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## The Texas City Refinery Explosion: The Lessons Learned

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Chairman, Ladies and Gentlemen,

Thank you very much for that introduction.

Before I begin to talk about the Texas City incident and the lessons we have learned, I should tell you that the text of this address will be available on the conference website.

It's a privilege to be asked to address the premier conference on process safety held in the United States. I only wish the circumstances were happier.

I accepted your invitation and came across the Atlantic to be here for one main reason. From the moment BP began investigating what happened at Texas City we made a conscious decision as a company to share what we learned with others – the local community, other companies, regulators, the media, and industry as a whole.

There's nothing proprietary about an awful incident of this kind. But one thing we can do is to be as open and transparent as possible so that it never recurs. It should not take others to have a fatal accident to learn the lessons we did.

I have to say, at the outset, that I'm not a process engineer. Before the Texas City explosion I knew little about refineries. My expertise is in oil and gas exploration and production having run a major part of our business in the North Sea. There of course the industry approach to safety was changed by the tragic incident on Piper Alpha where major loss of life forced fundamental rethinking of the whole approach to safety. The fact that I was outside the relevant line organization is consistent with BP's incident investigation protocol.

For a technical analysis of what happened at Texas City, and a precise description of what we're doing to put things right I hope you will be able to attend a session led by my colleague Mike Broadribb. Mike - who is a process engineer and has been deeply involved in everything we've been doing since the incident - will take you through the details.

What I want to do today is to describe the context – to talk about how BP approached safety management prior to the Texas City explosion; to describe the impact of the explosion on the company; and to share with you some of the lessons learned and remedial actions we're taking.

It's not an easy story to tell. BP doesn't come out of it well. And it's a complicated tale involving many factors that go well beyond the process of operating a refinery safely – BP's empowerment ethos, the behaviour of individuals in leadership and the clarity of our standards to name a few. Truly the heart of our operations.

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In particular, I don't want anyone to leave here today thinking that going forward we know it all – that BP is as sure it has all the answers now as it was certain before the explosion that the company's safety management framework compared favourably with any in the industry.

This was a preventable incident, as I will explain. It should be seen as a process failure, a cultural failure and a management failure.

Our investigations have revealed significant deficiencies in the work and safety culture at Texas City. The question, of course, is why these deficiencies developed – and why weren't they sufficiently identified and addressed before the explosion.

If we've learned one thing from this tragedy it's the need for humility.

So let me begin with some background...

If this was March 22nd 2005 – the day before the explosion – and I was standing here addressing this audience the day before the explosion, my remarks to you would have been much different.

For a start, my confidence in the BP Group's safety culture, safety standards, safety management systems and safety audit programmes would have been evident.

I'd have pointed to some statistics – for example, how in the previous five years the company had reduced its OSHA recordable injury rate by almost 70 percent and its fatality rate by 75 percent.

I'd have argued that this positive trend reflected a concerted, systematic approach to safety.

I'd have talked about how accountability for safe operations had been embedded in the line, was led and managed at the facility level and had become the shared responsibility of everyone working in a BP facility – from contractors to plant managers.

I'd have described how frequent audits were conducted of our major operating facilities in order to assess compliance with group standards and expectations.

I'm sure I'd have mentioned how everyone working in a BP facility is empowered and expected to raise safety concerns and to stop work if they think conditions are unsafe.

I'd have pointed, perhaps with some pride, to BP's comprehensive HSE management system framework. This defined the company's expectations for managers in many areas including safety and accident prevention, and plant and equipment integrity.

You'd have heard how we had adopted minimum standards across BP - governing things like permits to work, energy isolation, ground disturbance, confined space entry, working at heights, lifting operations, driving safety and management of change – all as a result of investigating fatalities and serious injuries in depth on a company-wide basis so as to identify faulty patterns of behaviour.

And I would have described our efforts to continuously drive up safety standards regardless of our improving record.

But on March 23rd 2005 it became clear that none of this was enough.

At 1.20pm on March 23rd an explosion rocked the Texas City refinery, engulfing the Isomerization unit in flames and destroying temporary trailers placed nearby to support an ongoing turnaround. Fifteen people lost their lives. Many others were injured.

I was in London.

Like a lot of people seeing the coverage on BBC and CNN I realised that what had happened was a turning point – that nothing was going to be the same for BP wherever you worked in the company.

But that was only the start of understanding. We couldn't undo the damage done to the families of those who died. Nor could we wave away the injuries sustained by so many workers. We couldn't change the past. We had to look forward. And we had to respond.

We knew immediately that there would be huge fall-out.  
Anger in the local community.  
Intense regulatory scrutiny.  
Litigation.  
Massive media coverage.  
And attacks on our motives, competence and commitment to safe operations.

We knew there would be no easy answers and we knew we'd be judged on the basis of what we did, and not what we said.

The one thing we felt able to rely on, despite what had happened, were the principles described in BP's Code of Conduct, underpinned by our corporate values. These have been our compasses, guiding us to try to do the right thing for the right reasons.

Our chief executive, John Browne, reinforced that approach when he flew into Texas City immediately after the explosion.

