National Commission on the

BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING

Attachment 5

Written Statement of Doug Suttles

Chief Operating Officer for Exploration and Production, BP

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling
Written Statement of Doug Suttles
Chief Operating Officer, BP Exploration and Production Inc.
September 27, 2010[1]

Chairman Graham, Chairman Reilly, and members of the Commission, I am Doug Suttles, Chief Operating Officer of BP Exploration and Production Inc. I thank you for the opportunity to participate in today's panel to discuss the collaborative efforts of the numerous parties, including federal, state and local agencies and industry, involved in the Deepwater Horizon response.

The Deepwater Horizon incident has profoundly affected all of us, and we are especially mindful of the tragedy experienced by the family members and friends of those who lost their lives. I am here to assure you that BP is fully committed to doing the right thing for all the people affected by this spill. One way to achieve that goal is to share -- with the government, industry, stakeholders and the public -- the critical lessons learned from the response effort. On September 1, 2010, BP submitted to the Bureau of Ocean Energy Management, Regulation and Enforcement ("BOEMRE"), a report entitled *Deepwater Horizon Containment and Response: Harnessing Capabilities and Lessons Learned.* While the report does not cover all aspects of the Deepwater Horizon response to date, it does provide a preliminary outline of some of the important lessons learned and capabilities developed from the collective response effort to this incident. A copy of the report can be obtained from the BOEMRE website at http://www.boemre.gov/ooc/PDFs/NarrativeFinal.pdf.

LESSONS LEARNED

The nature of the Deepwater Horizon incident, including its scope and complexity, resulted in marked developments in marine spill response knowledge and capabilities. While numerous and wide-ranging, these advancements can be grouped into the following areas: (1) collaboration; (2) systemization; (3) information; and (4) innovation.

Collaboration. The Deepwater Horizon response brought together an unprecedented amount of manpower and resources. At its peak, the response involved more than 47,800 responders, dozens of federal, state and local agencies, hundreds of industry suppliers, and entities from 19 countries. The resources deployed included more than 6,000 marine vessels, six deepwater drilling vessels, two floating production, storage and offloading units, and 150 aircraft. This vast collection of resources was coordinated and managed under the Unified Command (UC) structure, which was led by the National Incident Commander, Retired Coast Guard Commandant Thad Allen. The list of those participating in the Unified Command is long, and includes representatives from BP and Transocean, the U.S. Coast Guard, the BOEMRE,

[1] The data described throughout this testimony are accurate to the best of my knowledge as of Thursday, September 23, 2010, when this testimony was prepared and includes information from my personal experience as well as information that was provided to me by others at BP. New information continues to become available as our efforts to respond to and address the incident continue.

other federal entities such as the Departments of Homeland Security, Energy, and Defense, the National Oceanic and Atmospheric Administration ("NOAA"), the U.S. Fish & Wildlife Service, the National Marine Fisheries Service, the Environmental Protection Agency ("EPA"), the Occupational Safety and Health Administration, and the affected States. As a result of this extraordinary team effort, the industry and the nation now possess the following enhanced capabilities:

- Greater familiarity and strengthened relationships among industry, government and responders;
- A network of seasoned experts and support personnel drawn from around the world; and
- An expanded and proven roster of suppliers and vendors with specific capabilities.

Systemization. As the Deepwater Horizon spill progressed and the size of the response expanded, existing systems and organizational structures were adjusted to adapt to the changing demands of the incident. Among others, innovative systems were developed to address the rapid and growing needs for resources and personnel, such as protocols for qualifying and training responders, organizing work flow, and increasing the efficiency and effectiveness of operations. Specific improvements made to organizational systems during the course of the response include:

- The development of the branch office structure, which delegates key decision-making authority and resources to the local level responders, thereby implementing the insight that "all oil spill response is local";
- The use of modular structures deploying small, well-organized units to a range of locations instead of simply expanding existing teams, allowing for more efficient scaling of operations;
- The Vessels of Opportunity program, where structures and protocols were used to train a large force of local responders for integration, command and deployment; and
- Improved supply-chain management to ensure timely and appropriate delivery of materials and equipment.

Information. The sheer scope and scale of this response required that newly-created infrastructure be put in place to assure the timely and accurate transmission of information. Novel application of state-of-the-art information tools were utilized to improve the speed and quality of decision making, which enabled increased safety and enhanced speed and effectiveness of the response. Among the many new information capabilities developed are:

- The creation of state-of-the-art information tools to distribute detailed real-time knowledge on the specific characteristics of surface oil, the retrofitting of the HIVE with 12 monitors to stream real time footage of images captured by Remote Operating Vehicles, and the development of the Common Operating Picture, which allowed for an instant and integrated view of the entire response to enable rapid, coordinated decision making.

- The development of scientific capability through consultation with experts from a wide scope of disciplines, including geochemistry, industrial hygiene, water and air sampling, ecology, environmental science, hydrogeology, flow assurance, process safety, toxicology, zoology, and geophysics. This wide pool of scientific expertise provided the intellectual knowledge necessary for an effective response.

- The emphasis on dialogue that resulted from the need to keep all the parties involved in the response fully informed about the response strategies and progress.

Innovation. The concentration of talent, time pressures, and the need to achieve results without compromising safety, resulted in a series of innovations over the course of the Deepwater Horizon response that will no doubt inform and influence any future spill response, and the future of the oil production industry as a whole. It is critical that the ability to innovate in response to changing conditions be maintained as an integral part of oil spill response. Ranging from incremental enhancements to step changes, innovations were made in the areas of:

- Equipment -- such as subsea dispersant injection systems and controlled in-situ burning technology;

- Systems, processes and procedures -- such as the creation of booming and aerial surveillance plans; and

- Organizational schemes -- such as the development of enhanced simultaneous operations management structures that allowed for the side-by-side operation of 19 major vessels.

COLLABORATION OF PARTIES

For the purpose of today's panel, I would like to highlight in further detail a number of advancements in the area of collaboration -- by all parties involved in the response and at all levels – that contributed greatly to the effectiveness of the response.

Common Operating Picture. One powerful tool developed during the response is the Common Operating Picture ("COP"). The COP is a single, comprehensive and integrated view of the entire response effort, providing a snapshot of the status of both the oil and logistics of the response. To map the spill, the COP application collects data from a wide array of responders, along with geographic information system ("GIS") data, NOAA and EPA databases and other

sources. The COP also displays information collected during specific response maneuvers, such as boom placement, location of vessels and areas of in situ burning. The collective efforts of the responders, in providing necessary data in an accurate and timely manner, results in the availability of a real-time picture of the spill and response, spanning "space to sky to sea to shore." This integrated view arms responders with additional tools to more effectively coordinate activities and direct resources.

Branch Office Structure. Another significant development that resulted from BP's close coordination with local, state and federal agencies was the creation of the branch office structure. Over the course of the response, 19 branch offices were created across the Gulf Coast, with staff sizes varying from 25 to around 2,300. These branch offices, which operated with the mission and authority to oversee all activities relating to stretches of local coastlines, provide a model that will assist future response efforts in a wide variety of ways, including:

- Increasing the speed and effectiveness of near-shore response through strong operating leadership at the local level;
- Allowing for direct involvement by state and local officials in the response, which will lead to a greater understanding of strategies and priorities;
- Identifying local knowledge and delegating necessary authority to local responders, who are often the most effective at solving and identifying problems; and
- Increasing the accountability of state and local authorities for all aspects of the response effort.

Vessels of Opportunity. The enhancements made to the Vessels of Opportunity ("VOO") program also illustrate how collaboration formed a valuable component of the spill response. The VOO program draws from the resources of the nearby communities and employs local residents and businesses as near-shore responders to supplement efforts to protect coastlines. In the Deepwater Horizon response, 5,800 vessels were employed in the VOO program. These vessels, and the individuals who manned them, assisted with various response tasks and were involved not only in transport and logistics, but also in booming, skimming and in-situ burning. Enhancements to critical processes and procedures were made to ensure the proper training, rapid deployment, and clear organization of local responders, indicating that the program may offer strong potential in future response scenarios.

CONCLUSION

There is no question that the Deepwater Horizon response was a monumental team effort; BP could not have responded as effectively alone. All of us at BP are extremely grateful for the assistance offered by the thousands of devoted participants who came together to address this challenge, and who were guided by the skillful leadership of Admiral Allen, to launch what has become the largest spill response in the history of the world. Looking forward, we hope to continue building upon these important relationships so that we may all -- together -- work

towards the goal of further developing the knowledge, tools and technologies needed to ensure that an oil spill of this magnitude will never again occur in this country or elsewhere.

I appreciate the opportunity to be part of today's panel and I look forward to taking your questions.

National Commission on the

BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING

Attachment 6

Written Statement and Presentation of William "Billy" Nungesser

President of Plaquemines Parish, Louisiana

Mr. Chairman, Mr. Reilly and commission members. Thank you for allowing me this opportunity to share with you my experiences of the past 5 months as we have responded to the oil spill disaster in Plaquemines Parish Louisiana. Today I hope to discuss the criticisms I have of the response efforts to the oil spill; the response and approval process to our requests for protective berms; the problems associated with getting and deploying booms and skimmers along our coastline; my interpretation of our interactions with federal responders; and my view of local involvement and ways this involvement might be improved.

Back in May of this year I had the privilege of sitting beside Captain Stanton of the Coast Guard on one of our flyovers of the oil spill area on one of our flyovers of the oil spill area. I'll never forget what Captain Stanton said to me during that trip. He said, "don't worry Mr. Nungesser we are going to help you clean up the marsh." I said "Mr. Stanton if we don't keep the oil out of the marsh you won't clean it up." From that moment to this there were never any preparations made to keep the oil out of the marsh. We knew the boom being used was ineffective and would not work so we asked for ocean boom. Although we were promised we would get some, yet to this day we have never gotten a single foot of ocean boom.

We saw right away that responding to oil sightings from Venice, LA. with a 2 hour boat ride was not the best way to go. We came up with a plan to deploy Jack-up boats to the front lines so we could respond as soon as the oil was sighted. At first no one would listen. When President Obama came down on May 2, 2010 we explained the importance of being out there on the front lines. Captain Stanton told President Obama in that meeting that they were working on a plan. President Obama told Captain Stanton "until your plan gets completed put President Nungesser's jack-up boats to work" and we did. The next day the President called to make sure the jack-up boats went to work and from that moment on the jack-up boats have been on the front line. Those jack-up boats are still out there picking up oil. Last week they picked up approximately 8,000 gallons of oil. In fact I am confident that they are doing more work with greater success than any of the subcontractors BP still has out on the job. The organization and management of these jack-up boat teams has been superb. Now a lot of people don't like them because everything they see comes ashore and it seems that some people don't want everything that is out there to come ashore. Unfortunately, since day one a sense of urgency has not been there. It is apparent that BP contractors knew little about organization or chain of command for there was absolutely no one on the ground making the decisions or having the authority to make decisions to get the job done. Even sadder than that is the fact that sitting here today, 5 months later, I still do not know who is in charge. Is it Houma, is it New Orleans, is it Washington, is it the Coast Guard, or is it BP? If you know please tell me and maybe we can speak to the right person and get something done.

To make our jack-up boat plan work efficiently we broke the area into grids. After weeks of continuously beating on the Corps, the Coast Guard and the Corps came up with their own grid system that overlaps ours. Then they went and leased there own jack-up boats. Never yet though has anyone admitted that they did anything wrong or could have done something better. It is beyond me why we are always fighting? We are still fighting daily trying to get information about of things happening now. Still not being informed without a seat at the table. St. Bernard Parish President Graig Taffaro related to you last week that local people should be involved with every decision made but for some reason we are not. I would echo that same concern. I have the

greatest respect for the Coast Guard for what they are trained to do. They are great "fire fighters." They go out there and risk life and limb to rescue and put out the fire. They don't gut the house and rebuild it though and that is what we've tasked them to do. It is just not something they are trained to do. Their structure is not set up that way so having 5,000 Coast Guard personnel on the ground has done absolutely nothing but result in pointing fingers back and forth between BP and the Coast Guard. I have not met one Coast Guard person with oil on their uniform. What have they done through this whole situation to assist in the cleanup? Not one thing. On the other side BP subcontractors are not interested in cleaning up the oil; they are interested in making money. They have been waiting on this for years with all of their OSRO certification. They are not interested in cleaning up the marsh except in how long it can be drug out. The real interested parties in cleaning up the marsh and saving our wetlands are the local people and unfortunately we have little or no control and very little say-so. Either that or everything we say falls on deaf ears.

On my second trip to Grand Island on May 28, 2010 to visit with President Obama he agreed to send his team down to revisit the berms issue. When his team heard what we had to say no one objected to them being built. They are catching oil. That happened because of President Obama. Both times when President Obama came down the right thing happened. If he would have been able to stay down in Plaquemines Parish throughout this disaster I am confident things would have moved smoothly. It should not have taken the President of the United States to get this done though. We made our plan clear from the beginning. Originally we intended to build these berms 18ft high and 3,000ft wide just like they used to be before coastal erosion destroyed them. In other words our plan was to rebuild the protection nature put there in the first place. I don't know how anyone can say these berms will do more harm than good particularly given the fact that they were out there years ago. Recognizing however that our original design would be difficult to make happen on such short notice we altered our plan and designed the berms to be 6 ft. high and 125 ft. wide. This change gave us the ability to move forward with the protection needed much quicker. Is it going to change the currents? Absolutely, just like every year we lose more land to coastal erosion changes the currents. I cannot tell you for certain there will never be a negative affect but I can tell you that when the berms were there before there was a definite positive affect to our coastline. I can also tell you that the benefit of protecting our coast from the oil and protecting our marsh from saltwater coming in and destroying them far outweighs any negative affect. Everyone with anytime living in this region thinks the EPA is absolutely crazy for saying they are doing more harm than good. Get a map from 100 years ago and look at the landscape. All we are trying to do is make the land whole again. The EPA is not willing to come down and test the fish kills or test our air or do anything else to insure the dispersants and oil are not harming us long-term, but from Washington they are willing to make a call and say the berms should be stopped. BP was not too impressed when they were told to stop spraying the dispersants but they still want us to stop the berms. By the way, the people of south Louisiana have been trying to build these berms for many years. It is part of our coastal protection plan. We know that if we can replace what nature put there to begin with we will go a long way toward protecting our coast and our marsh from incidents such as this disastrous oil spill, and from coastal erosion, and from the affects of storms and hurricanes. We will continue to fight to build the berms. We will plant grass and trees and we will save the marshlands that are behind these barrier islands. You can be a part of this heroic effort or you can stand in the way. We invite you to do the right thing and be a part of this effort.

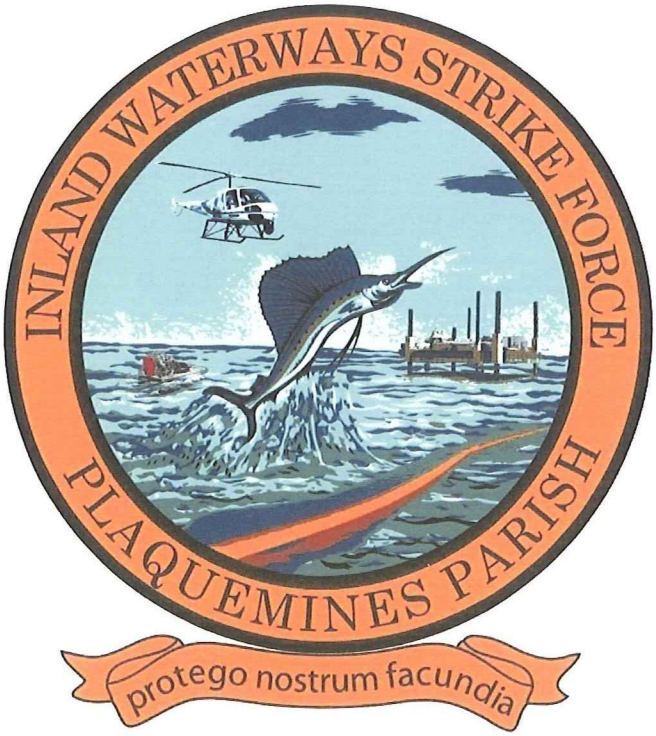
We believe however, that for our federal agencies to make negative comments could be detrimental to the marsh. To make statements such as many have that they believe the local boats are doing more harm to the marsh than the contractors, is exactly the wrong statement to make. Those local boats were there working in the marsh before this every happened and we are fighting to make sure they can be there and go back to work when all the responders and everyone else is gone. We have been told that we may want to leave the oil out there because we may do more harm in removing it. I have asked for the data that proves such a thing but as yet no one has produced any evidence to that affect. These kinds of ridiculous rumors and comments by federal agencies and the Coast Guard have infuriated the people of south Louisiana who are working so hard to save our coastline and with it our way of life. Building the berms and barrier islands should continue whether it is to keep the oil out or for the overall protection of Louisiana and the Nation. We will never be able to build levees and floodwalls high enough or wide enough without these berms being built back where nature had them originally. In fact I will go so far as to say that there is a good possibility that without these berms and barrier islands we are finished.

In conclusion let me say that the way we handle disasters such as this one must change on a national level if we are to be successful in disaster clean-up and recovery in the future. It can be done and the locals can show you how without wasting time and money. When the history books are written about the Deep Water Horizon Oil Spill they will say there was more money wasted on equipment and personnel that were never needed and never used than ever needed to be. They will also say that in this case a lot of marshland and wildlife could have been saved if only the responders would have listened to the local people; had the sense of urgency been there; had the subcontractors cared about what they were doing; and had somebody been put in charge that knew what they were doing and were willing to listen? I'll say it one more time because here we are today and I still can't tell you who is making decisions. You will hear Houma, you will hear the Coast Guard and you will hear 2-3 different names at BP but there is not one person that I could tell you today who is in charge and is able to make the decisions that matter. This thing happened 5 months ago and still at this late date we don't know who's in charge. Shame on us.

Thank you

Billy Nungesser
Parish President

Plaquemines Parish Government



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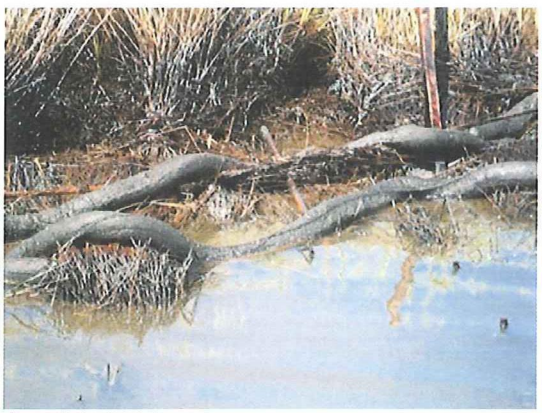
Protecting Plaquemines Parish

Since late April, Plaquemines Parish President Billy Nungesser has taken an aggressive approach to protect the resources of Plaquemines Parish. Many of the ideas proposed have been approved and continue to work. Even though the well is capped, the goal remains the same: make every effort and utilize every resource to keep the oil from destroying the wetlands, marine life, and wildlife.

