

**WRITTEN STATEMENT OF  
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MEMBER OF  
THE BP U.S. REFINERIES  
INDEPENDENT SAFETY REVIEW PANEL  
BEFORE THE  
COMMITTEE ON EDUCATION AND LABOR  
U.S. HOUSE OF REPRESENTATIVES  
WASHINGTON, D.C.**

**MARCH 22, 2007**

## **Introduction**

Mr. Chairman and distinguished members of the Committee, I am Admiral Frank L. “Skip” Bowman, U.S. Navy (retired). I serve as president and chief executive officer of the Nuclear Energy Institute. In addition, and of particular relevance to the hearings by the Committee, I also served as one of the 11 members on the BP U.S. Refineries Independent Safety Review Panel, which was chaired by former Secretary of State James A. Baker, III. In the remainder of this statement, I will refer to that panel as “the Panel.”

First, let me say that I regret the circumstances that bring us here today—the catastrophic accident that occurred at the BP Texas City refinery on March 23, 2005. Tomorrow will be the second anniversary of that tragic event. I want to extend my sympathy to all the families, colleagues and friends of those who perished in that accident, including Eva Rowe, who is here today and who lost both of her parents in the accident. I also want to extend my best wishes for continued recovery to those who were injured in the accident.

In August 2005, the U.S. Chemical Safety and Hazard Investigation Board, which I will refer to as the “CSB,” issued to the BP Global Executive Board of Directors an urgent recommendation to form an independent panel to “assess and report on the effectiveness of BP North America’s corporate oversight of safety management systems at its refineries and its corporate safety culture.” That same urgent recommendation called for a panel with a diverse makeup, including experts in corporate culture, organizational behavior, and human factors; and experts from other high risk sectors such as nuclear energy and the undersea navy.

I was selected to serve on the Panel because of my background and experience with the nuclear navy. After graduating from Duke University in 1966, I immediately began my naval career, which spanned almost 39 years. In 1973, I completed a dual masters program in nuclear engineering and naval architecture/marine engineering at Massachusetts Institute of Technology. During the course of my naval career, I served aboard six ships, five of which were nuclear submarines, and I commanded the submarine USS City of Corpus Christi and the tender USS Holland. A flag officer since 1991, I also served as Deputy Director of Operations, Joint Staff; Director for Political-Military Affairs, Joint Staff; and Chief of Naval Personnel. I served as Director, Naval Nuclear Propulsion from 1996 to 2004, during which time I held a joint appointment as Deputy Administrator for Naval Reactors in the National Nuclear Security Administration of the Department of Energy. In that position I was responsible for the operation of more than 100 nuclear reactors aboard Navy aircraft carriers and submarines and in its training and research facilities. Throughout its history—including during my tenure—the nuclear navy’s safety record has been exemplary. Since 1953, U.S. nuclear warships have logged over 128 million miles in defense of our country.

In my role as Director, Naval Nuclear Propulsion, I testified before the House Science Committee investigating the Columbia Space Shuttle accident on the organizational culture of safety that has made Naval Reactors a safety success.

I served on the Panel with ten distinguished, dedicated, and hard-working members. Each member brought to the Panel a unique set of skills and expertise, and together I believe we fulfilled the stated objective of the CSB in having a diverse group with expertise in the different areas called for by the CSB’s urgent recommendation. As called for by our charter, the Panel’s review was thorough and

independent. The Panel announced its final report in Houston on January 16, 2007, approximately two months ago.

I am here today in my capacity as a former member of the Panel. In that capacity, I will highlight for the benefit of the Committee certain aspects of the Panel's report. In particular, I will rely heavily on the executive summary from the Panel report. In making my comments today, I do not intend to interpret or add to what the Panel said in its report, which stands on its own. Instead, I intend to highlight selected portions of the report that may be of interest to this Committee. Mr. Chairman, with your permission, I will submit a copy of the Panel's entire report for the record. The Panel's report can also be accessed at the Panel's website, which may be found at <http://www.safetyreviewpanel.com>.

Before highlighting certain aspects of the Panel's report, let me quote two portions from the Panel's statement that preceded its report:

First, the very first sentence: "Process safety accidents can be prevented."

