U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF OCEAN ENERGY MANAGEMENT,

REGULATION AND ENFORCEMENT (BOEM)

FORUM ON OFFSHORE DRILLING

OIL SPILL PREPAREDNESS AND RESPONSE

Public Meeting

at the Battle House Renaissance Hotel

26 North Royal Street

Mobile, Alabama

on August 10, 2010

commencing at 9:00 a.m.

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DAVID SMITH: Good morning. Welcome to the Bureau of Ocean Energy Management, Regulation and Enforcement forum on offshore drilling. In just a few minutes BOEM Director Michael Bromwich will open the forum. But first we need to take care of a few administrative announcements.

First of all, in the event of an emergency, note the exits in the back of the room here. Make your way to the closest one and the staircase if a fire alarm should sound or something like that.

Also if you need to use the restroom, use this back door here and go on around and past the elevators and you'll find the restrooms there.

We ask that you set your cell phones, pagers, Blackberries to the off or the vibrate position. And if you have to take a call today, please do so outside the room so that you're not disrupting the panelists or your fellow audience members.

Also we would ask that you not disrupt the proceedings with applause or cheering or yelling or anything like that, whether you agree or disagree with the viewpoints that you're hearing today just out of respect for those sitting around you so that they can

hear the proceedings.

And finally please take a few minutes to fill out a comment card that we have on the table right outside the door here. You can drop them off in the box provided or give them to any of us with a name tag. We can take care of those for you. Also you can go to www.boemre.gov, boemre.gov, and follow the directions there for how to post comments on line at a place called regulations.gov or how to mail your comments to us as well. And regardless of which method you use, whether it's providing them here or going online, we're going to follow up all and see them.

Again, thanks for your attendance today. The director will be out in just a few moments to kick things off. Thank you.

(PAUSE WHILE BOEM AND PANEL I
ENTER THE STAGE.)

DIRECTOR MICHAEL BROMWICH: Good morning everyone. My name is Michael Bromwich. I'm the director of the Bureau of Ocean Energy Management, Regulation and Enforcement. And welcome to our second public forum on offshore drilling in Mobile, Alabama.

This is the second of eight such forums that we're going to be holding throughout the country between now and the middle of September. Last week we were in New Orleans and we focused on spill containment. Tomorrow we'll be in Pensacola, Florida, and we'll focus on a variety of drilling safety issues. But today our focus will be on oil spill preparedness and response.

Before we begin our presentations, let me just provide some framing and some background information for today's discussion.

The purpose of these forums is to deal with the principal issues that underlie the moratorium that was imposed by Secretary Salazar on July 12th. At the time he directed my organization and me specifically to collect both expert and public information about the three central issues relating to the moratorium. The first is drilling and workplace safety, the second is wild well intervention and containment techniques, and the third one we'll be focusing on today, oil spill response capabilities for offshore drilling and production facilities.

Now, the central purpose of these forums is to identify whether any modifications to the scope or

the duration of the moratorium on deepwater drilling operations is warranted based on our assessment of the risks that are associated with different types of operations. This is a public forum. I'm glad that we have a number of people here today. We have a terrific series of panelists. But the public is welcome and we urge them to comment on these various issues, and they can use among other things our website you see on the bottom of this slide, the URL to use for providing such comments.

Talking briefly about the importance of deepwater drilling, I think we're all more educated about that than we once were. Tens of thousands of workers are employed in the Gulf of Mexico in the offshore oil and gas industry. Our domestic energy production is critical to the health of our economy, to our energy independence and to national security.

Currently the Gulf of Mexico accounts for approximately 30 percent of domestic well production and 12 percent of domestic natural gas production. So the contributions of the Gulf are enormous.

The importance of drilling safety and effective oil spill response I think are obvious, but

let's talk briefly about what the risks are, the risks that have unfortunately been realized over the last 100 days or so. Deepwater spills have a potentially dramatic and devastating impact on a variety of activities. Those include fishing and shrimping, tourism, wildlife, the ocean and coastal environments and our local communities.

The only way to minimize the harm once an oil spill actually occurs is through effective and rapid oil spill response.

Some further information on the impact of the Deepwater Horizon oil spill in particular. As you know, the explosion took tragically the lives of 11 rig workers who died at the time of the blowout and the ensuing fire.

The Deepwater Horizon oil spill has had a visible and dramatic effect on the ocean and the coastal environments throughout the Gulf of Mexico.

Hundreds of miles of shoreline and wetlands in the Gulf states have been affected, in some cases dramatically so, by the Deepwater Horizon spill.

In addition, the entire Gulf ecosystem, which is extremely complicated, has been and will be

affected, and that includes marine plankton, it includes fish and shellfish, it includes bird, marine mammals and other wildlife.

In addition, the spill has had a substantial impact on fishing, shrimping, tourism, commercial retail and other industries throughout the Gulf of Mexico region.

Let's turn now to the resources that have been deployed in the Deepwater Horizon clean-up effort. Those oil spill response resources throughout the nation really have been mobilized and brought to the Gulf for anticipation of clean-up of the Deepwater Horizon spill.

Among other things, this includes literally tens of thousands of personnel, both governmental and private, millions of feet of boom, thousands, literally thousands of vessels, and over 100 helicopters and aircraft of various kinds.

To focus briefly on the inadequacy of current oil spill response plans, industry representatives have admitted repeatedly in public that they have not been and are currently not well equipped to handle worst-case scenarios. Industry

regional response plans proved thoroughly inadequate to address the Deepwater Horizon spill.

Among other things, the plans overestimated the daily recovery capacity of skimming systems in the open ocean, they failed to account for the spreading of oil and the significant shoreline impact of that oil, and they failed to provide for rapid mobilization of equipment from both domestic and international resources.

In terms of those resources, the unprecedented deployment of oil spill response resources to the Deepwater Horizon site and the relevant Gulf shorelines have raised serious concerns about the industry's ability to respond should another deepwater spill arise.

Industry executives have testified before Congress that they have deployed and did deploy all available resources to respond to the Deepwater Horizon spill.

And in a June 28, 2010, meeting at the Department of Interior, the Secretary Salazar meeting with other officials, industry representatives were unable to provide assurances that sufficient resources

exist to address a second oil spill while the response to the deepwater spill was ongoing.

Further, the Coast Guard determined that the number of oil skimming vessels was inadequate to recover the oil released from the Deepwater Horizon spill. As a result, the Coast Guard and EPA amended their oil spill response requirements to allow certain commercial and military vessels that are normally required to be available for spills in other regions to be deployed to the Gulf for the Deepwater Horizon site.

NOAA stated that it was fully engaged in responding to the Deepwater Horizon spill and that it would have had difficulty responding if another spill were to occur simultaneously in another U.S. location. Thankfully that hasn't happened.

There are, as we've seen from watching television over the last several months, serious weather-related complications in formulating appropriate oil spill responses. Clean-up operations during hurricane season are subject to a number of weather-related complications, difficulties and delays.

Response crews can't conduct skimming or burning operations when the seas are disturbed and there are high winds and high seas.

Increased wave heights may cause boom to break apart in some areas and be rendered ineffective.

And storm surges may distribute oil over a wider geographic area and carry the oil into the coastline and inland as well.

Although Tropical Storm Alex turned out to take a path away from the Macondo site, ocean conditions that were caused by the storm required all 510 skimmers that were responding to the Deepwater Horizon to be grounded and to have to return to shore temporarily.

This really states the obvious: Industry must develop effective oil response plans.

And that brings us to today's panelists.

Let me start by introducing the gentlemen to my left who are distinguished people from my own agency. Immediately to my left is Lars Herbst. Mr. Herbst is a regional director of BOEM's Gulf of Mexico region. In that capacity he supervises roughly 550 employees of various categories with various

professional qualifications. Mr. Herbst is a petroleum engineer by training and he has led the Gulf region in a very distinguished way since 2007. He has served in various positions with the region's field operations office since 1983, so for 27 years.

Sitting to Mr. Herbst's left is Bill Hauser. Bill is the chief of the Rules and Standards Bureau or the Rules and Standards Branch of our organization. He has served at headquarters for approximately 20 years. Earlier in his career Bill served as a petroleum engineer in the Alaska region. So he has extensive experience all over the country.

Mr. Herbst and Mr. Hauser will be with me and will be asking questions of the panelists throughout the day.

We will have three panels. The first panel, as you can see -- and I'll give them broader introductions in a moment -- is composed of two officials from BP. The second panel is composed of distinguished academists, environmentalists and business people. And then we'll be taking a break, and then the third panel will be composed of elected officials from the surrounding area to share their

views about the oil spill response and related issues with us.

Let me introduce the people from BP who will provide the first presentation. First, immediately to Bill Hauser's left is Richard Lynch. Richard is the vice president of drilling and completions and a part of BP called the Centralized Development Organization. He has a bachelor of science degree in petroleum engineering from the University of Wyoming and has had a variety of positions in BP.

Sitting to his left is Richard Morrison. Richard Morrison is the vice president of operations for the Gulf of Mexico. Richard Morrison has a drilling engineering degree from Texas A&M University and has had similarly a variety of assignments with BP.

So without anything further, gentlemen, let me turn it over to you for your presentation.

* * * * *

PANEL I

RICHARD MORRISON: Director Bromwich, thank you very much. We appreciate the opportunity given us here today to share with you the capability that we've

built around deepwater containment and response over these last 112 days. This is from the source to the shoreline.

It's quite difficult for both of us here actually to share with you advancements and accomplishments, achievements over the course of this knowing that there are 11 families out there who remain devastated by the chain of events on April 20th and the loss of their loved ones. You should know that the men and the women who are responding to this event are committed, are committed to making it never happen again, and have the family and friends of those lost and the residents of the Gulf Coast who have been affected on our minds the whole time.

Experience with deepwater containment and response is not a skill that any of us men or women in the industry were seeking to obtain. We had no choice. We came together. We will continue until it's completed.

The scale of the Mississippi Canyon 252 response is unprecedented in terms of scope, technology, stakeholders and organizational complexity. Our capacity and our capability to fight

the deepwater spill, both subsea and on the surface, has been greatly expanded over the course of this response. Proven tools and techniques were enhanced while new concepts were created, developed, tested, deployed under fire. Technologies were proven in a relatively short space of time. The manufacturing and supply changes were established while many existing supply chains were modified quickly to ramp up to meet the need. Critical equipment from across the U.S. and the globe was identified and mobilized to respond to this scale.

We'd like to take about 60 minutes today, if we could, to provide you an overview of the containment and the response experience and summarize our lessons learned, draw your attention to the enhancements made in both capability and capacity from the source to the shoreline, and obviously work to answer any questions that are on your mind after.

This slide here may look a little busy, a little cluttered to you at first glance, but it is a dramatic simplification of the activities that went on simultaneously during this response. And part of it continues today. Richard and I will take you through

the key containment activities that occurred 5,000 feet below the water depth and directly above the source, and I'll focus on the open water near-shore and shoreline activities.

At the peak of our operation it included 48,000 men and women working, 6,000 marine vessels, six deepwater drilling vessels, two FPSOs, 158 aircraft, obviously dozens of federal, state and local agencies, E&P operators and hundreds of industry suppliers and vendors. And we did this working through four incident command posts and 19 independent branch offices.

What was accomplished over the last 112 days and what is now in place for the future goes far beyond the physical equipment deployed or the statistics in a book. How the work was organized, prioritized and delivered and the deep expertise and knowledge and processes developed along the way are equally as important as the equipment that you see on this page.

The key point of this slide is it took experts from around the country and the globe to get the work done. It was a complex integration of

numerous stakeholders, all with a common purpose, to stop the flow, protect the coastline and minimize the impact to the environment and the communities.

While not an exhaustive list, these are five lessons that we like to share with you pertaining specifically to the containment and spill response. We'll touch on most of these as we go through our presentations today. I wanted to highlight these upfront.

The first one is something we call "know your oil." This oil on its way up to the surface from 5,000 feet changes rapidly. Characteristics change rapidly. And it changes all the way from the source to the shoreline. And knowing the type of oil every part of the way is very, very important.

Also the fact that the spill response becomes very local very quickly. And only a decentralized kind of an organizational structure model can actually meet the needs at the frontline.

The third one was centered around building long-term planning capability from the very, very beginning. So you need a team outside the daily firefighting, a 24-hour cycle, to think days, weeks

and months ahead.

