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MASSIVE OIL SPILL IN THE GULF OF MEXICO

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

TO

REVIEW ISSUES RELATED TO DEEPWATER OFFSHORE EXPLORATION FOR PETROLEUM AND THE ACCIDENT IN THE GULF OF MEXICO INVOLVING THE OFFSHORE OIL RIG DEEPWATER HORIZON

MAY 11, 2010

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MASSIVE OIL SPILL IN THE GULF OF MEXICO

TUESDAY, MAY 11, 2010

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10 a.m. in room SR–325, Russell Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. The committee will come to order. We're here today because of a disaster that never should have happened. The sobering reality is that, despite the losses and damage that have already been suffered, we do not yet know what the full impact of this disaster will be.

We should begin by remembering the 11 people who lost their lives in the explosion at the Deepwater Horizon rig and express deep sympathy for their families. I'm glad to be a co-sponsor, along with Senator Murkowski, of the Senate resolution that Senator Landrieu and other Gulf State Senators are offering and authoring, expressing the condolences that I know we all share. I hope the Senate will act on that resolution as soon as possible.

I'd also, of course, like to express our concern for all in the Gulf region whose jobs and way of life, are threatened by the effects of this Deepwater Horizon disaster. We owe it to them to see that disasters like this never happen again.

This hearing is the start of the Energy Committee's oversight of issues related to offshore oil development and the catastrophic blowout that occurred in the Gulf on the evening of April 20. It is the first of what I expect to be several hearings on these issues. Next week we'll be receiving testimony from Secretary of Interior Ken Salazar on these events and issues.

Our goal in the hearings is to create a thorough factual record and an informed discussion of the very important questions presented by the disaster. The disaster raised here both technological and regulatory questions. We have an obligation to bring a level of seriousness to this endeavor and to determine as quickly as possible and to the best of our ability the appropriate next steps.

As those steps become clear through the testimony we receive and the investigative work of our committee staff, I intend to work with Senator Murkowski, the ranking member, and other members of the committee on a bipartisan basis to develop and introduce

and advance any necessary and appropriate legislation through the Senate.

At the heart of this disaster are three interrelated systems: a technological system of materials and equipment; second, a human system of persons who operated the technological system; and third, a regulatory system. Those interrelated systems failed in a way that many have said was virtually impossible. We need to examine closely the extent to which each of these systems failed to do what it was supposed to do.

I don't believe it's enough to just label this catastrophic failure as an unpredictable and unforeseeable occurrence. I don't believe it's adequate to simply chalk what happened up to a view that accidents do happen. If this is like other catastrophic failures of technological systems in modern history, whether it was the sinking of the Titanic, Three Mile Island, or the loss of the Challenger, we will likely discover that there was a cascade of failures and technical and human and regulatory errors.

So our examination of what happened here will have the goal of putting in place improved systems to ensure that this type of catastrophe never happens again. We will also be looking to identify any problems or risks that might exist for operations that are ongoing so that we can ensure that they are addressed with quick and appropriate action to safeguard human lives and the environment.

We will begin the process today with two panels of excellent witnesses, and I welcome all of them. The first panel we will hear from is composed of two technical experts. One has long experience in the industry, as well as an independent view as a highly regarded university professor. The other is a retired expert from the Minerals Management Service of the Department of the Interior, with long experience in overseeing safety of offshore oil and gas operations.

After our first panel has given us a baseline of information and perspective on best practices for controlling oil and gas wells and overseeing their safety, we'll hear from a second panel composed of leaders of the three companies involved in this accident, BP, Transocean, and Halliburton. They'll provide us the information currently at their disposal on the disaster, the steps being taken to deal with the aftermath, and their future plans for continued investigation and remediation.

[The prepared statement of Senator Landrieu follows:]

PREPARED STATEMENT OF HON. MARY L. LANDRIEU, U.S. SENATOR FROM LOUISIANA

Thank you, Mr. Chairman, for holding this important hearing to examine the terrible tragedy that occurred on April 20, 2011 and the record of offshore exploration and development of petroleum.

Our nation lost 11 men in this terrible accident. Our thoughts and prayers are with their families and with those that are injured.

Today, along with all of the Senators from the Gulf Coast, and with the Chairman and Ranking Member of this Committee, I introduced a Senate Resolution in their memory.

We must not forget them. And we must do everything we can to prevent an incident kike this from happening again.

In short, we need to learn from this. But we most learn the right lessons.

We Can't Retreat

Some have suggested that we put a halt to all new offshore drilling. I believe it would be a terrible mistake to retreat from domestic energy production. In the face

of this disaster, it may seem easy to simply ban offshore oil and gas. But banning offshore drilling will not keep industry workers safe and it won't prevent our shores from the threat of an oil spill.

Why? Because unless we stop using oil, then we have to get it from somewhere. We could stop drilling here, but then we would simply import more than we already do from Saudi Arabia, Nigeria, Venezuela and elsewhere.

Transporting larger quantities of oil from far away places will increase, not decrease, our risks. That's because we need to get it from there to our gas tanks in massive oil tankers. And periodically, those tankers crash. In fact, according to the National Academy of Sciences, oil tankers spill about 4 times as much oil as offshore drilling does, on average.

Of course, it is also true that when we rely on energy production overseas, we are exporting it to countries whose environmental standards are lower, and whom have fewer resources to mitigate the impacts.

Why not stop using oil?

America must reduce its oil consumption, for national security, and yes, for environmental reasons.

But we need to be realistic. Today America consumes about 20 million barrels of oil each day. We produce about 5 million barrels of oil per here. We produce another 3 million barrels worth of biofuels.

I believe that the right course is reducing our oil consumption by promoting safe and clean alternative energy while increasing our domestic production. That is the true environmental stance. In that way, the United States takes responsibility for its production needs. And we would extricate ourselves from any number of geopolitical hotspots.

Summary—We Need to Learn the Right Lessons

We have seen disasters like this before. We have seen them in the oil industry, in coal mining, in shipping, in the nuclear power industry, and in the space race. We can react to this disaster in a meaningful fashion or we can react to it the wrong way.

We could deal with this disaster in the same way that we dealt with the meltdown at the Three Mile Island nuclear power plant. But I think that decision had terrible consequences:

We are 30 years behind the French in nuclear technology. Today, France gets almost 80% of its electricity from nuclear power. We get 20%.

France is also the world's largest net exporter of electric power, exporting 18% of its total production, and the cost of electricity in France is among the lowest in Europe. The United States is a net importer.

Today, France's carbon emissions per kilowatt hour are less than 1/10th that of Germany and the UK, and 1/13th that of Denmark. US carbon emissions are amongst the highest in the world.

> *By contrast, let's look at how the United States reacted to the disaster of the Space Shuttle Challenger. In that instance, millions of Americans watched in horror as the shuttle exploded after takeoff, killing all 7 of its crew, including the school teacher, Christa McAuliffe.*

The horror of that disaster shocked us all, and has haunted the nation with its memory. But what is notable is what we did not do: we did not end the U.S. space program. We did put the shuttle program on a brief hiatus and we carefully reviewed what went wrong, corrected those mistakes, and then kept the program going.

As a result, the United States remains the global leader in the space race. We have the best technology, the best satellites, and our space age industries are undisputed global leaders—generating jobs, spin-off industries, and technological innovations that have generated billions in revenues and improved the quality of life for all Americans.

Conclusion

Mr. Chairman, today I hope that we can begin to understand what went wrong on April 20th when 11 offshore oil-workmen lost their lives. And I hope that we can take steps to reduce the chances that it will ever happen again.

But I also hope that we learn the right lessons.

ATTACHMENT.—STATEMENT OF STATISTICS ON LOUISIANA AND GULF COAST SEAFOOD INDUSTRY SUBMITTED BY SENATOR LANDRIEU

- Louisiana seafood is a $2.4 billion industry, and is responsible for more than 27,000 jobs.
- In 2008, commercial fishermen in the Gulf of Mexico harvested 1.27 million pounds of finfish and shellfish and generated $659 million in revenue from these harvests.
- Depending on the season, up to 40 percent of the nation's commercial seafood harvest comes from the Gulf of Mexico.

Let me turn now to Senator Murkowski for her opening statement.

STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman.

It's been 21 days now since the explosion of the Deepwater Horizon rig, and since that time I think all of us have been intently following the news as the incident has unfolded. At first we hoped to hear that the 11 missing rig workers had been found, and now each day we watch the battle to shut off the flow and contain the oil spill.

I've said before that this incident is a tragedy on many, many levels, and our prayers continue to be with those who have lost loved ones in the explosion and with those who were injured. Mr. Chairman, you mentioned the resolution honoring the crew of the Deepwater Horizon and I too am honored to be a co-sponsor of that.

We continue to hope that this spill can be stopped and cleaned up as soon as possible in order to minimize the impact on the Gulf Coast, its residents, and the marine environment. America joins every Gulf Coast resident in hoping for all the factors to work in their favor right now, and it's everything from the weather cooperating, the technology to work, and the judgment of those in charge to be decisive and to be correct.

This accident has reminded us of a cold reality, that the production of energy will never be without risk or environmental consequence. Last November we on this committee heard testimony that left us with a simple conclusion, that offshore development does carry risks to both human and marine life, as well as the livelihoods of our coastal citizens, so government and industry must never grow complacent and always strive to minimize those risks.

Those reasons why are very, very simple: We all agree that we need to steadily minimize the percentage of oil in our overall energy mix, but under anyone's most optimistic scenario our Nation will need a lot of oil for a long time to come. For the sake of our Nation's economy, for the sake of our national security, and, this incident notwithstanding, for the sake of the world's environment, we need to safely produce the maximum amount of that energy here at home.

I was talking to someone recently about why those lessons that we truly take to heart tend to either be very painful or very expensive. Unfortunately, we all know that this incident has been both. We need to make sure that we take the right lessons to heart.

I'm going to have questions today for our technical panel and for BP, Transocean, and Halliburton on what they've learned and how we can produce oil while minimizing future risks. I've got a host

of questions about what caused the initial blowout, about well design, field pressure, the casing, the cementing process, the blowout preventer design requirements and their inspection and triggering mechanisms. I've got questions about sources of ignition, the challenges of very deep oil exploration and production, and the newly learned issues with mitigating a spill originating a mile under water. I've got questions about the interactions and authorities between the different parties with varying degrees of control over the drill rig and the well.

I've got many more questions than will fit at this hearing or that I can reasonably expect the witnesses to know at this time. But I am committed to getting full answers to all of them.

We often cite our Nation's strict safety and environmental laws for oil and gas development as a means to reassure Americans that we can responsibly develop our resources. But this argument will ring hollow if those stringent laws are not enforced equally stringently and objectively.

Many times I've said that there are words and then there are actions, and actions necessarily have consequences. Hopefully, all the actions associated with the Deepwater Horizon incident were in good faith and compliant with our laws. But if that's not the case, there will be no excuse.

Next week this committee will be hearing from Secretary Salazar. We'll be discussing with him the impacts on America's energy policy of the Deepwater Horizon incident. Our Nation is struggling to define our energy policy and this Deepwater Horizon will affect that process. But we can't look at this bad chapter and conclude that we should increase the billions of dollars we are sending to foreign governments who run greater risks and use our own money against our interests.

According to several polls that were released last week, it appears that Americans understand this. The American people are not yet ready to turn their backs on offshore production and neither should we. Again, our Nation already has some of the strongest environmental standards in the world. Those protections will only grow stronger in the wake of this tragedy.

But that fact doesn't make our jobs on this committee easier. It makes our jobs even harder. We are tasked with figuring out how to deliver America's energy resources to Americans in an imperfect system where lives can be lost and environments and lifestyles put at risk. What's worse, we must find the right balance in a global economy where so many other nations can compete for our energy dollars by relaxing their worker safety and environmental standards rather than strengthening them.

To that end, the Deepwater Horizon will teach us here today and perhaps for many years to come about how America can strengthen our standards for producing the energy that we need without compromising our economy or energy security. The question is how and when we might arrive at constructive and realistic agreements. We know where to start. We must figure out what happened to the Deepwater Horizon, what caused the apparent blowout, what started the fire on the rig, and what caused so many safety mechanisms to fail. Above all else, after this pain, after this expense, after this tragedy, what are the lessons that we need to take to heart?

Mr. Chairman, I look forward to the testimony this morning from all gathered and appreciate the opportunity today.

The CHAIRMAN. Why don't we go ahead with the first panel. We have two witnesses, Dr. F.E. Beck, who is an Associate Professor of Petroleum Engineering at Texas A&M University, and Mr. Elmer Danenberger, who retired in January from his position as the Chief of Offshore Regulatory Programs for the Minerals Management Service, if those two gentlemen would come forward.

Because of the gravity of this hearing, we have asked that all witnesses testify under oath. So I would ask if each of you would stand, please, and raise your right hand. Do you solemnly swear that the testimony you're about to give to the Senate Committee on Energy and Natural Resources shall be the truth, the whole truth, and nothing but the truth?

Mr. BECK. I do.

Mr. DANENBERGER. I do.

The CHAIRMAN. Thank you. Please be seated.

Let me mention a couple of housekeeping matters. First of all, of course, your written statements will be made part of the record, so we would ask you to take 6 or 8 minutes to summarize the main points that you think we need to understand from what you have developed as testimony.

We may, depending upon the number of Senators who come to ask questions, we may want to have only one round of questions to this panel, so that we can also hear from the second panel before we have to adjourn for the weekly lunches that we take. But we'll just see how many people arrive. If there is no great attendance, then we won't have to limit it that way.

The other point I would make as a housekeeping matter is we've been advised by the Majority Leader that there will be two votes on the Senate floor starting about 11:30, and it would be my intention to try to keep the hearing going and just ask that Senators who are not asking questions and who can go to vote early and then come back, and they can then keep the hearing going while others of us go.

So Dr. Beck, why don't you go ahead and tell us what you can to inform us as to the circumstances, not just of this accident, but the whole process that goes on with regard to deepwater drilling.

STATEMENT OF F.E. BECK, ASSOCIATE PROFESSOR OF PETROLEUM ENGINEERING, TEXAS A&M UNIVERSITY, COLLEGE STATION, TX

Mr. BECK. Chairman Bingaman, Ranking Member Murkowski, members of the committee: Good morning. Thank you for allowing me the opportunity to provide this testimony today. I have come here in hopes of providing some basic blowout prevention knowledge that I think each of you will find useful as you investigate the events which occurred on the Deepwater Horizon drill ship.

I am an Associate Professor of Petroleum Engineering at Texas A&M University. Prior to joining A&M, which was just last fall, I worked in industry for over 20 years and had academic experience prior to that time. During my industry career I have safely drilled numerous high-pressure natural gas wells. I do not claim to be an expert in deepwater drilling, but I do not see that this is a hin-

drance. Perhaps it is even an advantage, as I have no preference for any process, practice, or equipment package exclusive to deepwater drilling.

I maintain that any well, deepwater or onshore, drilled into a high-pressure oil or gas zone employs a common strategy for controlling pressure. I believe that understanding this strategy, which I'll call the multiple barrier strategy, will be critical in order for you to dissect the events that led to the Deepwater Horizon disaster. As I continue my discussion this morning, I will refer to oil and gas collectively as "gas" for simplicity.

Gas occurring in the subsurface is pressurized, as we all know, and it will naturally seek to flow to the atmosphere once it is penetrated by a wellbore. Barriers are used to protect the gas from flowing to the atmosphere. So a barrier provides a means by which gas is prevented from entering the wellbore or, if it has already entered the wellbore, from continuing to enter the wellbore, and from moving up the wellbore to the surface.

In the context of barriers, a "kick" occurs when a primary barrier, such as drilling fluid, has become ineffective and gas unexpectedly flows into the wellbore. This is not an uncommon event and there are time-proven techniques for preventing that kick from escalating to a blowout. A "blowout" occurs when gas flows uncontrollably to the surface because all barriers have failed.

In the drilling business, it is standard practice to have multiple barriers in place in the wellbore at all times. That way, if one barrier fails another barrier is already in place to be used to stop the well from flowing in an uncontrolled manner. There are numerous barriers that are routinely used for pressure control, many of which you may have already heard about in the accounts of this disaster. Common barriers are drilling fluid, cement, casing, wellhead seals, float valves, and of course blowout preventers.

The diagram before you shows how these barriers would exist in a typical wellbore. As you study this diagram, note that the pathway for gas to travel from the subsurface to the surface must cross multiple barriers. This simple principle, to assure that multiple barriers are in place in the wellbore at all times, is the cornerstone for safely drilling a high-pressure gas well.

Routine test procedures confirm the effectiveness of a given barrier. Barriers must be tested to be effective, oftentimes repeatedly, as in the case of blowout preventers. As we all know, we do not live in a perfect world and there remains the possibility that human error can create conditions whereby the design limits of a barrier are exceeded or where a barrier is not put in place correctly or in a timely manner.

If a barrier is lost or becomes ineffective and a kick occurs, it is critical that drill crews be able to quickly recognize when a kick is occurring and immediately take corrective action to prevent a kick from turning into a blowout. Monitoring the well at all times is critical.

Once again, for a blowout to occur multiple barriers must fail, be removed, or rendered useless through human error. As you seek to determine what happened on the Deepwater Horizon, there will be many highly technical and complicated discussions related to the equipment and processes involved. I encourage the committee to

stay focused on determining the barriers that were in place in the wellbore and in how the barriers were tested and how they failed.

Many of the best and brightest people in the drilling industry have been working diligently for years to assure that a disaster like the Deepwater Horizon never happens. Now that the unthinkable has happened, the industry will now need to take the lessons to be learned from the Deepwater Horizon and move forward to ensure that an accident such as this never happens again.

The industry needs to know the precise well conditions, well configurations, and operational decisions which led to the blowout on the Deepwater Horizon sooner rather than later.

Thank you very much.

[The prepared statement of Mr. Beck follows:]

PREPARED STATEMENT OF F.E. BECK, ASSOCIATE PROFESSOR OF PETROLEUM ENGINEERING, TEXAS A&M UNIVERSITY, COLLEGE STATION, TX

Good morning, thank you for the opportunity to provide testimony to this Committee. I trust that I will be able to provide some basic well construction knowledge that each of you will find useful as you investigate the events which occurred on the Deepwater Horizon semi-submersible drillship.

I sit before you today as a practicing petroleum engineer and Associate Professor of Petroleum Engineering at Texas A&M University, specializing in drilling deep, high pressure wells. I have, in the course of a twenty-plus year industry career, been involved in all aspects of designing and safely drilling deep, high pressure wells. I do not present myself as a deepwater drilling expert, as the bulk of my career has been onshore. However, I do offer myself as an expert in drilling engineering and operations management of high pressure wells in general.

The principles of well construction, blowout prevention and control, and safe operating practices are common across the onshore and offshore operating environments. While specific equipment and systems used in the deepwater offshore environment are unique and often quite different from that used onshore, the underlying purpose for which specific equipment is to be used is common to an onshore well of similar complexity. I believe that understanding a few of the basic principles that are used to plan and safely drill a high pressure well will assist you in dissecting the events that led to the Deepwater Horizon disaster.

As many of you know, oil and gas, which I will call "gas" from now on, are trapped in the microscopic pore space of subsurface rock formations. As the depth of the trapping formation increases, the pressure of the gas in the rock also increases. To complicate things, the rate at which the pressure increases is often variable and difficult to predict. If a borehole is drilled into the formation where the gas is trapped, there is a natural tendency for the gas to try to escape, or "flow" into the wellbore.

The challenge in designing and drilling a wellbore into a pressurized gas formation is to be able to prevent the gas from escaping the formation; and if it does escape, to be able to stop it from continuing to escape; and, then be able to return the wellbore to a balanced and safe condition whereby the gas remains in the formation. This leads me to a simple but fundamental concept that is used in well planning and blowout control, the concept of a "barrier". A barrier provides a means by which gas is prevented from entering the wellbore, or if it has already entered the wellbore, from continuing to enter the wellbore and from moving up the wellbore to the surface.

In the drilling business it is standard practice to always have multiple barriers in place in the wellbore at any given time. That way if one barrier fails, another barrier is already in place to be used to stop the well from flowing in an uncontrolled manner. A "kick" occurs when gas enters a wellbore during the drilling process because a barrier has become ineffective. A "blowout" occurs when gas flows uncontrollably to the surface because all barriers have failed. The drilling industry has time tested and proven techniques for installing barriers in a wellbore. In kick situations, barriers must be used to prevent the kick from escalating to a blowout.

To safely drill a well, it is very important to routinely check the effectiveness of a given barrier. It is even more critical to install a new barrier, and test the effectiveness of that barrier, before any barrier is removed from the wellbore. There are numerous barriers that can be used, many of which may be familiar to you. One

barrier is the fluid that fills the wellbore during drilling, commonly called "mud" or "drilling fluid". Drilling fluid is an extremely versatile barrier and is considered in most instances the first, or primary, barrier in the wellbore. Drilling fluid is very useful as a barrier because the density of this fluid can be changed to respond to changing formation pressures. The density of the fluid causes the drilling fluid to exert pressure against the formation. Increasing density causes an increase in pressure exerted against the formation, while reducing the density reduces the pressure exerted against the formation. In most instances, adjusting the density of the drilling fluid is all that is required to keep the pressures in the wellbore in balance.

Another common barrier is the high strength steel casing used in the construction of the well. Casing placed across a pressurized formation is an effective barrier, but only when used in conjunction with other barriers such as cement and some type of mechanical sealing element at the top of the casing. Casing is installed in a wellbore when the density of the drilling fluid can no longer be adjusted to exert sufficient pressure to keep the pressurized gas contained in the formation.

Cement is one of the key barriers used during the well construction process, but it is important to recognize that cement is perhaps the most difficult barrier to install and control. This is because cement is installed as a liquid but acts as a barrier as a solid. The time during which cement transitions from a liquid to a solid is critical, and the cement must be tested in place, meaning in the wellbore, as a solid in order to be a dependable barrier.

A different type of barrier is the mechanical barrier. A mechanical barrier is a device which, when deployed, physically blocks the movement of gas in the wellbore. The most common mechanical barrier is a blowout preventer. A blowout preventer is a large valve, more precisely series of valves, called the blowout preventer stack, placed at the top of the wellbore and used to stop movement of fluids into and up the wellbore.

Because piping, called the drill string, is used to drill the well, certain components of the blowout preventer stack are used to seal off the volume around the outside of the drill string. This leads to the need to also seal off the inside of the drill string by the use of smaller valves called "inside" blowout preventers or safety valves. Casing strings also require mechanical barriers, called float valves, to be installed at the bottom of the casing string.

Other components of the blowout preventer stack are used to seal off odd shaped or sized drilling tools run in the wellbore, or across the full diameter of the wellbore when no drill string is in place in the wellbore. Finally, a special valve, called the blind shear ram, is used to seal the wellbore in its entirety by cutting through the drill pipe, and possibly other piping components, and sealing the wellbore. The blind shear ram is used only in an emergency and is the last barrier against a blowout. It is very important to note that the blind shear ram will not necessarily cut though all possible piping components that may be in place in the wellbore.

The blowout preventer stack has multiple components with which to provide a barrier for given preconceived situations. Components of the stack have pressure ratings, for instance 10,000 pounds per square inch, or psi. This means that a blowout preventer component rated to 10,000 psi should be able to trap or contain wellbore pressures up to 10,000 psi, but that if pressures exceeding 10,000 psi are encountered the component cannot be expected to function properly. As with other barriers, testing the effectiveness of the blowout preventers is critical in that a nonfunctioning blowout preventer cannot be a barrier.

I should note at this point that the blowout preventer stack on a subsea well, as existed on the Deepwater Horizon, is an extremely complicated system, particularly in the means by which the blowout preventer is installed, tested, and operated. Blowout preventer valves are operated by hydraulic pressure; applying hydraulic pressure reliably at a water depth of five thousand feet can be a very complicated task and is an engineering marvel in itself.

An often overlooked but critical mechanical barrier exists at the junction between the casing and the blowout preventers. This junction is called the "wellhead". The wellhead system provides a mechanical barrier at the top of the outside of the steel casing and is critical in the event that cement fails to provide a barrier. Failure of a wellhead barrier can be catastrophic.

This leads us back to cement. Cement can be used as a barrier in several ways. First, cement is placed on the outside of the casing string to provide hydraulic isolation between the pressurized gas in the formation and the top of the casing string, wellhead, and wellbore.

Cement can also be used as a barrier in the form of a "plug" across the full diameter of the wellbore. When in place and tested this is considered to be a very reliable barrier. Mechanical devices such as bridge plugs and packers also act as barriers and can be used in place of cement plugs.

Failure of cement as a barrier is not in and of itself uncommon or disastrous. However, when cement fails as a barrier it is critical that a second barrier be in place and tested so as to offer the opportunity to repair the cement failure. Repairing cement failures is not uncommon, but can be time consuming and thus expensive.

I have mentioned several barriers that are commonly used to construct a wellbore in a safe and systematic manner, providing a means by which gas pressure in a formation can be safely encountered and balanced. These barriers are drilling fluid, cement, casing, the wellhead, and the blowout preventers.

As we all know we do not live in a perfect world, and often during the course of drilling a well a barrier becomes ineffective and gas enters the wellbore. In this event a second barrier, most often a mechanical barrier such as a blowout preventer, is called upon to be used to control the entry of gas into the wellbore.

As I mentioned earlier, the variation of pressure within subsurface formations is often erratic and unpredictable, and continuous adjustments of the density of the drilling fluid are required to balance the pressure in the formation. Often major adjustments to the drilling fluid density are required when a kick enters the wellbore. It is my experience that in the event of a kick on a deep high pressured well it is critical that the drill crew be able to flawlessly execute the standard procedures that the drilling industry has developed for such situations.

These procedures involve activating the blowout preventers, removing the kick from the wellbore, and then adjusting the density of the drilling fluid in order to return the wellbore to a balanced condition, in the process re-establishing the drilling fluid as an effective barrier.

For the drill crew to be able to do this, it is critical that the crew be able to recognize when a kick has occurred. Failure of a drill crew to recognize a kick in a timely manner is often disastrous. When a kick is recognized it is critical that the crew respond immediately to the kick and install a barrier, such as closing a blowout preventer valve across the wellbore or around the drill string.

In order for the drill crew to respond to a kick in a timely manner, it is imperative that certain critical parameters be continuously monitored. Since the drilling process requires the circulation of drilling fluid into the drill string and out of the wellbore, perhaps the most critical parameter to monitor is the rate at which fluid is exiting the well relative to the rate at which fluid is pumped into the well. It is a warning sign of a kick when fluid exits the well at a rate greater than fluid is entering the well.

Another warning sign of a kick is when the fluid volume in the drilling fluid holding tanks begins to increase. I cannot overstress the importance of monitoring fluid volumes throughout all phases of a drilling operation.

Only when at least two mechanical barriers are in place, and sufficiently tested, can the drilling fluid be removed as a barrier. Once again I stress the importance of testing a barrier for reliability prior to depending upon it to prevent a blowout.

The drilling industry strives to assure multiple barriers remain in place at all times during operations on a well. This reduces the possibility of a blowout caused by sequential loss of barriers. However, there remains the potential for human error to create conditions by which barriers are subjected to loads for which they were not designed. The industry has used intensive training as a means of reducing this risk, but unfortunately it has not eliminated the risk.

Drilling a deep, high pressured well is a complicated task. Drilling the same well in a deep water environment only adds to the complexity. However, deepwater wells, like any other well, can be safely drilled by insuring that multiple barriers remain in place at all times during the drilling operation.

For a blowout to occur multiple barriers must fail or be rendered useless through human error.

I hope that my testimony has provided the committee with a means to understand the barrier concept and to relate many terms such as drilling fluid, cement, casing, and blowout preventers to this concept.

I encourage the committee to continually ask themselves and interested parties whether or not multiple tested barriers were in place at all times on the Deepwater Horizon. It is my opinion that understanding all of the barriers that were in place on the Deepwater Horizon and their status at the time of the blowout will lead to a clear understanding of the disaster.

If a barrier failed, we must determine when and how it was tested, and when and how it failed; if a barrier was removed, we must ask why it was removed and determine if another barrier was put in place and tested in proper sequence. I know through extensive discussion with my peers that the drilling industry is keen to determine what happened on the Deepwater Horizon, and why it happened. Thank you very much.

The CHAIRMAN. Thank you very much.

Mr. Danenberger, why don't you go right ahead.

STATEMENT OF ELMER P. DANENBERGER, III, FORMER CHIEF, OFFSHORE REGULATORY PROGRAM, MINERALS MANAGEMENT SERVICE, DEPARTMENT OF THE INTERIOR

Mr. DANENBERGER. Thank you, Mr. Chairman.

Firstly, I want to extend my sincere condolences to the family and friends of the 11 workers who lost their lives. I talked to a lot of people associated with offshore oil and gas operations and every one of them has taken this personally and is committed to doing everything that they can to make sure this doesn't happen again, in the Gulf of Mexico, elsewhere in the U.S., off of Canada, in the North Sea, West Africa, Brazil, Arabian Gulf, Southeast Asia, Australia, and anywhere that oil and gas operations are conducted.

Also I want to express my disappointment with some of the comments that have been directed at my former colleagues with the Minerals Management Service. I can tell you without hesitation that everyone in that regulatory program is fully committed to safety and pollution prevention—inspectors, engineers, geologists, scientists, and others. The inspectors, they expose themselves to considerable risk every day when they fly offshore and they go around platforms, every day. After Hurricanes Ivan, Katrina, Rita, Gustav, Ike, even when their own personal lives were disrupted, these people were on the job next day doing everything they could to get production restored in a safe and timely manner.

Ethics? These people won't take a donut from industry. I know; I've tried to set them up.

So, that said, I want to get to my main points here. My written statement summarizes the history of offshore deepwater drilling, compliance record, blowout record, and then I've got some suggestions that I would like to offer to the committee.

Just quickly on the history, deepwater drilling really goes back to 1965 offshore California, with wells in comparable depths to the Deepwater Horizon well first being drilled in 1979 offshore Newfoundland. There's extensive history of deepwater drilling, over 3,000 wells drilled in more than 1,000 feet of water.

The compliance record has been very good. I looked back through all the civil penalty data and there really is a flawless record for the deepwater operations. Blowout history is better for deepwater operations than it is for shallow. I also took a look at some of the issues that have been raised since April 20. I've provided some comments on those for your consideration.

But I want to spend the rest of my time talking about the path forward. I think there should be an independent commission that takes a look at all aspects of this, regulatory and otherwise. They should draw from the detailed technical investigation that the MMS and Coast Guard have initiated today, not duplicate it but draw from it. I think we need some technical and regulatory experts on this committee.

Some of the things that I think that they should consider would be looking at whether we should streamline the OCS regulatory regime. Gaps, overlap, confusion can exist when there are too many different organizations. The amount of time that's dedicated to co-

ordination should be focused on safety and preventing accidents. Those are resources that we need.

I don't have any studies to confirm this, but from my experience the less complicated the authority and the regime the more effective. That said, we can't have the regulator investigating themselves. So I think there needs to be an independent investigation authority for major offshore accidents like this. This was first recommended by a former colleague of mine who used to be a professor at the University of Oklahoma, and it was after the Santa Barbara blowout and incidents in the early 1970s. It never really got traction, but I think it's an excellent idea.

I think we should either expand the role of the Coast Guard's National Offshore Safety Advisory Committee or establish a new expert committee to consider technological advances, performance data, and then make recommendations to the regulators, Congress, and others on standards and procedures. There should also be some sort of an annual forum so that everybody can be presented the latest information on research and technological advances.

I think there should be a system, preferably a private one, for collecting and assessing failure data for blowout prevention equipment. We may also want to look at standardized manufacturer testing programs for some BOP components, particularly the shear rams. This data I think should be publicly released so everyone can see it.

Beyond that, I think we should conduct a thorough review of blowout preventer performance considerations, including their redundancy, independent functioning, shearing capability, backup actuation options, and riser disconnect and sequencing, intentional and otherwise.

I think existing well control training programs should be expanded to include some of the well integrity, casing, and cementing aspects that have been prominent not only in this blowout, but in the recent Montara blowout offshore Australia. I think we should develop standards that address best practices for cementing operations, with decision fault trees that describe safeguards, problems, and appropriate responses. We also need to give considerations to other options for ensuring the integrity of the annulus and redundancy there, with perhaps some external packers in some situations.

I think we need to establish procedures that will facilitate the prompt publication of safety rules. This was always a frustration of mine and many other people that work in the Federal Government, trying to get a rule out in a timely way when it's urgent for safety reasons.

That said, we can't accomplish everything with prescriptive rules. There's no amount of—no number of people, no number of volumes, that's going to tell people precisely what they have to do in every situation. So really it has to fall back to operator responsibility, and that has to be clearly established through safety and environmental management programs.

These programs should also indicate what are you going to do for the industry as a whole, what are you going to do to participate in standards, what are you going to do in research. After Katrina and Rita we had an important hurricane conference in New Orle-

ans and less than half of the operators showed up. Now, how do you operate in the Gulf of Mexico without paying attention to hurricane issues?

Last, I think we need to recognize the importance of international cooperation on safety issues. This is an international industry. We have the same issues and concerns. I think we need to work together, and a good example for that has been the informal work of the International Regulators Forum.

Thank you for your time. I appreciate the opportunity.

[The prepared statement of Mr. Danenberger follows:]

PREPARED STATEMENT OF ELMER P. DANENBERGER, III, FORMER CHIEF, OFFSHORE REGULATORY PROGRAM, MINERALS MANAGEMENT SERVICE, DEPARTMENT OF THE INTERIOR

My name is Elmer Danenberger. In January, I retired after a 38 year career with the Department of the Interior's offshore oil and gas regulatory program. During my career, I served as a staff engineer in the Gulf of Mexico regional office, Chief of the Technical Advisory Section at the headquarters office of the U.S. Geological Survey, District Supervisor for Minerals Management Service (MMS) field offices in Hyannis, Massachusetts and Santa Maria, California, and Chief of the Engineering and Operations Division at MMS Headquarters. For the past five years, I served as Chief, Offshore Regulatory Programs, with responsibilities for safety and pollution-prevention research, accident investigations, regulations and standards, and inspection and enforcement programs.

Since retirement, I have closely followed the investigation of the Montara blowout in the Timor Sea northwest of Australia and the ongoing Deepwater Horizon (DWH) blowout in the Macondo field in the Gulf of Mexico. My comments to the Australian Commission of Inquiry may be viewed at http://www.montarainquiry.gov.au/submissions.html

In this statement, I will briefly comment on the history of deepwater drilling, the compliance and performance record with an emphasis on blowout data, and regulatory issues that have emerged since the Macondo well blew out three weeks ago. I will then suggest technical and regulatory improvements for your consideration.

Before I begin, I want to extend my sincere condolences to the families and friends of the eleven men who lost their lives on the Deepwater Horizon. Offshore workers are vital to our economy and energy security; yet their important contributions to society often go unnoticed. The best way to honor the victims of this tragedy is through our commitment to prevent future accidents. Everyone I have spoken to, in the US and around the world, is eager to assist in any way possible.