Second, the following paragraph:

Preventing process accidents requires vigilance. The passing of time without a process accident is not necessarily an indication that all is well and may contribute to a dangerous and growing sense of complacency. When people lose an appreciation of how their safety systems were intended to work, safety systems and controls can deteriorate, lessons can be forgotten, and hazards and deviations from safe operating procedures can be accepted. Workers and supervisors can increasingly rely on how things were done before, rather than rely on sound engineering principles and other controls. People can forget to be afraid.

Let me move now to highlight selected aspects of the Panel's review and report.

### **Background of the Panel's Review**

On March 23, 2005, the BP Texas City refinery experienced one of the most serious U.S. workplace disasters of the past two decades, resulting in 15 deaths, more than 170 injuries, and significant economic losses. The CSB, an independent federal agency charged with investigating industrial chemical accidents, promptly began an accident investigation.

On August 17, 2005, the CSB issued an urgent safety recommendation to the BP Global Executive Board of Directors that it commission an independent panel to assess and report on the effectiveness of BP North America's corporate oversight of safety management systems at its refineries and its corporate safety culture. In making its urgent recommendation, the CSB noted that the BP Texas City refinery had experienced two other fatal safety incidents in 2004, a major process-related hydrogen fire on July 28, 2005, and another serious incident on August 10, 2005. Based on these incidents and the results of the first few months of its preliminary investigation, the CSB cited serious concerns about:

- the effectiveness of the safety management system at the BP Texas City refinery,
- the effectiveness of BP North America's corporate safety oversight of its refining facilities, and

- a corporate safety culture that may have tolerated serious and longstanding deviations from good safety practice.

BP embraced the urgent recommendation of the CSB to form an independent panel. In a press release issued on August 17, 2005, the company noted that the Texas City explosion was the worst tragedy in BP's recent history and that it would "do everything possible to ensure nothing like it happens again."

On October 24, 2005, BP announced the formation of the BP U.S. Refineries Independent Safety Review Panel. Former Secretary of State James A. Baker, III chaired the Panel. In addition to Secretary Baker and myself, the Panel included the following members:

- Glenn Erwin, who monitors refinery safety nationwide for the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union;
- Slade Gorton, former U.S. Senator from Washington State and member of the 9/11 Commission;
- Dennis C. Hendershot, Principal Process Safety Specialist at Chilworth Technologies, Inc., and a Staff Consultant to the American Institute of Chemical Engineers' Center for Chemical Process Safety;
- Nancy G. Leveson, Professor of Aeronautics and Astronautics and Professor of Engineering Systems at the Massachusetts Institute of Technology;
- Sharon Priest, former Arkansas Secretary of State and currently the Executive Director of the Downtown Partnership, a non-profit organization devoted to developing downtown Little Rock, Arkansas;
- Isadore 'Irv' Rosenthal, former board member of the CSB and current Senior Research Fellow at the Wharton Risk Management and Decision Processes Center;
- Paul V. Tebo, former Vice President for Safety, Health, and the Environment of DuPont;
- Douglas A. Wiegmann, Director of the Human Factors and Patient Safety Research Program within the Division of Cardiovascular Surgery at Mayo Clinic in Rochester, Minnesota; and
- L. Duane Wilson, former Vice President, Refining, Marketing, Supply & Transportation—Fuels Technology of ConocoPhillips.

## **The Panel's Review**

### Purposes and Limitations

It is important that the Committee understand the primary purposes—and also some of the primary limitations—of the Panel's work.

The Panel's charter directed it to make a thorough, independent, and credible assessment of the effectiveness of BP's corporate oversight of safety management systems at its five U.S. refineries and its corporate safety culture. The charter further directed the Panel to produce a report examining and recommending needed improvements to BP's corporate safety oversight, corporate safety culture, and corporate and site safety management systems. The charter did not

contemplate that the Panel review environmental issues or general site security issues.

Significantly, the charter also provided that the Panel should not “seek to affix blame or apportion responsibility for any past event” and “should avoid duplicating the efforts of the CSB to determine the specific root causes of the incident at Texas City on March 23, 2005.” Both the CSB and BP have investigated the March 23, 2005 accident at Texas City. BP issued its own investigation report on the Texas City accident in December 2005. The CSB issued the final report on its investigation on March 20, 2007, just two days ago.