"From day one we said we can't be at the mercy of the oil, that's why we implemented these long term and inland plans to fight the oil. We have multiple lines of defense and offense in place to prevent oil from moving inland and at the same time clean up the oil in the interior bays. And today our crews are still cleaning up oil in the marsh on a daily basis," said President Nungesser.

July 31, 2010 - St. Mary's Point. President Nungesser tours marsh with Strike Force teams.



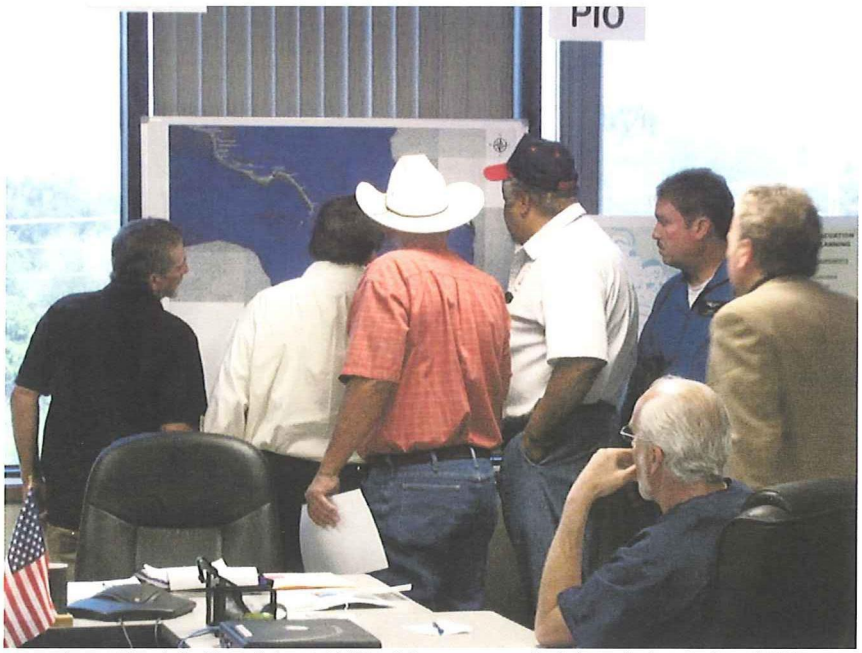
Bay Jimmy: September 24, 2010

DEEPWATER HORIZON OIL RIG

April 20, 2010 - Deepwater Horizon Oil Rig catches fire 50 miles off the Coast of Plaquemines Parish. 11 workers lost their lives.

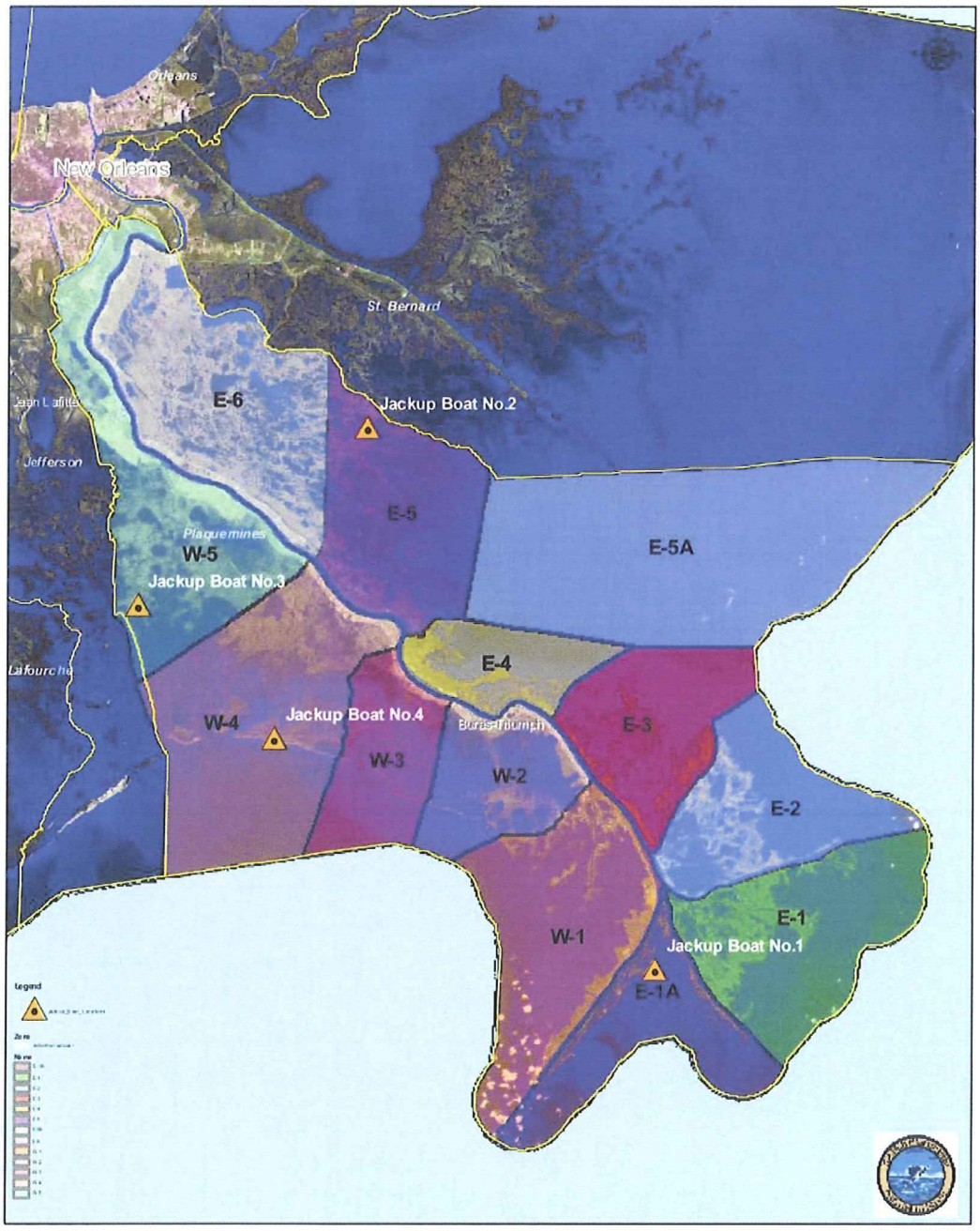
April 22, 2010 - Deepwater Horizon Oil Rig sinks after burning for more than 36 hours.

PLAQUEMINES PARISH REACTION



April 29, 2010 – Plaquemines Parish President Billy Nungesser initiated the Inland Waterways Strike Force, an effort to protect Plaquemines Parish's wetlands and its way of life. While boom was deployed at barrier islands and the mouth of the river, Nungesser wanted Plaquemines protected from the worst case scenario. Additionally, he pushed the Coast Guard and BP to utilize the knowledge and boats of local fishermen, shrimpers, and oystermen who know the waterways through and through.

13 SECTIONS



Plaquemines Parish Strike Force 13 Zones

The Inland Waterways Strike Force divided the Parish into 13 sections. People with oil spill experience, local fishermen, and emergency planners reviewed the areas and what type of boats to use for the specific region. "Jack up" boats were staged at four locations along coastal Plaquemines Parish to hold boom, act as a central location for boom distribution, serve as the eyes and ears to prevent oil from getting up into the bayous and marsh and to minimize the damage to the coast.

PRESIDENT BARACK OBAMA IN VENICE

May 2, 2010 President Nungesser proposed the Inland Waterways Strike Force Plan to President Barack Obama. The President supported the Jack Up plan and the next day BP approved it.

JACK UP BOATS

May 5, 2010 - Plaquemines Parish President Billy Nungesser and Governor Bobby Jindal initiate the Interior Waterway Strike Force Plan as the first Jack Up boat is loaded with boom to protect the waterways, oyster beds, breeding grounds, and marshlands of Plaquemines Parish.

May 7, 2010 - President Nungesser and Senator Vitter load up 2nd jack-up barge in Empire.

INLAND WATERWAYS STRIKE FORCE
Plaquemines Parish Oil Response Team

Plaquemines Parish has approximately 9,950 miles of coastal shoreline consisting of 901,817 acres. Plaquemines Parish staged jack up boats in different regions in order to strategically fight the oil using resources in the most efficient manner by cutting down travel time and having staging points closer the oil impacted areas. The teams dedicated themselves to clean up and protect Plaquemines Parish as aggressively as possible.

- Pick up oiled boom
- Deploy new boom
- Spot oil
- Suck up oil using air vacuums
- Pick up oil on beaches
- Transport oiled wildlife

INLAND WATERWAYS STRIKE FORCE

Saturated Boom Pickup

Large garbage cans lined with garbage bags are used to pick up oil saturated with booms. The extra pick up teams, working in coordination with USCG and BP, made a real difference.

MULE TEAMS

Mule teams are staged on the barrier islands to pick up oil when it washes ashore in the surf so it does not have a chance to wash back out with the tide or during storms and affect us in other areas. The Mule Teams move quickly to remove oil from the beach as it comes in with each tidal change.

July 11, 2010

INLAND WATERWAYS STRIKE FORCE

Air Vac

After successfully using a shop vacuum to suck up oil, we went to work to find a safer mechanism that didn't require electricity. We found an air driven vacuum system that fits on a 55 gallon drum. 14 air vacuums are currently in use. On average it fills up 55 gallons in approximately 12 minutes. They are placed on local fishing vessels to pick up oil with greater urgency.

August 3, 2010

SAND BERM BARRIER ISLAND PLAN

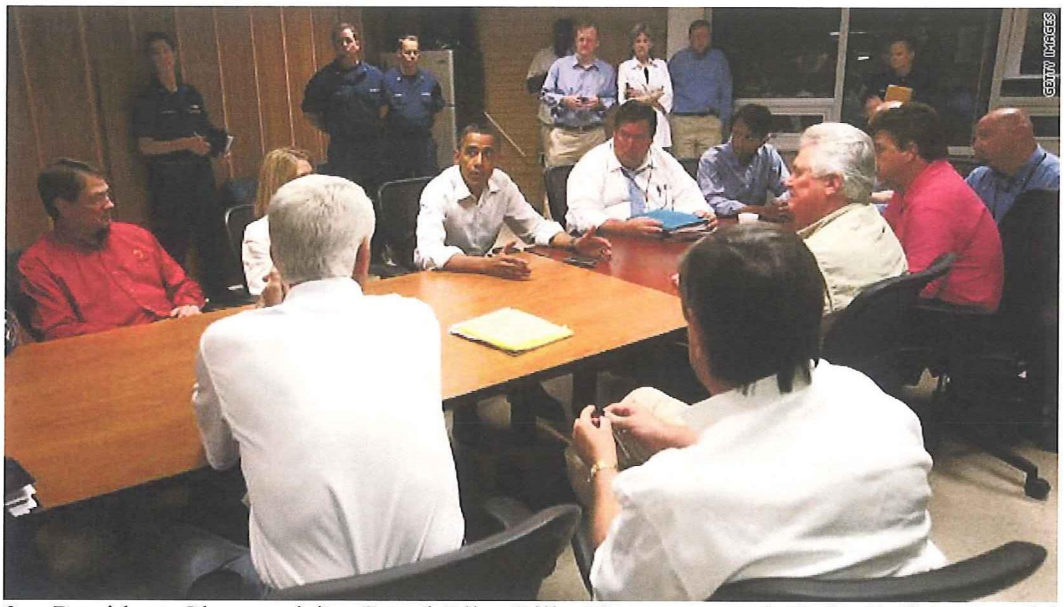
May 8, 2010 - President Nungesser and Governor Jindal announced Barrier Island Defense Plan

May 17, 2010 - President Nungesser, Governor Jindal, and other Coastal Leadership met with Col. Lee about Barrier Island Emergency Permit

May 23, 2010 - President Nungesser met with Governor Jindal and all Coastal leaders in Venice to show unified support for the Barrier Island Plan

May 27, 2010	US Army Corps of Engineers approves 6 of 24 reaches of the Louisiana Barrier Island Plan
May 27, 2010	Thad Allen directs BP to pay for one berm

SAND BERM BARRIER ISLAND PLAN



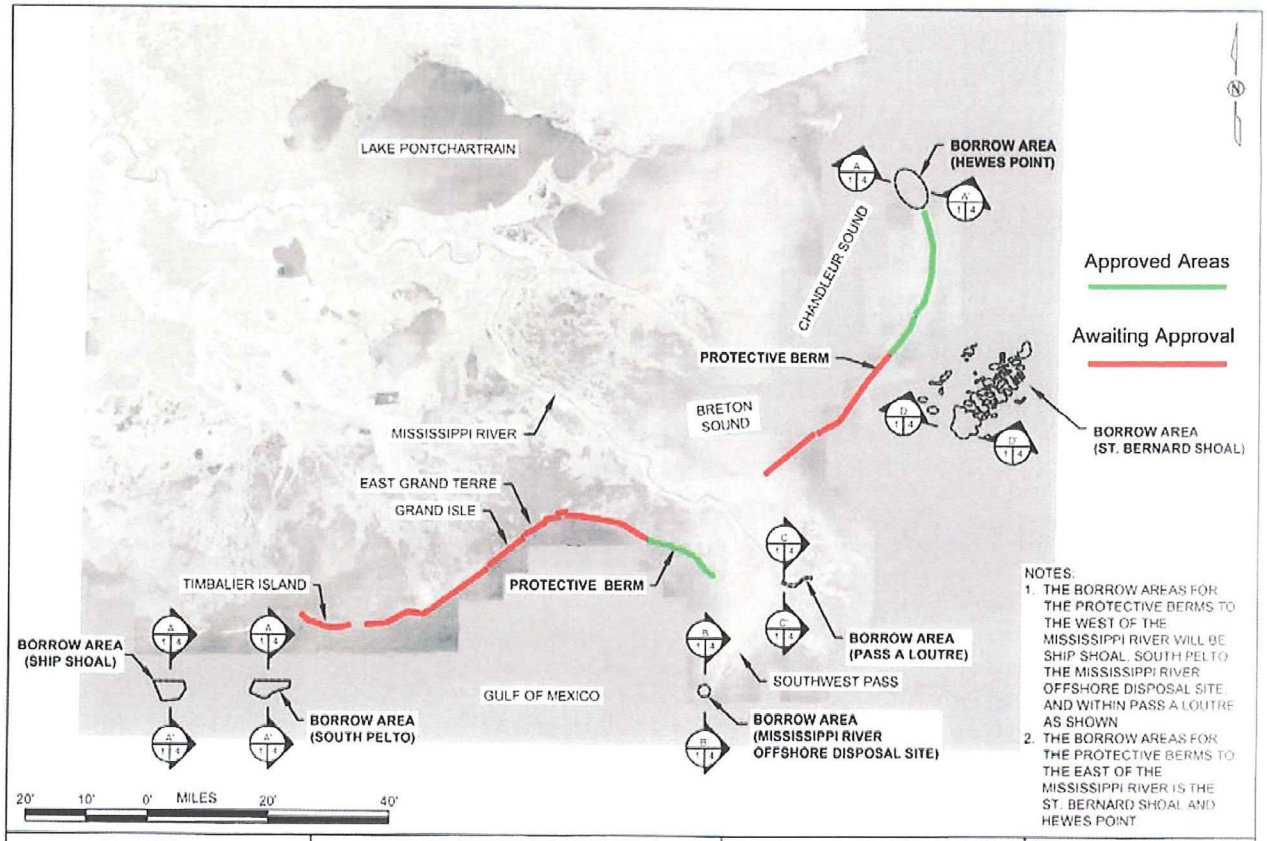
May 28, 2010 - President Obama visits Grand Idle; Billy Nungesser and Craig Taffaro travel by boat from Myrtle Grove to Grand Isle and make meeting. President Nungesser and Louisiana Leadership request the President to direct BP to pay for the 6 approved barrier island reaches. Obama said a panel will review plan in the next 3 days.

Governor Jindal, Tim Kerner, Chris Roberts, David Carmadelle, Steve Theriot, Tim Cappella, Billy Nungesser, John Young, Craig Taffaro, Wayne Landry, and Charlotte Randolph at press conference after Scientist panel.

June 1, 2010 - Panel of Scientists tear into Barrier Island Plan; local leaders respond; Thad Allen promised to respond in 24 hours with recommendation

June 2, 2010 - White House called saying it will direct BP to pay for construction of 5 additional reaches

SAND BERM BARRIER ISLAND PLAN



APPLICATION BY	OFFICE OF COASTAL PROTECTION & RESTORATION ENGINEERING BRANCH	BARRIER ISLAND DEFENSE	PLAN VIEW
OFFICE OF COASTAL PROTECTION & RESTORATION 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	450 LAUREL STREET BATON ROUGE, LOUISIANA 70801	STATE PROJECT NUMBER	DATE MAY 11, 2010 (REVISED 5/14/10)
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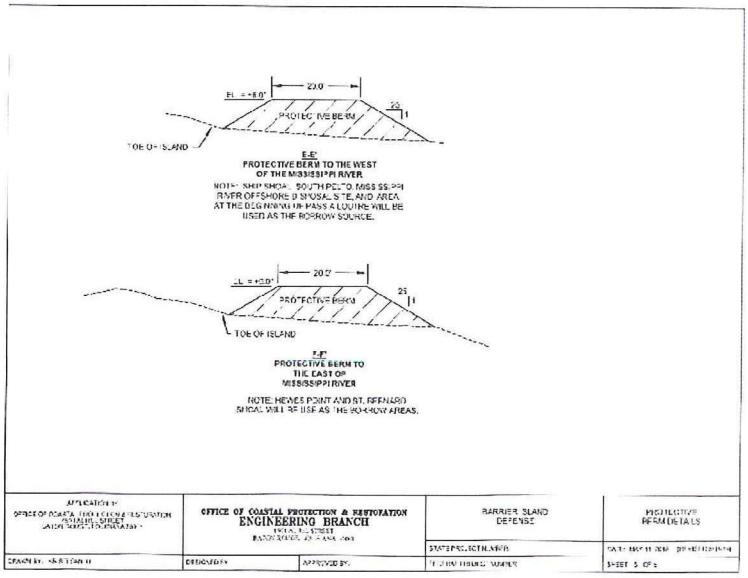


APPLICATION BY	OFFICE OF COASTAL PROTECTION & RESTORATION ENGINEERING BRANCH	BARRIER ISLAND DEFENSE	PROTECTIVE BERM DETAILS
		STATE PROJECT NUMBER	DATE MAY 11, 2010 (REVISED 5/14/10)
DRAWN BY KRISTIAN CANTU	DESIGNED BY / APPROVED BY	FEDERAL PROJECT NUMBER	SHEET 5 OF 5

SAND BERM BARRIER ISLAND PLAN

E4 Chandeleur Island Berm

SAND BERM BARRIER ISLAND PLAN

W9 Scofield Island Berm Construction

Oil washed along the W9 Berm

SAND BERM BARRIER ISLAND PLAN

W10 Scofield/Sandy Point Berm Construction

COSTNER MACHINE

BP ordered 32 of actor Kevin Costner's oil-separating centrifuges to the fight against the oil spill. Costner joined officials of the energy company for an inspection Friday of a barge that will take three of the devices into the Gulf starting this weekend.

