tiger Safety
M/V Intl. Diamond
504-329-4696
TC Clark
504-234-3228

Team 7 Leader
Joshua John
Shannon Mouldin
985-855-9961
Roy Deyer- Tiger Safety
YELLOW

Team 8 Leader
Die Hard
Terri Pizani
504-382-9708
Tiger Safety
BROWN

Dustin Michael
Denny Adolph
504-650-0308

Mark and Jace
Ivy Dean
881622438001

M/V Braxton Perry
Elysha Remberg
985-791-0229

Captain Craig
Craig Arcement
881622438047

Rebecca Lynn
Bryan Mobley
985-637-2326

F/V 6
Captain Craig
Denny Adolph
504-430-2774
Dwight Stoval
Tiger Safety

F/V 8
Anna Marie
Lance Naccio
985-209-2862
Clay Burgess
Tiger Safety

Boat 4
Malcolm

My Dad Whitney
Whitney Plaisance
504-431-8231

Night Shift
David Dardar
985-665-3404

Boat 2
ES&H

F/V 2
Dustin Michael
Denny Adolph
504-650-0308
Safety Team 2
Roy Dwyer

F/V 4
Mark 'n Jase
Ivy Dean
985-709-2195

IN-SITU Burn Organizational Chart

Task Force Fleet

- **Operational period, 28 April – 03 August 2010**
- **Grew from a 5 person idea to a 264 person multi task force, most with no experience in in-situ burning.**
- **In-situ burn group grew to three task forces by July 31st.**
- **Was continuously staffed with technical advisors, NOAA, USEPA.**
- **Led by USCG on water and at ICP, Houma.**

Tuesday, July 13, 2010

Offshore Operations Deputy
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Bill Darby 985-774-3446

CrossMar7 504-620-9540

Tugs
Emily C. Cheramie
Lady Ora
The Guardian

Crew Boats
Miss Bet
Lisa D

Technical / Scientific Advisor
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Nere' Mabile 281-989-9566

Burn Group 1
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Air Operations/
Documentation
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Dock Operations 985-746-9259
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Burn Group 2
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Matt Fredrickson 609-312-1626
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Ashleigh Scott 985-226-8242

Task Force 1
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Group Leader
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Safety Officer
Tomas Kaselonis

Task Force 2
Sea Fox
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Safety Officer
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Task Force 3
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Group Leader
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Safety Officer
Kyle Higgins

Task Force 4
Vessel Pending

Warrior
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Katie Lynn
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Vessel Pending

Coastal Mariner
985-791-0113

Heather Marie
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Mr. Andre
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Kelly Jo
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Poppa John
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K Marine 5
#?

Vessel Pending

Vessel Pending

Team 1
Dustin Michael
Denny Adolph
504-650-0308
Anna Marie
Lance Naccio
985-209-2862
Tiger Safety
RED

Team 3
Mister Jug
"Jug" Dufrane
504-415-9908
Captain Craig
Craig Arcement
504-430-2774
Tiger Safety
ORANGE

Team 9
Miss Yvette
"AJ" Fabre
504-234-3228
Victoria
Tammi Nguyen
504-669-3513
Tiger Safety
BLACK

Team 5
Big Bad Brad
Brad Briloux
985-817-1073
Lady Lynn
Hung Nguyen
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Tiger Safety
WHITE

Team 7
Night Shift
David Dardar
985-665-3404
Rebecca Lynn
Bryan Mobley
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Tiger Safety
BROWN

Air Field
Jeremiah
Williamson
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Documentation

Team 11
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Hai Huynh
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Phi Thuong
Phi Vo
504-253-0039
Tiger Safety
COLOR

Team 13
Sea World
Luong V Do
504-234-1724
Quoc-Viet
Sau Le
504-419-7796
Tiger Safety
COLOR

Team 15
Pending

Team 17
Pending

Team 2
Gulf Rambler
"T-James" Billiot
985-2329355
Mark & Jace
Ivy Dean
985-709-2195
Tiger Safety
GREEN

Team 4
Die Hard
Terril Pizani
504-382-9708
Texas Lady
Robin Palmisano
504-214-3066
Tiger Safety
PURPLE

Team 10
St. Martin VI
Toung Tran
504-931-1334
Joey Boy
Mui Nguyen
504-416-0316
Tiger Safety
SILVER

Team 6
Joshua John
Shannon Mouldin
985-855-9961
My Dad Whitney
Whitney Plaisance
504-431-8231
Tiger Safety
YELLOW

Team 8
Bub-Poot-Nae
"Chevo" Anderson
985-709-4384
Sea Flower
Sandy Nguyen
504-628-2097
Tiger Safety
BLUE