Since the Panel was not charged to conduct an investigation into the causes of the Texas City accident and did not seek to affix blame or apportion responsibility for that accident, the Panel’s focus and the scope of its review differed from that of the CSB and from the civil litigation relating to that accident. The Panel’s review related to all five of BP’s U.S. refineries, not just the Texas City refinery. The Panel examined BP’s corporate safety oversight, corporate safety culture, and its process safety management systems and not the Texas City accident or any particular incident. The Panel’s examination also was not limited to the period preceding the Texas City accident.

Rather than attempting to determine the root cause of, or culpability for, any particular incident, the Panel wanted to understand BP’s values, beliefs, and underlying assumptions about process safety, corporate safety oversight, and safety management systems in relation to all of BP’s U.S. refineries. The Panel focused on how these values, beliefs, and underlying assumptions interacted with the company’s corporate structure, management philosophy, and other systems that operated within that structure to affect the control or management of process hazards in these refineries. The Panel sought to understand why observed deficiencies in process safety performance existed at BP’s U.S. refineries so that the Panel could make recommendations that can enable BP to improve performance at all its refineries. In effect, the Panel’s review looked back primarily as a basis for looking forward to improve future process safety performance and to reduce the likelihood of accidents such as the Texas City tragedy.

While the Panel necessarily directed to BP the Panel’s recommendations contained in its report, the Panel believed that a broader audience including companies in refining, chemicals, and other process industries should carefully consider the Panel’s recommendations.

### The Panel’s Activities

The Panel developed and followed a multifaceted plan to accomplish the mandate of its charter and the CSB’s urgent recommendation. The plan included visits by the Panel and its staff to BP’s U.S. refineries; public meetings that the Panel conducted in the local communities where the refineries are located; interviews of refinery-level personnel and corporate-level managers; process safety reviews that technical consultants conducted at BP’s U.S. refineries; a process safety culture survey conducted among the workforce at BP’s U.S. refineries; frequent interaction with BP representatives, including periodic briefings by representatives of BP; a targeted document review; and meetings with other companies relating to their management of process safety.

### Focus on Process Safety

The Panel’s report focused on process safety. Not all refining hazards are caused by the same

factors or involve the same degree of potential damage. Personal or occupational safety hazards give rise to incidents—such as slips, falls, and vehicle accidents—that primarily affect one individual worker for each occurrence. Process safety hazards can give rise to major accidents involving the release of potentially dangerous materials, the release of energy (such as fires and explosions), or both. Process safety incidents can have catastrophic effects and can result in multiple injuries and fatalities, as well as substantial economic, property, and environmental damage. Process safety refinery incidents can affect workers inside the refinery and members of the public who reside nearby. Process safety in a refinery involves the prevention of leaks, spills, equipment malfunctions, over-pressures, excessive temperatures, corrosion, metal fatigue, and other similar conditions. Process safety programs focus on the design and engineering of facilities, hazard assessments, management of change, inspection, testing, and maintenance of equipment, effective alarms, effective process control, procedures, training of personnel, and human factors. The Texas City tragedy in March 2005 was a process safety accident.

The Panel believed that its charter and the CSB's August 2005 urgent recommendation required this focus on process safety.

### **The Panel's Findings**

The Panel focused on deficiencies relating to corporate safety culture, process safety management systems, and performance evaluation, corrective action, and corporate oversight.

#### Qualifications Relating to the Panel's Findings

The Panel's charter called for assessments of effectiveness and recommendations for improvement, not for findings related to legal compliance. In making its findings and recommendations, the Panel's objective was excellence in process safety performance, not legal compliance. As a result, the Panel's report and specifically the Panel's findings were not intended for use in legal proceedings to which BP is or may become a party. Rather, the Panel's findings provided a basis for recommendations to BP for making improvements in BP's corporate safety culture, process safety management systems, and corporate safety oversight. The Panel's report focused primarily on identified deficiencies that might be corrected through the implementation of its recommendations.

The Panel often based its findings and recommendations on general principles of industry best practices or other standards for reducing process risks. The Panel believed that observance of these standards should result in improved safety performance even though many of these standards do not necessarily have legal effect. The Panel's findings were based not only on the information developed during the course of the Panel's review, but also on the collective experience and expertise of the Panel members.