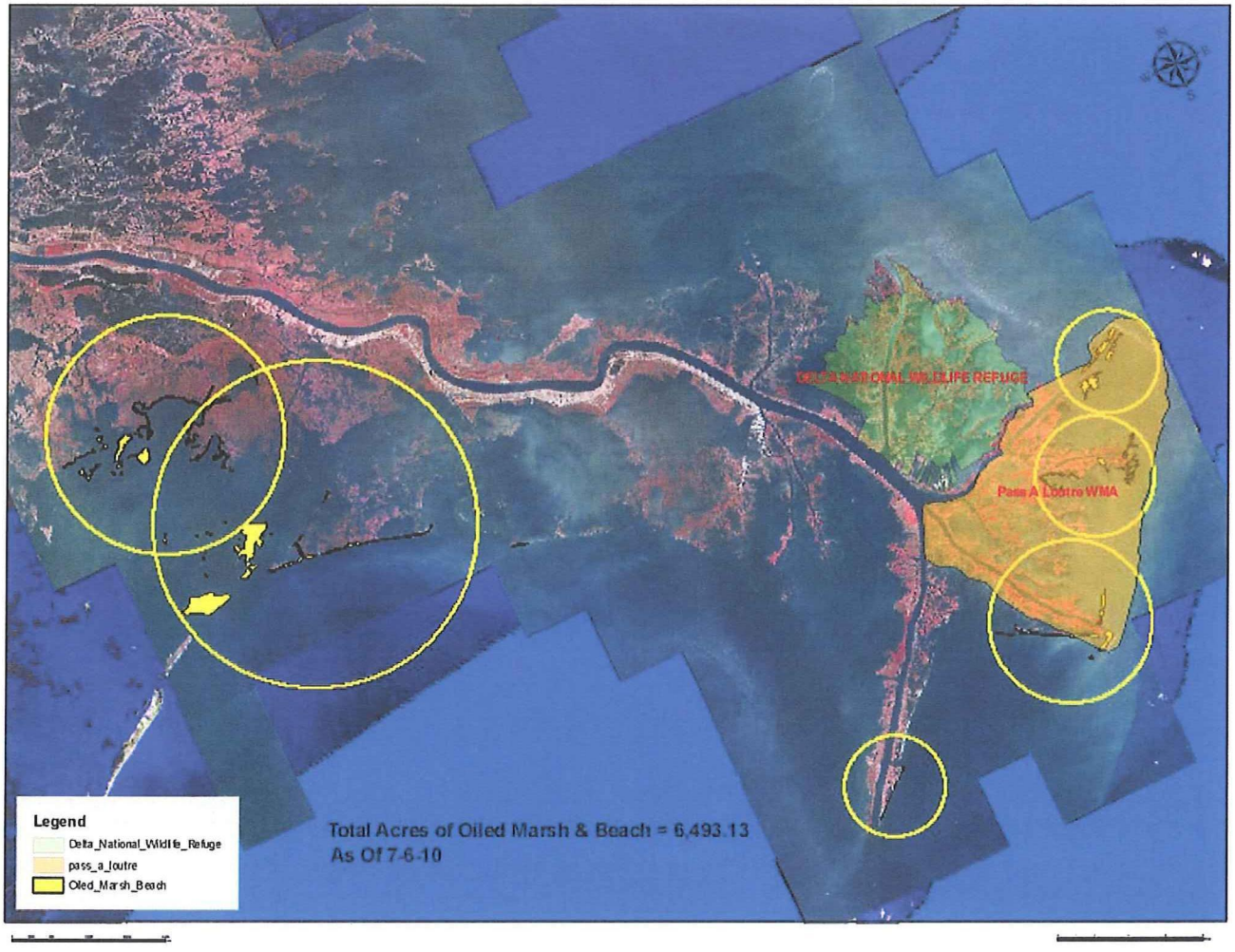
OIL IMPACT

May 7, 2010	Strike Force first discovered sheen in Plaquemines Parish in East Bay and West Bay
May 12, 2010	Strike Force first discovered Tar Balls onshore at South Pass
May 22, 2010	Strike Force first discovered oiled pelicans on Cat Island
June 3, 2010	Brown Pelicans were found completely coated in thick oil on East Grande Terre Island in Plaquemines Parish
July 15, 2010	Well cap shut off oil flow (AP estimates 94-184 million gallons spilled)

On May 23rd Admiral Mary Landry stated that "about 30 acres of marshland" has been impacted. On May 29th Doug Suttles said, "We've impacted 30 acres of marshland and 15 of those acres are estimated to require clean up at this time. I'll stress that the good news and that is that actually we haven't impacted any additional marshland in the last few days but clearly that could change."
On June 1st 2,968.631 acres of Plaquemines Parish's coast have been oiled.

OIL IMPACT

As of July 6th 6,493.13 acres of Plaquemines Parish's coast have been oiled



TIMES PICAYUNE August 8, 2010:

- Before BP plugged the well with a temporary cap on July 15, an average of 37 oiled birds were being collected dead or alive each day. Since then, the figure has nearly doubled to 71 per day, according to a Times-Picayune review of daily wildlife rescue reports.
- More oiled turtles recovered in the past 10 days than during the spill's first three months. A total of 428 oiled sea turtles have been recovered, with 222 coming in just the past 10 days. 17 visibly oiled turtles have died.
- As of Friday, August 6, 2010, a total of 1,794 oiled birds had been recovered alive, as well as 1,642 that had died, with 73 percent of the birds coming from Louisiana.

Dead Shark August 7, 2010 Dead Dolphion

Numerous ducks have been reported with visible oil, but no one has been able to catch them. Teal migration season began in August

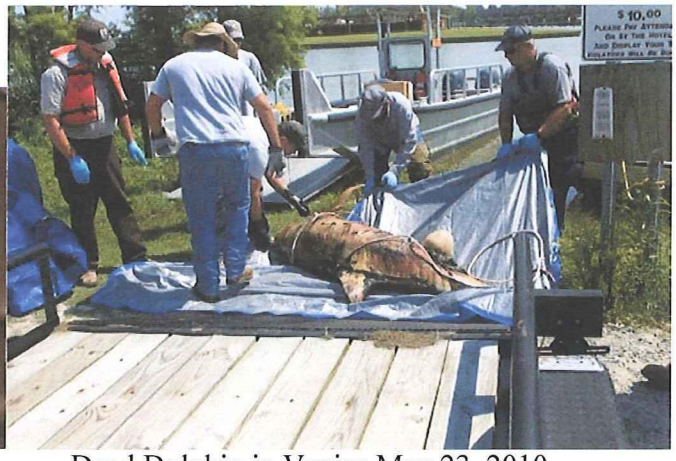
Trampled chicks and sea gull eggs on Queen Bess Island June 3, 2010

WILDLIFE IMPACT

Dead Pelican on East Grand Terre Island

Oiled Sea Gull

Dead Sea Turtle In Gulf Of Mexico



Dead Dolphin in Venice May 23, 2010

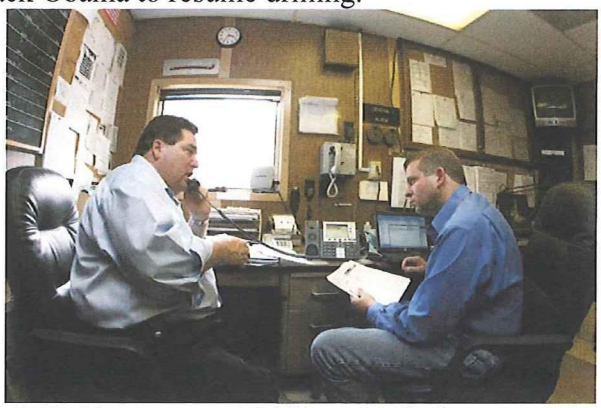
OIL MORATORIUM

On May 27, 2010 President Obama issued a six month moratorium on new deepwater drilling.

July 21, 2010 - Billy Nungesser speaks at Rally for Economic Survival at Cajundome in Lafayette.

Plaquemines Parish President Billy Nungesser received a standing ovation as he took the stage at the Rally for Economic Survival in front of a packed Cajun Dome in Lafayette. Following Governor Bobby Jindal, President Nungesser gave a passionate plea calling on President Barack Obama to resume drilling.

Oil rig workers talk to Billy Nungesser about their concerns with the moratorium and permit issues.



Billy Nungesser and 950 am radio host Michael Berry broadcast live from the drilling room on Hercules 251.

ıugust 4, 2010 - President Nungesser accompanied Michael Berry, known as "the Czar of Texas radio", as he broadcasted his show live from Hercules Rig 251. Berry and Nungesser went out to hear first hand from the men whose jobs are at rigs ecause of the moratorium and permits being held up.

SITTING DOWN WITH BP & USCG

July 21, 2010 – Billy Nungesser, Governor Jindal, Mitch Landrieu, Michel Claudet, Steve Theriot, and Craig Taffaro meet with USCG at Gulf Oil Crisis Summit

August 31, 2010 - National Incident Commander Thad Allen and Billy Nungesser at press conference after meeting.

"Although we've had our differences early on, in the response and getting assets out there, today we are on the same team. We are getting the job done," Nungesser said.

I grew up on the Gulf Coast. I know these waters. And I'm doing everything I can to clean them up.
- Fred Lemond, BP Cleanup Operations

Making This Right

Beaches
Claims
Cleanup
Economic Investment
Environmental Restoration
Health and Safety
Wildlife

BP has taken full responsibility for the cleanup in the Gulf. And that includes keeping you informed.

Searching For And Cleaning Up The Oil
You may have heard that oil is no longer flowing into the Gulf. But every morning our spotter planes and helicopters continue to search for oil off the coast, heading to areas previously mapped with satellite imagery and infrared photography. If oil is found, they radio down to the ships and boats of all sizes that are supporting the cleanup effort and working to collect the oil. These are local shrimping and fishing boats organized into task forces and strike teams, plus specialized skimmers mobilized from around the world.

We have recovered more than 35 million gallons of oil-water mixture from the Gulf. Other methods have also helped remove millions of additional gallons of oil from the water. We've deployed millions of feet of boom to protect beaches and sensitive wildlife areas.

Hurricane Preparedness
In the event of a hurricane, our first priority is keeping people safe. In coordination with the Coast Guard and local officials, we may suspend operations temporarily but have organized to resume them as soon as possible.

Our Responsibility
We have already spent more than $3.9 billion responding to the spill and on the cleanup, and none of this will be paid by taxpayers. We will work in the Gulf as long as it takes to get this done. We may not always be perfect but we will do everything we can to make this right.

For information visit: bp.com
restorethegulf.gov
facebook.com/bpamerica
twitter.com/bp_america
youtube.com/bp

For assistance, please call:
To report oil on the shoreline: (866) 448-5816
To report impacted wildlife: (866) 557-1401
To make spill-related claims: (800) 440-0858
bp.com/gulfresponse.com

We will get it done.
We will make this right.

The Gulf oil spill is a tragedy that never should have happened.

And while we were deeply disappointed that the recent "top kill" operation was unsuccessful, we were also prepared. The best engineers in the world are now working around the clock to contain and collect most of the leak.

As they do that, BP will continue to take full responsibility for cleaning up the spill.

We have organized the largest environmental response in this country's history. More than three million feet of boom, 30 planes and over 1,300 boats are working to protect the shoreline. When oil reaches the shore, thousands of people are ready to clean it up.

Thirty teams of specialists are combing the shore along with US Fish and Wildlife, NOAA and Louisiana Wildlife and Fisheries. If wildlife is affected, rescue stations have been set up to take care of them. Experts have been flown in from around the country. And BP has dedicated $500 million to watch over the long-term impact on marine life and shoreline.

We will honor all legitimate claims. We will continue working for as long as it takes. And our efforts will not come at any cost to taxpayers.

We understand that it is our responsibility to keep you informed. And to do everything we can so this never happens again.

We will get this done. We will make this right.

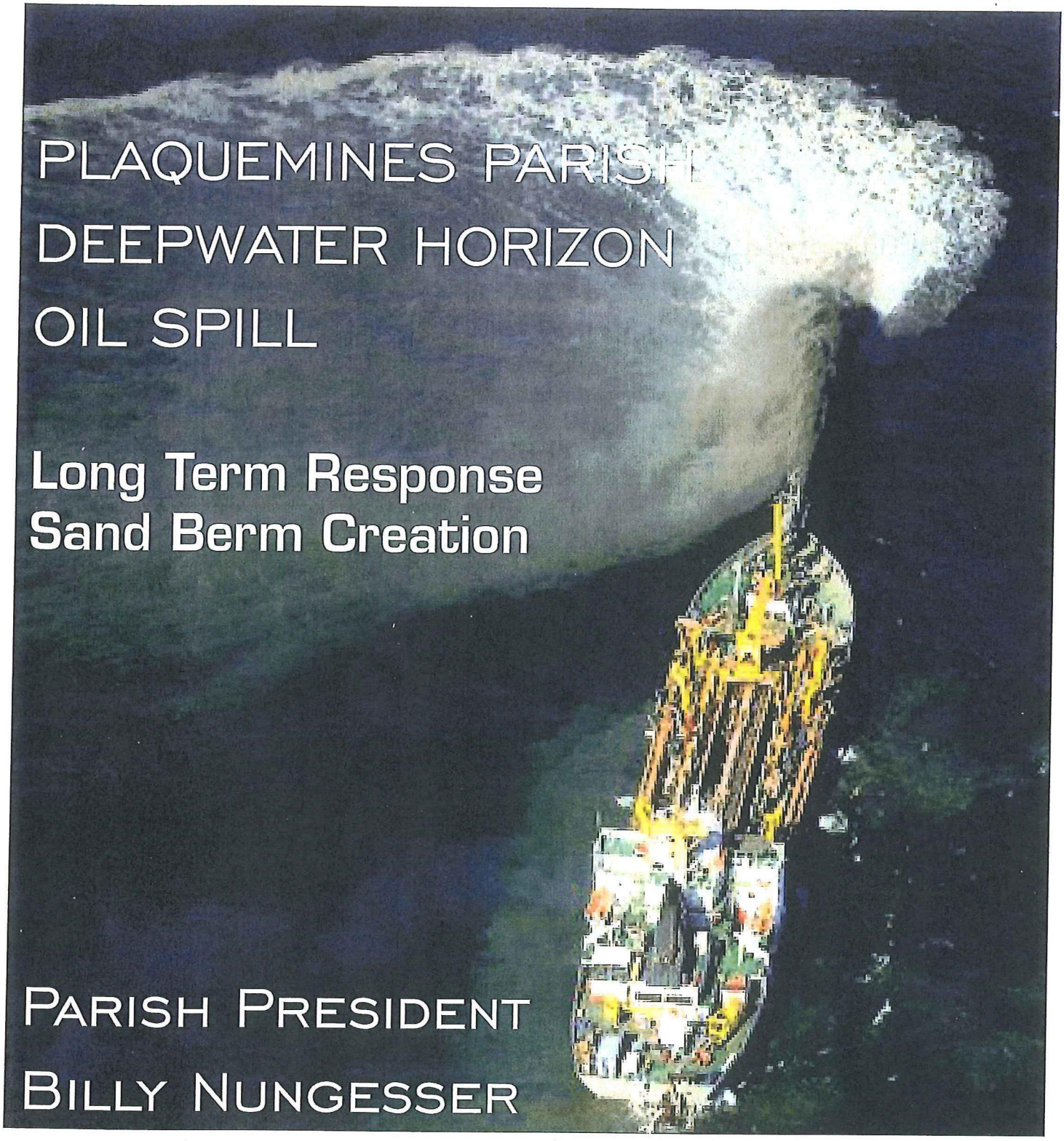
www.bp.com
www.deepwaterhorizonresponse.com

For assistance or information, please call the following 24/7 hotlines:
To report oil on the shoreline: (866) 448-5816
To report impacted wildlife: (866) 557-1401
To make spill-related claims: (800) 440-0858

bp

PLAQUEMINES PARISH DEEPWATER HORIZON OIL SPILL

Long Term Response
Sand Berm Creation



PARISH PRESIDENT
BILLY NUNGESSER

PLAQUEMINES PARISH

September 2010

Berm Project

- W-9 to date 3 miles constructed
- E-4 to date 3.5 miles constructed
- Total 12.5 million cubic yards of material to date have been handled
- Largest assembly of the nations large dredge fleet in U.S. history
- Largest and fastest coastal project in U.S. history
- Continues to be effective collecting oil and protecting the marsh from oil

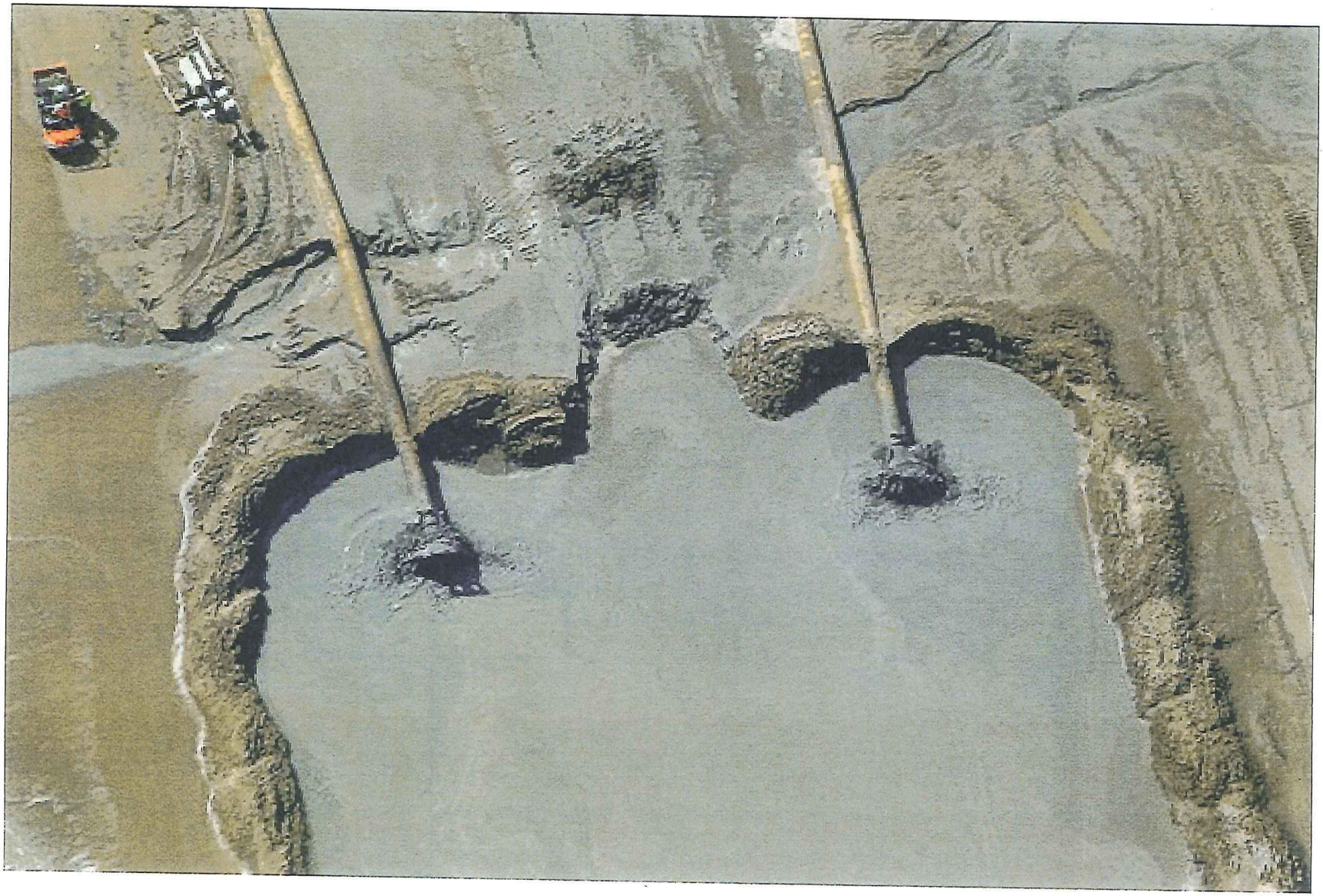

E-4: Chandeleur Islands
South to North # 38 of 65
July 11, 2010

E-4 Today

W-9 Before

W-9 Today

W-9 Today



Construction of Berms

Construction of Berms

Construction of Berms

National Commission on the

BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING

Attachment 7

Written Statement and Presentation of Dr. Ian MacDonald

Professor of Oceanography, Department of Earth, Ocean and Atmospheric Science, Florida State University

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

September 27, 2010 in Washington, DC.