I also want to express my disappointment in certain media comments directed at my former MMS colleagues. These comments have not only been ill-informed and unsubstantiated, but malicious. Without hesitation, I can tell you that MMS regulatory personnel—inspectors, engineers, scientists, and others—are 100% committed to their safety and pollution prevention mission. MMS inspectors are themselves exposed to risks every day when they fly offshore and inspect facilities. MMS personnel have repeatedly made personal sacrifices to support the regulatory mission. After Ivan, Katrina, Rita, Gustav, and Ike, MMS employees worked to restore oil and gas production essential to our economy, even when their personal lives had been disrupted by the onshore impacts of these hurricanes. These personnel work under strict ethics standards, and despite a few isolated and highly publicized incidents that occurred more than four years ago, conduct themselves with the highest degree of professionalism. While a critical review of the entire offshore regulatory regime is necessary and appropriate, unsubstantiated accusations and personal attacks are not.

HISTORY, COMPLIANCE, AND BLOWOUT RECORD

Deepwater drilling is not new. In 1965, the drillship CUSS I ushered in the deepwater era by drilling a well in 632' of water offshore California. In 1979, the Discoverer Seven Seas drilled an exploratory well in 4876' of water off Newfoundland. This was the first of many wells to be drilled in water depths similar to or greater than those at the Macondo site. In the early 1980s, the Discoverer Seven Seas drilled a series of deepwater wells in the Mid-Atlantic including a record-setting well in 6952' in 1984. The current water depth record is 10139'—more than twice the depth of the water at the blowout location. In the Gulf of Mexico alone, 2500 wells were

drilled in water depths greater than 1000' between 1992 and 2006. Recently, approximately 30 rigs have been operating in greater than 1000' of water, about half of which are working in depths of 5000' or more.

Deepwater rigs are typically staffed with experienced and capable personnel, and their compliance records tend to be very good. I reviewed civil penalties summaries for the past 5 years (2006 to present) on the MMS website. Not a single case appeared to be related to deepwater drilling operations. According to recent news reports, the DWH had achieved a milestone of 7 years of accident-free operations.

I have written several papers on blowout occurrence rates and causes. The most recent paper, co-authored with David Izon and Melinda Mayes, reviews the blowout record during the 15-year period from 1992–2006. I have attached a link to that paper and a summary of the pertinent findings. According to these data, well control performance for deepwater drilling was significantly better than for shallow water operations. There were no fatalities or major spills associated with deepwater drilling blowouts during the 15-year study period.

REGULATORY ISSUES RAISED SINCE THE BLOWOUT

I will briefly comment on some regulatory issues that have been raised by the media since the Macondo blow out began on April 20. The extent to which these issues are relevant to the blowout has yet to be determined.

Acoustic Backup Systems for Seafloor Blowout Preventers.—At this time, there is no evidence that such systems would have made a difference in this incident. Attempts to close BOPs were reportedly made prior to the DWH evacuation. The BOP should have also been signaled when the rig lost power and when the riser disconnected. It is unlikely that additional signals sent acoustically to the stack would have prevented the blowout.

MMS requires a backup system for all seafloor BOPs, and disconnect sequencing that ensures that a well is secured before the marine riser is detached from the well bore. http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2009NTLs/09-g11.pdf

The DWH backup was a remotely operated vehicle (ROV) which successfully stabbed into the BOP stack and attempted to actuate ram closure after the well blew out. Problems with the rams or other BOP components apparently prevented a full, effective closure. The press has reported that cost was a factor in the MMS decision not to require acoustic backups. I never heard cost mentioned in any discussions about these systems. Concerns were raised that ambient noise from a flowing well would render the ROV systems ineffective, that seafloor topography might affect their reliability and performance, and that there was a risk of unintended actuations. The internal consensus was that ROVs were the more reliable option. Further research on this topic is suggested.

Shear Ram Reliability.—Shear rams are intended to cut through pipe that might be in the BOP stack when the well has to be secured in an emergency situation. Heavier, high strength drill pipe is more difficult to shear, and thus a complete seal of the well bore is not always achieved. Also, increased hydrostatic pressure at greater water depths and higher well pressure increase the force required to completely shear the pipe. In 2003, MMS revised its regulations (250.416(e)) to require the submittal of information demonstrating that shear rams on the proposed BOP stack can cut the drill pipe in the hole under maximum anticipated surface pressure. However, shear rams may not be able to cut tool joints and certain other equipment that is run through the BOP. Since this is an industry-wide issue, I suggest that an international standard or guidance document be developed for minimizing the risk of shearing failures. Standardized shearing tests should be required for each BOP model, and test data should be publicly available. http://www.mms.gov/tarprojects/463/%28463%29%20West%20Engineering%20Final%20Report.pdf

Reduced BOP Testing Frequency.—MMS reduced the required BOP pressure testing frequency to once every 14 days (from once every 7 days) after an internal review and a contract research study (http://www.mms.gov/tarprojects/253/AA.PDF) indicated that there would be no increase in the risk of BOP failure. To the best of my knowledge, no company or international regulator requires more frequent testing.

Cementing.—Cement is used to secure the steel casing installed in the well bore, and prevent the migration of gas or fluids in the annulus surrounding the casing. As indicated in the attached summary of blowout data, 18 of 39 blowouts during the 15-year period from 1992-2006 involved cementing operations. An industry standard should be developed to address cementing problems, how they can be prevented, and the actions that should be taken when they do occur. In light of the findings from the Montara blowout (Australia) and related concerns elsewhere,

there is significant international interest in such a standard. The advisability of using external casing packers, in addition to cement, to seal certain annuli should also be considered.

Research—Deepwater and Well Control.—The MMS Technology Assessment and Research (TAR) program has been a leader in deepwater operations (http://www.mms.gov/tarprojectcategories/deepwate.htm) and drilling research (http://www.mms.gov/tarprojectcategories/drilling.htm), and funded a pioneering deepwater well control research center at Louisiana State University. MMS also participates in the International Committee on Regulatory Authority Research and Development (ICRARD), a consortium that addresses offshore safety issues. Many operators and contractors conduct related research. An organized process for reviewing the findings and recommendations of industry and government safety research and proposing follow-up studies is suggested.

Research—Spill Response.—The TAR program has conducted oil spill response research (http://www.mms.gov/taroilspills/) for more than 30 years and currently operates the Ohmsett spill response research center in New Jersey (http://ohmsett.com/). Most boom and skimmer and skimmer performance data have been collected at Ohmsett. Some of the first in situ burn tests were conducted at the facility. Remote sensing tests and data on dispersant performance have also been collected at Ohmsett. The TAR program funded one of the first studies on seafloor containment and collection systems. The Coast Guard, NOAA, the states of Alaska and California, Norway, and Canada have been important oil spill research partners. The oil spill research community is rather small, and the communication among researchers has been quite good. Consistency is critical, and we need to make sure that industry and governmental research efforts are sustained.

PATH FORWARD

In the aftermath of the DWH tragedy, we need to consolidate our efforts and ensure that all pertinent issues are addressed in a complete and timely manner. I recommend that a single, independent commission be established to recommend operational and regulatory changes to the President and Congress. The Commission should be comprised of technology, operations, and regulatory policy experts from the public and private sectors, and should draw on, not duplicate, the detailed technical investigation that the MMS and Coast Guard have just initiated. The following are policy and technical recommendations that I believe such a Commission should consider:

1. Streamline the OCS regulatory regime to minimize the potential for gaps, overlap, and confusion. Because of the complexity of the OCS regime, regulatory and industry personnel spend too much time resolving and coordinating administrative and procedural matters. This time would be better spent focusing on mission critical safety issues. A single agency should be responsible and accountable for safety and pollution prevention at offshore facilities, and should draw on the expertise of other agencies and organizations as necessary to achieve performance objectives.
2. Establish an independent authority to investigate offshore accidents, make recommendations, and assess trends. Such an authority was first recommended by Dr. Don Kash, then a professor at the University of Oklahoma, in 1973 following a series of major offshore accidents.
3. Either expand the role and jurisdiction of the Coast Guard's National Offshore Safety Advisory Committee, or establish a new expert advisory board to review technological advances and performance data, and make recommendations regarding new research, standards, and procedures. This board should also organize an annual public forum for presenting government and industry research and safety performance updates.
4. Establish a public or private system for collecting and assessing failure data for blowout prevention equipment. Establish standardized manufacturer testing programs for certain BOP components (e.g. shear rams). The resulting data should be publicly released. Existing quality assurance program for surface and subsurface safety valves (producing wells) should also be reviewed.
5. Conduct a thorough review of BOP performance considerations including redundancy, independent functioning, shearing capability (for pipe or other obstructions), backup actuation options, and riser disconnect and drive-off sequencing (intentional and unintentional).
6. Expand existing well control training programs or develop new programs to cover well integrity issues. This training should include a review of major historical accidents to remind personnel what can happen and why.

7. Develop standards that address best practices for cementing operations with decision/fault trees that describe safeguards, problems, and appropriate responses. Consideration should be given to other options, such as external packers, for redundant annular protection above oil and gas reservoirs.

8. Establish special procedures that will facilitate the prompt publication of safety rules. The Federal review and publication process for rules is enormously complex, time consuming, and frustrating. Too many resources must be dedicated to getting rules through the system, and technological advances and new findings cannot be readily addressed.

9. Require that all OCS operators have comprehensive safety and environmental management programs. Compliance with prescriptive rules and standards is only part of the safety equation. Companies must actively manage their activities to minimize safety and environmental risks. These management programs should also explain how the company will participate in the standards development and research activities needed to make everyone safer.

10. Recognize the importance of international cooperation on offshore safety and pollution prevention issues. The offshore industry is international in scope, as are the operational and regulatory challenges. Effective international communication reduces risks and burdens. The International Regulators' Forum (http://www.irfoffshoresafety.com/) is a model for informal cooperation, but more could be done.

ATTACHMENT

OCS DRILLING BLOWOUTS—1992 TO 2006

ELMER DANENBERGER, DAVID IZON, AND MELINDA MAYES

(http://drillingcontractor.org/dcpi/dc__-julyaug07/DC__July07_____MMSBlowouts.pdf)

Highlights

1. During the study period, blowouts occurred at a rate of one for every 387 wells drilled, compared with a rate of one blowout for every 246 wells during the period covered in my previous blowout study (1971-91).

2. 2493 wells were drilled over the study period in water depths greater than 1000.' There were five minor blowouts yielding a rate of 499 wells per incident. This is better than the rate of 387 wells per incident for all water depths.

3. The severity of blowouts, as measured by their duration and consequences, decreased significantly compared with the previous study period (1971-1991). Only one fatality and two injuries resulted from drilling blowouts during the 1992-2006 period compared with 25 fatalities and 61 injuries during the previous period. The fatality was on a jackup rig; a crew member was found missing after the rig was evacuated because of well control incident.

4. The seven fires and explosions associated with the 1992-2006 blowouts occurred either on jackups or platform rigs, not deepwater floating rigs.

5. Blowouts during the 1992-2006 period resulted in the spillage of 341 bbls of oil/condensate and 982 bbls of synthetic-based mud. Most of the spillage resulted from an unintended riser disconnect, that caused a release of mud and allowed the well to flow briefly. The blowout preventers were shut-in by a remotely operated vehicle. Procedures were changed to automatically close blowout preventers when the riser is disconnected.

6. Over-pressured shallow gas influxes persisted as a major contributing factor to blowouts. These incidents have minimal environmental risk, but significant safety risk.

7. While the number of blowouts declined, the percentage of blowouts associated with cementing operations increased significantly. Cementing problems were a contributing factor in 18 of the 39 incidents.

8. Half of the blowouts lasted less than 24 hours. The longest lasted 11 days. Over 50% of the blowouts were controlled by pumping mud or cement or by actuating mechanical well control equipment. 36% of the wells ceased flowing because sediments bridged or sealed the well. 13 of the wells ceased flowing when trapped gas or shallow gas pockets were depleted. Although relief wells were initiated in two of the blowouts, both wells were controlled by other means prior to completion of the relief well.

9. Of the 34 blowouts involving mobile drilling units, 28 were bottom-founded jackups. Only 6 involved floating rigs, all semisubmersibles.

The CHAIRMAN. Thank you very much.

Let me start questions. One of our witnesses on the second panel, Steven Newman, who is the Chief Executive for Transocean, has in his testimony a statement that I wanted to ask you two gentlemen about. He says: "The one thing we know with certainty is that on the evening of April 20 there was a sudden catastrophic failure of the cement and the casing or both. Therein lies the root cause of the occurrence. Without a disastrous failure of one of these elements, the explosion could not have occurred."

Do you agree with that, Dr. Beck?

Mr. BECK. I agree, but I think it must be supplemented with the statement that the wellhead system at the top of the casing is also suspect in that situation. So if you consider the seals at the top of the casing part of the casing, then yes, I would say that that's a likely scenario on where the failure was.

The CHAIRMAN. Let me just ask, though. What occurs to me just reading through your testimony about all of the different things that need to be done properly in order to ensure that a blowout not occur, it seems that, although that failure of the cement or casing may well be a proximate cause, a cause that led to this disaster, you can cite others as well that are also proximate causes: the failure of the shear rams on this blowout protector to work properly. Had they worked properly, I assume that that would have prevented the blowout from occurring. Is that an accurate—

Mr. BECK. It's not totally accurate, Senator, because in the context of a failure at the wellhead system it is possible in my opinion that that could create a situation across the blowout preventers that would render them useless at that point because they're attempting possibly to close on a piece of casing for which they were not intended to close or shear.

So in my opinion, with what I've read about the situation, while it seems obvious that the shear rams did not shear, they may have been asked to function on a piece of tubular in the well that they were never intended to function on to begin with. So it's possible there was something blocking the blowout preventers that kept them from functioning correctly.

The CHAIRMAN. Let me ask about—your testimony also talks about the importance of properly responding to a kick when there's a kick involved, so that that doesn't become a blowout. I would assume that an adequate response to a kick in this circumstance might well have prevented this accident from occurring?

Mr. BECK. It may have prevented it. It really depends upon the failure that occurred. If there was a sudden catastrophic failure, for instance at the wellhead, that somehow blocked the BOP's, recognition of the kick wouldn't have made the blowout preventers function in that situation. It may have given much more time for people to evacuate, though, in that situation.

The CHAIRMAN. Another issue that's been raised is the question of whether or not there should be sensors in the well, as I understand it, to detect changes in temperature, changes in pressure, and whether or not the lack of those, those sensors, could have been a cause. What's your thinking on that?

Mr. BECK. Typically, putting a sensor in that situation is desirable. Whether we could continually sense temperature is difficult. Sensing pressure behind the casing is routine practice onshore and

I believe that some of the systems that are used for hanging the casing in the wellbore prevent monitoring the pressure behind the casing string. In my opinion, that would be a desirable addition to the wellhead systems that we use in subsea drilling.

The CHAIRMAN. Mr. Danenberger, you have a very good list of recommended changes that ought to occur. I think you have ten of them that you briefly described to us. The obvious question is why hasn't the MMS put some of these in place prior to this accident occurring? Has the need for this has only become obvious since the 20th of April, or is this something that should have been required previously?

Mr. DANENBERGER. I think regulations are an evolutionary process. MMS has a research program that's been a leader in deepwater well control and has looked at a lot of these issues, and changes have been made over time in the regulations. More need to be made, but I think it's been a process that perhaps needs to be—could have been accelerated had some of these issues been looked at more carefully. But I think MMS has made a consistent effort over the years to address technological issues.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Mr. Beck, you have stated in your testimony: "For a blowout to occur, multiple barriers must fail or be rendered useless through human error." You've outlined the multiple barriers process. Trying to understand where it failed is obviously going to be an ongoing process. Will the eventual removal of the BOP so that we can literally dissect it, will that necessarily give us the answers that we're looking for in terms of really what has happened?

Mr. BECK. I think that that will definitely address whether or not some external blockage occurred in the BOPs that prevented them from failing—or caused them to fail, excuse me, that prevented them from functioning. So recovery of the BOPs will be hugely beneficial to the investigation.

Senator MURKOWSKI. Mr. Danenberger, your testimony provides that you think that the frequency of the BOP tests is probably sufficient, testing I guess every 14 days, and that it's as stringent as it is anywhere else in the world. But what about the test itself? Is there a way to fully execute the shearing of a pipe each time that a BOP test is done without cutting off that well entirely?

Are we testing what we need to test to give us that certainty that we need?

Mr. DANENBERGER. That's an excellent question. I think that the test is very good from the standpoint of measuring the ability of the different rams and chokes and other components in the blowout preventer system to hold pressure, and even the blind shear ram with nothing in the hole. But I think there probably needs to be a better program, as I indicated in my testimony, for testing blind shears independently to better understand what force is being generated and what force is required to shear some of these different components that might be in the blowout preventer stack.

Senator MURKOWSKI. So it's not just an issue of making sure that we're doing the monitoring on a regularly scheduled basis. It's making sure that we've tested all that we can possibly test?

Mr. DANENBERGER. Some of these other tests wouldn't be during your biweekly test. They'd be an independent laboratory effort. Also, good maintenance is critical throughout the operation of this equipment.

Senator MURKOWSKI. How often are you supposed to——

Mr. DANENBERGER. Excuse me?

Senator MURKOWSKI. In terms of timing or regularly scheduled maintenance, what is suggested there?

Mr. DANENBERGER. Any time a component fails during a pressure test, that is corrected. But after each well there can and I think typically is, should be, a thorough inspection of the entire stack when it's back up on the surface.

Senator MURKOWSKI. Let me ask you, Dr. Beck, about the pressures. Can you give us some kind of indication as to what pressures the Deepwater Horizon may have been contending with leading up to the event? I've read in various media accounts that it's anywhere between 10,000 psi to 40,000 psi. What were we dealing with?

Mr. BECK. I have—I did have a chance to review just quickly some of the data in the second panel's discussion, although it wasn't complete enough for me to make direct calculations. But a very well educated guess would be that bottom hole pressure was in the neighborhood, in the subsurface formation, was in the neighborhood of about 14,000 psi.

I'm working—once again, I don't—it is an assumption, but with a 10,000 pound wellhead system BOP stack that failed, then it's clear that that much pressure occurred at the surface. So pressure of 10,000 psi was able to be generated probably all the way up at the seafloor at the wellhead.

Senator MURKOWSKI. To what extent is it likely or perhaps unlikely that as we keep pushing out and going deeper into seeking additional reservoirs out there, that we're going to encounter these higher pressure reservoirs? I mean, is this going to be the norm as we continue to push further out, that we'll be seeing pressures like this?

Mr. BECK. The deeper the wells that we drill, the higher the pressures that we will encounter. I think our industry is capable of handling surface pressures of 15,000 psi almost routinely. But if we start trying to handle 20,000 psi or higher, new systems—the reliability of those systems is going to need to be tested extremely before we deploy those.

Senator MURKOWSKI. The reliability needs to be tested, but according to Mr. Danenberger we need to make sure that we're doing the right kind of testing.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Dorgan.

Senator DORGAN. Mr. Chairman, thank you very much.

I think it's likely the one thing that unites all of us on this committee is we don't know very much about the details of this spill, and that's the purpose of the first panel, to hear from these experts.

The chairman indicated that there's technology, human factor, and the regulatory factor, and suggested all have the potential to see failures. This is—as I understand it, the offshore platform is

one mile above the ocean floor and the drilling goes 18,000 feet below the ocean floor. That's the kind of sophisticated exploration that most of us have very little understanding of. So I appreciate the testimony that you've given us.

Let me ask, if I might, Dr. Beck. Is the equipment and the technology used on this platform different or similar or identical to the equipment and technology used on other drilling that's going on around the world?

Mr. BECK. The technology used in deepwater drilling is developed specifically for deepwater drilling. Now, the work that's done in the Gulf of Mexico is similar to the work that's done in other areas of the world in terms of deepwater. So those equipment packages would be very similar, right, supplied by the same companies and the like.

It's quite a bit different, of course, from my world, which would be onshore drilling. The same small components on a small scale, but on a large scale the complexity of the deepwater systems are extreme.

Senator DORGAN. Dr. Beck, the kind of well that we're talking about here, because of its depth and because of the nature of it, is are there higher risks trying to access that oil?

Mr. BECK. I don't see that the conditions that this well was drilled into are, while severe, extreme relative to what the industry capabilities are right now. It's a very difficult well, but it is not the most difficult well the industry has drilled really by any means. Our capabilities are—we are capable of handling much higher formation pressures than what in my observation or deduction from the data tells us we encountered in this well.

Senator DORGAN. So, Dr. Danenberger, if this is not an unusual situation, using no different technology, or no different equipment, how should we consider the situation? I was in an area of Norway recently where they have massive numbers of offshore drilling and production and so on. We've had offshore production for years. Then clearly this has to be a failure of systems. Is that correct? Is the chairman correct when he says it's likely a failure of one of three things, the technology that exists, the human factor, or the regulatory system?

Mr. DANENBERGER. Yes, absolutely correct. That should have been—at the time that this blowout occurred, the production casing had been set. It should have been a totally sealed wellbore with no potential for influx.

Senator DORGAN. Mr. Chairman, I'm going to discontinue questions. I'm anxious for the second panel, obviously. I think these two witnesses have provided a substantial amount of information.

Thank you very much.

The CHAIRMAN. Thank you.

Senator BARRASSO.

Senator BARRASSO. Thank you very much, Mr. Chairman. Thank you for holding this hearing. As the members know, there is no coastline in Wyoming, but we know quite a bit about energy production, about treasured landscapes, and about wildlife protection. The tragedy unfolding in the Gulf of Mexico is heart-wrenching and communities and people's economic livelihoods are in jeopardy. Our first priority needs to be stopping the leak, containing the spill.

Reading the written testimony for today's hearing, reading the written testimony, I hear one message, and the message is: Don't blame me. Shifting this blame does not get us very far. I am hopeful that we can learn from this experience, first to better prevent another massive spill, and also to ensure that we have an immediate and effective response.

It's important to remember that this tragedy does not change America's energy needs and our continued dependence on foreign oil. Blocking future offshore exploration only means we will import more from foreign countries. I'm confident that America can do a better job of developing offshore energy than Azerbaijan, Nigeria, and Venezuela. If there is a way to make the process safer and the response more effective, then it's very important that we implement it immediately.

Mr. Danenberger, if I could—38 years of experience with the Department of the Interior—we're talking multiple administrations, nonpartisan, working as you have. I was wondering about the suggestion by Secretary Salazar recently that he's considering proposing splitting MMS into two. One agency would be in charge of inspecting the rigs, investigating oil companies, enforcing safety regulations; the other to oversee leasing and royalties.

Do you think that that will be more effective for managing offshore exploration and improving safety?

Mr. DANENBERGER. Let me just say that that tends to be the trend internationally, to separate the resource management agency from the safety and pollution prevention agency. Certainly, at least it would be viewed as being more independent under those circumstances.

Senator BARRASSO. In the last Congress I introduced, along with Senator Wyden, a bill to encourage and make the Director of MMS be someone who would then be confirmed by the Senate. Right now that position is not a Senate- confirmed position. I think that by doing such a thing that actually lets the Senate focus on that person and ask these tough questions during every confirmation process. What would you think of that idea?

Mr. DANENBERGER. I don't really have an opinion on that.

Senator BARRASSO. Dr. Beck, one of the things that you said, you said that something blocking the blowout preventers—that there might have been something blocking the blowout preventers that prevented them from working properly, something blocking them that might have prevented them from working properly. Then the question comes there, are these systems vulnerable to sabotage, to terrorist attack? Are these systems vulnerable either prior to installation or by someone plotting against us who is working on the rig?

Mr. BECK. That's a very difficult question. I think a determined effort, obviously, by a knowledgeable person, would be—somebody would be capable of doing damage in that manner. The fact that there are multiple people on the rig, multiple people—you can't do any single operation on a rig like this singlehandedly, right. It would take a lot of people. A single person would have a hard time, I think, doing anything like that.

For instance, when you're working on the BOPs, that's not one person. It's a crew doing it. So I think that the risk of terrorism on a rig like this would be extremely minimal.

Senator BARRASSO. Mr. Danenberger, I saw you shaking your head.

Mr. DANENBERGER. Yes, I agree totally. I don't think it was a terrorism situation.

Senator BARRASSO. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Landrieu.

Senator LANDRIEU. Thank you, Mr. Chairman. Thank you for noting when this important hearing started the loss of the 11 workers and those that are still struggling with injuries. Several of those were from my State of Louisiana, from other Gulf Coast States, and our thoughts and prayers continue to be with them.

I want to just make a short statement and then ask my questions, because I think it's important to keep this in perspective. There are over 300,000 men and women that work in the oil and gas industry in Louisiana alone, and almost every State in the Nation contributes in some way, shape, or form to this industry, both onshore and offshore. The work done by offshore crewmen is particularly difficult and dangerous at times. They are separated from their families weeks at a time, usually 2 weeks on and 2 weeks off. We owe a debt of gratitude to the people that work in this industry.

I believe some of these facts are important. Mr. Danenberger, you outlined some today, but I'd like for the record to put some more into the record. From 1947 until today there have been 42,645 wells drilled in State and Federal waters in the Gulf of Mexico. The first deep well was 31 years ago in 1979. That well was 1,022 feet deep. Until that time until now, there have been 2,259 deepwater wells drilled. That averages approximately 133 wells per year. These wells accounted for only 4 percent of oil production in the Gulf in 1990, but today they're responsible for 60 percent, and we need their production. We must find a way to do this more safely.

Since 1971, not a single spill in the Gulf or the entire Federal OCS caused by a well blowout exceeded 1,000 barrels of oil. We're exceeding 7,000 barrels of oil every day and a half with this current uncontrolled flow.

The record will show from 1947 to 2009, 175,813 barrels have been spilled out of 16 billion produced. That is one one-thousandth percent of the total production.

I think it's important to keep that in perspective. I also think it's important to understand, Mr. Chairman, as you have said many times, that America uses 20 million barrels of oil a day. We produce less than half of that. Any constriction of domestic oil and gas production either onshore or offshore will only further put us in a perilous situation and an overreliance on foreign oil, and in addition will export some of these problems to countries less equipped and less inclined to prevent this kind of catastrophic disaster.

So my question to you, Mr. Danenberger, is about this shear ram. There was a report done in 2004, I understand, by West Engineering Service that recommended that there be some changes be-

cause it was noted that sometimes the shear rams would not work in terms of multiple prevention. Can either one of you comment about why that was not taken into more serious consideration, and should we continue to go forward with deepwater production when we know now that blowout preventers, which is one of the last lines of defense, may not function if there's something jamming that casing?

Mr. Danenberger, starting with you, and then Mr. Beck.

Mr. DANENBERGER. Thank you. There were changes made in the regulations to require that operators provide data to show that the shear ram would effectively shear the drill pipe that was in the—that was being used on the well, under the worst possible conditions. However, we do know that tool joints and other type of piping that might be in the hole can't always be sheared. So I think more work is needed there to minimize the amount of time that such equipment—that you're exposed to that risk, and to get more data on the performance of shear rams and the challenges. You almost need a little safety assessment with each well right now until things are more comfortable.

Senator LANDRIEU. Mr. Beck, real quickly?

Mr. BECK. Senator, in the context of the West report, I'm not familiar with that report, so I won't address that. But in the context of shear rams, I think it's important for everybody to realize that the use of shear rams is a rare occurrence. This is not something that's going on daily or weekly or monthly. It's possible that rigs out there have never used their shear rams in a serious event such as this. So it is the last line of defense. It is something we definitely need to look at. They will not shear all elements, all piping elements, that are latent. They are subject—it is subject to human error for incorrectly spacing the pipe across the BOPs. You have to physically say or measure and not place a tool joint across a shear ram.

So the shear rams are built to shear a specific tube, OK.

Senator LANDRIEU. Mr. Chairman, as I conclude I want to call on this committee again to relook at the revenue-sharing proposals that have been put before this committee. Obviously, these are resources belonging to the Federal Government, but right now Louisiana and the Gulf Coast States are assuming almost 100 percent of the risk to our wetlands and coastline, which is why I believe we need a new look at that provision.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator SESSIONS.

Senator SESSIONS. Thank you, Mr. Chairman, and for having this hearing.

I was able to fly over the Gulf recently and it was a very disturbing scene. People are very worried. Some people think that the Atlantic Coast may be beginning to see some signs of oil on our beaches, but the mayors that I have talked to told me their beaches are OK so far. But we're just at the whim of the tides and the winds.

So it has a ramification that goes beyond almost anything I've seen in terms of the economics of this situation. I'm really worried about it. I believe we need to have some questions answered. I be-

lieve we need to review our policies and only then can we feel confident that we can go forward effectively.

The production of oil and gas off our shores is so important to this Nation and to our economy which most people probably don't fully recognize. It is something that I have supported for a long time, and I hope and I pray that we can get this situation straightened out. But I believe we must have a full review of what we are doing and how we do it. We've had a good success record in the Gulf, that could have created some laxity or complacency or overconfidence. I don't know, but it is time to find that out.

Mr. Beck, you talked about the shear rams and how often they're activated. Do you know how many times in the Gulf of Mexico shear rams have actually been executed?

Mr. BECK. No, sir, I do not know that.

Senator SESSIONS. You mentioned that the use of shear rams were rare and then you mentioned that they have never been activated. What was that?

Mr. BECK. There are many rigs drilling in the Gulf of Mexico that have never experienced a blowout. It just doesn't happen to every well, every rig that we drill. So these people are not going to have—they're not going to say, well, my shear rams worked in this situation. Perhaps in a situation where you were evacuating for a hurricane they would use them, but not always in the context of a blowout, because we just don't have that number of blowouts to test every single blowout preventer out there.

Senator SESSIONS. But that does not diminish the necessity that they work, does it?

Mr. BECK. Not at all. They need to be tested and known to work.

Senator SESSIONS. Now, one of you indicated that you had unusual pressure coming from this well. There is a 2004 study, Mr. Danenberger, by the MMS which raised significant questions about the ability of the rams to cut through the stronger pipes used in deepwater drilling. Apparently, these are thicker pipes, and they have additonal pressure placed on them at these great depths. In your opinion, Dr. Beck, was that MMS finding correct and can we depend on shear rams as presently configured to operate at 5,000 feet of water?

Mr. BECK. Once again, all I can say, Senator, is that a shear ram as designed to cut a specific tube is very dependable. It's when it attempts to cut something other than that tube that it's no longer dependable.

Senator SESSIONS. Mr. Danenberger, is there any assurances we have that these shear rams are being used so that we can depend on them to work? When people have raised questions about whether or not it's safe to drill in the Gulf, I've made reference to them, and I'm under the impression we can depend on this technology. What I understand Dr. Beck to say is, well, it may not work. What do you think?

Mr. DANENBERGER. I think there are good data that they're reliable from a functioning standpoint and they're reliable, as Dr. Beck indicated, in cutting pipe that they're designed to cut. But I think we need to take more of a look at the situations where there might be——

Senator SESSIONS. Do MMS regulations require that shear rams actually work or does it accept the fact that it just might not work?

Mr. DANENBERGER. They require to drill pipe that is going to be primarily in the well, that it be able to shear that. Now, there are going to be short time periods where something else is in the wellbore and I think that needs to be examined more closely.

Senator SESSIONS. Would that kind of pipe be in the well after it's being brought on line, after the drilling is complete?

Mr. DANENBERGER. I don't think so, but I'm not sure exactly what activity was going on at the time of the blowout.

Senator SESSIONS. So you would acknowledge that there is uncertainty. Would you say too much uncertainty, which needs to be eliminated?

Mr. DANENBERGER. I think, as I mentioned in my testimony, we need to have a little bit better standardization on the performance of certain BOP components, and the shear ram would be one of them.

Senator SESSIONS. Is that what MMS is supposed to do? Aren't they supposed to have minimum regulations that would ensure that the shear rams work?

Mr. DANENBERGER. MMS sponsored the study you referenced. They're very much attentive to these issues and have made changes in the regulations. Whether they're sufficient at this time, I think——

Senator SESSIONS. Could they have mandated changes so that they could be certain to work?

Mr. DANENBERGER. I think we need to know better the potential for problems and the extent of the problems and the options in terms of solutions.

Senator SESSIONS. I would agree.

Thank you, Mr. Chairman. I don't think we're there yet and we need to do more.

The CHAIRMAN. Senator Menendez.

Senator MENENDEZ. Thank you, Mr. Chairman.

Mr. Chairman, despite what I have heard for quite some time from the industry, that we are just absolutely safe under all circumstances, I think it doesn't take a rocket scientist to figure out that there is no such thing as too safe to spill, because we've had that experience already. I'm looking forward to the second panel because, as I read the written testimony, I can already see the liability chase. In one step, it's like a bit of a Texas two-step: Oh, yeah, we're responsible, but. BP says Transocean, United States says Halliburton.

So I can see the liability chase that's going to go on. So I'm looking forward to that second panel to see who's going to fess up to what.

Let me ask you, Mr. Danenberger. I understand you left MMS a year ago, is that right?

Mr. DANENBERGER. January, this January.

Senator MENENDEZ. Oh, January this year, OK. Thank you for your service.

I wonder. The Montara wellhead explosion off the coast of Australia in 2009, it spilled for 105 days. It leaked between 1.2 and 9 million gallons of oil. Based upon the testimony we received from

MMS last year, it seems MMS simply dismissed the spill as something that could not occur in U.S. waters. Now it's happened.

Did MMS learn anything from this accident?

Mr. DANENBERGER. That investigation, like this one, is still going on. As a matter of fact, they just finished the hearings 4 days before this incident occurred. So there are still lessons to be learned there. There are some similarities in that there is a failure of well integrity in both situations. I think there needs to be renewed emphasis on the well integrity work.

Senator MENENDEZ. You submitted, I guess on a voluntary basis, to the commission in the Montara a statement; is that correct?

Mr. DANENBERGER. Yes.

Senator MENENDEZ. In it you said, among other things I found to be very interesting, it says: "This incident appears to have been entirely preventable if internationally accepted practices were followed." Is that true in the case of the situation here?

Mr. DANENBERGER. It may be. We have to find out more. The main point there with the Montara blowout was that they didn't have a secondary barrier in the production casing. So that's internationally recognized and it was going to be in place here, but apparently it never happened.

Senator MENENDEZ. Dr. Beck, the blowout preventer as I understand it—correct me if I'm wrong—had supposedly multiple redundancies, right?

Mr. BECK. Correct.

Senator MENENDEZ. Yet none of them worked; is that a fair statement?

Mr. BECK. That I think is a fair statement.

Senator MENENDEZ. So we have multiple redundancies. It's not just a singular thing that's going to work to create the safety. Multiple redundancies. We're told that, oh well, don't worry because if one doesn't work another one will, and if that one doesn't work another one will. None of them worked. None of them worked.

So, Mr. Danenberger, when MMS goes ahead and does testing, can you give me a sense of the testing? How is it that the testing always seems to pass and yet when it was needed it failed?

Mr. DANENBERGER. All the components of the blowout preventer stack that have to hold pressure are pressure- tested during these blowout preventer tests and charts are made that show the pressure holding, and they're certified. So it's——

Senator MENENDEZ. This is a test that in retrospect now is an appropriate test to really judge whether or not under these set of circumstances it will operate as it's supposed to? Is it something that should be——

Mr. DANENBERGER. It's an appropriate test. Whether more needs to be done, we'll have to learn that.

Senator MENENDEZ. One final question. Dr. Beck, as I understand it, current safety and environmental regulations don't differentiate between deep and shallow water development. Should there be more stringent regulations for deepwater development?

Mr. BECK. Senator, I would defer that to Mr. Danenberger in terms of——

Senator MENENDEZ. All right. Mr. Danenberger, can you answer that question for me?