Finally, the Panel's findings were based on its assessment that occurred primarily during 2006. The Panel's report acknowledged that since the Texas City accident in March 2005, BP has undertaken or announced a number of measures, including dedicating significant resources and personnel, that are intended to improve the process safety performance at BP's five U.S. refineries. Taken at face value, these measures represent a major commitment to an improved process safety regime.

#### Summary of the Panel's Findings

The findings of the Panel are summarized below under three headings: Corporate Safety Culture; Process Safety Management Systems; and Performance Evaluation, Corrective Action, and Corporate Oversight.

### **Corporate Safety Culture**

A positive safety culture is important for good process safety performance. In its report, the Panel made findings about BP's process safety leadership, employee empowerment, resources and positioning of process safety capabilities, incorporation of process safety into management decision-making, and the process safety cultures at BP's five U.S. refineries.

***Process safety leadership.*** The Panel believed that leadership from the top of the company, starting with the Board and going down, is essential. In the Panel's opinion, it is imperative that BP's leadership set the process safety "tone at the top" of the organization and establish appropriate expectations regarding process safety performance. Based on its review, the Panel believed that BP had not provided effective process safety leadership and had not adequately established process safety as a core value across all its five U.S. refineries. While BP had an aspirational goal of "no accidents, no harm to people," BP had not provided effective leadership in making certain its management and U.S. refining workforce understood what was expected of them regarding process safety performance. BP has emphasized personal safety in recent years and has achieved significant improvement in personal safety performance, but BP did not emphasize process safety. BP mistakenly interpreted improving personal injury rates as an indication of acceptable process safety performance at its U.S. refineries. BP's reliance on this data, combined with an inadequate process safety understanding, created a false sense of confidence that BP was properly addressing process safety risks. The Panel further found that process safety leadership appeared to have suffered as a result of high turnover of refinery plant managers.

During the course of its review, the Panel observed a shift in BP's understanding of process safety. As discussed in the Panel report, BP has undertaken a number of measures intended to improve process safety performance. The Panel also recognized that BP executive management and corporate-level management have more visibly demonstrated their commitment to process safety in recent months.

***Employee empowerment.*** A good process safety culture requires a positive, trusting, and open environment with effective lines of communication between management and the workforce, including employee representatives. The Panel found that BP's Cherry Point, Washington refinery has a very positive, open, and trusting environment. BP's Carson, California refinery appears to have a generally positive, trusting, and open environment with effective lines of communication between management and the workforce, including employee representatives. The Panel found that at BP's Texas City, Texas, Toledo, Ohio, and Whiting, Indiana refineries, BP had not established a positive, trusting, and open environment with effective lines of communication between management and the workforce, although the safety culture appeared to be improving at Texas City and Whiting.

***Resources and positioning of process safety capabilities.*** BP has not always ensured that it identified and provided the resources required for strong process safety performance at its U.S. refineries. Despite having numerous staff at different levels of the organization that support process safety, the Panel found that BP did not have a designated, high-ranking leader for process safety dedicated to its refining business. During the course of its review, the Panel did

not develop or identify sufficient information to conclude whether BP ever intentionally withheld resources on any safety-related assets or projects for budgetary or cost reasons. The Panel believed, however, that the company did not always ensure that adequate resources were effectively allocated to support or sustain a high level of process safety performance. In addition, BP's corporate management mandated numerous initiatives that applied to the U.S. refineries and that, while well-intentioned, overloaded personnel at BP's U.S. refineries. This "initiative overload" may have undermined process safety performance at the U.S. refineries. In addition, the Panel found that operations and maintenance personnel in BP's five U.S. refineries sometimes worked high rates of overtime, and this could impact their ability to perform their jobs safely and increases process safety risk. BP has announced plans to increase both funding and hiring at its U.S. refineries.

***Incorporation of process safety into management decision-making.*** The Panel also found that BP did not effectively incorporate process safety into management decision-making. BP tended to have a short-term focus, and its decentralized management system and entrepreneurial culture have delegated substantial discretion to U.S. refinery plant managers without clearly defining process safety expectations, responsibilities, or accountabilities. In addition, while accountability is a core concept within BP for driving desired conduct, the Panel found that BP had not demonstrated that it had effectively held executive management and refining line managers and supervisors, both at the corporate level and at the refinery level, accountable for process safety performance at its five U.S. refineries. The Panel observed in its report that it appeared to the Panel that BP now recognizes the need to provide clearer process safety expectations.

