



Chemical Safety and Hazard Investigation Board

Office of General Counsel

Memorandum

To: Board Members

From: Christopher Warner

Cc: Leadership Team

Subject: Board Action Report – Notation Item 934

Date: July 17, 2012

On July 9, 2012, the Board approved Notation Item 934, thereby adopting the CSB Strategic Plan for Fiscal Years 2012 – 2016.

Voting Summary – Notation Item 934

Disposition: APPROVED

Disposition date: July 9, 2012

	Approve	Disapprove	Calendar	Not Participating	Date
R. Moure-Eraso	X				6/29/2012
J. Bresland	X				7/9/2012
M. Griffon	X				7/9/2012



U.S. Chemical Safety and Hazard Investigation Board

MEMORANDUM

June 29, 2012

To: Board Members
From: Rafael Moure-Eraso
Cc: Leadership Team
Subject: Notation Item 934

A handwritten signature in cursive script, appearing to read "Rafael Moure-Eraso", written over the printed name in the "From:" field.

Attached for your review and vote is Notation Item 934. This item provides for the adoption of an updated CSB strategic plan covering Fiscal Years 2012 – 2016.

You may direct any questions about this item to John Lau. Please return your completed vote sheets to Chris Kirkpatrick by the close of business on July 9, 2012. Thank you for your attention to this item.

**U.S. Chemical Safety and
Hazard Investigation Board**



Hon. Rafael Moure-Eraso
Chairperson

Hon. John S. Bresland
Board Member

Hon. Mark Griffon
Board Member

**CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD
MEMBER VOTING RECORD**

Notation No.: 934

Voting Period: June 29 – July 9, 2012

Subject: Strategic Plan for Fiscal Years 2012 – 2016

Whereas,

1. Consistent with the Government Performance and Results Act of 1993 and 2010, the CSB reviews and updates the agency's strategic plan every four years;
2. The strategic plan establishes the CSB's strategic goals, strategic objectives, and outcome-based performance measures for managing and evaluating agency operations;
3. The CSB strategic planning team collected extensive input from external stakeholders; agency Board Members, managers, and staff; and members of the public; and
4. Based upon that input, best practice research, and guidance from the Office of Management and Budget, the strategic planning team prepared the attached proposed strategic plan for Fiscal Years 2012 – 2016.

Therefore, the Board, pursuant to its authority, hereby votes to adopt the attached proposed strategic plan as the CSB Strategic Plan for Fiscal Years 2012 – 2016.

_____ I **APPROVE** this notation item **AS PRESENTED**.

_____ I **CALENDAR** this notation item for discussion at a Board meeting.

_____ *Some of my concerns are discussed below or on the attached memorandum.*

_____ I **DISAPPROVE** this notation item.

_____ *A dissent is attached.*

_____ *I will not file a dissent.*

_____ I am **NOT PARTICIPATING**.

Date: _____

Member: _____



U.S. Chemical Safety and
Hazard Investigation Board



2012-2016

CHEMICAL SAFETY BOARD
STRATEGIC PLAN



A MESSAGE FROM THE CHAIRPERSON OF THE CSB



On behalf of my fellow board members and the professional staff at the U.S. Chemical Safety Board and Hazard Investigation Board (CSB), I am pleased to present the 2012-2016 US Chemical Safety Board Strategic Plan. This is an updated strategic plan required every four years, and includes the CSB strategic goals, strategic objectives, and associated performance measures for managing and evaluating agency operations.

The CSB is internationally known as an expert in chemical safety and has built a solid reputation by responding to over 100 incidents since FY 1998, which resulted in 70 investigation reports, case studies, safety bulletins, and over 25 safety videos many of which have won awards. Since 1998, the CSB has led the way in chemical process and hazardous substance investigations and institutional knowledge. With this updated strategic plan, the CSB will continue as a leader in creating a safer and brighter future in the chemical and oil refining industries.

To build on the CSB legislative mandate, this strategic plan includes an updated mission and vision statement. In addition, the plan contains 13 strategic objectives that succinctly show the purpose of the agency across all organizational functions. These outcome-oriented objectives clearly reflect how specific agency activities help drive the success of the CSB strategic goals.

In addition, this plan includes tables of outcome-based performance measures for each strategic goal. The CSB believes that evaluating agency practices by selecting and monitoring performance measures is the best way to show accountability to the American people. Despite challenges faced by the CSB in the areas of budget and an aging workforce, agency leaders will use this document to make critical decisions to maximize efficiency to achieve agency goals.

I hope you find that the updated CSB Strategic Plan provides a clear understanding of the agency, our mission and mandate, and our contribution toward improving safety.

Sincerely,

Rafael Moure-Eraso, Chairperson
June 2012

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EXECUTIVE SUMMARY

The U.S. Chemical Safety and Hazard Investigation Board (CSB), established by the Clean Air Act Amendments of 1990, is an independent federal agency created to investigate chemical accidents and determine the causes, so that similar events may be prevented in the future. This strategic plan is a revision to the *2007–2012 CSB Strategic Plan*, which was streamlined to place emphasis on conducting investigations, securing implementation of recommendations, and disseminating CSB findings. The revised plan also includes additional specifics on potential safety studies and forums, and increases emphasis on outreach to stakeholders.

The CSB has established three strategic goals for 2012–2016:

- **GOAL 1:** Conduct incident investigations and safety studies concerning releases of hazardous chemical substances.
- **GOAL 2:** Improve safety and environmental protection by ensuring that CSB recommendations are implemented and by broadly disseminating CSB findings through advocacy and outreach.
- **GOAL 3:** Preserve the public trust by maintaining and improving organizational excellence.

Goal 1 drives the core mission of the agency by ensuring that we select and complete incident investigations that have the potential to generate thorough recommendations with high preventive impact. It also focuses the agency on developing and completing safety studies with an emphasis on emerging safety issues. Goal 2 focuses on implementing our recommendations and

their associated advocacy and outreach.

The highly successful CSB safety videos are an important component of the agency information dissemination efforts. Goal 3, on organizational excellence, serves to bind all agency processes using best practice project management. This includes the agency's high-performing information technology and administrative functions.

The CSB's performance management framework includes 13 strategic objectives that have been developed directly from the three strategic goals. The objectives drive agency performance on a more specific level: they focus the agency on what is most important and facilitate assignments as well as create measurable assignments of organizational tasks and individual performance elements. All CSB employees' performance standards are derived from one or more of the 13 strategic objectives.

Finally, the CSB strategic planning process includes the development and implementation of specific performance measures and associated target levels for achievement that are the performance goals for the agency. This plan details those performance measures that will be sustained throughout the entire strategic plan four-year period. In addition, the agency develops an annual action plan (annual performance plan) that includes many additional performance measures that correspond to a specific fiscal year. The *2012–2016 CSB Strategic Plan*, the annual CSB Action Plan, and individual performance plans constitute the foundation of the organization's performance management framework.



CSB's 2009 Bayer Public Meeting

MISSION, VISION AND STRATEGIC GOALS

MISSION: To independently investigate significant chemical incidents and hazards and effectively advocate the implementation of the resulting recommendations to protect workers, the public, and the environment.

VISION: Be a recognized leader in protecting people and the environment from hazardous chemicals by issuing quality reports, high-impact recommendations, videos, and other educational tools that promote safety.

VALUES: Integrity, independence, objectivity, accountability, and scientific rigor.

GOAL 1: Conduct incident investigations and safety studies concerning releases of hazardous chemical substances.