Spotter 1
Gordon Rice
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Training
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Team 12
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Dung Hoang
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Mother Cabrini
Than Tran
504-722-6181
Tiger Safety
COLOR

Team 14
Niron
Leroy Richards
973-395-6606
Robert William
Mark Daigle
504-908-8751
Tiger Safety
COLOR

Relief Vessel
Daybreak
Tuan Nguyen
504-615-1078

Spotter 2
Ala Hamdan
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Crew Boat
Pending

Spotter 3
Kevin Johnson
985-791-6409

Spotter 4
Flavio DeAndrade
713-297-1155

IN-SITU Burn Organizational Chart

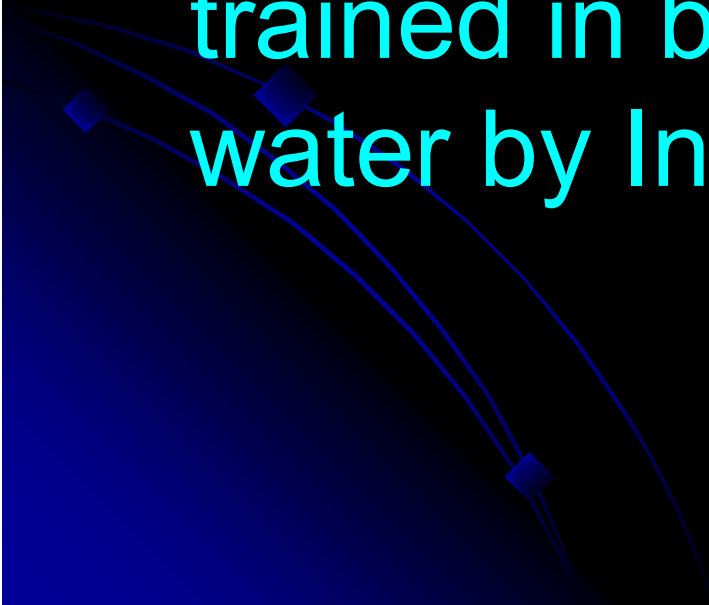
Safety

- **Safety was paramount to the evolution.**
- Industrial hygienists were hired to monitor health & Safety.
 - There were no personnel burns.
 - Safety and air monitoring personnel were on each lead boat of the burn team.
 - Air monitoring for sulfur dioxide (SO₂) and benzene was always outside the established parameters.
 - No smoke exposure cases

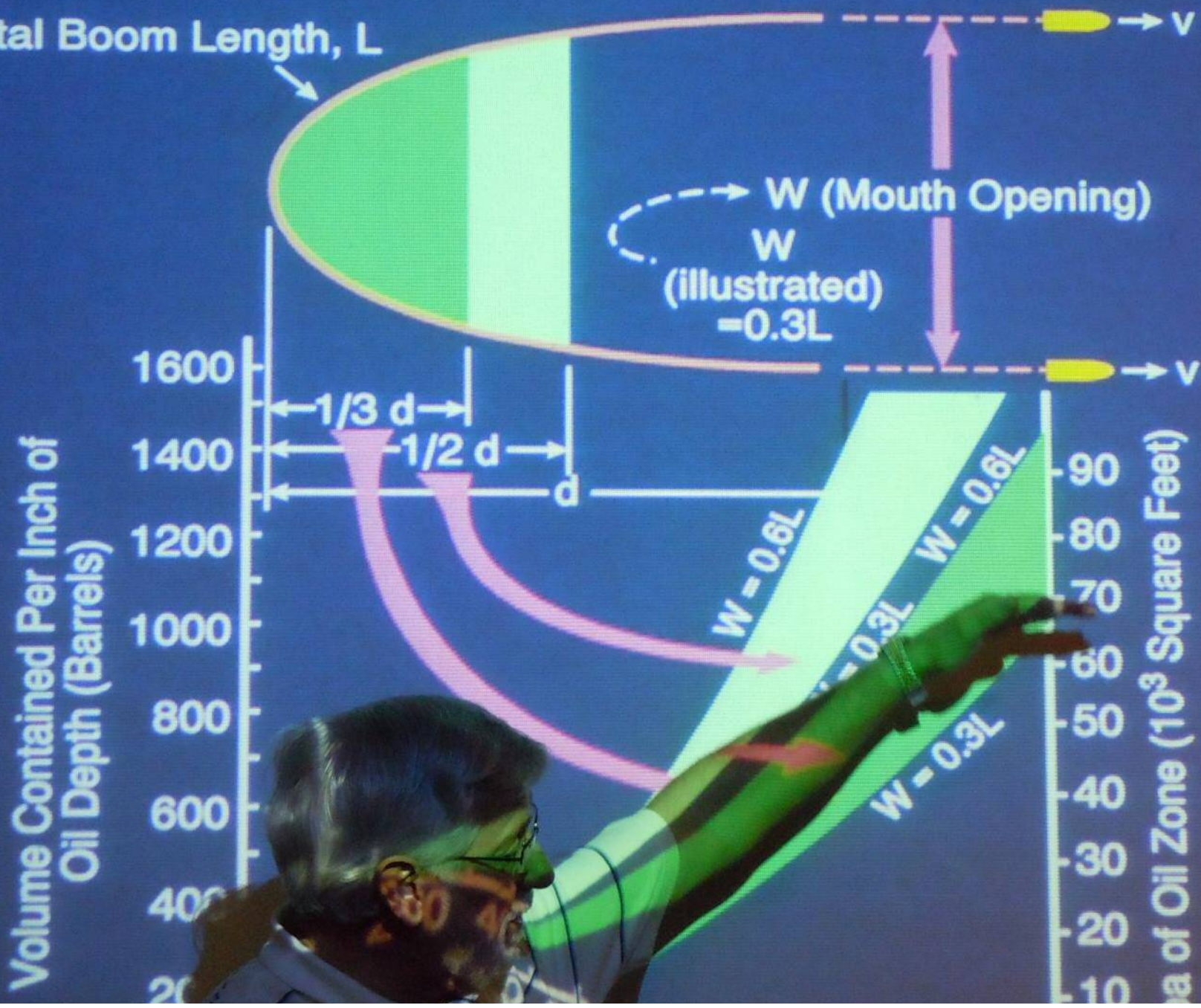
**Safety meetings held daily @ 0530 hrs
on Command vessel out at sea.**