***Process safety cultures at BP's U.S. refineries.*** The Panel's report found that BP had not instilled a common, unifying process safety culture among its U.S. refineries. Each refinery had its own separate and distinct process safety culture. While some refineries were far more effective than others in promoting process safety, significant process safety culture issues existed at all five U.S. refineries, not just Texas City. Although the five refineries did not share a unified process safety culture, each exhibited some similar weaknesses. The Panel found instances of a lack of operating discipline, toleration of serious deviations from safe operating practices, and apparent complacency toward serious process safety risks at each refinery.

### **Process Safety Management Systems**

The Panel's report also discussed findings relating to the effectiveness of process safety management systems that BP utilized for its five U.S. refineries. These findings related to BP's process risk assessment and analysis, compliance with internal process safety standards, implementation of external good engineering practices, process safety knowledge and competence, and general effectiveness of BP's corporate process safety management system.

***Process risk assessment and analysis.*** While the Panel found that all of BP's U.S. refineries had active programs to analyze process hazards, the system as a whole did not ensure adequate identification and rigorous analysis of those hazards. The Panel's examination also indicated that the extent and recurring nature of this deficiency was not isolated, but systemic.

***Compliance with internal process safety standards.*** The Panel's technical consultants and the Panel observed that BP does have internal standards and programs for managing process risks. However, the Panel's examination found that BP's corporate safety management system did not ensure timely compliance with internal process safety standards and programs at BP's five U.S.



refineries. This finding related to several areas that were addressed by BP internal standards: rupture disks under relief valves; equipment inspections; critical alarms and emergency shut-down devices; area electrical classification; and near miss investigations.

***Implementation of external good engineering practices.*** The Panel also found that BP's corporate safety management system did not ensure timely implementation of external good engineering practices that support and could improve process safety performance at BP's five U.S. refineries. The Panel believed that such practices play an important role in the management of process safety in refineries operating in the United States.

***Process safety knowledge and competence.*** Although many members of BP's technical and process safety staff have the capabilities and expertise needed to support a sophisticated process safety effort, the Panel believed that BP's system for ensuring an appropriate level of process safety awareness, knowledge, and competence in the organization relating to its five U.S. refineries had not been effective in a number of respects. First, BP had not effectively defined the level of process safety knowledge or competency required of executive management, line management above the refinery level, and refinery managers. Second, BP had not adequately ensured that its U.S. refinery personnel and contractors have sufficient process safety knowledge and competence. The information that the Panel reviewed indicated that process safety education and training needed to be more rigorous, comprehensive, and integrated. Third, the Panel found that at most of BP's U.S. refineries, the implementation of and over-reliance on BP's computer-based training contributed to inadequate process safety training of refinery employees.

***Effectiveness of BP's corporate process safety management system.*** BP has an aspirational goal and expectation of "no accidents, no harm to people, and no damage to the environment," and is developing programs and practices aimed at addressing process risks. These programs and practices include the development of new standards, engineering technical practices, and other internal guidance, as well as the dedication of substantial resources. Despite these positive changes, the Panel's examination indicated that BP's corporate process safety management system did not effectively translate corporate expectations into measurable criteria for management of process risk or define the appropriate role of qualitative and quantitative risk management criteria.

The findings above, together with other information that the Panel obtained during its examination, lead the Panel to conclude that material deficiencies in process safety performance existed at BP's five U.S. refineries. Some of these deficiencies are common among multiple refineries, and some of the deficiencies appeared to relate to legacy systems in effect prior to BP's acquisition of the refineries. (BP acquired four of its five U.S. refineries through mergers with Amoco in 1998 and ARCO in 2000.)

BP appears to have established a relatively effective personal safety management system by embedding personal safety aspirations and expectations within the U.S. refining workforce. However, the Panel's report concluded that BP had not effectively implemented its corporate-level aspirational guidelines and expectations relating to process risk. Therefore, the Panel found that BP had not implemented an integrated, comprehensive, and effective process safety management system for its five U.S. refineries.

***Panel observations relating to process safety management practices.*** The Panel observed several positive notable practices or, in the case of BP's process safety minimum expectation program, an excellent process safety management practice. The notable practices relate to

creation of an engineering authority at each refinery and several other refinery-specific programs that are described in more detail in the Panel's report.

