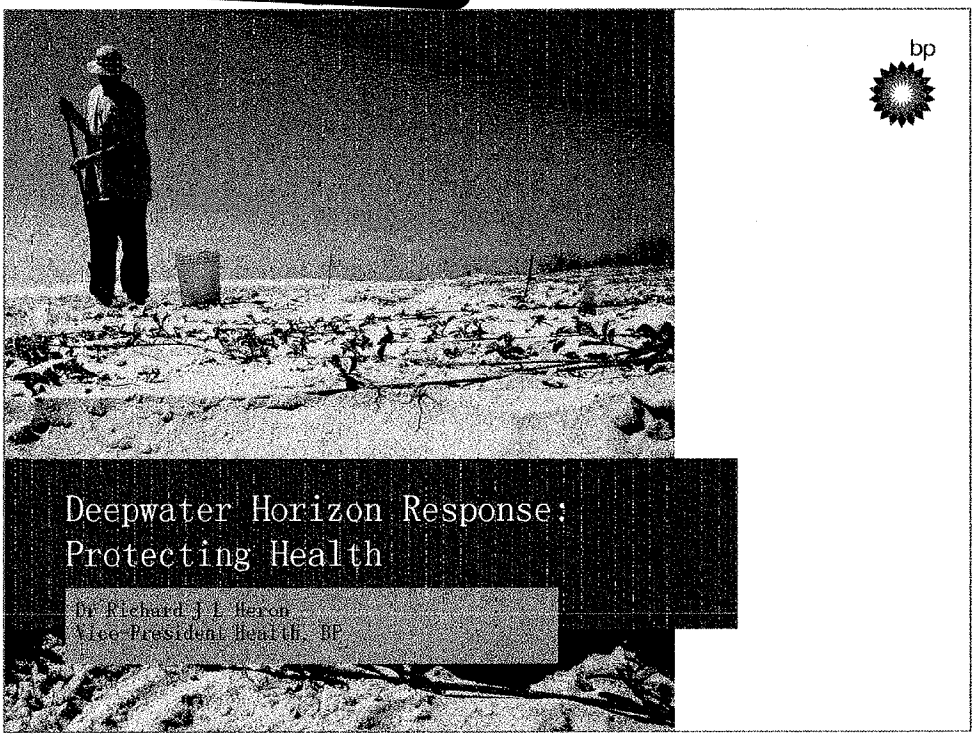

Good morning/afternoon everyone, and welcome.

I have two main aims in talking to you today.

The first is to give a fact-based, transparent account of the health issues BP faced in the aftermath of the tragic Deepwater Horizon accident, and our response to them.

Secondly, to share with you some of the valuable insights we've learned through addressing an accident with consequences of this magnitude, and the implications they have for how we will be addressing potential health and industrial hygiene risks in the future.

We are only too well aware that we will, rightly, be judged by what we do, not what we say. This is an account of some things that we did, and of some important things we now are doing and plan to do in the future. You will make your own minds up about how effective or appropriate they are.

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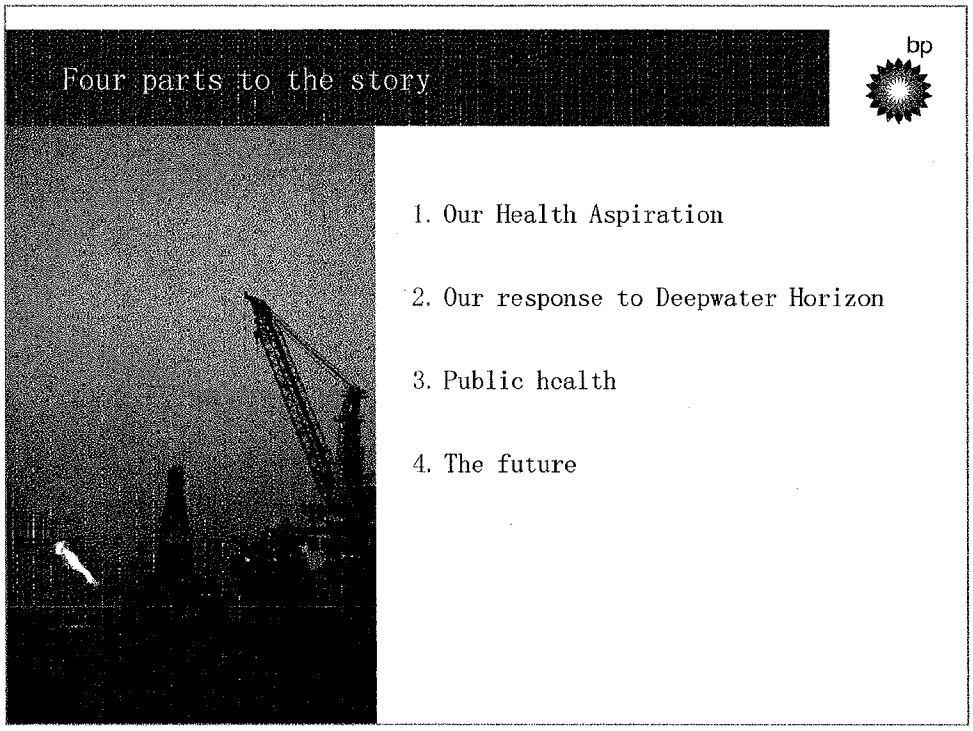

I've split up today's presentation into four parts:

In the first part, I'll explain what BP's aspirations are in protecting the health of workers and others affected by what BP does.

In parts two and three, I'll talk in some depth about the range of challenges that confronted us as a result of the Deepwater Horizon accident, and how we responded and are continuing to address the wider health aspects.

Finally, I'll touch on some of the important lessons that are emerging from this experience and their potential implications for the future.

NEXT SLIDE

Let me just give you a bit of background to BP's overall approach to Health and Industrial Hygiene.

We cannot escape the fact that 11 people lost their lives in the Deepwater Horizon accident, and 16 were injured. Any presentation we give on this matter inevitably has that backdrop.

Our aspiration on Health is embodied in the words "no harm to people". We continue to be committed to achieving this important aspiration.

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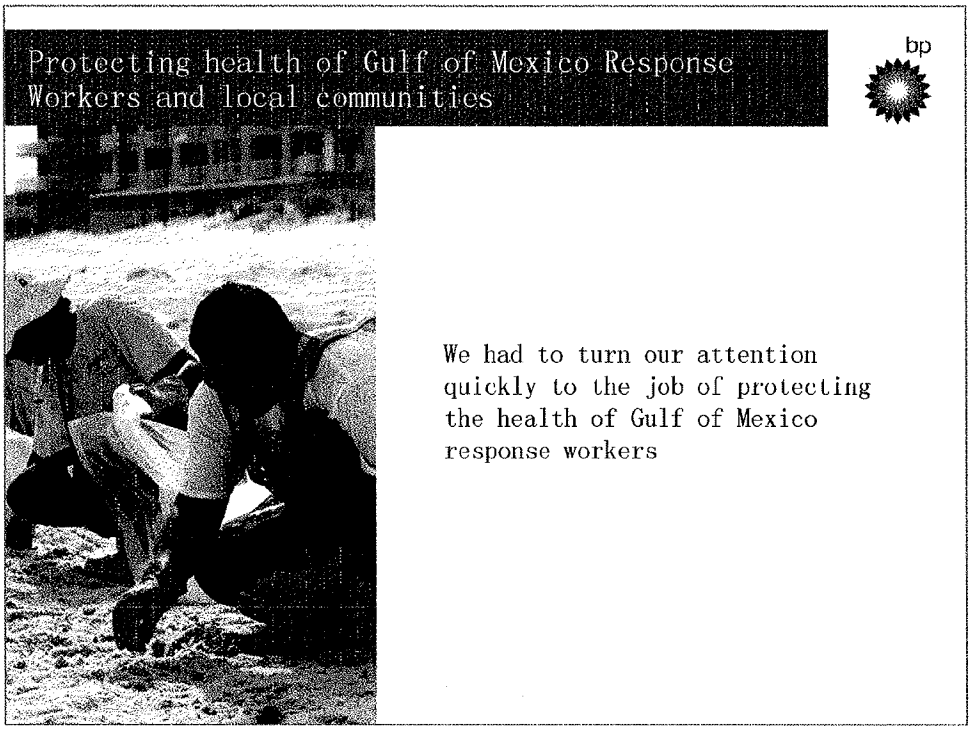

We wanted to do everything in our power to live up to the BP Health aspiration in our response to the accident, and its consequences, by protecting the health of everyone involved in the recovery and clean up operation.

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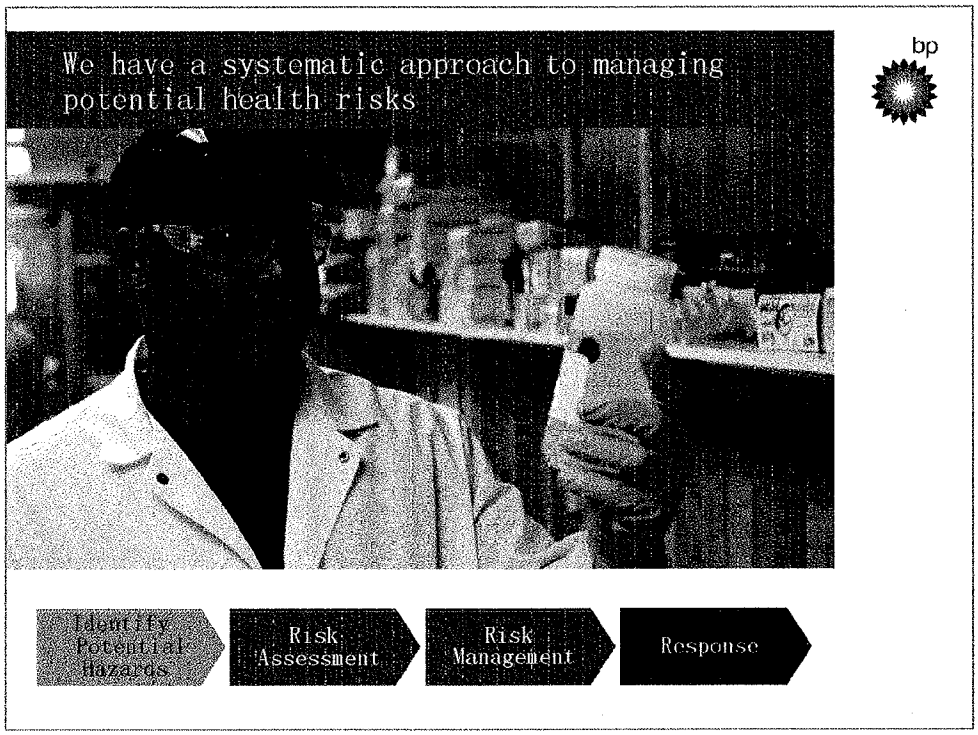

As a business we had already taken our aspirations on Health and sought to achieve them by creating the right organisational culture. We have a comprehensive way of working - the Operating Management System, or OMS.

This sets out a reasonable, logical process for managing potential health risks, which helped us to keep our response to the accident on track.

The OMS process helps to identify possible hazards in a given situation, assess potential risks, and make available the right resources and procedures to address potential risks.

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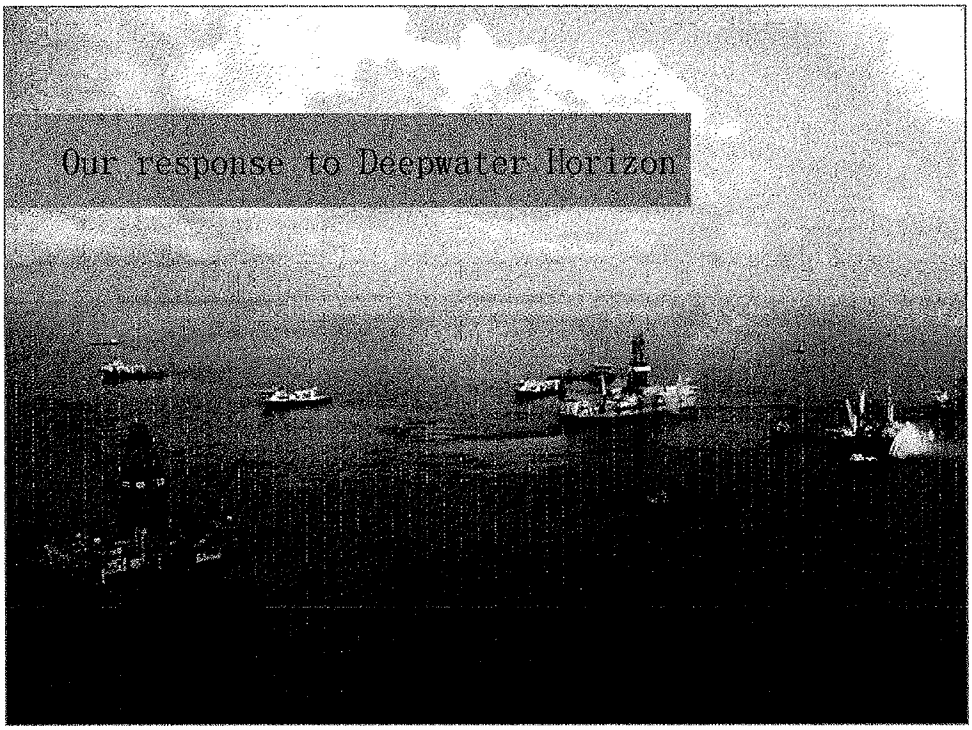

I'm now going to talk about the aftermath of the accident itself – the immediate challenges we faced and how we responded.