Mr. DANENBERGER. The operations are similar in many circumstances, particularly with regard to well integrity, and there are some differences in the regulations. Whether there should be a separate set of regulations or a separate section for deepwater, I think that merits consideration.

Senator MENENDEZ. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Risch.

Senator RISCH. Thank you, Mr. Chairman. Thank you for holding this hearing.

Gentlemen, I have just one question for you. I come at this with a couple of premises. First of all, we're going to continue to develop oil wells in the Gulf. I don't think there's any question about that. It's necessary. Fourty years ago on the first Earth Day, the big issue was stopping nuclear power, and they were incredibly successful and stopped nuclear power, and as a result of that, of course, we are much more reliant today on fossil fuels than what we were. We're going to continue to be like that as we drift away from that, and this committee I think, as everyone on this committee, is committed to move from fossil fuels. But it's going to take some time, there's no question about it.

When you have human activity like this, where you have a highly technical and highly sophisticated process of developing a deepwater well, accidents are going to happen. The thing that has struck me, aside from the tragedy of this—and I think everyone would concur that this is an awful situation—but it seems to me that we have been totally unprepared to respond to this. Knowing the Federal Government as I do and the bureaucracy as I do, that doesn't—it really doesn't surprise me, that the government is not able to respond to this.

But it seems to me that the industry itself has the expertise, has the technology, has the engineers, that they should be able to respond to this better. Now, I know that there was some concerted effort to get the best minds together to try to resolve this, but it would seem to me that some type of an agency—and I'm thinking of a private agency—that brings together all of the companies that are doing this kind of exploration and production, would be very beneficial to them, because this is a problem—this isn't just BP's problem. This is an industry problem that everyone's going to pay the price for for a long time, along with the American consumer.

So my question to you is, what do you think about some type of a private agency, obviously overseen by the Federal Government or that sort of thing, that provides the technical help when something like this happens to respond quickly and to put the best minds together they can to try to resolve this? Mr. Beck, could we start with you?

Mr. BECK. Senator, in terms of a private agency, there are so many operators drilling wells in the Gulf, each of them needing a staff to be able to do the types of responses that you're talking about. I think a private agency would turn into an extremely large organization to be able to service all of those individual companies, if I understand your premise here in terms of a centralized response unit.

The industry is very good at sharing technical information. We have societies, technical societies that publish large amounts of pa-

pers that people read and digest what's happening technically. But there is no central clearinghouse for assuring that everybody knows that information.

Senator RISCH. It seems to me that a central clearinghouse might work better. I mean, the response right now, I don't think anybody is satisfied with the way the industry is coordinating a response to this.

Mr. Danenberger, I'd like to hear your response.

Mr. DANENBERGER. I think in terms of a response, I really have a hard time finding a lot of fault. Every option in terms of the intervention and trying to stop the flow hasn't worked, but every possibility is being tried in terms of actuating the existing equipment or trying new equipment and concepts. So I think that's been very good myself.

Senator RISCH. What's the exit strategy here? What is going to work? Or what's the path to get there? I mean, obviously you can't tell me what's going to work, but I'm looking for a path to get to an end game, because there's got to be an end game here.

Mr. DANENBERGER. The relief well will work and I think the chances are good that the well will be killed before the relief well is called on to complete the job.

Senator RISCH. Gentlemen, thank you very much.

Mr. Chairman, I'm less than satisfied with those answers, but thank you.

The CHAIRMAN. All right. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman.

Mr. Danenberger, you spent decades at the lead Federal agency in this area, the Minerals Management Service, the key, particularly in terms of offshore oil drilling, before your retirement in January. The agency allowed rigs like Deepwater Horizon to drill with near certainty that blowouts would occur, without adequate backup devices. Why?

Mr. DANENBERGER. I think I'm not really sure about the question. There were good backup capabilities——

Senator WYDEN. They weren't required, were they?

Mr. DANENBERGER. Yes, they were required to have a backup actuation system, which in this case was the remotely operated vehicle. It performed its function. It's just there were some other issues——

Senator WYDEN. So the agency you're saying required these, enforced the regulations, and they just didn't work? Or what happened?

Mr. DANENBERGER. Yes, they were required to have a backup actuation capability, not an acoustic backup——

Senator WYDEN. Pardon me?

Mr. DANENBERGER. They're required to have a backup actuation capability, which doesn't appear to have been the problem.

Senator WYDEN. But they weren't required to have a backup capability that worked, were they?

Mr. DANENBERGER. The backup worked. It was just the stack—it did its job. It's just the stack was either damaged or unable to perform the function when it was activated by the backup ROV.

Senator WYDEN. In 2007 you co-authored a study of blowouts and it's entitled "Absence of Fatalities in Blowouts Encouraging; an

MMS Study of Offshore Incidents" in the previous decade. It strikes me that that title is instructive because, though not every blowout ends in tragedy, it turns out that blowouts and fatalities are not exactly absent in oil and gas drilling.

So again, my question is, when you're putting out these studies, how can one conclude that Minerals Management is doing its job to ensure that adequate preventive activities are taking place, when you're saying, shoot, absence of problems are what people ought to be thinking about here?

Mr. DANENBERGER. The study showed an improvement in the blowout record and performance. So I think that's what that title was reflecting.

Senator WYDEN. Was it fair to say that there were an absence of these problems? Because to me that's a signal, Mr. Danenberger, from the lead Federal agency that people really don't have to sweat it in this area.

To me—Mr. Chairman, I'd like to put into the record as well this particular study, because it looks, for example, at the number of blowouts, for example, in these deepwater situations, and you sure can't conclude that there is an absence here. For wells in water deeper than 1,000 feet, there's a blowout once for every 499 wells. People who are riding on airplanes aren't going to say it's acceptable to have a tire blowing out every 500 takeoffs, and yet the lead Federal agency is basically telling everybody they really don't have to sweat the safety concerns here, and I don't think that is what a lead Federal safety agency ought to be doing.

By the way, Mr. Danenberger, when you talk about the question of financial oversight, we had the Inspector General do a report, as you will recall, that I asked for with respect to financial improprieties, and it seems to me there are some pretty significant safety gaps at this agency that need to be corrected as well.

I want to give you the last word, Mr. Danenberger.

Mr. DANENBERGER. The purpose of studies like that is not to say there aren't problems. It's to report on the record, and that was the purpose of that study. It was a 15-year period. There was one fatality from a blowout that didn't have anything to do with deepwater drilling. Most of the blowouts cited are not blowouts that you would consider—that the average person would think of as a blowout. It was just a short loss of well control, less than a day, and it was controlled either with blowout preventer equipment or other immediately available options.

Senator WYDEN. Mr. Chairman, I hope colleagues will take a look at this study, because what this study is all about is sending a message that there really are not the safety concerns in this industry that the American people now full well exist.

Thank you, Mr. Chairman.

The CHAIRMAN. All right. We have four other Senators who have not asked questions of this panel yet. Let me call on Senator Lincoln.

Senator LINCOLN. Thank you, Mr. Chairman, and a special thanks to you and Senator Murkowski for holding such an important hearing on the tragedy that's taken place in the Gulf of Mexico. While I think it's clear to many of us that domestic oil production is critical to our national security, so is the safety of our do-

mestic oil production, and that's what we're here today to talk about. It's imperative that we get some answers as to what happened, what the response has been, and how another accident like this one in the Gulf can be prevented. We appreciate you gentlemen being here today to help us answer some of those questions. We appreciate your expertise.

I'm not sure how many of my questions have been addressed, as I was absent for a little bit. But I would like to ask Dr. Beck, in your testimony you state that the blowout preventer valves were operated by hydraulic pressure and that applying hydraulic pressure reliability at a water depth of 5,000 feet can be a very complicated task and is an engineering marvel in itself. What are the differences in how blowout preventers are installed and, more importantly, tested, as well as operated, at deepwater levels? Do you believe that the blowout preventers are any less reliable in deepwater than they are in the more shallow water? What's the testing for all of that?

Mr. BECK. Senator, as I said in my introduction, I do not portray myself as a deepwater drilling expert. So the issues with specifics on the deepwater BOP stacks I have not dealt with in my career. So I would decline to speak about specifics that are going on in the testing and the installation of those. There are much better experts than me to address that.

Senator LINCOLN. Are they tested at those levels?

Mr. BECK. The BOP stacks are tested repeatedly on 1-day intervals.

Senator LINCOLN. At 5,000 feet?

Mr. BECK. On the sea floor, I believe. But once again, I'm stretching out of my expertise. But it's a very difficult task to retrieve a BOP stack off of the sea floor, so maintenance work and testing work should be done in place.

Senator LINCOLN. Right. But you don't know that it is?

Mr. BECK. I don't know the specifics of how that's accomplished.

Senator LINCOLN. I just think it's important for us to know that if these are the technologies that we're depending on, that they've been tested in the circumstances that they're being used.

Just to Mr. Danenberger: As you well know, in 2000 MMS issued a report that recommended deepwater drillers be installed with remote control shutoff devices. However, in 2003 I believe MMS determined that these devices were not essential and therefore not required. Some reports claim that MMS based these decisions on complaints from some of the drilling companies in terms of cost: too expensive, not always reliable.

In your testimony you dispute that costs were discussed in that decision from MMS and state other concerns led to the decision. Do you believe a remote control shutoff switch would have made a difference in this accident, and do you believe that MMS should review this decision and make remote shutoff switches mandatory, as they do in Norway and Brazil?

Mr. DANENBERGER. They had backup capabilities on the Deepwater Horizon that should have actuated the blowout preventer system. So I don't think the problem was the absence of an acoustic backup. However, I think that's something that merits further re-

view as to whether it would provide any advantages in the future. The ROV system has been reliable when tested and attempted.

Senator LINCOLN. The remote shutoff?

Mr. DANENBERGER. Yes, shutting in with the remotely operated vehicle, which is presently used by most of the rigs in the Gulf.

Senator LINCOLN. So you're not necessarily saying that it would have been a difference in this, but you do think it should be further reviewed?

Mr. DANENBERGER. Yes.

Senator LINCOLN. Thank you.

In the testimony as well, you state that 18 of the 39 blowouts from the years 1992 to 2006 involved cementing operations. I don't know—I know Senator Wyden brought some issues from the letter there. But you go on to say that an industry standard should be developed to address cementing problems, how they can be prevented, and the actions that should be taken. Would you care to elaborate on that, on the need for industry standards for cementing in offshore drilling, and what role do you believe that cementing may have played in this accident?

Mr. DANENBERGER. Possibly played a significant role. We don't know what happened yet. But that should have been a secure wellbore with no influx possible at that point. So there was some failure, and quite possibly the cementing system. I just think the record on well integrity points to some problems with cementing operations that require further review and perhaps standardization.

Senator LINCOLN. So there are no standards currently?

Mr. DANENBERGER. There are standards, more for the makeup, composition, but not the real fault tree, like if this happens I'll do this, that type of analysis.

Senator LINCOLN. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator STABENOW.

Senator STABENOW. Thank you, Mr. Chairman.

In the interest of time, I would just ask one question, but I would first preface that we all understand that this was a horrible disaster and the most important thing to remember is there are 11 lives that were lost as well as the catastrophe economically and environmentally.

Mr. Danenberger, I just have one question. You had a series of recommendations regarding an independent commission, to streamline regulations, so that they can focus more on safety, expanding training. Then you said that we need standards for best practices. I'm very surprised that today we don't currently have standards for best practices. Are you suggesting we don't have standards for best practices?

Mr. DANENBERGER. There are many standards for best practices, over 100 incorporated in the MMS regulations. There are just a couple areas where maybe more work should be done. One we just mentioned, cementing, and maybe some more work on certain BOP components.

Senator STABENOW. I think, Mr. Chairman, I think probably the American people would have assumed we would have had stand-

ards for best practices in all of these areas. Certainly if we don't, we need to.

Thank you.

The CHAIRMAN. Senator Udall.

Senator UDALL. Thank you, Mr. Chairman. I'll also be short and ask one question. I do associate myself with all the remarks this morning from my colleagues on both sides of the aisle.

Mr. Danenberger, I appreciate your comments in your written statement and I look forward to reading it more exhaustively, and your support and, if you will, defense of most of the employees at MMS. That's true, but there's also been a couple of cases that I believe you're aware of where MMS has demonstrated its close and sometimes inappropriate relationship with industry, most notably in the Denver office. As a Colorado Senator, it's on the forefront of my mind.

MMS collects billions of dollars in royalties from oil and gas lease sales every year, but it's also charged with regulating the safety and environmental practices of the industry. Those two roles, you could argue, contradict each other, come into conflict. Can you comment on this mixed role that MMS plays as both the advocate and the regulator for the oil and gas industry?

Mr. DANENBERGER. I think it's something that is probably going to be looked at, and that's a reasonable—something that's reasonable for your committee certainly to look at, whether we should have a truly independent safety and pollution prevention regulator that's separate from the resource management and royalty collection function. I think that concept might merit further attention.

The CHAIRMAN. Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman. I also would like to thank our panelists for being here, especially you, Mr. Danenberger, because I think your knowledge of MMS is very helpful to this committee.

My question is for you. I would like to follow up on the issue raised by Senator Lincoln. She was asking about the cement that's used to keep oil and gas from bubbling to the surface and exploding during drilling. It's my understanding that in 2000 MMS asked the industry for advice on how to deal with problems with that cement used in the drilling. I guess I'd like to ask you, do you think it should take a decade or longer to fix a problem MMS has identified, and in your experience with the agency are these types of delays common or have they occurred more recently since MMS has begun relying more on industry self- regulation?

Mr. DANENBERGER. I think that the issues associated with cementing have been under discussion for a while and there have been some changes made in practices and in the regulations. I think clearly more needs to be done and that should be a focus of attention right now.

Senator SHAHEEN. Can you just—do you know what the regulation is governing that cement use and how the industry was involved with developing that regulation?

Mr. DANENBERGER. Yes. It was developed by the MMS. That regulation tells when you have to cement, how much cement you have to use, how high up into the annulus, how long you have to wait on cement, how you pressure-test the casing after the cement is

set. So that is well covered. It's just from my experience in looking at the Montara blowout—and I don't know what the situation is with this one—there wasn't a good understanding on the part of some of the workers as to what actions they should take when certain signals were given that maybe they didn't have a good cement job. So that's kind of a fault tree assessment that we may need in a standard.

Senator SHAHEEN. Given that the training is now done by the industry, is that something that should be incorporated into the industry training?

Mr. DANENBERGER. Yes, I think there should be—there are certain specialists that do the cementing, but I think the primary operator's representatives and drilling contractor people should have a pretty good familiarity with those operations. Cementing is not currently required as part of the overall well control training program.

Senator SHAHEEN. Thank you.

The CHAIRMAN. I believe that everyone's had a chance to ask questions. We appreciate both of you testifying today very much and we may call on you in the future for additional expert advice on this issue.

Our second panel is composed of witnesses from the three companies that are most immediately involved in the operation on the Deepwater Horizon drilling rig in the days and hours leading up to this catastrophic failure. BP is the integrated exploration and production company that was ultimately the primary operator of the well being drilled. Its representative on this panel is Lamar McKay, President, Chairman and President of BP America.

Transocean Limited was the owner and operator of the Deepwater Horizon drilling rig that exploded on April 20. It is the primary offshore drilling contractor in the deepwaters of the Gulf of Mexico, providing rigs to many of the deepwater exploration and development wells, and its representative on this panel is Steven Newman, its Chief Executive Officer.

Halliburton is the oilfield services provider that was subcontracted to provide a range of services on the Deepwater Horizon, including the cement and casing program of the well that experienced the disastrous blowout. Its representative on this panel is Tim Probert, the President of Global Business Lines and Chief Health, Safety and Environment Officer.

As I indicated before, we're asking all witnesses to please be sworn today. If each of you would stand, raise your right hand, I'll administer the oath to you. Do you solemnly swear that the testimony you're about to give to the Senate Committee on Energy and Natural Resources shall be the truth, the whole truth, and nothing but the truth?

Mr. MCKAY. I do.

Mr. NEWMAN. I do.

Mr. PROBERT. I do.

The CHAIRMAN. Please be seated.

As with the previous panel, your entire statement, written statement, will be made part of the record, and we would ask that each of you take 5 or 6 minutes to make the main points that you think

we need to understand, starting with you, Mr. McKay, and then Mr. Newman, and then Mr. Probert. Go right ahead.

STATEMENT OF LAMAR MCKAY, PRESIDENT AND CHAIRMAN, BP AMERICA, INC.

Mr. MCKAY. Thank you, Chairman. Chairman Bingaman, Ranking Member Murkowski, members of the committee: My name is Lamar McKay and I am the Chairman and President of BP America.

We have experienced a tragic series of events. 3 weeks ago tonight, 11 people were lost in an explosion and a fire aboard the Transocean Deepwater Horizon and 17 others were injured. My deepest sympathies go out to the families and friends who have suffered such a terrible loss and to those in the Gulf Coast communities whose lives and livelihoods are being impacted.

Over the last few days I've seen the response firsthand and I've talked with the men and women on the front line. There is a deep and steadfast resolve to do all we humanly can to stop the leak, contain the spill, and to minimize the damage suffered by the environment and the people of the Gulf Coast.

As a responsible party under the Oil Pollution Act, we will carry out our responsibilities to mitigate the environmental and economic impacts of this incident. Our efforts are part of a unified command that was established within hours of the accident and provides a structure for our work with Departments of Homeland Security and Interior, as well as Defense, Energy, OSHA, and other Federal agencies, as well as affected State and local governments and Transocean.

We are grateful for the involvement of President Obama and members of his Cabinet and for the leadership, direction, and resources they have provided. We are also grateful to the Governors, Congressional members, State agencies, and local communities of Mississippi, Alabama, Louisiana, Texas, and Florida.

I want to underscore that the global resources of BP are committed to this effort and have been from the outset. Nothing is being spared. Everyone understands the enormity of what lies ahead and is working to deliver an effective response at the wellhead, on the water, and at the shoreline.

Before I describe our round-the-clock efforts to respond to this series of events, I want to reiterate our commitment to find out what happened. Figuring out what happened and why it happened is a complex process. We are cooperating with the joint investigation by the Departments of Homeland Security and Interior and investigations by Congress. In addition, BP has commissioned an internal investigation whose results we plan to share so we can all learn from these terrible events.

I want to be clear. It's inappropriate to draw any conclusion before all the facts are known. As we speak, our investigation team is locating and analyzing data, interviewing available witnesses, and reviewing and assessing evidence. Today I think it's important to give you and the American public an idea of the questions we are asking. There are really two key sets of questions here and we're actively exploring both of them. First, what caused the explosion and fire on board Transocean's Deepwater Horizon rig? Sec-

ond, why did Transocean's blowout preventer, the key fail-safe mechanism, fail to shut in the well and release the rig?

With respect to the first question, the key issue we are examining is how hydrocarbons could have entered the wellbore. BP as the leaseholder and the operator of the well hired Transocean to drill that well. Transocean as owner and operator of the Deepwater Horizon drilling rig had responsibility for the safety of drilling operations. We don't know yet precisely what happened on the night of April 20, but what we do know is that there were anomalous pressure test readings prior to the explosion. These could have raised concerns about well control prior to the operation to replace mud with seawater in the well, in preparation for setting of the cement plug.

Through our investigation we hope to learn more about what happened and what was done in the hours before the explosion. Apart from looking at the causes of the explosion, we are also examining why the blowout preventer, the BOP as it is called, did not work as the ultimate fail- safe to seal the well and prevent an oil spill. Clearly the BOP remains a critical piece of equipment throughout all operations to ensure well control up until the time the well is sealed with a cement plug and is temporarily abandoned.

We will continue full speed ahead with our investigation, keeping all lines of inquiry open, until we find out what happened and why. At the same time, we are fully engaged in efforts to respond to these events. Our subsea efforts to stop the flow of oil and secure the well involve four parallel and concurrent strategies. Activating the BOP would be the preferred course since it would stop or diminish the flow at the source. Unfortunately, this has proved unsuccessful so far.

We are working on a containment system which will place large enclosures or containment chambers atop the leaks and conduct flow to a ship at the surface. There have been technical challenges, however. Engineers are now working to see if these challenges can be overcome.

We have begun to drill the first of two relief wells designed to intercept and permanently secure the original well. We began drilling the first relief well on May 2 and expect to begin drilling the second relief well later this week. This operation could take approximately 3 months.

A fourth effort, known as a "top kill," uses a tube to inject a mixture of multi-sized particles directly into the blowout preventers to cap the well. It's a proven industry technique and it's been used worldwide, but never in 5,000 feet of water.

On the open water a fleet of about 300 response vessels has been mobilized and about one million feet of boom is now in place, with more than a million more feet available. We ar also attacking the spill area with Coast Guard-approved biodegradable dispersants, which are being applied from planes and boats. We have also developed and tested a technique to apply dispersant at the leak point on the seabed. The EPA is carefully analyzing options for this technique's further use.

To protect the shoreline, we are implementing what the U.S. Coast Guard has called the most massive shoreline protection effort

ever mounted. 13 staging areas are in place and over 4,000 volunteers have already been trained.

We recognize that there are both environmental and economic impacts. BP will play all necessary cleanup costs and is committed to paying legitimate claims for other loss and damages caused by the spill.

Tragic and unforeseen as this accident was, we must not lose sight of why BP and other energy companies are operating in the offshore, including the Gulf of Mexico. The Gulf provides one in four barrels of oil produced in the United States, a resource our economy requires. BP and the entire energy industry are under no illusions about the challenge we face. We know that we will be judged by our response to this crisis. We intend to do everything in our power to bring this well under control, to mitigate the environmental impact of the spill, and to address economic claims in a responsible manner. No resource available to this company will be spared. I can assure you that we and the entire industry will learn from this terrible event and emerge from it stronger and safer.

Thank you for the opportunity to appear before you today. I'd be happy to answer your questions.

[The prepared statement of Mr. McKay follows:]

PREPARED STATEMENT OF LAMAR MCKAY[1], CHAIRMAN & PRESIDENT, BP AMERICA, INC.

Chairman Bingaman, Ranking Member Murkowski, members of the committee, I am Lamar McKay, Chairman and President of BP America.

We have all experienced a tragic series of events.

I want to be clear from the outset that we will not rest until the well is under control. As a responsible party under the Oil Pollution Act, we will carry out our responsibilities to mitigate the environmental and economic impacts of this incident.

We—and, indeed, the entire energy sector as a whole—are determined to understand what happened, why it happened, take the learnings from this incident, and make the changes necessary to make our company and our industry stronger and safer. We understand that the world is watching and that we and our industry colleagues will be judged by how we respond to these events.

Three weeks ago tonight, eleven people were lost in an explosion and fire aboard the Transocean Deepwater Horizon drilling rig, and seventeen others were injured. My deepest sympathies go out to the families and friends who have suffered such a terrible loss and to those in Gulf Coast communities whose lives and livelihoods are being impacted.

This was a horrendous accident. We are all devastated by this. It has profoundly touched our employees, their families, our partners, customers, those in the surrounding areas and those in government with whom we are working. There has been tremendous shock that such an accident could have happened, and great sorrow for the lives lost and the injuries sustained. The safety of our employees and our contractors and the safety of the environment are always our first priorities.

Even as we absorb the human dimensions of this tragedy, I want to underscore our intense determination to do everything humanly possible to minimize the environmental and economic impacts of the resulting oil spill on the Gulf Coast. From the outset, the global resources of BP have been engaged. Nothing is being spared. We are fully committed to the response.

And from the beginning, we have never been alone. On the night of the accident, the Coast Guard helped rescue the 115 survivors from the rig. The list of casualties could easily have been longer without the professionalism and dedication of the Coast Guard.

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[1]The data described throughout this testimony is accurate to the best of my knowledge as of 8am Monday, May 10, 2010, when this testimony was submitted. The information that we have continues to develop as our response to the incident continues.

Even before the Transocean Deepwater Horizon sank on the morning of April 22nd, a Unified Command structure was established, as provided by federal regulations. Currently led by the National Incident Commander, Admiral Thad Allen, the Unified Command provides a structure for BP's work with the Coast Guard, the Minerals Management Service and Transocean, among others.

Immediately following the explosion, in coordination with the Unified Command, BP began mobilizing oil spill response resources including skimmers, storage barges, tugs, aircraft, dispersant, and open-water and near shore boom.

Working together with federal and state governments under the umbrella of the Unified Command, BP's team of operational and technical experts is coordinating with many agencies, organizations and companies. These include the Departments of Energy, Interior, Homeland Security and Defense, National Oceanic and Atmospheric Administration (NOAA), US Fish & Wildlife Service (USFW), National Marine Fisheries Service (NMFS), EPA, OSHA, Gulf Coast state environmental and wildlife agencies, the Marine Spill Response Corporation (an oil spill response consortium), as well as numerous state, city, parish and county agencies.

As Coast Guard Rear Admiral Mary Landry noted on April 28: "BP is being appropriately forward leaning in bringing all the resources to bear to control this spill."

The industry as a whole has responded in full support. Among the resources that have been made available:

- Drilling and technical experts who are helping determine solutions to stopping the spill and mitigating its impact, including specialists in the areas of subsea wells, environmental science and emergency response;
- Technical advice on blowout preventers, dispersant application, well construction and containment options;
- Additional drilling rigs to serve as staging areas for equipment and responders, more remotely operated vehicles (ROVs) for deep underwater work, barges, support vessels and additional aircraft, as well as training and working space for the Unified Command.

The actions we're taking

As Chairman and President of BP America, I am part of an executive team that reports directly to our Global CEO, Tony Hayward. I am BP's lead representative in the US and am responsible for broad oversight and connectivity across all of our US-based businesses.

BP itself has committed tremendous global resources to the effort. Among many other tasks, they are helping to train and organize the more than 10,000 citizen volunteers who have come forward to offer their services.

Indeed, we have received a great many offers of help and assistance. The outpouring of support from government, industry, businesses and private citizens has truly been humbling and inspiring. It is remarkable to watch people come together in crisis.

Our efforts are focused on two overarching goals:

- Stopping the flow of oil; and
- Minimizing the impact on the environment.

Subsea efforts to secure the well

Our subsea efforts to stop the flow of oil and secure the well have involved four concurrent strategies:

- Working to activate the blow-out preventer (BOP) on the well using submersible ROVs. This would be the preferred course of action, since it would stop or diminish the flow at the source on the ocean floor. Unfortunately, this effort has so far not proved successful.
- Work continues on a subsea oil recovery plan using a containment system, placing large enclosures or containment chambers atop the leaks and conducting flow from the ocean floor to a ship at the surface through a pipe. As we anticipated, however, there have been technical challenges. This system has never been used before at 5,000 feet. Engineers are now working to see if these challenges can be overcome.
- We have begun to drill the first of two relief wells to permanently secure the well. These wells are designed to intercept the original MC252 #1 well. Once this is accomplished, a specialized heavy fluid will be injected into the well bore to stop the flow of oil and allow work to be carried out to permanently cap the existing well. On Sunday, May 2nd, we began drilling the first of these wells. A second drillship will mobilize to the area to begin the second relief well later this week. This relief well operation could take approximately three months.

- A fourth effort is known as a "top kill." It is a proven industry technique for capping wells and has been used worldwide, but never in 5000 feet of water. It uses a tube to inject a mixture of multi-sized particles directly into the blow-out preventer. The attempt to do this could take two or three weeks to accomplish.

We have succeeded in stopping the flow from one of the three existing leak points on the damaged well. While this may not affect the overall flow rate, it should reduce the complexity of the situation to be dealt with on the seabed.

Attacking the spill

We are attacking the spill on two fronts: in the open water and on the shoreline, through the activation of our pre-approved spill response plans.

- On the water On the open water, we have mobilized a fleet of 294 response vessels, including skimmers, storage barges, tugs, and other vessels. The Hoss barge, the world's largest skimming vessel, has been onsite since April 25. In addition, there are 15, 210-foot Marine Spill Response Corporation Oil Spill Response Vessels, which each have the capacity to collect, separate, and store 4000 barrels of oil. To date, over 97,000 barrels of oil and water mix have been recovered.

Also on the open water, we are attacking the spill area with Coast Guardapproved biodegradable dispersants, which are being applied from both planes and boats. Dispersants are soap-like products which help the oil to break up and disperse in the water, which, in turn, helps speed natural degradation.

Thirty-seven aircraft, both fixed-wing and helicopters, are now supporting the response effort. Over 444,000 gallons of dispersant have been applied on the surface and more than 180,000 gallons are available. Typically, about 2,100 gallons of dispersant is needed to treat 1,000 barrels of oil.

To ensure that adequate supplies of dispersant will be available for surface and subsea application, the manufacturer has stepped up the manufacturing process, and existing supplies are being sourced from all over the world. The cooperation of industry partners has been superb and that is deeply, deeply appreciated.

We have also developed and tested a technique to apply dispersant at the leak point on the seabed. As far as we are aware, this is the first documented attempt to apply dispersant at the source. Early evidence suggests that the test has been impactful, and we are working with NOAA, EPA, and other agencies to refine and improve the technique. EPA is carefully monitoring the impact of dispersant and is analyzing its potential impact on the environment and options for possible future use.

Actions to protect the shoreline

Near the shoreline, we are implementing with great urgency oil spill response contingency plans to protect sensitive areas. According to the Coast Guard, the result is the most massive shoreline protection effort ever mounted.

To ensure rapid implementation of state contingency plans, we announced last week that we would make available grants of $25 million to Louisiana, Mississippi, Alabama, and Florida.

To date, we have about one million feet of boom deployed in an effort to contain the spill and protect the coastal shoreline, and another 1.3 million feet are available. The Department of Defense is helping to airlift boom to wherever it is needed across the Gulf coast.

Incident Command Posts have been or are being established at:

- Alabama: Mobile;
- Florida: St. Petersburg;
- Louisiana: Robert and Houma.

Thirteen staging areas are also in place to help protect the shoreline:

- Alabama: Theodore, Orange Beach and Dauphin Island;
- Florida: Panama City and Pensacola.
- Louisiana: Grand Isle, Venice, Shell Beach, Slidell, Cocodrie;
- Mississippi: Pascagoula, Biloxi and Pass Christian;

Highly mobile, shallow draft skimmers are also staged along the coast ready to attack the oil where it approaches the shoreline.

Wildlife clean-up stations are being mobilized, and pre-impact baseline assessment and beach clean-up will be carried out where possible. Rapid response teams are ready to deploy to any affected areas to assess the type and quantity of oiling, so the most effective cleaning strategies can be applied.

A toll-free number has been established to report oiled or injured wildlife, and the public is being urged not to attempt to help injured or oiled animals, but to report any sightings via the toll-free number.

Contingency plans for waste management to prevent secondary contamination are also being implemented.

Over 10,000 personnel are now engaged in the response, including shoreline defense and community outreach.

Additional resources, both people and equipment, continue to arrive for staging throughout the Gulf states in preparation for deployment should they be needed.

Communication, community outreach, & engaging volunteers

We are also making every effort to keep the public and government officials informed of what is happening.

BP executives have regularly briefed the President's Cabinet and National Security Council team, members of Congress, the governors and attorneys general of the Gulf Coast states, and many local officials.

On the ground, in the states and local communities, we are working with numerous organizations such as fishing associations, local businesses, parks, wildlife and environmental organizations, educational institutions, medical and emergency establishments, local media, and the general public.

BP is leading volunteer efforts in preparation for shoreline clean-up. We have and will continue to help recruit and deploy volunteers, many of whom are being compensated for their efforts, to affected areas. More than 14,000 calls from volunteers offering their help have been received and over 4,000 volunteers have been trained thus far.

Volunteer activities at this time are focused on clearing the beaches of existing debris and placing protective boom along the shoreline. Our "adopt a boom" program is proving very successful in engaging local fishermen in the response. More than 600 fishing vessels are signed up to deploy boom and assist with the response.

There are five BP community-outreach sites engaging, training, and preparing volunteers:

- Alabama: Mobile;
- Florida: Pensacola;
- Louisiana: Venice
- Mississippi: Pascagoula and Biloxi.

A phone line has been established for potential volunteers to register their interest in assisting the response effort.

Coping with economic impacts

We recognize that beyond the environmental impacts there are also economic impacts on the people of the Gulf Coast states. BP will pay all necessary clean up costs and is committed to paying legitimate claims for other loss and damages caused by the spill.

We have put in place a BP Claims Process. All claimants are being directed to a toll-free number and a website and will be assigned to experienced adjusters who will assist them in making their claim.

As an alternative, claimants can visit one of BP's Community Outreach Centers or claims centers.

The process is being expedited to make immediate payments to those who have experienced a loss of income, while the overall claim is more fully evaluated. As of today, we have paid out approximately $3.5 million.

Commitment to investigate what happened

BP is one of the lease holders and the operator of this exploration well. As operator, BP hired Transocean to conduct the well drilling operations. Transocean owned the Deepwater Horizon drilling rig and its equipment, including the blowout preventer.

The questions we all want answered are: What happened on the seabed and aboard the Deepwater Horizon and why did these things happen?

A full answer to those questions will have to await the outcome of a joint investigation by the Departments of Homeland Security and Interior, investigation by Congress, and an independent internal investigation that BP is conducting.

BP's investigation into the cause of this accident is being led by a senior BP executive from outside the affected business. The team has more than 40 people. The investigation is ongoing and has not yet reached conclusions about incident cause. We intend to share the results of our findings so that our industry and our regulators can benefit from the lessons learned.

Investigations take time, of course, in order to ensure that the root cause of the failure is fully understood. But let me give you an idea of the questions that BP and the entire energy industry, are asking:

- What caused the explosion and fire?
- And why did the blowout preventer fail?

Only seven of the 126 onboard the Deepwater Horizon were BP employees, so we have only some of the story, but we are working to piece together what happened from meticulous review of the records of rig operations that we have as well as information from those witnesses to whom we have access.

We are looking at our own actions and those of our contractors, as is the Marine Board. We are looking at why the blowout preventer did not work because that was to be the fail-safe in case of an accident. The blowout preventer is a 450-ton piece of equipment that sits on top of the wellhead during drilling operations. It contains valves that can be closed remotely if pressure causes fluids such as oil or natural gas to enter the well and threaten the drilling rig. By closing this valve, the drilling crew can regain control of the well.

Blowout preventers are used on every oil and gas well drilled in the world today. They are carefully and deliberately designed with multiple levels of redundancy and are regularly tested. If they don't pass the test, they are not used.

The systems are intended to fail-closed and be fail-safe; sadly and for reasons we do not yet understand, in this case, they were not. Transocean's blowout preventer failed to operate.

All of us urgently want to understand how this vital piece of equipment and its built-in redundancy systems failed and what measures are required to prevent this from ever happening again. In this endeavor, you will have the full support of BP as well as, I am sure, the rest of the industry.

Energy policy remains critical

Tragic and unforeseen as this accident was, we must not lose sight of why BP and other energy companies are operating in the offshore, including the Gulf of Mexico. The Gulf is one of the world's great energy producing basins, providing one in four barrels of oil produced in the United States. That is a resource that powers America and the world every day, one our economy requires.

Conclusion

But before we can think about the future, we have to deal with the immediate challenge of today.

BP is under no illusions about the seriousness of the situation we face. In the last three weeks, the eyes of the world have been upon us. President Obama and members of his Cabinet have visited the Gulf region and made clear their expectations of BP and our industry. So have members of Congress, as well as the general public.

We intend to do everything within our power to bring this well under control, to mitigate the environmental impact of the spill and to address economic claims in a responsible manner.