Determining the Rate of the BP Oil Discharge and Comparison with Natural Oil Seeps

Testimony of Ian R. MacDonald, Professor of Oceanography, Florida State University
imacdonald@fsu.edu 850-644-5498

Determining the Rate of the Discharge

The final cement seal on BP's blown out well at 1500 m water depth, 75 km southeast of Grand Island, Louisiana was confirmed by the Unified Command on 19 September 2010, 150 days after the deadly explosion on the Transocean sister vessel Deepwater Horizon. Prior to the final plug, oil discharged for 84 days after the rig sank on 22 April, until a steel cap was installed and successfully closed on 15 July. In the aftermath, we can see how understanding consistently lagged behind events by considering the sequence of estimates made the authorities of the Unified Command and a few others about the singular, all-important, and very consequential variable in the ongoing emergency: the rate of discharge, from which one can estimate the total pollution load discharged into the deep-water Gulf of Mexico. Here is the full sequence of Unified Command estimates in magnitudes of barrels of oil per day listed in the order that they were issued with the consequent results (Table 1).

Table 1. Estimates of oil discharge rate from BP well. These estimates were give in press statements from spokespeople representing Unified Command: Coast Guard Rear Admiral Mary Landry, Coast Guard Admiral Thad Allen, and Dr. Marcia McNutt speaking for the Flow Rate Technical Group. Rates are median values in barrels of oil per day. The release is the total barrels that would have issued from the well between 22 April and 15 July 2010. The discharge subtracts 800,000 barrels that were recovered into ships from the total release to show the magnitude of oil that was in the ocean. E.V. Units are relative to the Exxon Valdez spill.

Date 2010	Authority	Rate (bopd)	Release	Discharge	E.V Units	Ref.
23-Apr	Landry	0	0	NA	NA	[1]
25-Apr	Landry	1,000	84,000	NA	NA	[2]
28-Apr	Landry	5,000	420,000	NA	NA	[3]
1-May	Allen	Accurate estimate impossible	NA	NA	NA	[4]
27-May	McNutt	16,000	1,344,000	544,000	2.1	[5]
10-Jun	McNutt	30,000	2,520,000	1,720,000	6.7	[6]
15-Jun	McNutt	48,000	4,032,000	3,232,000	12.6	[7]
2-Aug	McNutt	58,000	4,872,000	4,072,000	15.8	[8]

The trend of increasing rates and the increasing perception of possible grave consequences for the ecosystem and people of the region is obvious from the sequence.

During the first five weeks or more of the emergency, the official rate of release grossly underestimated the true rates that would eventually be determined. Of particular note was the interval from 28 April to 27 May during which authorities were responding to an estimated discharge rate of 5,000 bopd, which was more than an order of magnitude lower than the true rate happening as efforts went forward. Where did this rate come from and why was it allowed to stand for so long?

During the early days of the spill BP technicians and NOAA experts made estimates of the amount of oil on the water and from these calculated the rate of discharge. They based these estimates on remote sensing evaluation of the size and appearance of the oil that was floating on the water over the well site and was rapidly spreading to cover larger and larger areas.

Oil does not mix with water and a light, low-sulfur crude oil like that from the Macondo well will rapidly spread into thin layers on the surface of the ocean. Evaporation and other processes will consume about one third of the floating oil over the course of a few days, but initially the appearance of the oil is well-correlated to its thickness. NOAA (National Oceanic and Atmospheric Administration) has authored a useful field guide for judging the amount of oil released by pollution events [9]. This guide conforms to the International Bonn agreement covering how oil pollution at sea should be evaluated.

According to these standards, the thinnest possible oil layers are called "sheen;" they comprise no more than a few molecules--layers thinner than the wavelength of visible light and detectable only because they dampen small ripples and give the water a reflective appearance. Somewhat thicker oil layers called "rainbow" become visible when they refract light over a few multiples of the visible range: these layers are about 0.5 to 5 μm. Heavier oil begins to show "metallic" "dull" and "dark" colors in layers of 10 to >100 μm. For reference, remember that a human hair is about 100 μm, so "dark" oil is still a very thin layer, but when spread over hundreds or thousands of square kilometers the volume becomes large.

My public profile in the BP oil discharge story stems from back of the envelop estimates I made on 27 April along with my colleague John Amos. Although no one in the public yet had access to the video of oil jetting from the pipes, we could access a variety of satellite images of the surface oil. From previous work on remote sensing of natural oil seeps in the Gulf of Mexico, I had memorized a simple formula:

$$1\ \mu m \times 1\ km^2 = 1\ m^3$$

This allowed me easily to convert the area of the spreading oil into volume. By combining satellite images we had access to with the Coast Guard's description of the oil appearance and consulting the NOAA field guide for appropriate thicknesses, I estimated that the *minimum* rate of discharge had to be 26,500 bopd.

The Unified Command, who were looking at identical types of data, got a much different result. Technicians working for BP made a series of estimates of discharge rates beginning on 27 April--looking at data similar to what John Amos and I had reviewed. Their results were summarized in confidential memos numbered CE02095 to CE02099, several of which were obtained by Representative Edward Markey, who then had his staff copy them to me for independent evaluation.

In these worksheets, the technicians identify three classes of oil: sheen, dull, and dark, and make their calculations in imperial units based on variables of "area," "cover factor" (%), and "gal/sq mi." Multiplying through gives the volume in gallons for each of the oil classes and dividing by days of discharge gives the instantaneous rate. Unlike my estimate, these analysts compensate for evaporation and dissipation by using a multiplier of 2, meaning that they assumed that half of the oil discharged had disappeared by 26 April, four days after the spill began. The "Best Guess" was 5768 bopd. The other memos in the series CE02096 to CE02099 give best guess estimates of 5092, 5906, 5226, and 5707, respectively. The worksheets have header indicating that they were completed using ASTM Standards for oil estimation [10].

If the "gal/sq mi" parameter is recalculated in the accepted units of microns it is evident that the parameters for oil class thickness do not match the ASTM standards, which in any event do not provide reliable guidance for layers thicker than 3 μm. Nor do they match the NOAA field manual. The guidelines that were actually used by the BP technicians seem to have been taken from BP's official Regional Oil Spill Response Plan—Gulf of Mexico. This document has already been criticized because it included protection plans for sea otters and walruses, which do not occur in the Gulf. Possibly more serious however, is the table in Section 1D of the Plan, which is entitled "Oil Thickness Estimations." This set of standards uses the same gallons/square mile multiplier as is found in the BP worksheets, but the table in the plan also gives equivalent thicknesses in microns. Comparison of the BP table with the NOAA and Bonn standards shows that the BP technicians were using oil thicknesses that were as much as 100 time *smaller* than the NOAA guidelines. So the "Best Guess" was obtained using guidelines that were biased toward results much lower than would have been obtained by using accepted standards.

A pressing question would be why the Unified Command authorities apparently relied on BP's internal, and evidently erroneous standards instead of using NOAA's guideline that was formulated on the basis of international agreed upon standards.

Comparison of Natural Oil Seeps with the BP Discharge

This section of my testimony, which will not be given orally due to lack of time, concerns the differences in magnitude and distribution between natural oil and gas seeps in the Gulf of Mexico and the prolonged discharge from the BP well in Mississippi Canyon 252.

The existence of natural seeps in the Gulf of Mexico has been cited as a factor that has pre-conditioned the gulf ecosystem better to rebound from the pollution dose received due to the 84-day discharge of 4.1 million barrels of oil (550,000 tons) and 2.1 million barrels of oil equivalent of gas (185,000 tons) from the BP well. The natural seeps, it has been suggested, are a hydrocarbon-rich environment promoting the prevalence of oil-consuming bacteria, strains of which might then consume oil discharged from the BP well. Moreover, the wide-spread occurrence of natural seep provides a alternate, background source of hydrocarbons throughout the Gulf. Oil from these natural sources, goes this argument, might be mistaken for oil from the BP discharge.

An active natural seep discharges about 10 barrels of oil per day with variable magnitudes of gas1-2. The BP discharge was as much as 62,000 barrels of oil and over 31,000 barrels of oil equivalent gas during the initial phases of the emergency, decreasing to an estimated 53,000 BOPD at the end.

Oil from natural seeps, like the oil that rose to the surface from the BP well, leaves traces that can be detected by satellite remote sensing4. Natural seeps create floating layers (slicks) that are <1% of the thickness of a human hair (<1 μm) and cover surface areas of 0.5 to 1 km2. The oil from BP's discharge created large slicks with similar thicknesses and included substantial areas around the well where the oil was at least 100 fold thicker. In all, the surface oil from the discharge covered an area over 20,000 km2 during much of the discharge episode. Pelagic life--fishes, birds, turtles, and whales as well as plankton and planktonic larvae will have received a concentrated dose of hydrocarbons over many weeks. Widespread, deleterious impacts should be anticipated.

Natural seeps can be found from depths of about 300 ft (100 m) to the full ocean depth of the gulf 12,000 ft (3,600 m). They are concentrated in the central and western Gulf from the U.S. south to the Mexican side of the Gulf. The main concentration of natural seeps is about 100 miles west of the BP well.

Bacteria in seep sediments consume substantial quantities of oil and gas. The end-member oil signatures are very different: fresh oil is dominated by straight chain normal alkanes. Biodegraded oil is generally completely depleted in normal alkanes. This difference is readily seen in a whole-oil gas chromatograph.

Samples of surface oil in fresh, weathered, concentrated oil layers, and very weathered emulsion were collected and analyzed by gas chromatography. The resulting signatures show relatively little depletion of normal alkanes even in the most extensively weathered samples. These samples suggest that the breakdown of the surface oil has been dominated by physical and chemical processes, not extensive biodegradation.

With the dissipation of the surface oil, a fraction of the product remaining after the rate of evaporative loss diminished could take on enough water and suspended solids to sink. Recent samples raise concerns about wide-spread oil possibly sunk from the surface and now on the bottom. Animals that feed or burrow into deep-sea sediments are not adapted to oil. Burrowing organisms that are common in non-seep areas are completely absent in natural seeps, where oil saturates the sediments and oxygen is depleted immediately below the sediment water interface.

In summary, the BP oil discharge was at least 10,000 times more concentrated in space and time and about twelve times greater in magnitude than the total annual release from natural seeps of the Gulf of Mexico. In my scientific opinion, the bulk of this material was dispersed in surface layers, from which about one third evaporated and ten percent was removed by burning or skimming. An additional ten percent was chemically dispersed. The remaining fraction--over fifty percent of the total discharge--is a highly durable material that resists further dissipation. Much of it is now buried in marine and coastal sediments. There is scant evidence for bacterial degradation of this material prior to burial.

The BP oil discharge has been described as a unplanned and unwanted experiment. When we teach freshmen college students the scientific method, we explain that the rigorous approach to experimental results is to disprove the hypothesis of no effect: i.e., the experimental drug does not cure disease better than the placebo, or the toxin does not kill a significant proportion of the test organisms. If this *null hypothesis* is disproved, one can consider the alternatives--the drug is effective or the toxin is deadly. In the BP oil discharge experiment, the hypothesis we need to disprove is that the Gulf of Mexico coastal and marine ecosystem can absorb about 750,000 tons of hydrocarbons released from a single point in less than three months *with no lasting, harmful impact.*

We have to ask ourselves whether our tests are sufficient to disprove the hypothesis of no effect. If we reach a rapid judgment based on the numbers of dead birds, for example, we might miss the true impact. In Prince William Sound, for example, no dead orcas were found after the Exxon Valdez spill, none the less, the present orca population in the Sound was reduced by over half by the spill7. My concern in the Gulf is for a fractional loss of productivity and biodiversity across a broad sector of ecosystem components (populations and habitats) that persists for years to come--a lowered baseline. The worst case scenario is tipping point

effects from which populations may not recover; because we must remember that this experiment was performed on an ecosystem that was already badly damaged by stresses like hypoxia, over-fishing, coastal runoff to name just a few.

My recommended approach would be to identify and monitor key habitats and populations to verify ecosystem health: e.g. pelagic—tuna, flying fish, whales; coastal—coquina, periwinkles, menhaden, etc. Track these populations over time because the test of a healthy ecosystem is the continued existence of the species that depend on ecosystem health. Finally, although we are very concerned to see fishermen and hotel owners compensated for their economic losses, a major component of the ongoing response effort should put repayment of the Gulf of Mexico ecosystem in the front of the line. We should use the BP fine (as much as $19billion) to establish an endowment to restore, understand, and sustain the coastal and marine environment in perpetuity.

Notes

1. Johnson, A., *No crude oil leaking from Gulf well: US Coast Guard.* AFP, 2010. **22 April 2010** (http://www.google.com/hostednews/afp/article/ALeqM5itwtn8wbxh89L01OGPOb1S0QKgJQ).
2. Robertson, C., *Oil Leaking Underwater From Well in Rig Blast.* New York Times, 2010. **24 April 2010** (http://www.nytimes.com/2010/04/25/us/25rig.html).
3. Robertson, C. and L. Kaufman, *Size of Spill in Gulf of Mexico Is Larger Than Thought.* New York Times, 2010. **28 April 2010** (http://www.nytimes.com/2010/04/29/us/29spill.html).
4. Unified Command, *PRESS BRIEFING BY COAST GUARD COMMANDANT THAD ALLEN, AND ASSISTANT TO THE PRESIDENT FOR HOMELAND SECURITY JOHN BRENNAN ON ONGOING RESPONSE TO OIL SPILL.* Deepwater Horizon Response, 2010. **May 01, 2010 21:02:16 CST** (http://www.deepwaterhorizonresponse.com/go/doc/2931/535447).
5. Unified Command, *Flow Rate Group Provides Preliminary Best Estimate Of Oil Flowing from BP Oil Well.* Deepwater Horizon Response, 2010. **May 27, 2010 9:14:13 PM CDT** (http://www.deepwaterhorizonresponse.com/go/doc/2931/569235/).
6. Unified Command, *Admiral Allen; Dr. McNutt Provide Updates on Progress of Scientific Teams Analyzing Flow Rates from BP's Well.* Deepwater Horizon Response, 2101. **June 10, 2010 4:11:07 PM CDT** (http://www.deepwaterhorizonresponse.com/go/doc/2931/627011/).
7. Unified Command, *U.S. Scientific Team Draws on New Data, Multiple Scientific Methodologies to Reach Updated Estimate of Oil Flows from BP's Well.* Deepwater Horizon Response, 2010. **June 15, 2010 16:00:16 CST** (http://www.deepwaterhorizonresponse.com/go/doc/2931/661583).
8. Unified Command, *U.S. Scientific Teams Refine Estimates of Oil Flow from BP's Well Prior to Capping.* Deepwater Horizon Response, 2010. **August 02, 2010 17:18:46 CST** (http://www.deepwaterhorizonresponse.com/go/doc/2931/840475/).
9. NOAA Hazmat, *OPEN WATER OIL IDENTIFICATION JOB AID for aerial observation.* Office of Response and Restoration, 2007. **Job Aid** (http://response.restoration.noaa.gov/book_shelf/1462_FINAL%20OWJA%202007.pdf).
10. ASTM International, *Standard Guide for Visually Estimating Oil Spill Thickness on Water*, in *ASTM Committee F20 on Hazardous Substances and Oil Spill Response*. 2006, ASTM Int'l: West Conshohocken, PA. p. 4.