### **Performance Evaluation, Corrective Action, and Corporate Oversight**

Maintaining and improving a process safety management system requires the periodic evaluation of performance and the correction of identified deficiencies. As discussed in the Panel's report, significant deficiencies existed in BP's site and corporate systems for measuring process safety performance, investigating incidents and near misses, auditing system performance, addressing previously identified process safety-related action items, and ensuring sufficient management and board oversight. Many of the process safety deficiencies were not new but were identifiable to BP based upon lessons from previous process safety incidents, including process incidents that occurred at BP's facility in Grangemouth, Scotland in 2000.

***Measuring process safety performance.*** BP primarily used injury rates to measure process safety performance at its U.S. refineries before the Texas City accident. Although BP was not alone in this practice, BP's reliance on injury rates significantly hindered its perception of process risk. BP tracked some metrics relevant to process safety at its U.S. refineries. Apparently, however, BP did not understand or accept what this data indicated about the risk of a major accident or the overall performance of its process safety management systems. As a result, BP's corporate safety management system for its U.S. refineries did not effectively measure and monitor process safety performance.

The Panel observed that the process safety performance metrics that BP was using were evolving. BP was monitoring at the corporate level several leading and lagging process safety metrics. BP also was working with external experts to review process safety performance indicators across the company and the industry.

***Incident and near miss investigations.*** BP acknowledged the importance of incident and near miss investigations, and it employed multiple methods at different levels of the organization to distribute information regarding incidents and lessons learned. Although BP was improving aspects of its incident and near miss investigation process, BP had not instituted effective root cause analysis procedures to identify systemic causal factors that may contribute to future accidents. When true root or system causes are not identified, corrective actions may address immediate or superficial causes, but not likely the true root causes. The Panel also believed that BP had an incomplete picture of process safety performance at its U.S. refineries because BP's process safety management system likely resulted in underreporting of incidents and near misses.

***Process safety audits.*** The Panel found that BP has not implemented an effective process safety audit system for its U.S. refineries based on the Panel's concerns about auditor qualifications, audit scope, reliance on internal auditors, and the limited review of audit findings.

The Panel also was concerned that the principal focus of the audits was on compliance and verifying that required management systems were in place to satisfy legal requirements. It did not appear, however, that BP used the audits to ensure that the management systems were delivering the desired safety performance or to assess a site's performance against industry best practices. BP is in the process of changing how it conducts audits of safety and operations management systems, including process safety audits.

***Timely correction of identified process safety deficiencies.*** The Panel observed that BP expends significant efforts to identify deficiencies and to correct many identified deficiencies, which BP

often does promptly. The Panel also found, however, that BP had sometimes failed to address promptly and track to completion process safety deficiencies identified during hazard assessments, audits, inspections, and incident investigations. The Panel's review, for example, found repeat audit findings at BP's U.S. refineries, suggesting that true root causes were not being identified and corrected. This problem was especially apparent with overdue mechanical integrity inspection and testing. Although BP regularly conducted various assessments, reviews, and audits within the company, the follow through after these reviews had fallen short repeatedly. This failure to follow through compromises the effectiveness of even the best audit program or incident investigation.

In addition, BP did not take full advantage of opportunities to improve process operations at its U.S. refineries and its process safety management systems. BP did not effectively use the results of its operating experiences, process hazard analyses, audits, near misses, or accident investigations to improve process operations and process safety management systems.

***Corporate oversight.*** BP acknowledged the importance of ensuring that the company-wide safety management system functions as intended. The company's system for assuring process safety performance used a bottom-up reporting system that originates with each business unit, such as a refinery. As information was reported up, however, data was aggregated. By the time information was formally reported at higher levels of the organization, refinery-specific performance data was no longer presented separately.

The Panel's examination indicated that BP's executive management either did not receive refinery-specific information that suggested process safety deficiencies at some of the U.S. refineries or did not effectively respond to the information that it did receive. According to annual reports on health, safety, security, and environmental assurance that BP management provided to the Environment and Ethics Assurance Committee of BP's Board of Directors for 1999 through 2005, management was monitoring process safety matters, including plant and operational integrity issues. The reports identify safety and integrity management risks that various levels of the organization confronted and describe management actions proposed to address and mitigate those risks. From 2001 to 2003, for example, BP developed and implemented standards for process safety and major accident risk assessments and increased monitoring and reporting of action item closure, sharing of lessons learned, overdue planned inspections, and losses of containment. The reports and other documents that the Panel examined indicated, however, that issues persisted relating to assurance of effective implementation of BP's policies and expectations relating to safety and integrity management.