Any organization can show the world its best side when things are going well. It is in adversity that we truly see what they are made of.

We know that we will be judged by our response to this crisis. No resource available to this company will be spared. I can assure you that we and the entire industry will learn from this terrible event, and emerge from it stronger, smarter and safer.

The CHAIRMAN. Thank you.

Mr. Newman, go right ahead.

STATEMENT OF STEVEN NEWMAN, CHIEF EXECUTIVE OFFICER, TRANSOCEAN, LTD

Mr. NEWMAN. Chairman Bingaman, Ranking Member Murkowski, and other members of the committee: I want to thank you for the opportunity to speak with you today. My name is Steven Newman and I am the chief executive officer of Transocean Limited. Transocean is the leading offshore drilling contractor, with more than 18,000 employees worldwide. I am a petroleum engineer by training and I have spent years working with and on drilling rigs. I have worked at Transocean for more than 15 years and I am

incredibly proud of the contributions our company has made to the energy industry during that time.

Today, however, I sit before you with a heavy heart. The last few weeks have been a time of great sadness and reflection for our company and for me personally. Nothing is more important to me and to Transocean than the safety of our crew members, and our hearts ache for the widows, parents, and children of the 11 crew members, including 9 Transocean employees, who died in the Deepwater Horizon explosion. These were exceptional men and we are committed to doing everything we can to support their families as they struggle to cope with this tragedy.

Over the last few weeks, we have also seen great acts of courage and kindness in our colleagues and in our communities. That courage and kindness was embodied by the 115 crew members who were rescued from the Deepwater Horizon and were as worried about the fate of their colleagues as they were about their own safety. It was embodied by the brave men and women of the U.S. Coast Guard who provided onsite response and search and rescue efforts, and by the medical professionals and families and friends who received the injured crew members when they arrived on shore. It is embodied by our friends and colleagues in Transocean and across the industry who have rallied to help the families of those who were lost.

This has been a very emotional period for all of us at Transocean. It has also been a period of intense activity and effort. Immediately after the explosion, Transocean began working with BP and the unified command in the effort to stop the flow of hydrocarbons from the well. Our finest engineers and operational personnel have been working with BP to identify and pursue options for stopping the flow as soon as possible.

Our drilling rig, the Development Driller III, is involved in drilling the relief well, and our drill ship, the Discoverer Enterprise, is standing by on location to carry out unique oil recovery operations in the Gulf.

We will continue to support BP and the unified command in all of these efforts. At the same time, we have been working hard to get to the bottom of the question that this committee and the American public want and deserve an answer to: What happened on the night of April 20, and how do we assure the American public that it will not happen again?

Transocean has assembled an independent investigative team to determine the cause of these tragic events, a team that includes Transocean and industry experts. They will be interviewing people who have potentially helpful information and studying the operations and the equipment involved. Because the drilling process is a collaborative effort among many different companies, contractors, and subcontractors, the process of understanding what led to the April 20 explosion and how to prevent such an accident in the future must also be collaborative. Our team is working side by side with others, including BP and governmental agencies, and these investigative efforts will continue until we have satisfactory answers.

While it is still too early to know exactly what happened on April 20, we do have some clues about the cause of the disaster. The most significant clue is that these events occurred after the well

construction process was essentially complete. Drilling had been finished on April 17 and the well had been sealed with casing and cement. For that reason, the one thing we do know is that on the evening of April 20 there was a sudden catastrophic failure of the cement, the casing, or both. Without a failure of one of those elements, the explosion could not have occurred.

It is also clear that the drill crew had very little, if any, time to react. The initial indications of trouble and the subsequent explosions were almost instantaneous. What caused that sudden violent failure? Was the well properly designed? Were there problems with the casing or the seal assembly? Was the casing properly cemented and the well effectively sealed? Were all appropriate tests run on the cement and the casing? Were the blowout preventers damaged by the surge that emanated from the well? Did the surge blow debris into the BOPs which prevented them from squeezing, crushing, or shearing the pipe? These are some of the critical questions that need to be answered in the coming weeks and months.

Until we know exactly what happened on April 20, we cannot determine how best to prevent such tragedies in the future. But regardless of what the investigations uncover, ours is an industry that must put safety first. We must do so for the sake of our employees, for the sake of their families, and for the sake of people all over the world who use and enjoy and rely on our oceans and waterways for their sustenance.

Thank you again for the opportunity to speak here today, and I'm happy to answer any questions.

[The prepared statement of Mr. Newman follows:]

PREPARED STATEMENT OF STEVEN NEWMAN, CHIEF EXECUTIVE OFFICER, TRANSOCEAN, LTD

Chairman Bingaman, Ranking Member Murkowski, and other members of the Committee, I want to thank you for the opportunity to speak with you today.

My name is Steven Newman, and I am the Chief Executive Officer of Transocean, Ltd. Transocean is a leading offshore drilling contractor, with more than 18,000 employees worldwide. I am a petroleum engineer by training, I have spent considerable time working on drilling rigs and I have worked at Transocean for more than 15 years. I am proud of the Company's historical contributions to the energy industry during that time. Today, however, I sit before you with a heavy heart.

The last few weeks have been a time of great sadness and reflection for our Company—and for me personally. Nothing is more important to me and to Transocean than the safety of our employees and crew members, and our hearts ache for the widows, parents and children of the 11 crew members—including nine Transocean employees—who died in the Deepwater Horizon explosion. These were exceptional men, and we are committed to doing everything we can to support their families as they struggle to cope with this tragedy.

We have also seen great courage and kindness since April 20 that has reaffirmed our faith in the human spirit. That spirit is embodied by the 115 crew members who were rescued from the Deepwater Horizon and were as worried about the fate of their colleagues as they were about themselves. It is embodied by the emergency workers and friends and family who were waiting for the injured crew members when they arrived ashore. And it is embodied by the friends and colleagues who have rallied to help the families of those who were lost at sea.

While this has been a very emotional period for all of us at Transocean, it has also been a period of intense activity and effort.

Immediately after the explosion, Transocean began working with BP (in BP's role as operator/leaseholder of this well) and the "Unified Command" (which includes officials from the U.S. Coast Guard, the Department of the Interior's Minerals Management Service (MMS), and the National Oceanic and Atmospheric Administration (NOAA)) in the effort to stop the flow of hydrocarbons. Our finest operational personnel and engineers have been working with BP to identify and pursue options for

stopping the flow as soon as possible. Our drilling rig, the Development Driller III, is involved in drilling the relief well at the site, and our drillship, the Discoverer Enterprise, is involved in the unique oil recovery operations in the Gulf. We will continue to support BP and the Unified Command in all of these efforts.

We have also been working hard to get to the bottom of the question to which the Members of this Committee—and the American people—want and deserve an answer: What happened the night of April 20th, and how do we assure the American public that it will not happen again?

Transocean has assembled an investigative team to determine what led to these tragic events—a team that includes dedicated Transocean and industry experts. They will be interviewing people who have potentially helpful information and studying the operations and the equipment involved. Our team is working side by side with others, including BP and governmental agencies, and these investigative efforts will continue until we have satisfactory answers.

As is often the case after a tragedy of this kind, there has been a lot of speculation about the root cause. I believe it is premature to reach definitive conclusions about what caused the April 20th explosion, but on behalf of our Transocean employees, I feel compelled to respond to some of this speculation. In particular, as we seek to uncover what happened, it is important to understand the well construction process—and the roles of the various parties involved in an operation like the one that was taking place in the Gulf of Mexico.

All offshore oil and gas production projects begin and end with the Operator. When the Operator (in this case, BP) leases a parcel of land on the outer continental shelf (OCS) from the U.S. government, it must prepare and submit detailed plans specifying where and how a well is to be drilled, cased, cemented and completed based on its interpretation of propriety data, including geologic data from seismic surveys. Once those plans are approved and permits are issued and work begins, the Operator—or leaseholder—serves as the general contractor that manages all of the work that is performed on its lease. In this capacity, the Operator hires various contractors to perform specific functions in the construction of the well.

In addition, the Operator brings in various sub-contractors to perform specific roles. For example:

- The Operator selects a driller (in this case, Transocean), which provides a vessel (called a "rig") from which drilling operations are performed. As the name suggests, the driller is also responsible for rotating the long string of drill pipe with a drill bit on the end that drills a hole deeper and deeper into the ocean floor. The Operator's well plan dictates the manner in which the drilling is to occur, including the location, the path, the depth, the process and the testing. The drill bits, which are selected by the Operator, are supplied by another sub-contractor.
- A key element of the drilling process is drilling mud, a heavy fluid manufactured to the Operator's specifications. That mud is pumped into the well hole and circulated in order to hold back the pressure of the reservoir and prevent oil, gas or water in that reservoir from moving to the surface through the well. The mud is monitored by another sub-contractor (the mud engineer) (in this instance, M-I Swaco) to detect any problems.
- As the drilling progresses, huge pipes are inserted into the well to maintain the integrity of the hole that has been drilled and to serve as the primary barrier against fluids entering the well. This job is coordinated by the casing sub-contractor selected by the Operator (in this case, Weatherford). In its well plan, the Operator specifies the diameter and strength of each casing segment, purchases the casing, and dictates how it will be cemented in place. Well casing is inserted in a telescope-like manner, with each successive section inside the previous one. Each casing segment also includes a seal assembly to ensure pressure containment.
- After drilling is concluded, yet another area of expertise comes into play. The cementing sub-contractor is responsible for encasing the well in cement, for putting a temporary cement plug in the top of the well, and for ensuring the integrity of the cement. The purpose of this work is to seal the well to make sure that the contents of the reservoir (i.e., oil and natural gas) are not driven by the reservoir pressure into the well. (Once drilling is complete and the well is cased and cemented, it is no longer necessary to circulate drilling mud through the well; at that point, the casing and cement serve to control the formation pressure.) The cementing process is dictated by the Operator's well plan, and the testing of the cement on the Deepwater Horizon was performed by the cement contractor (Haliburton in this instance) as specified and directed by BP.

Against that background, let me turn to the April 20 Deepwater Horizon explosion and its possible causes. What is most unusual about the explosion in this case is

that it occurred after the well construction process was essentially finished. Drilling had been completed on April 17, and the well had been sealed with cement (to be reopened by the Operator at a later date if the Operator chose to put the well into production). At this point, drilling mud was no longer being used as a means of reservoir pressure containment; the cement and the casing were the barriers controlling pressure from the reservoir. Indeed, at the time of the explosion, the rig crew, at the direction of the Operator, was in the process of displacing drilling mud and replacing it with sea water.

For that reason, the one thing we know with certainty is that on the evening of April 20, there was a sudden, catastrophic failure of the cement, the casing, or both. Therein lies the root cause of this occurrence; without a disastrous failure of one of those elements, the explosion could not have occurred. It is also clear that the drill crew had very little (if any) time to react. The explosions were almost instantaneous.

What caused that catastrophic, sudden and violent failure? Was the well properly designed? Was the well properly cemented? Were there problems with the well casing? Were all appropriate tests run on the cement and casings? These are some of the critical questions that need to be answered in the coming weeks and months.

Over the past several days, some have suggested that the blowout preventers (or BOPs) used on this project were the cause of the accident. That simply makes no sense. A BOP is a large piece of equipment positioned on top of a wellhead to provide pressure control. As explained in more detail in the attachment to my testimony, BOPs are designed to quickly shut off the flow of oil or natural gas by squeezing, crushing or shearing the pipe in the event of a "kick" or "blowout".a sudden, unexpected release of pressure from within the well that can occur during drilling.

The attention now being given to the BOPs in this case is somewhat ironic because at the time of the explosion, the drilling process was complete. The well had been sealed with casing and cement, and within a few days, the BOPs would have been removed. At this point, the well barriers—the cementing and the casing—were responsible for controlling any pressure from the reservoir.

To be sure, BOPs are an important aspect of well control. During drilling, BOPs provide a secondary means of controlling pressure if the primary mechanisms (e.g., drilling mud) prove inadequate. BOPs are robust, sophisticated pieces of equipment that can be activated by various direct and remote methods. Since the BOPs were still in place in this circumstance, they may have been activated during this event and may have restricted the flow to some extent. At this point, we cannot be certain. But we have no reason to believe that they were not operational—they were jointly tested by BP and Transocean personnel as specified on April 10 and 17 and found to be functional. We also do not know whether the BOPs were damaged by the surge that emanated from the well beneath or whether the surge may have blown debris (e.g., cement, casing) into the BOPs, thereby preventing them from squeezing, crushing or shearing the pipe.

For these reasons, I believe it is inappropriate to focus any causation discussions exclusively on the BOPs. Certainly, we need to understand what happened to the BOPs and whether changes should be made to improve the effectiveness of these devices in the unusual circumstances of an accident like the one on April 20. But the BOPs were clearly not the root cause of the explosion. Our most important task is to understand why a cased and cemented wellbore suddenly and catastrophically failed. As a starting point, our investigative team has looked at numerous possible causes, contributing factors, or trigger events, in an effort to ensure that nothing is overlooked in this investigation.

As I explained earlier, the well construction process is a collaborative effort. For the same reason, the process of understanding what led to the April 20 explosion and how to prevent such an accident in the future must also be collaborative. Ours is an industry that must put safety first. And I can assure you that Transocean has never—and will never—compromise on safety. In 2009, Transocean recorded its best ever Total Recordable Incident Rate (TRIR). And the federal agency charged with enforcing safety on deepwater oil rigs, MMS, which—as you know—is a unit of the U.S. Department of the Interior, awarded one of its top prizes for safety to Transocean in 2009. The MMS SAFE Award recognizes "exemplary performance by Outer Continental Shelf (OCS) oil and gas operators and contractors." In the words of MMS, this award "highlights to the public that companies can conduct offshore oil and gas activities safely and in a pollution-free manner, even though such activities are complex and carry a significant element of risk." In awarding this prize to Transocean, MMS credited the Company's "outstanding drilling operations" and a "perfect performance period."

Despite a strong safety record, Transocean has never been complacent about safety. We believe that any incident is one too many. Last year, our Company experi-

enced an employee accident record that I found unacceptable. As a result, I recommended to our Board of Directors that they withhold bonuses for all executives in order to make clear that achieving stronger safety performance was a basic expectation—and fundamental to our success. That recommendation was accepted, and our Company paid no executive bonuses last year, in order to send a loud message that we evaluate our success in large part based on the safety of our operations.

Until we fully understand what happened on April 20, we cannot determine with certainty how best to prevent such tragedies in the future. But I am committed—for the sake of the men who lost their lives on April 20, for the sake of their loved ones, for the sake of all the hard-working people who work on Transocean rigs around the world, and for the sake of people in each of the affected states and worldwide who rely on our oceans and waterways for their livelihood—to work with others in the industry, with Congress and with all involved federal agencies to make sure that such an incident never happens again.

The CHAIRMAN. Thank you very much.

Mr. PROBERT.

STATEMENT OF TIM PROBERT, PRESIDENT, GLOBAL BUSINESS LINES, AND CHIEF HEALTH, SAFETY AND ENVIRONMENTAL OFFICER, HALLIBURTON

Mr. PROBERT. Chairman Bingaman, Ranking Member Murkowski, and members of the committee: Thank you for inviting Halliburton to testify. We'll continue to work with you and your staff to collect the factual data that will enable an understanding of what took place and what we can collectively do to ensure that domestic oil and gas production is undertaken in the safest, most environmentally responsible manner possible.

The catastrophic blowout and the spread of oil in the Gulf of Mexico are tragic events for everyone. On behalf of the entire Halliburton family, we extend our heartfelt sympathy to the families, the friends, and the colleagues of the 11 people who lost their lives and those workers who were injured in the tragedy.

As we hope you can appreciate, neither Halliburton nor any other party can make a judgment or offer any credible theories about what happened until, at a minimum, the well owner has interviewed everyone on the Deepwater Horizon to recreate the daily log of activities on April 20. In the absence of that information, we should not be making a rush to judgment. However, two things can be said with some certainty: the casing shoe was cemented some 20 hours prior to the tragic incident; and had the BOP functioned as expected, this catastrophe may well not have occurred.

For more than 50 years Halliburton has provided—excuse me. For more than 90 years, Halliburton has provided a variety of production and—a variety of products and services to well owners throughout the life cycle of their reservoirs in the oil and gas exploration and production industry. With respect to the Mississippi Canyon 252 well, Halliburton was contracted by the well owner to perform a variety of services. These included cementing, mud logging, directional drilling, and real-time data acquisition and data delivery services for key personnel on board the rig and on shore.

Since the blowout, Halliburton's been working at the direction of the well owner to assist in the effort to bring the well under control. This includes intervention support to help secure the damaged well and assistance in drilling one or more relief wells.

At the outset I need to emphasize that Halliburton as a service provider to the well owner is contractually bound to comply with the well owner's instructions on all matters relating to the performance of all work-related activities. The construction of a deepwater well is a complex operation involving the performance of many tasks by many parties. While the well owner's representative has ultimate authority for planning and approving activities on the rig, the drilling contractor performs and directs much of the daily activity.

Now, cement can be used to isolate formation fluids, to prevent movement of these fluids between formations, and to bond and support the steel casing. There are many external factors which affect the design and the execution of the cement job. These include the variability of the hole geometry, the relative location of hydrocarbon zones, and the hydrocarbon content of associated drilling fluids. The centralizer placement on the production casing, the drilling fluid, conditioning program prior to cementing, and the cement slurry and placement design used for the well were implemented as directed by the well owner and as shown on the diagram which is attached to my prepared remarks. By design, there was no continuous cement column installed throughout the entire wellbore.

Approximately 20 hours prior to the catastrophic loss of well control, Halliburton had completed the cementing of the ninth and final production casing string in accordance with the well program. Following the placement of the cement slurry, the casing seal assembly was set in the casing hanger. In accordance with accepted industry practice and as required by MMS and as directed by the well owner, a positive pressure test was then conducted to demonstrate the integrity of the production casing string. The results of the positive tests were reviewed by the well owner and the decision was made to proceed with the well program.

The next step included the performance of a negative pressure test, which tests the integrity of the casing seal assembly and is conducted by the drilling contractor at the direction of the well owner and in accordance with MMS requirements. We understand that Halliburton was instructed to record drill pipe pressure during this test. After being advised by the drilling contractor that the negative test had been completed, Halliburton's cementing personnel were placed on standby.

We understand that the drilling contractor replaced the dense drilling fluid in the riser with lighter seawater prior to the planned placement of the final cement plug, the drilling fluid being transferred directly to a work boat standing by alongside.

The final cement plug would have been installed inside the production string and enabled the planned temporary abandonment of the well. But prior to that point in the well construction plan that Halliburton personnel would have set the final cement plug, the catastrophic incident occurred. As a result, the final cement plug was not set.

Halliburton's confident that the cementing work on the Mississippi Canyon 252 well was completed in accordance with the requirements of the well owner's well construction plan.

Thank you for the opportunity to share our views and I also look forward to answering your questions.

[The prepared statement of Mr. Probert follows:]

PREPARED STATEMENT OF TIM PROBERT, PRESIDENT, GLOBAL BUSINESS LINES AND CHIEF HEALTH, SAFETY AND ENVIRONMENTAL OFFICER, HALLIBURTON

Chairman Bingaman, Ranking Member Murkowski, and Members of the Committee:

Thank you for the opportunity to share my company's perspective as you review issues related to deepwater exploration for petroleum and the accident in the U.S. Gulf of Mexico involving the offshore oil rig Deepwater Horizon. Halliburton looks forward to continuing to work with you, your colleagues, and your staff to understand what happened and what we collectively can do in the future to ensure that oil and gas production in the United States is undertaken in the safest, most environmentally responsible manner possible.

At the outset, I want to assure you and your colleagues that Halliburton has and will continue to fully support, and cooperate with, the ongoing investigations into how and why this tragic event happened. We have already made our senior personnel available to brief Members and staff and we have produced thousands of pages of documents in support of current investigations. Halliburton had four employees stationed on the rig at the time of the accident. They returned to shore safely and each has and will continue to be made available to assist the investigative efforts. We are mindful, however, that Halliburton cannot make any judgment or offer any theories about what happened until at a minimum the well owner has completed interviewing everyone on board to re-create the daily log of activities, including those that occurred after we successfully completed the cementing operations of the production casing string.

The April 20th catastrophic blowout, explosions and fire of the Deepwater Horizon rig and the spread of oil in the Gulf of Mexico are tragic events for everyone connected to the situation. The deaths and injuries to personnel working in our industry cannot be forgotten. Halliburton extends its heartfelt sympathy to the families, friends and colleagues of the 11 people who lost their lives and those workers injured in the tragedy.

Background on Halliburton

As a global leader in oilfield services, Halliburton has been providing a variety of services to the oil and natural gas exploration and production industry for more than 90 years. Halliburton's areas of activity are primarily in the upstream oil and gas industry. They include providing products and services for clients throughout the life cycle of the hydrocarbon reservoir—from locating hydrocarbons and managing geological data, to directional drilling and formation evaluation, well construction and completion, to optimizing production through the life of the field. The company is also engaged in developing and providing technologies for carbon sequestration and we are a service provider to the geothermal energy industry.

Halliburton is the largest cementing service and material provider in the oil and gas industry. Halliburton provides zonal isolation and engineering solutions for the life of a well. The company safely conducts thousands of successful well service operations each year and is committed to continuously improve its performance. The company views safety and environmental performance as critical to its success and these are core elements of our corporate culture. Halliburton has much to offer to help our nation meet its energy security needs.

With respect to the Mississippi Canyon 252 well, Halliburton was contracted by the well owner to perform a variety of services on the rig. These included cementing, mud logging, directional drilling, and measurement-while-drilling services. In addition, Halliburton provided selected real-time drilling and rig data acquisition and transmission services to key personnel both on board the Deepwater Horizon and at various onshore locations.

Halliburton's Participation in the Remediation Efforts on Mississippi Canyon 252 Well

Since the blowout, Halliburton has been working at the direction of the well owner to provide assistance in the effort to bring the well under control. This includes intervention support to help secure the damaged well and planning and services associated with drilling relief well operations.

Halliburton has deployed survey management experts to assist in planning the path of the relief wells and has mobilized its technology group to work in collabora-

tion with another industry partner to combine our technologies, in an effort to develop an integrated ranging system to expedite the intersection of the original well.

Operations Preceding the Catastrophic Loss of Well Control on Mississippi Canyon 252 Well

I need to start this section with an important statement of disclosure. Halliburton, as a service provider to the well owner, is contractually bound to comply with the well owner's instructions on all matters relating to the performance of all work-related activities. It is also important to understand the roles and responsibilities of the various parties involved in the construction of a well. The construction of a deep water well is a complex operation involving the performance of numerous tasks by multiple parties led by the well owner's representative, who has the ultimate authority for decisions on how and when various activities are conducted.

Attached* to this testimony is an illustration showing the approximate depths and positions of the casing and liner strings set in this well. In addition, the approximate position of the various cement placements is illustrated, which is consistent with the well design. It should be noted that cement is used at specific designated spots and is not designed to be a complete barrier through the entire wellbore.

Cement can be used to isolate formation fluids, to prevent movement of these fluids between formations and to bond and support the casing. A mixture of cement, water and chemicals is combined in a slurry that can be pumped into position around the outside of steel liners and casing. There are many external factors that impact the design and execution of a cement job. These include the variability in the hole geometry, relative location of hydrocarbon zones, hydrocarbon content and the prior condition of the wellbore and associated fluids as determined by the drilling fluid provider. Casing strings are typically run with devices to centralize the casing concentrically in the wellbore and prevent incomplete displacement of drilling fluid, or "channeling".

While every effort is made to complete a cement job with the highest levels of mechanical and hydraulic integrity, the above mentioned well conditions may prevent this. Confirming cement integrity after placement would require the well owner to direct the wireline provider to obtain cement evaluation logs. Based on the findings of these logs, the well owner can elect to perform remedial action by perforating the casing and "squeezing" cement into remaining voids to improve the integrity of the original cement.

The centralizer placement on the production casing, the drilling fluid conditioning program prior to cementing and the cement slurry and placement design used for this well were implemented as directed by the well owner. However, as shown in the attached diagram, by design there is no continuous cement column throughout the entire wellbore.

Approximately 20 hours prior to the catastrophic loss of well control, Halliburton had completed the cementing of the ninth and final production casing string in accordance with the well program.

Following the placement of 51 barrels of cement slurry, the casing seal assembly was set in the casing hanger. In accordance with accepted industry practice, as required by MMS and as directed by the well owner, a positive pressure test was then conducted to demonstrate the integrity of the production casing string. The results of the positive test were reviewed by the well owner and the decision was made to proceed with the well program.

The next step included the performance of a "negative" pressure test, which tests the integrity of the casing seal assembly and is conducted by the drilling contractor at the direction of the well owner and in accordance with MMS requirements. We understand that Halliburton was instructed to record drill pipe pressure during this test until Halliburton's cementing personnel were advised by the drilling contractor that the negative pressure test had been completed, and were placed on standby.

We understand that the drilling contractor then proceeded to displace the riser with seawater prior to the planned placement of the final cement plug, which would have been installed inside the production string and enabled the planned temporary abandonment of the well. Prior to the point in the well construction plan that the Halliburton personnel would have set the final cement plug, the catastrophic incident occurred. As a result, the final cement plug was never set.

Halliburton is confident that the cementing work on the Mississippi Canyon 252 well was completed in accordance with the requirements of the well owner's well construction plan.

Thank you for the opportunity to share our views.

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*Illustrations have been retained in committee files.

The CHAIRMAN. Thank you very much.

I just note for all Senators we're in the middle of a vote. I guess we're halfway through a vote. So we will plan to keep the hearing going. If Senators want to go ahead and vote and then return to ask their questions, they're encouraged to do that.

Let me start with some questions. Mr. Probert, you say in one of your last statements there that you understand the drilling contractor proceeded to displace the riser with seawater prior to the planned placement of the final cement plug. Is that standard operating procedure?

Mr. PROBERT. That is an operating procedure which is commonly used, yes.

The CHAIRMAN. There's no safety problem in doing that as a normal matter?

Mr. PROBERT. What that effectively does is it reduces the density of fluid in the riser, and as a result of that reduces the hydrostatic head which is bearing down on the wellhead. Other than that, that's the primary issue associated with that process.

The CHAIRMAN. But I would have thought that you would want as much pressure in the well, downward pressure, as possible until you had that plug in place. Am I wrong about that?

Mr. PROBERT. No, there's no question that the hydrostatic head would have been reduced during the course of that process. But it is a process which is undertaken prior to the setting of the final cement plug.

The CHAIRMAN. Let me ask just a very general question about data. I think you make reference to the need to recreate the daily log of activities that occurred on the rig. I think that was your comment, Mr. Probert. Is all of the data that was available on the rig prior to the explosion, is all of that information—has it been preserved and is it information that is being made available to the government investigators at this time, Mr. McKay?

Mr. MCKAY. As I understand it, there's quite a bit of data that was located on a remote server from the rig onshore. That data has been preserved. All data, everything that we can get our hands on and turn over, is being turned over, yes.

The CHAIRMAN. All right.

Mr. Newman, is that your view as well?

Mr. NEWMAN. There would be some amount of written data that would have been on the rig at the time of the event, and obviously that data is no longer available to us. But whatever was transferred electronically or sent in to our offices prior to the event is being preserved and provided to the government.

The CHAIRMAN. Did you have a remote server that was capturing this data away from the rig, just as Mr. McKay indicated BP did?

Mr. NEWMAN. The only distinction I would draw, Senator, is that BP's data would have been real-time leading up right to the sequence of events that transpired. Our data, there is some delay in the replication of our data, so our operational data, our sequence of events, ends at 3 o'clock in the afternoon on the 20th.

The CHAIRMAN. Mr. Probert, do you have that, all that data preserved?

Mr. PROBERT. Yes, all that data has been preserved and it has been made available as requested.

The CHAIRMAN. One of the issues that is going to be focused on probably when we have Secretary Salazar next week is whether there were efforts made to improve or to strengthen the safety requirements for this type of drilling operation that MMS made that were not successful, that industry resisted. Are there any aspects of this that you're aware of, Mr. McKay, where the MMS was urging additional safety precautions to be taken that the industry was not in compliance with?

Mr. MCKAY. No, I'm not aware of any. Some people have referenced a letter that went in to comment to the MMS about safety regulations where we were providing comments as to the nature and prescriptive nature of the regulation.

We suggested that performance standards should be set, companies should be made to adhere to those performance standards. So we made recommendations on how we thought regulations could be made better. But we have not submitted anything that would try to slow down or limit safety regulations.

The CHAIRMAN. Mr. Newman, do you have any knowledge of circumstances where your company or industry more generally has been resistant to efforts by MMS to impose stricter safety requirements?

Mr. NEWMAN. Senator, I would draw a distinction between discussions with the regulatory authorities and regulations. We participate in those discussions when the area or topic being discussed would have specific application to our business or where we would have expertise that we could bring to bear on those discussions.

When the regulations are passed, we adopt the regulations and we stand in full compliance with those.

The CHAIRMAN. Mr. Probert, did you have a comment on this?

Mr. PROBERT. No, just to say that we also work closely with the API and the MMS in developing standards for certain processes which are undertaken.

The CHAIRMAN. Thank you all.

Senator MURKOWSKI.

Senator MURKOWSKI. Thank you, Mr. Chairman.

I might just note that in reading through the testimony of each of the three of you—and this was alluded to by Senator Menendez—that he suggests that there's this transference of liability or finger-pointing. I have stated that there's going to be plenty of time to try to figure out who is to blame, who is at fault. That will go on, and I think we appreciate and recognize that.

You have suggested, Mr. McKay, that as the owner and operator of the Deepwater Horizon rig that Transocean—you're not suggesting that that liability is there, but you're transferring it. Mr. Newman is suggesting that it's not the BOP at all. You're very clear about that in your testimony. You say that's not the root cause, and that in fact we should be looking to some of the things that could cause the catastrophic failure, the casing, the cementing. Then Mr. Probert takes it all the way back around to the well owner here, at BP.

I would suggest to all three of you that we are all in this together, because this incident is affecting, will have impact on the development of our energy policy for this country. If we can't continue to operate and convince people that we can perform safely,

then not only will BP not be out there, but the Transoceans won't be there to drill the rigs and the Halliburtons won't be there to provide for the cementing. So we figure out how we make this happen together.

Mr. McKay, I want to ask you some questions about what's happening right now. We've been watching with fascination this containment dome and whether it's going to work. It's not encouraging and it's very disappointing to so many who were hoping it would be able to contain some of that. We're now talking and watching the ongoing effort with drilling the two relief wells, but recognize that that's 2 months off.

We're now discussing the top-kill, but that too is a couple weeks off. In the mean time, we've got volumes that are—we're not entirely certain exactly how much is coming up on a daily basis.

The issue with the dispersants. I would like to understand from you whether or not we have the supply of dispersants that we need, whether we are getting them out there, not only at the surface but at the seabed, in a manner that is aggressive. When the Exxon Valdez incident happened, we delayed with some critical methods that we could have perhaps contained, whether it was burning or dispersants. I'd like to think that there has not been any delay. The dispersants at the seabed have been held off until some further testing came about. Can you give me some assurance that we're moving aggressively to try to break up as much as we possibly can?

Mr. MCKAY. Yes. To answer pretty quickly, we've got two levels of dispersants that we're utilizing. One is at the surface through multiple sorties flown every day that the weather permits, and that's been very successful and impactful, I think, so far. We have also been testing—

Senator MURKOWSKI. Do you have enough of the dispersant?

Mr. MCKAY. Yes. What we've done is we've worked the supply chain such that NALCO, our chemical supplier, can supply 75,000 gallons a day sustainably. That amount of dispersant should cover the amount we're using at the surface on the water, as well as what we hope to do, is more subsea injection.

We've just done a 2-hour. The third test on subsea injection for dispersant was yesterday. It ended at 4:40 a.m. this morning, I believe. EPA is making absolutely sure that the correct monitoring is in place and will be in place, and we hope to be getting approval pretty soon for further dispersants.

Senator MURKOWSKI. Mr. McKay, do you know if this is the first time that EPA has done these testings at these deepwater levels, testing the dispersants for safety and effectiveness?

Mr. MCKAY. I believe—I believe this is the first use at 5,000 feet and the first test at 5,000 feet.

Senator MURKOWSKI. It stuns me to think that we know that we need to utilize dispersants in the event of a spill and yet we haven't put in place the testing necessary. We've probably lost days here where we could have been acting while we wait for the testing to play out, which is more than just a little bit frustrating there.

Let me ask you, Mr. Probert. You have—your written testimony, and you've just repeated, indicates that the final cement well plug wasn't yet placed prior to the blowout. This is contrary to certain

media accounts out there. So the question is why is that significant. I want to make sure that I am clear. The well—was the well in fact cased and completed when the blowout occurred?

Mr. PROBERT. There are certainly some conflicting reports in the media, and I can confirm that the final cement plug was not set. As we heard in the testimony this morning, the concept of multiple barriers is very important in any given well. That plug would have been the final barrier before the well would have been temporarily suspended, as was the plan, for completion at a later date.

Senator MURKOWSKI. So I know that we've got a vote that we've got to get off to, but just one question. What sorts of tests were conducted? What kind of maintenance logs are in place for the cement work on the well? Do we have all that?

Mr. PROBERT. In actual fact there is no direct test that was performed on the cement itself. However——

Senator MURKOWSKI. Do you usually do a direct test?

Mr. PROBERT. The direct tests were to be performed on the cement. It would be something called either a temperature log or a cement bond log. That's the only test that can really determine the actual effectiveness of the bond between the cement sheath, the formation, and the casing itself.

Senator MURKOWSKI. Then when is that typically conducted?

Mr. PROBERT. That is conducted after two prior tests which are conducted. The first test is a so-called positive pressure test, which is conducted to test the integrity of the casing itself. The second test is a so- called negative test, which is designed to test the integrity of the casing hanger seals, or the seal assembly, which contains the casing.

Senator MURKOWSKI. Were both of those tests conducted?

Mr. PROBERT. Those tests were performed, though I can't comment as to what the information was relating to either of those tests.

Senator MURKOWSKI. Why can't you comment?

Mr. PROBERT. Because we do not have data associated with both of those tests.

Senator MURKOWSKI. Will you be able to gain that data?

Mr. PROBERT. There is information on the positive test, though I do not believe that there is information available from our data stream on the negative test.

Senator MURKOWSKI. But is it fair to say, though, that somebody has that?

Mr. PROBERT. I'm afraid I can't comment. It's certainly not collected on our servers. I would have to defer on that particular point to these gentlemen.

Senator MURKOWSKI. It would seem to me, Mr. Chairman, that we'd want to know whether or not the tests were conducted and then what the results of those tests were. That seems to be pretty key to what could have taken place.

Mr. PROBERT. I think that everyone is working very hard to make sure that the data is made available so a reconstruction of events can take place, so that determination can be made.

Senator MURKOWSKI. Mr. McKay or Mr. Newman, do you have that data?

Mr. MCKAY. I have not had a chance to review any data. I know it's all being gathered. I hope that we do.

Senator MURKOWSKI. You do believe you have it?

Mr. MCKAY.T1 I BELIEVE THERE SHOULD BE SOME DATA, AT LEAST FROM INTERVIEWS, IF NOT PHYSICAL DATA FROM THE SERVERS, DIGITAL DATA. SO THAT WILL BE A LARGE PART OF THE INVESTIGATION, TO UNDERSTAND THAT SEQUENCE.