Training

- Training was conducted for all aircraft spotters.
 - All shrimp boat crews were trained in both class room and on water by In-situ staff.
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Total Boom Length, L

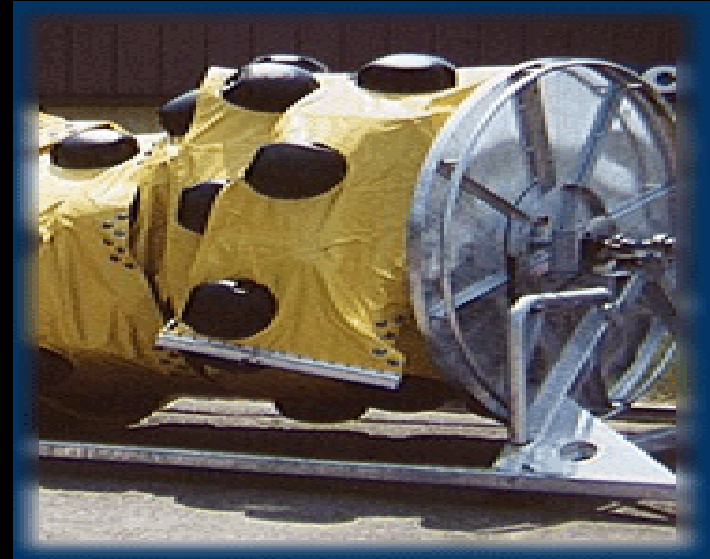


Burn Plan

- The burn plan included:
 - Burn feasibility, operational checklists, and an action plan, including the “Go/No-Go” policy and burn termination criteria.
 - Addressed clear delegation of authority for stopping the burn.
 - One person (Burn Coordinator) onboard each command vessel to stop the burn should safety become jeopardized.
- 

Fire Booms

- Several types of fire boom were operationally tested.
 - Elastec / American Marine Hydro-Fire boom
 - Applied Fabrics
 - 3m Ceramic boom
 - Oil stop
- Boom from all over the world utilized.









Finding the oil



- At first Light, the sixty-five foot Shrimp vessels would leave the fleet and begin the search for black oil.
- Once they found the oil, they would begin to deploy fire boom.
- The burn teams were vectored to dark oil by the spotter aircraft.
- Once on station, spotters observed and directed the burn teams.

Strategy



- * The fire boom is 500 Feet long.
- * Was towed behind two shrimp vessels with a 300 foot tow line.
- * Once the oil was captured, an ignition boat would come to the boom and using an igniter, lights a fire.
- * Once the fire is going, the vessels turn into the wind and keep towing very slowly gathering more oil.