The fourth one is the pursuit of multiple parallel efforts and solutions, and flexibility is required and essential when you really don't know how the situation actually may evolve over time.

And I think the fifth one goes without saying, but being nimble in this continuous learning cycle to integrate all relevant experience as you go forward under fire really accelerates the process and progress.

So that's just a short summary. We spent some time together over the last couple of days thinking about really lifting up what we have learned. And we'll go a little more deeply here in a second. So I'll turn it over to Richard here, and he'll take us through the deepwater containment part of the puzzle.

RICHARD LYNCH: Thanks, Richard. And thank you. I'll go ahead and just jump right in the middle of this. Maybe first, though, just to introduce myself a little bit just so you'll know a little bit more about me, as you heard, my name is Richard Lynch. I've spent the last 30 years working for BP,

actually joining back in 1980, going to work for ARCO, and spent about two-thirds of my career in drilling and pollution engineering. The other third of my career has been spent in major projects, management and operations, production operations management.

What I would say is I've actually spent the last 106 days personally engaged in this. And the team that I've had that's done the subsea containment have been very, very dedicated to the efforts that went on. And the thing that fueled this, as Richard said, was around the loss of life, the life here in the Gulf of Mexico, and importantly the impact it's had on our industry. A lot of us, this is our career, this is the way we make our living.

But I'm actually humbled to tell you this morning and report to you that on the 7th of August at about 10 o'clock a.m. we have successfully pressure tested the cement plug in the Macondo well, which was a huge point actually, which says that the main well boring made for that well is now isolated. Of course, that was only made possible by the fact that we put a stacking cap into place with a transition spool flange on top of the Horizon BOP and enclosed the choke at

2:25 p.m. on the 15th of July. I know those sound like awfully long times when you think about them in realtime, but actually both of those activities were being planned on about day 3 when I walked in the door. It took time for us to execute that, and I think that's a major learning for all of us here today.

So what do I do in my daily role? Well, my role is to lead what we call our near term containment. And this is at the source. So I've had a few things that went rather not so well and I've had a few things go rather well. I led the efforts for the large cofferdam that was put at the sea bottom filled with hydrates on the way down. We knew that there was a risk of that when we ran the device. The reality of it was that was an installation problem, believe it or not; diagnosed it as soon as we got partway down, and at that point it was too late.

I would further report that I was actually leading the team that put the riser insertion tube tool in place at the end of the riser and collected some 22,000 barrels of oil coming into the riser, which was pulled for the top kill activities. After

the top kill activities, I led the efforts to put the top hats in place that actually come down -- come to the top of the Horizon BOP and recovered oil at that point. At the same time I led the activities to get the Q4000 up and running, to turn it around from a vessel that was in the mode to do a dynamic kill into a vessel that was actually now back in a containment mode by reversing the equipment and actually burning crude oil and oil at the surface.

I went on to lead the activities to actually put the capping stack into place and transition spool; led the activities to do the static kill and the cement job.

So I've kind of seen it from the inside out. And I'm happy to share those experiences with you here today because I think it's critically important.

So what will I be talking about? I'm going to talk about well containment. I will not be addressing dispersants nor will I be discussing relief wells here today. I think those will be topics for another session some other time.

But if we have a look at what it takes for

me anyway to align my team and provide clarity in everything we do, it gets back to very simple things, kind of foundational elements, if you will. That's guiding us on simple mission goal statements and some very, very simple boundary conditions. And believe me, we use these every time we have a conversation about what we're going to do next.

So our simple mission has been to contain as much hydrocarbon at the source as possible until the leak is physically stopped. And that's been our goal from day one.

Now, the boundary conditions around that might look a little unusual to you, but let me just work through them. First and foremost, whatever we do, we don't want to make it worse. We don't want to make the leak worse. It's critically important because when you're working in and around one of these BOP stacks with the ROV and the equipment and vessels on the topsides, you've actually got an innerspace problem that you're working with, not the outerspace problem that the astronauts face but an innerspace problem, because you can only have so many things working in the same place at the same time. It's very

easy to bump, disengage, rupture, break, create problems in those areas if you're not very, very deliberate about what you're doing.

Next was maintaining a path for growing the containment. This was all about keeping our plan for continuing to increase the containment capability that we had. We were blessed to have the Enterprise. It was a vessel specially equipped with gear that can put a top hat in place and recover almost immediately. I was fortunate to have that in the inventory. However, the other machines and equipment and gear actually had to be engineered, manufactured and delivered to the site and installed for use, and that took some time. But what we didn't want to do with anything that we put on the bottom was in any way hamper or slow down actually continuing to grow that containment. So we had to go about it in a very methodical way.

And last but not least, all the actions must complement the relief well. What's so important about that is the fact the relief wells in these well control incidents are the end game. It's probably the most important element. Whatever you do, you wouldn't want to do anything that would actually compromise or

jeopardize the outcome of that relief well.

So I've got a picture up here, here again not nearly as busy as the one Richard put up. But this is actually kind of a snapshot if we were to go offshore today and take and cut a cross-section not only at the surface but cut right down to the ocean itself and down into the subsurface below. So you've got kind of a panoramic view here. I want to break the picture down for you and explain a few things so we all kind of are talking on common terms.

First and foremost, when we look at the very subsurface, that's a piece I'm not going to be talking about. But you can see the one relief well from the DDIII there that's nearly at its intersection point. As of this morning, the well has been drilled down to 17,909 feet. We're approximately 3.5 feet away from the original well bore. We're very close to the relief well at this point in time.

Above that you'll see all the different subsea equipment. The BOP that you see in the center of the picture is the Horizon BOP, and that's the representation of it with the capping stack with the small BOP on top of that. You'll see the different

manifolds on the bottom. You will also see the pipes that rise from the sea bottom back to the vessels.

So what's so important here is you actually have to have a containment at the source. Either the piping or the arrangements that you see are actually the utilities that collect the oil that was contained. The piping across the sea bottom moves that oil and gas to those risers. Those risers convey the oil and gas to the sea surface. And then once at the sea surface, you go through some onboarding onto the vessels where the oil and gas is processed, the gas is cleared, the oil is stored, and any volatile that would be involved in the process would be separated and handled accordingly.

So it's a very, very simple process. There's kind of three basic layers of what we build on and what we look at in our architecture.

The other thing when you look at the picture, though, you see a lot of these little lights that are kind of buzzing about at the different locations. You can see them at the top of the Horizon stack. Those are the ROVs. And it is a robotics world. This is how work is done at subsea, obviously

driven by men and women at the top. But these ROVs are actually the working tools at depths. There's large vessels that control -- have control of those vessels, and generally those large vessels also have large cranes. That's how we install and deinstall the equipment that we have on the bottom.

Also on the top sides here you'll see not only the rigs but you'll also see some other large vessels, the Loch Rannoch, the Evi Knutsen, which are both very large -- these are DP, dynamically positioned vessels for the oil. Beside that you see the Helix Producer, Toisa Pisces. These are floating production, storage and offtake units, they're called FPSOs. And you'll see numerous support vessels.

At the side there you'll see the Q4000. That Q4000 is another work platform. It's actually a construction vessel that has a vertical tower on it that allows it to work a bit like a drilling rig but a little bit better. And that's been the vessel that we've done a lot of work with. You need to think about the Q4000. The Q4000 actually has control of the Horizon BOP stack, believe it or not. Because we were actually able to rebuild and reconnect the Q4000

to the stack so we could manipulate it.

I guess the other thing that I'd point out in the picture is that there's probably some things that are missing. What you don't see in the picture are some of the flotilla, I don't know, some 21, 22 skimming vessels that are onsite. You don't see the Discoverer Enterprise that is sitting there with our top hat number counting 11 deploying right now ready to come over the top of the capping stack and take over the well if required. You don't see the Chevron Clear Leader which is sitting at Grand Isle 55 completely fueled up and ready to go at this point in time in case we need to call on it. And you don't see the Schiehallion, another vessel, another FPSO, which should be ready to go should in fact we have any problem with the Helix Producer or the Toisa Pisces.

So I guess the point I'm trying to make here is it's not just an equipment issue. It looks like an equipment issue. It's just not an equipment issue. In fact, in order to respond, this is an integrated approach where you have to apply the equipment and technology with protocols and know-how and a deep wealth of expertise. None of this goes together

easily.

So what I'm going to do -- I'll move back here just a second. What I'm going to do today -- I can talk for hours about this stuff. I know I'd bore you to death. But what I want to do is focus in on a few topics that I think are important here for different reasons. It's just to draw some of the detail out of the work that we've done. Every one of these topics has actually helped us in the pursuit of collecting and containing some 827,000 barrels to date and some 18.6 billions of energy in gas. I'm going to be talking to you about 4D planning, four-dimensional planning. I'm sure that sounds different, and I'll explain what that means. I'm going to talk to you about a "hat for every occasion" and what that means. And last but not least, I'm going to talk to you about the Yellow Pod.

So as I move to the next slide, the 4D planning, for me to paint a picture of this would be a little bit like scripting or doing choreography for a ballet or maybe it's a NASCAR pit stop or maybe it's the Blue Angels flying in formation. And what I mean by that, in 4D planning there's an X, Y and a Z

element of all your attributes, but you also have to take into account the element of time. And so it's how everything changes in its position relative to time. And what we use this for in particular is to create storyboards and time snapshots to make sure all of the equipment at the top sides where we have the vessels' simultaneous operations going on and in the innerspace where we have the ROVs working together, and then where we have the cooling subsea levels, where everything is in the right position at the right time so things work very efficiently as you go through this process.

We've had multiple applications with using the capping stack, the Yellow Pod, which I'll talk about, subsea manifolds, jumper installations, essentially building out all of the subsea architecture. How do we do this?

Every vessel has a positioning system on it, every ROV has a positioning system on it, so we know where they're at. We use these simulations, if you will, to choreograph how the vessels move and who will be in what space at what time. Why is that important? Well, it's important from an efficiency

and a safety standpoint, but it's critically important when you're trying to contain as much oil as you can as often as you can. We use these as modeling scenarios.

So when you start running through a sequence of different placements with your team members around the table, suddenly people start seeing the picture through other people's eyes, if you will. Because as you discuss this, you start understanding the interactions between the different vessels and the different ROVs and what does that mean. It's helped us tremendously in getting our skills to understand what's critically important in making this happen, and it actually has given us fantastic ability to bring our multidisciplinary teams together, as we have subsurface people, we have marine people, we have BOP experts, we have subsea architecture experts, we have drilling experts; get them at the same table having the same conversation and making a difference is what this is all about.

So that's a little bit on 4D. I've got another picture here. This is just a screen capture of one of the panels that we have. This was a panel

that was describing 7 p.m. on the 13th of July 2010. There's a multiple series of these. But this kind of shows on the right where all the surface vessel locations are. And you can see they've got different names and you can see the working radiuses around the well bores and what's going on. Actually those red circles you're seeing there, that's the sonar coverage radiuses and the ROV vessels down below them. And then when you look at the subsea, you can see the different locations of those little red pieces. Those are actually the ROVs. And every one of those ROVs has a position. Every one of those ROVs has an accountability. Every one of those ROVs has a function. And if they're not at the right place at the right time, you can't accomplish what you need to do. And of course, how are they all managed or manipulated? It's by the guy sitting in the vessel driving the toys, driving the go-cart. How do the guys in the vessel know where they need to be at what point in time? It's by the procedures that are prepared, that we've written and choreographed. And how does that work? It's actually by the statement of requirements and the basis of the design to actually

drive this through a very systematic process. And I'm sure from those of you that have observed from afar, it probably doesn't look like this has been organized. It probably looks a bit disorganized. But I just want to show you that in fact there's a deep and a great deal of planning that goes into every movement that takes place in these deepwater scenarios.

So my next little vignette here is on the "hat for every occasion." As you might guess, this isn't about head wear but it's actually about the containment hats that we use on the bottom. We've built a series of -- I guess I've got number 11 on the rig right now. The slide says 10. There's actually 11 with the H-4 cap that we have onboard the Enterprise at this point in time. But these are customized devices fit -- custom made to fit on various pieces and parts where the leaks are coming out. These pieces are built typically over a week to ten days time. We get together as a team, we brainstorm the requirements, we write the statement of requirements, and we build the devices that work. There again, they look very simple. Actually they are

very simple. Things need to be kind of caveman simple in this environment to make them work. Why? Because little machines put them in place is how they go into position. However, there's actually some very key pieces to each and every one of these things.