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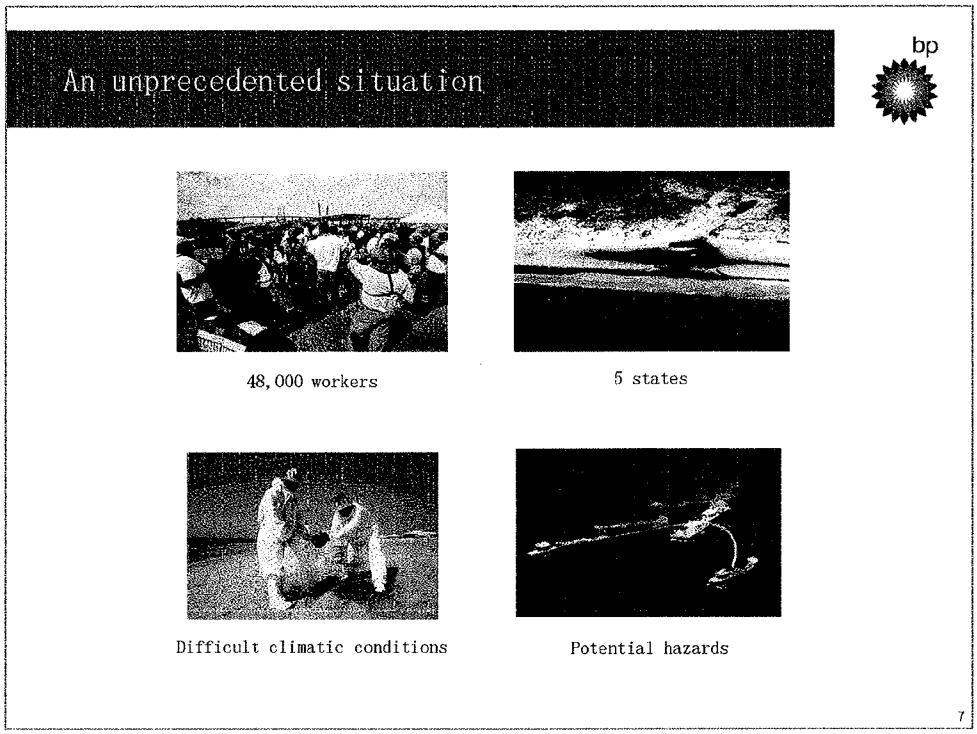

It was a daunting set of challenges – the unprecedented size and scale of the accident, the numbers of agencies involved, the pressure to move fast, and the extraordinary profile of the accident.

Responding in light of these factors required the coordination of approximately 48,000 workers, the population of a medium-sized town, spread over an area that involved five states.

These workers operated in an often difficult and demanding environment. There were storms out at sea. The beaches being cleaned often reached temperatures in excess of 40 degrees Celsius (104 degrees Fahrenheit). Imagine a beach with shelters approximately every 200 yards/meters, each containing workers who, due to the high heat and humidity, in some instances can work only for 10 minutes out of every hour. After this intense work, the workers need to go to their shelters and consume cold drinks and snacks, so that they can regain the energy and hydration necessary to do another 10 minutes work...

Workers faced all sorts of potential hazards, both man made and natural, each recognized and treated as possible risks to workers' health. Potential hazards included, for example, snakes and rodents, and exposure to oil and certain other chemicals.

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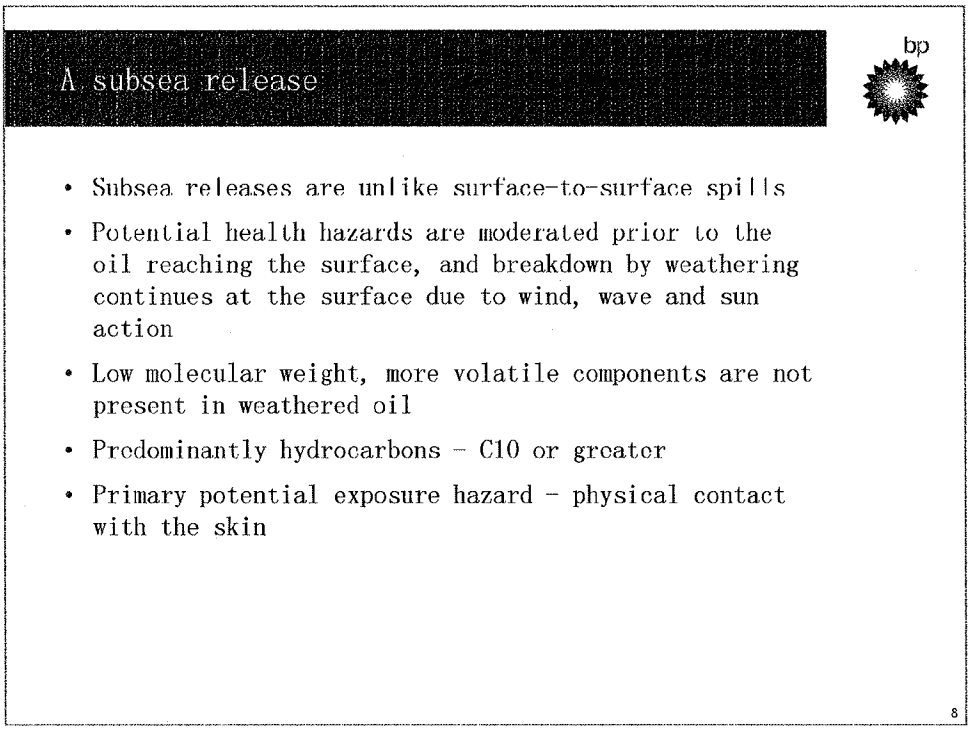
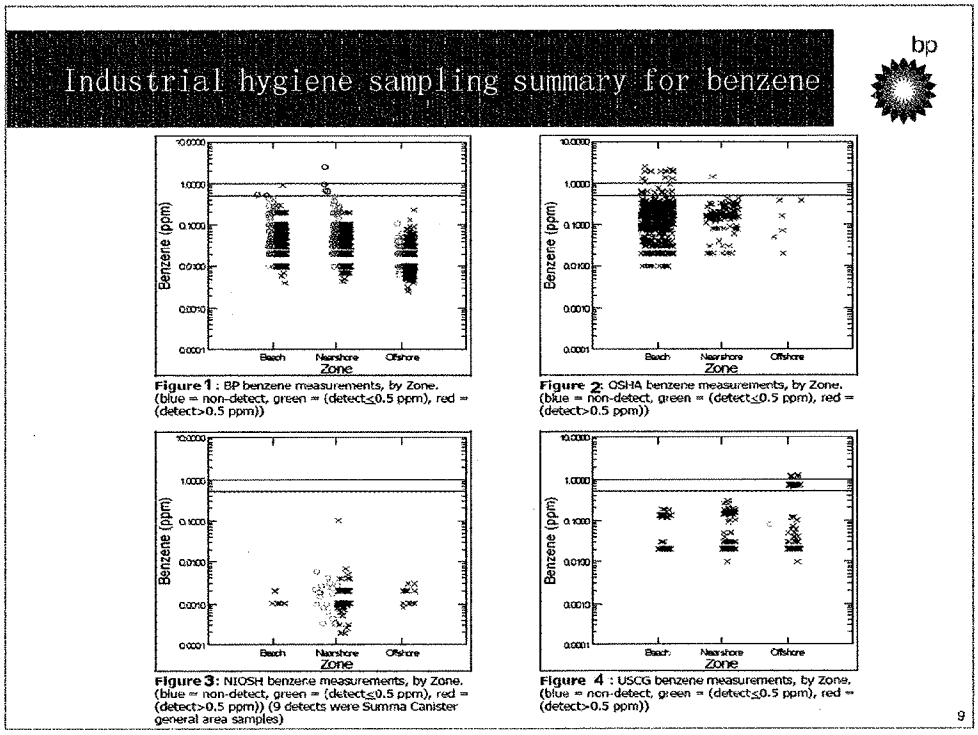


Subsea releases (other than natural subsea seeps) are relatively rare events. In this instance, the oil itself, which was light crude oil, and gas traveled through several miles of sea water prior to arriving at the surface; this process greatly reduced many of the oil and gas's more volatile components (e.g., benzene),

Once the oil reached the surface, it was weathered by wind, sun, and wave action. Due to the extensive weathering, the more volatile components were largely eliminated prior to arrival at shore. The remaining components were a mixture of heavier molecular weight hydrocarbons. This weathering helps explain why sampling indicated low levels of benzene, toluene, ethylbenzene and xylenes. This is described on the following slides.



This is a summary of more than 10,000 industrial hygiene samples for benzene taken by NIOSH, the Coast Guard, OSHA, and BP.

The Deepwater Horizon Well was capped on July 15, and the graphs represent samples taken from the end of April to July 22, 2010.

The 'Y' axis represents the concentration of benzene in parts per million. To represent all results on the same graph, a logarithmic scale was used. The horizontal line across the top of each figure represents the OSHA action level and ACGIH TLV for benzene (0.5 ppm).

The 'X' axis categorizes the samples based on the location of the worker: Beach, Nearshore, or Offshore.

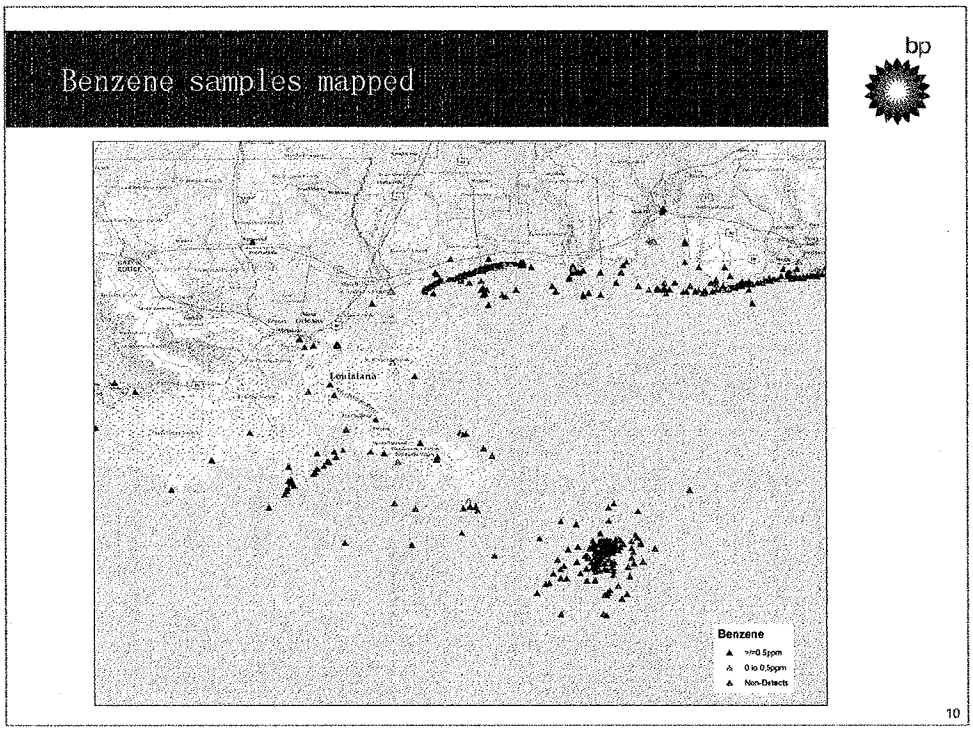
Blue X's represent benzene samples that were non-detects, that is, below the analytical instrument's ability to detect this substance. The detection limit was <0.012 ppm for 12-hour samples, which is about 1/40 of the action level, and 1/80 of the OSHA permissible exposure limit for benzene (1 ppm). Green O's represent samples in which benzene was detected.

As the slide indicates only one of the more than 10,000 sample results exceeded the permissible exposure limit of 1 ppm.

Key points:

OSHA, the Coast Guard, and NIOSH sampled workers performing similar activities as the workers that BP sampled.

The monitoring results of all four organizations are remarkably consistent with the overwhelming number of samples being non-detects.



This next slide shows a map of the Gulf of Mexico and its shoreline from Louisiana to the Florida Panhandle. The colored triangles on the map show where the more than 10,000 benzene samples summarized on the previous slide were taken. The concentration of triangles toward the bottom of the map represents samples that were taken at or near the well itself.

The blue triangles that you see across most of the map represent the location of worker benzene samples that were taken, but that were below the detection limit of the analytical instruments. The yellow triangles are those benzene samples above the OSHA 0.5 ppm action level, but that are below the 1 ppm permissible exposure limit. And the red triangles depict benzene samples above the 1 ppm permissible exposure limit.

Dispersants

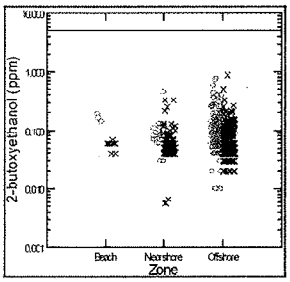


Figure 1: BP 2-butoxyethanol measurements, by Zone. **(NIOSH REL = 5 ppm)** (blue = non-detect, green = (detect≤5 ppm), red = (detect>5 ppm))

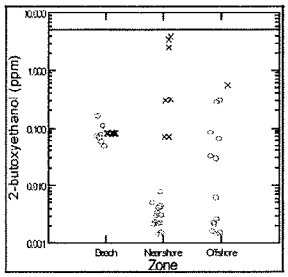


Figure 2: OSHA, NIOSH, and USCG 2-butoxyethanol measurements, by Zone. (NIOSH REL = 5 ppm) Normalized exposures for all zones. (blue = non-detect, green = (detect≤5 ppm), red = (detect>5 ppm))

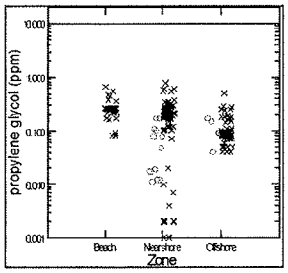


Figure 3 : OSHA, NIOSH, and USCG propylene glycol, by Zone. **(AIHA WEEL = 10 mg/m3)** (blue = non-detect, green = (detect≤10 mg/m³), red = (detect>10 mg/m³))

As you no doubt heard in media reports, we used dispersants to assist in the biodegradation process of the oil. Technicians took industrial hygiene samples to monitor for 2-butoxyethanol and propylene glycol, both of which are constituents of the dispersants used.