First, he emphasized that BP was responsible for what happens inside the boundaries of its sites, and this incident was no exception.

Second, he promised the company would provide support to the victims of this tragedy and their families.

Third, he pledged BP's full resources to determine the cause of the explosion and fire and he also made it clear that BP would take any action necessary to prevent a recurrence.

And fourth, he guaranteed the company's full cooperation with government agencies investigating the accident and promised to make public our own investigation and to share lessons learned with others.

So what have we been doing since 23rd March last year? Well, for the last 13 months there has been no doubt inside BP about what we should be doing to make amends and to prevent repetition.

On March 24th a ten person Fatality Investigation Team was set up, which I led. It included technical and safety experts from across the company as well as hourly and supervisory personnel from the Texas City refinery.

Our mission was clear - gather the facts, determine critical factors and system causes and report our findings and recommendations.

No area was off limits and there were no preconceived notions going in.

We retained outside experts to model the explosion and test key components, often in consultation with investigators from the Chemical Safety Board. We shared information gathered during our investigation with the CSB and with other relevant agencies. We carried out the investigation in line with bp's own internal guidance and the CCPS guidelines.

I should also say that the three union members of the team played an important role gathering the facts and shaping our final report. Every thing in the final report was shared and discussed with them.

Just two months after the explosion we decided to publish an interim report detailing the critical factors leading to the explosion in order to share the information, and begin taking corrective action as soon as possible.

Also, by establishing what occurred early on, we could begin the process of resolving claims. Throughout, our objective has been to agree fair compensation with every victim of the explosion without the need for litigation.

A sum of \$700 million was set aside for that purpose. So far we've compensated more than 230 people who were injured and achieved settlements with all but three of the family members of every person who died.

Seven months later in December we produced our final report. The full texts of both our reports are available on BP's worldwide web.

We published these reports knowing they would receive intense scrutiny – not least from the CSB, OSHA and other government agencies and I'd like to spend a little time describing our relations with regulators.

The CSB has been critical of our operations at Texas City and, as some of you know, there are areas where we disagree – for example, over issues where there is limited evidence.

It shouldn't be a surprise that there are differing interpretations of what happened. After an incident of this magnitude it's probably inevitable. What's more important is that our findings are generally consistent.

We also entered a settlement with OSHA and paid a fine of \$21.3 million to resolve more than 300 separate alleged violations of OSHA regulations.

Again, we see far more value in working with the agency. We both want to make Texas City a safer place – and our own report makes it clear there were serious problems at the refinery that must be addressed. A prolonged dispute with OSHA would benefit no one.

The fact is we share common goals with the regulatory authorities - about the need to reduce the risk of similar events in the future, and about the need to improve the safety culture and process safety management at all our refineries.

That's why we endorsed the CSB recommendation to the industry to revisit standards for the positioning of temporary buildings near process areas and published our own Engineering Technical Practice on the matter.

And that's why we accepted another CSB recommendation and set up an independent panel under the leadership of former US Secretary of State James A. Baker to assess the health of our safety management systems and safety culture across our US refining network.

There's one other aspect of the scrutiny we've been under I should mention – the scrutiny we've received from our employees all over the world.

I can only speak for myself but I was shocked by the Texas City explosion. It seemed so out of character with what I believed was BP's prevailing safety culture. It was hard to understand how such an incident could have happened.

Finding out what had gone wrong, accounting for it publicly and putting it right was the universal desire within the company. The feedback we've received, for the most part, indicates that the investigation met these expectations.

Our employees are relieved that BP accepted responsibility early on; glad it offered compensation and are reassured that we cooperated with governmental agencies. They support our transparency. And they support the steps we're taking to reduce the risk of a recurrence.

Turning to the Final Report our team produced last December, there is one central issue I want to discuss with you - why hadn't BP performance expectations fully taken root at Texas City?

Mike Broadribb will be taking you through the process-related issues. I will concentrate on what we termed cultural issues.

The fact is that the more we probed, the more we learned and the more we wanted to learn. Our list of questions grew and grew.

Why was there no active supervision present at the ISOM unit during the restart? Why did operators print the start up procedure but not follow it? Why wasn't documentation about previous incidents more complete?

Why didn't people see risk – for example, in locating trailers so close to the blow down stack? Why were so many vehicles in the process areas at the refinery? Why had the site missed opportunities to replace blow down stacks?

Why hadn't the measures taken at the refinery in 2001-04 to improve safety standards and work practices – and there were many of them – had more impact? And why hadn't we made more progress addressing the low morale and distrust of site management found in people assurance surveys at Texas City?

In the end we identified five main underlying causes:

- Firstly, over the years the working environment had eroded to one characterized by resistance to change and lack of trust, motivation and purpose. Expectations around supervisory and management behaviour were unclear. Rules were not followed consistently. Individuals felt disempowered from suggesting or initiating improvements
- Secondly, process safety, operations performance and systematic risk reduction priorities had not been set nor consistently reinforced by management. Safety lessons from other parts of BP were not acted on.
- Thirdly, many changes in a complex organization – both of structure and personnel - led to a lack of clear accountabilities and poor communication. The result was workforce confusion over roles, responsibilities and priorities
- The fourth cause focused on poor hazard awareness and understanding of process safety on the site - resulting in people accepting higher levels of risk.
- And finally, poor performance management and vertical communication in the refinery meant there was no adequate early warning system of problems and no independent means of understanding the deteriorating standards in the plant through thorough audit of the organisation.