Discharge Rate Estimates from Unified Command

Date	Authority	Rate (bopd)	Ref.
23-Apr	Landry	0	[1]
25-Apr	Landry	1,000	[2]
28-Apr	Landry	5,000	[3]
1-May	Allen	Accurate estimate impossible	[4]
27-May	McNutt	16,000	[5]
10-Jun	McNutt	30,000	[6]
15-Jun	McNutt	48,000	[7]
2-Aug	McNutt	58,000	[8]

1. Johnson, A., *No crude oil leaking from Gulf well: US Coast Guard.* AFP, 2010. **22 April 2010** (http://www.google.com/hostednews/afp/article/ALeqM5itwtn8wbxh89L01OGPOb1S0QKgJQ).
2. Robertson, C., *Oil Leaking Underwater From Well in Rig Blast.* New York Times, 2010. **24 April 2010** (http://www.nytimes.com/2010/04/25/us/25rig.html).
3. Robertson, C. and L. Kaufman, *Size of Spill in Gulf of Mexico Is Larger Than Thought.* New York Times, 2010. **28 April 2010** (http://www.nytimes.com/2010/04/29/us/29spill.html).
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7. Unified Command, *U.S. Scientific Team Draws on New Data, Multiple Scientific Methodologies to Reach Updated Estimate of Oil Flows from BP's Well.* Deepwater Horizon Response, 2010. **June 15, 2010 16:00:16 CST** (http://www.deepwaterhorizonresponse.com/go/doc/2931/661583).
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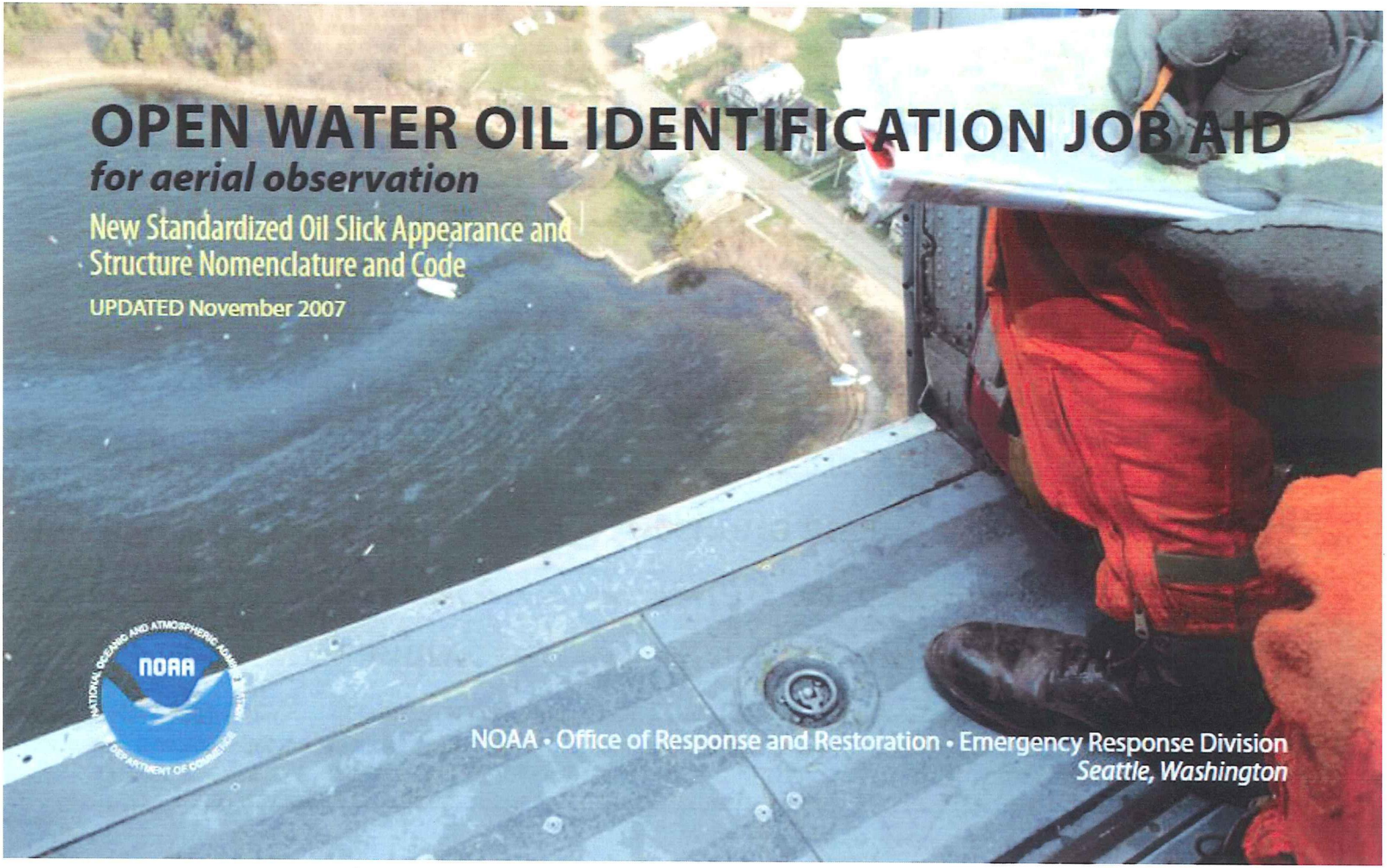


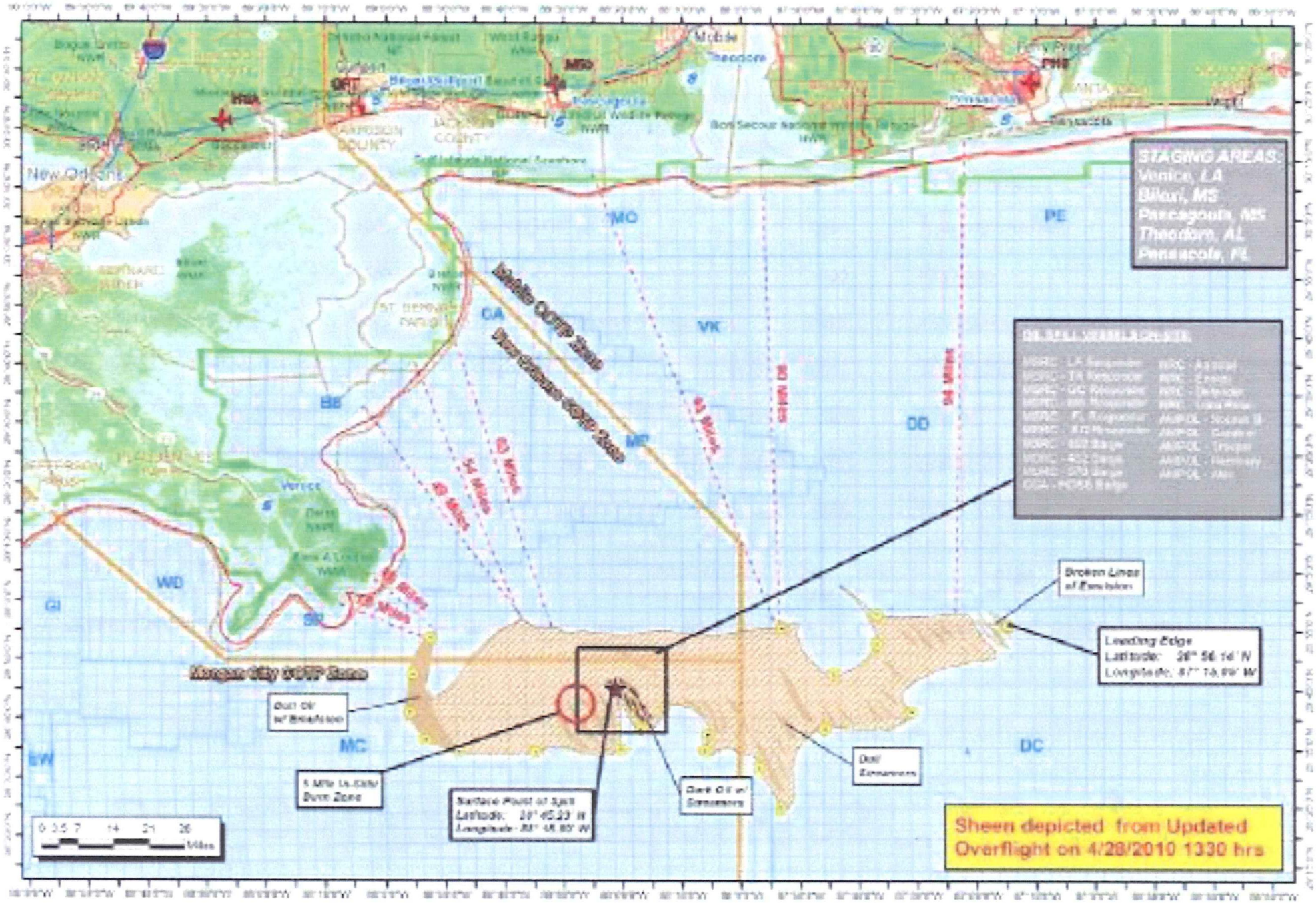
OPEN WATER OIL IDENTIFICATION JOB AID

for aerial observation

New Standardized Oil Slick Appearance and Structure Nomenclature and Code

UPDATED November 2007

NOAA • Office of Response and Restoration • Emergency Response Division
Seattle, Washington


STAGING AREAS:
Venice, LA
Biloxi, MS
Pascagoula, MS
Theodore, AL
Pensacola, FL
Broken Lines of Emulsion
Leading Edge
Latitude: 28° 56.14' N
Longitude: 87° 19.89' W
Surface Point of Spill
Latitude: 28° 45.23' N
Longitude: 88° 48.80' W
Sheen depicted from Updated Overflight on 4/28/2010 1330 hrs
Miles
MO
PE
VK
CA
BB
MP
DD
WD
GI
SP
MC
EW
DC

BP Spill Rate Estimates ~ 28 April

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 mi	gals	bbls
Sheen	1500	0.5	50	37500	893
Dull oil	250	0.2	666	33300	793
Dark oil	9	0.15	3330	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 mi	gals	bbls
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**

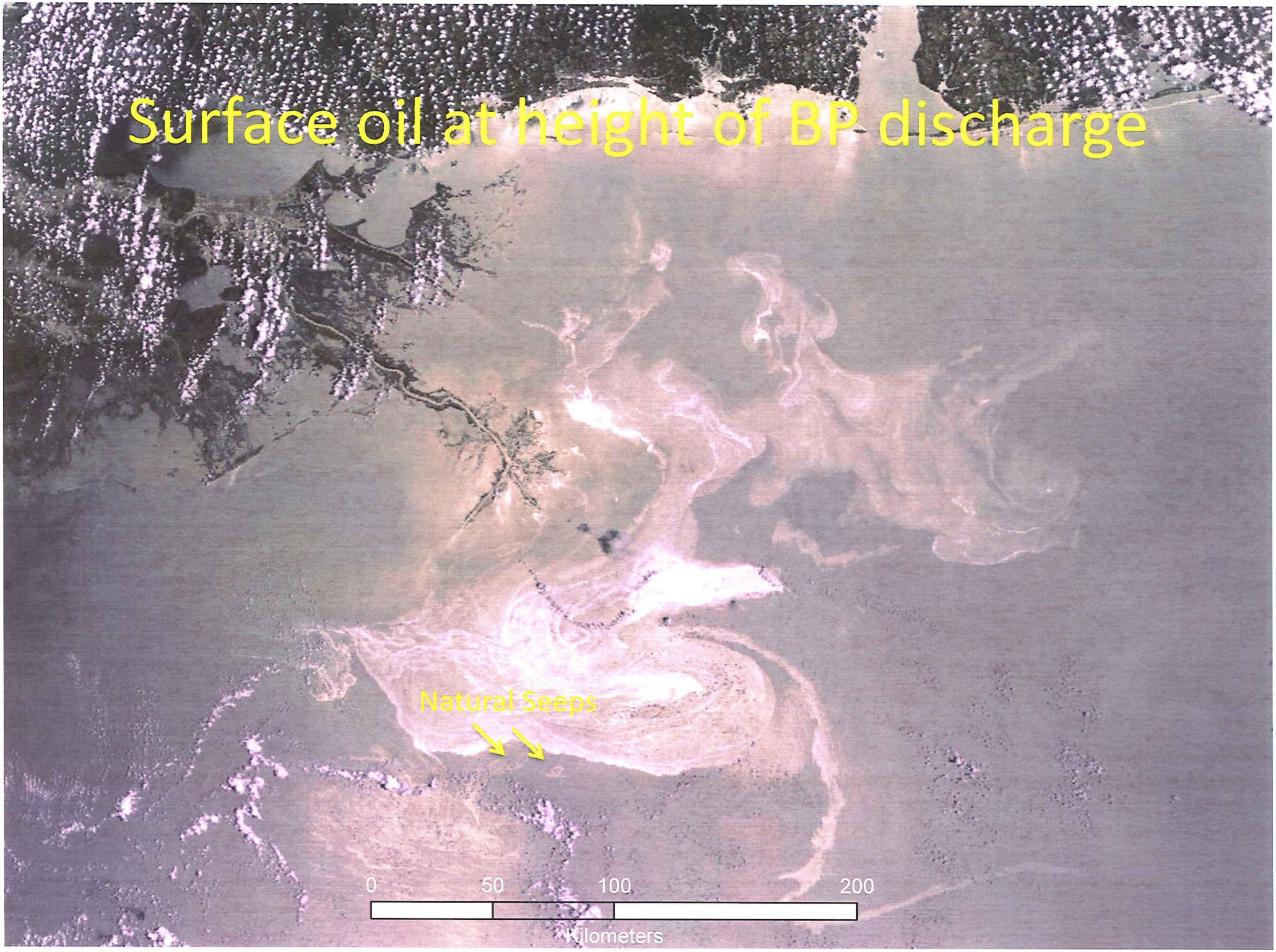
Oil on Water Estimate - High

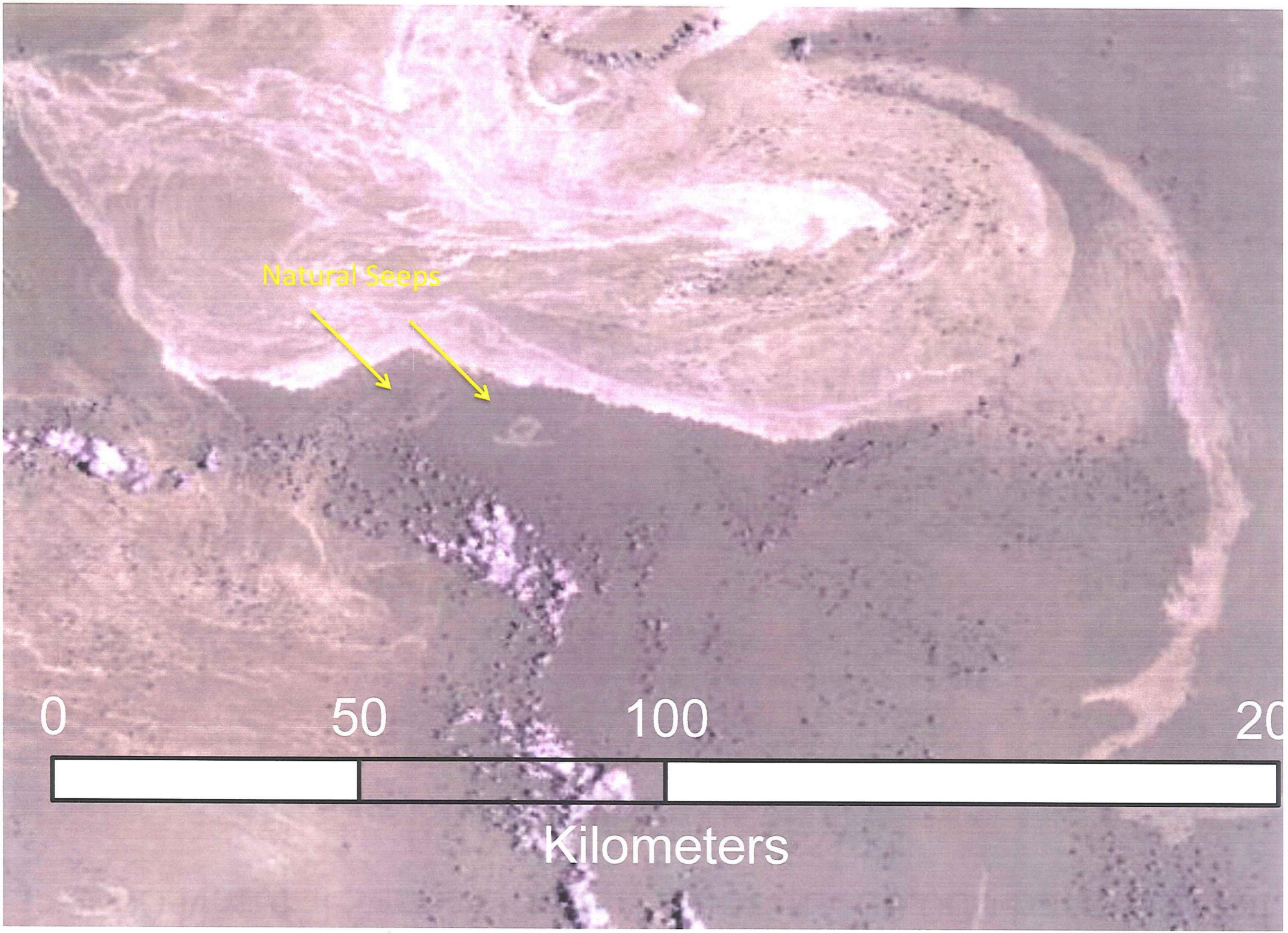
	sq mi	Cover Factor	gal/sq mi	gals	bbls
Sheen	1500	0.75	666	749250	17839
Dull oil	250	0.5	3330	416250	9911
Dark oil	9	0.35	13320	41958	999
Total oil on water				1E+06	28749
x 2 to compensate for evap and disp					57498
recovered					700
chemically dispersed					6000
Total emitted					64198
Barrels emitted per day					**14266**

Code	Description	Layer-Thickness Interval		Concentration	
		microns (µm)	inches (in.)	m^3 per Km^2	bbl/acre
S	Sheen (silver/gray)	0.04 - 0.30	1.6×10^{-6} – 1.2×10^{-5}	0.04 – 0.30	1×10^{-3} – 7.8×10^{-3}
R	Rainbow	0.30 – 5.0	1.2×10^{-5} - 2.0×10^{-4}	0.30 – 5.0	7.8×10^{-3} – 1.28×10^{-1}
M	Metallic	5.0 – 50	2.0×10^{-4} – 2.0×10^{-3}	5.0 – 50	1.28×10^{-1} – 1.28
T	Transitional Dark (or True) Color	50 – 200	2.0×10^{-3} – 8×10^{-3}	50 – 200	1.28 – 5.1
D	Dark (or True) Color	>200	$> 8 \times 10^{-3}$	>200	> 5.1

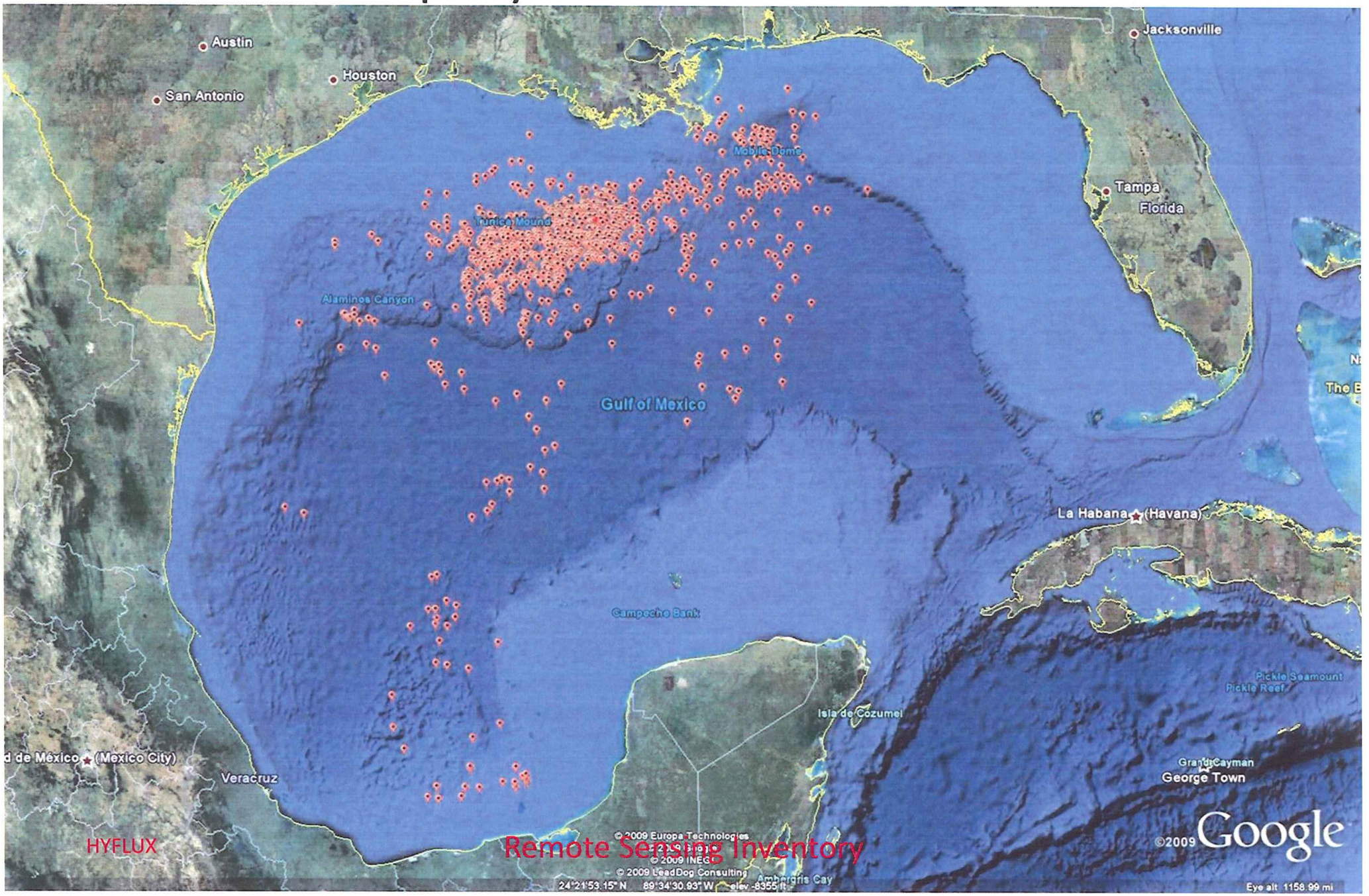
Oil Thickness Estimations				
Standard Term	Approx. Film Thickness		Approx. Quantity of Oil in Film	
	Inches	Mm		
Barely Visible	0.0000015	0.00004	25 gals/mile²	44 liters/km²
Silvery	0.000003	0.00008	50 gals/mile²	88 liters/km²
Slight Color	0.000006	0.00015	100 gals/mile²	176 liters/km²
Bright Color	0.000012	0.0003	200 gals/mile²	351 liters/km²
Dull	0.00004	0.001	666 gals/mile²	1,168 liters/km²
Dark	0.00008	0.002	1,332 gals/mile²	2,237 liters/km²
Thickness of light oils: 0.0010 inches to 0.00010 inches. Thickness of heavy oils: 0.10 inches to 0.010 inches.				