GOAL 2: Improve safety and environmental protection by ensuring that CSB recommendations are implemented and by broadly disseminating CSB findings through advocacy and outreach.

GOAL 3: Preserve the public trust by maintaining and improving organizational excellence.



Liquefied petroleum gas fire at Valero's Mckee Refinery near Sunray, TX, February 16, 2007



A massive fire and explosion sent huge flames and smoke plumes into the air at the Carribean Petroleum Corporation near San Juan, Puerto Rico

BACKGROUND AND LEGISLATIVE MANDATE

The U.S. Chemical Safety and Hazard Investigation Board (CSB) is an independent federal agency established to investigate incidents and hazards resulting from the production, processing, and handling of chemical substances that cause death, serious injury, or substantial environmental or property damage. It was created as a part of the Clean Air Act Amendments of 1990.

The CSB's mission is to independently investigate significant chemical incidents and hazards and effectively advocate the implementation of recommendations to protect

workers, the public, and the environment. Since fiscal year 1998, the year CSB



Current members and general counsel of the U.S. Chemical Safety and Hazard Investigation Board (CSB)

began operations, the agency has continued to work on developing and publishing investigation reports and other safety products.

The CSB investigations review all aspects of chemical incidents, including proximate causes such as equipment failures,



CSB Board Members and General Counsel at the 2009 Bayer CropScience public meeting in Institute, WV.

underlying causes such as inadequacies in safety management systems and safety culture, and opportunities for improving regulatory standards and enforcement. The CSB makes safety recommendations to regulatory agencies, companies, industry organizations, standard-setting bodies, first responders, and labor groups.

The CSB is headquartered in Washington, DC, and has a regional office in Denver, CO. The CSB is governed by its Board, which consists of one presidentially appointed Chairperson (who also serves as a board member) and four presidentially appointed board members. All nominations to the Board are subject to Senate confirmation; each member serves a five-year fixed term. Over time, the CSB has worked to develop expertise in various investigative competencies (chemical and mechanical engineering, human factors, regulatory affairs, legal affairs, public health, etc.) to ensure the mission is achieved. Table 1 shows staffing from 2007 through 2011.

Even with a lean staffing profile, the CSB has completed 70 reports, case studies, safety bulletins, and other investigative products since inception. Despite its small staff, the agency is mandated to follow all government requirements, such as those in the Federal Information Security Management Act (FISMA), Government Performance Results Act (GPRA), and other oversight legislation. Its support staff has the lead in ensuring compliance with such directives, which it does successfully by maintaining flexibility and creating



CSB Chairman Rafael Moure-Eraso



CSB Investigator Don Holmstrom

support positions where employees have numerous ancillary duties. In addition, the agency benefits from the positive initiative of its employees: numerous display the agency's "culture of volunteerism," and CSB employees frequently receive the President's Award for their extraordinary support of the Combined Federal Campaign each year.

The CSB deployed to over 100 incidents since FY 1998, which resulted in 70 investigation reports, case studies, safety bulletins,

CSB EMPLOYEES			
YEAR	INVESTIGATIVE/ RECOMMENDATIONS	ADMINISTRATIVE	BOARD MEMBERS
2007	20	17	3
2008	20	16	4
2009	20	17	3
2010	21	15	5
2011	20	16	3

TABLE 1
Distribution of CSB employees

and other products that are publicly available, primarily through our website.¹ Figure 1 shows the geographic breadth of investigations by the CSB since its inception.

The types of incidents investigated involve sectors such as oil and gas exploration and production, refining, chemical manufacturing, food production, hazardous waste disposal, power generation, laboratory research, and chemical distribution. The incidents have included chemical fires, explosions, toxic gas releases, and confined

spaces with hazardous atmospheres. In addition, international stakeholders have benefited from lessons learned from U.S. domestic incidents: our recommendations on industry best practices have been adopted in numerous countries over the past decade and have resulted in improved worldwide process safety knowledge. In fact, the CSB’s investigative reports and safety videos are used extensively around the world, especially in countries with a significant chemical and oil industry presence. The CSB receives



FIGURE 1
CSB completed investigations since 1998

¹The number of deployments to incidents is greater than the number of completed products because some incidents are still under investigation, several incidents may have been combined into a single product, and others may have been administratively closed after an initial assessment when the agency determined that few safety benefits could be garnered for a particular incident.

requests for safety briefings regularly from stakeholders in South America, Australia, Europe, and Asia; our videos have been subtitled in Spanish, French, Korean, and Chinese and used in employee safety training programs.

Over its history, the agency staff has gained significant experience in a wide variety of chemical sectors. This institutional knowledge growth has resulted in highly trained and sophisticated investigative staff

conversant in many areas of chemical and process safety. In fact, a number of chemical hazards have been the subject of multiple deployments, indicating the importance of addressing critical safety trends throughout various industries, including the handling of toxic chemicals such as hydrogen fluoride, chlorine, ammonia, and phosgene and the mitigation of risks surrounding combustible dusts, reactive chemicals, oil and gas production, and hot work activities such as welding.

ORGANIZATIONAL UNIT DESCRIPTIONS

The CSB relies on a combination of investigative, recommendations, and administrative staff to fulfill its mission. The investigative staff are located at the Washington, DC, headquarters and a regional office in Denver, CO. The CSB has substantial expertise in the areas of plant operations, environmental impacts, public health, human factors, causal analysis, and process safety. The CSB manages

investigations to include expertise from various disciplines to ensure each investigation is exhaustive and rigorous.

The CSB consists of five presidentially appointed members, one of whom is appointed as Chairperson by the President. Each board member is appointed to a fixed five-year term with a possibility for reappointment. Primary responsibilities of Board members include deploying with investigative