Number one, in this environment, 5,000 foot of water, you're roughly at 2,237 PSI at that depth. The ambient temperature down there is 39 degrees Fahrenheit. At that pressure and temperature combination, hydrates form from your gas. The oil and gas from this Macondo well is a very high GOR oil, it's a 3,000 standard cubic feet per barrel gas/oil ratio. Because of that, the ice crystals immediately form when they hit the seawater. So anything that you have that collects seawater with the hydrocarbon immediately ices up.

So therefore one of the key design elements of these little top hats is the fact that we have methanol injection that goes from the surface down to an I-box cable, a specially designed bundled cable that ties into the top of these things where we can inject methanol or glycol into the top hat so that it will stay ice free; critically important because if

the cap ices up, you don't recover any more hydrocarbons.

The next piece of the top hat are the small looking -- it looks like smoke stacks with vents on top. Vents are critically important for actually putting the top hat into position. The vents actually prevent the flow through the top hat. They serve as two things: They help create visibility because in an oil spill you can't see where you're replacing the top hat, and the second thing with the vent is they tend to center the top hat over the flow. So once the flow captures those vents, the hat centers up and then you can put it into position with full visibility about what's going on.

The other thing about the top hats are they're relatively large in diameter. These are relatively four foot in diameter that you see here. But to use them you have to actually figure out a way that you can store them subsea and go pick them up, pick the one that you need at any point in time. So if you will, we kind of have these little hat storage racks that we keep on bottom. And we'll have a whole selection of hats that we can go over with a rig and

reach down with a J into the hat, pick it up and put it into position. So if you look at the very top of the white member of the hat, the skinny pipe piece, you'll see those notches that are hanging there. That's called an auto J-latch. We use another piece for industry, but that's what houses and connects and redeploys the hats at any point in time. So that's the "hat for every occasion."

We move on now to the Yellow Pod. You're probably saying what in the world is a Yellow Pod and why is he talking about that? Well, a pod, the Yellow Pod in particular in this case, the pod is a device that takes and converts electric signal to hydraulic power into manipulation of the BOP stack. It's actually the brain that controls the BOP stack at full water depth. And what's so important here, when the Horizon rig capsized and tumbled to the sea floor, it disconnected all the wiring from the BOP, if you will. It pulled the box cables out of the pods. We no longer had control of the BOP stack through conventional means. And actually what we had to do was devise a way to go in and retrieve these pods, because you can retrieve them but they're generally

retrieved at the surface, not in 5,000 feet of water. So we had to devise a way to retrieve the pods, bring them back to the surface, repair the pod, and replace the pod back on the BOP, which we've successfully done. We had to cut the locks off the bottom of the sea and pull it back up on the surface where we plumbed it, had it fired up, everything was functionally beautifully, we put it back into position, put it into place.

I will tell you it's a life-changing experience any time you do one of these kinds of operations because they're very, very delicate. If you look at that pod up there, it's about 12 feet tall, about seven foot wide, weighs 22 tons. So this isn't actually like light, simple things. These are very massive pieces of equipment. What you have to be so careful of is that you don't damage the BOP stack or any of the plumbing or the piping anywhere around this while you're doing this operation. I can proudly report that after we got the Yellow Pod, we had to pull it for the hurricane event that we had or the tropical storm event that came through, we were able to pull the Q4000 and re-establish it again. We were

actually doing things that had never been done in the industry to this point at these water depths. So this was kind of a break-through for us. We knew we could do it, but we had never actually done it up to this point in time.

So I'm going to jump here to my last piece and talk a little bit about the benefits that we see for future deepwater containment. So my first comment symbol, we've gained a significant amount of knowledge in deepwater containment, both in equipment and technology advancements. I realize this slide says knowledge advancements; it should say technology advancements. That's a typo on my part. As well as the realtime integration of these into a full containment capability.

So what I'm saying here is it's important that we combine the equipment to the technology and the people and integrate the teams so we can actually get in there and get it done. We've gained all that in that area now. These capabilities perform the basis of the future deepwater containment response. And for future readiness, we will retrieve, inspect and preserve the tools that we have, and we look

toward to contributing additional lessons that we've learned as we progress.

That kind of concludes my piece. I'm going to turn it back to Richard now and let you go on about your surface containment, Richard.

RICHARD MORRISON: Thanks, Richard.

So the rest of this talk we'll deal with spill response, including the open water and near-shore and shoreline operations. And there's really four elements of this open water response shown here. It's surveillance and imaging, it's basically finding the oil and typing it; skimming, picking it up off the water's surface; and controlled in-situ burning, it's burning it on the surface of the water; and the application of dispersants. Those four elements make up the foundation of open water response.

So I'll start with the imaging, surveillance and imaging. From the time that oil leaves the well, it's, like I said, constantly changing. And open water response really starts with locating and imaging this oil on the surface and then differentiating the type of oil it is. Is it skimmable? Is it burnable?

Is it dispersible? Or none of the above? You really have to know the oil.

Oral spotting and imaging at the beginning of this response really relied heavily on helicopters and fixed-wing aircraft with trained spotters onboard to take field notes, take pictures, bring it back to the incident command post and tell us what we saw. That was kind of where we started at the beginning of this. And about two days after the rig went down I think we had run about four surveillance flights over the source to locate the oil on the surface.

As the footprint of this oil expanded in the Gulf and the movement of the oil shifted frequently and sometimes overnight, a more complete and dynamic image of that oil on the surface was really required for us to be able to position our skimming vessels or skimming fleet and put them in the most productive areas on the water. And it was also really to locate -- the other purpose was to locate targets, specific defined targets for aerial dispersant application and allow us to attack some of those small stringers and ribbons as they moved further and further away from the source towards the shoreline.

So working with the Coast Guard, NOAA, fisheries, state fisheries, the National Geospatial-Intelligence Agency, several other international and commercial providers, we were able to really deepen and broaden the capability of the image track and characterize the oil on the surface during both daylight and nighttime. I'll come back to that in a second. High resolution satellite imagery was made available to us very quickly by NGIA. But still there wasn't really a capability to take satellite imagery and tell what kind of oil it was. Was it thick, thin, skimmable, burnable? We didn't have that capability.

So by integrating and calibrating satellite imagery with multispectral photography, with thermal imaging, with aerial radar and infrared, we've really been able to create a series of process flows and steps to generate a very accurate -- well, the most accurate and most up-to-date operating picture for the responders. So technology advances and imaging was a really valuable improvement for us during the last 100 or so days. And near infrared and thermal imaging technologies were really brought to bear for the first time. So we've expanded this surveillance window of

24 hours, something that really wasn't available to us.

Another element, in the peak of this activity we were managing up to 200 flights a day. We were doing that from Tyndall Air Force Base. They helped us a lot to manage the safety of our operations with air deflection. But really as we worked with them more and more over the course of the response, we were able to leverage their "bombs on target" technology to boats on oil. So it really helped us get to the right targets at the right time. So they were tremendous in that. So that's the first part.

The second part is once you've typed the oil, now it's time to go skim it up and collect it. So fighting the spill offshore and near the source is really the most critical line of defense you have to keep oil from showing up on the shoreline.

So within about two hours of the reported trouble on the Horizon, the MSRC Company was contacted and began mobilizing their fleet of oil well spill responders to the Gulf along with the HOSS barge, the Clean Gulf HOSS barge started steaming our way. Our offshore capability -- or actually our offshore

capacity ramped up dramatically during this first month, around 200,000 barrels a day skimming capability to more than 500,000 barrels a day skimming capability with over about 60 deepwater skimming vessels. We estimate about 800, 820,000 barrels of decanted oil and water was collected from the surface.

And during this response we tried several new offshore skimming technologies and implemented several new techniques that included the introduction of the Big Gulp skimmer. This was taking some old barges, modifying the front of the barge, creating a weir skimmer, if you will. And what they really did, they really were able to pick up some of the really heavy, hard, emulsified, tied up with seaweed, seagrass -- the really hard stuff to collect, these Big Gulps got out there and collected a lot of that for us.

We also, down in the bottom left there, we converted two of our active platform supply vessels that we had on contract to massive skimmers. We put Transrec 150 skimmers on here, the latest technology for sure. We hooked them up with some sink separators

and then put some massive storage on those vessels to really bring the skimming capacity up out near the source. You can see the booming arrangement that those skimmers have on them are huge. It's 1,200, 1,300 foot end to end. So we're really collecting a large amount of oil with those systems.

We converted some Hornbeck Offshore tankers to basically washing stations to allow the skimmers to come up off of the product quickly and get back to skimming. We reached out and got some equipment from Norway, ocean buster systems and enhanced booming systems all played a part.

So combined with our near-shore skimming fleet, we built up a capacity of about 1.2 million barrels of skimming capacity available to us here in this response. And that's compared to about 495,000 barrels a day that was in our spill response plan. So a massive build here.

Big learning here was that skimming effectiveness is really driven by what's called an encounter rate, not so much the nameplate capacity or the ERDC. The driver to a high encounter rate is keeping the vessels on oil, and you do that through

surveillance. It's the swath width of that booming system that's in the water, really important. It's the speed of the vessel, how fast can it travel. It's the amount of onboard storage you have to minimize the amount of transfers. And your ability to skim in heavy weather. That was really key, and the key learning here was how do we build systems that allow us to stay on station in four- to seven-foot seas. And that's a key point going forward.

Here's one that was really a huge enhancement over the period. Controlled burning proved to be extremely effective for us. We estimate that we may have recovered as much oil from controlled burns as we did with skimming. Prior to this response there had only been one three-minute burn in the mid 1980s in the United States, one. In this response we conducted 411 burns ranging from ten minutes to 12 hours. The calculation of what was consumed by burning, not a precise calculation. But reasonable estimates say that we burned about 265,000 barrels of oil on the surface that didn't make it to the shore.

So key learning around controlled burning was that not all surface oil is burnable so you need

trained spotters, which is critical to success. And there was only a handful of people with this expertise before, so training the new generation, if you will, was really key.

Okay. A little bit about dispersants, another very effective tool in our line of defense. And it's both subsea dispersants and aerial dispersants. The purpose of dispersants is to break up the oil, speed up the natural degradation. This dispersion accelerates evaporation and it allows the very active micro-organisms system that exists in the Gulf of Mexico to really attack the oil. For aerial operations the Coast Guard approves surface dispersant applications when other means aren't available. So if we can't skim or we can't burn, we can disperse. It's a very, very tightly managed and scrutinized tool in unified command and by the EPA, very, very high scrutiny there to make sure we get the right products on the right targets with the minimum amount used. That's the goal.

What we knew going into this response has been -- and it's just recently been confirmed independently by EPA -- and that is the dispersant

used here is less toxic than the oil. We knew that. EPA's testing for dispersants near the shore to date have detected no dispersant compounds in the water. NOAA and other EPA scientists are conducting rigorous ongoing monitoring and analysis of the effectiveness and toxicity of dispersants that were used. So to date the results from toxicity testing have not shown any significant effects on aquatic life. Seafood is also being closely monitored and tested, and they've not detected any dispersants in seafood as of yet.

Subsea dispersants, down there at the bottom left here -- and this was the first application of subsea dispersants. And as you can see on the photos there, oil on the surface where most of our response vessels that Richard was talking about are stationed and working was dramatically reduced by injecting dispersants at the source 5,000 feet below. Not only did it reduce our potential impacts to the coastline but it allowed us to work more safely at the source.

So in summary, our capacity capability to fight a spill offshore is significantly enhanced, new technology, new techniques were tried and tested. But

really I just don't want you to leave -- it's really the people and the know-how that made the big difference here.

And finally, let me just touch on near-shore and shoreline. There are really four elements of that. It's branch structure -- I'll talk about that -- vessels of opportunity program, geographic response plans, shoreline clean-up and assessment.

So the branch structure -- you know, oil hit the shores of Louisiana about 16 days into this response. And over the course of the next few weeks after that it touched Mississippi, Alabama, Florida, most recently in Texas. Needless to say, it changed the game and tested the responders in the local communities in ways no one could have imagined. This is where spill response becomes very local, whether it's boom placement, where it's knowledge of the shoreline, of the currents, the tides, how to mobilize vessels of opportunity to defend that shoreline. So many of the local communities, as you know, were extremely upset early on that their priorities weren't being met and they had no clear line of communication with unified command to address their specific needs.