The CHAIRMAN. We're going to take a short recess until we can return from these votes. We'll just stand in recess a few minutes.

[Recess from 12:03 p.m. to 12:13 p.m.]

Senator SHAHEEN[presiding]. Thank you all for coming back to order. We will go ahead and resume, and other members of the committee will arrive shortly.

I missed some of the questioning, so if I'm covering territory that's already been covered please let me know. I think, to you, Mr. McKay, one of the things that I have found troubling and I know that, in talking to others, they are also concerned, is that there didn't seem to be an emergency plan in place that could address how to deal with the spill once it happened.

I know that there's a lot of investigating relative to what actually happened, but, as you said or someone from BP said, this was a spill that was unthinkable, but once it happened the strategy around the containment dome seemed to be not a plan that had been thought through in any significant way prior to the accident.

So I guess I would like to ask, what kinds of measures BP has had in place to address this sort of a spill and why did it take the actual spill before the company came up with the idea of the containment dome and had tested that to see how it might work?

Mr. MCKAY. As far as spill response, the industry and I think BP is very similar to the rest of industry in this regard, the spill responses have heretofore concentrated primarily on dealing with oil at the surface and dealing with the spill, which I think sits under the national contingency plan, One Gulf, and then the BP and MMS-approved spill response plan, which I think has worked foundationally really well, and it's been spooled up and it's the largest effort that's ever been undertaken.

The point you bring up is about subsea intervention. We've not dealt with a situation like this before. There are—obviously, it's a specifically difficult situation in 5,000 feet of water. This fluid type is extremely difficult as well. I think after this is under control and thought about in hindsight, there will be some ideas about how to make the subsea intervention response better. I think we're learning right now as we go.

So I think that is something that needs to be looked at.

Senator SHAHEEN. Maybe each of you could answer: How much research and development does your company do on deepwater spills, and is this an area where there should be more focus? Right now can you quantify how much money is being spent on that kind of R and D to address deepwater spills, if anything?

Mr. MCKAY. I cannot quantify how much is being spent. We work with government agencies, but I cannot quantify how much.

Senator SHAHEEN. Are you—is BP doing research in that area, on how to respond to deepwater spills?

Mr. MCKAY. We have worked very hard on our spill response. As I said, I think what we're learning here is subsea intervention capability is something that needs to be looked at further.

Senator SHAHEEN. Mr. Newman.

Mr. NEWMAN. Transocean is not currently engaged in any research and development with respect to deepwater oil spills.

Senator SHAHEEN. Mr. Probert.

Mr. PROBERT. Halliburton's focus really has revolved to this point around the intervention of wells which require some kind of remedial activity, either a relief well or some other kind of activity associated with that.

Senator SHAHEEN. Are any of you aware of anyone in the industry who is researching on how to handle deepwater spills, or anybody in universities, for example? Is there anybody in the industry, first of all?

Mr. MCKAY. I think the industry has a lot of knowledge about handling deepwater interventions. But the question is in the specific situation. We are dealing with fluids and depth of water that hasn't been dealt with before in actuality. So what we're doing is utilizing the industry experts all across the world. We've got 160 companies working on this, as well as government agencies.

I really do think what we learn from here is going to impact the industry and how we ought to do this.

Senator SHAHEEN. I appreciate that, and I think we all understand the enormous response and the commitment that BP now has to try and respond to this accident. I guess my question really is should we not be more proactive about recognizing that when we're drilling at these depths that, despite all of the precautions, that there is the potential for this kind of a disaster and therefore having research under way that would show us how to respond in case of a disaster is something that we ought to figure out how to do? You can take that as a statement rather than a question.

The CHAIRMAN [presiding]. I guess the normal routine is to go back and forth. Senator Sessions, did you have questions?

Senator SESSIONS. Yes, thank you, Mr. Chairman.

The matters we're dealing with are exceedingly important. If we don't produce oil off our shores, we'll be importing oil that was produced somewhere else in the world. We do it today. Diving for the reserves on our Outer Continental shelf is important to our economy, it is important to jobs, and it is important to our Nation's ability to be competitive.

But it needs to be done safely. Again I will say that maybe we have become a bit too complacent.

To follow up on the chairman's comments, first let me follow up on Senator Shaheen's question. It is a bit odd to me that no one had considered prior to this incident that we would have a spill of this magnitude and that industry did not have the technology readily deployable to address the situation so I'll ask you, Mr. McKay. Immediately after this blowout occurred and we begin to see the leaks, the idea came that we needed a cofferdam, a containment mechanism that could go over the leak and take the oil out. That took several weeks to construct.

Why had something like this not been constructed, and why were these kinds of ideas not thoroughly examined prior to diving in deepwater and under these unusual circumstances?

Mr. MCKAY. This situation is extremely, as you may imagine, extremely hard to predict, the specifics of the situation. What we have in this case is we have a blowout preventer that didn't work, for whatever reason. We don't know why. We've got the lower marine riser package still on top of that blowout preventer. The emergency system disconnect, which we believe was hit on the rig, did not activate the blowout preventer or release that disconnect. So we've got a disconnect connected on top of the blowout preventer and a riser coming off the top of that.

Then that impacts what solution we have to use to address the problem. So this situation where we've got a lower marine riser package that hasn't come off and a riser bent over at the top of it and along the seabed, that's extremely difficult to predict, impossible to predict that.

So the intervention activity that we're doing has been focused on trying to get that blowout preventer actuated and shut. That's not been successful so far.

Senator SESSIONS. All I was asking basically was shouldn't you have anticipated that these kind of things could occur, and that this kind of cofferdam would be needed, and shouldn't we have some already constructed or at least the designs tested?

Mr. MCKAY. I think what I would say, as we learn from this incident we're going to have to understand what type of capability we will—I think it's difficult to have predicted a cofferdam would have been needed. But I think we're going to have to look back and see what is needed.

Senator SESSIONS. The Wall Street Journal had an article today regarding the removal of the mud. First I'll ask you, Mr. McKay: Did BP direct that the reverse procedure should be undertaken and ask the Minerals Management Service to alter the normal requirements and to displace the mud before the plugging operation began?

Mr. MCKAY. I've not read that article, so I can't comment directly. I do know that the investigation——

Senator SESSIONS. You work for BP?

Mr. MCKAY. I do work for BP.

Senator SESSIONS. All right. But it said, according to a worker, BP asked permission from Minerals Management Service to displace the mud before the plugging operation, final plugging operation, had begun, which mud weighs about, what, 50 percent more than water. As the heavy mud was taken out and replaced by the much lighter seawater, quote, "that's when the well came at us, basically," the worker said.

Mr. MCKAY. I'm not familiar with the individual procedure on that well. The investigation is going to look at every piece of the procedure, the directives, the decisions, and the processes that were used, and that investigation is under way. So I have not had a review of that yet.

Senator SESSIONS. Mr. Newman, what would be your answer? What do you know—and I would ask you to tell us what you know.

This is an important question. Do you know whether BP made that decision or did Transocean make that decision?

Mr. NEWMAN. Because BP are the operator of the well and BP are the permitholder and BP have the relationship with the MMS, if there was a discussion between somebody and the MMS about whether or not it was appropriate to proceed in a particular fashion, that conversation would have taken place between BP and the MMS.

Senator SESSIONS. Mr. Probert, I'll ask you what you know about that situation.

Mr. PROBERT. I concur with Mr. Newman's view.

Senator SESSIONS. Not his view, but what do you know?

Mr. PROBERT. We have no knowledge of that discussion. However, if a discussion took place it would be with the leaseholder and the MMS.

Senator SESSIONS. What knowledge do you have about a decision being made to remove the mud before the plug was finished?

Mr. PROBERT. The only information that we have, that it was part of the well program.

Senator SESSIONS. But it's an unusual thing, was it not?

Mr. PROBERT. I cannot say that it's not a procedure that has been utilized—not utilized previously. It is a process which has been undertaken previously. I'm afraid I can't tell you how many times.

Senator SESSIONS. But it would not be the normal procedure, would it not? Yes or no, normally?

Mr. PROBERT. It is a procedure which has been used on multiple occasions in the Gulf of Mexico.

Senator SESSIONS. Would it be used less than 10 percent of the procedures?

Mr. PROBERT. I'm afraid I am not in a position to comment.

Senator SESSIONS. You are in this business, are you not? You're under oath. I'm just asking you a simple question. What percentage in your best judgment is it that they remove the mud before the final plug is put in?

Mr. PROBERT. I do not know, Senator.

Senator SESSIONS. Is it less than 50 percent?

Mr. PROBERT. I do not know, Senator.

Senator SESSIONS. You don't know?

Mr. PROBERT. I do not know. The obligation for that decision lies between the leaseholder and MMS, and that's the discussion——

Senator SESSIONS. I didn't ask about that. I asked you what the procedure normally.

Do you know, Mr. Newman.

Mr. NEWMAN. I couldn't be able to—I wouldn't be able to quantify the percentage of wells that are handled in this particular manner.

Senator SESSIONS. This article indicates it's unusual. Are you aware of any time that this has been done before?

The CHAIRMAN. Could you withhold until we get to another round?

Senator SESSIONS. I'm sorry, I'm over time. Thank you.

The CHAIRMAN. Thank you, Senator Sessions.

Senator LANDRIEU.

Senator LANDRIEU. Thank you very much.

As you can imagine, since this has happened I've been down to the State on every occasion that I can get there. Just as late as yesterday, I was visiting with elected officials and fishermen that are extremely concerned about what's actually happening on the ground today, as you can imagine.

My first question is to BP, because this is the question, Mr. McKay, that I get more than any other question: Will BP pay? Let me ask it in this way. It's my understanding that you are the lease operator, that you're the responsible party under the 1990 Act. It is also my understanding that if you're found to be grossly negligent you can—will automatically be pressed by the law to exceed the $75 million liability cap. But my question is, if you're not found to be grossly negligent, is BP prepared to pay the full extent of real economic damage, not just to the individual businesses, but to parishes and other government entities that are expending huge amounts of money to try to contain this industry?

Mr. MCKAY. We've been very clear. Tony Hayward, our CEO, has been very clear, and we are going to pay all legitimate claims, all legitimate claims.

Senator LANDRIEU. Define "legitimate," please, for us?

Mr. MCKAY. Substantiated claims. I can't define the term. Here's the intent. The intent is to be fair, responsive, and expeditious. As to the $75 million that you mentioned, we think that we're going to exceed that, obviously, and that is irrelevant. So we have been very clear we're going to pay the claims and the entire resources of BP are behind this.

Senator LANDRIEU. Mr. Chairman, I may announce, because I'm happy that we made this step yesterday, but at least for the small businesses—and there are many, small and large, affected by this catastrophe along the Gulf Coast—that the Small Business Administration yesterday has made clear that on an individual basis the 6,000 small business disaster loans that are still pending in the same area from the last disasters we had can be deferred and new loans can be given until these claims can come full circle, because the last thing we want to do is for a region that has been hammered by storms and other disasters, is to have this be another economic disaster for the people of this region. So knowing that gives some confidence.

My next question, Mr. Newman, is to you. Are you the largest drilling operator in the world, and if not who is larger than you and what rank are you?

Mr. NEWMAN. Senator, we are the largest offshore drilling contractor.

Senator LANDRIEU. Can you speak right into the mike, please.

Mr. NEWMAN. We are the largest offshore drilling contractor in the world.

Senator LANDRIEU. To your knowledge, has a blowout of this magnitude in terms of volume spilled in an uncontrolled fashion for this length of time ever happened in the offshore waters in the United States or anywhere else, to your knowledge?

Mr. NEWMAN. The only incident that comes to my mind, Senator, is the Ixtoc well in Mexico, which I believe happened in the 1970s.

Senator LANDRIEU. Do you know how deep that well was? Do you have any recollection?

Mr. NEWMAN. I have a vague recollection that that operation was conducted from a jackup, so it would have been shallow water.

Senator LANDRIEU. I think, Mr. Chairman, for the record, that incident, which is well documented, was in shallow water. The Montara incident that was referred to by my colleague from New Jersey was in 200 feet of water. This is in 5,000 feet of water, 18,000 feet deep.

Now, given that, what are the regulations for these ultra-deep wells that you can just comment briefly on that give our people confidence that this deep drilling can be done safely? Obviously it has, but it wasn't in this case. Is there anything that you can offer that shows what you as the primary driller in the world? Do you call special meetings? Do you have special requirements? Did you not anticipate that this could happen?

Mr. NEWMAN. With respect to the applicable regulations, which have to do in our case with specifically the blowout preventer, the regulations in the U.S. require two control stations on the rig, and in fact on the Deepwater Horizon there were three control stations. The regulations require that you have three ram preventers and one annular preventer, and in the case of the Deepwater Horizon the rig was fitted out with five ram preventers and two annulars, so in excess of the regulations.

The regulations require that there be an independent means of activating the BOP, and in the case of the Deepwater Horizon, in addition to manual operation from the rig, the BOP system on the Deepwater Horizon was fitted out with two automatic response systems and an ROV intervention system. So in terms of satisfying and in fact far exceeding the regulations with respect to the blowout preventer, we certainly comply.

Senator LANDRIEU. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator WYDEN.

Senator WYDEN. Thank you, Mr. Chairman.

Mr. McKay, there have been with BP a series of horrific accidents over a number of years. Again and again, major safety problems, problems that have resulted in hundreds of millions of dollars in fines being paid by your company, settling criminal charges. In each case, as far as I can tell—and I've looked back at the explosion at the Texas City refinery, the fire at the Whiting refinery, the violations at the Toledo refinery, the failure to maintain the pipeline system on the North Slope—the company always says the same thing. I want to have your reaction to this because I think we've all said that we understand that the specific cause for the Deepwater Horizon disaster isn't known, but this sure fits in my view a pattern, a pattern of serious safety and environmental problems at BP.

The company always says the same thing after one of these accidents: We're going to toughen up our standards, we're going to improve management, we're going to deal with risk. Then another such accident takes place and we have yet more finger-pointing.

So my question to you is, why hasn't BP been able to change its corporate culture and end this pattern of accidents?

Mr. MCKAY. In 2005 and 2006, you mentioned some incidents that were extremely serious, extremely serious. I believe we are changing this company. I believe it's being changed to its core. Our CEO, Tony Hayward, in 2007 took over the reins. His single mantra has been: Safety and compliant operations.

We are changing this company. We've put in management systems that are covering the world in a consistent and rigorous way——

Senator WYDEN. But tell me, if you would, what management systems you put in that would have taken all possible precautions against this kind of problem? Because it seems to me I'm hearing about reports of various things that others in the industry are doing, various kinds of computer models and the like that they test. What specifically have you done to put in place changes that reduce the likelihood of these kinds of accidents that BP has a history of being involved in?

Mr. MCKAY. I believe our operating management system in the Gulf of Mexico is as good as anyone. I can't point to any deficiencies to point out to you. The investigations are obviously going to be important in terms of if there was something missed. I know of nothing that points me in a direction that we have deficiencies in our operating management system.

Senator WYDEN. With respect to the changes that you have put in since 2007, in 2007—I'm looking now at a comment that Tony Hayward made as Chief Executive: "Our operations failed to meet our own standards, the requirements of the law. We're going to improve risk management." These are just quotes that he has made.

You're telling me you know of no deficiencies, but I'm still not clear what changes the company has made since those comments from Tony Hayward, because we know for a fact—what's on the record? We can't yet pinpoint the cause of this disaster. Everybody stipulates that. But we sure know that there has been a pattern of problems at BP, and I'm trying to get you to tell me what changes, concrete changes, have been implemented since Tony Hayward made that statement in 2007.

Mr. MCKAY. We have several things that have been made. One, we have a board-level safety and environmental and ethics audit committee that is very active. We have a group organizational risk committee that has been installed by Tony Hayward at the very, very top. We have an operation management system that has been standardized and is being put in place in every single location in the world, and I believe is very, very rigorous and very complete.

I'll acknowledge we've had issues and we've got to change some of the areas of the company. I don't see any——

Senator WYDEN. What has to change at the company? You said you've got to make changes at the company. That's what I want to hear about.

Mr. MCKAY. As I said, we're installing operation and management systems everywhere in the world that are consistent, diligent, and rigorous, to a higher standard than they have been in some places in the world. I would say in the Gulf of Mexico this has been an area where we've been extremely safe. We have a tremendous track record of compliance as measured by the MMS.

What I'm telling you is I have not been aware of or seen deficiencies in the Gulf of Mexico systems.

Senator WYDEN. I'm still not clear what changes have been made after Tony Hayward said there were going to be changes made.

Mr. MCKAY. It gets down to the agenda and the culture of the company.

Senator WYDEN. It sure does, and the culture of this company is that there's been one accident after another.

Mr. MCKAY. The agenda has been clear. I believe we've progressed a long way. We're not finished. We'll never be finished.

Senator WYDEN. I'll hold the record open on this point, but I would like to see an itemized list of what has actually been changed since Tony Hayward said that there are going to be changes. You told me that there were no deficiencies. I'm not clear on what's been changed.

Thank you, Mr. Chairman.

Senator MENENDEZ. Thank you, Mr. Chairman.

Mr. McKay, we're sitting in the very same hearing room where the hearings were held to investigate the sinking of the Titanic. At that time we had a ship supposedly so technologically advanced that it could not sink. Here we have a rig that the industry has told us so many times is so technologically advanced it supposedly could not spill. Unfortunately, despite these claims, both technological marvels ended in tragedy.

When I look at this tragedy, it's not only, of course, the loss of those lives, which we lament, and the enormous damage being done to the Gulf region. But I look at BP's response here. On page 7–1 of BP's exploration plan for the lease sale in question, BP certified that it had the, quote, "capability to respond to a worst case discharge resulting from the activities proposed in our exploration plan." What I see is a company not prepared to address a worst case scenario, but a company that is flailing around trying whatever they think of next to try to deal with the worst case scenario that you had the ability to do.

You seem to be jumping from action to action, which we all hope and pray can work. But that doesn't give me a sense of a plan that was ready to be implemented in a worst case scenario. Isn't that a fair criticism?

Mr. MCKAY. Let me explain what we are doing. We have multiple parallel efforts at every level of this crisis. One, in the subsurface we're drilling 2 relief wells. Two, we're working on the subsea, on the blowout preventers. We've got 8 remote operated submarines around that blowout preventer trying to get it to actuate.

We've got containment and subsea systems that are being developed to deal with a very unique and specific situation. We have aggressive spill response on the surface that is part of the national contingency plan, One Gulf, and the BP response plan, which I think has worked well. We're fighting it aggressively offshore. We are using dispersant, in situ burn, and skimming. We're protecting the shorelines with boom. We are prepared to clean up and deal with anything that gets to shore, and we're prepared to deal with the economic impacts.

Senator MENENDEZ. I appreciate your litany of what you're attempting to do, but one seems more incredible than the other. First we had this four-story dome, trying to lower it into a spill, which I guess you couldn't all foresee the crystallization that might take place. Then you have the oil dispersants, which in and of themselves is a challenge. Then I'm hearing of a plan that is called a "junk shot," whereby garbage such as shredded tires and golf balls would be shot down the blowout preventer to clog the leak.

I mean, I don't get the sense that you are truly prepared for the certification you made to the Interior Department of a worst case scenario. I get the sense you're making things up as you go along.

Let me go to—I know that my colleague asked you about liability questions and you said all legitimate—"legitimate claims," that was your word? Yes. I don't get the sense that you are necessarily quantifying what a legitimate claim is or defining what a legitimate claim is, which makes me nervous.

Do you have a problem with raising the liability cap in the legislation that I proposed to $10 billion?

Mr. MCKAY. I have not had a chance to look at any legislative proposals and understand——

Senator MENENDEZ. Very simply, you have a $75 million liability cap. You say that you're going to pay all legitimate claims. I think it's pretty reasonable to understand that $75 million is not going to reach the amount that is going to be conducted in damages here. So do you have a problem? You earned $5.6 billion in the last quarter alone. Do you as an industry have a problem with the $10 billion cap?

Mr. MCKAY. As I said, I can't comment right now on the legislation or the $10 billion. What I can comment on is I've made it clear and our CEO has made it clear we are going to pay all legitimate claims. The $75 million does not come into account. We've been as clear as we can be on this incident about that.

Senator MENENDEZ. Are you going to shift those legitimate claims to the liabilities that we see in your testimony, when you talk about Deepwater Horizon and when you talk about—they talk about Halliburton? Is this going to be a liability chase where all of those people harmed are going to have to wait and file and go, as they did on the Exxon Valdez, all the way up? Is that what you intend to do?

Mr. MCKAY. We have made it clear we're going to deal with the people and the communities that are affected directly. We've made that clear.

Senator MENENDEZ. One last question, Mr. Chairman.

BP's lease for Deepwater Horizon received a categorical exclusion from the NEPA process last year. Why would this rig not require the oversight and regulation mandated under our country's most important environmental legislation? How could such an inherently dangerous activity not undergo through the environmental review of that process?

Mr. MCKAY. You're asking me?

Senator MENENDEZ. Yes.

Mr. MCKAY. The exclusion you're referring to is essentially when the lease sale is done there's an environmental impact statement that's done with the lease sale. Then there are grid environmental

assessments that are done for areas within that lease sale. Those are utilized as the environmental assessments for wells that are drilled in those areas, and that's what we use, and that's a common industry practice, and it's also used—it's MMS regulated.

Senator MENENDEZ. It seems to me it's a common industry practice we've got to review.

Mr. Chairman, I have a series of other questions. I'll submit them for the record.

The CHAIRMAN. Very good.

Senator UDALL.

Senator UDALL. Thank you, Mr. Chairman.

Mr. Newman, I want to direct a question your way. I've heard reports that your workers were instructed to sign energy and liability waivers as soon as they returned to shore, in some cases before they were even able to see their families. Were employees given an opportunity to consult with their doctors or lawyers before signing these waivers? I have a copy of one of them here I'd like to ask to be included in the record.

The CHAIRMAN. We'll include that in the record.

Senator UDALL. If so, why was there a rush here? The accounts certainly have me concerned. I think they would concern other members of the committee as well.

Mr. NEWMAN. Senator, if I could put that question into context. Immediately after the disaster happened on the rig, we mobilized a team of Transocean people to Louisiana to begin preparations for the arrival on shore of those crew members. That preparation included providing them with clothing, because many of them were awakened from their beds when the explosion happened. It included providing them with food and water. It included providing them with medical care because they had left the rig under such extreme circumstances. Many of them did not have identification with them, so it included consultation with the TSA to make sure that as those crew members were put on planes the following day to reunite with their families that they would have no identification issues with the TSA at the airport.

It included a preliminary gathering of facts. The statement that you're referring to is an exercise in our attempt to facilitate that. So we asked our workers if they had any information related to the cause of the event, and we asked our workers if they were injured. I don't think it's appropriate to characterize those statements as waivers.

Senator UDALL. We'll leave that judgment as the investigation unfolds. It certainly left, I think, in many people's mouths a sour taste and questions about what the intent was of Transocean, whether it was to support the workers or defend Transocean from potential liability.

Let me move to all three of you. I know each of you are conducting your own investigations. I'm just curious, will the results and the analysis, as well as any testimony you generate in your companies, will that be available to the Federal Government and to the Congress? Mr. McKay, I could start——

Mr. MCKAY. Yes, it will.

Senator UDALL. Mr. Newman.

Mr. NEWMAN. I think this event has such an impact on our business and our industry that it behooves us to share everything we can with respect to understanding exactly what happened, so that we can prevent it from ever happening again.

Senator UDALL. Mr. Probert.

Mr. PROBERT. Similarly, I will add that we will of course share any information and hopefully use it as a basis for ensuring that the industry is safe and environmentally sound as we look forward into the future.

Senator UDALL. If I might, with a final question directed to all three of you, I had the great honor to chair the subcommittee in the House, Space and Aeronautics, so I'm very familiar with the difficulty of working in extreme conditions such as those that NASA works in. NASA's had its share of disasters and its experiences emphasize that accidents, while they can be few and far between, that doesn't make them any less catastrophic or tragic.

It seems unfathomable to me that we didn't have any focus on technological improvements in spill cleanup technology since the Exxon Valdez more than 20 years ago. We've expanded our technology to get to these resources, but we seem to be using 20th century technologies to respond to what's happened. Again, I welcome your comments from each three—all three of you.

Mr. MCKAY. I think the improvements are in the deployment and usage of some of the technology, as well as what we were talking about earlier, subsea dispersant, which I think is a new potential technology that could be, No. 1, effective, and No. 2, use a lot less dispersant for the impact it may have. So I think there is quite a bit of new technology being developed.

Senator UDALL. Mr. Newman.

Mr. NEWMAN. Senator, under the provisions of the International Maritime Organization, IMO, which we are obligated to comply with because we operate marine assets, every one of our rigs is required to have a shipboard oil pollution plan, which deals with the chemicals and the materials that we use on the rig, such as diesel for our engines, cleaning products, and things like that. I would tell you that we work very closely with the providers of those materials to ensure that our shipboard oil pollution plans are as robust and comprehensive as possible to deal with the materials we have on our drilling rigs.

Senator UDALL. Mr. Probert.

Mr. PROBERT. As I may have mentioned earlier, our primary focus as a company has revolved around intervention of existing wells that may be challenged as a result of some kind of well control issue. That is where most of our technological effort has been focused.

Senator UDALL. I know Senator Shaheen—and, Mr. Chairman, I'll just finish with this comment—asked a similar question. Her understanding, and mine, was that nobody's really doing any research to address deepwater spills. I think that stands out as obviously something that needs to be pursued with real vigor here in the short term and immediately.

Mr. Chairman, thank you.

The CHAIRMAN. Thank you.

Senator CANTWELL. Thank you, Mr. Chairman.

I want to follow up on my colleague Senator Landrieu's question that was talking about how we're going to pay for this and the full cost. I understand, Mr. McKay, you said that you would pay all viable claims. What are "viable claims"? Are you talking about a legal standard of whether you are found with gross negligence in the case?

Mr. MCKAY. No, no. Let me explain. What we've said is we want to be very responsive and direct with claims, with people and businesses that are affected. We've been clear that we want to stand behind that. We mean it. That's our intent.

The only reason we say "legitimate" is that claims have to have some basis, some substantiation. We've been clear about the $75 million, that that's not going to be a limit for this.

Let me just tell you what we are paying. We've paid—I don't know the number as of this morning, but as of yesterday it was closing on 1,000 claims, mostly fishermen who are out of work, mostly folks who don't have cash to make ends meet because they're out of work, and that's what we're trying to concentrate on right now.

So I think we're being very responsive with that. Obviously, we've got to make sure that we keep getting better and better at it. But so far I think we're meeting the local needs, and we'll go from there.

Senator CANTWELL. How are you determining a viable claim? I'm assuming a lot of the discussion this morning, or at least it sounds like BP is saying maybe the fault lies with the rig operators, and Transocean is saying maybe the fault lies with improper cementing by Halliburton, and Halliburton seems to imply that Transocean may not have properly operated the drill fluid right.

So is that an ongoing part of the discussion? Are you saying any legitimate claim incident to this will be paid by BP?

Mr. MCKAY. Let me be really clear. Liability, blame, fault, put it over here. We are dealing with we are a responsible party. Our obligation is to deal with the spill, clean it up, and make sure the impacts of that spill are compensated, and we are going to do that.

Senator CANTWELL. No matter if that's $14 billion?

Mr. MCKAY. I'm not going to speculate on numbers. All we've said is that every legitimate claim and the full resources of BP are behind this.

Senator CANTWELL. There is cost estimates by experts now that say it could be as high as $14 billion. So are you saying that BP will pay all claims, even if——

Mr. MCKAY. I'm saying we will pay all legitimate claims, yes.

Senator CANTWELL. Mr. Chairman, I think that that is the question before us, is this is a panel and discussion about how we're going to move forward from this, and I think it reminds me of when we had in this very hearing—I guess you have this room for big investigative hearings. The last time I think I was in here was when the Challenger blew up and we had a big discussion about what was the fault behind the Challenger system, and we found out that there were system failures. Yes, there was freezing of the temperature in the O-ring, but we found that there were many, many other problems that led to that. I think that's what we're going to find here as well, that there is too cozy a relationship with

MMS and the oversight, and that the industry and the oversight of the various things my colleagues have been talking about with the blowout preventers and other things, that there is much more oversight and detail that needs to be made here.

But I think the question that's going to remain is how are we going to clean up $14 billion of oil spill, or whatever the number is, and that we really have an accounting here of how that is going to work, because we have to move forward with preserving that area.

So, Mr. Newman or Mr. Probert, I don't know if you have any comments about that, because I definitely feel like the case from defense is being built here this morning.

Mr. NEWMAN. I guess I would agree with the way Mr. McKay has characterized it. Liability and culpability and ultimate responsibility for the events that resulted in the incident are one thing, and responding to the economic impact of the event is another thing. I think the way Senator Landrieu has explained it coincides with my understanding, which is that as the lease operator and the well owner that falls on BP.

Mr. PROBERT. I would simply add that well owners, drilling contractors, and service providers like ourselves really do work very closely to try and create a safer environment to develop oil and gas resources, and it's in the interests of all of us and the industry in general and the Nation's energy security that we learn from this and continue to take those learnings and build them into our future operating procedures and technology.

Senator CANTWELL. For one opinion, what I've learned from this situation is I think it's time for us to diversify off of oil.

So thank you, Mr. Chairman.

Senator LANDRIEU. Mr. Chairman.

The CHAIRMAN. Senator Landrieu wishes to put something in the record. Go right ahead.

Senator LANDRIEU. Thank you. I just have some documentation about the value of the Louisiana seafood industry, which is more than $3.4 billion I just want to put in the record. Thank you, Mr. Chairman.

The CHAIRMAN. I think all Senators, at least all who are here, have had a chance to ask one round of questions. Let me now start on a second round. Senator Murkowski, did you have questions?

Senator MURKOWSKI. I'll be very brief, Mr. Chairman.

Mr. McKay, there was an Associated Press article that referenced the comprehensive blowout plan for the Deepwater Horizon. The article states that BP had not filed a specific comprehensive blowout plan and indicated that it was not required to file a scenario for potential blowout because it didn't trigger certain conditions cited in the MMS report. The article goes on to speculate whether or not—if there had been a specific, a site-specific plan, it would have helped to facilitate a quicker response.

Can you comment on this? Was there in fact an exemption? did you file a site-specific comprehensive blowout plan?

Mr. MCKAY. I believe that is in reference to the exclusion that's granted by the MMS for specific wells in a given area.

Senator MURKOWSKI. What is the exclusion?

Mr. MCKAY. When the lease sale is conducted, an environmental impact statement is done, which is a very extensive environmental study. That's one for the lease sale. Then there are grid environmental assessments that are done in the areas within that lease sale. That environmental assessment in the EIS are utilized as the environmental assessments for drilling wells, and you essentially apply for exclusion because they've already been done, and that's what we did. That's industry practice and MMS practice.

Senator MURKOWSKI. Do you believe that it would have helped BP, Transocean, Halliburton, in this instance had there been a specific blowout prevention plan?

Mr. MCKAY. I don't think it's called a "blowout prevention plan," though maybe I'm wrong.

Senator MURKOWSKI. I'm going off an AP article, so I apologize for that.

Mr. MCKAY. I don't—I honestly don't believe that—we filed our scenarios around this well and the environmental assessments that were done impact the spill response plans, and those are clear, those are worked with the MMS. They're very extensive. I don't think the individual well location within an area, an environmental assessment would have made any difference. I don't think so. I don't know that for a fact, but that's what I believe.

Senator MURKOWSKI. But you maintain that because MMS did not require it there was no necessity from BP's part in doing anything?

Mr. MCKAY. I don't believe so. I believe we were under normal industry and MMS practice.

Senator MURKOWSKI. Then a question to all three of you, and it's the same question: Given where we are after the Deepwater Horizon incident, have you ordered any additional safety measures or modified procedures for operation outside the U.S. based on this incident?

Mr. MCKAY. Yes. We have requested that all of our rig contractors provide an update on any modifications that may have been made to blowout preventers. We have instituted some incremental testing on blowout preventers worldwide and have sent notices to all of our businesses around the world that are doing deepwater drilling. We have also communicated with the MMS everything we understand about that, and they are incorporating what we're learning here into new and—I think new testing—well, I don't know what will come out, but new ideas around how to ensure safety around these types of incidents.

Senator MURKOWSKI. Let me ask you. You've indicated that you're asking for information on any modifications. Do you have any reason to believe that the Deepwater Horizon BOP was modified?

Mr. MCKAY. During our intervention work in the last 3 weeks we have—we do have reason to believe that it was modified. I don't know the extent of those modifications.

Senator MURKOWSKI. Mr. Newman, can you speak to that, because I'm assuming if there were any modifications that would have been done by Transocean?

Mr. NEWMAN. They were in fact done by Transocean, Senator. They were performed in 2005. They were done at BP's request and at BP's expense.

Senator MURKOWSKI. What were those modifications?

Mr. NEWMAN. As I mentioned in a comment earlier, the BOP on the Deepwater Horizon is fitted with five ram preventers on the rig. The modification made in 2005 converted one of those ram preventers, the lowermost ram preventer, from a conventional wellbore sealing ram preventer to a BOP test ram. So it allowed for more efficient testing of the BOP.

Senator MURKOWSKI. OK, but why would that modification have been requested?

Mr. NEWMAN. Because testing a BOP interrupts the well construction process, it does have an impact on the efficiency of the operation, and to the extent that we can make that process more efficient it has clear benefits in terms of the overall time required to drill the well.

Senator MURKOWSKI. Have you ever done such a modification?

Mr. NEWMAN. Yes, ma'am.

Senator MURKOWSKI. Multiple times? I mean, is this standard on deeper water wells?

Mr. NEWMAN. On rigs that have blowout preventers that are fitted with a number of ram preventers that exceeds requirements, we have converted rams to BOP test rams.

Senator MURKOWSKI. Have there been any incidents with those where the BOPs have been modified?

Mr. NEWMAN. There have been BOPs modified. There are no——

Senator MURKOWSKI. Right, but have there been any incidents?

Mr. NEWMAN. No incidents related to that modification.

Senator MURKOWSKI. Let me ask you the same question. Within your interests outside the United States, have you requested any additional safety measures or modification procedures as a result of this incident?

Mr. NEWMAN. Senator, we operate a consistent standard of policies and procedures, maintenance practices, and operating practices across the Transocean fleet throughout the world, and in the aftermath of this incident until we find out what may have contributed to the cause of events, we have not changed any of that standard Transocean system of policies and procedures around the world.

Senator MURKOWSKI. Mr. Probert.

Mr. PROBERT. Other than to alert our organization around the world to this incident, firstly. Second, we also operate to a standard set of procedures, and it's certainly our expectation that as we learn from this incident there may well be some changes in process, procedures, or other approaches which we would then implement as part of our global standard. But that will wait, obviously, on the findings of the analysis of the root causes of this incident.

Senator MURKOWSKI. Thank you, Mr. Chairman.

The CHAIRMAN. Let me just ask a question here before going on to everybody else. One of the issues the first panel talked about was the known limitations on the ability of these shear rams to function under certain circumstances where there's joints in the drill shaft that they're expected to cut and that sort of thing. Do

you agree that the shear ram cannot cut these tool joints, and if so is that not a serious design flaw in the BOP? Mr. Newman?

Mr. NEWMAN. I agree with the statement that there are tubulars that are used in the well construction process that the shear rams are incapable of shearing.