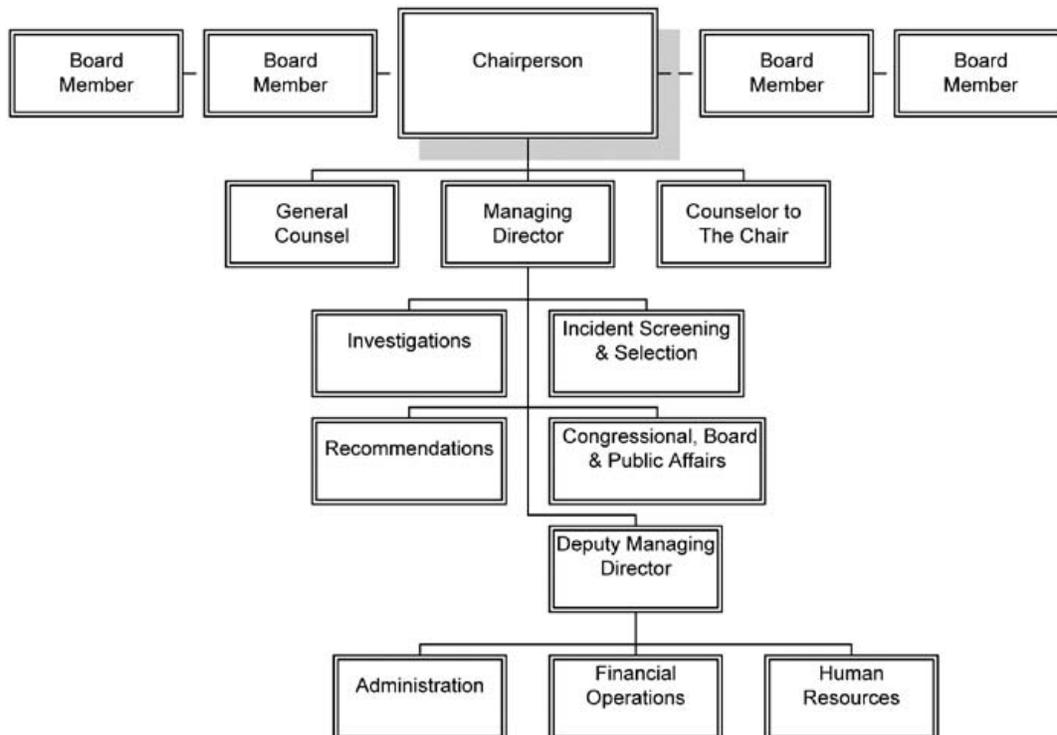


FIGURE 2
CSB Organizational Chart



CSB Board Member
and Investigators
Tour Offshore Oil Rig

teams, providing input in the report development process, voting on final CSB products and recommendations and advocating for safety recommendations. The CSB's enabling language provides that board members be appointed based on technical qualifications, professional standing, and demonstrated knowledge of incident reconstruction, safety engineering, human factors, toxicology, and air pollution regulation.

The Managing Director reports to the Chairperson; oversees the investigative and recommendations units as well as other functions for the CSB such as administration, human resources, procurement, finance, and public affairs; and directs day to day operations of the agency. The General Counsel (OGC) and a Counselor to the Chairperson also report to the Chairperson. Figure 2 shows the organizational structure of the CSB.

Moreover, the CSB, as an independent government agency, employs personnel to manage information technology, administration, and finance functions to ensure compliance with all government requirements such as FISMA and GPRA. However,

because of its small size, the CSB leverages the resources of larger agencies where possible. In particular, the CSB consults with the National Transportation Safety Board (NTSB), which is considered a sister agency to the CSB and after which the CSB was originally patterned. In areas such as training, recommendations and advocacy, public affairs, and certain legal matters, the CSB confers with the NTSB as appropriate and incorporates existing knowledge to benefit the CSB and help it achieve its investigative mission.

To recruit qualified staff and provide an additional field presence, the CSB has recently expanded its use of regionally located employees in different parts of the country. This has afforded the CSB the opportunity to be poised and ready for quick deployments in areas of the country where certain industries are located, such as the oil refining and petrochemical industries in Texas and Louisiana. Moving forward, the CSB expects that this new approach to field staffing and regional deployments will result in additional benefits and cost savings.

STRATEGIC GOALS AND OBJECTIVES

MISSION: To independently investigate significant chemical incidents and hazards and effectively advocate the implementation of the resulting recommendations to protect workers, the public, and the environment.

VISION: Be a recognized leader in protecting people and the environment from hazardous chemicals by issuing quality reports, high-impact recommendations, videos, and other educational tools that promote safety.

<p>GOAL 1: Conduct incident investigations and safety studies concerning releases of hazardous chemical substances.</p>	<p>1. Select incidents and hazards for investigation with high potential to generate recommendations with broad preventive impact.</p>
	<p>2. Complete timely, high-quality investigations that examine the technical, management systems, organizational, and regulatory causes of chemical incidents.</p>
	<p>3. Develop recommendations that will help prevent chemical incidents.</p>
	<p>4. Complete studies with broad safety and environmental preventive impact.</p>
	<p>5. Advance the identification and understanding of new and recurring issues in chemical safety and the environment.</p>
<p>GOAL 2: Improve safety and environmental protection by ensuring that CSB recommendations are implemented and by broadly disseminating CSB findings through advocacy and outreach.</p>	<p>1. Advocate the timely implementation of high-impact recommendations to the Congress, federal agencies, state governments, and private and non-profit entities.</p>
	<p>2. Emphasize Board and staff advocacy of a “Most Wanted Chemical Safety Improvements” program.</p>
	<p>3. Disseminate information by producing high-quality videos and outreach products that result in improved worker and environmental protection.</p>
<p>GOAL 3: Preserve the public trust by maintaining and improving organizational excellence.</p>	<p>1. Institute best practice planning and project management in all CSB processes.</p>
	<p>2. Ensure optimization of the CSB’s budget and resource management by aligning action plans to strategic goals.</p>
	<p>3. Maintain effective human capital management by promoting development and retention of leadership, technical, and analytical competencies.</p>
	<p>4. Support the CSB mission by maintaining state-of-the-art information technology and effective administrative processes.</p>
	<p>5. Foster effective internal communications.</p>



FIGURE 3

Map of deployments for ongoing CSB investigations

STRATEGIC GOAL 1

Conduct incident investigations and safety studies concerning releases of hazardous chemical substances.

As a principal federal agency investigating chemical incidents and hazards, the CSB deploys investigation teams to major incidents shortly after they occur. These incidents can occur at any location across the United States, as shown in Figure 3 of ongoing investigations as of October 2011.

After its initial deployment, the CSB gathers all relevant facts to understand the circumstances surrounding the particular incident; these facts help the agency conduct its comprehensive review of underlying causes and safety failures. This review, which can take up to a year or more, involves interviewing witnesses and other parties, collecting evidence, conducting lab testing, and diagramming the incident using logic tools. The CSB focuses on potential recommendations to prevent similar incidents in the future. Through FY 2011, the CSB has conducted 70 investigations and issued 624 recommendations. Moving forward, the CSB is increasing the size of its investigative workforce and enhancing expertise in chemical process safety, safety culture, human factors, and environmental protection. The agency is also increasingly

focused on the timeliness of investigations by improving project management without compromising the in-depth analysis of the investigative process.

STRATEGIC OBJECTIVES

1. Select incidents and hazards for investigation with high potential to generate recommendations with broad preventive impact.

As discussed, the purpose of the CSB's investigations is to determine the facts, conditions, and underlying and contributing causes of chemical incidents and develop recommendations to help prevent similar incidents and /or mitigate their impacts should they occur. To conduct this important mandate, incidents must be selected that will have the greatest impact on workplace, public, and environmental safety. Because of the large number of incidents that occur, the CSB must exercise discretion in all cases when deciding whether to initiate an investigation. To that end, the agency uses a screening procedure to ensure the systematic and timely evaluation of chemical incidents throughout the U.S., and the prudent selection of incidents for further investigation. After notification of an incident from a number of sources, the incident is evaluated based on the severity of the



12 Investigative staff deployed to the ConAgra plant after an explosion on June 9, 2009 that killed 4 workers and injured dozens of others.

consequences and preliminary understanding of the potential causes and analyzed according to several factors such as the severity of injuries, property losses, and offsite impacts. The factors are scored numerically and

compared with the same factors from other incidents. The high-consequence incidents then receive additional management review by top leadership of the CSB and a decision is made whether to deploy.