Some of the local officials actually kicked some of our response teams off their beaches, kicked them off. They needed more than just boots on the ground; they wanted a closer relationship with BP, U.S. Coast Guard leaders planning the work, and they wanted more action. So this prompted this fundamental change in our organizational structure.

We created 19 individual branch offices. And the role of those branch offices was very clear. It's to defend a very specific stretch of coastline, bays or marshes with every resource you've got, it's to rapidly clean it up if there's any shoreline impacts, and most importantly is really to understand the needs and the priorities of the local community and take decisive action to expedite clean-up.

Each of these branch offices were staffed with about -- well, senior operations leaders with BP, Coast Guard, various agencies' staff, local representatives, and they had all the tools at their hands. They had aircraft, they had skimmers, they had boom, they had beach crews as well. And the results were dramatic in a lot of places.

The near-shore vessels of opportunity, we

significantly increased our skimming capacity in the near-shore to about 600,000 barrels a day of skimming capacity, and we mobilized another block and we purchased about another 800 skimming systems in the event we needed it. But a lot of these were deployed on vessels of opportunity as well as Coast Guard assets. During the response we tried a lot of things. And what we did was for the first time we did booming and skimming with commercial fishing vessels. We actually put booms and skimmers with the commercial fishing vessels. It worked out really well. We developed some scooping systems to collect some of these heavier tar balls up from the surface before it hit. We designed and built swaray (phonetic) units to vacuum up oil from the shallow waters with shallow water barges. We developed shallow water washing stations to come and collect all of this oil, collect and separate all the oil. We built floating camps for housing and supplying these vessels of opportunity task forces and shoreline response teams. We built beach cleaning equipment that lifted and sifted sand to recover tar balls carried by the tide cycle down to 14 inches. And we started up nighttime beach

operations to improve clean-up efficiency.

A couple of words about geographic response plans. Detailed planning, rapid shoreline clean-up assessments were really critical elements of this response. To execute specific shoreline protection strategies across a really wide area of operations with a finite amount of boom supplies, each state's area contingency plan had to be converted to a very, very detailed, foot-by-foot trigger point geographic response plan. When you combine that with the graphical interface system, GIS, to eliminate a common operating picture, it gave unified command, it gave local officials, state officials a much improved capability to visualize, prioritize and adjust activities to changing conditions.

So when the response began, we had a little over a million foot of boom in inventory. And when it ended we had about 5 million feet deployed.

So the improved geographical response team that's summarized up here now exists, it will continue to exist and will be invaluable as we go forward in future responses, be they small or large.

Shoreline clean-up -- this is almost the

last one -- shoreline clean-up assessment team, the final element or protection and perhaps the most critical from a recovery and a restoration standpoint, is the SCAT team, shoreline clean-up assessment team, that operates in our environmental units. These SCAT teams are made up of the world's most recognized experts in their field of responsibility for rapidly assessing all shoreline impacts, establishing a specific clean-up plan for those shorelines or marshes, and the techniques to be used. And while many of y'all and us actually viewing the TV images felt as if the response was slow to address oil in the marshes, it was actually the deep experience and know-how from within this SCAT team that prescribed a very well proven, recognized technique for minimizing the long-term impacts in the marshes. In many cases the least damaging approach to marsh cleanup was to allow the tides to continuously flush in and flush out, flush in and flush out, and then catching that oil as it came out with absorbent boom and containment boom. It didn't play well on TV, but the less invasive techniques actually proved up. This is the Pass a Loutre, which is one of the first marshes that

we had oil in. This is, of course, after about a month and a half. There's dead grass here that will recover hopefully. But that was a technique that worked for us quite well, is to allow Mother Nature to help flush the marsh.

Just by data management, IT backbone, infrastructure behind this, it is very important with all the data, with all the reports and all the information to have a common operating picture. And so this capability actually was just for the future for an oil spill or any kind of crisis or event.

So conclusion, clearly capacity capability to fight a deepwater spill was greatly expanded. Proven tools, techniques were enhanced while others were created, developed, tested. Containment and spill response is complex but manageable. Response requires a systematic approach across all levels. Know-how, innovation and expertise are just as important as the physical hardware that you put down in the ocean.

I hope this gives you some insights and actually confidence in our industry's newly developed ability to fight this type of spill. We all hope and

we pray that nothing like this will happen again. But if it does, we'll be ready.

I'll turn it over to you.

DIRECTOR MICHAEL BROMWICH: Thank you very much. We appreciate it. We've been provided a significant amount of information both on spill containment and on spill response.

Before we get to the questions, I just want to confirm a discussion that we had privately last week. I have asked BP to lay out in quite substantial detail the history of its spill containment efforts in this episode and the history of its spill response efforts in this episode. And I've asked for those to be submitted by September 1.

I think, as you know, the assignment we have is to evaluate any recommendations to the Secretary as to whether the moratorium can be shortened in any way. These public forums are a central part of that, but so is additional information that we're able to obtain from a variety of sources, including industry. Because BP has been at the center of this, I think there's really no substitute for quite detailed, obviously far more detailed than we can have in a

forum like this, accounts that are quasi-historical, quasi-journalistic in style that lay out all that you did, all that you tried, all that you failed, the good, the bad and the ugly. I think those will be enormously helpful as we move forward and draw the conclusions that we need to draw.

As to drilling safety, as you think you know, I have asked for something slightly different also by September 1st, which is a lessons learned recommendations for the future on drilling safety because of the wealth of investigations that we're all too familiar with. I have not asked you to do a backward-facing review on drilling safety. I would ask you to do it on a forward-facing basis.

So those are things I've asked for, as you know, by September 1st. You've told me that you think you'll be able to do that. I think those will be enormously helpful.

My first questions are for Richard Lynch. You provided a lot of information on the spill containment issues. If you could distill that a little bit and identify the three central failures and then three central successes as your spill containment

efforts evolved. Failures, things that either didn't work in this context or things that because of what you've learned you've now concluded won't work at all in any context.

RICHARD LYNCH: Yes. Good questions. Hopefully I can address them in detail here.

So the three failures, obviously one was truly the lack of understanding of how hydrates aggregate in a subsea environment in a plume, if you will. That caused failures in several different ways but critically, very critically important.

I think the second thing is actually understanding flow rates in a subsea environment, also very difficult to do, measure and understand. I don't know if I'd call that a failure, but it's a failure to understand actually how you can do that in a personalized way.

And I think maybe lastly -- and it's a huge learning -- is the design of the system such that hurricane evacuation, hurricane recovery if you were to come back from a hurricane, how could that be done in a very expedient way. We certainly have the systems that we borrowed from many of other

operations, the systems that we had. But there again, if you look at the architecture, the way it's put together, I wouldn't call it a failure but it's certainly taxing on the system to come back and recover the elements of subsea containment that actually are a critical design element.

The successes. So I think a key success for me is about having the equipment. And one of the critical pieces of equipment that you've seen on the slides was the flexible hose, flexible lines that we used. These are high pressure lines, it's not a hose -- it is a hose but it's not. It's a 15,000 PSI device engineered, very specifically made. And actually securing those and how you attach those were some huge lessons on how to do that more rapidly.

I think the techniques that we actually had around the containment, once we better understood the hydrates, the top hats and the small flushing volumes were very, very important.

And maybe lastly, I think a key success is that through the course of this entire operation, in a relative sense, with as many vessels as we've had onsite, our side lines have been impeccable. I've

never been in an operation where I've seen these many vessels of this length, size and displacement as close as they are working at full strength. And to me that's a testament to the men and women offshore that have made that happen. And of course, we've had a part to play in the office as well. That's a very tricky managed situation. But that is a huge piece that I actually feel quite good about when I look back at the oil response.

DIRECTOR MICHAEL BROMWICH: One of your slides showed the various top hats that were used. What happens to those that were either never used or that were used? Are those available in inventory for future events, if necessary? And is it advisable going forward that additional top hats be premanufactured to anticipate future spills?

RICHARD LYNCH: I would say yes on both. Yes, they will be inspected, cleaned, preserved and inventoried. We have a plan for that. And certainly I think the whole art of top hat making, I think, is one that probably is not fully understood yet. But yes, there certainly could be some standards that could be included where there's known connection

points, H4 connectors -- HC connectors. There would be some known quantities that we know we'll have to deal with.

But I would say the other thing is actually having design concepts ready because actual manufacture time is quite short if you actually have a concept ready to go and we get that down to an art form of actually how you do it in a more industrial manner instead of all custom built.

DIRECTOR MICHAEL BROMWICH: Now my final question on spill containment, and I'll ask Lars and Bill if they have questions on containment issues. As you know, the centerpiece of last week's public forum was the proposal by the four majors to put together a quite extensive and expensive spill containment proposal. I don't know the extent to which they have already contacted BP, but I think certainly from the government's point of view it makes sense to have one integrated industry-wide spill containment plan rather than a pocket of knowledge that you've developed over time and a separate containment plan that the other four majors have. I'd like your response on that.

RICHARD MORRISON: I'll take that one. So

yes, since we met last week there's been quite a few conversations starting with the four companies. We'll take this and bring it to them in a deeper way. We do also agree that one approach is the right way. And this equipment and capability that we've got now will be a substantial contribution bridge in the short term until some of those longer term solutions that were rolled out are actually built and figured out and ready to go.

RICHARD LYNCH: And Richard, I'd like to add, if I could, I think it's important that particularly Chevron and Shell Oil have been pretty integrated into our teams as well. So a lot of the lessons learned -- I mean we were literally working alongside them and using many of their pieces of equipment throughout.

LARS HERBST: Thank you very much for the presentation. Very, very thorough by both of you.

I do have a series of questions, and I'll stick to the containment as well here at the beginning, starting, I guess, with Richard Lynch. One of the learning I'd like you to hit on is organizational size of the company. Touch on what it

took for BP to handle a response of this size. Obviously you had many, many contractors, thousands and thousands of contractors working on this. But the size of the company to carry off the development and the installation of this responsive equipment.

RICHARD LYNCH: Yeah, good question, Mr. Herbst. So when I view -- and I'll use it for the subsea containment piece, if you will, what we had working for Houston. We had a staff of between 4 to 500 professionals onsite. We have -- and I know you've been there. We have a nice setup as far as how we work in our emergency responses and we actually create working rooms for all of that. So it's just not only about people, it's actually about facilities as well, I guess I would say. In today's world, the IT infrastructure around that is very important. It's important for both the stored documents and the way that people communicate. So kind of maybe three levels of importance here when I view that.

The working teams themselves, they can be some very small teams. But the key, as Richard said earlier in this presentation, on day one we had to launch these projects that we knew were two or

three-month projects and we had to have them organized with the right level of leadership and technical skills base to do that. And so if you will, we were parallel tracking many, many projects simultaneously. And it may be in a different environment where you have more of the work done you wouldn't have to do that. But that certainly drove the size of the requirements of what we had. But it was something that we learned that things change every day. So we were constantly calling on additional expertise, other folks to come in and help along the way.

LARS HERBST: So just to follow up on that, a lot of people obviously involved with design and equipment, of moving forward here if this equipment is already designed and ready to be deployed, the size of the technical expertise that a company would need would have to be produced from what you had?

RICHARD LYNCH: Yes, certainly did.

LARS HERBST: The next quick question is on some of the decisionmaking process going forward. With all this equipment ready to go as we foresee it happening, especially as it relates to the stacking cap or some full containment closure of the well

equipment, do you envision that that is the first step in the process as opposed to a containment and flowback to the surface which obviously takes time to deploy? To deploy flow lines and manifolds and risers and surface vessels takes quite a bit of time. Do you see that as the path forward, that that's a first step.

RICHARD LYNCH: Good question. I believe it's both actually. I don't think it's -- it's not a -- I wouldn't put a single horse in the race in this case. It's very important to have both. And the reason for that, the unpredictability of what you will have is very hard to understand. And even though the capping stack and the transition spool, things of that nature, are very robust and work very well, we may not be so fortunate next time. So I think you need to have both actually, in my personal opinion.