CAGE
THR: 0
DPT: 4850'
HDG: 089
TRN: 0.5
Maxx 3
30 45 60 75 90 105 12
P:-4 074 R: 1
TRN:-0.5
ROV
DPT: 4922'
ALT: 87
BTY: 5009'
1500 m
OCEANEERING
Dive Number: 37
06/03/10
14:32:06
CAGE
THR: 0
DPT: 4840'
HDG: 090
TRN: 0.5
Maxx 3
60 75 90 105 120 135
P:-4 095 R:-1
TRN:-0.5
ROV
DPT: 4936'
ALT: 70
BTY: 5006'
1505 m
OCEANEERING
ber: 37
06/03/10
14:31:29


Surface oil at height of BP discharge
Natural Seeps
0
50
100
200
Kilometers

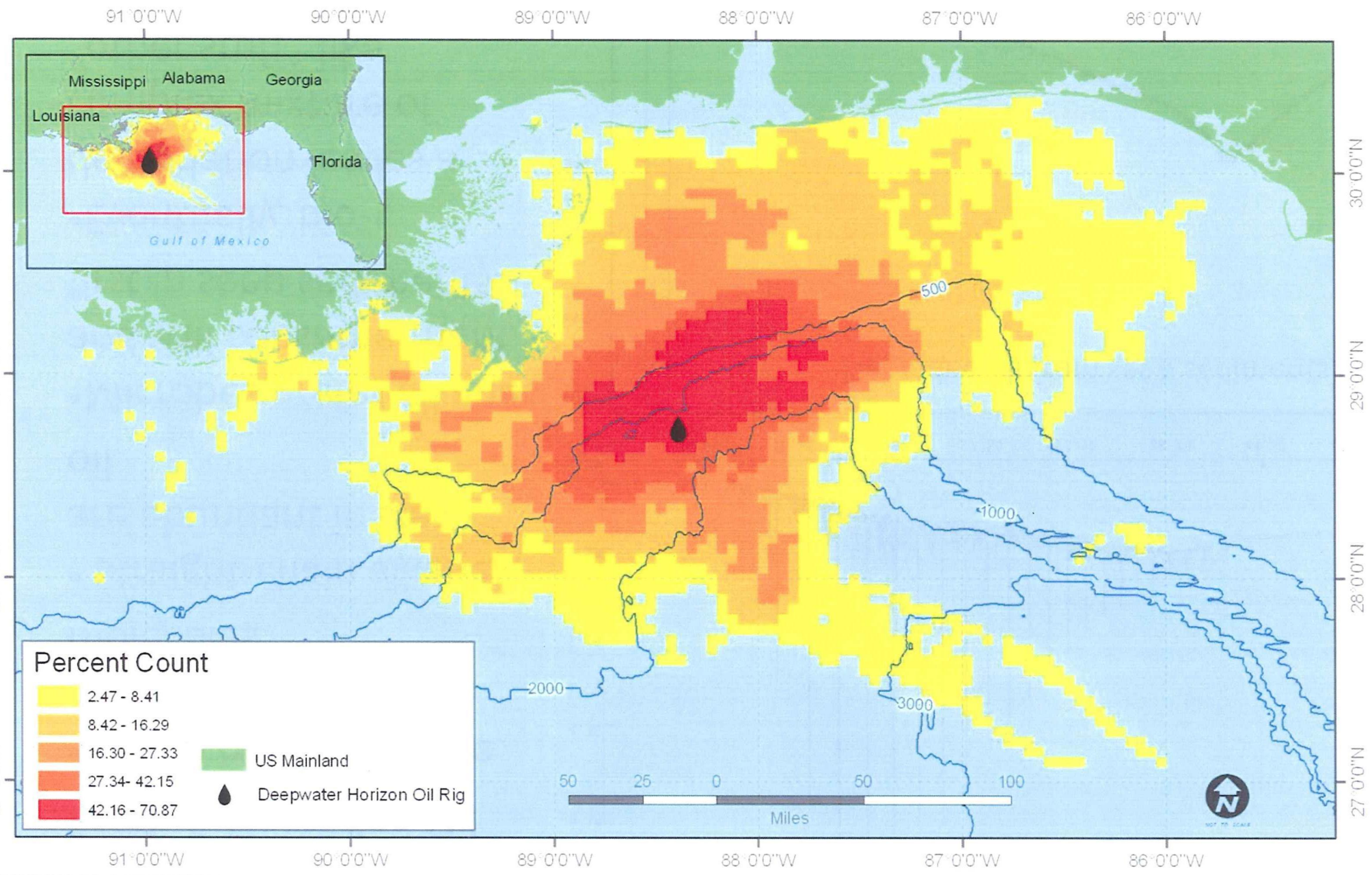

Natural Seeps
0
50
100
20
Kilometers

~1000 Natural Seeps Discharge about 400,000 barrels of oil per year across the Gulf



BP's Oil Spill Analysis. Normalized Detection of Surface Oil.

MacDonald Image Lab
Dr. Oscar Garcia-Pineda
EOAS Department

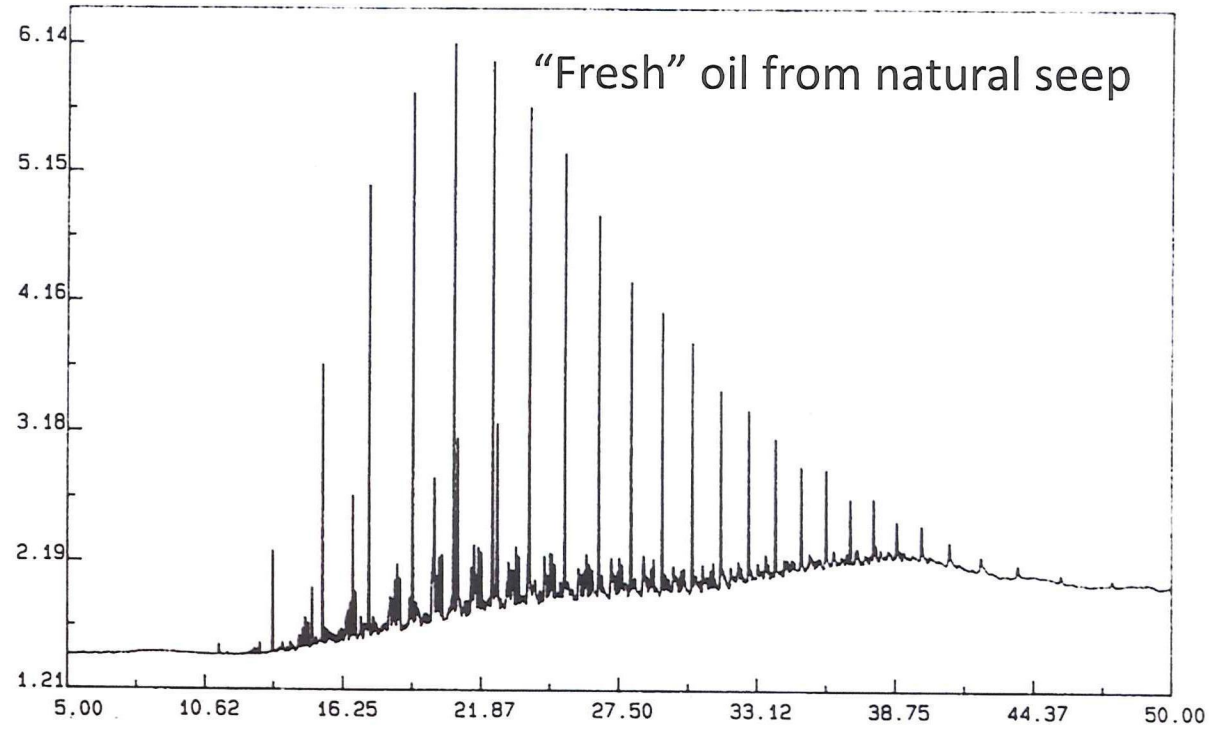


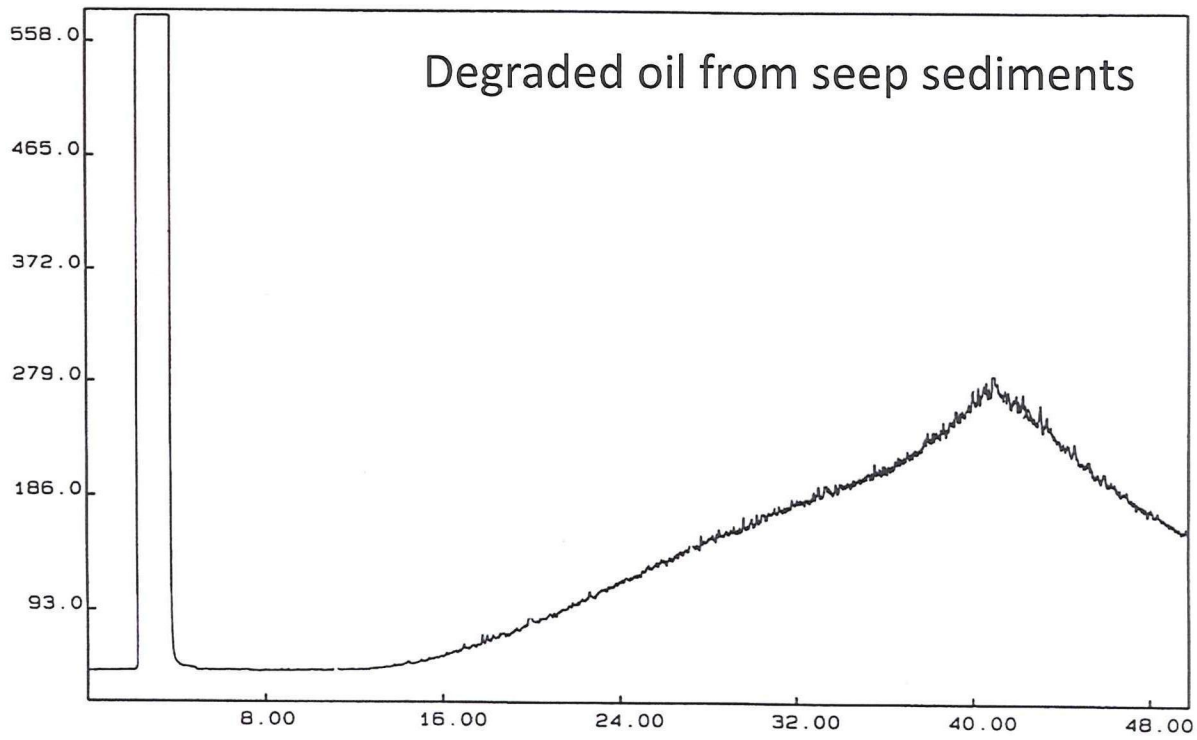
Projection: WGS_1984
Date: September 16, 2010

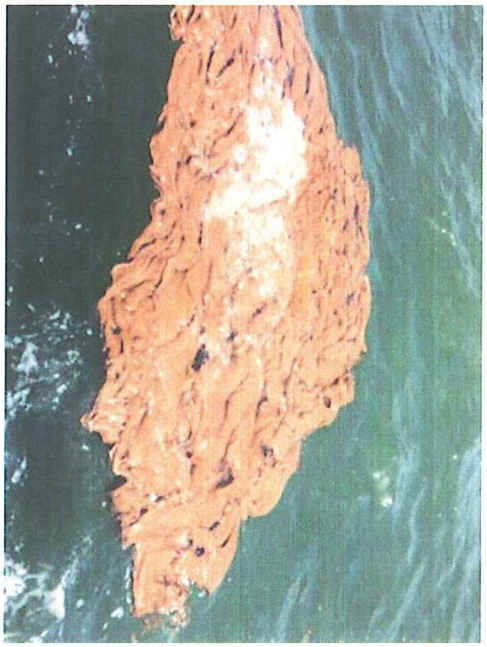
Source: TOMSA
32 Envisat ASAR frames

Fresh & Degraded Oil

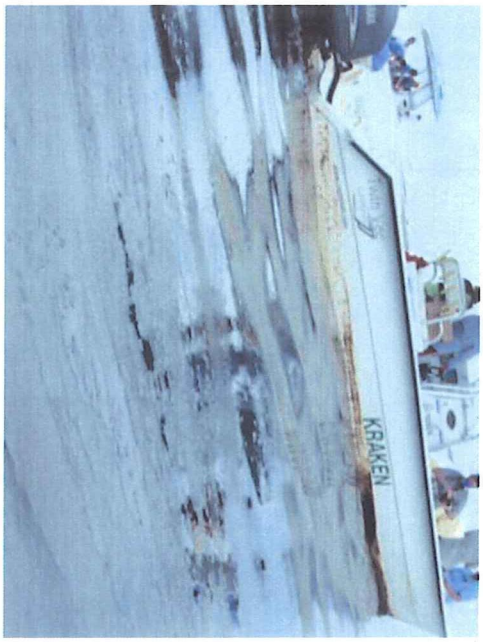
- Crude oil is a mixture of many different molecules.
- Straight-chain alkanes are abundant in fresh oil.
- Microbes prefer alkanes and will consume them first in seep sediments.
- Eventually, bio-degradation leaves a complex mixture of "other stuff" like asphaltenes. The alkanes disappear.



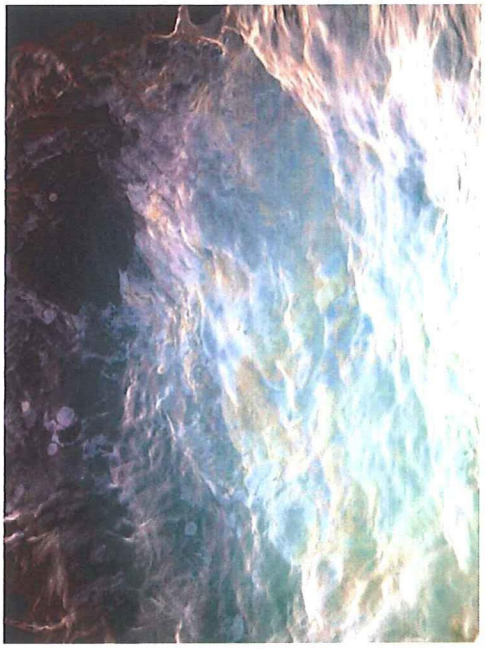




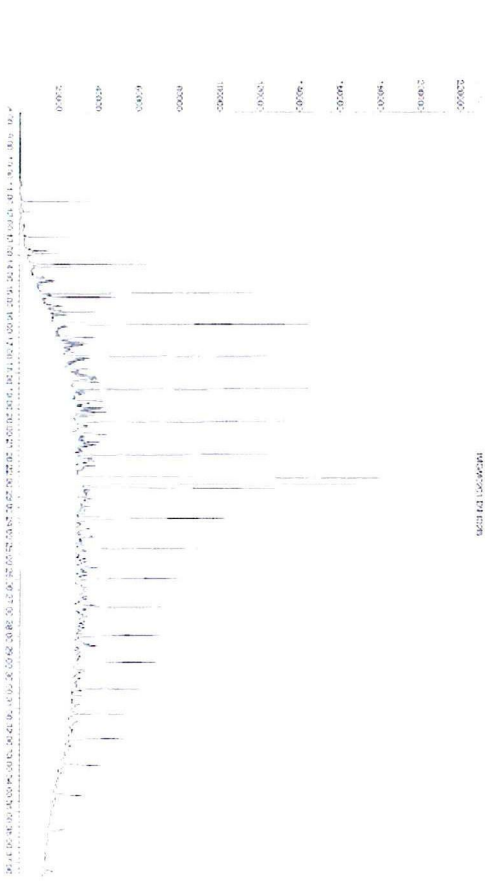
Emulsified oil
23 July, ~95 km from Wellhead (S Pass, LA)

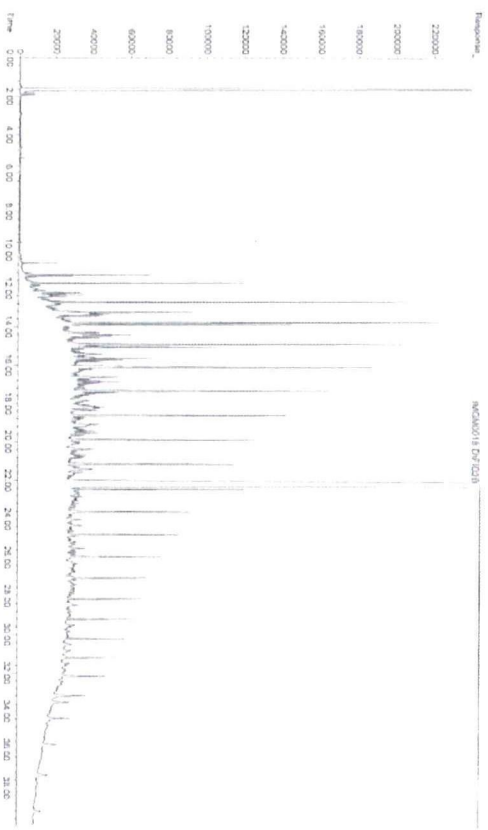


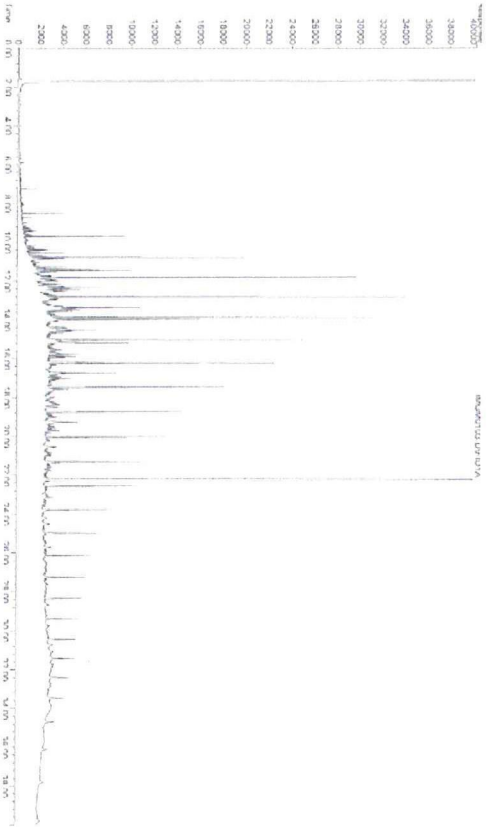
Weathered oil (> 1mm)
26 May, ~75 km from Wellhead (NE Pass, LA)



Freshly surfaced oil
12 July, ~3km from wellhead







National Commission on the
BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING

Attachment 8

Written Statement and Presentation of Dr. Richard Camilli

Associate Scientist, Department of Applied Ocean Physics and Engineering
Woods Hole Oceanographic Institution

WOODS HOLE OCEANOGRAPHIC INSTITUTION

Richard Camilli, Ph.D., *Associate Scientist, Dept. of Applied Ocean Physics and Engineering*

Testimony to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

Good morning chairmen and commission members. Thank you for the opportunity to speak today about the flow rate and fate of oil from the Deepwater Horizon disaster. My name is Richard Camilli. I am a Scientist in the Woods Hole Oceanographic Institution's Department of Applied Ocean Physics and Engineering.