CY	NUMBER RANKED MEDIUM TO HIGH PRIORITY*
2007	14
2008	8
2009	23
2010	18
2011	19
Total	82

TABLE 2
CSB screening data

COMPANY	FACILITY LOCATION	DATE	SUBSTANCE INVOLVED	FATALITIES	INJURIES
DuPont (I)	Buffalo, NY	11/9/2010	Vinyl Fluoride	1	1
DuPont (II)	Belle WV	12/3/2010	Monomethyamine	0	2
AL Solutions	New Cumberland, WV	12/9/2010	Titanium/Zirconium Powder	3	0
Hoeganaes Corporation (I)	Gallatin, TN	1/31/2011	Iron Powder	2	0
Carbide Industries	Louisville, KY	3/21/2011	Calcium Carbide	2	3
Hoeganaes Corporation (II)	Gallatin, TN	3/29/2011	Iron Powder	0	1
Donaldson Enterprises	Honolulu, HI	4/8/2011	Fireworks	5	0
Hoeganaes Corporation (III)	Gallatin, TN	5/27/2011	Hydrogen/Iron Powder	3	2

TABLE 3
2011 Fiscal year deployments by the CSB



FIGURE 4

Explosion at Kleen Energy plant in Middletown, CT. Six workers were fatally injured after a natural gas explosion. . (Dramatization from CSB safety video, Deadly Practices, February 3, 2011)



FIGURE 5

Two workers were fatally injured when a waste tank containing the pesticide methomyl exploded at the Bayer CropScience chemical plant in Institute, WV. The CSB issued the report on this incident on January 20, 2011. (Dramatization from CSB safety video, Fire in the Valley, March 21, 2011)

Overall, the CSB has screened 5,896 incidents since 2004. The CSB continually evaluates and develops deployment criteria to better target incidents for investigation.

In fiscal year (FY) 2011, the CSB deployed to eight incidents in five states (Table 3). The CSB will continue its systematic and objective approach to reviewing incidents and deciding about deployment.

After returning from a deployment, the CSB performs a detailed scoping analysis to help determine the amount of personnel resources needed to complete an investigation, the expected timeframe to complete the report, and the report format. In the scoping analysis, investigators examine issues such as regulatory impacts and the possible improvement in process safety. Moreover, scoping attempts to determine potential recommendations,

expected costs for travel and contractors, and the degree to which a given investigation can impact other in-progress investigations.

The CSB continually refines its scoping process to maximize its available resources. As such, some investigations are completed with a published report, and some are administratively closed after an initial assessment if the agency believes few safety benefits can be garnered for a particular incident.

2. Complete timely, high-quality investigations that examine the technical, management system, organizational, and regulatory causes of chemical incidents.

To ensure that lessons from incidents are properly disseminated, incident investigations must be completed in a timely manner. After



FIGURE 6

On December 19, 2007, four were killed and 13 transported to the hospital after an explosion at T2 Laboratories, Inc. during the production of a gasoline additive. This high-quality, comprehensive report was issued on September 15, 2009. (Dramatization from CSB safety video, Runaway: Explosion at T2 Laboratories, September 22, 2009)

an incident, the community and stakeholders expect timely and accurate findings. These important findings and recommendations are offered to help reduce the occurrence of similar incidents. The CSB endeavors to complete its thorough investigations as quickly as possible and, in many cases, incident investigations are completed in less than a year. For example, the CSB completed the Kleen Energy investigation and issued urgent recommendations in only 141 days, and in that case several organizations received early guidance to avoid the dangers of flammable gas blows.

In the case of the Allied Terminals' investigation, a 2-million-gallon liquid fertilizer storage tank collapsed at the Allied Terminal distribution facility in Chesapeake, VA, on November 12, 2008. The incident critically injured two contract workers and fertilizer over-topped a containment dike and flooded sections of a nearby residential neighborhood. The CSB report was issued in only 7 months. Other short turnaround reports include Barton Solvents (325 days), Hoeganaes (320 days), Universal Form Clamp (300 days), Formosa (287 days), and Isotec (338 days).

While the Kleen Energy investigation was completed in 141 days, a large team was assigned to gather evidence, interview witnesses, and analyze the potential root and contributory causes. Once a report is drafted,

the CSB has a quality control process to provide significant internal review and oversight. The steps in the process include:

1. Accuracy review by the investigation team, which fact-checks the draft report in detail.
2. Internal Staff Review, including review by other investigative and technical staff.
3. Technical editor review, which provides feedback in areas of style, grammar, syntax, and structure.
4. Board member review: Board members receive an advance draft of the report to provide their feedback.
5. Confidential business information (CBI) review: the report is shared with affected companies on matters of confidential business information and to review for factual accuracy.
6. Factual accuracy reviews: The report is also shared with workers' representatives, outside experts/peer reviewers, and other government agencies to review for factual accuracy.
7. Recommendation recipient review meetings: The CSB staff meets with proposed recommendation recipients to ensure they are the appropriate recipient to most effectively implement the necessary safety changes.



FIGURE 7

On January 23, 2010, a release of highly toxic phosgene at the DuPont facility in Belle, WV, exposed an operator and resulted in his death. The CSB released its report on September 20, 2011, and issued 14 recommendations to OSHA, DuPont, and industry trade associations. (Dramatization from CSB safety video, Fatal Exposure: Tragedy at DuPont, September 22, 2011)

8. Board meeting and adoption: The report is typically considered by the Board in a public meeting. At this time board members can deliberate and the public can offer comments on the report before it is adopted and released in final form.

These quality assurance steps help ensure that all CSB reports are thoughtfully constructed, contain appropriate and accurate information, and have properly designed recommendations.

3. Develop recommendations that will prevent chemical incidents

The CSB best achieves its long-term goals by issuing recommendations having widespread preventive impact and ensuring that they are implemented in a timely fashion. In accordance with the Clean Air Act Amendments of 1990, the CSB may issue recommendations to the Congress, other federal agencies, state governments, and entities in the private sector. Normally, the CSB



Damage from the February 20, 2003, dust explosion at the CTA Acoustics manufacturing plant in Corbin, KY.

develops recommendations concurrently as it develops the final report for an investigation; they are then issued simultaneously. However, in some cases, when important safety information needs to be distributed because of the potential to protect and save lives immediately, the CSB issues “urgent recommendations” to allow changes to occur more quickly.

Following the investigation of the explosion at Kleen Energy in Connecticut in 2010, for example, the CSB made urgent recommendations to several institutions with the goal of eliminating the unsafe practice of “flammable gas blows” (pipe cleaning using large volumes of natural gas at high pressure) during the construction of gas-fired power plants. The National Fire Protection Association (NFPA) quickly responded to the CSB recommendation and the NFPA’s new interim standard now entirely bans this unsafe practice. The legislature for the State of Connecticut unanimously passed legislation to also ban the gas blow practice, and the major suppliers of gas turbines in the U.S. modified guidance to their customers to strongly advise against gas blows. These actions, as a result of the CSB recommendations, substantially enhanced protection to workers and the public in and near gas-fired power plants.

Following the CSB BP Texas City investigation and the Combustible Dust Hazard

Study, the Occupational Health and Safety Administration (OSHA) accepted the CSB’s recommendations to implement vigorous enforcement programs, called National Emphasis Programs (NEPs). OSHA has reported that the NEPs have discovered and eliminated many hundreds of serious violations of OSHA standards.

The CSB plans a “Most Wanted List of Chemical Safety Improvements” program (“Most Wanted List”), which will direct special advocacy efforts and emphasize those recommendations and hazards where actions are likely to promote the most important safety improvements based on the agency’s work. This list will be roughly patterned after and based on lessons learned from the NTSB’s “Most Wanted List Program” for transportation safety improvements. The CSB plans to devote additional resources both at the Board and staff level in targeted advocacy to ensure that the “Most Wanted List” receives heightened exposure in the stakeholder community.