LARS HERBST: One last question. Along the actual containment of the surface vessels, the other industry parties that spoke at the last meeting about the containment system, I think they were looking at an FPSO-type system. But how does industry move forward from this particular point ensuring that some

of these vessels -- you've named a couple of them as being very critical -- the Enterprise vessel, the Helix Producer, Toisa Pisces -- all as far as critical surface facilities to produce oil back, how will the industry ensure that those will be in place and available?

RICHARD LYNCH: Well, certainly the Enterprise is a drilling rig actually that is under contract, and I think that vessel would be available. The Helix Producer, I believe, will be going on to serve its main function in the Gulf of Mexico over the old Typhoon prospect. And the Toisa Pisces will not be under contract. But it's critically important, Mr. Herbst, to find a way such that if another event like this should occur, that vessels like that could be made available in a ready notice form. You know, I doubt that everybody had brought their rigs forward. Pulling them off of a production facility is a more difficult decision but nonetheless would certainly be done. If you remember, we pulled the HP-1 off its actually maiden voyage to bring it across the waters.

LARS HERBST: So would you envision that contracts would be in place in advance?

RICHARD LYNCH: I would say yes, you would want the contracts, at least the bridging contracts, in place ready to go.

RICHARD MORRISON: Mr. Herbst, I think one of the first efforts of this nonprofit JV is to seek those contracts as the bridge until these new FPSO purpose builds are in place and designed and waiting.

LARS HERBST: Thank you.

DIRECTOR MICHAEL BROMWICH: Bill, do you have any questions on containment?

WILLIAM HAUSER: Yes, just one quick question. The cofferdam that was built early and failed fairly quickly, is that a viable response item?

RICHARD LYNCH: Yes. It may be a couple of pieces. Cofferdams, that technology has been used a lot in shallow waters. We've all seen that before. It is viable and it would be made viable either through subsea gas separation or a much more aggressive dosing regimen of nondistal fluids, put something in there so the hydrate would not form. The issue is keeping the water out. And with the larger volume vessels, you're just dealing with more water to

deal with. So is it workable? Yes. It needs to be engineered, though, to get to that point.

WILLIAM HAUSER: Thank you.

DIRECTOR MICHAEL BROMWICH: Okay. We're running a little long. I only have one question on the spill response for Richard Morrison, and it really is related to Lar's question on spill containment. What happens to all the equipment that's been used? To what extent is it available in the event of future spills? What arrangements are being made looking into that?

RICHARD MORRISON: Okay. So on the deepwater skimming, those arrangements will be made with MSRC, NRC, Open Gulf and all of those. Those responder class vessels will stay. What we're going to be proposing is taking a percentage of our working platform supply vessel fleet and converting those at a fairly rapid pace to offshore skimmers. We're going to add to the fleet using active assets for more robust sea conditions that can help in early response.

As for the skimmers, the shallow water, bay, marsh skimmers, there's 800 in inventory. Those will

be pulled out of the water, decontaminated, cleaned up and ready to deploy in a warehouse or whatever. As far as arrangements go, I'm sure there will be some discussions with the folks that do that for a living to see if there's some sort of an arrangement that we want to have. But right now we own a pretty good percentage of those shallow water, bay skimmers and we'll make sure that they get looked after and applied to the right model to use in the future.

DIRECTOR MICHAEL BROMWICH: Lars, do you have any questions on spill response?

LARS HERBST: Just one question. The eventual rate that the government came up with on spill rate was around 53,000 barrels of oil a day, I believe. Within the spill plan that BP had, it would have had over a 450,000 barrel skim rate. What do you attribute that to as far as the inability to pick up at that rate? Was it the eventual encounter rate? Is it truly the effectiveness of this equipment or is it the oil that was actually spilled?

RICHARD MORRISON: We've been thinking about that quite awhile actually to understand what that means. There are some -- there are some days when a

fairly large percentage of your skimming fleet is not on oil, they can't find it or it's three miles away from it. So it comes back to that image. So I think that having that massive skimming capability and still some oil hitting the shore, it is about getting better, keeping boats on oil. It does come back to encounter rate. If you don't have any oil in the boom to skim, then the skimmer is going to look really inefficient. So you have to pick it up. You have to concentrate it. And then you have to put a skimmer in it to suck it up.

So I think there's a lot of work we need to do thinking about what is the key driver and what are the key attributes we're looking for in our future skimming fleets. And it's not just the nameplate or it's not just the key rated capacity of a skimmer. It's how good is that skimmer and that skimming team encountering oil where they can pick it up.

WILLIAM HAUSER: When you began applying the subsea dispersants, what effect did you see on the surface?

RICHARD MORRISON: In four hours it went from heavy oil, brown oil on the surface, to sheen.

RICHARD LYNCH: And Richard, more importantly, so long as the vessels themselves were working, we would see the VOC levels were actually being masked up (phonetic). Working in the aftermath, we had circle-activated filters for the VOCs. We actually saw the VOC levels fall from hundreds to nothing. So it made an incredible difference at the working surface of the sea where the vessels were actually encountering the heavy oil.

DIRECTOR MICHAEL BROMWICH: Okay. Thank you very much for your presentation. We really appreciate it. We look forward to reports, obviously, by September 1 which will further advance our knowledge. And I think we're ready for our second panel. Thank you again.

RICHARD MORRISON: Appreciate it.

(PAUSE WHILE PANEL I LEFT AND PANEL II ENTER THE STAGE.)

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PANEL II

DIRECTOR MICHAEL BROMWICH: Okay. Let me begin with introducing our second panel. We'll start with -- in fact, I'll introduce you one at a time as

you make your presentation. So let's do it that way.

The first presentation will be given by Dr. Edward Overton who is with the Department of Environmental Studies at LSU. He has his B.S. from the University of Alabama in Tuscaloosa and his Ph.D. in chemistry from the University of Alabama in Tuscaloosa as well. His research interests include evaluation and interpretation of analytical, chemical, physical and toxicological data and the development of field employable analytical instrumentation to detect and identify toxic volatile chemicals. In addition, Dr. Overton has been involved in the education of NOAA and Coast Guard chemical response team personnel.

Thanks very much for joining us, Dr. Overton. We look forward to your presentation.

DR. EDWARD OVERTON: Let me speak from the podium so I can see my slide.

DIRECTOR MICHAEL BROMWICH: Good idea.

DR. EDWARD OVERTON: Good morning. And it's a real pleasure to be home. I grew up in Fairhope, went to school at McGill, University of Alabama, and will retire shortly and get back to Fairhope.

I worked the Exxon Valdez spill, and I

noticed that the people in Alaska took that spill very seriously. And as an outside worker, you know, it was noticeable. And now on this spill I see what they were experiencing. Because this is our Gulf, this is my Gulf, and it certainly is important to all of us.

So let me just make a couple of comments. A lot has already been said. I wasn't sure what was going to be prepared. So just to quickly run through some of the statistics. But I borrowed from Google some of the capability -- whoop, wrong way, wrong button. Excuse me.

To put things in perspective, of course, the Saints Superdome, the amount of oil that was spilled will fill up the Superdome to about a quarter of its size, to give you some total perspective. The total amount in the Gulf is 500 million Superdomes in volume. So this gives you an idea of oil as it goes in the Gulf. This is the AB report, and Seth Bernstein (phonetic) came up with these numbers.

Dispersants were unprecedented. Large amounts of dispersants were used. Fortunately they were only used well offshore in something on the order of 200 to 1,000 feet of water.

But oil spills always cause impacts. And the bottom line is they cause impacts, dramatic, substantial and long lasting impacts to the people along the Gulf Coast, to our environment, to the economy. And along Louisiana's coast, because it's a delicate marsh system, if you have land wash, you have geology. So these are the things that we're terribly worried about.

I think it's important to note that oil spills are acute events. That is, damage occurs during the oil spill, most of the damage that will be done has been done. But we don't know how long it will be -- it will take years to fully understand the environmental damage. But most of the damage that will be done has already been done.

Oil changes as it goes in the environment. So this is just a quick little presentation of what happens. You start off -- I keep hitting the wrong button here guys. The scientist call this a weathering process, so you start off and all of the light volatile ends that cause most of the toxicity in oil evaporates. So what happens is oil stays in the environment. It goes from a toxic, sticky, gunky mess

to kind of a sticky mess. You lose those volatiles. They evaporate. Some of them dissolve in the water column. But they cause a lot less problems in terms of breathing. So by the time the oil gets to the shoreline, you're somewhere between a sticky, floating mess and kind of a gunky material. The difference here is it's sticky. This is just a slimy material that doesn't stick on stuff; this is a material that does stick on stuff. Ultimately if oil stays in the environment long enough, it will turn into something fairly innocuous in terms of brown and sandy called tar balls. You step on it and your feet get dirty. It does cause some damage for turtles and things like that that eat small pellets. But generally there's not much damage here. So oil undergoes a metamorphosis from really bad to barely dangerous.

Now, what do we know? We have a lot of experience from other oil spills. Major oil spills occur every 10 to 20 years. So the Valdez incident and the Ixtoc incident -- Ixtoc was in our Gulf. It was mostly in the Texas area down in the Bay of Campeche. But most environmental indicators -- I'm an environmental scientist -- most environmental

indicators return to normal very quickly. In Alaska three to five years. I think in the Gulf, because of our acclimated environment, warm temperatures, we're looking at a faster recovery. So that's the good news. Most things will come back to normal fairly quickly. Spills are acute events; that is, the damage that's going to be done has probably been done. They're not a chronic event. Some of the damage won't be seen for years and it looks kind of chronic, but the damage has been done. It just shows up in years.

The deepwater spill was a little bit different. Our environment was highly acclimated, millions of years -- two Exxon Valdez tankers seeping into the Gulf of Mexico every year for the last millions of years. What does that mean? That means both the deepwater environment and the surface water environment has the bacteria that are needed to break up the oil when it comes in. We call that an acclimated environment. We also have very warm temperatures compared to Alaska. So all of those help mitigate a response.

What are the options you have? And of course, Panel Number I went over those. Basically you

can treat oil at its surface with a chemical that's a soap, dispersants, we call them dispersants, you can mechanically get it off the water, you can suck it or you can skim it, a variety of technologies. And by the way, when you get closer to shore, you have to change the technology. You can't use big ocean skimmers to get oil off marsh and grassland. So that's really important.

And then, of course, there's in-situ burning. I'm not a big fan of in-situ burning. Normally if it's thick enough to skim, it's thick enough -- I mean if it's thick enough to burn, it's thick enough to skim. And of course, if you skim it, you can recycle it. So as an environmental scientist, I would prefer to skim rather than burn. But early on I think there were not enough skimmers around in the early part of the spill, to be blunt. And so in-situ burning was considered a pretty good option.

Let me just run through it real quick, because we don't have much time, about what happens in the environment, particularly the effect of dispersants. Looking back on this spill, looking back in hindsight -- we're not quite at the end of it yet

-- it looks like dispersants was a pretty good damn idea. What happens is you take thick oil off the surface and you spread it down in the water column and you make it readily available for bacteria. Lots of worries about dispersants, lots of hype in the media. But dispersants are soaps. All of the materials in the dispersants -- none of them were what we call compounds that won't biodegrade. So all of them are biodegradable. They were not persistent organic chemicals. We don't have any -- nothing like DDT, PCBs or the heavy metals.

So what happens in a normal spill, you have a number of bacteria that can degrade oil. When the food source comes around, in this case petroleum hydrocarbons, the petroleum degraders grew rapidly and then they start degrading oil. This was a slow moving spill, so after the first several days, the bacterial population was somewhere up here so you didn't have this time lag. So by dispersing oil in the environment, we kept the population, the environment acclimated to hydrocarbon degrading bacteria. And of the course at the end of the spill, it went away in a hurry. And this was good news. We have to call a

spade a spade, and it does look like the oil is rapidly, rapidly degrading, and that is very, very good news. The residual effect, I'm hoping -- I'm backing up my estimates of three to five years with recovery down to one to two to three years for most -- not all -- most environmental indicators.

By the way, the concentration of oil, dispersed oil down here is in the -- up here is in the 44 per billion range. It gets down here very low in the low part per billion range, and dispersed oil does not sink. Dispersed oil does not sink. And dispersed oil does not come ashore. If it is dispersed, you can't see it. If it is dispersed, you won't see it, and I'll show you an example of that.