Ignition



The BURN









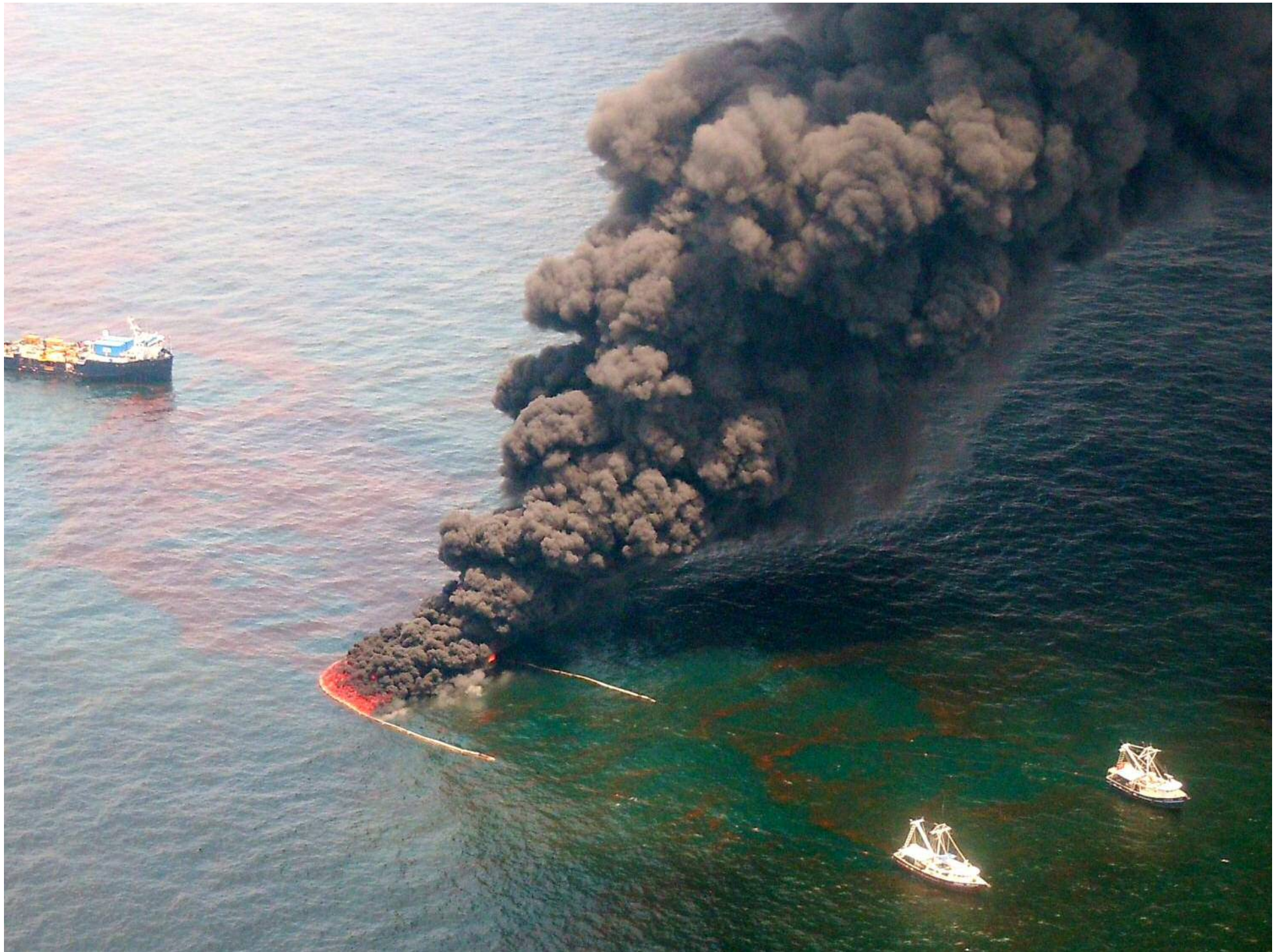






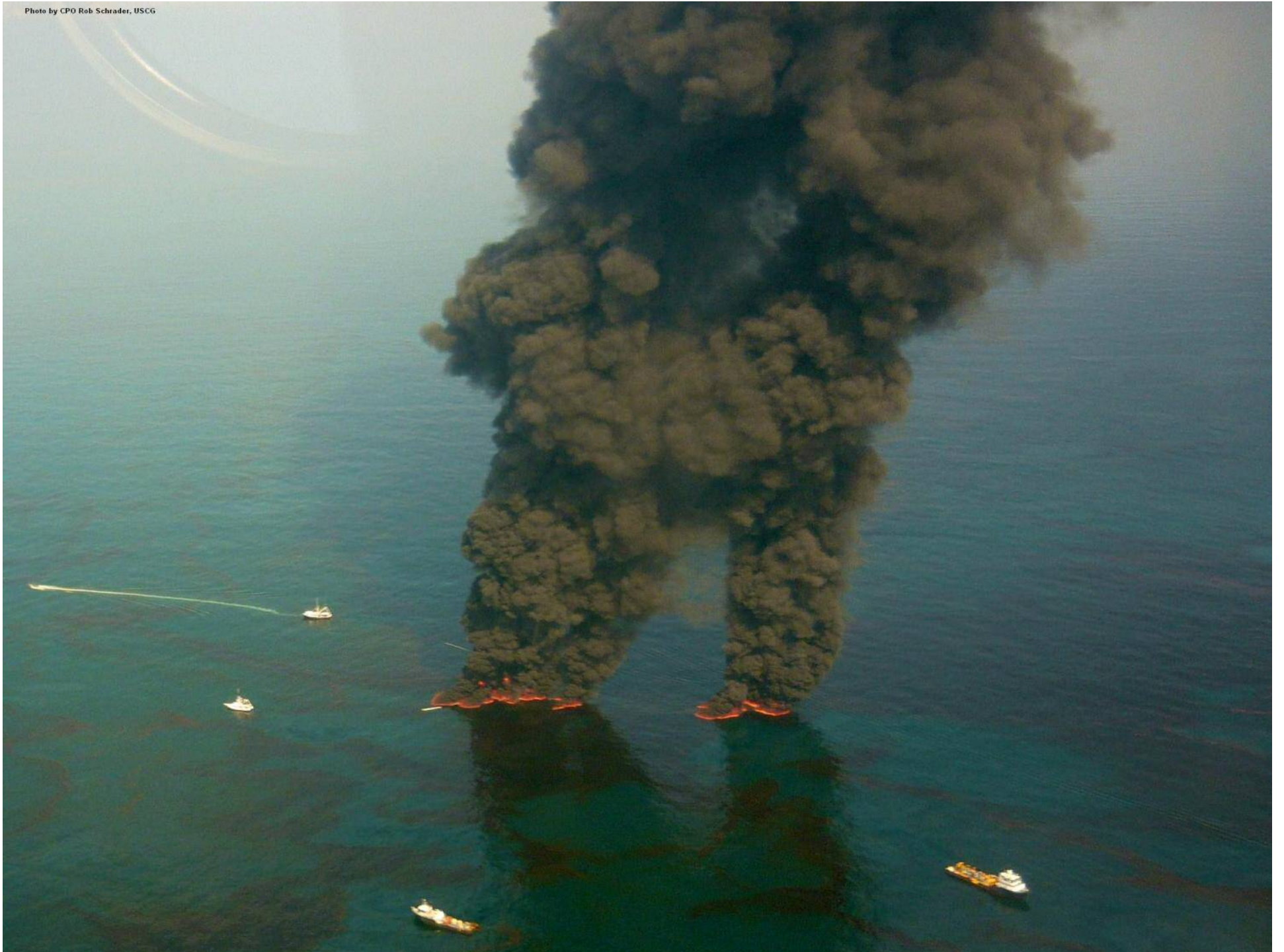








Photo by CPO Rob Schrader, USCG











Air Monitoring



- Weather conditions O/S:
 - Air - 100-103° F
 - Water – 89-90° F.
- USCG Strike Team personnel conducted on surface air monitoring. < 2ppm at surface of oil.
- On Board each lead shrimp boat industrial hygienists were stationed.
- SMART (*SPECIAL MONITORING OF APPLIED RESPONSE TECHNOLOGY*) protocol was used for protection of populations that may be impacted by particulates resulting from an in-situ burn.
- Real time particulate monitoring was one factor among several including smoke modeling and trajectory analysis, visual observations and behavior of the smoke plume.