4. Complete studies with broad safety and environmental preventive impact

The Clean Air Act Amendments of 1990 also authorize the CSB to conduct research and studies with respect to the potential for chemical releases, whether or not an accidental release has occurred where there



FIGURE 8

Ignited aluminum dust venting from pipes at the Hayes Lemmerz plant in Huntington, IN, and the subject of the combustible dust study. (Dramatization from *Combustible Dust: An Insidious Hazard*, July 28, 2009)

is evidence which indicates the presence of a potential hazard or hazards. To the extent practical, this should be in cooperation with other federal agencies, state and local agencies, and associations or organizations from the industrial and commercial sectors. Safety studies, for example, may examine trends from incident data or information regarding emerging issues, and analyze such data to determine what safety measures may be recommended. The CSB may also hold public meetings or symposia to gather a wide range of perspectives on particular issues. By summarizing findings from these efforts in a study, the CSB is not simply reacting to specific circumstances from selected incidents, but is instead examining larger issues, looking proactively to the future, and drawing attention to safety issues that otherwise might not be the focus of industry.

The CSB has developed and published safety studies regarding combustible dust hazards, reactive chemicals, and public safety at oil and gas storage facilities. The goal of the combustible dust study was to determine the scope of the combustible dust problem and recommend new safety measures for facilities that handle combustible powders. Based on the results of the dust study, the CSB recommended that OSHA promulgate a combustible dust standard for general industry. Although OSHA initially deferred the recommendation, OSHA has now accepted it following the tragic dust explosion at Imperial Sugar and has been actively developing the rule. OSHA has held multiple stakeholder and expert meetings. OSHA is reportedly planning to complete the Small Business Regulatory Fairness Act review by the end of 2012. When the rule is completed, it will better protect tens of thousands of workers in establishments that handle combustible dusts in everything from the food to the plastics industries.

While the CSB will focus its investigative resources on investigation of specific incidents, as resources allow the CSB plans to continue conducting safety studies. The CSB will cooperate to the extent practical with other interested parties to identify and conduct studies. As an initial step, the CSB may hold a roundtable discussion to evaluate candidate topics for studies and to provide an open and transparent forum for stakeholders to provide input on priority safety issues. In general, study topics should be selected based on at least a qualitative evaluation of risk as well as the ability of the CSB to bring unique expertise or knowledge to bear on a problem. For example, past or ongoing studies (such as combustible dust, public protections at oil sites, and hot work safety) have relied heavily on information gathered by the CSB in its actual incident investigations. Two areas being considered for future study are the safety concerns associated with the use of hydrogen fluoride (HF) in alkylation units at refineries and the effectiveness of regulatory inspections at complex, high-hazard facilities covered by Environmental Protection Agency (EPA) and OSHA process safety standards.

5. Advance the identification and understanding of new and recurring issues in chemical safety and the environment.

To help improve safety, the CSB must be cognizant of new and recurring issues in the field of chemical safety. Some issues continue to emerge through the CSB's incident screening process² and some are an extension of technology changes. The agency plans to disseminate information learned from its research on newly discovered and recurring issues through agency-sponsored safety forums, by participating in industry conferences and symposia, and through its

²The number of deployments to incidents is greater than the number of completed products because some incidents are still under investigation, several incidents may have been combined into a single product, and others may have been administratively closed after an initial assessment when the agency determined that few safety benefits could be garnered for a particular incident.

website. Four issues that are of interest to the CSB include:

- **Inherently Safer Technology (IST)**, an industry-developed concept for eliminating or reducing process hazards. IST is applied to the design and operation life cycle, including manufacture, storage, use, and disposal, and considers substituting a less hazardous material, using less hazardous process conditions, and/or designing a process to reduce the potential for harm. As noted in a 2011 Process Safety Progress article,³ the CSB examined the importance of IST as part of recent investigations, including the Valero and Kleen Energy incidents. In one case, the CSB recommended that chlorine be replaced with safer chemicals for use in cooling water treatment, and in the other the CSB recommended that natural gas be replaced with nitrogen or air for purging newly constructed gas piping systems.
- **Management of Organizational Change** was identified as a key issue in the CSB's investigation of the 2005 incident at the BP Texas City refinery. Company process safety programs had addressed the analysis of changes in equipment, but not important changes in the organization that had safety implications. Examples of organizational changes that need to be analyzed and managed include staffing, operator overtime and training, and loss of experienced personnel.

Even before the completion of the BP Texas City investigation, the CSB issued an urgent recommendation for BP to convene an independent panel of experts to review the management systems and safety culture of the company's five US refineries. BP complied by establishing a diverse panel led by former Secretary of State James A. Baker III. The report of the "Baker Panel," as it has become known, made ten substantive recommendations to BP and stated that similar shortcomings likely existed elsewhere in the industry.

A number of the panel's recommendations were similar to those later made by the CSB in its final report. BP still reports yearly on the progress of implementing the Baker Panel recommendations; the CSB and the Baker Panel reports remain the focus of intense attention in the industry.

- **Regulatory Reform** is an area of interest emerging from the CSB's investigation of the 2010 Deepwater Horizon incident. As part of its investigation the CSB is analyzing various options for modifying the current regulatory framework for chemical safety on off-shore oil drilling platforms. Among other considerations, the CSB is weighing the advantages and disadvantages of replacing the current regulatory scheme with the use of a safety case model. The CSB held a public hearing on international regulatory regimes and heard testimony from regulators from the United Kingdom, Norway, and Australia on the strengths and weaknesses of the various international regulatory systems. Additionally, the CSB heard testimony from both labor and industry representatives about the key challenges facing the sector. Onshore, the CSB continues to advocate recommendations for improving the 20-year-old OSHA Process Safety Management standard, including broadening coverage to include more hazardous processes and improving specific requirements for reactive chemical safety, atmospheric storage tanks, and management of change.
- **Safety Culture** continues to be cited in investigations across many industry sectors including the Presidential Commission Report on Deepwater Horizon, the Fukushima Daiichi incident, and the Defense Nuclear Facilities Safety Board's recommendation for the Hanford Waste Treatment and Immobilization Plant. A potential study would consider issues such as how safety culture is defined, what makes an effective safety culture, and how to evaluate safety culture.

³Amyotte, P. R., MacDonald, D. K. and Khan, F. I. (2011), An Analysis of CSB Investigation Reports Concerning the Hierarchy of Controls. Process Safety Progress 30: 261–265. doi: 10.1002/prs.10461

PERFORMANCE MEASURES

PERFORMANCE MEASURES GOAL 1			
MEASURE	FY 2011 RESULT	FY 2012 TARGET	PERFORMANCE MEASURE TYPE
1.2a Number of completed investigations	5	7 completed investigations 2 interim products related to the Macondo investigation.	Output
1.2b Average time to complete an investigation	N/A	Establish baseline	Efficiency
1.3 Percentage of recommendations issued classified as High Impact ⁴	5%	10% of total issued recommendations classified as High Impact	Efficiency
1.4 Number of completed studies	1	2 completed studies	Output
1.5 Impact or result from work in Most Wanted List (MWL) or selected emerging issue.	N/A	Symposia, roundtable, or other result from MWL or emerging issue	Output

In addition to the items listed above, the CSB will continue to monitor new technologies, such as nanotechnology, and the use of new techniques for energy production.