For these reasons, the Panel believed that BP's process safety management system was not effective in evaluating whether the steps that BP took were actually improving the company's process safety performance. The Panel found that neither BP's executive management nor its refining line management had ensured the implementation of an integrated, comprehensive, and effective process safety management system.

BP's Board of Directors had been monitoring process safety performance of BP's operations based on information that BP's corporate management presented to it. A substantial gulf appears to have existed, however, between the actual performance of BP's process safety management systems and the company's perception of that performance. Although BP's executive and refining line management was responsible for ensuring the implementation of an integrated, comprehensive, and effective process safety management system, BP's Board had not ensured, as a best practice, that management did so. In reviewing the conduct of the Board, the Panel was

guided by its chartered purpose to examine and recommend any needed improvements. In the Panel's judgment, this purpose did not call for an examination of legal compliance, but called for excellence. It was in this context and in the context of best practices that the Panel believed that BP's Board can and should do more to improve its oversight of process safety at BP's five U.S. refineries.

### **The Panel's Recommendations**

The Panel was charged with making recommendations to improve BP's corporate safety culture; process safety management systems; and corporate oversight of process safety. For each recommendation below, the Panel developed commentary that is an integral part of the recommendation and that provides more specific guidance relating to implementation of the recommendation. Reference should be made to Section VII of the Panel's report for a discussion of the recommendations and the related commentary. Each recommendation below should be read in conjunction with the related commentary.

#### **RECOMMENDATION # 1 – PROCESS SAFETY LEADERSHIP**

The Board of Directors of BP p.l.c, BP's executive management (including its Group Chief Executive), and other members of BP's corporate management must provide effective leadership on and establish appropriate goals for process safety. Those individuals must demonstrate their commitment to process safety by articulating a clear message on the importance of process safety and matching that message both with the policies they adopt and the actions they take.

#### **RECOMMENDATION #2 – INTEGRATED AND COMPREHENSIVE PROCESS SAFETY MANAGEMENT SYSTEM**

BP should establish and implement an integrated and comprehensive process safety management system that systematically and continuously identifies, reduces, and manages process safety risks at its U.S. refineries.

#### **RECOMMENDATION #3 – PROCESS SAFETY KNOWLEDGE AND EXPERTISE**

BP should develop and implement a system to ensure that its executive management, its refining line management above the refinery level, and all U.S. refining personnel, including managers, supervisors, workers, and contractors, possess an appropriate level of process safety knowledge and expertise.

#### **RECOMMENDATION #4 – PROCESS SAFETY CULTURE**

BP should involve the relevant stakeholders to develop a positive, trusting, and open process safety culture within each U.S. refinery.

#### **RECOMMENDATION #5 – CLEARLY DEFINED EXPECTATIONS AND ACCOUNTABILITY FOR PROCESS SAFETY**

BP should clearly define expectations and strengthen accountability for process safety performance at all levels in executive management and in the refining managerial and

supervisory reporting line.

#### **RECOMMENDATION #6 – SUPPORT FOR LINE MANAGEMENT**

BP should provide more effective and better coordinated process safety support for the U.S. refining line organization.

#### **RECOMMENDATION #7 – LEADING AND LAGGING PERFORMANCE INDICATORS FOR PROCESS SAFETY**

BP should develop, implement, maintain, and periodically update an integrated set of leading and lagging performance indicators for more effectively monitoring the process safety performance of the U.S. refineries by BP's refining line management, executive management (including the Group Chief Executive), and Board of Directors. In addition, BP should work with the U.S. Chemical Safety and Hazard Investigation Board and with industry, labor organizations, other governmental agencies, and other organizations to develop a consensus set of leading and lagging indicators for process safety performance for use in the refining and chemical processing industries.

#### **RECOMMENDATION #8 – PROCESS SAFETY AUDITING**

BP should establish and implement an effective system to audit process safety performance at its U.S. refineries.