Here's an example of using dispersants. If you go in closer, that's what it looks like up close. You see dispersants on it, and this is what's happening. That oil is being dissolved down into the water. On this frame, you could wash your hands in it. This is what dispersants -- this is what oil looks like in a lab if you take oil and spread it, concentrated oil. Remember the oil below the dispersants typically is in the range of 100 down to

one part per billion. So that's kind of what it would look like if you had oil dispersing in this seawater.

Now, when it's down in this concentration, if you're swimming in the environment, you're getting impacted by the oil. So animals that swim in the environment below the earth's surface, you take oil two-dimensional resonance, dissolve it down in the water column, you're exposing more organisms. So what you're doing, pure and simple, is sacrificing animals that are swimming offshore from keeping that oil onshore. Right? And the normal paradigm is oil coming onshore, particularly in grass and marshlands in coastal Louisiana, Alabama, Bayou La Batre and those areas, the oil causes more damage on marshy coastland than it does on beaches. It's very easy to clean up off beaches, impossible almost to clean up off marsh coast lines. And they are the base of the food chain.

So the decision is made quite simply on dispersants to use it offshore to protect the marsh coast lines, accepting that there will be damage, damage is already done at the surface, but you will allow some damage. So it's the lesser of two evils.

It's a tradeoff. I tell everybody dispersant use is a horrible idea; the only worse idea or more horrible idea would be not to use dispersants.

This spill was different in another way. It was a deepwater spill. So we not only had oil moving around on the continental slope but we had oil moving around in the deep abyss of the Gulf of Mexico. We know almost nothing about the environmental impacts of that oil. Initial results are pretty promising. It looks like oil can do two things, it can be toxic and it can deplete the oxygen concentration. It looks like most of the initial surveys in this vast, vast area of the Gulf have not shown particularly alarming low concentration levels of dissolved oxygen and not noticeable -- the oil quickly gets to below detection limits with a measure device they call a barometer. So oil from the spill generally went in this direction down here, stayed out and is being degraded. It's colder, it's slower, it will take much longer to degrade than on the ocean surface.

What about impact? Well, this is just a quick overview of impacts. Of course, the volatiles are lost to weathering, particularly to human health.

And the two previous panelists talked about the health of workers as to why you disperse oil at depth.

But notice the difference between the Exxon Valdez and the Deepwater Horizon clean-up efforts. See this haze out here? This is high pressure. There are three ways to get chemicals in your body: You can breathe it, you can eat it, or you can absorb it through your skin. If you don't have any of those, even if you're dealing with a very toxic chemical, there's no damage done; right? So here what you've got is an inhalation problem, whereas this gunky material has basically lost its volatile -- benzene, for example -- those toxic compounds. So the routes of exposure are much less in this spill.

Now, the damage here is 95/95, and those four workers are out there. So there are different kinds of problems associated. There were and are long-term problems in some of the clean-up work from the Exxon Valdez spill that's been documented numerous times in the media reports.

What about seafood harvest? This is my son catching some of the fish that he caught. But generally pHs in oil do not bioaccumulate up the food

chain and they're not in the edible portions of the fish. So if you don't eat the whole organism, you don't have to worry about it. So shrimp -- anything except a soft shell crab and oyster where you ingest the whole organism. So extensive testing needs to be done to ensure the quality. That testing includes a sniff panel, organoleptic testing. That just means folks with a good sniffer sniff the seafood; anything that gets a hit gets sent to a more elaborate but very much more time consuming analysis.

These are my conclusions, and everybody draws different conclusions. But of course, the first one is we hope that the well is dead. It's not quite dead yet. It will be dead in a couple of weeks. Recover as much residual oil as possible. I think there's still a little oil coming ashore. We're still trying to clean that up, I know, off the coast of Louisiana. Natural recovery is in full swing because of our highly acclimated environment. Frankly, because of the dispersion, we've got a lot of bacteria out there, and those bacteria are doing a heck of a job in removing a lot of residual oil.

I don't think there's significant oil

lurking below the surface. A lot of people say: It's out of sight but it's down this. This oil floats, it doesn't sink except in near coastal areas where it absorbs sediment and becomes heavier than water.

For folks in the Bureau of Ocean Energy Management, this is to you. Use a portion of the royalty income to help support this. I know the MMS, the old MMS did use a portion of that in their programs through the New Orleans office. But it's just incredible the amount of this revenue sharing that goes on to the Gulf states versus some of the other states in the union. So we're taking the risk, the oil is coming across our coast, our shoreline. Let's figure out a way to make sure that the research is done, and it's both a private and public partnership, that money is spent so we don't have to put up with this kind of incident again being caught flat-footed.

I also encourage everyone in the industry as well as the government to not only talk safety but walk safety; right? The Exxon Valdez incident should not have happened, and I suspect when the dust settles, this incident should not have happened. It's

just inexcusable to talk the talk on safety and not walk the walk. So procedures need to be in place, but it needs to be a corporate mindset that safety comes first.

And finally, I encourage our country, everybody, Republicans, Democrats, Independents, southerners, northerners, to come up with a sensible energy policy where we can use our important fossil fuels as a stop gap in getting renewable energy, but we can't do it in the short term. It's a century-long process, 50 to 100 years, to get renewable energy, nuclear energy, sensible nuclear energy, foreign reactors, there are a variety of options here, and save fossil fuels for the petrochemical products that we have all over this room, like the chairs you're sitting in, the cushions you're sitting on, the microphones, plastics, all of those things. When the carbon is gone, we've got to come up with a substitute for that.

So I'd like to conclude these comments with an energy policy is critical for the future of the United States. Thank you very much.

DIRECTOR MICHAEL BROMWICH: Thank you very

much, Mr. Overton. Appreciate it.

(APPLAUSE.)

DIRECTOR MICHAEL BROMWICH: Our next panelist is Dr. George Crozier who is and has been executive director of the Dauphin Island Sea Lab at the mouth of Mobile Bay since 1979. He is also currently the adjunct professor in the Department of Biology for the University of Alabama at Birmingham. Dr. Crozier?

DR. GEORGE CROZIER: Thank you, Director Bromwich.

Not knowing exactly what we were going to do today, some of this may or may not be fully appropriate. But I thought it was important. One of the things that I noticed early on in the process is that -- and I've done it, Dr. Overton has done it, almost everyone has done it. When we look at the Gulf of Mexico, we have described a number of ecoregions that are very legitimate in the Gulf. And one of the things that I've objected to after I finally caught on myself is that this was never a disaster for the Gulf of Mexico. It simply wasn't. The figures that Dr. Overton showed are pretty real. The Gulf is a

huge body of water. I think that what we saw -- if you'll look at the area that the oceanographers refer to as the Mississippi Bight, this is the mouth of the river east of Cape San Blas. This is the B-I-G-H-T, bight. And this is the area that was impacted by the spill.

This gives you another view of the same thing. The star obviously is the site of the spill, which is halfway down the continental slope, not in the deepest part of the Gulf of Mexico. But I think what is intriguing to me about it is to realize and look at what we call the Desoto Canyon to the east. And that is actually east of Pensacola, Florida. So you begin to get a sense of the three dimensions of where the spill occurred.

The second thing to be aware of is that it occurred during summer months. That is movement toward the land. So from the very outset it was clear to those of us that have worked in the Gulf, in the north central Gulf for a long time, that that's where the problem lay, the north central Gulf. This was our disaster. There was very little -- let me go back. When we look at the Florida coast -- and that does

show the very controversial and much discussed loop current that proceeds into the Gulf through the Straits of Yucatan. And we were very lucky that it did not extend as far north, particularly given the low rainfall that we had this spring and summer. So we don't understand a lot about it. And this is one of the things that's going to have to be looked at a little more carefully. We don't know a lot about the details of the Gulf of Mexico. And the issues are going to be dealt with only with adequate observation systems. And we don't have those. There's going to be a lot more said about this over time. So that gives you an idea that you're in this pocket of the north central Gulf that we're dealing with the spill.

These were drifters put out by the Dauphin Island Sea Lab. And what I've often described to people is that it was a puddle, it was a puddle of oil that was going to gradually move north with every tendency in the Gulf of Mexico during the summer. And you can see that the drifters go all over the place, but basically they stayed in this central site. So if the wind was blowing from the east, it went into Chandeleur Sound and the mouth of the river. If it

was blowing from the west, it would head towards Pensacola and Alabama and the Panhandle of Florida.

We had an extraordinary -- another great spring. We had a late northern cold front that kept it off at the very outset of the spill. So the areas of Mississippi, Alabama and the Panhandle were never really exposed thanks to the actions really of Mother Nature.

And this is what, as Dr. Overton has said, this is what is at danger here. These are examples of fish eggs and larvae and copepods and crab larvae that are -- they're all spawning now. This was the wrong time of year also. And they're spawning over that shelf in the deeper water. And then they are moved. The reason they do that is because we have net transport toward the land. So these things are being carried -- usually different parts of the water column itself is moving towards the land all the time.

So our projections at this point, there's going to be a short-term impact on our regional fisheries. Red snapper, grouper, reef fish that are spawning out there now, starting in the late spring, we will almost certainly see a decline in harvest when

they would reach harvest age at two to three years. And we may have impacts sooner in the invertebrates. But these are things we will know probably within the next 100 days because the samples have been taken.

With regard to spill response, I lucked out in putting in some slides that I think deal with this. Because I sat on Dauphin Island and watched the spill being responded to in every way, shape and form. And the first thing, it was clearly the policy was to boom it. And quite frankly, we found that the booms were not particularly effective and we had damage from the booms being washed into the marshes, and they did more damage that way than they would have provided any help at all.

The second thing that seemed pretty obvious, as has been pointed out with the first panel, there weren't enough skimmers. A boom without the capability of picking up what it booms is not particularly effective. So I think that there has to be some serious consideration given in that particular issue.

The clean-up efforts, I think that the industry and only the industry could stop the well.

But I have never seen more misallocated types of resources. And I've said this to almost every group in Mobile that I've talked to. For the most part on Dauphin Island I had ten men per tar ball that was picked up on the beach. There were scenes where they were desperately needed and weren't there even in Alabama and in the Panhandle one day at a time.

Part of the problem in dealing with this is the chaotic nature of it. One day there will be some oil on the beaches, there will be tar balls, there might even been a pretty good sheen of heavy oil, and the next day it would be gone. Our folks going out from the laboratory would go out and there would be no oil, the tide would change and they had to come back through it. This is an extraordinarily difficult issue to deal with. I think the spotting question that the first panel raised is an excellent one. I think we're going to have to have a better idea of how the water moves and we're going to have to have a better onsite surveillance on keeping track of where the oil is and where we go with it and how we deal with it.

But I simply cannot stress enough the lack

of flexibility, nimbleness. It didn't seem to be there. And of course, the stories are legion with regard to the abuse. I think this was on the front page of the Mobile paper, and this is exactly what it looked like on the beaches on Dauphin Island. We had enormous clean-up crews cleaning up not very much and water that did not appear to be in any way impaired by the oil.

And so we lost a lot of the summer season. We may have lost all of the summer season. I do agree that the idea of using dispersants was to keep it off the beaches. And I think the governors all approved this use. But I think that the day that BP announced that it would be August before they could guarantee that the well would be shut down, I think that was the end of the summer of 2010 for our economies. And I think this is something that we're going to have to figure out how to deal with.

Also I have to comment on the lack of accurate information and the attitude that has led to these cartoons. I want to apologize for them. I think this is real, the fact that we have kind of dealt with the problems after the fact with our

fishing industries, something that people are not going to forget and they shouldn't forget. There have been all the demonstrations that you could ask for in opposition to the drilling, the deepwater drilling. And I know that there were hard core environmentalists that warned against the risk of deepwater drilling over a year ago. And I know that they were largely ignored. I probably would have ignored them also. There was a great trust in the industry. And I think that there was also the problem that we've seen and all the complaints about the government and its relationship with BP which was dictated by the Oil Pollution Act of 1990. This is not well understood. And I think there's going to have to be serious consideration given to the implications of using Open 90 to drive this process forward.

And there is never going to be in Louisiana -- and by the way, Ed, I was born and raised in Louisiana, New Orleans, and came here. I taught tennis in Houma, Louisiana, I've lived with the people. It is not going to be easily forgiven or forgotten at this point.