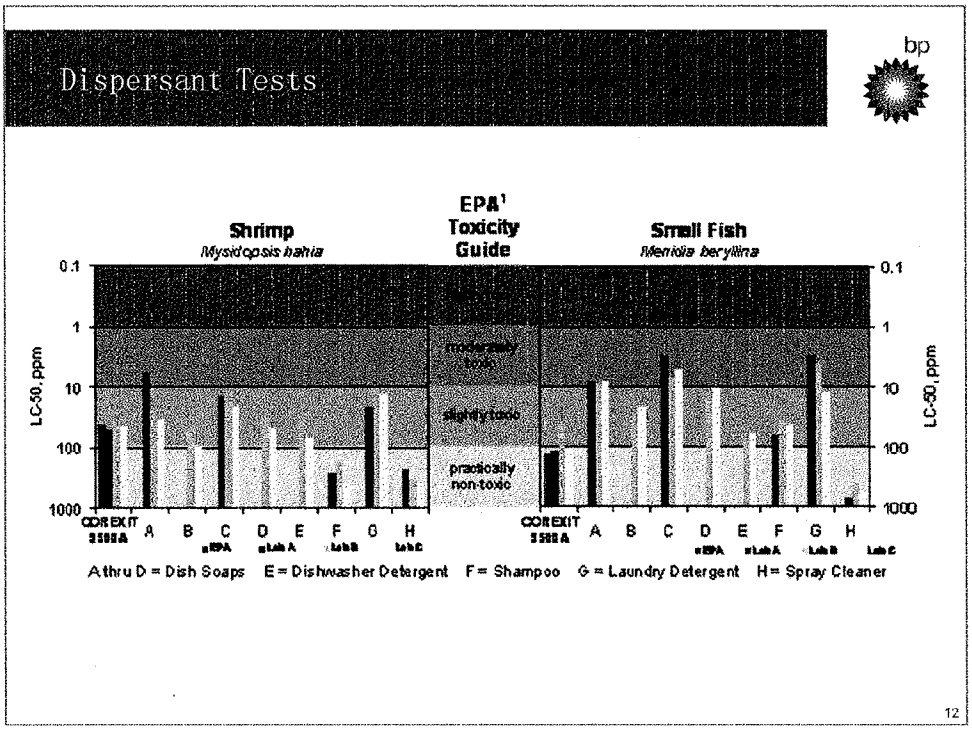
This slide shows a summary of more than 900 industrial hygiene samples collected by NIOSH, the Coast Guard, OSHA, and BP to test for those two constituents. The charts used to present these data are similar to the charts used on the previous slide for benzene using a logarithmic scale.

The horizontal line across the top of figures 1 and 2 shows the 2- butoxyethanol OSHA permissible exposure limit The horizontal line across the top of figure 3 depicts the American Industrial Hygiene Association Workplace Environmental Exposure Limit (AIHA WEEL) for propylene glycol which provides the most protective exposure limit for this substance (there is no PEL for propylene glycol).

Blue X's again represent samples that were below the detection limit of the analytical instruments used. The green O's represent samples where the constituent was measured above that detection limit by the instrument.

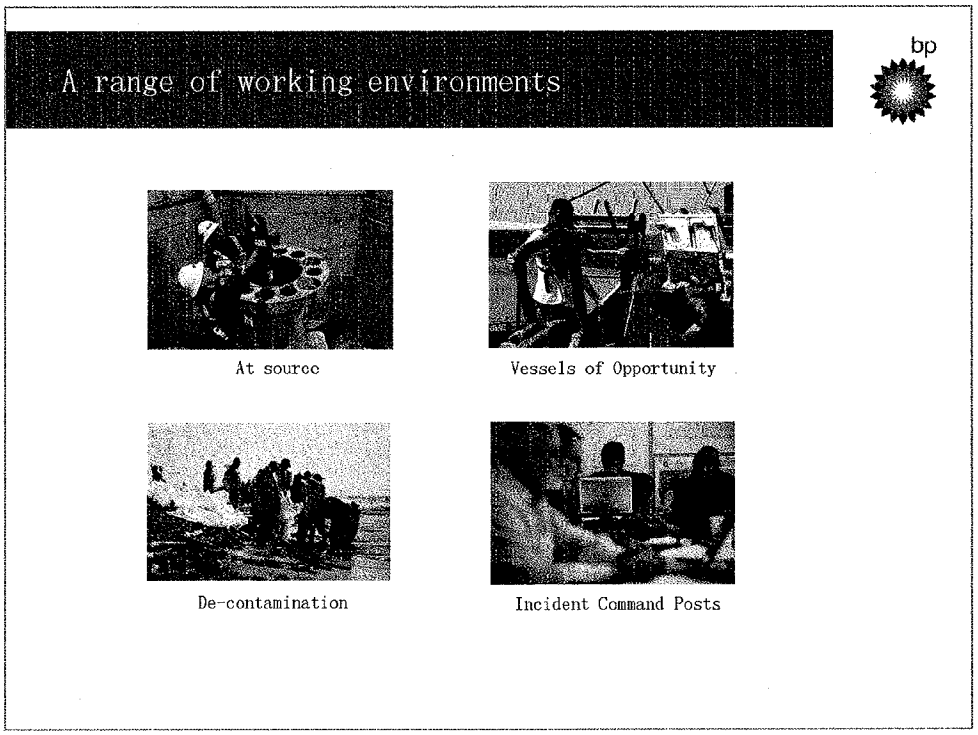
The NIOSH recommended exposure limit for 2-butoxyethanol is 5 ppm, and the OSHA permissible exposure limit is 50 ppm. All four organizations' sample results show excellent consistency, and demonstrate that all detectable results were below the OSHA permissible exposure limit by at least an order of magnitude.

The AIHA WEEL for propylene glycol is 10 mg/m³, and OSHA does not have a permissible exposure limit. These results are also well below the AIHA WEEL.



A series of toxicity tests were conducted to compare the dispersants used in the Deepwater Horizon oil spill with common products, such as dishwashing liquid, dishwasher detergent, baby shampoo, laundry detergent, and spray cleaner. Three independent laboratories (all of which were approved for EPA testing) conducted these tests, using rigorous quality controls, and following EPA's standard test methods.

This slide shows the test results from each of the independent laboratories, along with EPA test data, for Corexit 9500A. These tests used shrimp and minnows. These results categorize Corexit 9500A as "practically non-toxic" to "slightly toxic," using EPA's guide. The data demonstrate that this dispersant is no more toxic than many household products that are used by millions of persons every day. Also, it should be noted that this dispersant rapidly degrades in the environment.



Many other types of workers, besides beach cleanup workers, faced potential risks. For example...

[click through one by one]

- Workers at the source
- Those in 'Vessels of Opportunity' - that is, volunteer vessels, such as fishing boats, that were involved in skimming and laying boom
- People involved in de-contamination operations
- Staff at the Incident Command Posts

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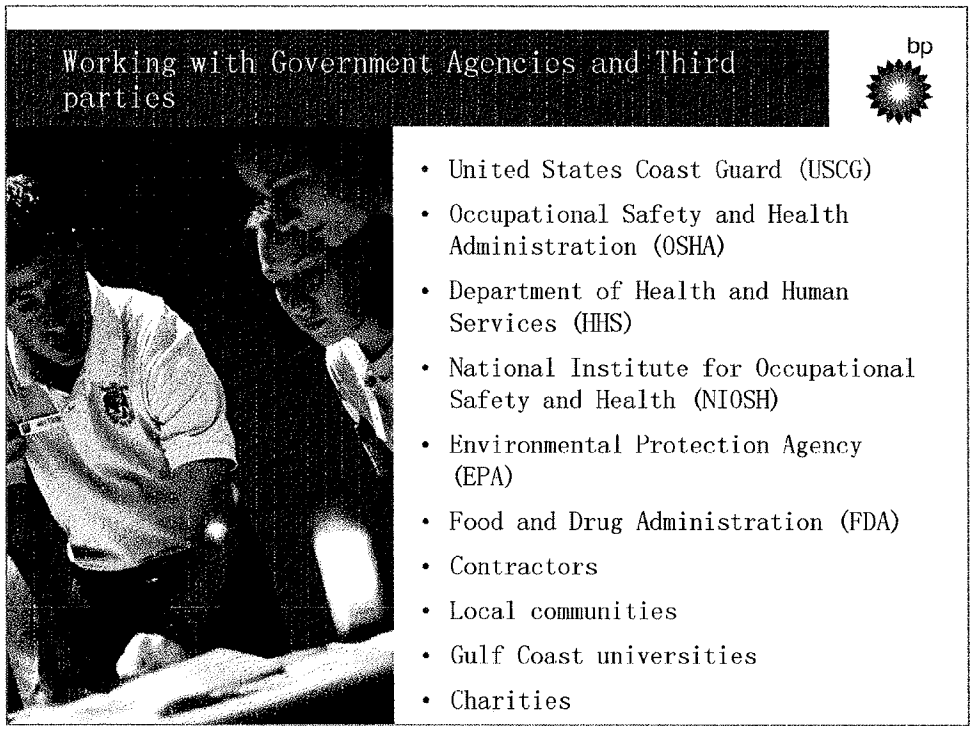

In an operation of this scale numerous third parties had to be involved - the US Coast Guard (USCG), Occupational Safety and Health Administration (OSHA), Department of Health and Human Services (HHS), Food and Drug Administration (FDA), National Institute for Occupational Safety and Health (NIOSH), Environmental Protection Agency (EPA), contractors, plus the local communities and charities.

It was critical to quickly develop an understanding of their respective roles and accountabilities, so that we could establish an efficient way of working together.

Often, as the situation unfolded, we would find ourselves seated in a large space - like an "aircraft hangar" - at a long trestle table, with senior representatives of some of these agencies, working to make decisions. We quickly learnt how to develop constructive partnerships and ways of working under acute time pressure.

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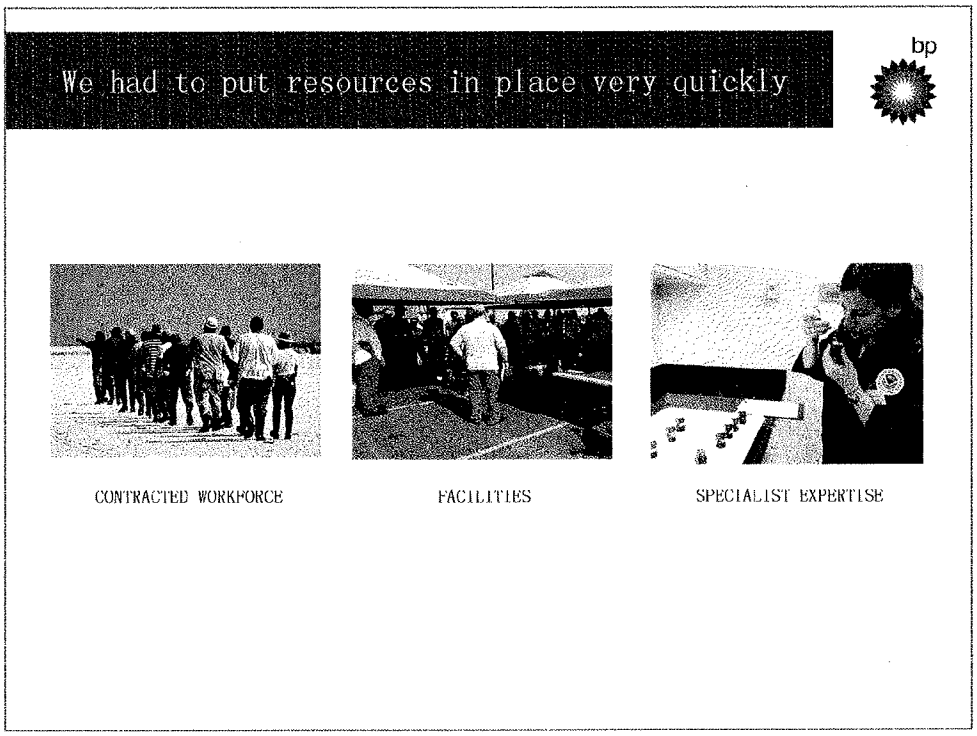

We had to get the right people and facilities in place as quickly as possible.

For example, the approximate numbers of personnel etc. involved are as follows:

CONTRACTED WORKFORCE
48,000 workers
– in 10 weeks

FACILITIES
Air-conditioned shelters, ambulances, emergency medical centres

SPECIALIST EXPERTISE
200 industrial hygienists
175 paramedics
30 nurses,
15 doctors

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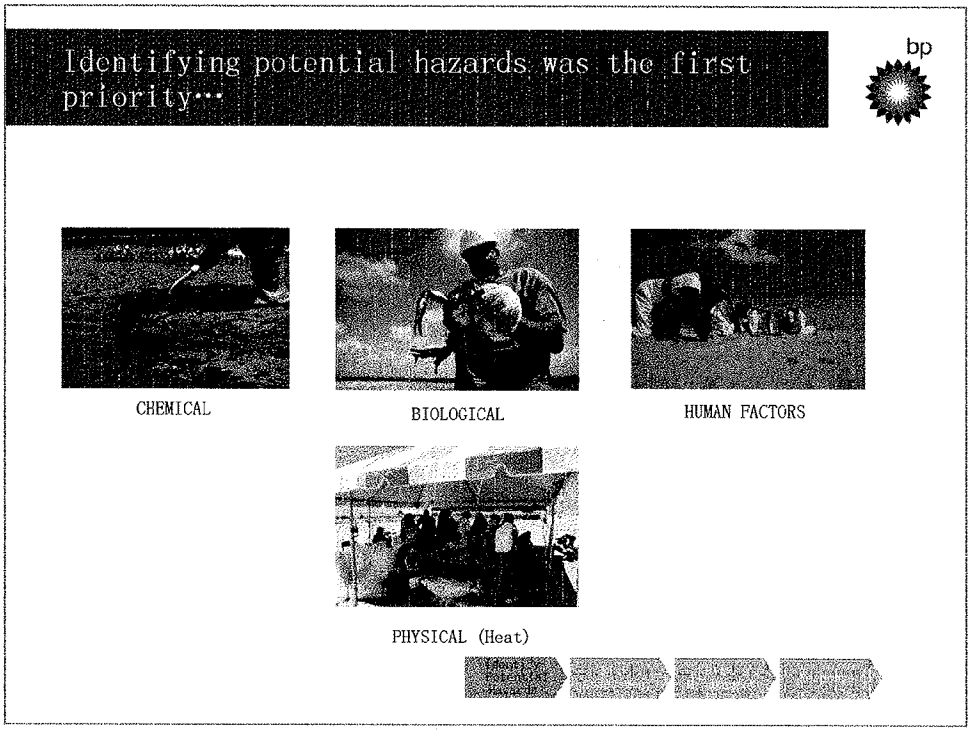