Air Monitoring



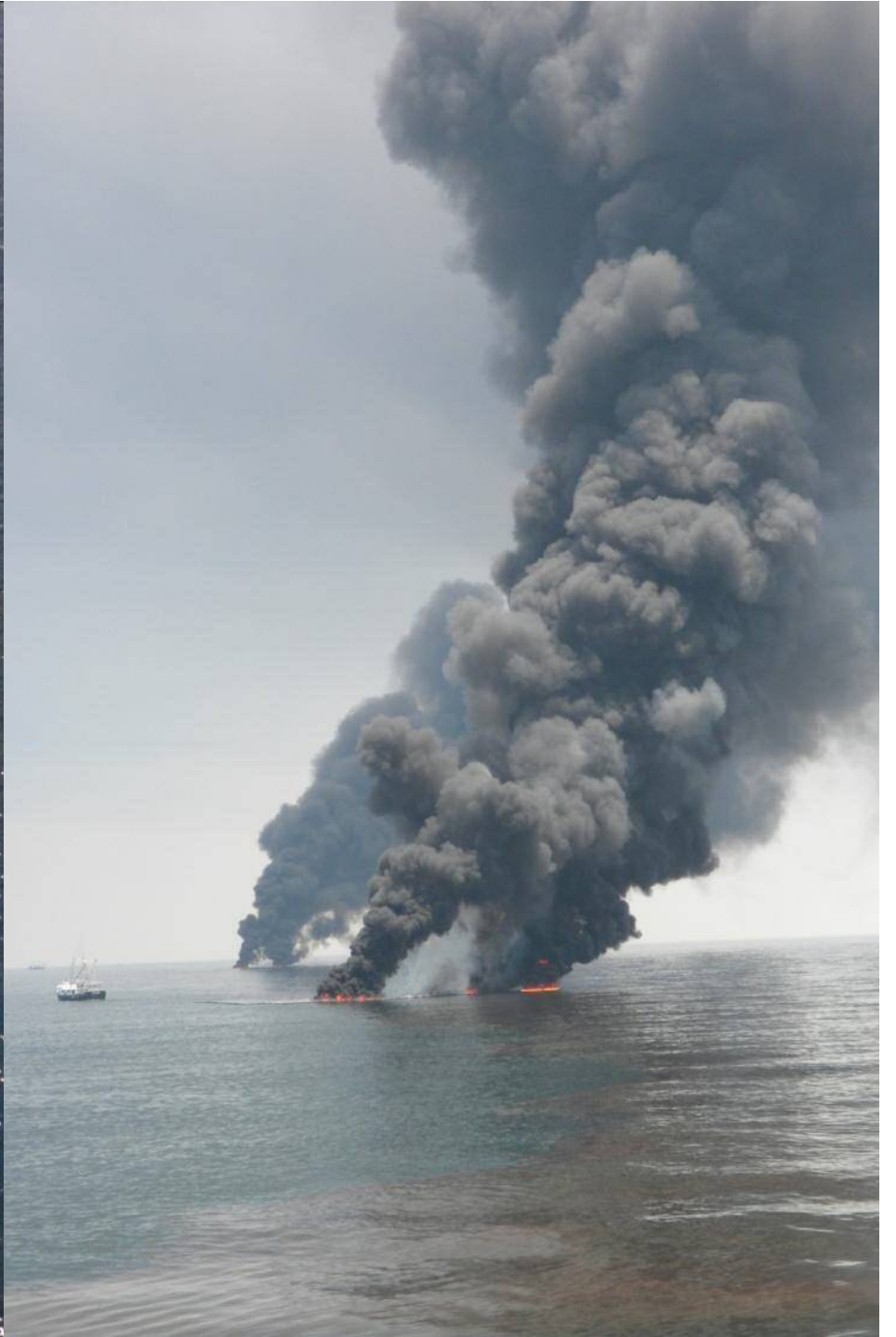
- Early air monitoring had shown that particulate levels during the in-situ burns were not an issue.
- The air was periodically monitored for particulates as designated by the in-situ burn safety section.
 - Consisted of at least one vessel to document that the plume does not exceed 150 ug of PM-10 per m³ of air, averaged over 12 hours.
- USEPA EPA set up a high resolution monitor to gather real-time measurements of hydrogen sulfide (H₂S) in outdoor air near Venice.
- Deployed Airborne Spectral Photometric Environmental Collection Technology (ASPECT)





05.20.2010 05:50























How Much Oil is Consumed?

- The oil burns at approx 1800-2000 degrees.
- Burn volume calculations for each burn included a minimum and maximum estimate.
- Minimum volume estimate was based on:
 - The lower of any air surface estimates of burn size.
 - Duration of the burn.
 - Burn Rate of 0.05gpm/sqft
- Maximum volume was based on the best upper estimates of burn area:
 - The duration of the burn.
 - Burn rate of 0.07gpm/sqft.
- What is left after the burn is small globules of tar. The burn was 95% effective in removing the oil from the water.

AL ALLEN³

BURN 6 5/6/10 - TEAM #1
 LOCATION: $\approx 6-6\frac{1}{2}$ miles SW of source
 (Lat N $28^{\circ}38.837'$, W $88^{\circ}21.827'$)
 IGNITION AT ≈ 1043
 SPOTTER HAD TO LEAVE FOR FUEL.
 FIELD EST. OF BURN TIME ≈ 8 min.
 AS OIL KEPT FEEDING INTO FIRE.
 OVERALL STEADY BURN AREA EST. AT $\approx 110' \times 140'$
 (Often more than $\frac{1}{2}$ Full Area of Boom?)
 AREA $\approx 110' \times 140' = 15,400 \text{ ft}^2$ For ≈ 128 min.