#### **RECOMMENDATION #9 – BOARD MONITORING**

BP's Board should monitor the implementation of the recommendations of the Panel (including the related commentary) and the ongoing process safety performance of BP's U.S. refineries. The Board should, for a period of at least five calendar years, engage an independent monitor to report annually to the Board on BP's progress in implementing the Panel's recommendations (including the related commentary). The Board should also report publicly on the progress of such implementation and on BP's ongoing process safety performance.

#### **RECOMMENDATION #10 – INDUSTRY LEADER**

BP should use the lessons learned from the Texas City tragedy and from the Panel's report to transform the company into a recognized industry leader in process safety management.

The Panel believes that these recommendations, together with the related commentary, can help bring about sustainable improvements in process safety performance at all BP U.S. refineries.

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The Panel's recommendations were based on findings developed during 2006. Since March 2005, BP has expressed a major commitment to a far better process safety regime, has committed significant resources and personnel to that end, and has undertaken or announced many measures that could impact process safety performance at BP's five U.S. refineries. In making its findings and recommendations, the Panel was not attempting to deny the beneficial effect on process safety that these measures may have. BP is a large corporation, and the Panel recognized that it is especially challenging to make dramatic and systemic changes in short time frames. However,

whether measures already undertaken or announced will be effective remains to be seen. The ultimate effectiveness and sustainability of BP's intended improvements to its process safety performance can be determined only over time. The Panel believed that BP has much work remaining to improve the process safety performance at its U.S. refineries. The Panel's report also stated that BP should assess its future steps, including actions already planned as of the date of the Panel's report, against the Panel's findings and recommendations (and related commentary).

The Panel's recommendations and related commentary contain elements designed to ensure that measures taken will sustain improvement in process safety performance. The Panel believed this emphasis on sustainability was particularly important given BP's failure to fully and comprehensively implement across BP's U.S. refineries the lessons from previous serious accidents, including the process incidents that occurred at BP's facility in Grangemouth, Scotland in 2000. The Panel's recommendations, and the process safety excellence that those recommendations contemplate, should not be abandoned or neglected. They should not become lesser priorities as changes occur in the economic, business, or regulatory climate for the U.S. refining industry; as refinery margins decline from their current high levels; as changes occur at BP, including changes in management; or as mergers and acquisitions take place.

The Panel believed that the investments in BP's refining business and its refining workforce that its report suggested can benefit the company in many ways over time. Such investments should help reduce the economic or opportunity costs associated with a refinery operating at less than full capacity or not operating at all. Other potential benefits of investments in operations and process safety, such as improved workforce morale and increased productivity, may be difficult to measure but are no less important. The Panel believed that as process safety is embedded in all aspects of corporate culture, management systems, and operations relating to BP's U.S. refineries, BP's U.S. refining business will benefit.

The Panel recognized that the task ahead of BP is significant and will take a concerted and lasting effort. It will not be easy, especially as time passes and the collective recognition of the importance of the task begins to fade. The Panel believed, however, that the BP refining workforce was ready, willing, and able to participate in a sustained, corporate-wide effort to move BP towards excellence in process safety performance as called for in the Panel's report. During its review, the Panel interacted with a large number of BP employees, contractors, managers, and executives. The Panel generally came away with favorable impressions of these people. As a group, they appeared hardworking and conscientious. Most importantly, they appeared sincerely interested in improving BP's management of process safety to prevent future incidents like the Texas City tragedy. This was the case at the Carson, Cherry Point, Texas City, Toledo, and Whiting refineries and in BP's corporate offices in Chicago and London.

I note that on January 16, 2007, the same day that the Panel announced its report, BP stated that it would implement the Panel's recommendations.

Finally, the Panel believed that all companies in the refining, chemical, and other process industries should give serious consideration to its recommendations and related commentary.

While the Panel made no findings about companies other than BP, the Panel was under no illusion that the deficiencies in process safety culture, management, or corporate oversight identified in the Panel's report were limited to BP. If other refining and chemical companies understand the Panel's recommendations and related commentary and apply them to their own safety cultures, process safety management systems, and corporate oversight mechanisms, the Panel sincerely believed that the safety of the world's refineries, chemical plants, and other process facilities will be improved and lives will be saved.

Thank you for allowing me to testify before you today.