Using our Operating Management System, our first priority was to identify the potential hazards that these workers faced. [click through each example]

CHEMICAL
Including possible exposure to crude oil, crude oil related materials, and dispersants

BIOLOGICAL
Including rodents, snakes

HUMAN FACTORS
Including heat stress, fatigue, dehydration

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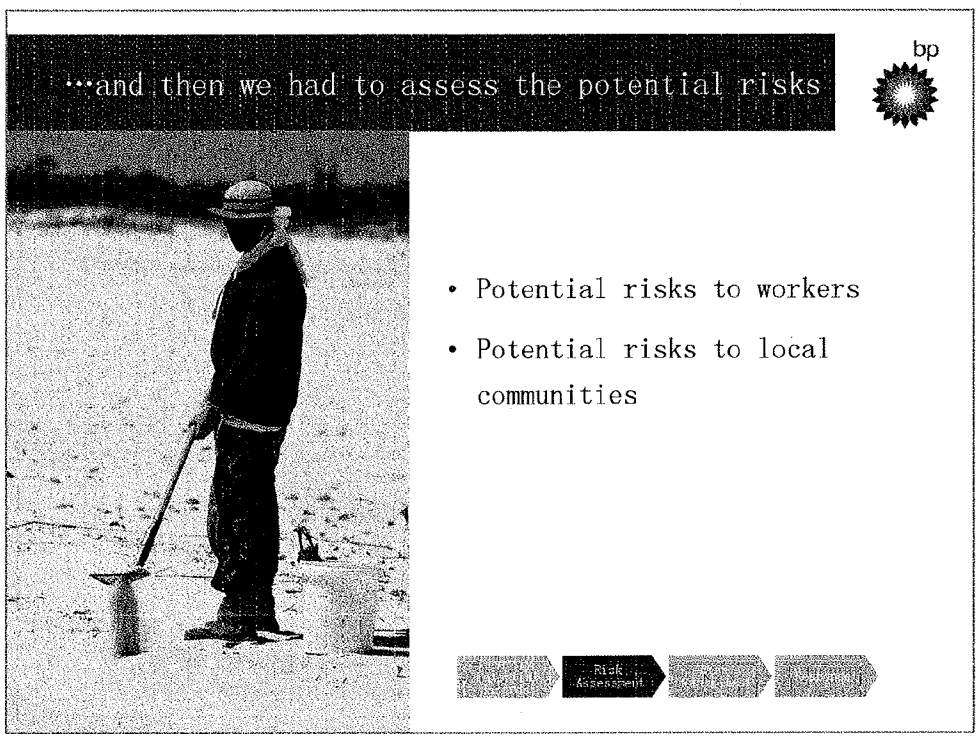

We had to carefully evaluate sometimes competing considerations posed by different risks…e.g. for workers on the beach, personal protective equipment would help minimize risks of chemical exposure but could increase risks of heat exhaustion. Both risks needed to be carefully considered in the selection of personal protective equipment and the development of a heat-stress management plan.

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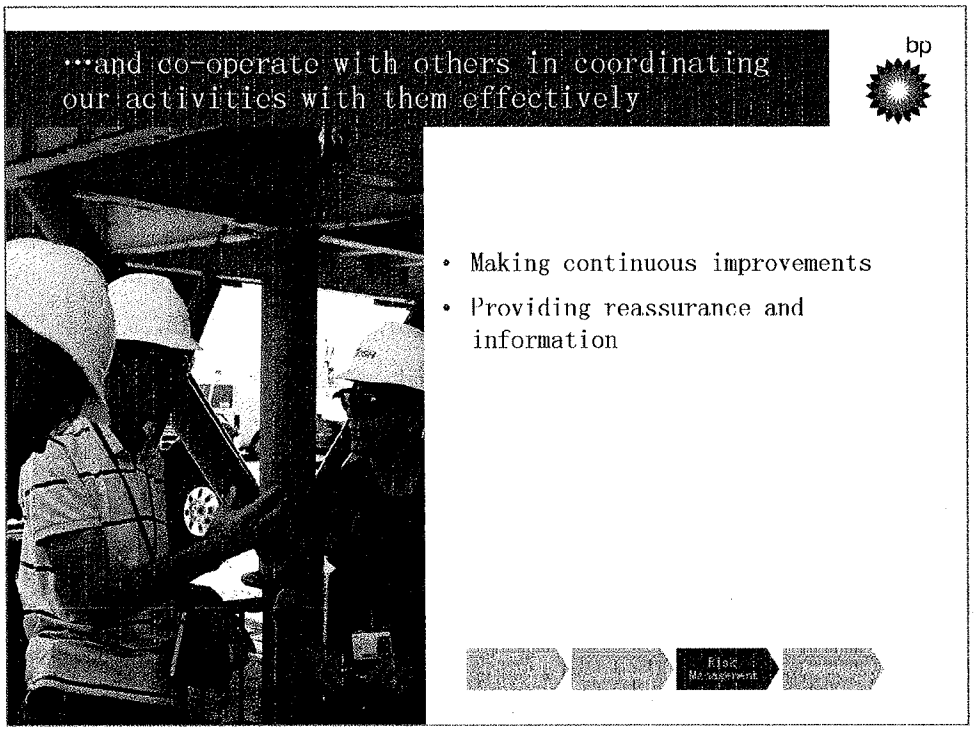


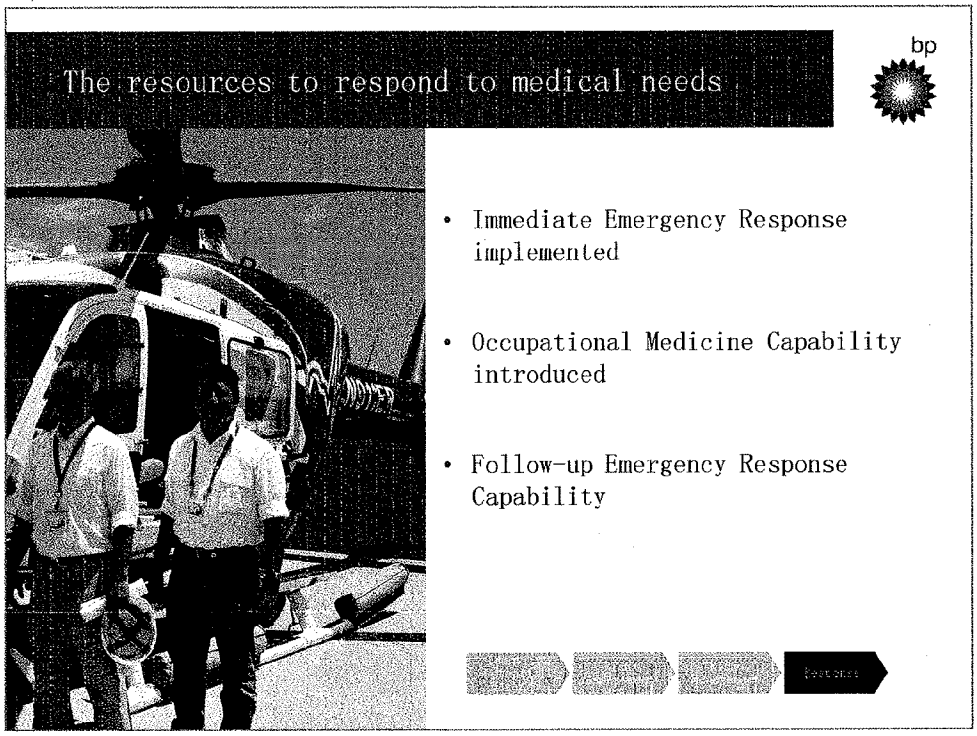
We implemented rigorous systems and worked with each other so that together we were offering effective risk-management solutions. For example:

We introduced improvements for worker comfort including Heating, Ventilation and Air Conditioning (HVAC) systems. We adjusted shifts to reduce the potential for fatigue, provided massage centres, and implemented an unprecedented industrial hygiene monitoring program to assure workers were properly protected from potential chemical exposures. Respiratory protection was provided for those job tasks that required PPE to protect workers.

Our protocol for Industrial Hygiene Exposure Investigation was approved by the United States Coast Guard and the Occupational Safety and Health Administration. We had significant input from NIOSH (National Institute for Occupational Safety and Health).

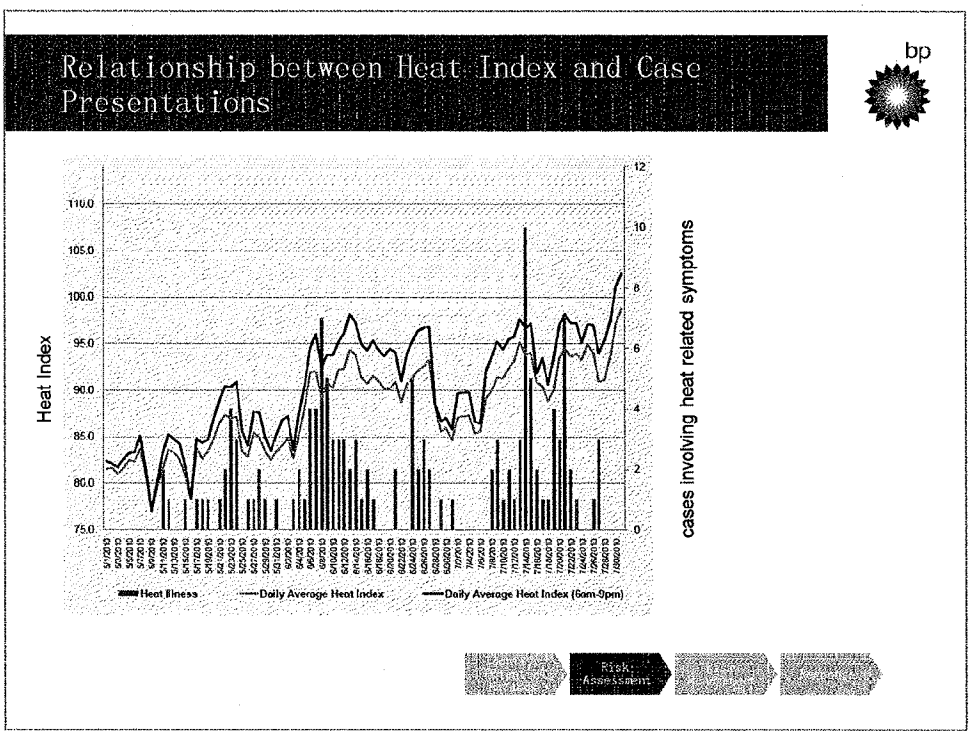
We commissioned specialist reviews of heat stress management, food safety, and other issues so that we might improve our programs.

We worked closely with certified industrial hygienists and technicians to comprehensively monitor the work environment. This included (1) real-time workplace exposure monitoring that provided immediate results so that we could promptly identify potential issues regarding work practices, personal protective equipment, and the like; (2) personal full shift worker monitoring for a wide variety of tasks, including oil skimming, burning, and source control; and (3) shoreline monitoring for a variety of potential chemical pollutants.

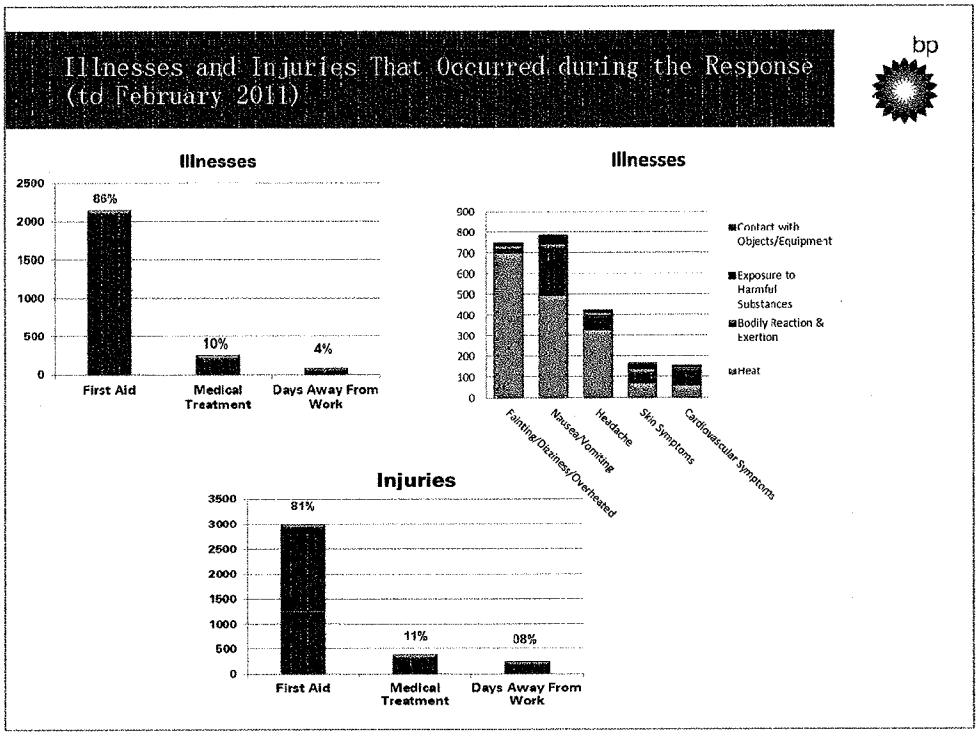


In terms of medical facilities, we worked closely with contract providers, local parishes and the Department of Health and Human Services (HHS), to develop the means to respond to the medical and health needs of response workers. For example, we reimbursed HHS for its costs associated with providing trailers and staff for six months, to ensure that we were able to provide medical services and as necessary referrals to local medical facilities. Also, in cooperation with other responders, we arranged to provide emergency evacuation by air, land and sea.

At each Incident Command Post we worked together with both the US Coast Guard and the HHS to set up round-the-clock Emergency Medical Services.



On this slide the blue horizontal line shows the heat index during the day between 6am and 9pm, and the yellow line shows the average daily index. The vertical blue bars show the number of cases that we identified as heat stress. As you would expect, the number of cases involving heat stress increased as the temperature and heat index increased.