This past May, at the request of the US Coast Guard, I led a team of researchers in a study to estimate the flow rate and total spill volume from the Deepwater Horizon's Macondo well. This investigation was undertaken using advanced acoustic technologies during well containment operations.

We integrated our equipment onto a remotely operated vehicle and operations commenced immediately following termination of the 'top kill' attempt. Our investigation was conducted on a non-interference basis, exactly as described in my prior Congressional testimony. Less than 48 hrs after completing field operations, my analysis team and I provided an initial flow estimate of 0.12 to 0.23 m^3/s. Following more detailed calculations, using over 16,000 discrete Doppler velocity measurements and 2,600 individual sonar cross section measurements, we revised our estimate upward by 8% to 0.25 m^3/s. These flow rates were, at that time, described as bulk volumetric rates because we had no accurate information as to fluid composition and BP had denied clearance for my team to use isobaric samplers to collect and analyze end member fluids from the leak.

Through the continued support of the Coast Guard, and the direct involvement of USGS Director, Dr. Marcia McNutt, I was authorized to lead a second team back to the Deepwater Horizon site and collect end member fluids from within the LMRP 'top hat' using the same samplers that had previously been prohibited by BP. Based on compositional analysis, and the previously measured volumetric flow rate I calculated the oil flow at 59,000 bbl/day, as of May 31st.

Using this estimate and the DOE's measured pre shut-in flow rate of 53,000 bbls/day, I extrapolated a linear trend for the interval between April 20th and July 14th and calculated a cumulative leak of 5 million barrels. Subtracting the collected oil from this total yields a net 4.2 million barrels released to the ocean.

This estimate does not take into account flow rate change resulting from riser shearing, the oil that burned prior to the platform's sinking, or minor subsequent refinements in our oil composition analysis. These factors offset each other and I therefore do not expect the 4.2 million barrel estimate to undergo significant revision. Neglecting these considerations, the WHOI team's findings are within 2% of the official government estimate.

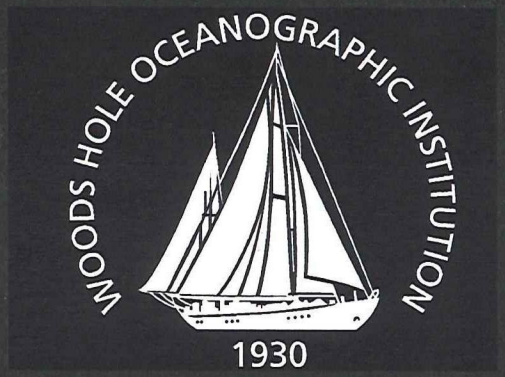
Based on subsurface oil emulsion layers I observed during the flow rate investigation, I submitted a proposal to the National Science Foundation to map subsurface hydrocarbon plumes using an autonomous underwater vehicle equipped with a mass spectrometer. As Chief Scientist I led another expedition back to the MC252 block. Our investigation revealed a continuous subsurface hydrocarbon plume over 35 km long, 2 km wide, and 200m high, traveling in a southwesterly direction at an average rate of 6.7km/day at 1100 meters depth. We determined that the plume's origin was the Macondo well, but that it did not create hypoxic 'dead zones' that would threaten fisheries. Our findings are detailed in a paper published in *Science*.

Other studies provide additional insight into microbial degradation of these subsurface hydrocarbons. The emerging body of evidence indicates that biodegradation within these plumes was predominately limited to low molecular weight alkanes, mainly propane. Questions remain as to the transport and fate of more recalcitrant oil components, particularly aromatic and polycyclic aromatic hydrocarbons (many of which are known carcinogens).

Other important aspects of assessment should be systematically addressed, including survey of sediment contamination, and long term monitoring of the Mississippi Canyon block and surrounding areas. I am prepared to describe field-proven technologies for high-speed non-contact sediment contamination mapping, and systems for monitoring water column contamination over extended periods.

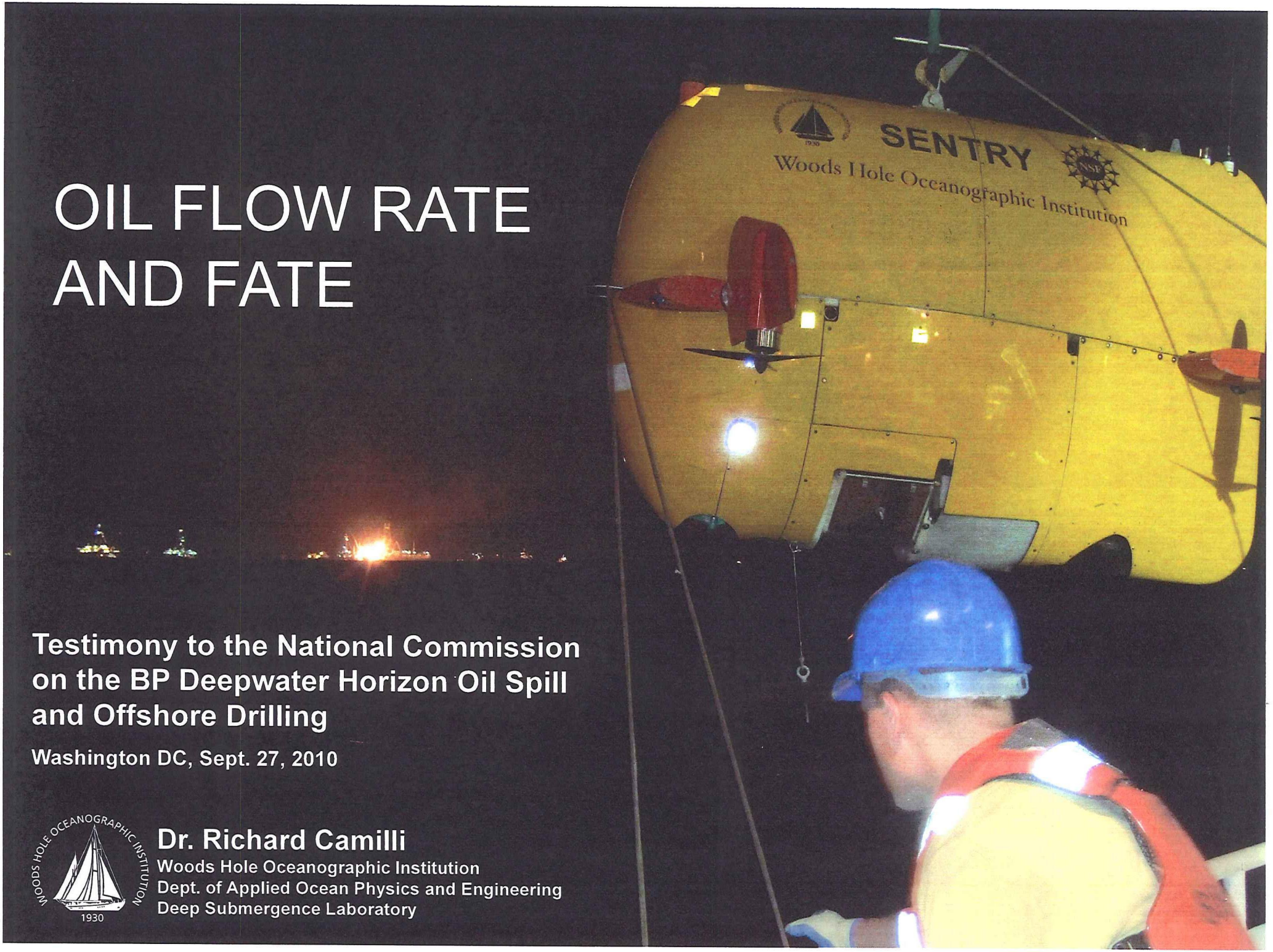
I would like to close by acknowledging the significant assistance provided by individuals within many governmental, academic, and industrial organizations. Throughout these investigations my colleagues and I have sought to remain sensitive to the lives lost in this tragedy, their families, the many residents of the Gulf Coast who have been impacted, as well as the ongoing assessment and cleanup efforts. We will continue to assist our nation and its cognizant agencies to the fullest extent possible when called upon. In order to avoid subjective biases or factual misrepresentation, we made a conscious decision to present findings publicly only after scientifically rigorous vetting or peer review.

Dr. Richard Camilli
Woods Hole Oceanographic Institution
Dept. of Applied Ocean Physics and Engineering
Deep Submergence Laboratory
MIT-WHOI Applied Ocean Sciences and Engineering



OIL FLOW RATE AND FATE

OIL FLOW RATE AND FATE

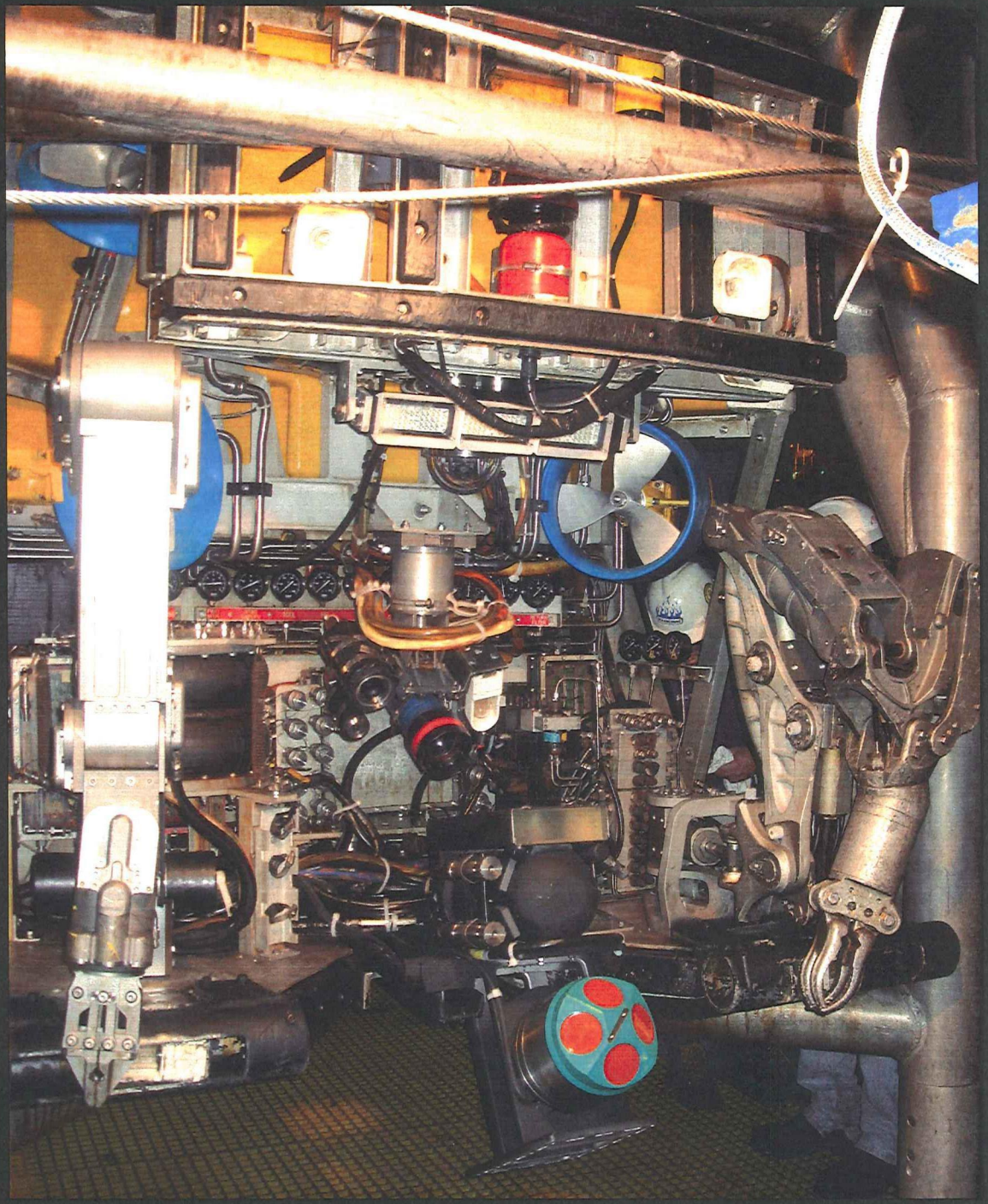


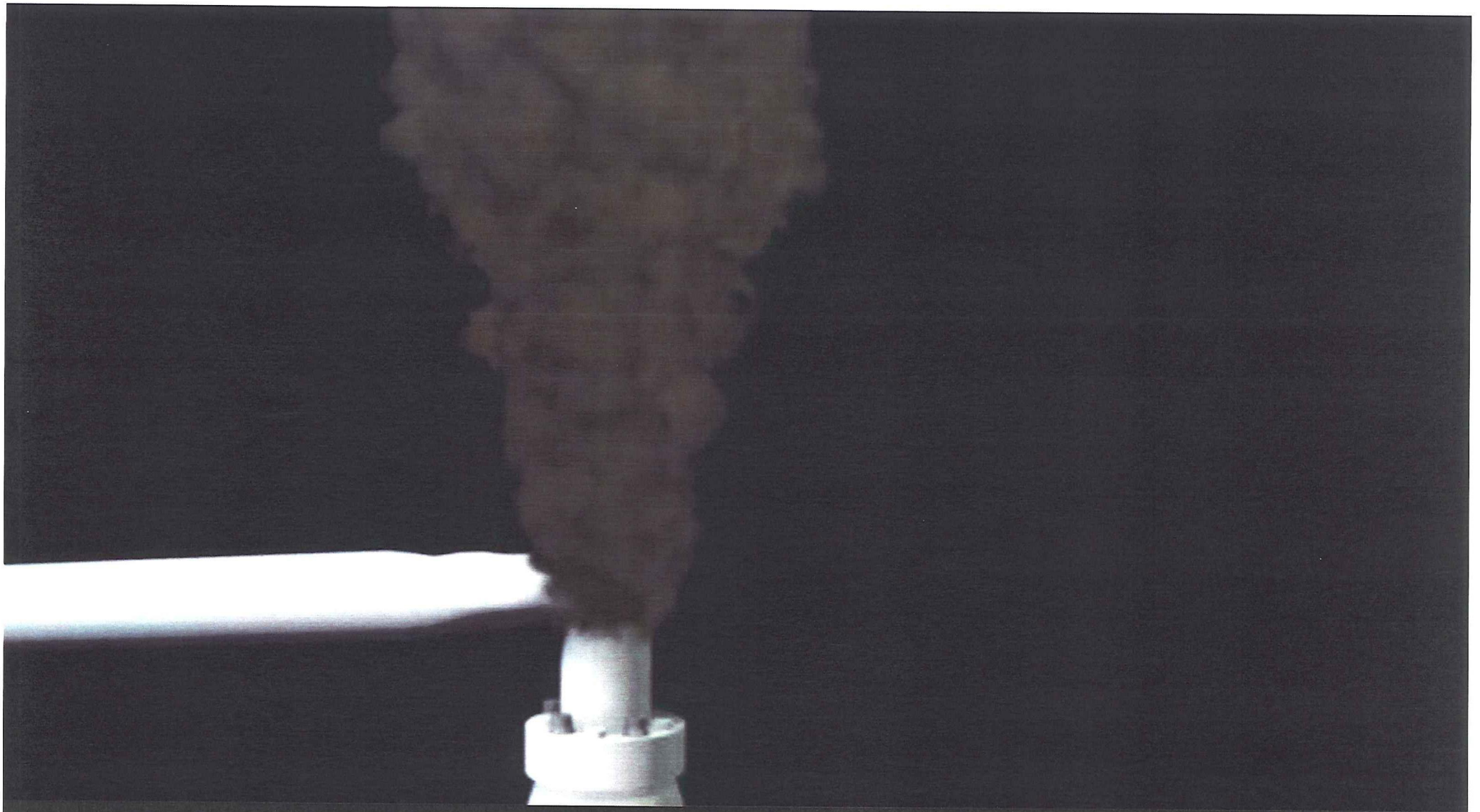
Testimony to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling

Washington DC, Sept. 27, 2010

Dr. Richard Camilli
Woods Hole Oceanographic Institution
Dept. of Applied Ocean Physics and Engineering
Deep Submergence Laboratory