The CHAIRMAN. Do you agree that that's a serious design flaw in the BOP?

Mr. NEWMAN. I do not support the contention that that's a design flaw in the BOP, because the industry recognizes those limitations and there are strict operating procedures in place to account for the inability of the BOP—the inability of the shear rams to shear every tubular that might run through the BOP.

The CHAIRMAN. Those are operating procedures that would apply to your personnel operating that BOP?

Mr. NEWMAN. Yes, our personnel understand what those operating procedures are.

The CHAIRMAN. Do you believe they were followed in this case?

Mr. NEWMAN. I do.

The CHAIRMAN. So you think that, even though the operating—the proper operating procedures were followed, the failure of the shear rams to stop the explosion or the blowout from occurring was not a problem with—it's not a problem with the design of the BOP, it's not a problem with the way the BOP was operated or managed? How do you explain the fact that this BOP was not able to prevent this blowout?

Mr. NEWMAN. The operating procedures that I referred to earlier, Senator, would apply to the processes our people use when they are manipulating pipe in the BOP or through the BOP. So running drill pipe down to the bottom to put the drill bit on the bottom of the hole to continue to drill, pulling that drill bit back up through the BOP, running casing down through the BOP to progress a casing operation.

The operating procedures I was referring to that are people are following relate to situations where our people are in control of the pipe that is going through the BOP.

The CHAIRMAN. They were not in control at the time this accident occurred?

Mr. NEWMAN. I believe there are—without knowing today, Senator, what's inside the BOP, it is entirely possible that there is material inside the BOP that would have come from the wellbore, not from the Transocean people on the rig.

The CHAIRMAN. From the wellbore itself?

Mr. NEWMAN. Yes, sir.

The CHAIRMAN. Let me go ahead with Senator Landrieu.

Senator LANDRIEU. Thank you, Mr. Chairman.

Let me just, since I've got a minute, put some additional information into the record which I think will be important. The commercial fishermen in the Gulf of Mexico harvested 1.27 million pounds of fish and shellfish, generated $659 million in revenue. 40 percent of the Nation's commercial seafood harvest is from the Gulf of Mexico, and that's one of the industries at risk.

We also, of course, have commercial boat captains whose boats have been pushed into their slips and their harbors, unable to operate. So the amount of economic damage continues to mount.

I am encouraged, Mr. McKay, by what you say, that there will be no limit to legitimate true economic damage, because it will be substantial, whether it's $14 billion or something up to that amount. We don't know. It's important for the Gulf Coast, who has leaned forward in this production, for the people of the Gulf Coast, from Florida, even though they don't allow drilling, all the way over to Texas, that do allow drilling, to know that BP and the operators will be there to protect their economic interests. We want to make sure that the government agencies like the Small Business Administration, like Commerce, like other industries, can step up and help us through this difficult time.

But because my eyes are leaning forward even despite this accident, I want to ask a question about ultra-deep drilling. According to Offshore Magazine, there are currently about 120 deepwater sites drilling in the world today. Is that approximately accurate, 120 are drilled every year, deepwater? That's my information. Do any of you dispute that?

[No response.]

Senator LANDRIEU. OK, approximately 120 are being drilled as we speak. What is required internationally to make sure that this doesn't happen? Or maybe I should ask the question this way: Are the requirements, Mr. Newman, which you say you exceeded, that MMS requires for this deepwater drilling—are our requirements the highest internationally or are there other nations that require higher safety standards than what MMS is requiring of us to do this kind of exploration and production?

Mr. NEWMAN. The regulatory regimes—we operate around the world and we operate in about 30 countries. The regulatory regimes vary from very minimal to quite stringent. I would characterize the U.S. as closer to the end of being quite stringent in terms of very well-described rules as it relates to——

Senator LANDRIEU. But we're not the most stringent?

Mr. NEWMAN. I think there are aspects of the regulatory regime in places like the U.K. and Norway that might be characterized as being more stringent than the United States.

Senator LANDRIEU. But you're also testifying that there's some places where the regulations could be quite lax?

Mr. NEWMAN. There are areas where we operate with very little regulatory oversight. But as I mentioned a minute ago, our policies and procedures, our maintenance standards, our equipment standards, our operating practices, are consistent throughout the world regardless of the regulatory environment we're operating in.

Senator LANDRIEU. So you would say that the requirements that—and this committee has a great deal of responsibility in this regard as the oversight for Interior and MMS. You would say that the standards that we promote in this committee and here in this Congress have international implications, because what we require of you to drill in the Gulf you normally would follow those around the world? So it's important for us to everything this right; would you say that's true or not?

Mr. NEWMAN. I think because of the opportunity that the administration and the Congress have to influence the way things are done in the U.S., it does have international implications.

Senator LANDRIEU. Let me ask you this, Mr. Newman. You just recently, your company, acquired another drilling operator, which I think caused you then to become the largest in the world. My question—some of my constituents might be thinking, are you too large to be safe? What kind of parameters are in place to make sure that—and you did, too, Mr. McKay. You've acquired other companies to become a quite large operator.

What could you say, Mr. Newman, to give us any confidence that when you acquired this most recent acquisition—if you doubled in size, did you double your safety operators? Could you comment about that?

Mr. NEWMAN. You're referring to the combination between Transocean and GlobalSantaFe——

Senator LANDRIEU. Yes.

Mr. NEWMAN [continuing]. Which took place in November 2007. That, the combination of those two companies and the integration of such a large work force, I think in hindsight went extremely well, and I believe that was due in large part to the strong operating cultures and strong safety cultures that both of those organizations had. Both organizations prided themselves on a focus on safety, a focus on customer satisfaction, and a focus on the quality and the performance of our drilling equipment.

So I do not think it had an impact on our ability to operate safely.

Senator LANDRIEU. Mr. Chairman, in this instance it may or may not have, but I do think that this committee has to give some focus to the merging of some of these companies and to the extent in which they operate to make sure that they have consistent policies throughout.

Thank you.

The CHAIRMAN. Senator Sessions.

Senator SESSIONS. Just to follow up a bit on the removal of the mud, the Wall Street Journal says that it is common practice to pour wet cement down into the pipe. The wet cement, which is heavier than drilling mud, sinks down through the drilling mud and hardens into the plug. Then the mud is removed after the plug is in place.

In this case, a decision was made shortly before the explosion to perform the remaining tasks in reverse order, which is to take the mud out first. Mr. Lloyd Heinz, Chairman of the Department of Petroleum Engineering at Texas Tech, agrees that this is an unusual approach. "Normally you would not evacuate the riser"—that's the pipe from the seafloor to the rig—"until you were done with the last plug at the seafloor," he said in an interview.

So I guess I'll ask you, Mr. McKay: Do you agree that normally you would not do that?

Mr. MCKAY. I don't have specific knowledge of the procedure for this well, whether reverse circulating was part of the procedure or not. That will be part of the investigation.

Senator SESSIONS. Mr. Newman, would you comment on that? Is that normal? Would you agree with Mr. Heinz?

Mr. NEWMAN. It is normal practice to remove the drilling mud from the riser prior to disconnecting the riser from the well, and that would have been part of the logical sequence of events. Now,

I don't have any specific knowledge with respect to the actual order of the events as they took place on Tuesday evening the 20th, because our record of events ends at 3 p.m.

Senator SESSIONS. Would you agree, Mr. Probert, that that was normal?

Mr. PROBERT. I don't know the details. I certainly don't want to be nonresponsive to your request, Senator, concerning your earlier question, which was is this normal procedure and is this undertaken on a regular basis. That's something that I don't have knowledge of today, but I would certainly be more than willing to sort of gather, attempt to gather that information for you should it be helpful to you.

Senator SESSIONS. Mr. McKay, had the mud not been removed first and replaced by seawater, would that have made the blowout more or less likely in your opinion?

Mr. MCKAY. I don't know. I don't know.

Senator SESSIONS. Mr. Newman.

Mr. NEWMAN. I think that calls into question the actual mode of failure, and until we can determine that I think any hypothesis about the impact the mud in the riser might have had I think is premature.

Senator SESSIONS. Mr. Probert.

Mr. PROBERT. Indeed, we really need to gather the information, reconstruct the sequence of events, to be in a position to establish exactly what took place.

Senator SESSIONS. Mr. Newman, I suppose you've worked for a number of companies and drilled for them. I'm intrigued by my colleague's $10 billion cap on the strict liability legislation. I think it's something we should consider. But I understand there could be a result that it would favor only the super-major oil producers because the sum of money is so large. Do you think that significant increase to the liability caps could keep competitors out of the business, smaller companies? Would that be good policy?

Mr. NEWMAN. I'm not sure I want to comment on public policy. But I believe the Congress ought to take into consideration all of the potential ramifications, including the commercial ramifications of such a policy.

The CHAIRMAN. Senator Cantwell, did you have additional questions?

Senator CANTWELL. I did, Mr. Chairman. I know we're trying to wrap this up, but I wanted to go back to Mr. McKay if I could because I think this issue of who pays for this cleanup is so critically important.

Mr. McKay, just going back to you, although I'm happy to have the other witnesses chime in here. It literally was just last year that the last parts of the Exxon Valdez cleanup were settled. I mean, it was a 20-year process. It went all the way to the Supreme Court.

So Mr. McKay, are you saying you're going to avoid that by paying legitimate claims in advance? I know you can't stop anybody from suing you, but are you saying you're going to pay legitimate claims in advance of any court process?

Mr. MCKAY. We are paying legitimate claims right now, so yes, I am. Obviously we can't keep from being sued, but yes, we have

said exactly what we mean: We're going to pay the legitimate claims.

Senator CANTWELL. So if it's a legitimate claim of harm to the fishing industry, both short-term and long- term, you're going to pay?

Mr. MCKAY. We're going to pay all legitimate claims.

Senator CANTWELL. If it's an impact for a business loss from tourism, you're going to pay?

Mr. MCKAY. We're going to pay all legitimate claims.

Senator CANTWELL. To State and local governments for lost tax revenue, you're going to pay?

Mr. MCKAY. Question mark.

Senator CANTWELL. Long-term damages to the Louisiana fishing industry and its brand?

Mr. MCKAY. I can't—I can't quantify or speculate on long-term. I don't know how to define it.

Senator CANTWELL. Additional troubles from depleted fisheries and their recovery?

Mr. MCKAY. We're going to pay all legitimate claims.

Senator CANTWELL. Shipping impacts?

Mr. MCKAY. Legitimate claims.

Senator CANTWELL. Impacts on further drilling operations? I'm talking about things now that were part of the Exxon Valdez. I guess what I'm saying is I think the American people are most anxious about this. I guess let me just go back. OPA 1990 set a framework, a process, that basically said: Here's the liability and here's the framework. So we obviously only have so much money in that. I know my colleagues think we're going to raise that, but to make that retroactive is nearly impossible.

So you're stepping up today at a hearing with probably the best advice money can buy behind you, with PR and legal teams, and I'm sure they're saying: Let's say that we're going to pay. So I want to make sure that we really understand what you are saying you are going to be committed to today, because the long-term impacts of this is going to be for 20 years and we cannot sustain this kind of behavior or cost, and I want to make sure that we're getting full answers to the coverage that you are really signing up for today.

Mr. MCKAY. I'm trying to give you as clear an answer as I possibly can. We are trying to be extremely responsive, expeditious, meet every responsibility we have as a responsible party, and that means pay all legitimate claims. So that is our intent. I can't speculate on every individual case, but I can tell you this is not about legal words; this is about getting it done and getting it done right.

Senator CANTWELL. I hope so. Impacts to the pristine beaches that we have in this area, those are legitimate claims?

Mr. MCKAY. Yes, as termed. If it impacts the beaches and impacts commerce, yes.

Senator CANTWELL. Mr. Chairman, I am one who hopes that we never get into that situation where now we're into some court debating about what is now a legitimate claim, because you're making a big presentation here that you are stepping up to these responsibilities. I hope that is true. I hope, Mr. Chairman, that we will also go back on the legislation we've already passed out of this committee that included an opening up further of the Gulf and

pass legislation to reconsider that. I think this is clear evidence that the beaches of Destin don't need to be subject to any more oil spill threats in the future.

I thank the chair.

The CHAIRMAN. Thank you very much.

If there are no other questions—do you have anything more, Senator Sessions?

Senator SESSIONS. No. I thank Senator Cantwell for pursuing that line of inquiry. I do believe there's some confusion about—I've tried to look at the law on it. My understanding is legally you still remain subject to all the normal trespass and pollution laws of a State if you damage property or beaches. Is that correct?

Mr. MCKAY. I don't understand the law in detail, but we'll be subject to all laws for sure.

Senator SESSIONS. Essentially I would say this. The provisions in the Pollution Act that provide for these damages, strict liability damages, expressly—it is expressly stated in the Act that that does not abrogate existing State law. So I do feel like that that's part of it.

But I believe, again, your answer is you should do what's right and compensate fully and not try to utilize technical defenses that are not legitimate.

Thank you, Mr. Chairman.

The CHAIRMAN. Let me just thank the witnesses for their testimony, indicate that if members have additional questions they want to submit for the record they should do so by the end of business tomorrow on Thursday. If you folks would be able to respond to those in the next week, that would be appreciated.

Thank you all very much, and that will conclude the hearing.

[Whereupon, at 1:22 p.m., the hearing was adjourned.]

APPENDIX

Responses to Additional Questions

Responses of F.E. Beck to Questions From Senator Murkowski

Question 1. Can you describe your perspective in terms of your observations of the regulatory environment and technological improvements for offshore oil and gas over the years? Specifically, do you observe that industry and government have been taking their safety and environmental responsibilities more seriously, less seriously, or about the same as OCS development has expanded into the deepwater?

Answer. Although I am not involved in the offshore business, my observation is that safety and environmental concerns for deepwater are taken very seriously by the vast majority of operators and service companies. Development of technologies for deepwater have far outpaced developments for OCS and onshore environments. However, in light of the Deepwater Horizon disaster, I cannot help but think that the abilities of regulatory agencies have not kept pace with the technological developments associated with deepwater. I believe there needs to be an expanded skill set and training matrix developed for regulators so that they will be able to properly monitor and approve deepwater operation plans.

Question 2. In the event of a large natural gas "bubble" hitting the rig, are you aware of or would you favor requiring mechanisms to be available where gas sensors and alarms could trigger an automatic shutoff of any potential spark or flame source?

Answer. Using gas sensors in a "smart" manner to prevent an explosion seems to me a very good idea. The "smart" part will need to recognize that shutting down power at the wrong time can create many other problems on the rig and potentially in the wellbore itself, so it would be necessary to make sure the automatic shutoff would only occur in a true emergency. In the normal course of drilling a well there are numerous instances of gas being brought to surface that are not emergency situations, so these normal occurrences would need to be built into the "smart" system. All-in-all I like the concept.

Question 3. Can you describe the level to which the Deepwater Horizon is in a situation where it is dependent on its BOP to avoid catastrophic blowouts perhaps more than other rigs in shallower waters?

Answer. Actually, I consider deepwater drilling to be less risky in terms of blowouts than OCS, or shallow water, operations. This is because the BOP's are on the seafloor, and when correct designs and procedures are in place, the gas and pressures are kept well away from the rig and personnel. I think it is critical that everyone understands that blowout preventer systems as designed today will never be able to overcome poor well design or faulty operational decision making. The blowout preventers fit into an overall well design. Drilling engineers, and regulators, must understand how the BOP's are intended to be used as a well control tool. I think that blowout preventer systems in a subsea or deepwater environment are much more critical as a means to protect the environment. As we have seen on the Deepwater Horizon, there are limited subsea intervention methods for capping a subsea blowout. On OCS operations there are many more tools, methods, and techniques developed for controlling a blowout once it has occurred. It is obvious that we need to develop new methods for intervention.

Response of F.E. Beck to Question From Senator Lincoln

Question 1. In media reports following this disaster, I keep reading over and over again that certain devices and technologies being discussed to stop the leak have never been used in water this deep. Do you believe the depth of water presents more challenges in containing the leak? Do you believe more testing, research and technologies are needed to ensure the safety of deepwater and ultra-deep water drilling?

Answer. There are very few proven technologies for capping a subsea blowout, partially because there have been so few blowouts in this environment, but also because the deepwater environment is very difficult to mimic in a controlled manner, so proving technology is very difficult. There definitely needs to be a concerted effort made to develop and test equipment, new technology, and procedures in a realistically simulated deepwater environment. Industry, government, and academia need to join in a consortium to create a research and testing facility and think tank so that new and improved tools and processes can be developed to allow continued safe and reliable development of deepwater resources.

WILMERHALE,
Washington, DC, June 11, 2010.

Hon. JEFF BINGAMAN,
Chairman, Committee on Energy and Natural Resources, U.S. Senate, Dirksen Senate Building, Washington DC.

Re: Response to Chairman Bingaman's Correspondence Dated May 17, 2010, to Mr. Lamar McKay, Chairman and President of BP America, Inc.

DEAR CHAIRMAN BINGAMAN: I am writing on behalf of BP America, Inc. (BP) in response to your May 17, 2010 correspondence to Mr. Lamar McKay, its Chairman and President, in which you and your colleagues requested responses to certain questions for the record in connection with the U.S. Senate Energy and Natural Resources Committee's examination of the incident in the Gulf of Mexico involving the Deepwater Horizon oil rig. As part of BP's commitment to provide information responsive to the Committee's requests in a timely manner, we are providing the following responses to questions of the Committee, which are highlighted below, including the documents identified by the Bates range [BP-HZN-SNR00016959 to BP-HZN-SNR00019314]. To provide responsive information in a timely fashion, BP has endeavored to collect information and documents from some of the sources likely to have relevant data and best able to provide it within the timeframe set out by the Committee. This information supplements BP's earlier production to the Committee on June 3, 2010 and represents current understandings of these matters.

Included in this production are the following documents responsive to the Committee's requests (b), (c), (d) and certain subparts of (f), respectively, from your May 17 letter: (1) additional correspondence between BP employees and the Minerals Management Service (MMS) related to the Macondo well [BP-HZN-SNR00016988 to -89; BP-HZN-SNR00016991 to -995; BP-HZN-SNR00017392 to -94; and BP-HZN-SNR00018153 to -75]; (2) documents relating to the risk of an accidental release of oil or gas at the Deepwater Horizon drilling rig or other offshore deepwater drilling facilities; (3) additional reports of daily activity on the Deepwater Horizon [BP-HZN-SNR00017395 to -8152]; and (4) well program documents [BPHZN-SNR00016959 to -87; BP-HZN-SNR00016990; BP-HZN-SNR00016996 to -7391; and BP-HZN-SNR00018176 to -80]. In addition, this production includes documents responsive to elements of the document requests embedded in the Chairman's several questions herein.

RESPONSES OF LAMAR MCKAY TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Please list all types of data from the Deepwater Horizon operation now in BP's possession, and whether each item of data has been made available without limitation to the Federal Government investigators, and identify those investigators.

Answer. If the data has not been made available without limitation, please state the extent and nature of any limitation. Please describe the means by which data was transferred from the rig to BP data collection facilities off of the rig. BP currently possesses the following information recorded or measured by sensors on or from the Deepwater Horizon for the Deepwater Horizon Mississippi Canyon 252 Well #1 (MC252 #1) drilling operation. Except as noted, these data have not been provided to any federal investigator. BP understands the request as seeking data of the types listed and, on that basis, believes the listing below is complete. However, reviews are continuing and BP will supplement this response as appropriate.

(a) Wellbore data

- Wireline logs and evaluation data.—This data for the Deepwater Horizon was provided to BP by the contractor on a CD after the April 20 incident.
- Mud logs.—The Deepwater Horizon mud logs were provided to BP on a CD by the contractor after the April 20 incident.

• Logging While Drilling/Monitoring While Drilling (LWD/MWD) logs.—The Deepwater Horizon LWD/MWD logs were provided to BP by the contractor on a CD after the April 20 incident.

• Wellbore Surveys.—The Deepwater Horizon surveys were provided to BP on a CD by the contractor after the April 20 incident.

(b) Surface Data—(rig sensors that capture parameters such as flow-in, flow-out, pit volume and pressures). This information is real-time data that is provided to BP via an internet site established by the contractor and on ASCII files supplied by the contractor. This data was provided to the Marine Board Investigation (MBI) Panel, on May 8 and May 21, 2010.

(c) Computer Analyzed Makeup Of Casing String Connections.—This information is believed to have been provided to BP by the contractor to BP after the April 20 incident.

(d) Blowout Preventer (BOP) Digital Test Data.—This data for the Deepwater Horizon was provided electronically to BP by the contractor.

(e) Cement Pumping Data Report Data.—This data was provided to BP by the contractor after the April 20 incident.

Question 2. Please list all contacts with and witness statements from eyewitnesses to the Deepwater Horizon operation including but not limited to the crew present on the rig at the time of the explosion. Please state whether these statements and witnesses have been made available to the Federal government investigators without limitation, and identify those investigators. If they have not, please state the extent and nature of any limitation.

Answer. The following BP employees were eyewitnesses to the incident and present on the scene at the time of the April 20 Deepwater Horizon incident: (a) Shane Albers, (b) Robert Kaluza, (c) Lee Lambert, (d) Patrick O'Bryan, (e) David Sims, (f) Brad Tippetts, and (g) Donald Vidrine. Each of these witnesses provided a witness statement to United States Coast Guard personnel following the April 20 incident. Messrs. Vidrine and Kaluza also prepared a written statement shortly after the April 20 incident. BP understands that employees of other companies also provided statements to the Coast Guard. Pursuant to a confidentiality order issued by the Coast Guard, BP is prohibited from distributing this information.

Question 3. Please describe BP's data and document retention policy as it relates to material relevant to the Deepwater Horizon Macondo well operation. Please state when the last data from the Deepwater Horizon was received by BP.

Answer. Since the Deepwater Horizon incident occurred on April 20, 2010, BP has taken steps to preserve documents that are potentially relevant to the Macondo well operation, the April 20 incident, and the subsequent discharge of hydrocarbons into the Gulf of Mexico. For example, BP has sent a Legal Hold Order to over 3,500 BP employees identified as possible custodians of potentially relevant documents. The Legal Hold Order directs recipients to preserve all potentially relevant documents, including those relating to the April 20 incident; the response to that incident, including investigation, containment and clean-up efforts; any damages resulting from the incident; the exploration of, and drilling operations at, Mississippi Canyon Block 252, where the Macondo well is located; and the Deepwater Horizon rig and equipment, including their design, safety features, maintenance and operation; among many other matters. The Legal Hold Order explains that the "documents" that must be preserved include all potentially relevant electronically stored information (including electronic mail, and other electronic databases or files, such as Word, Excel, and PowerPoint), paper documents, video and other recordings, and physical objects, among other things. The Legal Hold Order instructs that all potentially relevant documents must be preserved, and calls for the immediate suspension of any document retention policies that could cause any such documents to be discarded or no longer retained.

Based on presently available information, the surface data from the Deepwater Horizon was transmitted continuously by the contractor, including on April 20, to a website to which BP had access that disclosed real-time data of certain parameters, and stopped being transmitted at 21:49 CT on the night of April 20, which is the last data received from the Deepwater Horizon.

Question 4. Please describe the number of BP company employees at the rig site at the time of the explosion as well as their job title and function, education, and years of experience working offshore. Also please state the number and job titles of all BP employees involved in the well planning team for the Macondo well, including the original and all subsequent well plans. Please include information for each employee as follows: job title, education, and years of experience.

Answer.

(a) The following BP employees were on the Deepwater Horizon at the time of the April 20 incident:

1. Shane Albers. Mr. Albers' job title is Subsea Project Engineer Challenger. Mr. Albers' job function is focused on delivery of subsea tie-back projects to new or existing hosts. Mr. Albers holds a Bachelor of Science in Mechanical Engineering and a Bachelor of Business Administration in Finance, Economics, and General Business from Texas Tech University, earned in 2009. Mr. Albers has 1 year of experience working offshore.

2. Robert Kaluza. Mr. Kaluza's job title is Well Site Leader. Well Site Leaders are stationed on the rig site to evaluate whether the well is constructed to BP design specifications. Mr. Kaluza holds a Bachelor of Science in Business Administration and Finance from University of North Dakota, earned in 1973. He also has a Masters of Business Administration from the University of Alaska, earned in 1986, and a Bachelor of Science in Petroleum Engineering from the University of Alaska, earned in 1995. Mr. Kaluza has 35 years of experience in the oil and gas industry and over 8 years as a Well Site Leader, including nearly 2 years of offshore deepwater working experience.

3. Conward Lee Lambert. Mr. Lambert's job title is Well Site Leader Trainee. Mr. Lambert's job function is to develop the necessary skills and competency needed to work as a deepwater Well Site Leader. Mr. Lambert holds a Bachelor of Business Administration in Computer Information Systems from Texas State University, earned in 2002. Mr. Lambert has 2 years of experience as a Well Site Leader, and 6 months of offshore drilling training experience.

4. Patrick O'Bryan. Dr. O'Bryan's job title is Vice President for Drilling and Completions in the Gulf of Mexico. Mr. O'Bryan's job function is to manage drilling and completions for BP's Gulf of Mexico business. Mr. O'Bryan holds a PhD in Petroleum Engineering from Louisiana State University, earned in 1988, a Master of Science in Petroleum Engineering from Louisiana State University, earned in 1985, and a Bachelor of Science in Petroleum Engineering from Mississippi State University, earned in 1983. Mr. O'Bryan has 22 years of experience in the oil and gas industry including over 5 years of deepwater drilling experience.

5. David Sims. Mr. Sims' job title is Operations Manager for Exploration & Appraisal in the Gulf of Mexico. Currently, Mr. Sims' responsibilities include managing operations for the relief well being drilled by Transocean's DDIII rig, and previously, for exploration and appraisal in the Gulf of Mexico. Mr. Sims holds a Bachelor of Science in Mechanical Engineering from Texas A&M University, earned in 1982. Mr. Sims has 28 years of experience in the oil and gas industry, including 4 years of deepwater drilling experience.

6. Brad Tippetts. Mr. Tippetts' job title is Subsea Wells Engineer Challenger. Mr. Tippetts' job function is to plan and oversee all activities that fall under the category of wellhead conversion for exploration/appraisal wells to development well. Mr. Tippetts holds a Bachelor of Science from University of Utah, earned in 2006 and has 3 years of experience working offshore.

7. Donald Vidrine. Mr. Vidrine's job title is Well Site Leader. Well Site Leaders are stationed on the rig site to evaluate whether the well is constructed to BP design specifications. Mr. Vidrine holds a Bachelor of Science in Agronomy from McNeese University, earned in 1970. Mr. Vidrine has 32 years of experience as a Well Site Leader, including 25 years of experience working offshore.

b. Numerous BP employees provided input and guidance in the planning, design, and/or execution of the MC252 #1 well. To date we have identified the following as individuals who provided such input and/or guidance:

1. David Sims. Identified above.

2. Mark Hafle. Mr. Hafle's job title is Senior Drilling Engineer. Mr. Hafle holds a Bachelor of Science in Petroleum Engineering from Marietta College. He has 23 years of experience in the oil and gas industry, all working for BP. He has 17 years of experience in deepwater drilling.

3. Brett Cocales. Mr. Cocales' job title is Senior Drilling Engineer. Mr. Cocales holds a Bachelor of Science in Petroleum Engineering from Montana Tech, earned in 1986 and a MBA from University of Montana earned in 1989. He has 24 years of experience in the oil and gas industry, including nearly 10 years in deepwater drilling.

4. John Guide. Mr. Guide's job title is Wells Team Leader. Mr. Guide holds a Bachelor of Science in Chemical Engineering from the University of Pitts-

burgh, earned in 1980. He has 30 years of experience in the oil and gas industry, including 10 years in deepwater drilling.

5. Ian Little. Mr. Little's title is Vice President of Drilling and Completions for North Africa. Mr. Little holds a Bachelor of Science in Civil Engineering from University of Strathclyde (Glasgow, Scotland), earned in 1981. He has 28 years of experience in the oil and gas industry, including 8 years of deepwater experience in West of Shetlands (UKCS), Egypt, and the Gulf of Mexico.

6. Donald Vidrine. Identified above.

7. Robert Kaluza. Identified above

8. Ronald Sepulvado. Mr. R. Sepulvado's job title is Well Site Leader. He has a Bachelor of Science in Agricultural Business from Louisiana State University, earned in 1971. He has 33 years of experience as a Well Site Leader, all in offshore drilling.

9. Murry Sepulvado. Mr. M. Sepulvado's job title and function is Well Site Leader. He has 32 years experience as a Well Site Leader, all in offshore drilling.

10. Gregg Walz. Mr. Walz's title is Drilling Engineering Team Leader, Gulf of Mexico Exploration & Appraisal. Mr. Walz holds a Bachelor of Science in Petroleum Engineering from New Mexico Institute of Mining and Technology, earned in 1980. He has 30 years of experience, including 14 years of experience in offshore drilling of which 6 have been in deepwater.

11. Brian Morel. Mr. Morel's job title is Drilling Engineer. Mr. Morel holds a Bachelor of Science in Mechanical Engineering from Rice University, earned in 2005. He has 5 years of experience in the oil and gas industry, including 2 years experience in deepwater drilling.

Question 5. Were there any incentives or bonus programs available for your company employees or employees of any of your contractors in effect at the time of the Deepwater Horizon accident? If so, please describe the terms on which bonuses or incentives were available.

Answer. BP had no incentives or bonus programs for any of the employees of any of the contractors for the Deepwater Horizon.

Further, BP had no incentives or bonus programs for any BP employees directly related to the Deepwater Horizon. BP employees, including the BP employees who worked on the Deepwater Horizon, are eligible for participation in the Variable Pay Program (VPP), which creates the opportunity to receive additional compensation beyond the employee's base salary. The amount of the variable pay award depends on the combination of the employee's performance based on individual objectives set at the beginning of each year and the performance of the employee's Strategic Performance Unit (SPU) during the year. BP's Gulf of Mexico (GoM) operations is the SPU for BP's employees involved with the Deepwater Horizon. The variable pay award for such BP employees is based on the overall performance of the Gulf of Mexico SPU as a whole, and not on the performance of any individual drilling operation.

Question 6. Please state whether there was any active monitoring in the Macondo well of the annulus (using downhole sensors) in the 20 hours preceding the accident? Were there any sensors in the borehole? If so, please provide that data. Please also state whether it is included in the data listed in response to Question #1.

Answer. Based on information presently available, during the 20 hours immediately preceding the April 20 incident, all active monitoring was conducted using sensors at the surface, and not with downhole sensors.

Question 7. Please state whether it is your intention to acquire downhole data during the relief well drilling process, and if so state the purposes for which you intend to use the data. Include in your answer whether it is your intention to use such data to analyze the integrity of the bottomhole or to get a better understanding of the competence of the cement within the production liner and in the annulus. Include in your answer whether HR2D seismic data has been or will be acquired. Do you have or will you obtain any data indicating any changes to the subsurface, both in terms of the existing Macondo well and the geology surrounding the well following the well blowout?

Answer. BP has acquired high resolution two dimensional (HR2D) seismic data during the relief well drilling process. The purpose of collecting this data is to determine the presence of shallow hazards to support the relief well drilling program and casing design. These data were produced to this Committee on June 3, 2010 [BP-HZN-SNR00000007 to -010]. In addition, BP currently intends to collect downhole data in compliance with MMS requirements, as well as any other data necessary to complete the drilling of the relief wells, including but not limited to the following:

(a) MWD/LWD logging data. Monitoring while drilling and logging while drilling data includes subsurface lithology, directional surveys, wellbore pressures and temperatures, and drillstring dynamics of the relief well while drilling. The purpose of collecting this data is to ensure the relief well achieves the objective of intersecting the MC 252 #1 well and to comply with regulatory requirements.

(b) Drill cuttings from the 22" shoe to total depth (TD). The purpose of collecting this data is to allow for comparison of the cuttings from the original well to aid in determining the interval being drilled and to comply with regulatory requirements.

(c) Mud Samples from the 22" shoe to TD. The purpose of collecting this data is to allow for geochemical analysis to check for any potential oil from the original well.

(d) Base oil samples from the 22" shoe to TD. The purpose of collecting this data is to allow for geochemical analysis to check for any potential oil from the original well.

(e) Magnetic Ranging data. The relative position of the relief well with respect to the MC 252 #1 well will be determined using magnetic measurements.

The primary purpose of collecting the data described above is to enable the relief well's intersection with the MC 252 #1 well and for pumping operations to stop the flow of the MC 252 #1 well and prevent further flow. The collection of this data is not specifically intended to analyze the condition of the bottomhole and/or quality of the cementing related to the MC 252 #1 wellbore. Some of the data collected, specifically the mud and base oil samples, may provide some indication of changes to the subsurface, but it is not being collected solely or primarily for this purpose. BP may collect additional data in the future.

Question 8. Please provide a complete description of the activities that were occurring on the rig within the last 12 hours of operation prior to the accident, and complete copies of any documents or data in your possession that reflect those activities. Include in your answer information on the activities of each employee and whether there were any visitors on the rig at the time. If so, what were the purposes of their visit?

Answer. Investigations into the Deepwater Horizon incident are ongoing. That said, BP is producing a copy of a presentation developed by the team that is conducting BP's nonprivileged, internal investigation, which includes a timeline of events covering certain activities during the last 12 hours of operations [BP-HSN-SNR00018985 to -9032]. As noted in the presentation itself, not all information contained therein has been verified, and its perspectives are subject to further review in light of additional information or analysis. BP is also producing the cement test reports referred to in response to the Chairman's question No. 1. Documents reflecting activities during the last 12 hours prior to the accident also are included among those produced to this Committee on June 3, 2010.

BP employees Patrick O'Bryan and David Sims were visiting the Deepwater Horizon at the time of the incident for a scheduled leadership visit.

Question 9. Please state your current understanding of the timing and possible causes of this accident, and whether you believe it was a sudden catastrophic failure or whether there were warning signs in advance of the explosion. If you believe there were warning signs, please state what they were and why they were not acted upon. Include copies of any and all data and documents in your possession relevant to your answer.

Answer. Investigations into the Deepwater Horizon incident are ongoing, including BP's nonprivileged, internal investigation intended to address the topics posed by this question. That said, we are producing a copy of the presentation made by BP's internal investigation team (referred to in the response to the Chairman's question No. 8) which tentatively provides information relevant to your inquiry. Not all information contained within the presentation has been verified, and its preliminary perspectives are subject to review in light of additional information or analysis. BP's investigation is continuing into the timing and possible causes of the incident and the actions of those persons on the Deepwater Horizon prior to the April 20 incident.

Other documents responsive to this request include: (a) the technical data described in response to the Chairman's question No. 1; and (b) the documents produced to this Committee on June 3, 2010 detailing well construction details and daily operations on the Deepwater Horizon in the period prior to the incident.

Question 10. You have testified that there were anomalous pressure readings on the well in advance of the explosion. Please provide specific information about these pressure readings, when they were obtained, and what you believe they indicate, including any information they provide to you regarding the possible causes of the ex-

plosion. Please provide copies of any and all documents in your possession relevant to these pressure readings.

Answer. BP's non-privileged, internal investigation into the activities and events of the April 20 incident is continuing. Based on information presently available, there were pressure readings on the MC252 #1 well prior to the April 20 incident that on post-incident review appear anomalous. BP's current understanding of these pressure readings is outlined in the presentation being produced with this letter (referred to in the response to the Chairman's question No. 8). As noted in the presentation itself, not all information contained therein has been verified, and the preliminary perspectives it reflects are subject to review in light of additional information or analysis. BP's investigation as to the potential connection, if any, between these pressure readings and factors that may have contributed to the April 20 incident is continuing.