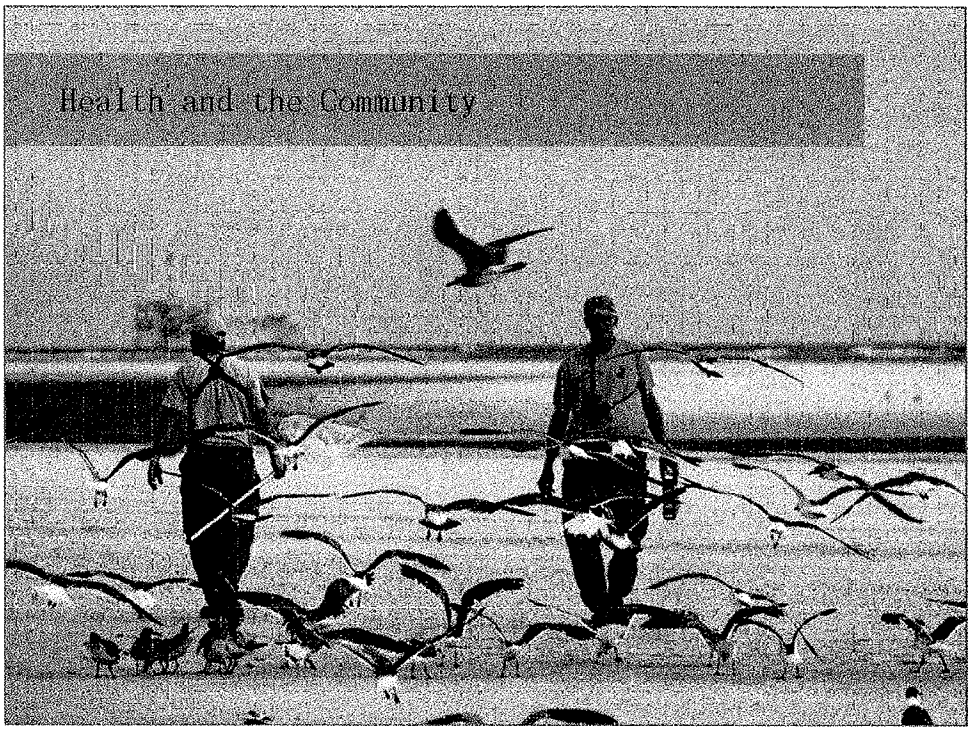


As of early February 2011, workers had reported approximately 2500 (2,508) occupational illnesses and 3700 (3,715) injuries from among approximately a peak of more than 48,000 responders and volunteers working on the Deepwater Horizon response.

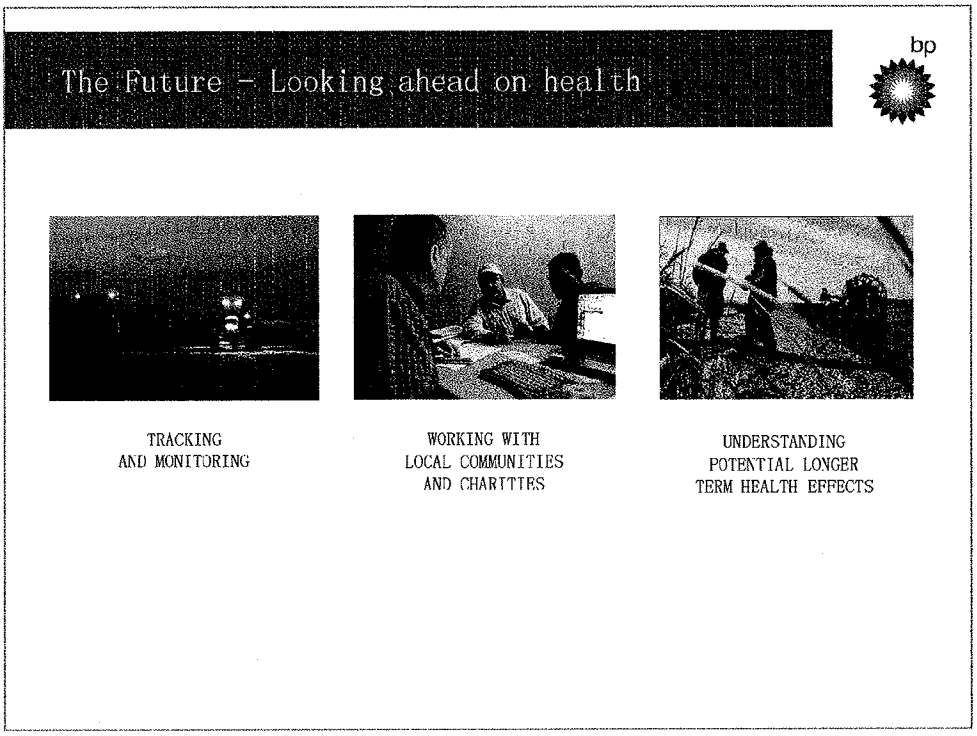
Approximately 75% of all of the reported injuries and illnesses were "on-shore" rather than at sea or in the source area.

Because of the rapid recruitment of the workforce, the need to provide expeditious induction and training, and the difficult working environment in which the response took place, we took a conservative approach towards treating any person who reported feeling unwell. Approximately 14% of the reported illnesses were considered OSHA recordable. Most were "First Aid " cases; that is, cases that were primarily one-time treatment events for the purpose of observation of minor scratches, cuts, burns, splinters, or other minor industrial injuries, which do not ordinarily require medical care.

About 69% of all reported illnesses involved symptoms of heat stress. The heat stress symptoms most often reported were dizziness, feeling overheated, nausea, and headaches.

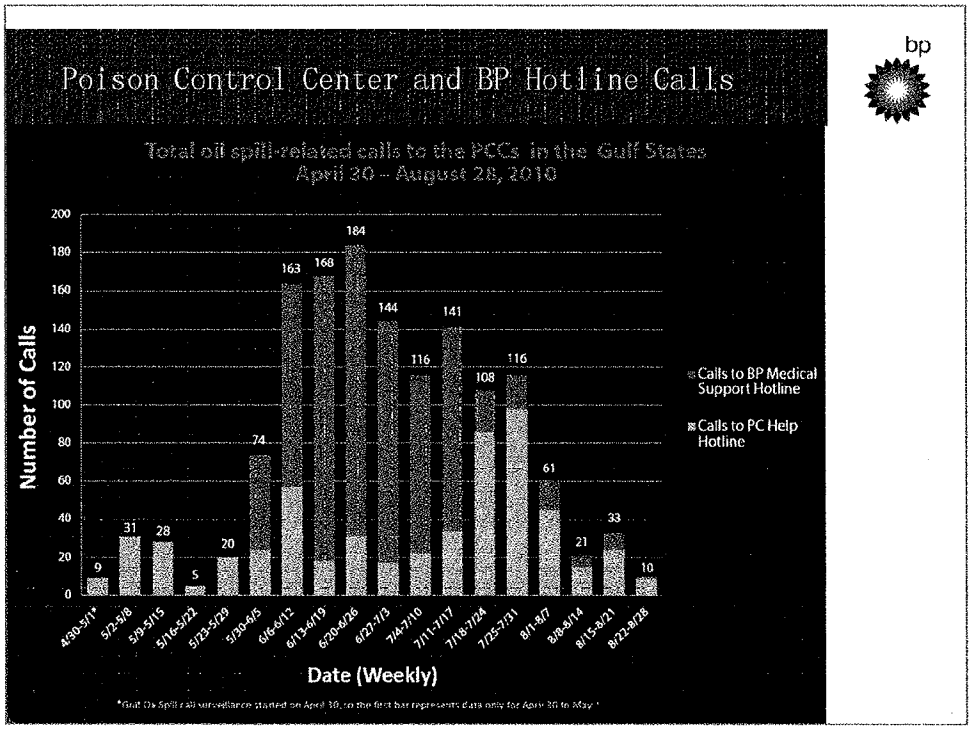


So hopefully that gives you some idea of what the recovery and clean up operation has involved. Let's now look at how we are dealing with the potential public health effects.



We are committed to cooperating with public health officials as they address potential health issues arising out of the Deepwater Horizon accident. To achieve that important objective, BP is supporting independent studies of potential long-term worker health effects by sharing response worker data with NIH and providing funding support for those activities.

[See Next Slide]



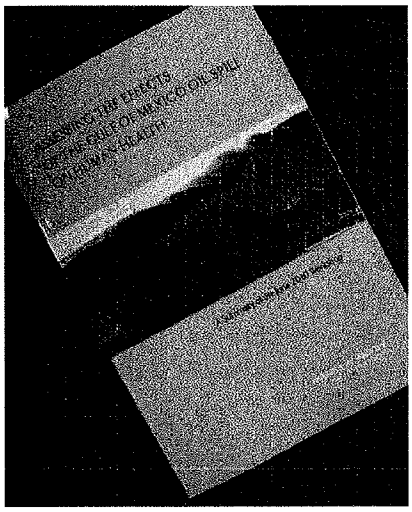
We worked with the Rocky Mountain Poison and Drug Centre to set up a medical helpline to address public concerns about potential exposure resulting from the spill. Calls were recorded pursuant to American Association of Poison Control Centers Guidelines and downloaded to the national system normally within about 15 minutes. This enabled them to be accessed by any of the National Poison Control Centers.

In May 2010, BP set up a telephone help-line with the Rocky Mountain Poison and Drug Centre in Colorado. One of the largest PCC's in the USA, RMPDC trained staff were able to handle peaks in calls of concern and input that call and caller information into the National Poisons Control Centre database, often within 15 minutes of the call being logged.

This chart shows the number of calls (dark bars) to the BP hot-line and the number decreased fairly quickly after the capping of the well on July 15th. At about the same time calls were transferred directly to the National Poisons Control Line so that they could all be diverted to local poison control centers and managed locally.

It is worth noting that about 50% of the calls were for information only, and the other 50% were related to specific health concerns. The health concerns identified generally consisted of symptoms and signs reported by the person affected. Some of these were objective (vomiting, for example), others were subjective (nausea, for example). There are large variations in how subjective symptoms are perceived and reported. Because of the nature of environmental exposures generally, the exact cause of the symptoms reported generally cannot be confirmed for most of the Poison Control Centre data.

Long-term health studies and local outreach



- BP provided $10 million in support of GuLF Study led by NIEHS
- Study formally launched February 28, 2011
- BP provided $52 million to help fund behavioral health support across US Gulf Coast

In August of 2010 BP provided the National Institutes of Health (NIH) a $10 million donation under the Gulf Coast Research Initiative (GCRI) to support a study of a wide range of public health issues relating to the Gulf spill. The funding will expedite work in support of the research priorities identified in the Institute of Medicine report, "Assessing the Effects of the Gulf of Mexico Oil Spill on Human Health," released on August 10, 2010.

That report summarized proposals submitted to NIH by federal, state, and local government officials, research scientists, academic leaders, policymakers, health care providers, public health advocates, and Gulf Coast community representatives and residents at a workshop conducted in New Orleans in June 2010.

The $10 million will support the immediate needs of researchers, including Gulf Coast academic institutions and local and state agencies, in understanding potential acute and long-term health impacts of exposures to oil, dispersed oil and dispersants.

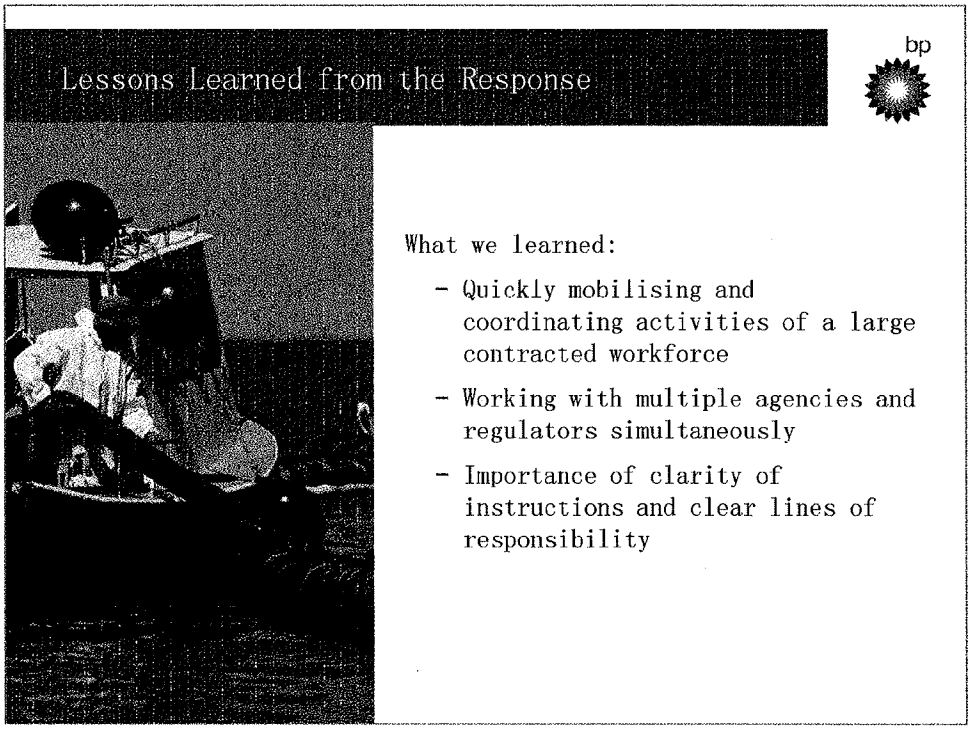
Decisions regarding the distribution of the grant will be made by NIH with input from Gulf state academic institutions and state and local officials

All project proposals will be peer reviewed by appropriate experts, and the data and findings from NIH-funded studies will be made fully and openly available in accordance with standard practice applicable to this type of research.