And I think this may be core. This is a

recent quote from an article in the Environmental Law Institute's magazine, The Forum. And I think that it has enormous meaning relative to this deal between the government and the so-called responsible party. "At its core, environmental protection deals with protecting the commons. And the ocean is one of the last great commons available to all of us. There is a bit of irony and considerable opportunity for conflict" -- and I think that's what we've seen -- "when the government obtains the science and engineering expertise needed to protect the public commons from a private company and from industry."

And we know this was the case. But I think this was something that was forced on us with good intentions with the Congressional action of 1990.

This has now come out. This is the split in trying understand what everybody has asked me for the last probably two weeks: Where did the oil go? And Dr. Overton has done a very good job. There is an enormous amount of material that has dissolved and been diluted in the Gulf of Mexico. I think this is probably one of the differences between what was estimated coming out of the pipe versus what was on

the surface, because a lot of it dissolved and went out into the Gulf before it ever got to the surface. I think one of the things that struck me is we all grew up with the idea that oil and water don't mix. And that might be true of vegetable oil. But as a matter of fact, crude oil and water does mix. And crude oil is a good name for this material that comes out.

Now, part of the question that remains -- and leave it to the scientists to not agree on everything -- when we talk about chemically dispersed, naturally dispersed and residual, as far as I'm concerned, the dispersed oil is still there. Okay? It is dispersed, but it's part of the residual. And as NOAA has pointed out here, it is undergoing degradation. Now, I do think that part of our long-term concerns here are going to be the fact that the dispersant at surface -- and at one point I was not happy with the dispersant on the surface because it seemed as though if you used dispersant, you have gone all in with the microbial community. Because if you disperse it, you can no longer boom it. If you can't boom it, you can't skim it very well and you

can't burn it at all. So you've taken several of the tools out of your toolbox and committed to one tool with the dispersant. On the other hand, dispersant does work. And I suspect that hindsight is going to support the idea of the dispersant use at the surface. Because at the surface not only is sunlight degrading the water, you have plenty of oxygen, you have a vibrant microbial community and lots of oxygen, and they did provide some fertilizer to go along with this.

Now, the question, however, that does remain to be answered, there is going to be the issue of submerged oil, whether they call it plumes, clouds, residual oil, dispersed oil. Dr. Overton is the first one to point out, and it made me very curious about some of these images of oil sinking to the bottom. Because as he said, these formed microscopic droplets that are usually buoyant, this material is going to be degraded, it's going to stay wherever the velocity of the pipe sent it. And so we have reports of plumes by academic communities that are saying that they're headed out to the southwest into the Gulf. There's another one that was reported that moved,

interestingly enough, right towards Pensacola, the Desoto Canyon. And there's crews out right now from the University of South Florida looking at that same site. It will be very interesting to see what they find when they come back with it. But I think that was one of the mechanisms. We had more exposure of oil and tar balls in Pensacola Beach before we saw it at Dauphin Island and to the west. And I think Desoto Canyon was the mechanism for that with the subsurface oil.

And we're certainly going to be blessed with tar balls, which you heard also from Dr. Overton. This is not a toxic component. This is something we've had on the beaches in Alabama for as long as I've been here, so 40 years. And I was told that there had been residuals from Ixtoc that was seen 10 to 20 years afterwards. How they tied it back to Ixtoc I'm not quite sure.

These were what I thought were the lessons to be learned at this point. The booms didn't work very well in our part of the world. And we didn't have skimmers associated with them. And I think there was a naive assumption that the boom was just going to

stop the oil. I don't know what we thought we were going to do with it after it stopped it, but that's what the booms were for. We had large boom systems that failed, extensive boom systems that failed. We are having an action that is a permanent boom, they're closing the Katrina Cut in Dauphin Island nominally to stop the oil which never came and now it's an issue of saving oysters in the east end of Mississippi Sound.

As I said, I think the dispersants limit your capacities, but I think that hindsight is going to say that using it on the surface did accelerate the loss of this spill and the removal, out of sight, out of mind. I don't, however, agree, that the use underwater is as productive and as positive as on the surface. I think it has created the uncertainty of large amounts of carbon at depth. And the depth we don't know that much about. It's colder. There is not as much oxygen, obviously, as on the surface. Hurricanes will not stir it down to the level of 3,000 feet, which is where one of these plumes had been detected. And ultimately the problem may be that the oxygen is being consumed as the product is being degraded. And that's a good thing. But what it does,

we already have issues of low dissolved oxygen in the Gulf of Mexico. And I think one of the biggest research questions is going to be trying to figure out how often oxygen is available at depth versus how much oil is there.

According do the Natural Research Council -- and Dr. Overton and I discussed this briefly before we came on -- the Natural Research Council has raised the issue of the bioaccumulation of polycyclic aromatic hydrocarbons. This is going to be understood in the Mobile area because of mercury which was a big issue here ten years ago. People understand this issue by biomagnification. The intriguing thing for us is that the mercury is not biodegradable, the PAH is. So we have two processes going on in the water. We have the PAH that is being degraded by portions of the microbial community and perhaps being assimilated by other portions that aren't capable of degrading it. And if the Natural Research Council is accurate, then we have the concept that we're going to have to continue to monitor the seafood for some time.

The interesting thing, I think, is that right now there's absolutely nothing wrong with the

fish. There wasn't. I told Dr. Shipp they shouldn't should canceled the Deep Sea Fishing Rodeo. The fish out there have not had time to accumulate any of these toxins. And the danger is actually in the young of the year, the eggs and the larvae. So, as Ed said, we'll have a fisheries impact over the short term.

Perhaps the greatest problem of all as I see it -- I've been talking about the resilience of the ecosystem from the very beginning. And I also have used the figure of three to five years based on Ixtoc's recovery. So I knew that the system was resilient. A lot of people who have listened to me over the last three months say: You sound like an optimist. And I say: No, I think I'm a realist. And I believe this is the case.

What is striking, however, is that the human system that depends on the ecosystem is simply not showing that kind of resilience. And I think we're going to have a tragic economic situation that extends from south Louisiana or southeast Louisiana through the Panhandle of the beaches. The beaches will be fine next year, the seafood is fine to eat now, the seafood will be fine to eat next year. In fact, the

seafood will probably always be fine because it will never be more scrutinized than it is right now and it will be in the foreseeable future.

So I think the ecosystem is fine. I think it will recover. And only scientists looking at very tiny nuances may see some differences in a three- to five-year period. And it may go faster. I agree with Dr. Overton that the disappearance of the spill is rather dramatic. But I do worry about how much never got to the surface and is somewhere in the deep Gulf of Mexico. I think that's basically what our long-term academic concerns are. And there will be work done on that. Thank you.

DIRECTOR MICHAEL BROMWICH: Thank you very much, Dr. Crozier.

(APPLAUSE.)

DIRECTOR MICHAEL BROMWICH: Our next panelist and presenter is Manley K. Fuller, III, with the Florida Wildlife Federation, which is a private, statewide, nonprofit citizens' conservation education organization made up of thousands of Floridians and other citizens from all walks of life. Mr. Fuller.

MANLEY FULLER: Thank you very much,

Director Bromwich. As he said, I represent the Florida Wildlife Federation, which is a state-based organization in Florida. I'm going to provide some general comments today and I will supplement those with a more complete written commentary in the near future to you.

You and your colleagues and other federal agencies and Congress have great responsibilities in responding to the Deepwater Horizon disaster and a responsibility to greatly reduce the probability of recurrences. And when they do occur, to have policies in place to meet future challenges. I want to make some general observations today and follow up, as I said, with more detailed written comments.

We believe that principal accountability and luterpace (phonetic) must be upheld. I realize this is outside of your area. But the ongoing investigations by the Department of Justice must be rigorous and independent. And the public needs to know what happened and what lessons were learned, and they seem to be incorporated in an oversight of the oil industry. If criminal behavior occurred, the guilty should be prosecuted to the full extent of the

law. When responsible individuals are guilty of criminal behavior, they should be prosecuted. If criminal conspiracies occur, likewise. Both corporate and individual liability and penalties should be assessed. Never forget that this disaster resulted in the premature deaths of workers on the Deepwater Horizon. It's had additional potential public health effects, it's had staggering economic costs, and it has had short-term -- and we need to know more about the long-term -- potential deleterious effects to the ecosystems of the Gulf of Mexico.

We need to learn from this experience and incorporate those lessons in the federal policy. We think that the experiences of other oil industry disasters need to be carefully reviewed. These should include -- we would encourage you to look at the reports and the analysis of the 2009 Timor C oil well failure off the western coast of Australia. We believe -- my understanding is that there's some formal assessments of that incident which are about to be published, and the Australian government is looking at revamping their legislation.

I realize she's a very hard-hitting author,

but Dr. Riki Ott has produced a book and she's been speaking in the Gulf region in the last month or so. I would encourage you to read chapter 24 of her policy recommendations for considering what might we do to strengthen oil pollution prevention. And she talks a lot about her perspectives on the experience with the Exxon Valdez.

I'm on the advisory board to the Florida State Marine Laboratory. They and a number of institutions in Florida and maybe some outside of the state are involved in a group called the Oil Spill Academic Task Force. And I would encourage you to review the reports that have been put together by that group of -- I think it's roughly 300 marine scientists. And there's reviews of previous oil spills that may have come from a wrecked tanker, it may not have necessarily come from a broken well.

There's been a lot of long-term ecological study of the disaster in the tropical environment off the east coast of Panama where some longer-term problems of the ecosystem were documented. They looked at mangrove communities, seagrass communities, coral reef communities, et cetera.

The Oil Spill Academic Task Force has a number of reports and citations that could be useful to you all in developing better oil spill policies, oil spill prevention policies.

We believe that there has been a lack of adequate and effective oversight of the oil industry. We believe that -- we believe that and recognize your agency has been under intense political pressure to relax the moratorium. We believe that it's incumbent that the moratorium not be ended prematurely and that better regulations need to be in place to actually regulate the industry.

We believe that there are problems in the existing oil spill response plans, not just BP but with others across the industry. We need to understand what went wrong here. Safety measures have to be put in place. I know, for instance, in a brief review, that there's been a great debate about whether there should be remote control shutoff switches added as additional redundancy as is required in I believe it's Norway and Brazil; that the industry concluded that that would be an unnecessarily expensive and the technology, they didn't consider it reliable. I

understand that there's been some improvements in that technology in the last few years. And additional redundancy, think about if another piece of half a million dollar equipment had been in place to stop this nightmare from occurring how much better off we would all be.

So we encourage you to look at other nation's programs as well. And I've heard -- oceanographers have taught me that the Norwegian approach is one of the better in the world. And we would encourage you to look there to see if it might help you in your regulatory responsibilities.

There's been a whole lot of talk today about dispersants and it's been in the media and we have been party to litigation relating to dispersants. We think that any chemical discharge into the waters of the United States should be public information, there should be complete transparency about that. We don't think that there's any legitimacy to having people making proprietary claims about chemicals that will be discharged in large quantity into the waters of the United States. One thing, though, I think would be good is if there's a lot more research to make sure

that we reduce the toxicity of dispersants to the greatest extent possible and that EPA should rate dispersants in terms of their toxicity. And there should be an effort to reduce toxicity whenever it's required for us to use these tools.

We believe it's too early to assess the impacts of the spill on the Gulf. Certainly I think the experts who spoke before me have pointed out a number of trends and probable events. But we think that there needs to be long-term monitoring of the impacts of the spill. We need to look at the level of dispersant use as unprecedented. The more acute and visible impacts, the oiled birds, marshes and beaches, are obvious indicators. But we think that there's need to know more about what's occurred in the subsurface and to look at -- we need to know a lot more about deepwater ecosystems, submerged coral reefs, slope communities and what impacts that might have had, might have occurred to them.

I want to say that it's good that the weather conditions kept the oil -- that we were able to shut the oil off, that that process has occurred and that's a good thing. And we appreciate that. But

think about it this way: An oil spill response plan should look at the worst possible scenarios, because we have seen an extremely bad scenario come to pass here. What if it had not been stopped? What if this occurred in a different time of the year when the currents were moving in another direction? What if we had major hurricanes at the onset of an incident like this? Those impacts, we're talking about critical public resources.

And so we think that the moratorium on deepwater drilling must continue until the regulatory permitting, environmental review and enforcement programs are completely overhauled and put in place. What we know is it took three months to control a blowout that discharged approximately 200 million gallons of oil and 2 million gallons of dispersant into the public waters of the United States in the Gulf of Mexico. The oil industry prior to that -- I know we need to look forward, but you can learn some lessons by looking backwards, too. The oil industry provided assurances that blowout preventers were fail safe and a spill of this size could not occur. Well it did and the preventers failed.