EVALUATION OF PERFORMANCE MEASURES

For each strategic objective in Goal 1, the CSB has designed key performance measures to evaluate success. For Objective 1.1, the focus for the agency will be to ensure that objective deployment criteria are in place to match screening criteria and that new investigations are subject to a rigorous scoping process to ensure that key agency resources are properly allocated across products. For Objective 1.2, the agency will remain vigilant in completing incident investigations by focusing on timeliness and costs for each. The CSB must complete investigations in the most expeditious manner without sacrificing

quality to ensure that lessons learned can be applied to the industry as quickly as possible to improve safety. Furthermore, with finite government resources, the agency monitors the time to complete an investigation and will explore opportunities to achieve savings and economies of scale in the investigative process, which may involve partnerships with outside entities such as universities and trade associations. For Objective 1.3, with the advent of the “Most Wanted List,” the agency will target achievement of significant recommendations to support and validate the new list with common safety concerns. In safety studies, by allocating available resources for this effort the agency will plan to initiate one study that will be completed in FY 2014. Finally, the CSB will explore opportunities to effect change from its work on new and recurring issues by identifying and participating in external events that focus on these issues.

⁴High impact recommendations are those with widespread preventive impact, such as recommendations to federal agencies, major companies, and national organizations.

STRATEGIC GOAL 2

Improve safety and environmental protection by ensuring that CSB recommendations are implemented and by broadly disseminating CSB findings through advocacy and outreach.

The CSB investigates incidents and determines underlying causes to improve safety by ensuring that its safety recommendations are implemented and through the dissemination of information. In fact, the agency has been a world leader in using innovative communication techniques for advocacy and outreach.

At the end of FY 2011 the CSB closed just over 66% of the recommendations issued, for an overall adoption rate of 62% when adjusted for recommendations classified as “No Longer Applicable” or “Reconsidered/Superceded”. CSB recommendations that have been implemented, which substantially enhance safety include those previously discussed related to the unsafe practice of gas blows, and OSHA enforcement NEP’s related to combustible dust and refinery safety. Other significant recommendations that have been implemented include:

- Modifying the NFPA fuel gas code to ensure inherently safer purging of gas lines to the outdoors at industrial and commercial establishments;
- Accelerating Valero Corporation’s replacement of chlorine with inherently safer hypochlorite biocide for process water at all its refineries;
- Persuading the City of Daytona Beach to establish a comprehensive health and safety program for its public employees that is at least as effective as relevant OSHA standards;
- Modifying the American Petroleum Institute (API) industry standard for temporary structures to ensure that they are located away from high-risk processes in refineries, and also ensuring that non-essential employees are not permitted to enter high-risk areas during start-ups;
- Obtaining changes in required training for propane technicians and in the State of West Virginia, thus helping to prevent serious propane incidents;

- Triggering a wholesale modernization of the NYC Fire Code, which was a patchwork of sections, some a century old; and,
- Enhancing the process safety component of engineering education required for accreditation of university programs.

In addition to promoting the implementation of specific recommendations, the CSB furthers safety by broadly disseminating its investigative findings. The CSB’s investigation reports and related videos are used extensively in the U.S. and around the world, especially in countries where there is a significant chemical and energy industry presence. There is considerable interest from Europe in both the current and past work of the CSB, and discussion among the European Union member countries about forming a European chemical incident investigation agency, modeled after the CSB. When CSB board members or staff make presentations at industry conferences or meetings, they are invariably told by the attendees about the high quality of the reports and safety videos. To measure and confirm this anecdotal feedback, the CSB is designing a survey to measure the impact of its reports and safety videos.

CSB safety videos are used in corporate training and seminars across the U.S. The CSB continues to receive positive feedback from health and safety executives and a multitude of other stakeholders such as unions and emergency responders:

- There was not a sound in the room during the video or my presentation. Several [attendees] came up to me afterwards and commented on how the video really helped them to understand what happened.
- That [CSB] training video spoke directly to an activity we regulate. They did a good job of tying the sequence of tragic events together, and the animation really makes it come alive.
- These are the most informative and pertinent videos our shop has seen. The CSB videos use high quality graphics simulations and excellent commentary that really help management, operators, and main-

tenance personnel think about how their specific decisions and work activities can cause or prevent these tragedies.

Although the CSB's award-winning safety videos are effective, board member presentations and staff participation in conferences and meetings are also critical in fostering the adoption of recommendations. The CSB will continue to present its findings, recommendations, and safety videos at a wide variety of conferences, including industry associations, state safety councils, national public health symposia, and similar events. CSB board members are often featured as keynote speakers at industry conferences, which allows them to reach large audiences. By using a variety of effective communication vehicles, the CSB message has become widely known in the industrial chemical and oil refinery communities, and its safety recommendations are adopted by a majority of recipients. This effort, along with the development of outreach and advocacy plans, will continue over the next four years as the agency further enhances its video capability and uses social media to gain a wider audience.

STRATEGIC OBJECTIVES

1. Advocate the timely implementation of high-impact recommendations to the Congress, federal agencies, state governments, and private and non-profit entities.

The CSB is ultimately successful when its recommendations are implemented quickly. Timely and persistent follow-up is essential to ensuring that CSB recommendations are successfully implemented. To that end, the CSB Office of Recommendations tracks each recommendation from issuance to closure and maintains regular communication with recipients to promote implementation. The Office also plans and coordinates advocacy activities with the board members, the Office of Investigations, and the Office of Congressional, Public and Board Affairs.

To facilitate tracking recommendations, the CSB assigns each recommendation a status designation based on the action(s)

proposed and taken by the recipient. Briefly, the recommendation status designates a recommendation as either open or closed, with all new recommendations designated as "Open—Awaiting Response." Where a recipient indicates to the Board planned or preliminary actions that appear consistent with the intent of the recommendation, the Board may acknowledge this by designating the recommendation with the status "Open—Acceptable Response or Alternate Response." Where a recipient disagrees with a recommendation and the Board believes the recipient may reconsider its position, the Board may also designate the recommendation as "Open—Unacceptable Response." All recommendation statuses are communicated to the recipients and posted on the CSB website; they may also be announced in press releases or interviews.

From its inception through FY 2011, the CSB issued 624 recommendations and closed 413 (66%). Before a recommendation may be closed, the CSB requires that the recipient provide adequate documentation that the recommendation has been implemented as the Board envisioned. The Board may also close recommendations that recipients have not implemented or that no longer apply; however, 88% of the CSB's closed recommendations were closed after the Board determined that the recipient had either met or exceeded the intent of the recommendation (Table 4).

The CSB issues a variety of recommendations to a number of different stakeholders, from federal agencies to single industrial facilities. To make the greatest impact, the CSB aims to issue recommendations with the potential to produce widespread and lasting safety improvements. To this end, the CSB has issued a number of recommendations to federal agencies with broad regulatory authority, such as OSHA and the EPA. Some CSB recommendations call for the issuance of new, or substantive changes to existing regulations, such as the OSHA Process Safety Management Standard (PSM, 1910.119) or the EPA's Risk Management Program

STATUS	DEFINITION	# OF RECOMMENDATIONS
Closed—Acceptable Action and Closed—Exceeds Recommended Action	Action met and/or exceeded the objectives the Board envisioned	365 (88%)
Closed—Unacceptable Action/No Response Received	Recommendation not implemented, and Board concludes recipient will not consider its position	12 (3%)
Closed—No Longer Applicable	Recommendation no longer applicable	30 (7%)
Closed—Reconsidered/Superseded	Recommendation withdrawn and replaced with new, more appropriate recommendation	6 (1%)
Total Closed		413

TABLE 4
CSB recommendations closed through FY 2011

Standard (40 CFR 68.) Since rulemaking is a lengthy process, however, the CSB also issues regulatory enforcement recommendations for more immediate impact. Following the CSB’s BP Texas City investigation and the Combustible Dust Study, for example, OSHA accepted the CSB’s recommendations to implement NEPs, which have promoted safer workplaces through the discovery and elimination of serious hazards.