In addition to the support for these health studies, BP provided:

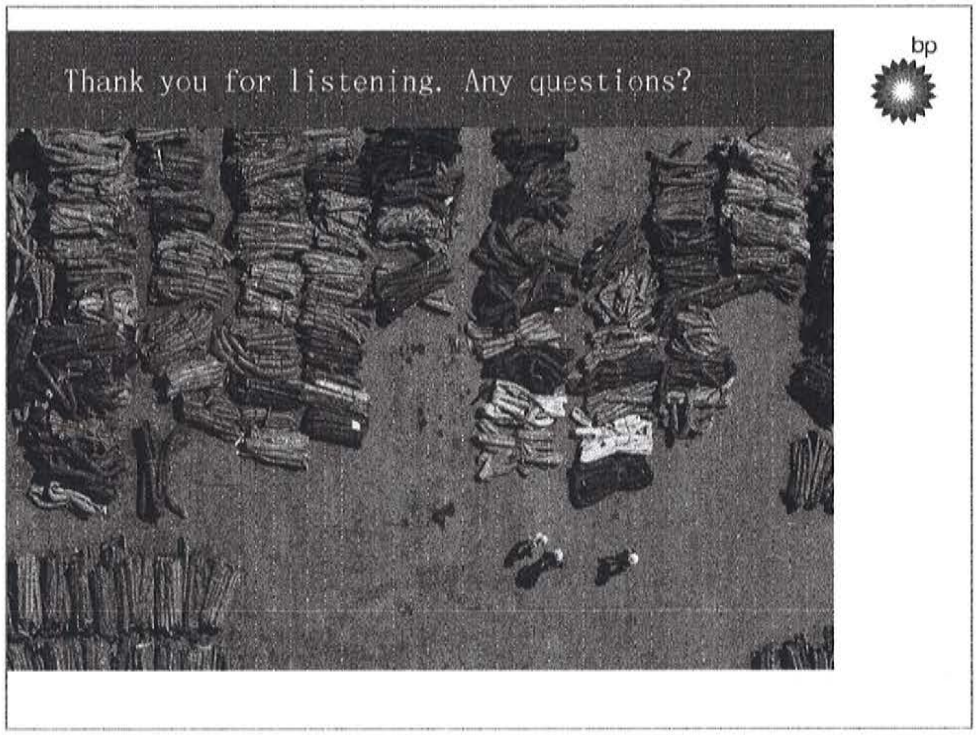
$52 million to federal and state health organizations to fund behavioural health support and outreach programs to the following organizations across the US Gulf Coast region.

[SAMHSA (Substance Abuse and Mental Health Services Administration) - $10m
Louisiana Department of Health and Hospitals - $15m
Mississippi Department of Mental Health -- $12m
Alabama Department of Mental Health – $12m
Florida Department of Children and Families – $3m]



I hope that what I've talked about so far has given you at least a sense of the scale and complexity of the operation we were involved in, and continue to be involved in. Its unprecedented nature placed new demands on our resources and capabilities, and we have learnt a lot as a result.

One of the key learnings from a health and industrial hygiene standpoint is the importance of both the immediate and longer-term involvement of representatives from these two disciplines in the response activities. Equally important was the involvement of our federal and state agency partners in providing these resources and closely coordinating our efforts. Those resources enabled us to closely monitor the health and well-being of the response workers so that we could help protect their health and safety under the difficult circumstances they encountered. That involvement was of substantial importance during the height of response activities but continues now and into the future since our work in this area is not yet complete.

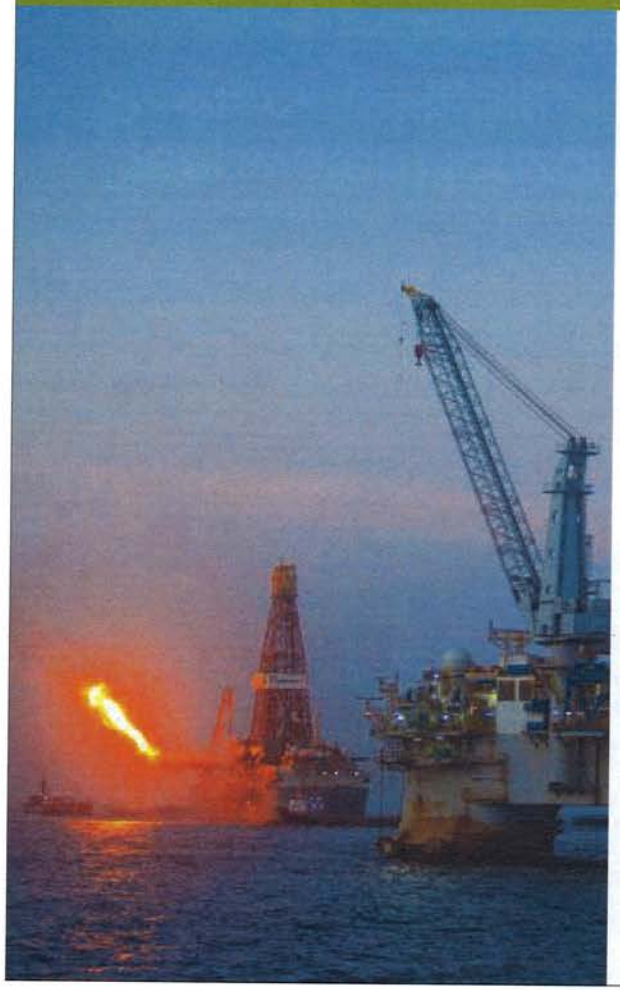

Thank you for listening. Any questions?
bp

bp

Deepwater Horizon Response: Protecting Health

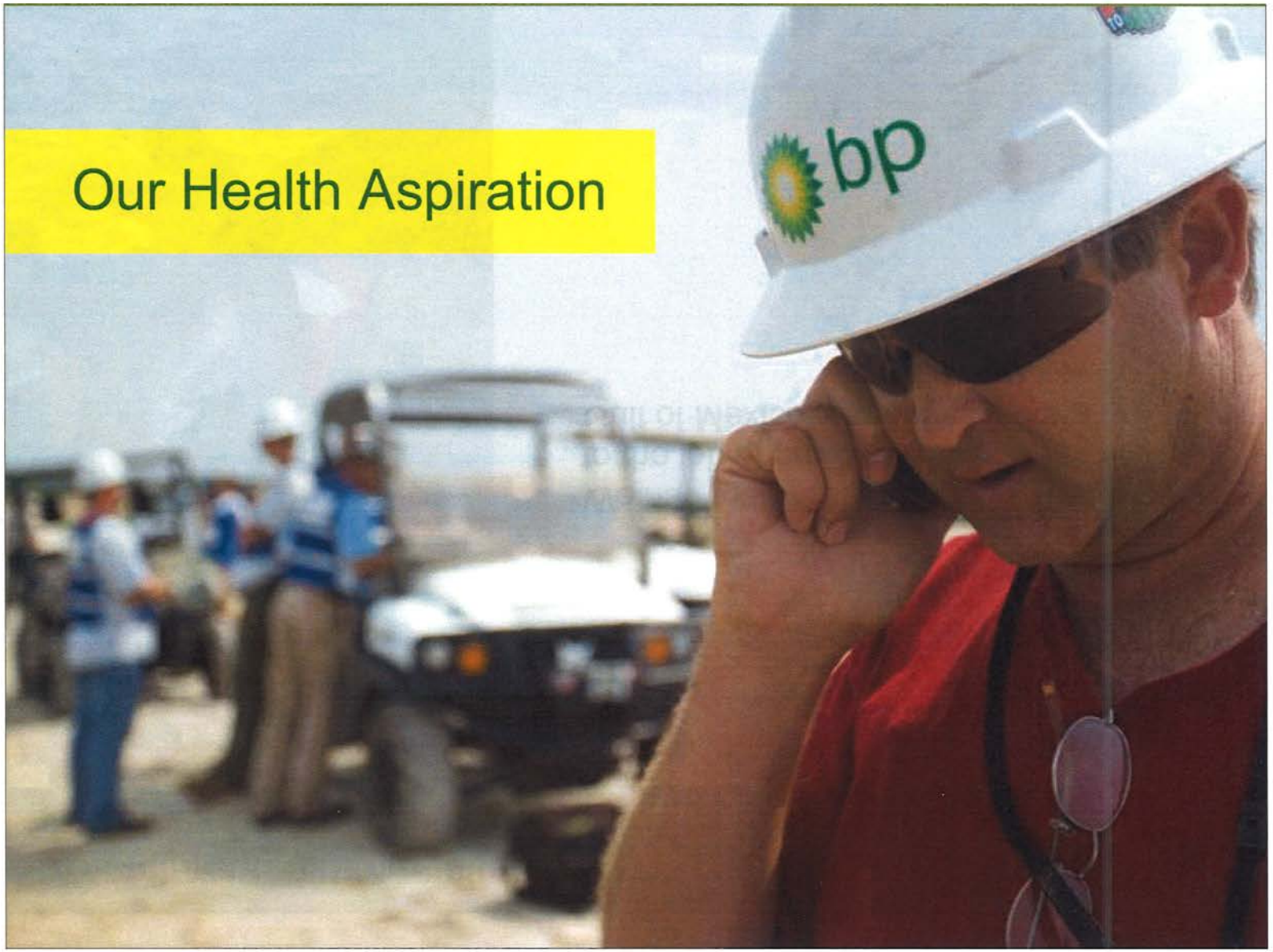
Dr Richard J L Heron
Vice-President Health, BP

Four parts to the story



1. Our Health Aspiration
1. Our response to Deepwater Horizon
1. Public health

- The future


Our Health Aspiration
bp

Protecting health of Gulf of Mexico Response Workers and local communities

We had to turn our attention quickly to the job of protecting the health of Gulf of Mexico response workers

We have a systematic approach to managing potential health risks

Identify Potential Hazards → Risk Assessment → Risk Management → Response


Our response to Deepwater Horizon

An unprecedented situation

48,000 workers

5 states

Difficult climatic conditions

Potential hazards

A subsea release

- Subsea releases are unlike surface-to-surface spills
- Potential health hazards are moderated prior to the oil reaching the surface, and breakdown by weathering continues at the surface due to wind, wave and sun action
- Low molecular weight, more volatile components are not present in weathered oil
- Predominantly hydrocarbons - C10 or greater
- Primary potential exposure hazard - physical contact with the skin

Industrial hygiene sampling summary for benzene

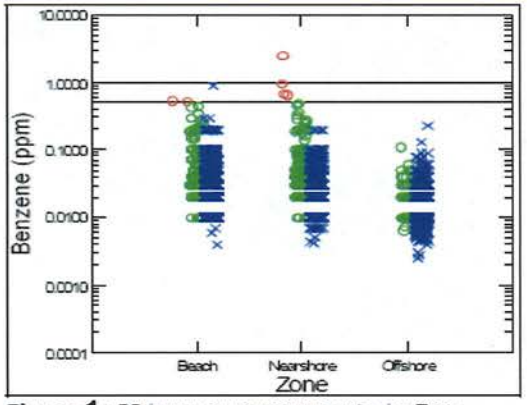


Figure 1 : BP benzene measurements, by Zone. (blue = non-detect, green = (detect≤0.5 ppm), red = (detect>0.5 ppm))

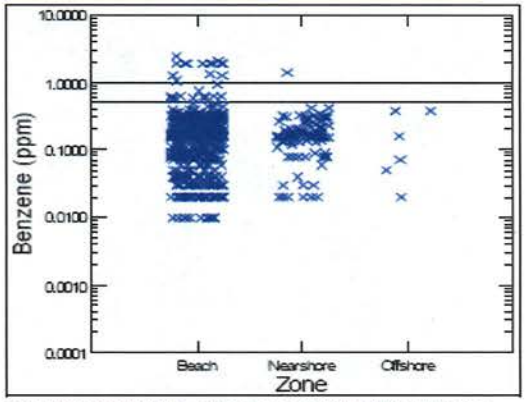


Figure 2: OSHA benzene measurements, by Zone. (blue = non-detect, green = (detect≤0.5 ppm), red = (detect>0.5 ppm))

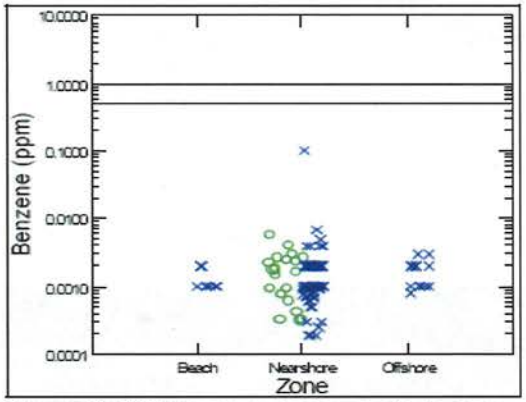


Figure 3: NIOSH benzene measurements, by Zone. (blue = non-detect, green = (detect≤0.5 ppm), red = (detect>0.5 ppm)) (9 detects were Summa Canister general area samples)