ROV-mounted sonar imaging and Doppler acoustic velocity measurement tools

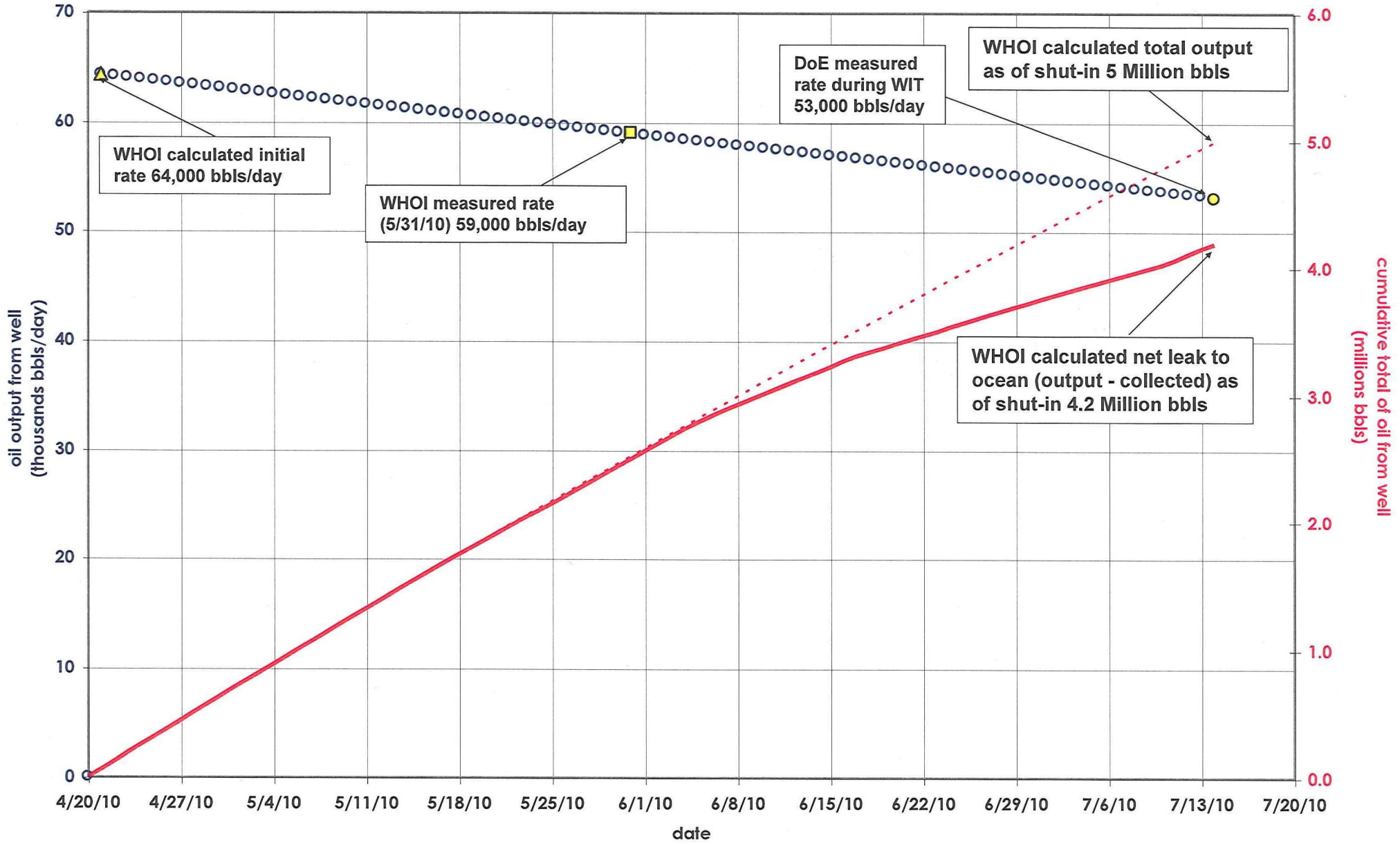




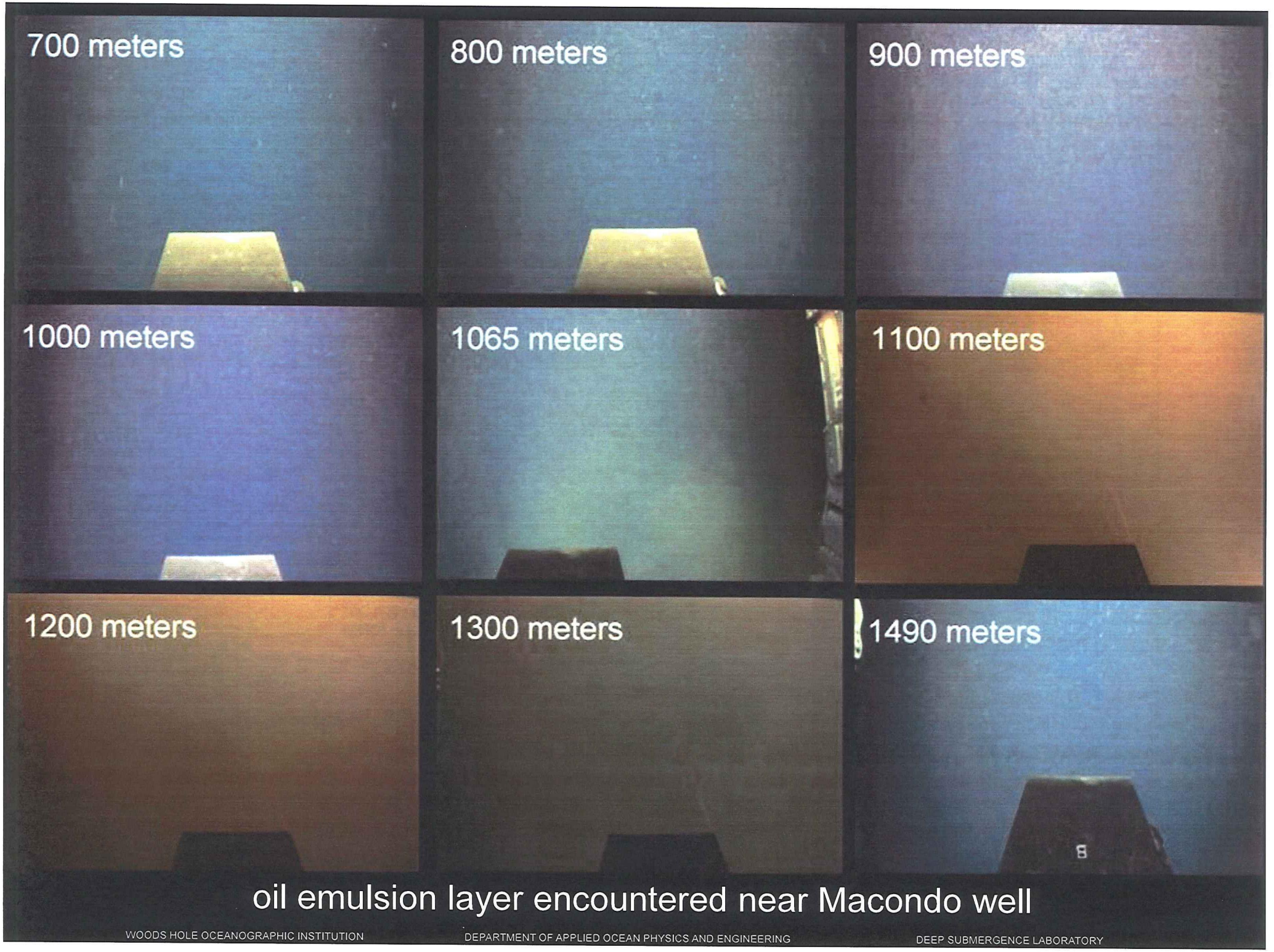
Acoustic flow rate analysis

- Sonar measurement of flow cross section
- Doppler sonar measurement of fluid velocity
- Analysis of fluid composition

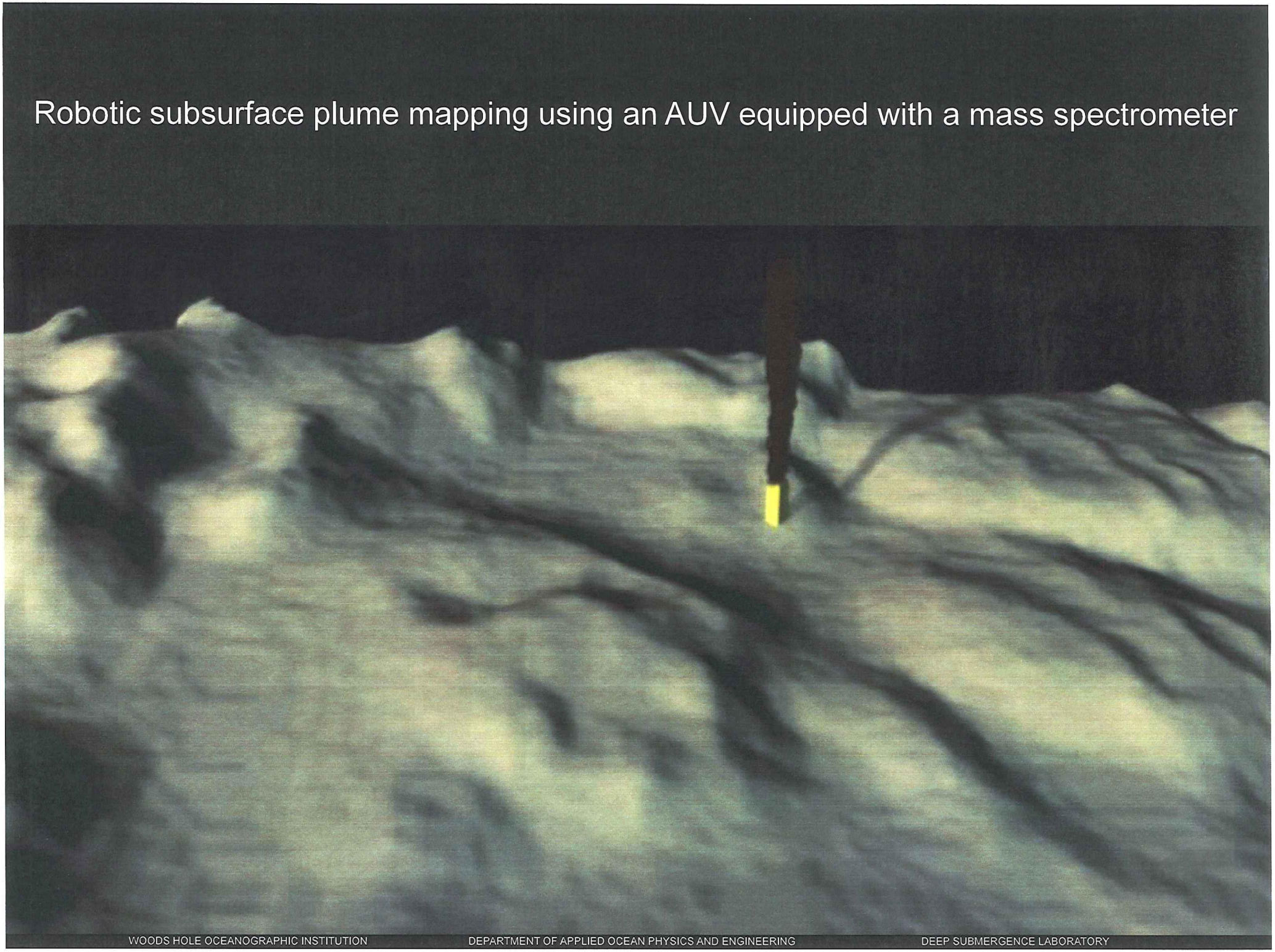
Deepwater Horizon flow rate and cumulative spill



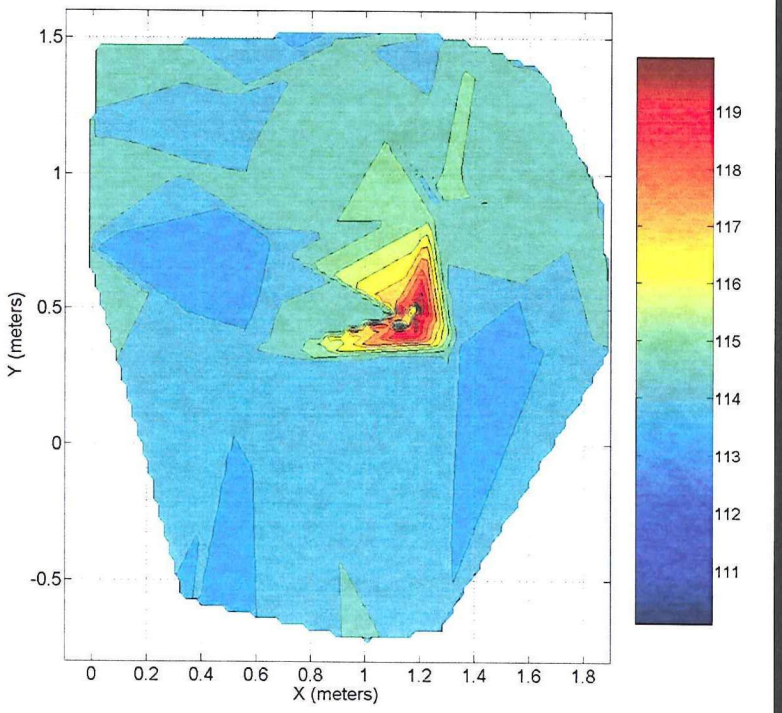
WOODS HOLE OCEANOGRAPHIC INSTITUTION DEPARTMENT OF APPLIED OCEAN PHYSICS AND ENGINEERING DEEP SUBMERGENCE LABORATORY


700 meters
800 meters
900 meters
1000 meters
1065 meters
1100 meters
1200 meters
1300 meters
1490 meters
oil emulsion layer encountered near Macondo well
WOODS HOLE OCEANOGRAPHIC INSTITUTION
DEPARTMENT OF APPLIED OCEAN PHYSICS AND ENGINEERING
DEEP SUBMERGENCE LABORATORY

Robotic subsurface plume mapping using an AUV equipped with a mass spectrometer

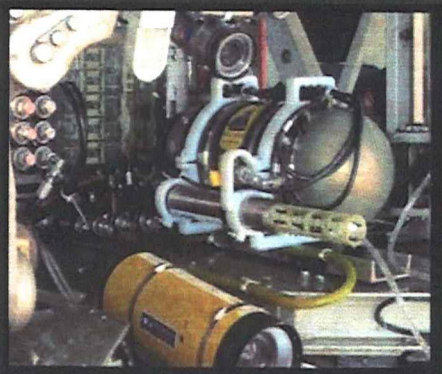


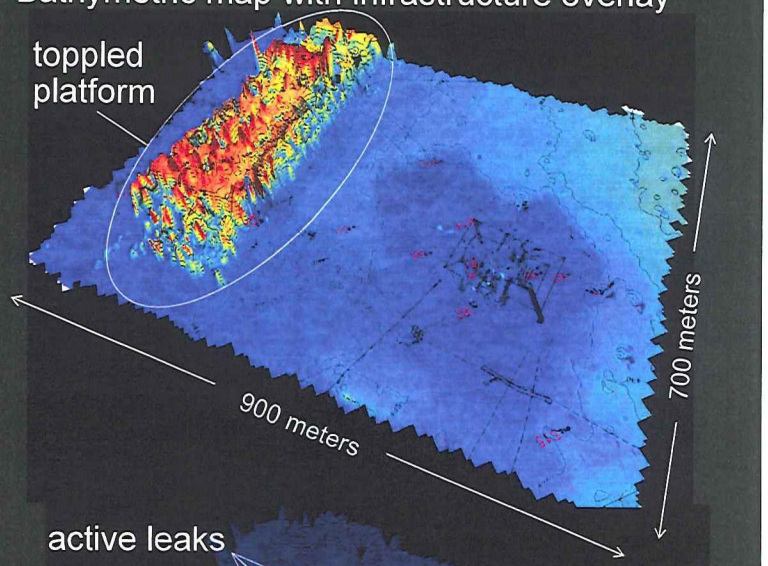
geo-referenced seafloor mapping of crude oil leaks and sediment contamination from a toppled offshore oil platform

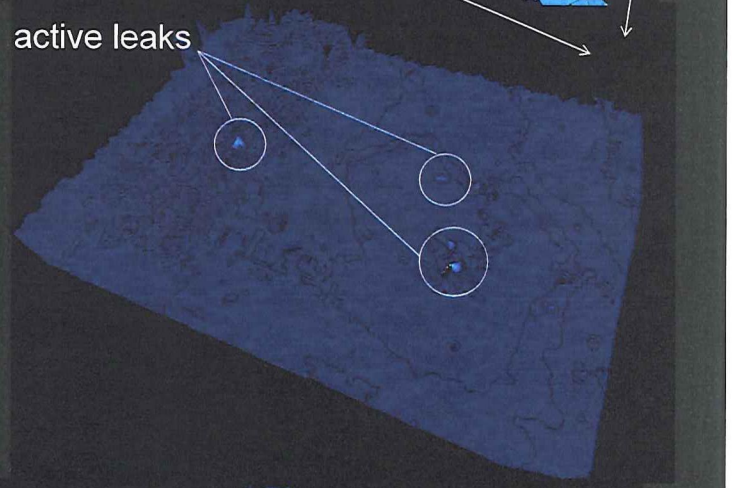


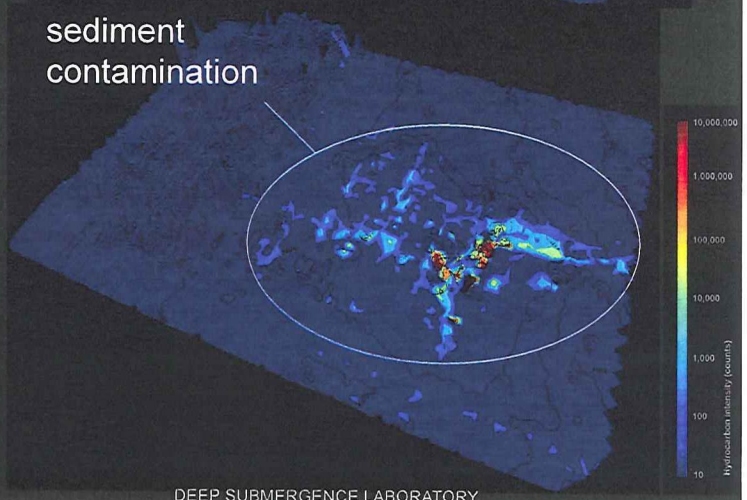
Ultra-high spatial resolution detection of sunken oil (capable of localizing sources at centimeter spatial scales). Colorbar indicates total hydrocarbon counts.

Camilli et al., "Method for rapid localization of seafloor petroleum contamination using concurrent mass spectrometry and acoustic positioning" *Marine Pollution Bulletin* 58(10):1505-1513. 2009.









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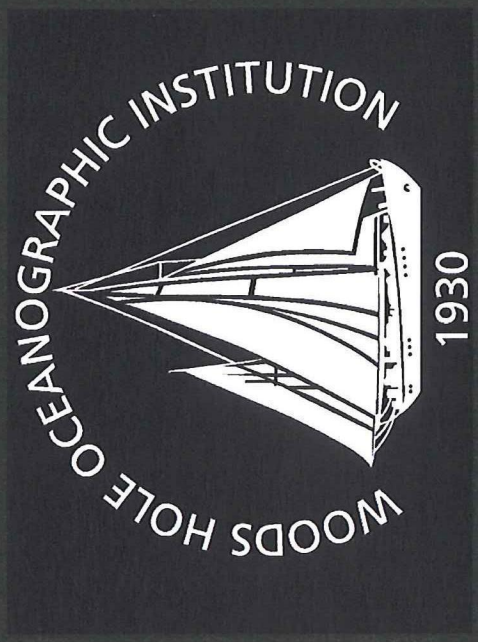
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