The CSB also promotes needed safety improvements by issuing recommendations to industry trade associations and professional and other organizations that develop voluntary consensus standards and/or best

practice guidance documents. Following the natural gas explosion at the ConAgra Slim Jim facility in Garner, NC, for example, the CSB issued urgent recommendations to the NFPA and the American Gas Association (AGA) calling for strict gas line purging requirements in the National Fuel Gas Code (NFGC). The permanent changes to the NFGC made pursuant to the CSB’s recommendation strengthened the standards and codes that govern purging of gas lines.

The CSB has also issued recommendations to state and local governments, individual companies, and specific facilities. The CSB recommendations issued pursuant to an



Four were killed when propane vapors ignited and exploded at the Little General store in Ghent, WV. The CSB issued its investigative report September 25, 2008.

RECOMMENDATION PURPOSE	# OF RECS	% OF RECS	CLOSED (#)	CLOSED (%)	OPEN (#)	OPEN (%)
Broad communications & alerts/bulletins	128	20.5%	118	92.2%	10	7.8%
Corporate Level Recommendation	126	20.2%	90	71.4%	36	28.6%
Facility Specific Recommendation	126	20.2%	89	70.6%	37	29.4%
Industry Guide or Recommended Practice	99	15.9%	56	56.6%	43	43.4%
Regulation - State	35	5.6%	19	54.3%	16	45.7%
Voluntary Consensus Standard	31	5.0%	9	29.0%	22	71.0%
Regulation - Federal	18	2.9%	3	16.7%	15	83.3%
Research/data	15	2.4%	8	53.3%	7	46.7%
Regulation—Local	14	2.2%	6	42.9%	8	57.1%
Regulatory Enforcement	12	2.0%	6	50.0%	6	50.0%
Other	20	3.2%	9	45.0%	11	55.0%
Total	624		413	66.2%	211	33.8%

TABLE 5

CSB recommendations by type (through FY 2011)

investigation of a major chlorine release in Glendale, AZ, in 2003 prompted the Maricopa County Air Control Agency to modify the facility’s air pollution permit to include safety controls. This change represents a novel mechanism to integrate safety and air pollution goals, which are often at odds or uncoordinated in legislation and enforcement. In addition, following the Little General Store investigation, the CSB issued a recommendation to the NFPA for enhanced mandatory training for propane technicians.

The CSB measures the success of its recommendations by adoption rates, which have remained relatively successful and consistent. As of FY 2011, the CSB adoption rate for recipients stands at 62%. The Office of Recommendations continues to improve its tracking systems, allowing the agency to more aggressively follow up with recommendation recipients and ensure progress.

The CSB is also scaling up its advocacy and outreach efforts. After issuing a recommendation to the NFPA for enhanced mandatory training for propane technicians, CSB staff testified at NFPA’s committee and membership meetings, advocating a permanent change in its code. These efforts resulted

in the NFPA adopting an interim standard that significantly increases training for those technicians. The standard is adopted as code by all states and is expected to become final during its upcoming review cycle.

The Office of Recommendations also coordinates advocacy efforts with board members to bring high-level attention to important safety issues. For example, after the Kleen Energy investigation, recommendations staff and the CSB Board presented at NFPA committee meetings and publicly supported the development and dissemination of a new gas safety standard created in response to a CSB recommendation. Board members also made public appearances in support of a new law in Connecticut that prohibits unsafe gas blows (also the result of a CSB recommendation), and met with representatives of the International Code Council (ICC) to promote prohibition of gas blows in their codes and standards.

2. Emphasize Board and staff advocacy of a “Most Wanted Chemical Safety Improvements” Program

The CSB uses an aggressive plan of strategic advocacy to ensure that its safety message is well understood and brings about positive

change. For the CSB, strategic advocacy means identifying priority interests of the agency and guiding the delivery of a coordinated set of key messages to critical target audiences using different channels and methods.

The CSB will implement a “Most Wanted Chemical Safety Improvements” Program (“Most Wanted List”), a small group of critical chemical safety improvements selected by the Board for intensive follow-up and heightened awareness, because these improvements can potentially enhance chemical safety at the national level. The “Most Wanted List” may include broad issues drawn from the cumulative experience of the CSB, changes suggested by multiple recommendations from several cases or studies, or individual recommendations. Each board member will assume responsibility for one or more of the issue areas in the “Most Wanted List” and support their advocacy with the support of, and in collaboration with, staff.

3. Disseminate information by producing high-quality videos and similar products that result in improved worker and environmental protection

The CSB video program has been an integral part of outreach since 2005. During the last six years, the agency has produced 27 documentary-quality videos designed to

show the facts and circumstances involving specific chemical incidents and the lessons learned from each. The videos have won numerous awards:

- 2011—DC Peer Video Award (Silver) *Deadly Practices*
- 2011—DC Peer Video Award (Bronze) *No Escape*
- 2011—DC Peer Video Award (Bronze) *Fire in the Valley*
- 2010—TIVA-DC (Television, Internet & Video Association of Washington, DC) Peer Award (Gold) for animation from *Inferno: Dust Explosion at Imperial Sugar* and TIVA Peer Award (Silver) for *Combustible Dust: An Insidious Hazard*
- 2010—CINE Golden Eagles for *No Place to Hang Out: The Dangers of Oil Sites and Dangers of Hot Work*
- 2010—The European Process Safety Award
- 2009—MERLOT (Multimedia Educational Resource for Learning and Online Teaching) award for *Half an Hour to Tragedy*
- 2009—TIVA-DC Peer award (bronze) for *Half an Hour to Tragedy*
- 2008—American Chemical Society (ACS) Howard Fawcett Award for outstanding contributions in the field of chemical health and safety



FIGURE 9

The safety video *Inferno: Dust Explosion at Imperial Sugar* won the Gold TIVA Peer Award in 2010. (Dramatization from CSB safety video, *Inferno: Dust Explosion at Imperial Sugar*, October 6, 2009)



FIGURE 10
 The safety video *Dangers of Hot Work* won a CINE Golden Eagle award in 2010. (Dramatization from CSB safety video, *Dangers of Hot Work*, June 7, 2010)

The CSB safety videos have become known as a best practice in disseminating government safety information and have been used to support training by a large number of international organizations. In the four years prior to FY 2012, over 75,000 video DVD compilations were distributed to individuals, trade associations, universities, companies,

and unions. The CSB will have a specialized outreach plan for each of its produced videos to ensure maximum impact and exposure for various stakeholder communities. The outreach plan will be measured by surveys to determine the impact of safety videos and the extent to which they have contributed to improved safety.

PERFORMANCE MEASURES

PERFORMANCE MEASURES GOAL 2			
MEASURE	FY 2011 RESULT	FY 2012 TARGET	PERFORMANCE MEASURE TYPE
2.1a Aggregate adoption rates of recommendations to include Closed-Exceeds Recommended Action (ERA) and Closed – Acceptable Action (AA)	62%	65% Five year rolling rate for Closed-ERA and Closed AA Total issued– Closed R/S – Closed NLA	Outcome
2.1b Aggregate adoption rates of high impact recommendations to include Closed-Exceeds Recommended Action (ERA) and Closed – Acceptable Action (AA)	NA	Establish baseline Recommendations Closed-ERA and Closed AA Total issued– Closed R/S – Closed NLA	Outcome
2.2a Number of MWL issues advocated	NA	Develop MWL	Outcome
2.3a Number of videos produced	3 videos	5 videos	Output
2.3b Conduct a survey or other measurement of video effectiveness	NA	Establish baseline with evaluation program	Output (first year only)

EVALUATION OF PERFORMANCE MEASURES

To evaluate the achievement of Goal 2, the CSB will use a number of performance measures. The CSB will track the adoption of safety recommendations over time and will launch its “Most Wanted List” during FY 2012 by publishing the first “Most Wanted List of Chemical Safety Improvements” along with an advocacy and outreach plan. Moreover, for the production of safety

videos, the agency will closely monitor completion and ensure that each specific video is produced, in most cases, to coincide with the publication of an incident report during the year. Finally, the CSB will develop a formal evaluation program for the videos that will measure the degree to which safety videos are reaching their target audiences, disseminating knowledge, and impacting the potential for improved safety at industrial facilities.