The funding that -- we're glad to see that the industry is talking about helping for preparedness in the future. Let's make that a reality. The Norwegians, I understand, have maintained equipment, chemicals, stuff in advance dispersed along their coast. Obviously there has to be an ongoing -- so that you can have quicker action. All this should be included in the oil spill response plans.

We are concerned that the BP Macondo exploratory well was approved with categorical exclusion, which is a waiver of any site-specific environmental review. The well did not have a blowout prevention plan. There was no analysis of worst case oil spill and response. The lease was issued with an environmental assessment but no detailed environmental review. The EA was tied to a very general multisale EIS for the central Gulf. The assumptions in this EIS about the chance of a spill and the potential impacts of a spill were all proven wrong by this incident. All new drilling in the Gulf of Mexico is based on this crumbled foundation of overly general and completely inadequate EISes, and it needs to be revamped.

Regardless of the moratorium, environmental laws require a complete reassessment of deepwater oil drilling before resumption. We'd like you to take a look at the Royalty Relief Program, which one way of looking at it is it provides -- you pay less royalties the more dangerous and the deeper that you're drilling. That program needs to be re-examined.

In the State of Florida for many years both Democrat and Republican leadership have felt that we did not want oil drilling closer to Florida and moving into the eastern Gulf. The administration proposed in March to open new areas for releasing in the eastern Gulf and the middle and south Atlantic. We think that these should be suspended. We do not support moving oil drilling closer to Florida than the 2006 federal law which was offered by Senator Mel Martinez and Senator Bill Nelson.

Florida is not a producing state, but we are affected by what occurs -- potentially affected by what occurs in other portions of the Gulf. We want to see that the industry is well regulated, that there's adequate enforcement in the budget, that in times of budgetary difficulty that there's adequate funding for

enforcement, inspection. We want to see stronger enforcement and regulation of the activities of offshore oil drilling.

Also we would like to encourage that there be an examination of the historic shallow water oil wells in the western central Gulf. Some of these are older wells. There are reports of low level -- again, low level leaks from old rigs and pipes and some of this associated with Rita and Katrina. We'd like there to be an investigation as to whether or not -- what should be done to eliminate any low level spills that occur from that.

So I would conclude my remarks by recognizing that you have a great challenge before you. But the waters of the United States are critical resources, and environmental stewardship should be the hallmark of any drilling in the waters of the United States. And encourage you -- I mentioned several other countries that we'd like you to reach out to. I read recently that the Mexican government, Pemex and the oil industry in Mexico is getting into the -- indicates that they want to get into more deepwater drilling. And we'd encourage you to be in contact,

close collaboration with your colleagues in Mexico. Because clearly from the Ixtoc experience, that can have effects on U.S. waters if there were a disaster to occur in their waters.

So I'd like to conclude with those comments but provide you with a more detailed written --

DIRECTOR MICHAEL BROMWICH: Thank you very much, Mr. Fuller. We appreciate your comments.

Our final presenter on this panel is Steve Russell. He's with the Mobile Area Chamber of Commerce and has been since 2004. And he's currently the director of business retention and expansion. Mr. Russell.

STEVE RUSSELL: Thank you, Director Bromwich and gentlemen, for taking your time to come to Mobile and to learn about how the oil spill is affecting the Mobile area economy, especially with regards to containment and oil spill response as you requested.

I have an eight-minute statement or so I'd like to make.

DIRECTOR MICHAEL BROMWICH: Go ahead. Thank you.

STEVE RUSSELL: All right. As all of you

know, this oil spill is an emotional and tragic event for all of our Gulf Coast residents. Three major industries in the Mobile area are affected by the oil spill and the subsequent six-month moratorium: fishing, tourism and oil and gas.

In reality, the entire area's economy has been affected by this spill, from shrimpers and oystermen to commercial and recreational fishermen, restaurateurs, hotel and condominium owners and many others who make their living on the water. Additionally, those who visit us and enjoy our beaches, both onshore and inshore waterways, whether that's for recreational boating or fishing or birding, have all been affected.

The Mobile Area Chamber is very happy that the well has been capped and that things are now progressing. So now we expect our waterways and beaches to be restored and that financial resources will be provided to save the businesses from financial ruin. We also want to ensure that safety measures are in place to keep this tragedy from ever happening again.

With that being said, the Mobile Area

Chamber remains committed in support of the local offshore oil and gas industry which provides good paying jobs and which serves as a much needed source for industry and customers throughout the southeast United States. We feel it is critical that the U.S. should have access to increased domestic supplies which not only enhances our national security but supports our current economic recovery.

Gentlemen, you have heard groups across the Gulf, now including the Mobile Area Chamber, oppose the six-month moratorium on deepwater drilling for a number of very important reasons but most especially because of the jobs that will be lost in this industry and the ripple effect of suppliers such as to restaurateurs, grocery stores and others too numerous to mention, much like what is now happening with our other two industries, tourism and fishing.

Making this more of a unique Mobile area response, while the oil and gas industry in our community is not the largest industry, it does employ almost 1,900 people. That's out of a total of about 165,000 countywide. So a little more than 1 percent. These Mobile County workers build services in work

boats, they construct subsea systems, fabricate weld repair topside of drilling rigs and ships, perform offshore repair, provide technology products, fabricate and install flow lines in the deep water of the Gulf of Mexico.

These businesses have reported to me that while they are sufficiently busy now, the pipeline is running dry quickly. And all are concerned what 2011 will bring.

An update of the Oil and Gas Economic Impact Analysis done by the Mobile Area Chamber of Commerce says that this industry spends 199 million dollars in Mobile County and Baldwin County. These are to purchase supplies that they buy. When layoffs happen there will certainly be fewer and fewer dollars circulated in the economy affecting many, many more businesses. It will affect state revenues and public education funding.

The six-month moratorium on deepwater drilling is unfairly punishing those companies and their employees who are working in a responsible and safe manner, putting people out of work, and may I emphasize driving away jobs to distant shores. With

hundreds of deepwater wells that have been drilled and worked safely throughout the history of the industry in this country, the government's response in forcing a six-month moratorium has been disproportionate and punitive.

As I previously mentioned, the Mobile Area Chamber of Commerce supports safety measures to keep this from ever happening again. A 30-day moratorium should be more sufficient to conduct rigorous safety inspections. A 30-day moratorium would greatly reduce job losses and negative economic impacts while still achieving the goal of improving safety in this industry.

More specifically, I would also like to address the pending bill, number HR5608, also known as the Marquis bill. We want to express deep concern for this legislative initiative which imposes new incident response requirements on vessel in excess of 400 gross tons that operate in U.S. waters. The proposed initiative would expand performance standards and require plans based on physical and ecological characteristics where these vessels operate. The response plans as proposed on the Marquis bill would

be, according to local companies, would be impractical, speculative and would further stress federal oversight resources, not to mention increase the federal budget requirements for the Department of Homeland security. Our area of businesses believe this bill is an overreaction to the current oil spill crisis that we are experiencing today. And I remind you again it is not necessarily representative of the entire industry. We ask, Director, with all due respect that input of the affected industries be elicited and that further evaluation, including the economic impact to our area, be conducted prior to this legislation moving on.

Finally, Mobile has the opportunity to serve as a hub for oil and gas activity in the eastern Gulf of Mexico as a result of a marketing initiative that we started in 2006 which we call Offshore Alabama. If successful, the initiative is expected to generate many jobs in the Mobile area and more energy for residents throughout the southeast United States. We are willing to take the responsibility of drilling for the purpose of supplying this much needed energy unlike one of our neighboring states and are also

willing to pursue any and all technology which produces the end result in the safest manner. We feel this responsibility not only to our local area but to our country as a whole.

DIRECTOR MICHAEL BROMWICH: Thank you very much, Mr. Russell. And thank you for the specific comments directed at the economic impact on Mobile and the surrounding areas. It's obviously an issue that we care about a great deal and that we are looking at. And as you may or may not know, the administration, including my agency, is currently gathering information on economic impact so we have the most accurate and complete information that's available.

Just one comment and then I have one question, and I'll turn it over to my colleagues to see if they have others.

As you know, the moratorium imposed by Secretary Salazar was based on a thorough analysis of the risks that he assessed existed. And I invite you to read his lengthy and, I think, quite well reasoned and balanced decision on why he thought at that time that the moratorium was appropriate. It was based on

concerns about drilling safety, it was based on concerns about inadequate methods to contain a spill, and it was based on inadequate oil response plans.

The very purpose of these forums is to gather information, to add information and to hope to build the confidence that the secretary and others can have that we are better prepared now or will be in the near future than we have been in the past. So the very purpose of these forums is to gather that information in part to see whether there are categories of oil and gas drilling activities that might be allowed to proceed prior to the expiration of the moratorium on November 30th. I am simply restating what's in Secretary Salazar's July 7th memo to me asking me to conduct these public forums which are very much aimed at gathering exactly that kind of information to see whether the moratorium, at least for some categories of activities, can be shortened. So I just want to make that as clear as I can.

I only have one question. It's for Dr. Crozier. Doctor, you mentioned concerns about subsea dispersants and some skepticism about their use, less so about surface dispersants but more

skepticism about subsea. Is that because we don't know enough yet about the ecological effects of subsea dispersants or do you believe that there is now ample evidence that suggests that we ought not to use them?

DR. GEORGE CROZIER: No. Clearly we don't know enough about the deep sea in the Gulf of Mexico, period. That would be the starting basis. And having, through whatever mechanism, retained whatever unknown amount of the material at depth has created -- I like the term "profound uncertainty." I frankly believe that it is probably not going to turn into a major issue, but I think that the food safety people and the concerns are valid, and I think that the comments that have been made in fact today and actually for some time now, that it is only right that we put the worst case scenario on the table so that it is not lost and so that plans are in fact put into at least semi-functional status to deal with it.

As I said, I think that the issue now is going to be developing a system that better monitors and increases our understanding of the deeper Gulf of Mexico than we have. And my concern about the dispersant at depth is just that simple, that we kept

it at depth. And the only thing we know about, as Dr. Overton said, it's colder, so what's going to happen is it goes slower. And there do remain questions with regard to oxygen consumption by the degradation process, which is clearly going on, but kind of at unknown rates in unknown areas.

DIRECTOR MICHAEL BROMWICH: Understood. Thank you.

Gentlemen?

LARS HERBST: Actually my question is a followup to those questions, pretty much the same question really. Having been involved with the spill response for over 100 days now, it's very obvious just from a surface expression -- I think BP had mentioned it earlier as well -- that when dispersants are ejected subsea into a turbulent flow of oil, it's very effective as far as the surface expression. And I understand your concern being the subsea one.

So both for Dr. Crozier and Dr. Overton, do you believe the science community could address a research study program that would address these concerns that you have and if this is a potential valuable tool that they could use?

DR. GEORGE CROZIER: You rattled through your question. What is your question? Is the science community going to deal with it?

LARS HERBST: Well, could the science community develop a research program to address these concerns?

DR. GEORGE CROZIER: Yes. I think that's already underway. It's certainly a factor that BP has developed, their Gulf Research Initiative. And the tantalizing figure of 500 million dollars over ten years is certainly drawing a lot of attention. And I think that's something that we will address.

However, I will point out that when we're talking about working 3,000 feet down in the Gulf of Mexico, there are some significant challenges that exist for the scientific community. And I think even -- I just simply think that we're going to ask some of these questions and look at them, but we can't even duplicate these experiments at sea level. And work is going to have to be done in the deep ocean. And then the tracking of these things is going to depend on the capacity of our ocean observing systems, which are only a gleam in a lot of people's eyes right now.

DIRECTOR MICHAEL BROMWICH: Thank you, gentlemen, very much for your presentations and for being here today.

We were going to have a third panel, but I just was informed that we're not. So I thank everybody who's here and for paying attention, I thank you gentlemen again for your presentations, and I thank the City of Mobile for its hospitality. And we will reconvene our next public forum tomorrow morning in Pensacola, Florida. Thanks very much.

(THE PUBLIC MEETING CONCLUDED AT 11:44 A.M.)

C E R T I F I C A T E

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COUNTY OF BALDWIN)

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