Other documents responsive to this request include the data (including surface data) described in response to the Chairman's question No. 1.

Question 11. Please state how the decision was made regarding the number of centralizers to be used in this well, and whether you believe the number used is industry best practice. Were there changes made to the original well plan and casing program that reduced the number of centralizers? If so, please state whether you believe that was adequate to maintain the integrity of the casing and cement program. Please provide any and all data and documentation regarding the decision on the number of centralizers to be used. BP's non-privileged, internal investigation into the April 20 incident is continuing.

Answer. BP's present understanding is that the number of centralizers used with the MC252 #1 well was selected based on the judgment and experience of the drilling team who were involved with the well design and execution and their understanding of the characteristics of the MC252 #1 well. For the 9-7/8" x 7" production casing, early plans called for six centralizers. As the cementing design iterations progressed, the number of centralizers varied. Six centralizers were run and believed in the judgment and experience of the drilling team to be adequate to maintain integrity of the casing and cement program. We are producing with this letter documents responsive to the assessment of the number of centralizers used.

Question 12. Questions have been raised about the timing of removing drilling mud from the Macondo well and replacing it with seawater during the plugging and abandonment process. Please state the point at which this operation began, whether this aspect of the operation was performed in accordance with your instructions to the rig operator, and whether there were changes in these plans during the course of the well operation. Please state whether any employee of any company involved in the rig operation expressed opinions on this subject or disagreed with any aspect of the operation directed by BP as the well operator. Please provide any and all data and documents relevant to this operation including the original and any modified plans for the plugging and abandonment operation.

Answer. BP's non-privileged, internal investigation into the activities and events of the April 20 incident are continuing and includes an analysis of the topics posed by this question. That said, based on presently available information, the removal of drilling mud and replacement with seawater on April 20, in preparation for temporary abandonment, began at approximately 16:00 CST. Based on information known to date, and its understanding of the facts, BP is not aware that any of its employees expressed disagreement regarding removal of drilling mud and replacement with seawater for MC252 #1 in preparation for temporary abandonment.

BP is producing a copy of the draft presentation developed by the team that is conducting BP's internal investigation (referred to in the response to the Chairman question no. 8). A copy of the Temporary Abandonment Permit approved by MMS on April 16, 2010 for the temporary abandonment of the Macondo MC 252 #1 well bore, which sets out the procedure approved by MMS for the temporary abandonment of the well, and related documents were produced to this Committee on June 3, 2010 [BP-HZN-SNR00000011—BP-HZN-SNR00000994]. Other documents responsive to this request include the data (including surface data) described in response to the Chairman's question No. 1.

Question 13. Some have suggested that the absence of an acoustic trigger device on the blowout preventer on this rig is a significant factor in the BOP's failure. Please state your view of this, including whether you think the BOP was triggered and failed to operate properly or whether there was a failure of the trigger mechanism itself. Please provide copies of any and all data and documents relevant to your response.

Answer. BP's investigation is continuing, and no determination has been made yet as to whether the absence of an acoustic backup control system was a significant factor with respect to the Deepwater Horizon BOP's performance.

The purpose of an acoustic backup control system is to provide back up operation of critical BOP functions in an emergency. Although the Deepwater Horizon did not have an acoustic backup control system, the Deepwater Horizon was equipped with multiple emergency systems: (1) an Emergency Disconnect System (EDS), (2) an automatic mode function (AMF), or "deadman," which activates when all hydraulic and electrical power is lost, and (3) ROV intervention capability. If a rig is equipped with multiple emergency systems, such as the Deepwater Horizon, an additional acoustic backup control system may be disadvantageous because it adds complexity to the hardware on the BOP stack.

BP is continuing its investigation and has not yet determined whether the BOP rams activated and closed either during the April 20 incident or subsequently.

Question 14. Testimony was received to the effect that the shear ram of the blowout preventer was known to be unable to cut through certain material in the well, including tool joints and possibly other debris. Please state your view of this. If this is the case, explain how in your view a blowout preventer can be considered a failsafe mechanism? Were there other mechanisms on this blowout preventer that you believe would have overcome this problem? Are there other technologies not used on this blowout preventer but available that may have overcome this problem?

Answer. The 5-1/2" drillpipe tube that was across the BOP stack at the time of the incident was capable of being sheared and sealed by the blind shear rams. It is known that the blind shear ram cannot shear the tool joint of the 5-1/2" drillpipe, and it is the responsibility of the drilling contractor, which operates the drill pipe and in this case was Transocean, to know the location of the tool joints in the BOP during all operations. In the event that the blind shear rams need to be shut and there are non-shearable components across the BOP stack, Transocean has procedures to drop the components into the well and allow the blind shear ram to be closed. There are no other mechanisms available on the BOP stack for the Deepwater Horizon that would shear the drillpipe tool joint. BP is aware that at least one manufacturer is developing shear ram technology that can shear through the tool joint for certain sizes of drillpipe, but such technology is not yet commercially available.

RESPONSES OF LAMAR MCKAY TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. Your testimony on the response efforts reflects that evacuated workers were all debriefed on the incident as soon as was possible. Please talk about who was conducting these debriefings, whether they knew the right questions to ask, and what mechanisms your company and the Unified Command had in place to transmit any timely and useful information back to the team working to contain the leak.

Answer. Individuals who were on the Deepwater Horizon rig were debriefed concerning the April 20 incident by the U.S. Coast Guard. The Coast Guard personnel responsible for debriefing these witnesses would be the most knowledgeable concerning the specific nature of the questions asked, and any transmission of information contained in the statements to the larger Unified Command.

Question 2. Can you describe the process for applying dispersants to oil at the leak source—how is it done and have initial attempts been encouraging?

Answer. The U.S. Environmental Protection Agency (EPA) and the U.S. Coast Guard have authorized BP to use dispersants underwater at the source of the Deepwater Horizon leak. Authorization followed a series of trials with ongoing sampling and monitoring of dispersant effectiveness and water column effects with Coast, Guard, EPA and other agency supervision. BP is currently applying liquid dispersant (Corexit 9500) at the wellhead at the rate of approximately 10,080 gallons/day, pursuant to a June 8, 2010 subsea dispersant application plan and approval. BP is using ROV's to apply the dispersant to the escaping oil at the source.

EPA has stated that, "[p]reliminary testing results indicate that subsurface use of the dispersant is effective at reducing the amount of oil from reaching the surface." EPA has also said that "what the monitoring data indicates so far is that the underwater use of dispersants is effective at breaking up the oil and, to this point, does not seem to have had any significant impacts on aquatic life. Using the dispersant underwater at the source of the leak also requires far less dispersant to be applied." [May 24, 2010 Press Release by EPA and Coast Guard].

All dispersant use is performed under the supervision of the EPA and the Coast Guard. The current plan requires BP gradually to reduce the amount of dispersants used at the site. As more oil is captured in the riser, less dispersant is needed to treat oil in the water column. EPA maintains a website dedicated to this topic which contains further details and documentation regarding the use of dispersants in con-

nection with the incident, the associated ongoing monitoring required by EPA, and detailed monitoring.[1]

Question 3. Law requires the responsible party to advertise how to claim compensation for losses due to a spill. Can you describe this process for the committee and viewers?

Answer. BP Exploration & Production Inc. (BPXP) has been designated as a "responsible party" under OPA and, when addressing claims, will be guided by the statute and implementing U.S. Coast Guard regulations and guidance. BPXP will abide by the statutory and regulatory guidance, and our intent is to be efficient, practical, and fair. Under OPA, claimants may recover for the following categories of costs and damages caused by an oil spill: removal costs, property damage, subsistence use of natural resources, net lost government revenue due to injury, destruction or loss of property or natural resources, lost profits and earnings due to injury, destruction or loss of property or natural resources, and net costs of providing increased or additional public services.

As directed by Congress under OPA, BPXP will evaluate a claim in the first instance. BPXP has hired ESIS, Inc. (ESIS)—a known leader in the field—to assist in the handling of claims. ESIS is part of the ACE Group of Companies, headed by ACE Limited. The ESIS Claims team assisting BPXP has extensive experience with claims, including injury, environmental and property damage claims. BPXP will work with ESIS, the Coast Guard and other relevant stakeholders as necessary in making decisions regarding specific claims. After the first month, claimants will continue to receive any future payments electronically. The check for the advance payment will be mailed or can be picked up at the nearest BP Claims Center, the location of which will be communicated to the claimant. Alternative arrangements can be made if these methods of check delivery are not feasible.

BP has established claims offices for the Deepwater Horizon incident along the Gulf Coast in Alabama, Florida, Louisiana, and Mississippi, with office hours from 8 a.m. to 7 p.m. each day. A complete listing of BP claims office locations is available to the public on the www.deepwaterhorizonreponse.com website.

Question 4. BP appears to be actively directing funds towards the containment, response, and compensation efforts underway and we've heard the company's statements about how it expects to exceed the $75 million strict liability cap under the Oil Pollution Act. Since the cap is expected to be exceeded, does that indicate the cap should potentially be raised?

Answer. In regard to the economic damages cap of $75 million contained in the Oil Pollution Act (OPA), BP has stated that it is prepared to pay above $75 million on these claims and will not seek reimbursement from the U.S. Government or the Oil Spill Liability Trust Fund. More generally, the OPA is applicable to a wide variety of activities involving exploration, production, transport and handling of oil. BP does not have a position at this time concerning changes that might be made to that federal authority.

Question 5. Would BP anticipate a raise in this strict liability cap to limit its ability to partner with and do business with Independent exploration and production

Answer. BP has not assessed whether raising the economic liability cap under the OPA would limit its ability to do business with independent exploration and production firms. BP would expect to participate in the public discourse in connection with any future legislative proposals.

Question 6. As I understand it there are 10,000 personnel employed on containment and response efforts with 2,500 volunteers. Can you describe any positive developments in terms of innovative response that the collective minds have come up with?

Answer. Since the start of the MC252 spill, BP has received thousands of suggestions from the public describing potential ways to stop the flow of oil and gas or to contain the spill on and off the Gulf coast shoreline. Over 40,000 ideas had been submitted up until the end of May. Since the beginning of June, the number of suggestions coming in has increased—with BP's Houston Call Center now receiving, on average, 5,000 suggestions a day. These suggestions have come in from across the world. The suggestions have come in from a variety of people, ranging from general members of the public to oil industry professionals. The suggestions also have come in from those speaking many different languages, ranging from Arabic to Russian. Anyone with an idea for BP's team is encouraged to submit it using the Alternative Response Technology (ART) online form located at http://www.horizonedocs.com/artform.php.

This form is a valuable tool in helping the team to see quickly the potential of the idea because it collects a list of the materials, equipment, and skills required

[1] http://www.epa.gov/bpspill/dispersants.html

for the idea to work. After the caller completes and submits the form, 30 technical and operational personnel review its technical feasibility and application and classify it as one of three categories:

- Not possible or feasible under these conditions;
- Already considered or planned for; or
- Feasible.

So far, over 7,000 ideas have been reviewed by BP technical and operational personnel. Currently, over 250 ideas have been advanced to a higher-level review in order to determine which ones fill an operational need and may require testing in the field.

- One such idea, submitted by Clean Beach Technologies, is a solution that is designed to mechanically separate oil from sand. A sample taken from an oiled beach in Louisiana was lab tested to verify this solution's efficacy. It appears that this solution may be feasible, so it is being prepared for field testing.
- Another idea, presented by Ocean Therapy Solutions, offers centrifuge equipment technology that can effectively separate oil from water within an oil spill scenario. This idea is also undergoing field tests.
- Other information being evaluated includes methods to combat the oil saturated in the sargassum, or seaweed, along the Gulf Coast. BP is currently looking for technologies that might be viable in this regard.

To ensure each idea received is reviewed in a timely manner, BP now has expanded its internal team and has linked up with a new working group. The working group has been set up by the U.S. Coast Guard. The Interagency Alternative Technology Assessment Program (IATAP) workgroup was announced in Washington on Friday, June 4th and includes representatives from the Minerals Management Service (MMS), the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), the United States Army Corps of Engineers (USACE), United States Department of Agriculture (USDA), and the Maritime Administration (MARAD).

RESPONSES OF LAMAR MCKAY TO QUESTIONS FROM SENATOR MENENDEZ

Question 1. Should BP be drilling in places and at depths at which it is evidently not equipped to stop an oil spill once one has begun?

Answer. The circumstances of the Deepwater Horizon spill are extremely unique. The cause of the April 20 incident is the subject of BP's non-privileged, internal investigation, but, preliminarily, it appears that it resulted from a series of unexpected and unusual events. More than 40,000 wells have been drilled in the Gulf of Mexico and the incident on April 20 is the first event of its kind. Because the investigations of the incident are ongoing, it is premature to draw any conclusions about causes, but BP expects those investigations and review of the sub-sea interventions to be highly instructive concerning appropriate sub-sea intervention capability. The lessons learned will be incorporated into future planning and training.

Question 2. BP's lease at Deepwater Horizon received a categorical exclusion from the NEPA process last year. Why would this rig not require the oversight and regulation mandated under our country's most important environmental regulation? How could such an inherently dangerous activity not undergo thorough environmental review?

Answer. The MC252 well did undergo thorough prior environmental review under the National Environmental Policy Act (NEPA). The Council on Environmental Quality (CEQ) detailed the standard review steps followed for this well in a recent Federal Register notice:

> Under the Outer Continental Shelf Lands Act, MMS has implemented a process for oil and gas development consisting of the following stages: (1) Preparing a nationwide 5-year oil and gas development program, (2) planning for and holding a specific lease sale, (3) approving a company's exploration plan, and (4) approving a company's development and production plan. MMS is required to apply NEPA during each of these stages, beginning with the initial planning of outer continental shelf leasing and ending with a decision on a specific well. The sequence of NEPA analyses is informed by the CEQ Regulations Implementing the Procedural Requirements of the National Environmental Policy Act, 40 CFR parts 1500-1508 . . . Specifically, 40 CFR 1502.20, discusses "tiering," a strategy used to avoid repetitive discussions of the same topics, and to prevent unnecessary duplication of work by reviewers, as the NEPA reviews progress from a broad program to a site specific action.

> In the case of the Gulf of Mexico leases, MMS prepared several tiered NEPA analyses. Environmental Impact Statements (EIS), the most intensive level of analysis, were prepared at two decision points. First, in April 2007, MMS prepared a broad "programmatic" EIS on the Outer Continental Shelf Oil and Gas Leasing Program for 2007-2012. Also, in April 2007, MMS prepared an EIS for the Gulf of Mexico OCS Oil and Gas Lease Sales in the Western and Central Planning Areas, the "multi-sale" EIS. In October 2007, MMS completed another NEPA analysis, an Environmental Assessment (EA), under the multi-sale EIS, for Central Gulf of Mexico Lease Sale 206. This is the sale in which the lease was issued for the location that includes the Deepwater Horizon well. MMS previously approved BP's development operations based on a programmatic EA that MMS prepared in December 2002. Finally, for the Deepwater Horizon well, MMS applied its existing Categorical Exclusion Review (CER) process prior to the decision to approve the Exploration Plan that included the drilling of the Deepwater Horizon well. The Categorical Exclusion used by MMS for Deepwater Horizon was established more than 20 years ago.

75, Fed. Reg. 29996 (May 28, 2010). BP understands that the CEQ is now conducting a review of NEPA policies, practices, and procedures for the Minerals Management Service.

Question 3. BP likes to say that it is moving "Beyond Petroleum." What percent of your company's global capital expenditures in each of the last five years was spent on researching, exploring, and producing fossil fuels, and what percent was spent on those same activities for renewable fuels and renewable energy?

Answer. Since 2005, BP has invested approximately $4 billion in alternative energy, with activity focused on advanced biofuels, wind, solar power, and carbon capture and storage. From 2005 until 2009, BP's most recent reporting date, capital expenditures on activities related to exploration and production of oil and natural gas resources were approximately $73.85 billion.

Question 4. In a regional oil spill response plan BP filed, the company said it was capable of handling a spill of up to 300,000 gallons per day, which might be more than what is currently spilling in the Gulf of Mexico. Yet BP is evidently incapable of responding properly to the current spill. Why was the oil spill response plan insufficient to handle the blowout? What lessons do you draw from this failure?

Answer. BP has a comprehensive oil spill response plan (OSRP) that was most recently reviewed and approved by the Mineral Management Service in June 2009. The worst case scenario anticipated by the OSRP is 250,000 barrels a day for 30 days. In connection with this event, the OSRP was implemented and BP was able to draw on and deploy an inventory of boom, dispersant, skimmers and other equipment to respond to the spill. Upon notification, resources from Marine Spill Response Corporation (MSRC) and National Response Corporation (NRC) (among others) were activated and mobilized to the scene. The OSRP has been the foundation from which the Coast Guard, other government agencies and BP have directed the response across the Gulf on the surface, in the subsea environment, and at the shore line. However, the type of failure here is unprecedented and has complicated the response effort. The investigations of the incident are ongoing, and it is premature to draw any conclusions about causes or relative effectiveness. When the leak is brought under control and investigations are complete, BP expects to share with governmental authorities, the industry and others any lessons learned, and it will certainly incorporate them into future planning and training.

Question 5. Recent news reports reveal that, based on the videotape of oil spilling from the seabed that BP released, numerous scientists believe that far more oil is spilling out than earlier estimates suggested. Does BP have other video or technical data that it has not yet made publicly available that would help independent experts determine the extent of the spill and what caused it? If so, do you pledge to make these resources available to the public so that independent experts can determine what went wrong?

Answer. BP has made video footage and other data information available to a range of stakeholders, including the U.S. Coast Guard, Minerals Management Service, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency, U.S. Department of Homeland Security, U.S. Department of the Interior, U.S. Fish & Wildlife Service, National Park Service, U.S. Department of State, U.S. Geologic Survey, Centers for Disease Control, and the Occupational Health and Safety Administration, Members of Congress, and the public through live streaming video. In addition, the federal government created a Flow Rate Technical Group (FRTG), comprised of members of the scientific community and government agencies, to provide further specificity on the flow rate. Consistent with its stated com-

mitment to transparency and cooperation, BP has provided the FRTG with data showing release points and amounts of oil and gas currently being collected on the surface, as well as subsea video of the oil release to assist with FRTG's efforts. BP will continue to contribute its resources to contain the oil spill and understand the rate of oil release and its implications.

RESPONSES OF LAMAR MCKAY TO QUESTIONS FROM SENATOR LINCOLN

Question 1. In media reports following this disaster, I keep reading over and over again that certain devices and technologies being discussed to stop the leak have never been used in water this deep. Do you believe the depth of water presents more challenges in containing the leak? Do you believe more testing, research and technologies are needed to ensure the safety of deepwater and ultra-deep water drilling?

Answer. The depth of the water (in this case, nearly a mile) does present certain challenges, but it is important to note that the particular circumstances that led to the April 20 incident and that have impacted the containment response efforts are unique.

BP has committed up to $500 million to an open research program studying the impact of the Deepwater Horizon incident and the associated response actions on the marine and shoreline environment of the Gulf of Mexico. The key questions to be addressed by this 10-year research program reflect discussions with the US government and academic scientists. BP will fund research to examine topics including technology improvements to detect oil, dispersed oil, and dispersant on the seabed, in the water column, and on the surface; improved remediation technology to address the impact of oil accidently released to the ocean; the behavior of oil, dispersed oil and dispersant on the seabed, in the water column, on the surface, and on the shoreline; and the impacts of oil, dispersed oil, and dispersant on the biota of the seabed, the water column, the surface, and the shoreline.

Question 2. As the responsible party, BP has assumed liability for the damages resulting from this accident. What is BP doing to ensure that in the response and cleanup efforts, taxpayers don't end up footing the bill for this disaster?

Answer. As a responsible party under the Oil Pollution Act (OPA), BPXP is carrying out its responsibilities to mitigate the environmental and economic impacts of this incident. Its efforts are part of a unified command that was established within hours of the accident, and that provides a structure for its work with the Departments of Homeland Security and Interior, other federal agencies, and state and local governments. BP is committed to working with President Obama and members of his Cabinet, the governors, relevant state agencies and local communities of the affected Gulf States, and Congressional members. Everyone at BP fully understands the enormous nature of what lies ahead and is working to deliver an effective response at the wellhead, on the water, and on the shoreline.

Pursuant to the OPA, BP is paying all necessary cleanup costs and is committed to paying all legitimate claims for other loss and damages caused by the spill. BP is expediting interim payments to individuals and small-business owners whose livelihoods have been affected. As of June 8, BP had received over 39,000 claims and paid over $53 million. As BP has indicated, it believes the claims related to this event will exceed the economic damages cap set out in the OPA. BP is prepared to pay amounts above the statutory limit and will not seek reimbursement from the U.S. Government or the Oil Spill Liability Trust Fund.

Pursuant to OPA and other laws, as of June 8, 2010, BP also has paid $45 million to federal and state trustees, to enable them to engage in the pre-assessment and initial assessment of potential injuries to natural resources in the Gulf. The parties are working together in a cooperative manner to develop and implement further studies to evaluate the potential effects of this incident on natural resources.

Question 3. In your testimony, you state that blowout preventers are used on every oil and gas well today, and are supposed to be "fail safe." Clearly, as you indicated, that was not the case on the Deepwater Horizon rig, and BP is looking at why the blowout preventer did not work.

Answer. The functioning of the blowout preventer (BOP), and specifically why it did not function as expected on the Deepwater Horizon, is the subject of BP's ongoing non-privileged, internal investigation.

Question 4. What was BP's contingency plan should a blowout preventer fail and a leak take place? Do you believe a remote-control shutoff device would have made a difference in this accident? Do you believe that MMS should review their decision not to require remote shutoff switches and make them mandatory as they do in Norway and Brazil?

Answer. BP's investigation is continuing, and no determination has been made yet as to whether the absence of an acoustic backup control system was a significant factor with respect to the Deepwater Horizon BOP's performance.

The purpose of an acoustic backup control system is to provide back up operation of critical BOP functions in an emergency. Although the Deepwater Horizon did not have an acoustic backup control system, the Deepwater Horizon was equipped with multiple emergency systems: (1) an Emergency Disconnect System (EDS), (2) an automatic mode function (AMF), or "deadman", which activates when all hydraulic and electrical power is lost, and (3) ROV intervention capability. If a rig is equipped with multiple emergency systems, such as the Deepwater Horizon, an additional acoustic backup control system may be disadvantageous because it adds complexity to the hardware on the BOP stack.

BP is continuing its investigation and has not yet determined whether the BOP rams activated and closed either during the April 20 incident or subsequently.

RESPONSES OF LAMAR MCKAY TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What is BP's safety record with offshore drilling in the Gulf of Mexico and worldwide? Have you had any other incidents when you have subcontracted with Transocean?

Answer. BP's Drilling and Completions operations safety performance is at or better than industry (as measured by the International Association of Drilling Contractors voluntary survey) for both Gulf of Mexico and worldwide operations. In 2009, BP experienced 14 recordable incidents including 2 that resulted in Lost Time Incidents (LTIs) in our drilling and completion operations in the Gulf of Mexico. One of the LTIs and 7 of the recordables occurred on Transocean drilling rigs. These 14 incidents result in a LTI frequency of 0.12 and a Recordable Injury Frequency (RIF) of 0.82 for BP 2009 Drilling & Completion activity in the Gulf of Mexico. According to the International Association of Drilling Contractors website, a voluntary reporting mechanism for companies, the average 2009 US Waters Lost Time Incidents frequency rate was 0.20 and the Recordable Injury Frequency was 0.87.

BP's 2009 worldwide Drilling & Completions Lost Time Incident rate was 0.09 and the RIF rate was 0.67. According to IADC, global industry rates in 2009 were 0.37 and 1.92 for LTI and total Recordable rates, respectively. On Transocean rigs in 2009, BP experienced a total of 4 lost time incidents and 15 recordable incidents globally. There was one fatality in 2009 that occurred on a rig in Azerbaijan operated by a Joint Venture company, Caspian Drilling Company, which Transocean provided rig management services. Transocean are no longer involved in this operation.

There have been two incidents involving Transocean's Deepwater Horizon drilling rig since January 2005, both of which occurred in 2007 and one of which resulted in a fine. One of the two incidents involved a Notice of Violation assessed by the U.S. Coast Guard in April 2007 in connection with the accidental release of 10-12 gallons of synthetic base mud into the Gulf of Mexico. A $250 fine was imposed for this incident.

The second incident occurred in March 2007. MMS issued an Incident of Noncompliance (INC) after concluding that a pressure washer located on the rig floor had no external ground wire. Rescission of the INC was requested because the equipment in question was maintained and operated in accordance with all applicable safety codes and regulations. On July 17, 2007, MMS approved the rescission request and removed the INC from its database. No fine was imposed in connection with this incident.

Question 2. What is/was the role of BP in drilling this particular well? Is there a BP employee on the rig overseeing the subcontractors? Was BP responsible for all the drilling requirements (Ex. the depth of the well, where to drill, the mud mixture, cement mixture, when to remove the mud, when to place the cement plug in place)?

Answer. The roles and responsibilities of BP in drilling this well are governed by the 1998 drilling contract between BP America Production Co. and Transocean Holdings LLC.[2] A summary interpretation of these roles and responsibilities is provided below, in accordance with BP's current understanding and interpretation of the contract. BP reserves the right to amend or supplement this response upon fur-

[2] The original contract was between Vastar Resources, Inc. and R&B Falcon Drilling Co. The contracting parties became BP America Production Co. and Transocean Holdings LLC through acquisition and assignments.

ther review and analysis of contractual rights and obligations, and upon further investigation.

MMS awarded the lease to BP Exploration & Production Inc. ("BPXP"). As operator, BPXP creates the well design, which includes drilling parameters such as well depth, drilling location, and the overall requirements for mud and cement to meet the well objectives. BP provides the procedures for well construction, including the order that they are to be performed. As the owner of the rig and equipment, Transocean is responsible for performing the drilling operation to the supplied specifications, and is responsible for overall safety on the rig. In addition, BP engages third-party contractors to provide specialized services such as mud and cement design. Specifically, Transocean is responsible for the safe handling of well control situations in accordance with the procedures set forth in, for example, the Transocean Emergency Response Manual.

BP company representatives, called Well Site Leaders, are stationed on the rig site to evaluate whether the well is constructed to BP design specifications. In addition, the Well Site Leaders are the primary interface with the third-party contractors on the rig that provide specialist services, such as mud and cementing services. The third-party contractors are independent contractors and are responsible for ensuring that their specialist services are performed properly and according to specifications. Typically, two Well Site Leaders are stationed on the rig site, and they work 12-hour shifts.

Question 3. Who were the subcontractors that BP hired to drill the well, to pour the mud, and pour the cement?

Answer. The contractors retained for drilling the MC252 #1 well were Transocean LTD to drill the well, M-I SWACO for mud-related services, and Halliburton Company for cement-related services.

Question 4. It is my understanding that drillers rely on three lines of defense to protect themselves from an explosive blowout: heavy mud, cement/cement plugs, and a BOP and alll three of these defenses failed? Could you please explain to me how three defenses failed to work?

Answer. Please refer to BP's response to the Chairman's question No. 8.

Question 5. Was this well abnormal in the amount of pressure that was being released from the reservoir?

Answer. BP's current understanding is that the pressure in the MC252 well is not materially different from the pressure that was anticipated during well planning.

Question 6. Could you please tell me the progress of the relief well and the current depth and time line for reaching the reservoir?

Answer. BP is currently drilling two relief wells. The depth of one relief well, MC252 #3, is approximately 14,000 feet, as of June 9. The depth of the other relief well, MC252 #2, is approximately 8,500 feet, again as of June 9. BP expects to reach the reservoir by August.

Sincerely,

TONYA ROBINSON.

RESPONSES OF ELMER P. DANENBERGER TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. Your testimony indicates significant familiarity with the Montara blowout off of Australia last year, so can you enlighten the committee as to how this incident is different from the Montara incident?

Answer. The differences are significant. The Montara blowout well was one of six development wells drilled with a jackup rig cantilevered over a production platform in <100 m of water. The wells were suspended from the jacket (platform tower) above the water surface pending installation of the platform decks. There was no BOP in place when the blowout occurred. The only barrier in the well bore at that time was the cement at the shoe of the production casing. The flow rate at Montara was significantly lower (probably <1000 BOPD). The main similarity in the two incidents is the failure of well integrity after the wells had been drilled to total depth and the production casing had been set. Both wells should have been completely sealed with casing and cement, and oil and gas influxes should not have been possible.

Question 2. Can you describe your experience at MMS in terms of your several decades as a regulator now that you've left? Specifically, do you observe that MMS has been taking its safety and environmental responsibilities more seriously, less seriously, or about the same as OCS development has expanded into the deepwater?

Answer. MMS regulatory personnel have always demonstrated a high degree of professionalism and taken their safety and pollution prevention responsibilities very seriously. I haven't seen any change in that commitment over the years. I do believe

the function-based division of responsibilities proposed by Secretary Salazar will ensure that accountability and authority are clear, and will enable regulatory managers and staff to focus solely on safety and pollution prevention. I also believe this function-based approach will improve the efficiency of the regulatory program and minimize the potential for gaps and confusion.

Question 3. In the event of a large natural gas "bubble" hitting the rig, has MMS required or contemplated requiring mechanisms be available where gas sensors and alarms could trigger an automatic shutoff of any potential spark or flame source?

Answer. As provided in 30 CFR 250.459 the areas around the rig floor and mud pits are designed and equipped to minimize the risks of sparks and other flame sources. However, the required alarm systems do not actuate BOP equipment. The concern is that auto-actuations triggered by gas alarms might compromise ongoing well control actions. For example, if a gas kick was detected and a shear ram was automatically actuated, it would no longer be possible to circulate mud down the drill pipe and kill the well in that manner. In light of the multiple BOP panels around the rig, personnel should be able to initiate an emergency closure prior to evacuation. Also, the shear ram should automatically actuate if power is lost or the riser is disconnected. Why these signals were either not delivered or unsuccessful in closing the shear ram on the BP well will be central issues in the investigation.

Question 4. Can you describe the level to which the Deepwater Horizon is in a situation where it is dependent on its BOP to avoid catastrophic blowouts perhaps more than other rigs in shallower waters?

Answer. In my opinion, the dependency on the BOP is the same regardless of the water depth. If there is a wellbore integrity failure and effective downhole barriers are not in place, the BOP will have to shut-in the well in any water depth. However, I agree that BOP reliability, while important at any depth, is more critical in deepwater. This is because of the greater difficulty in performing subsea well interventions as compared to surface capping operations on a shallow-water rig or platform.

Responses of Elmer P. Danenberger to Questions From Senator Menendez

Question 1. Why do the current safety and environmental regulations not differentiate between deep and shallow water development? Do you think there should be more stringent regulations for deepwater developments?

Answer. There are differences in drilling, production, pipeline, and environmental regulations for deep and shallow water. However, the requirements specific to deepwater operations are not collated in a separate regulatory subpart. This is something that I'm sure will be considered as the regulations are reviewed in the aftermath of this tragic accident.

A higher degree of reliability is critical in deepwater, because of the greater difficulty in performing well interventions. Regulations never precede technological and safety advances, so we cannot rely entirely on standards and prescriptive rules. Operators must assess risks and clearly demonstrate that they have redundant controls in place to protect people and the environment. These protections must be present during every phase of the drilling program and throughout the life of production operations. Regulators must challenge operators and make sure their management systems are effective and fully implemented in the field.

Question 2. Do you think we are drilling at depths in our waters that are too risky?

Answer. No, but I think well integrity risks need to be more closely scrutinized for all OCS operations, particularly those in deepwater. Special attention should be given to deepwater operations because of the size and complexity of the facilities, the high flow potential, the number of workers, and the greater difficulty and complexity of emergency responses. Operators must carefully examine and manage the risks associated with all of their activities and regulators need to continually question operators, audit their management programs, inspect their facilities, and hold them accountable for safety achievement, not just for compliance.

Response of Elmer P. Danenberger to Questions From Senator Lincoln

Question 1. In media reports following this disaster, I keep reading over and over again that certain devices and technologies being discussed to stop the leak have never been used in water this deep. Do you believe the depth of water presents more challenges in containing the leak? Do you believe more testing, research and technologies are needed to ensure the safety of deepwater and ultra-deep water drilling?

Answer. Deep water makes well intervention more difficult and complicates well control operations, particularly when the rig and riser are disconnected from the well. While the drilling technology for 5000' water depth wells is well established, there has never been a major deepwater blowout, and subsea intervention and con-

tainment systems are not sufficiently advanced. I believe that more research and development are needed to further evaluate deepwater well intervention options and test subsea containment systems.

RESPONSES OF STEVEN NEWMAN TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You have testified that the Deepwater Horizon explosion was a sudden catastrophic failure of the casing, the cement, or both. Please state the basis for that testimony, and provide any and all data and documents in your possession that support that statement.

Answer. The Deepwater Horizon explosion occurred after the well construction process was essentially finished. Drilling had been completed on April 17, and the well had been sealed with cement by the cementing contractor. BP did not plan to use the well for production at this time; rather BP planned to reopen the well at a later date if it chose to put the well into production. At the time of the explosion and fire, the Transocean crew, at the direction of BP, was in the process of displacing drilling mud and replacing it with sea water. The drilling mud thus was no longer being used as a means of reservoir pressure containment. The cement and the casing were the barriers controlling pressure from the reservoir.

The basis for my belief that there was a sudden catastrophic failure of the casing, the cement, or both, is that the reservoir of oil at the Macondo well is located more than 13,000 feet below the sea floor. The blowout preventer ("BOP") is located at the sea floor. At that stage of the drilling process, the pathway from the reservoir to the sea floor was supposed to be barriered by cement and casing. In other words, in order for the hydrocarbons to get from 13,000 feet below the sea floor to the sea floor and ultimately the rig, one or both of those barrier mechanisms must have failed.

Transocean has assembled an investigative team to determine what caused the explosion and fire, a team that includes dedicated Transocean and other industry experts. That investigation is ongoing. As this Committee and others have requested, Transocean will report the findings of the investigation when it is complete.

Question 2. You have testified that the plans for an offshore well operation like the Deepwater Horizon begin and end with the Operator. You have stated that the Operator's well plan dictated to Transocean as the driller the "manner in which the drilling is to occur, including the location, the path, the depth, the process and the testing." Please provide a complete copy of the Operator's plan for drilling the Macondo well including any changes made during the course of the operation.

Answer. In response to this request, Transocean will provide the Committee with a copy of the BP Well Plan for the Macondo well. For ease of reference, the Well Plan will bear Bates-numbers TRN-HCEC-00064695 through TRNFICEC-00064802. The Operator may submit changes; if so, those would be in the possession of the Operator or the regulator.

Question 3. Please state whether Transocean would take any action to challenge any aspect of such a plan if Transocean believed it to be inadequate or unsafe. Would Transocean carry out a plan at the behest of an Operator that it believed to be inadequate or unsafe? Did any employee of Transocean suggest or express a preference for a different approach for any aspect of the well operation or its implementation at any time prior to the explosion? In particular, did any employee suggest a different approach or any different activities for withdrawal of drilling mud during the plugging and abandonment phase of the operation? If not, did you believe the rig operation and implementation of all phases of the drilling operation to be safe at all times up to the explosion? Please provide any and all data and documents relevant to any aspect of your answer. If Transocean employees' actions were oral rather than written, please identify the employees and their job titles.