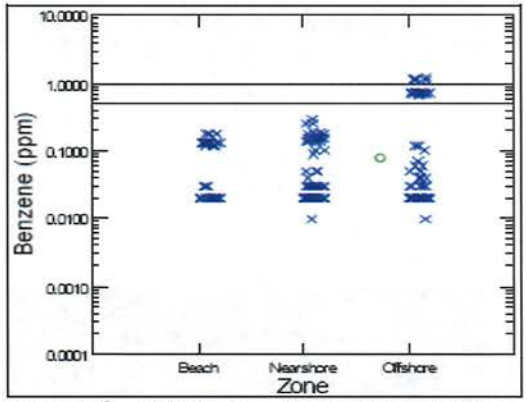
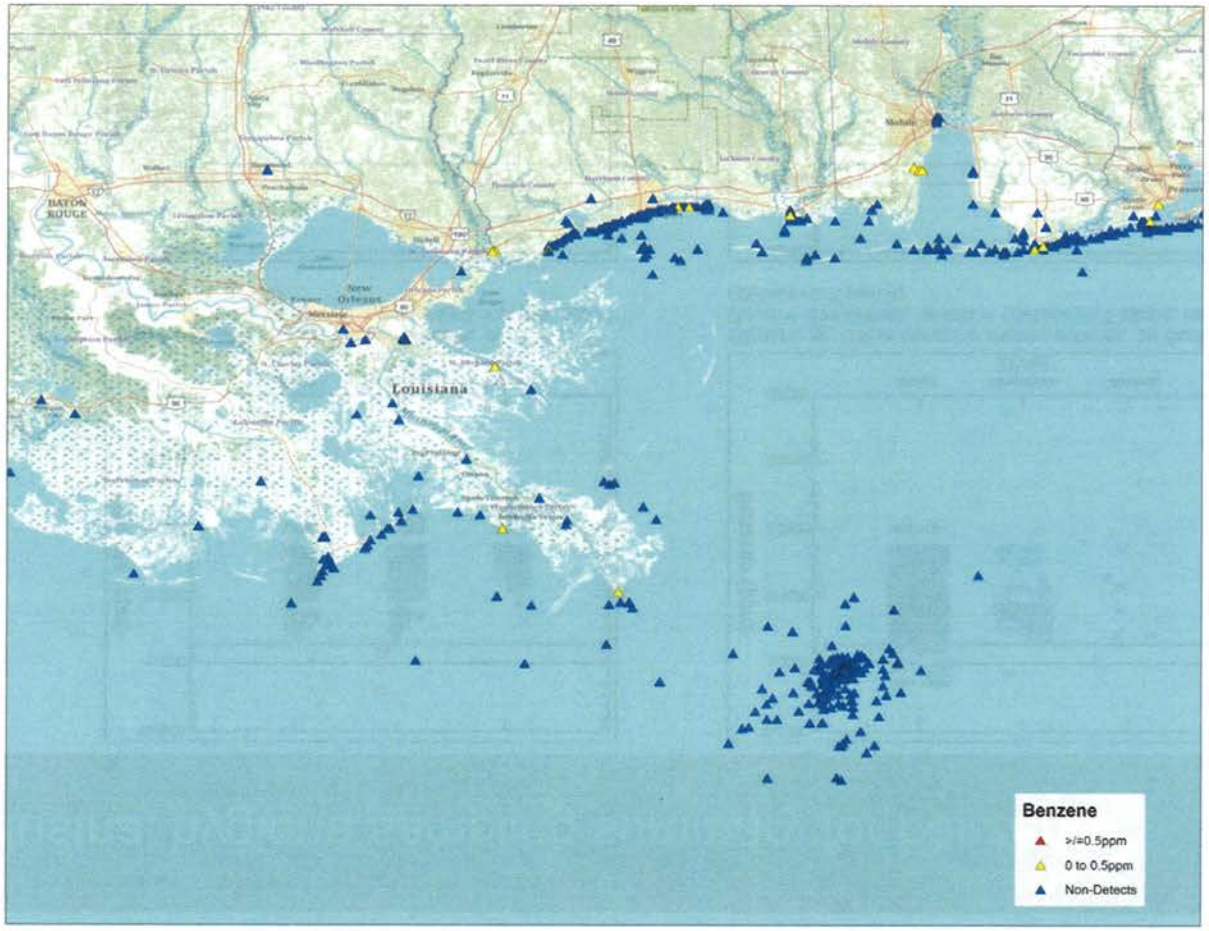


Figure 4 : USCG benzene measurements, by Zone. (blue = non-detect, green = (detect≤0.5 ppm), red = (detect>0.5 ppm))

Benzene samples mapped



Dispersants

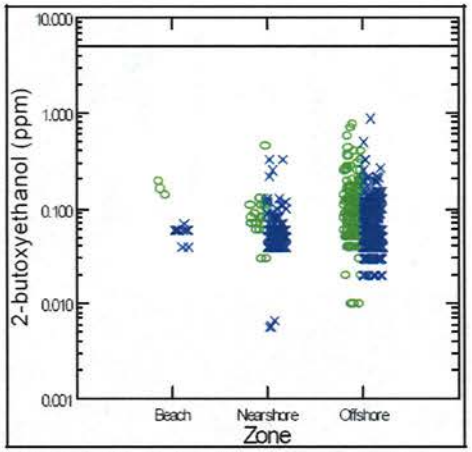


Figure 1: BP 2-butoxyethanol measurements, by Zone. **(NIOSH REL = 5 ppm)** (blue = non-detect, green = (detect≤5 ppm), red = (detect>5 ppm))

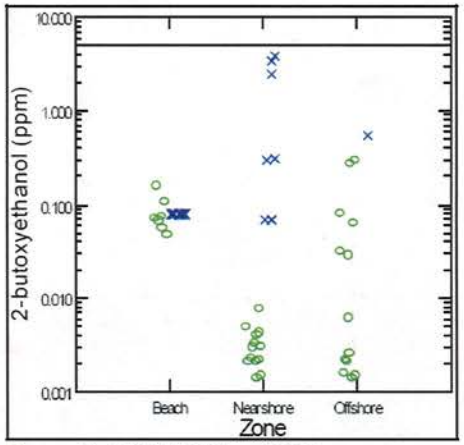


Figure 2: OSHA, NIOSH, and USCG 2-butoxyethanol measurements, by Zone. **(NIOSH REL = 5** ppm) Normalized exposures for all zones. (blue = non-detect, green = (detect≤5 ppm), red = (detect>5 ppm))

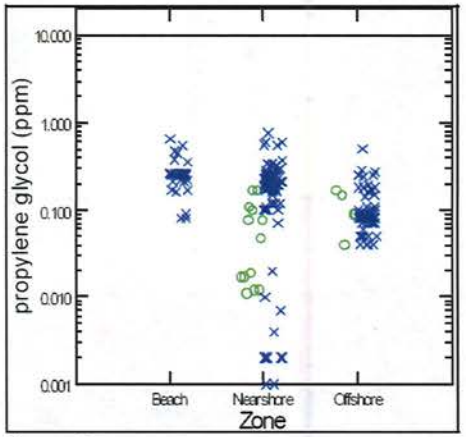
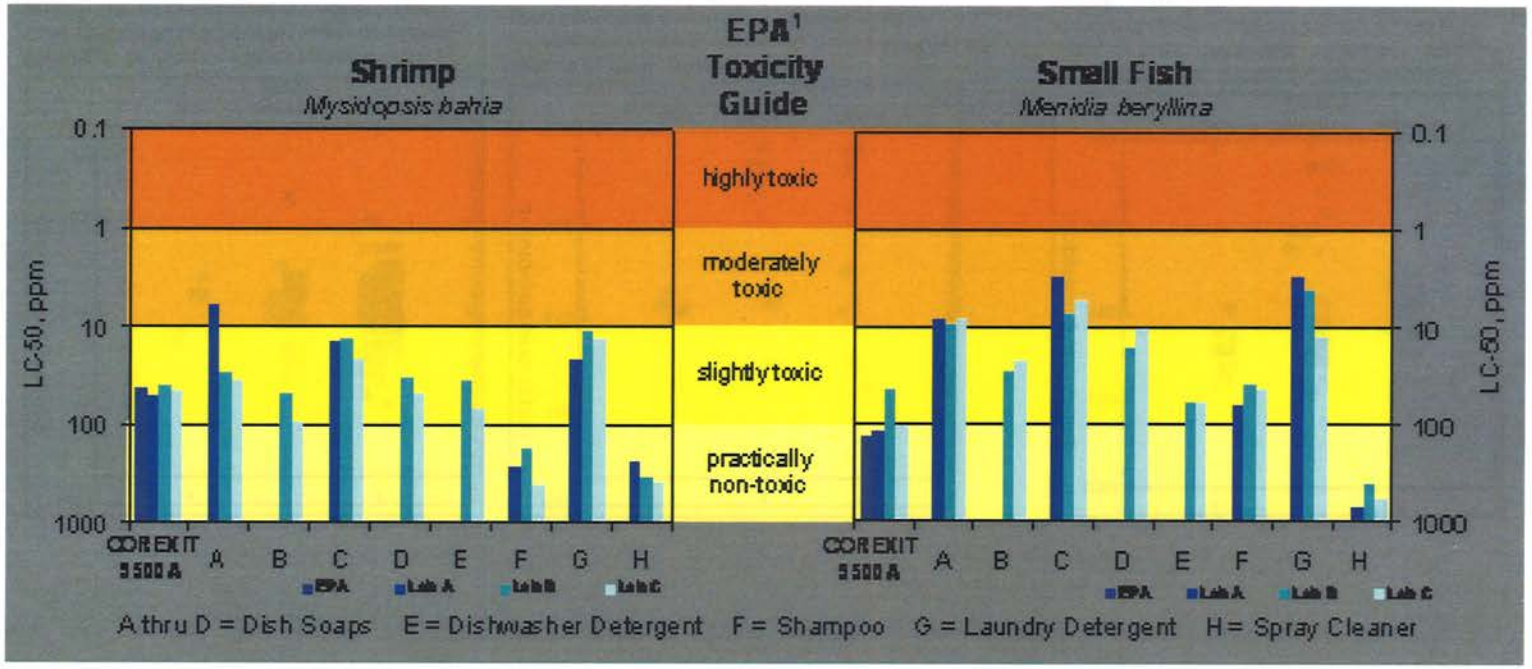


Figure 3 : OSHA, NIOSH, and USCG propylene glycol, by Zone. **(AIHA WEEL = 10 mg/m3)** (blue = non-detect, green = (detect≤10 mg/m^3), red = (detect>10 mg/m^3))

Dispersant Tests



A range of working environments

At source

Vessels of Opportunity

De-contamination

Incident Command Posts

Working with Government Agencies and Third parties

- United States Coast Guard (USCG)
- Occupational Safety and Health Administration (OSHA)
- Department of Health and Human Services (HHS)
- National Institute for Occupational Safety and Health (NIOSH)
- Environmental Protection Agency (EPA)
- Food and Drug Administration (FDA)
- Contractors
- Local communities
- Gulf Coast universities
- Charities

We had to put resources in place very quickly

CONTRACTED WORKFORCE

FACILITIES

SPECIALIST EXPERTISE

Identifying potential hazards was the first priority…

CHEMICAL

BIOLOGICAL

HUMAN FACTORS

PHYSICAL (Heat)

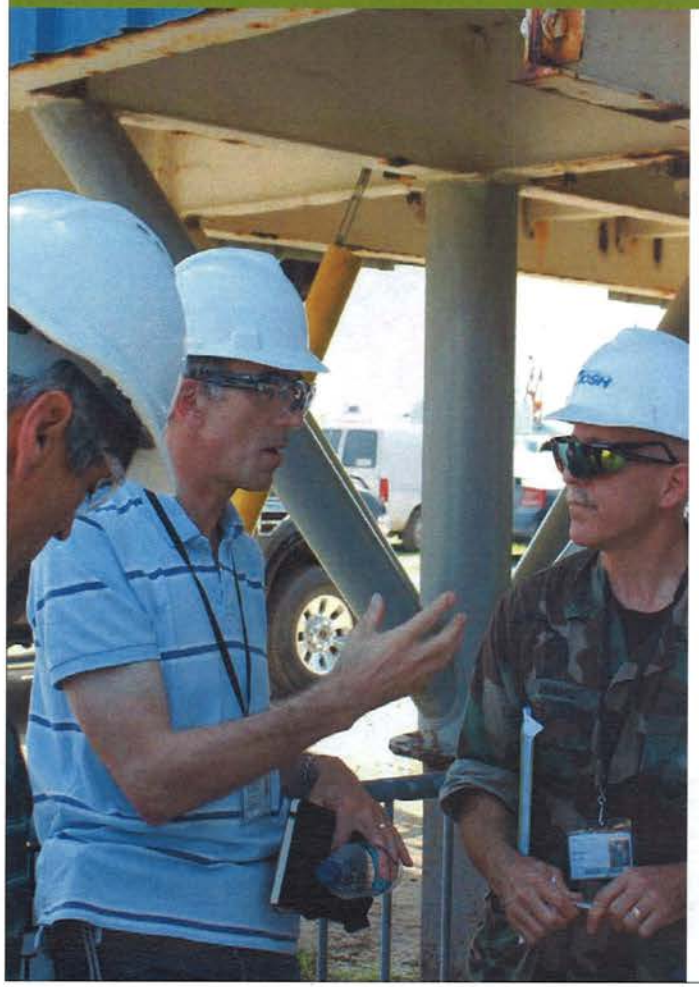
Identify Potential Hazards → Risk Assessment → Risk Management → Response

…and then we had to assess the potential risks

- Potential risks to workers
- Potential risks to local communities

Identify Potential Hazards → Risk Assessment → Risk Management → Response

…and co-operate with others in coordinating our activities with them effectively



- Making continuous improvements
- Providing reassurance and information

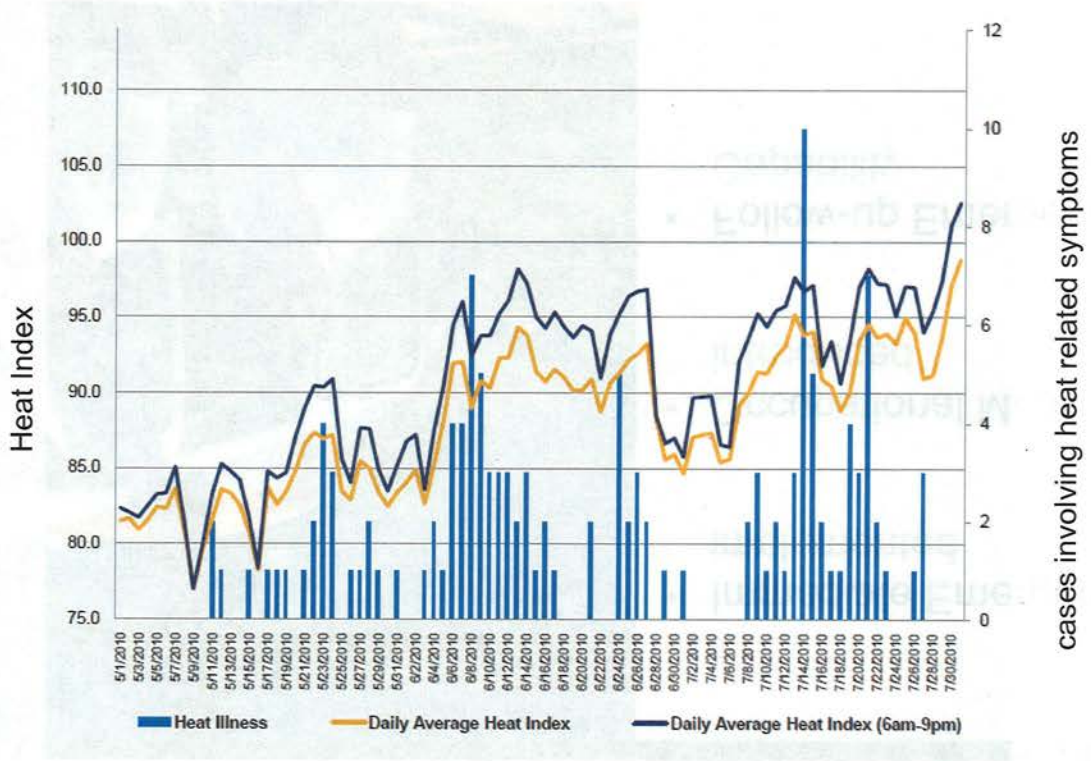
Identify Potential Hazards → Risk Assessment → Risk Management → Response