MAX. VOL. BURNED
 $15,400 \text{ ft}^2 \times 0.07 \frac{\text{gpm}}{\text{ft}^2} \times 128 \text{ min} = 137,784 \text{ gal}$
 $= \underline{\underline{3,285 \text{ bbl}}}$

MIN. VOL. BURNED
 ESTIMATED POSSIBLE AREA REDUCTION OF 25%.
 THEREFORE, MIN AREA $\approx 75\% (15,400 \text{ ft}^2)$
 $\approx 11,550 \text{ ft}^2$
 $11,550 \text{ ft}^2 \times 0.05 \frac{\text{gpm}}{\text{ft}^2} \times 128 \text{ min} = 73,920 \text{ gal}$
 $= \underline{\underline{1,760 \text{ bbl}}}$

BURN 7 5/6/10 - TEAM 2 (same general area/location)
 IGNITION AT ≈ 1843 - Flames quickly over $\frac{1}{2}$ boom area
 Flames often larger than $\frac{1}{2}$ boom. Burn Time ≈ 75 min.
 MAX. EST. AREA $> 110' \times 140' \Rightarrow > 15,400 \text{ ft}^2$
 MIN. " " $> 75\%$ of above.

MAX. VOL. BURNED: $(15,400)(0.07)(75) = 80,850 \text{ gal}$
 $= \underline{\underline{1,925 \text{ bbl}}}$

MIN. VOL BURNED: $75\% (15,400) \times 0.05 \times 75 \text{ min}$
 $= 11,550 \text{ ft}^2 \times 0.05 \frac{\text{gpm}}{\text{ft}^2} \times 75 \text{ min}$
 $= 43,313 \text{ gal}$
 $= \underline{\underline{1,031 \text{ bbl}}}$



Tomb@162subsea.com
 2 mi Burn Zone
 Center 28° 44' 14.782 N
 088° 22' 14.935 W
 Source 28° 44' 12" N
 088° 23' 14" W
 Skerman ops
 500 miles around
 1500 1000
 2000 hours of the platform
 5 mi from center
 Night SW of 252
 294/288
 338/339



How Much Oil was Consumed



- A number of “Mega Burns” occurred when a very large area fire spilled out of the boomed area.
- Fire continued to grow in size and intensity while moving across the buffer zone.
- One Burn consumed approx. 70,000 bbls.
- From April 28th to 03 August approx. 309,452 Barrels or 12,996,989 gallons were consumed and removed from the water.



05.20.2010 05:03

Estimated Length= 65ft x 16 =1040 ft



Shrimp Boat Scale=65 ft





Results

- Studies of the emissions from in-situ burning have shown fairly consistent results.
 - About 85 to 95% of the burned oil becomes carbon dioxide and water.
 - 5 to 15% of the oil is not burned efficiently and is converted to particulates, mostly soot.
 - 1-3%, is comprised of nitrogen dioxide, sulfur dioxide, carbon monoxide, polynuclear aromatic hydrocarbons (PAH), ketones, aldehydes, and other combustion by-products.
 - No "exotic" chemicals are formed.
 - The burning of oil on water is similar to burning the oil in a furnace or a car.