And to answer one of the questions I posed just now: many of the safety changes brought in during the previous three years at the refinery with hindsight look incomplete. I think the changes were real and did have impact. The management team was having impact on the areas on which it focused. The problem was that they weren't looking at the whole picture, addressing the whole problem... a kind of tunnel vision.

These conclusions concerned us so much that we undertook assessments of safety culture and organizational health at every other refinery in the BP system.

As a result we've identified areas in need of improvement at several of our facilities which we're tackling. But I'm able to report that these assessments found no other BP-operated refinery with the degree of safety and operational integrity concerns evident at Texas City in the aftermath of the incident.

So what actions are we taking to prevent a recurrence? We've begun to move on. Our investigation team made 81 recommendations. The site is implementing every one.

Mike will take you through the technical side. I'll concentrate on broader aspects.

One - we've put a new management team in place at Texas City, simplified the organization, improved communication, clarified roles and responsibilities and taken steps to verify compliance with operating procedures.

Two - we've created a project team to coordinate and track implementation of the recommendations in our Final Report and the corrective actions agreed as part of BP's settlement with OSHA.

Three - at a corporate level we've created a new Safety and Operations organization which I lead. A key aspect of this new role is to improve the transfer and incorporation of relevant learnings.

We are also enhancing our audit program, building in independence at the same time - the emphasis now is on making sure systems and procedures are

in place and used effectively. And we've established new standards designed to foster greater rigor and consistency for control of work and integrity management across the BP Group.

Four - we've committed \$1 billion over the next five years to upgrade and maintain the Texas City site. Among other things, we'll be installing modern process control systems on major units, eliminating the use of blow down stacks in light service and improving workforce training which, frankly, has been inadequate.

And five - we've introduced a new engineering technical practice governing the use of temporary buildings inside refineries and other processing plants. Since then some 160 trailers have been relocated at the Texas City refinery enabled by moving 400 workers to a new office building in downtown Texas City.

As you probably know, Texas City has only recently started up again having been shutdown since September 23rd 2005. This extended effort allowed repair of impacts sustained during the shutdown caused by Hurricane Rita and also to enable refurbishment of Tier 1 gasoline production units at the refinery.

While this has been going on we've taken the chance to review and update all of our operating and maintenance procedures. And all operations and maintenance personnel have received training - totalling upwards of 20,000 man-hours - on such matters as process safety management, hazard recognition and process trouble shooting.

I'd now like to talk about some of what we've learned over the last 13 months.

With an incident of this scale, the lessons learned are almost endless. But at the facility level seven stand out:

- The need to ensure plant leadership teams have the time to focus on day-to-day operations and aren't distracted by too many competing demands. Managers need to know what's happening in their control rooms and on the plant.
- The need to capture the right metrics that indicate process safety trends; do not get seduced by personal accident measures, they have their place but do not warn of incidents such as this one.
- Procedures are ineffective if they are not up-to-date and routinely followed
- The importance of two-way communication. If people believe leaders aren't listening or don't appear to be taking team members' concerns seriously, then soon they stop raising them. We must keep our promises to each other. It's the first step in rebuilding trust and the only way to earn the respect and obtain the commitment of the workforce. This is about staying in touch, being aware, being responsible and listening.
- The importance of investigating process incidents and loss of containment incidents the same way serious injuries are investigated. Document all incidents thoroughly. Share what you learn.
- The value of having an effective feedback loop to capture and incorporate into operating procedures and training programs lessons learned from earlier incidents and process upsets
- And lastly, keep non-essential personnel out of process areas. Take a hard look at any potential blast impact zones. And if you must have temporary structures near process areas make sure they are blast resistant. The safest way to protect your people is to move them outside of blast zones.

So in conclusion, the factors which contributed to the explosion at Texas City were years in the making and will require concerted, sustained commitment to rectify.

Our investigation revealed many safety areas at the refinery where procedures, practices and expected behaviours were not met. It has taught us hard lessons

about leadership and communication, engagement and teamwork.

Our task now is to transform the refinery's safety culture. For instance the practice of siting temporary accommodation trailers within potential blast zones seemed to be treated as normal. That is the challenge we face – to grow a culture that will challenge and correct things which are not right.

BP is determined to stay the course and do what it takes to get safety right at Texas City and elsewhere. It is only by a relentless commitment to this objective that we can demonstrate our respect and care for those who died or were injured a year ago and learn and implement lessons across our company.

It's a painful process, not least coming here and acknowledging our mistakes so publicly.

But as I said at the start, we've made a commitment to share learnings from this incident. We've seen a big impact in BP already, right across the company. And it's encouraging to know that other companies in our industry are proving receptive and open-minded in taking on board the lessons we learned the hard way.

The fact is that Texas City was a preventable accident but that our lessons could help prevent others from falling into the same traps.

Thank you for being so attentive.

Please learn from our mistakes.