The resources to respond to medical needs

- Immediate Emergency Response implemented
- Occupational Medicine Capability introduced
- Follow-up Emergency Response Capability

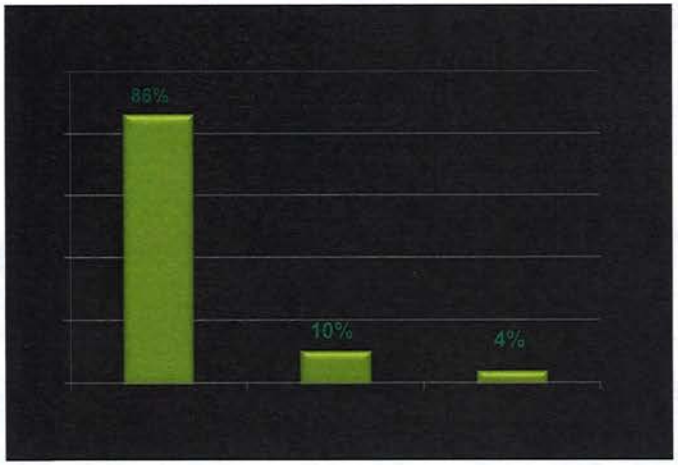
Identify Potential Hazards → Risk Assessment → Risk Management → Response

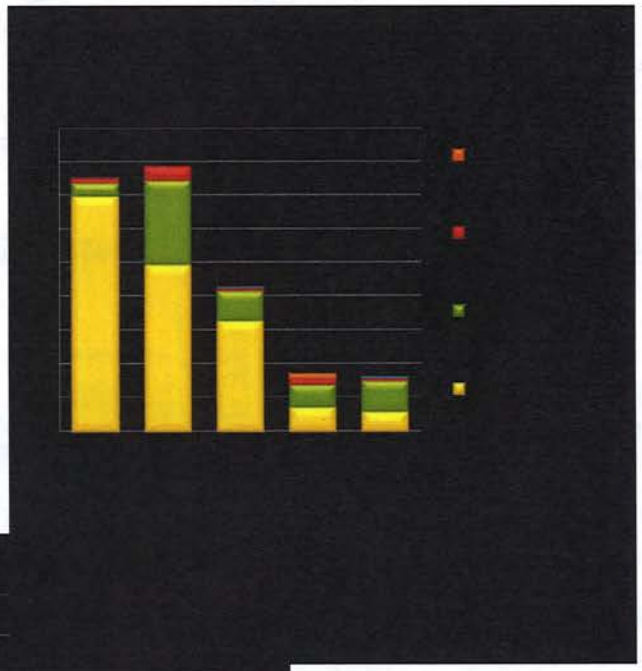
Relationship between Heat Index and Case Presentations

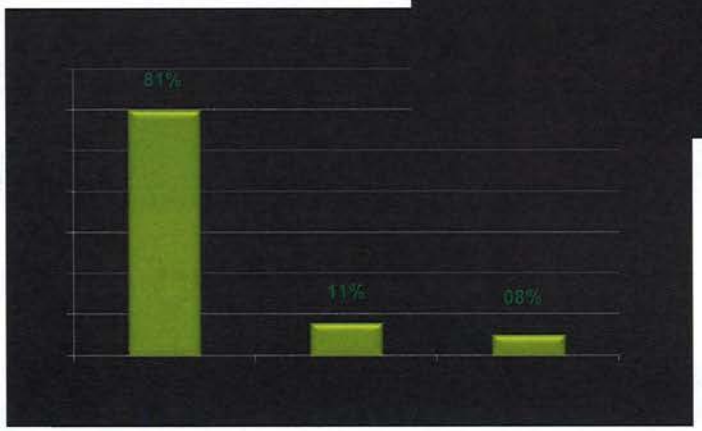


Identify Potential Hazards → Risk Assessment → Risk Management → Response

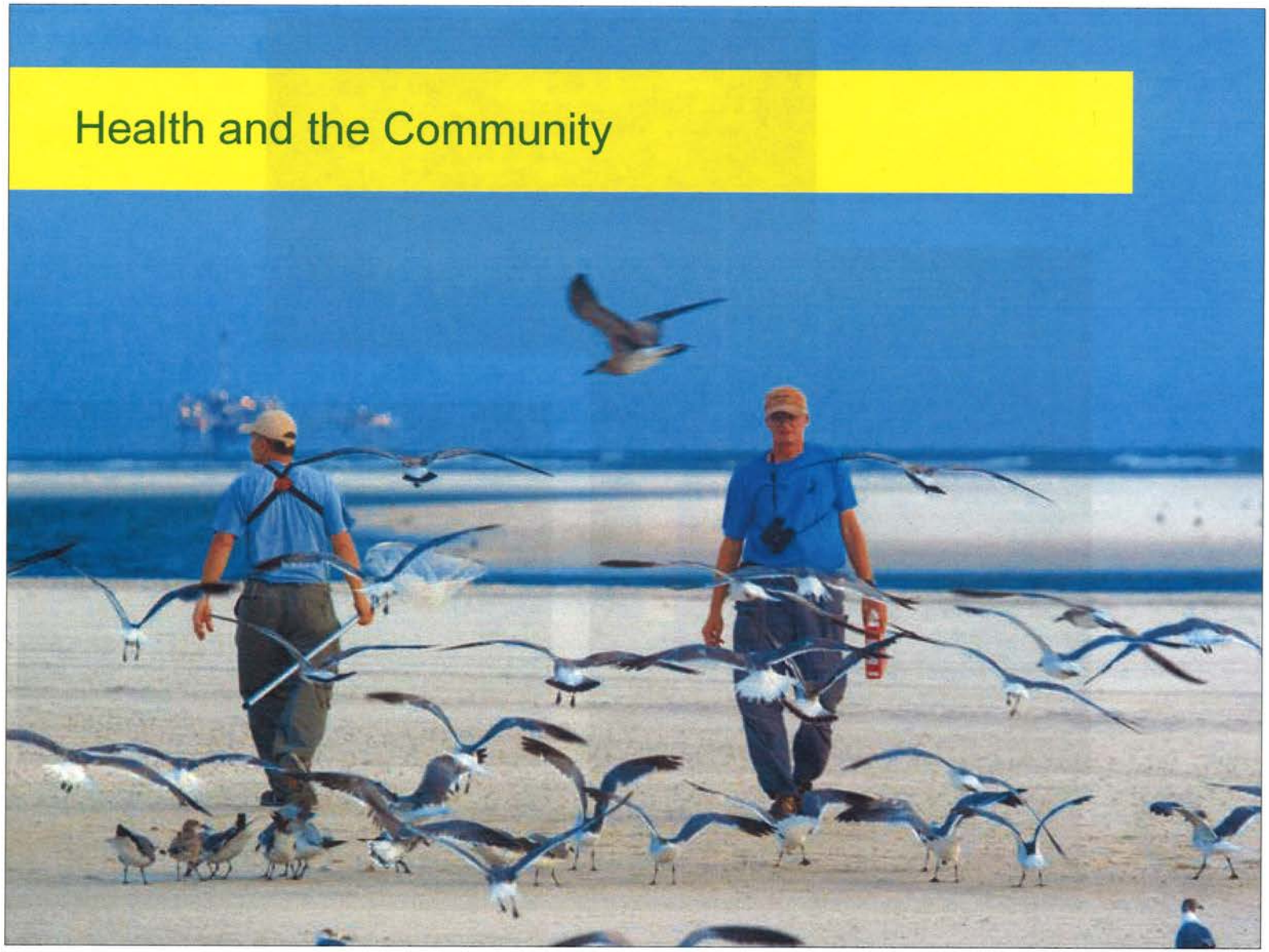
Illnesses and Injuries That Occurred during the Response (to February 2011)







Health and the Community



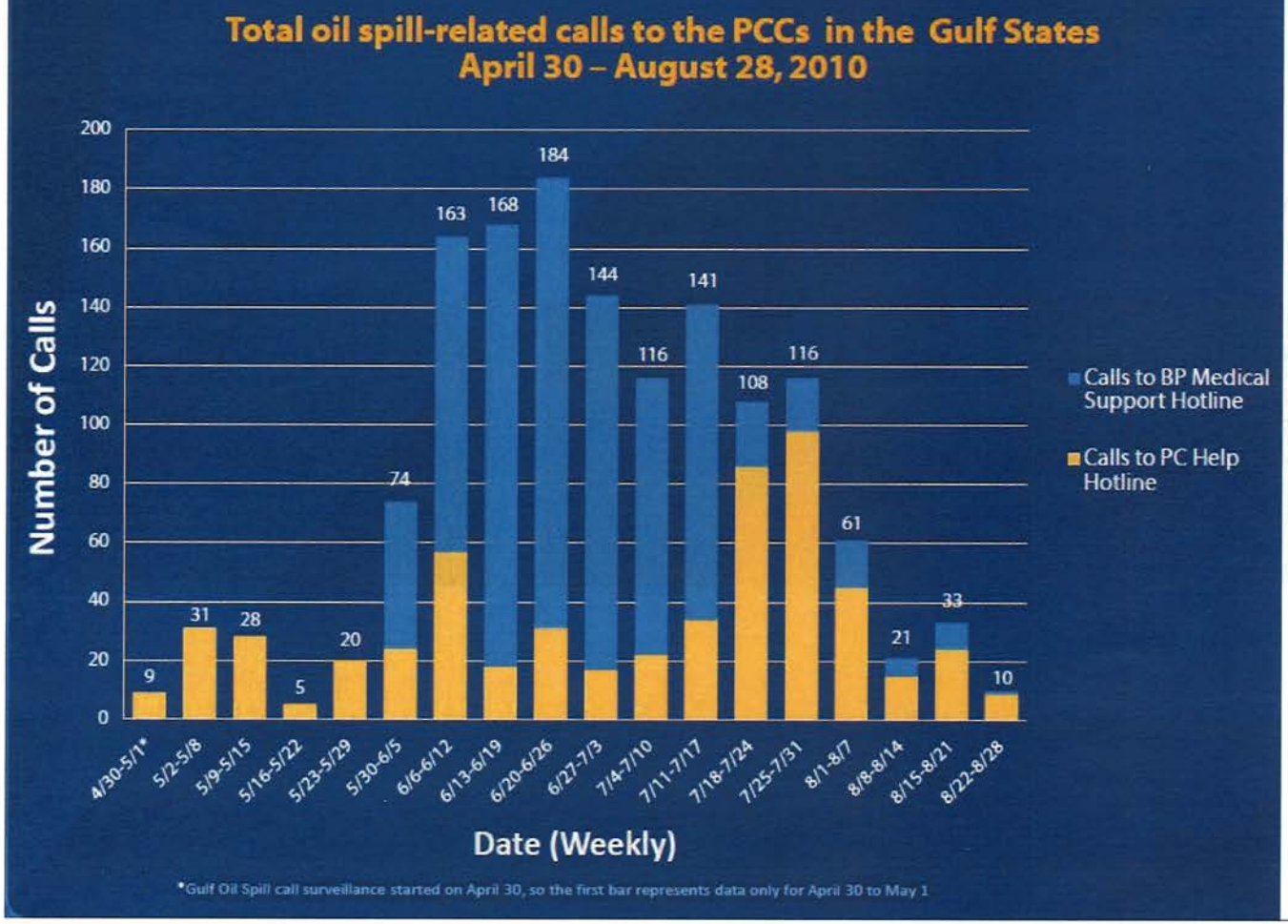
The Future - Looking ahead on health

TRACKING
AND MONITORING

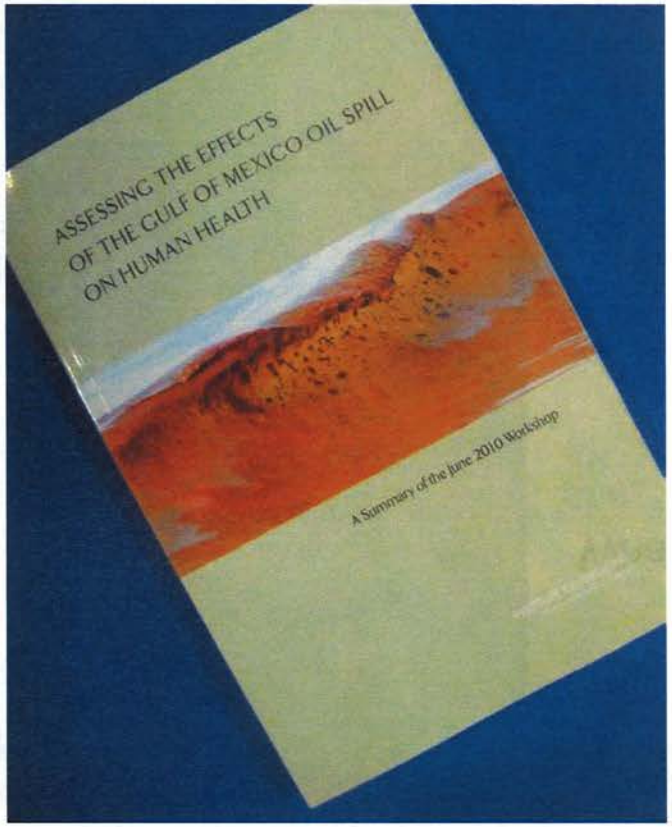
WORKING WITH
LOCAL COMMUNITIES
AND CHARITIES

UNDERSTANDING
POTENTIAL LONGER
TERM HEALTH EFFECTS

Poison Control Center and BP Hotline Calls



Long-term health studies and local outreach



- BP provided $10 million in support of GuLF Study led by NIEHS
- Study formally launched February 28, 2011
- BP provided $52 million to help fund behavioral health support across US Gulf Coast

Lessons Learned from the Response

What we learned:

- Quickly mobilising and coordinating activities of a large contracted workforce
- Working with multiple agencies and regulators simultaneously
- Importance of clarity of instructions and clear lines of responsibility

Thank you for listening. Any questions?