Answer. Transocean does not participate in the creation of Operator's well plan or changes and does not have expertise in that area. Transocean would not carry out a specific action being urged by an Operator if Transocean believed that action would be unsafe. Transocean would, however, generally rely on the operator with respect to decisions regarding the well design or integrity. Transocean is in the business of leasing rigs to our customers, and customer satisfaction is important to us, but we will not compromise safety in pursuit of customer satisfaction.

Our investigation into the cause or causes of this accident is ongoing. The investigation will examine the events leading up to the explosion, including, but not limited to, whether any Transocean employee suggested or expressed a preference for a different specific action with respect to withdrawal of drilling mud during the abandonment phase of the operation. There is some evidence of a discussion about activities on the rig on April 19 or 20 as reflected in testimony at the U.S. Coast

Guard hearings. Transocean has a copy of the transcript of Coast Guard proceedings. We have seen media statements reporting various versions of events on April 19 and 20, but our investigation has not yet provided sufficient information in part because some Transocean employees died in the accident and some on the rig are employed by 13P or are BP contractors.

Question 4. You have testified that the blowout preventer (BOP) was not the cause of the accident. Please state whether. had it performed correctly, it could have prevented the oil spill as a result of the accident. If not, please state what you believe to be the "fail-safe" mechanisms that should be present in an offshore well operation. Please provide any data or documentation relevant to your response.

Answer. Transocean will produce the following operations, maintenance and training manuals from Cameron related to the BOP and its control systems.

The Cameron BOP is designed to close around, or cut through, a string of drill pipe in use on the well to restrict the flow of oil; it is not designed to cut through cement, casing, tool joints, or other significant debris. Thus, provided that the BOP was asked to function within its design specifications, there currently is no reason to believe that it would not have done so.

Because the BOP has not been retrieved from the sea floor, we do not know whether it was damaged by the surge that emanated from the well beneath the BOP or whether the surge may have blown debris into the BOP, thereby preventing it from fully squeezing, crushing or shearing. As part of the ongoing Transocean investigation into this accident, personnel hope to examine the BOP when it is retrieved from atop the well.

Question 5. Many have testified to the fact that BOP's shear rams are known to be unable to cut through certain material in the well such as tool joints or other debris. Do you agree? If so, please discuss whether BOP's can or should be considered a fail safe protection against well failure? Do you advocate or require any steps be taken address this problem?

Answer. The BOP is designed to facilitate pressure control by closing around, or cutting through, drill pipe and most sizes of casing; it is not designed to close around, or cut through, all types of materials, including significant debris, such as cement. Without knowing what was inside the BOP at the time of the event, it is not possible to determine whether the BOP was subjected to conditions that exceeded its design constraints.

The BOP is a very robust piece of equipment and extremely effective during drilling operations. At the same time, should not he and has never been viewed by the industry as "fail-safe" in every circumstance. We do not subscribe to the position that the inability of the BOP shear rams to cut through every type of tubular or debris is a design flaw. The industry recognizes those limitations, and there are operating procedures in place to account for these limitations. Having said that, Transocean believes that we need to fully understand what happened to the well, the barriers, and the BOP and determine whether changes should be made to improve the effectiveness and safety in the unusual circumstances of an accident like the one on April 20, 2010.

Question 6. Please state whether the retrofit to the BOP discussed during your hearing testimony was conducted with the approval and oversight of the BOP manufacturer, Cameron.Please state whether these changes were tested following the retrofit of the altered rams and, if so, describe the nature of the tests and whether all the rams were tested and passed inspection. Please provide all documents or data in your possession that describe or otherwise discuss the retrofit or modifications of the BOP stack and any testing of the BOP following the retrofit.

Answer. As discussed in the hearing, the BOP was modified in 2005 at BP's request and at BP's expense, and as requested, Transocean will provide the Committee with a copy of the October 11, 2004 agreement in which BP requested the modification. The BOP on the Deepwater Horizon was fitted with seven preventors on the stack (five rain preventors and two annulars), which exceeded regulatory requirements. The 2005 modification converted one of those ram preventers, the lowermost ram preventer, from a conventional well bore sealing rain to a BOP test ram, which allowed for more efficient testing of the BOP.

Transocean performed the modifications under the direction of BP, and BP presumably coordinated with the Minerals Management Service ("MMS"). Although Cameron did not participate in these modifications, the changes were made using Cameron equipment.

The BOP rams—including the test ram—have been tested regularly since the conversion in 2005. The BOP most recently passed tests on April 10, 2010, and April 17, 2010, and the BOP blind shear rams passed a pressure test on April 20, 2010.

Question 7. Please describe any and all data or documents in your possession relevant in any way to the Deepwater Horizon operation at the Macondo well. Please

state whether that data has been made available without exception to Federal government investigators, and identify those investigators. If not, please describe the extent that any data or documents have been withheld and the reason for withholding.

Answer. Transocean has been and will continue to be open and responsive to requests from Congress and the federal government. This request is too broad in scope to be answered in a narrative or at this time; however, Transocean has collected and produced more than 100,000 documents to the federal government, including MMS and the U.S. Coast Guard, the U.S. Senate Committee on Environment and Public Works, the House Committee on Energy and Commerce, the House Committee on the Judiciary, and the House Committee on Natural Resources and Transocean continues to collect, review, and produce responsive materials. Transocean will provide the Committee with disks containing the documents it has previously produced and will provide the Committee with additional documents as they arc produced.

Question 8. Please identify any and all Transocean witnesses, and describe all witness statements from Transocean employees, with knowledge of the Deepwater Horizon operation, whether present on the rig or not. Please state whether these witnesses and statements have been made available without exception to Federal government investigators, and identify those investigators. If not, please describe the extent to which witness statements or access to witnesses has been withheld.

Answer. In response to this request, Transocean first refers the Committee to the April 20 Daily Drilling Report and the Persons on Board report that list all persons working on the rig that day. Transocean has produced all written and/or transcribed oral statements that Transocean representatives took from these employees after the accident and also produces statements that were taken by the U.S. Coast Guard following the accident to the extent these statements have been shared with Transocean. In addition, several persons on board have testified in the Coast Guard proceeding that is ongoing and/or to the House Judiciary Committee in May. Transocean has made its witness statements available from the outset.

Transocean has not prevented any federal government investigators from meeting with or speaking to any Transocean employee on the rig during the accident. For instance, we understand that most of the 70 surviving Transocean employees on the Deepwater Horizon at the time of the accident provided written statements to the Coast Guard and some have testified in the ongoing Coast Guard proceedings and/or the House Judiciary Committee hearing on May 27. For those employees who have retained their own counsel, Transocean has provided contact information for such counsel.

Finally, Transocean has not produced any of its attorneys' notes prepared during and after witness interviewed to assist Transocean's preparation for civil litigation. In addition to being privileged work produce, such interview notes do not appear responsive to this request upon request.

Question 9. Some have suggested that replacement of drilling mud with seawater is an area of concern in connection with this accident. Please describe in detail the operation and its sequence in the well plugging and abandonment process in which drilling mud was withdrawn from the well. Please state whether the sequence and timing of this operation is considered industry best practice, and whether you have ever used this sequence and timing of operation in other wells. If so, what percentage of your wells are handled in this manner? To the extent not covered in your response to question #3, please state whether any Transocean employee expressed any opinion on this matter to the Operator BP. If so, what was that opinion? Please provide any data or documents in your possession relevant to this issue, and identify any employee who made oral statements in this regard.

Answer. It is normal practice to remove the drilling mud from the riser prior to disconnecting the riser from the well, and that would have been part of the logical sequence of events during abandonment of the well. Given that our investigation into the accident has not yet concluded, however, we do not yet have a definitive understanding of the actual order of the events that took place on the evening of April 20, 2010, and therefore have not assessed whether the sequence of events would be considered consistent with industry best practices.

Question 10. You have testified that BP and Transocean jointly tested the BOP on April 10 and April 17 and it was found to be operational. Please state whether all the rams were activated during these tests and indicate whether they were tested individually or in concert (i.e. were all annular rams tested at the same time?). Please provide any and all data and documents related to these tests. In addition, please address media reports suggesting that pieces of rubber or rubber seals from the annular rams were brought up to the rig in drilling mud. Did any Transocean employees observe or learn of this result? Did they have opinions expressed in writ-

ing or orally about the causes and seriousness of this event? What actions if any were recommended or taken as a result? Please provide any data or documents in your possession related to this issue, and identify any employees who made oral statements in this regard.

Answer. In response to this request, Transocean has produced the IADC Daily Drilling Reports and the RMS Morning Reports documenting the results of the 130P tests conducted on April 10. 2010, and April 17, 2010. These reports reflect that the BOP passed tests on April 10, 2010, and April 17, 2010. In accordance with standard procedures, all rams except the shear rams were activated during these tests, and all were found to be functioning properly. This complies with testing procedures which are that all rams except the shear rams be tested individually, not simultaneously. In addition, the blind shear rams of the BOP were pressure tested on April 20, 2010, and passed.

We understand from the May 16, 2010 60 Minutes segment that Transocean Chief Electronics Technician Michael Williams stated that he saw pieces of rubber brought up to the rig in drilling mud approximately four weeks before the accident. While the Company has not located any record of this reported observation, having some rubber returns to the shakers in the drilling mud is normal. There are several sources of rubber down hole; annular rubber would be the most common source. Given the size of the annular, the manufacturer advises that periodic stripping by use is expected, and a handful of chunks of rubber is immaterial. The annular is roughly three feet in diameter, about 18 inches tall, and weights about 2.000 pounds. It is designed to close around drill pipe, and drill pipe regularly moves through closed annular valves, which can displace small pieces of the annular rubber. The rubber used in annular blowout preventers is known to be a consumable item, and rubber loss is not considered problematic if the annular blowout preventer continues to hold rated pressure. Cameron brochures, publicly available on Cameron's website highlight these facts. For example, one such brochure explains that "Rifle elastomeric packing elements used in CAMERON Type D/DL annular blowout preventers are considered to be consumable items and will eventually wear-out as a result of repeated closures and pressure test. Every closure and pressure test while in-service will use up some of the packing element life. The packing element subassembly should not he rejected for continued service based on cosmetic appearance. Failure of a pressure test or drift test are the only justifiable reasons for rejection." See In-Service Condition of CAMERON D/DL Annular BOP Packing Element Subassemblies, available athttp://www.c-am.com/cam/search/showdocw.cfm?DOCUMENT___ID=8360.

Question 11. Please state how many centralizers were used in the casing of the Macondo well. Include in your answer the number required in the original well plan and whether any changes were made to that aspect of the plan or its implementation at any time prior to the explosion. Please provide any and all data and documents relevant to your answer.

Answer. The Wall Street Journal has reported on the number of centralizers used in the casing of the Macondo well. Centralizers are used in the cement process and were provided by either the cementing contractor or the Operator. Transocean does not have independent knowledge of the number of centralizers available or used in the easing of the Macondo well.

Question 12. Please describe Transocean's data and document retention policy as relevant to the Deepwater Horizon Macondo well documents and data.

Answer. Almost immediately after the incident, Transocean instituted a policy of preserving documents that may he informative about the incident. That policy, which preceded any government or external requests to hold documents, remains in place. Any written documentation maintained solely on the rig at the time of the event is no longer available.

Question 13. Please describe when the last data available to Transocean regarding the Deepwater Horizon Macondo well operation was generated.

Answer. Recording of data is triggered by the manual entry of data on the rig. The next manual entries were not expected until midnight or later, as entries are typically made on the rig at the end of a twelve-hour shift that starts at noon. Transocean received the last data pack from the rig at 3:00 p.m. on April 20, 2010, the time of the last entry on the April 20, 2010 drilling report. Any information generated after 3:00 p.m. is not available to Transocean, although BP is believed to have real-time, streaming data from the rig to shore.

Responses of Steven Newman to Questions From Senator

Question 1. Briefings and testimony have indicated that mud weight in the drill column is an important barrier against blowouts. This blowout seems to have oc-

curred after drilling and after the mud weight would have been relevant, so is it a fair assumption that the root problem seems to have been with the actual well?

Answer. You are correct in that this blowout seems to have occurred after drilling and after the mud weight would have been relevant, where the casing and cement are expected to provide the sole barrier to hydrocarbon ingress. Therefore, without a failure of the cement, the casing, the well head hanger assemble seal for the 9-5/8" casing, or both, the explosion would not have occurred.

Question 2. Our previous panel spoke to the range of pressures that may have been at play leading up to the incident. Is it fair to say that at some point before the explosion, the rig experienced some kind of abnormality in well pressure, even though the well had been cased and cemented and was nearly complete?

Answer. The Deepwater Horizon explosion occurred after the well construction process was essentially finished. Drilling had been completed on April 17, and the well had been sealed with cement by the cementing contractor.

A blowout is associated with abnormal pressure. Transocean does not have records to determine when or how pressures became abnormal or triggered the blowout although BP is believed to received real-time, streaming data from the rig to shore.

The reservoir of oil at the Macondo well is located approximately 13,500 feet below the sea floor whereas the blowout preventer ("BOP") is located at the sea floor about 2 V2 miles away. At that stage of the drilling process, the pathway from the reservoir into the well and up to the sea floor was supposed to be effectively sealed by cement and casing. Therefore, in order for the hydrocarbons to get from 13,500 feet below the sea floor to the sea floor and the BOP and ultimately to the rig, one or both of the casing or cementing must have failed.

Question 3. What was the crew's and management's reaction to this abnormality?

Answer. As the Operator, BP was managing operations on the Deepwater Horizon. Media reports have indicated that BP stated that they were not prepared to address abnormalities of this nature. Media has also reported a rig to shore communication among BP personnel in which Transocean was not involved.

We do have information that members of the Transocean crew activated the blowout preventor prior to evacuating the rig.

Question 4. To the extent you are familiar with the Montara blowout off of Australia last year, can you enlighten the committee as to how this incident is different from the Montara incident?

Answer. Transocean has no direct knowledge of the Montara blowout other than what was reported in initial findings issued by the U.S. Coast Guard. While both involved the use of nitrogen cement, Transocean understands that the Montara incident involved a shallow-water operation using a jack-up rig over a platform, which is distinct from the deepwater incident involving the Deepwater Horizon.

Question 5. Transocean's operations have been directly affected in US waters as a result of the Deepwater Horizon incident, but have you ordered any additional safety measures or modified procedures for operations outside the U.S. based on the incident?

Answer. Transocean maintains a consistent standard of policies and procedures, maintenance practices, and operating practices across the Transocean fleet throughout the world. Until we know exactly what happened on April 20, 2010 and the real sequence of events, it is difficult to speculate about what additional safety measures should be implemented or what operational procedures should be modified. In the aftermath of this incident, we have continued to follow Transocean policies and procedures around the world until we find out what may have contributed to the cause of events.

Transocean is committed to working hard to understand what caused this accident and what might have averted it. We will implement whatever recommendations come out of that analysis.

Question 6. Is it foreseeable that a BOP would encounter a sudden introduction of cement or other foreign substance from a well that has either lost or failed to establish its integrity, or is such a scenario so unlikely that it had not previously been contemplated?

Answer. As noted above, the BOP is designed to close around or cut through, drill pipe to restrict the flow of oil; it is not designed to cut through cement, casing, tool joints, or significant debris. Failure of well integrity of a cased and cemented well and the possible subsequent introduction of cement and casing into a BOP is extremely unlikely.

RESPONSES OF STEVEN NEWMAN TO QUESTIONS FROM SENATOR MENENDEZ

Question 1. What other redundant mechanisms are available to the industry for preventing with deep blowouts that were not present on the Deepwater Horizon, and why were they not present?

Answer. The primary industry means of controlling reservoir pressure during drilling operations is drilling mud and cement and casing. The BOP serves as a secondary means of controlling reservoir pressure if the drilling mud proves inadequate during drilling operations. The BOP function is to seal the wellbore in the event of a blowout during drilling operations. I am not aware of any available mechanism other than a BOP for sealing the wellbore in the event of a blowout during this phase of operations.

In contrast, the sole means of controlling reservoir pressure after the drilling phase is complete and the well has been plugged or abandoned are the casing and cement. The BOP is removed from every well when the abandonment phase is complete, and at that time the B0P is no longer intended to serve as a redundant control mechanism. Therefore, the well design must be able to secure the well and seal it from hydrocarbon ingress and transport to the surface.

RESPONSE OF STEVEN NEWMAN TO QUESTION FROM SENATOR LINCOLN

Question 1. In media reports following this disaster, I keep reading over and over again that certain devices and technologies being discussed to stop the leak have never been used in water this deep. Do you believe the depth of water presents more challenges in containing the leak? Do you believe more testing, research and technologies are needed to ensure the safety of deepwater and ultra-deep water drilling?

Answer. In the course of our support of BP and the Unified Command in attempting to contain the leak and based on media reports, it appears that the depth of the water has presented more challenges than anticipated. We cannot say, however, with any certainty what additional testing, research and technologies might be warranted to ensure the safety of deepwater and ultra-deep water drilling until what caused the accident is known. Once the causes have been identified, Transocean will certainly support development of any additional technologies that may be necessary to ensure that the April 20 events do not occur again.

RESPONSES OF STEVEN NEWMAN TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What is Transocean's safety record in the Gulf of Mexico and worldwide?

Answer. Transocean has maintained a strong safety record in the Gulf of Mexico and throughout the world. Transocean has never—and will never—compromise on safety. In 2009, Transocean recorded its best ever Total Recordable Incident Rate (TRIR). Thirty-eight (38) rigs had zero TRIR (no recordable incidents) and sixty-seven (67) rigs had zero serious injury cases. Four (4) rigs achieved our safety vision of zero incidents. In addition, MMS awarded one of its top awards for safety to Transocean in 2009. The MMS SAFE Award recognizes "exemplary performance by Outer Continental Shelf (OCS) oil and gas operators and contractors." The Deepwater Horizon had a seven-year history with no loss time accidents. The Deepwater Horizon set the record for deepwater operations for a semi-submersible drilling rig and achieved the record for the deepest well ever drilled.

Question 2. What purpose does the Blow Out Preventer (BOP) serve?

Answer. A blowout preventer (BOP) is a series of large valves that are positioned on top of a well to provide secondary pressure control of a well. BOPs are designed to quickly shut off the flow of oil or natural gas in the case of a kick or blowout during drilling operations, which is a sudden, uncontrolled release of pressure from below the sea floor. BOPs are made in a variety of styles, sizes and pressure ratings. Sometimes, several different units of a BOP are combined into a single device, often called a BOP "stack." A BOP stack is a set of two or more preventers used to provide pressure control of a well. A typical stack might consist of one to six ram-type preventers and, optionally, one or two annular-type preventers. A typical stack configuration has the rani preventers on the bottom and the annular preventers at the top. The configuration of the stack preventers is optimized to provide maximum pressure integrity, safety and flexibility in the event of a well control incident. Deepwater BOP stacks weigh as much as 700,000 pounds and stand five stories tall.

Question 3. How many rams are there within the BOP stack and could you please explain the purpose of each ram?

Answer. The Outer Continental Shelf Lands Act ("OCSLA") requires that subsea BOP stacks (those positioned on wellheads on the ocean floor like the Deepwater Horizon) include at least four remote-controlled, hydraulically operated BOPs con-

sisting of an annular BOP, two BOPs equipped with pipe rams, and one BOP equipped with blind-shear rams. The Deepwater Horizon BOP exceeded these regulatory requirements by maintaining five rams and two annular preventers in its stack: two pipe rams, one blind shear ram. one casing shear ram, and two annulars. The BOP also had one test ram. The individual rams are pictured and explained more fully in the Cameron Manuals that will be provided. They are generally described as follows:

- Pipe rams consist of two blocks of steel with a half-circle hole on each edge sized to fit around the drill pipe upon closure.
- Blind shear rams are similar to pipe rams but without a hole for the pipe. When blind shear rams close, they form a solid surface in the center of the wellbore and contain pressure.
- Casing shear rams are rams outfitted with steel shearing devices designed to cut through drill pipe and other tubulars, if all other barriers fail.
- An annular B0P is another type of valve, this one featuring a sealing element that weighs more than one ton. Annular BOPs work by mechanically squeezing a rubber element inward to seal on either a pipe or the open hole itself.

Question 4. When did the last safety test occur for this particular BOP and what were the results of the test?

Answer. The Deepwater Horizon BOP was tested on April 10, 2010, and April 17, 2010. In accordance with standard procedures, all rams except the shear rams were assessed during these tests, and each passed successfully. The blind shear rams of the Deepwater Horizon BOP were pressure tested and passed on April 20, 2010.

RESPONSES OF TIM PROBERT TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Please provide any and all data and documents, including technical specifications, describing the well plan and its casing and cementing program as well as any modifications to that plan provided by BP or any other source for Halliburton's work on the Deep water Horizon Macondo well.

Answer. Halliburton does not have the actual well plan document, and thus has not had access to it in answering this question.

- Halliburton developed the cementing proposal based on well information provided by the well owner. Halliburton had no role in developing the casing program. Decisions regarding the final cementing procedure, including the number of centralizers and the cement volume, were made by the well owner. See the following documents:
- Macondo—MC252—97/8x7 Prod Casing—V6—CustomerCopy.pdf, HAL—0011047-HAL-0011058
- 9.875 x 7 Prod. Casing Design Report—21 Cent.PDF, HAL0010699-HAL0010720
- 9.875 x 7 Prod. Casing Design Report—6 Cent.PDF, HAL—0010988-HAL—0011020

Question 2. Please provide any and all documents or data to or from Halliburton or BP concerning the equipment or material to be used during Halliburton's activities on the Deepwater Horizon and in the Macondo well. Please state the type of cement, type of casing, extent of cementing, plugs and numbers of centralizers used in this well and provide all documentation of these specifications, and any modifications made to the original plan.

Answer.

- The cementing system designed for the Mississippi Canyon Block 252 Well Number 1, 9 7/8" x 7" casing job contained the following:
  - Lafarge Class H Cement + the following chemicals
    - B WOC (by weight of cement) EZ-Flo,
    - BWOC D-Air 3000
    - Potassium Chloride Salt
    - BWOC SSA -1 (fine silica sand)
    - BWOC SSA-2 (100 mesh silica sand)
    - BWOCSA-541
    - GPS (Gallons per sack of cement) ZoneSealant 2000
    - GPS SCR-100 Liquid
    - GPS Fresh Water
- See specifically the following documents:

- Macondo—MC252—97/8x7 Prod Casing—V6—CustomerCopy.pdf, HAL0011047-HAL-0011058
- 9.875 x 7 Prod. Casing Design Report—21 Cent.PDF, HAL0010699-HAL0010720
- 9.875 x 7 Prod. Casing Design Report—6 CentPDF, HAL0010988-HAL0011020

Question 3a. Please state how the decision was made regarding the number of centralizers to be used in this well, and whether you believe the number used is industry best practice.

Answer.

- Halliburton conducted computer software simulations using input provided by the well owner to determine the optimum number of centralizers for the 9 7/8" x 7" casing. The results of the computer simulations were communicated to the well owner prior to performing the cement program for the 9 7/8" x 7" casing.

Question 3b. Were there changes made to the original well plan and casing program that reduced the number of centralizers?

Answer. The well owner did make changes to the recommended number of centralizers for the 9 7/8" x 7" casing.

Question 3c. If so, please state whether you believe that was adequate to maintain the integrity of the casing and cement program.

Answer.

- The computer software simulations predicted the effects of reducing the number of centralizers. The results were communicated to the well owner. The results indicated that cement would channel in the annulus. Cement channeling does not in itself create a safety concern. When cement channeling occurs, it is typically remedied by pumping additional cement as a subsequent additional step in the well program.

Question 3d. What reasons would the Operator have for changing the number of centralizers in the well design?

Answer.

- Halliburton cannot speak for the well owner. The well owner is in the best position to respond to this question.

Question 3e. Please provide any and all data and documentation regarding the decision on the number of centralizers to be used.

Answer. Please see the following documents:

- 9.875 x 7 Prod. Casing Design Report—21 Cent.PDF, HAL—0010699-HALOO10720
- 9.875 x 7 Prod. Casing Design Report—6 CentPDF, HAL0010988-HAL0011020
- April 15, 2010 email exchange between Halliburton's BP account cementing representative and BP's cementing engineer, HAL0010648-HAL0010650
- April 18, 2010 email from Halliburton's BP account cementing representative and BP's cementing engineer, HAL0011088-HAL 0011090 3

Question 4a. Halliburton has stated that BP as the well Operator would provide all specifications for the cementing and other activities carried out by Halliburton. Would Halliburton question specifications provided to it if it believed they were inadequate or unsafe?

Answer.

- Yes

Question 4b. Was that done here?

Answer.

- Halliburton communicated to the well owner that based on their decision to use a reduced number of centralizers, the cement would likely channel. As noted above, cement channeling does not in itself create a safety concern. When cement channeling occurs, it is typically remedied by pumping additional cement as a subsequent additional step in the well program.

Question 4c. If so, provide any and all data and documentation.

Answer. See the following documents:

- 9.875 x 7 Prod. Casing Design Report—21 Cent.PDF, HAL0010699-HALOO10720
- 9.875 x 7 Prod. Casing Design Report—6 CentPDF, HAL0010988-HAL—0011020
- April 15, 2010 email exchange between Halliburton's BP account cementing representative and BP's cementing engineer, HAL0010648-HAL0010650
- April 18, 2010 email from Halliburton's BP account cementing representative and BP's cementing engineer, HAL—0011088-HAL—0011090

• Macondo—MC252—97/8x7 Prod Casing—V6—CustomerCopy.pdf, HAL0011047-HAL-0011058

Question 4d. If not, please state whether Halliburton would proceed with a well if it believed the specifications given it were unsafe or inadequate, and whether Halliburton believes the specifications given to it by BP for the Macondo well were adequate and safe.

Answer.

• As stated above in B, Halliburton communicated to the well owner that based on their decision to use a reduced number of centralizers, the cement would likely channel. As noted above, cement channeling does not in itself create a safety concern. When cement channeling occurs, it is typically remedied by pumping additional cement as a subsequent additional step in the well program.

Question 4e. Also state whether Halliburton believes that the specifications for the well ? both original and modified—were industry best practices.

Answer.

• The cementing program was developed based on well information provided by the well owner and in accordance with MMS requirements.

Question 4f. Provide any data and documentation in your possession relevant to your answer.

Answer.

• See documents referenced above in response to subparagraph C.

Question 5. In the Macondo well, the cementing was required to extend up the well for 500 feet above the lowest casing shoe. Please state whether you believe that was adequate for the Macondo well based on the casing program that was implemented, and provide any data and documentation or other basis for that belief.

Answer.

• The cementing program was designed in accordance with well information supplied by the well owner and cement volumes were calculated to meet the well owner's specifications.
• See the following documents:
  • Macondo—MC252—97/8x7 Prod Casing—V6—CustomerCopy.pdf, HAL—0011047-HAL-0011058
  • 9.875 x 7 Prod. Casing Design Report—21 Cent.PDF, HAL0010699-HAL0010720
  • 9.875 x 7 Prod. Casing Design Report—6 Cent.PDF, HAL0010988-HAL—0011020

Question 6. Please list all data or documentation from the deepwater Horizon operation now in Halliburton's possession. Please state whether all of that data has been made available without exception to Federal government investigators, and identify those investigators. If it has not been made fully available, please describe all data that has been withheld and the reason for the withholding.

Answer.

• Engineering reports
• Real time data stream
• Emails
• Well schematics

All such documents related to the Deepwater Horizon operation have been made available, without exception, to the Oversight and Investigation Subcommittee of the House Committee on Energy and Commerce, the House Natural Resources Committee, the House Judiciary Committee, and the U.S. Coast Guard.

Question 7a. Please list all contacts with, and witness statements from, Halliburton witnesses with information relevant to the Deepwater Horizon operation and explosion.

Answer.

• Halliburton made available to the well owner the four Halliburton employees who were on the Deepwater Horizon at the time of the explosion. Those employees have given interviews to the well owner. No written witness statements have been given. Two of those employees have been subpoenaed to testify before the joint U.S. Coast Guard and MMS hearings in New Orleans May 26-29, 2010.

Question 7b. Please state whether these witnesses and statements have been made available to Federal government investigators without exception, and identify the investigators who have received this information or interviewed these witnesses.

Answer.

- These Halliburton employees are available to the Federal government investigators and two of them have been subpoenaed to testify before the joint U.S. Coast Guard and MMS hearings in New Orleans May 26-29, 2010.

Question 7c. If they have not been made fully available, please describe the extent of any limitation or withholding and the basis for that limitation

Answer.

- As stated in B above, these Halliburton employees are available to the Federal government investigators and two of them have been subpoenaed to testify before the joint U.S. Coast Guard and MMS hearings in New Orleans May 26-29, 2010.

Question 8. Please describe the Halliburton policy for retention of data and documents applicable to information related to the Deepwater Horizon operation at the Macondo well.

Answer.

- Following the explosion on the Deepwater Horizon, Halliburton issued a document retention notice to employees within Halliburton who would have data and documents relating to Halliburton's operations on the Deepwater Horizon. Those documents and data will be retained for six years following the close of all investigations and litigation arising from the explosion.

Responses of Tim Probert to Questions From Senator Murkowski

Question 1a. What is Halliburton's current role and outlay of personnel and resources in the containment and response effort?

Answer.

- Halliburton is working with BP on well control solutions and mobilizing assets and resources at the direction of BP.
- Halliburton is providing services on the following relief well rigs:

  i. On the Development Driller III, Halliburton is providing Baroid Drilling Fluids, Cementing, Sperry Directional Drilling and Surface Data Logging; and
  ii. On the Development Driller II, Halliburton is providing Baroid Drilling Fluids, Cementing, and Sperry Surface Data Logging

- For the well kill operations on the vessel HOS Centerline #14, Halliburton is providing Cementing Services and Production Enhancement for high rate/pressure pumping.

Question 2. Has Halliburton ever questioned or refused its clients' orders on a well cementing job due to concern over the order's integrity?

Answer.

- Yes, Halliburton maintains stop work authority for our field crews and technical staff if there is a concern of an imminent safety hazard.

Response of Tim Probert to Question From Senator Menendez

Question 1a. Halliburton is in the unenviable position of having worked on the two most recent major spills-the Montara in Australia last year and now the ongoing disaster in the Gulf. Neither investigation is complete, but some have speculated that both accidents may have been caused by Halliburton's cementing process. After each accident has Halliburton thoroughly reviewed all of its procedures, its training, its equipment and its materials?

Answer.

- Yes

Question 1b. And has Halliburton made any changes in light of these reviews?

Answer.

- Until the root cause of the Mississippi Canyon Block 252 Well number 1 and the Montara incidents are identified, Halliburton will continue its process of working at the direction of the well owner in accordance with industry and MMS standards.

Response of Tim Probert to Question From Senator Lincoln

Question 1a. In media reports following this disaster, I keep reading over and over again that certain devices and technologies being discussed to stop the leak have never been used in water this deep. Do you believe the depth of water presents more challenges in containing the leak?

Answer.

- Yes

Question 1b. Do you believe more testing, research and technologies are needed to ensure the safety of deepwater and ultra-deep water drilling?

Answer.

- Such advances could be most beneficial but until the root cause of the Mississippi Canyon Block 252 Well number 1 incident is identified, Halliburton cannot speculate on the specific objectives for such additional testing, research and technologies.

RESPONSES OF TIM PROBERT TO QUESTIONS FROM SENATOR SESSIONS

Question 1a. Is it true that Halliburton had completed pouring the cement that lines the well 20 hours before the blow out?

Answer.

- Yes, Halliburton had completed cementing at locations in the wellbore as required by the well owner. We had not as yet been instructed to pump cement for the final plug at the time of the blowout.

Question 2. Was this particular well properly cemented?

Answer.

- The cement program was executed according to the procedure directed by the well owner.

Question 3. Were all the appropriate tests run on the cement and casings?

Answer.

- Pre-job laboratory testing of cementing materials was conducted in accordance with industry standards.
- Post-cementing evaluation (bond log) is the responsibility of the well owner. Halliburton is unclear whether the well owner included the bond log test in the well plan. Halliburton understands the well owner did not conduct a bond log test.
- Following placement of the cement slurry, the well owner conducted a positive pressure test to demonstrate the integrity of the production casing string. Halliburton did not conduct the test, but understands that based on the result of that test, the well owner chose to proceed with the well plan.
- Halliburton understands that a negative pressure test was then conducted by the drilling contractor and/or the well owner. The negative pressure test tests the integrity of the casing seal assembly. Halliburton is unclear of the results of the negative pressure test.

Question 4a. There have been reports that mud was being extracted from the riser before the top cement cap was in place. Is this true?

Answer.

- Halliburton understands that the mud was displaced from the riser. The top cement cap was never placed in Mississippi Canyon Block 252 Well Number 1.

Question 4b. If so, why would you remove the mud prior to securing the pressure with cement?

Answer.

- The order of all well construction activities are at the direction of the well owner. Halliburton did not take part in the decision making or the execution of the mud displacement.

Question 5. A 2007 study by three U.S. Minerals Management Service officials found that cementing was a factor in 18 of 39 well blowouts in the Gulf of Mexico over a 14-year period. That was the single largest factor, ahead of equipment failure and pipe failure. How many of those 18 blowouts did Halliburton serve as the lead subcontractor for cementing?

Answer.

- Review of the 18 loss of well control incidents (LWC) referenced in the article titled "Absence of Fatalities in Blowouts Encouraging in MMS study of OCS Incidents" published in the July/August 2007 issue of Drilling Contractor and in the original MMS study as "associated with cementing" in the 1992-2006 period, indicate that rig and/or operator activities shortly following cementing operations contributed to these LWC incidents.
- 14 of 18 incidents resulted from post cementing rig operations, including:
  - removal of the BOP (Blow Out Preventer) by the drilling contractor before the cement was set;
  - the drilling contractor inserting a wash string in the casing annuli which prevented the BOP from sealing the wellbore during the LWC event; and
  - the drilling contractor cutting the casing or removing a casing valve to set casing in the wellhead.

- 4 of 18 incidents resulted from well owners not utilizing industry recognized best cementing practices.
- The MMS report states that in nine LWC incidents, the cement service company is not specified, Halliburton is specified in six, BJ Services is specified in two, and Schlumberger is specified in one.

INSTRUCTIONS:
(1) Please print (except for signature);
(2) Please fill in all blanks.

Date: 04 / 22 / 2010 (Month/ Day / Year) Place/Rig # Deepwater Horizon

I am [redacted] (Full Name (Print)).

My home address is [redacted].

My home telephone number is [redacted].

I am employed by [redacted] as a [redacted] (Position).

I was on board the Deepwater Horizon on April 20, 2010 when as a result of an incident, it became necessary to evacuate the rig.

The evacuation was ordered about 9:30pm? a.m. or (p.m.)

At the time the evacuation was ordered, I was [redacted] (Exact Place on Rig) and was [redacted] (What You Were Doing).

I was not a witness to the incident requiring the evacuation and have no first hand or personal knowledge regarding the incident.

[redacted] (Initials)

I was not injured as a result of the incident or evacuation.

[redacted] (Initials)

[redacted] WITNESS [redacted] SIGNATURE

WITNESS

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