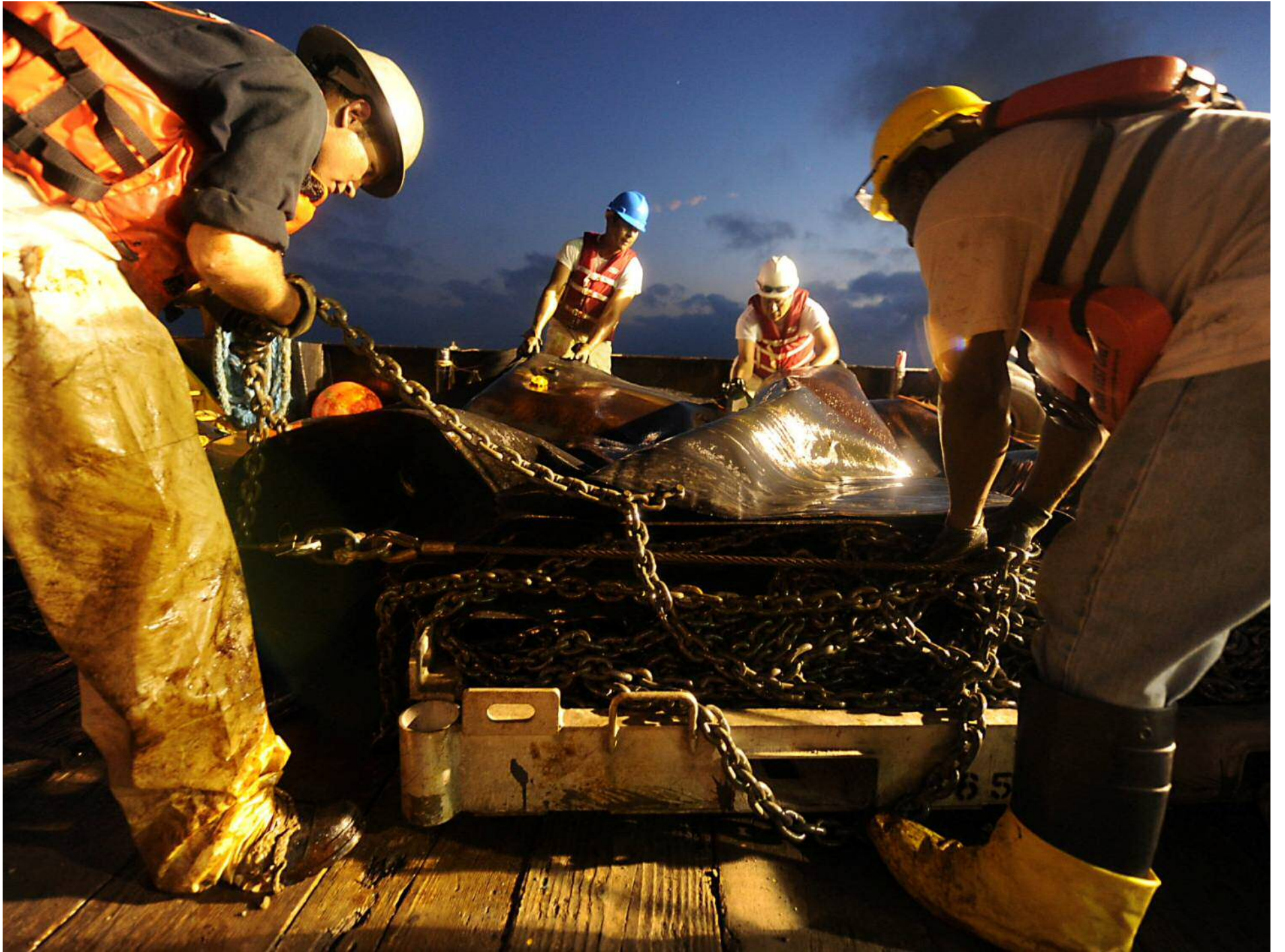
Waste Operations











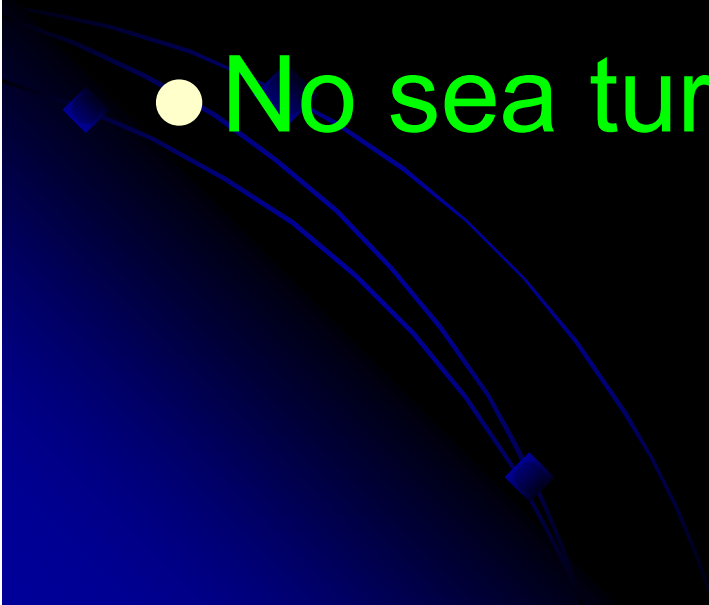









Wildlife Monitoring

- Pelicans were noted on several occasions.
 - Sea life was abundant.
 - No sea turtles were observed.
- 



Sampling

- Sampling of the oil morphed from an informal NOAA inquiry for water content into a complete analysis.
 - Sampling was very difficult due to the time frame for capture and then ignition.
 - Sampling methods needed to be standardized and personnel needed to be added by the individual Agency/consultant that requested them.
- 





Special Thanks

Ed Levine – NOAA SSC

MSTCS Jaeger – USCG GST

Alan Allen - Spiltec

Donnie Wilson - Elastech

Nere “NJ” Mabile - BP

Victoria Broje – Sun Oil

Ed Stevens – O’Briens

Don Costanza – O’Briens

Photos by

Chief Petty Officer Rob Schrader, USCG

Chief Petty Officer John Kapsimalis, USCG

Petty Officer Jeremy Thomas, USCG

Alan Allen, Spiltec

Donnie Wilson, Elastech

Nere Mabile, BP

Mr. Bill Darby, O'Brien's