STRATEGIC GOAL 3

Preserve the public trust by maintaining and growing organizational excellence.

Goal 3 embodies the entire CSB organization and its philosophy to promote continual improvement. In a government environment of finite budgets for the foreseeable future, agency leaders and staff must use more cost-effective means to conduct agency activities. For the CSB, this includes both mission-oriented and support activities. Organizational excellence at the CSB is embodied by six overarching principles:

- Closely monitored performance results that benefit all stakeholders
- A clear and compelling vision and mission
- Committed and focused leadership
- A dedicated and high performing workforce
- Effective communications among staff
- The promotion of knowledge management and succession planning.

These attributes of organizational excellence at the CSB are reflected in the strategic objectives detailed below.

STRATEGIC OBJECTIVES

1. Institute best practice planning and project management in all CSB processes.

The hallmark of any effective organization is project management. The CSB is developing state-of-the-art project planning

techniques to manage its investigative process and support functions. The CSB uses the Total Records and Information Management (TRIM) database as the agency repository for all incident screening, investigation, and safety recommendation data. The CSB will expand its use of TRIM’s project management capabilities by establishing milestones and improved tracking data within TRIM. The result will combine the CSB’s knowledge management base and project planning program into one user-friendly system accessible to all staff. In addition, the CSB will expand its specialized evaluation techniques, such as logic tree modeling, to help determine the cause of incidents. The CSB combines project management and advanced causal analysis to identify the underlying technical, management system, organizational, and regulatory causes that allow an incident to occur. The CSB will also broaden use of AcciMaps, which are multi-layered causal diagrams that arrange the various causes of an incident in terms of their level of influence. These and other techniques will enable the CSB to leverage its limited human resources to develop findings quickly and expedite the report production process.

The CSB’s project management approach will continue to be used and improved upon for non-investigative activities. For example, the CSB uses best practice project planning techniques to assist in developing support

CSB BUDGET (DOLLARS IN THOUSANDS)	
FISCAL YEAR	BUDGET
2007	\$ 9,113
2008	9,263
2009	10,199
2010	11,147
2011	10,799

TABLE 6

The CSB budget over time

plans, such as the human capital and action plans, and this document, the 2012–2016 CSB Strategic Plan. Moreover, the agency will also use project management to carefully plan its contingency operations in the event of a catastrophic event: alternative communication approaches, an offsite work facility, and contingencies to maintain critical data.

2. Ensure optimization of the CSB's budget and resource management by aligning action plans to strategic goals.

As one of the smaller independent federal agencies, the CSB must optimize its budget to ensure the agency mission is achieved efficiently. During the past five years, the CSB has maintained a budget of approximately \$9–11 million, which affords the agency about 40–45 professional staff (Table 6), in addition to five board members. This high-performing and relatively lean staff, supported by contractors, is solely responsible for the report output of the agency, typically five or six products per year. In FY 2007, the year of the highest agency output, the CSB produced a total of 11 products; in FY 2011, five investigative products were published. The CSB budget is maximized through the priorities established by the action plan, which is the critical internal document used to establish and track annual goals and objectives, and the action steps and plans to implement those priorities. The action plan is closely mapped to the strategic plan, which ensures that agency resources and target levels for achievement support long-term strategic goals. In addition, action plan priorities are specifically assigned to

individual managers and staff to promote personal accountability.

Moving forward, the agency will look for additional economies of scale. This includes contracting for support when appropriate, and by hiring investigative staff directly into field locations. Contractors are particularly important and useful when highly technical or specialized expertise is needed in a particular investigation for a fixed duration. For example, in its Macondo blowout investigation, the CSB is making extensive use of contracted experts. However, full-time investigator positions must be filled by federal employees due to extensive training and experience requirements, as well as the ongoing need to perform inherently governmental functions (such as negotiating with other government agencies and parties over access to evidence and information). Having investigators work from remote locations benefits the agency by avoiding relocation costs, and may more easily attract qualified investigators as they will not have to move from a lower cost of living location. Recruiting and retaining qualified senior investigators in the Washington, DC, office has been a challenge because of the higher cost of living. Hiring staff near chemical and petroleum industry centers, such as Texas and Louisiana, will also allow staff to be nearer to potential incident sites. The CSB also simplified its budget processes to maximize the use of appropriated funds because it is easier to project requirements. Overall, by using project management, budget optimization, action plan prioritization, and field investigative hiring, the CSB can ensure optimization of its resources.



FIGURE 11

CSB Human
Capital Triad

3. Maintain effective human capital management by promoting development in leadership, technical, and analytical competencies.

The CSB's effectiveness in completing its investigative mission is successful only with the hard work and dedication of its professional staff. To that end, the agency is fully committed to ensuring quality leadership, as well as management and professional competencies across the entire organization. The CSB selects well-qualified applicants to fill vacancies and expand the agency's technical capabilities. Once hired, the CSB commits to investing in training, development, and succession planning of its employees to grow their efficiency and effectiveness. The CSB's human capital approach is based on a triad of strategies that foster diversity, inclusiveness, and employee development. These workforce strategies create a diverse, high-performance workforce, develop a positive and inclusive work environment, and create an atmosphere to ensure employee development, growth and retention.

The CSB human capital approach is explained fully in the *CSB Human Capital Plan for Fiscal Years 2011 – 2015* (Human Capital Plan), which outlines strategies for human capital management including:

- Enhance recruitment
- Develop a core training curriculum
- Recruit and retain a high-performing, diverse workforce
- Align the performance management system to organizational goals
- Develop and implement strategies for succession planning

Essentially, the CSB uses the Office of Personnel Management (OPM) workforce planning model to analyze its workforce; it integrates the strategic goals with its human capital objectives by identifying the human capital required to meet organizational goals and competency gaps, while developing strategies to address human capital needs and close identified gaps.

The Human Capital Plan also details a number of specific tactics to improve the



CSB investigators at a DuPont plant after a fatal hotwork explosion in November 2010

skills of the investigative workforce. The agency emphasizes a core curriculum that addresses investigative competencies such as investigative technique, causal analysis, industry knowledge, writing, oral communications, negotiations, and project management. The CSB fills these investigator competencies by first working to recruit senior level investigators who have mastered the competencies and entry level investigators with the potential to master the competencies over time. In addition, the CSB uses some commercial training vehicles such as the American Institute of Chemical Engineers (AIChE) to teach skills. CSB employees also attend training at the NTSB training center in Ashburn, VA, since NTSB uses many of the same investigative techniques and has an existing curriculum available to CSB staff. Finally, commercial and government sources are used for miscellaneous training in management and leadership such as the American Management Association, OPM, and the Center for Creative Leadership. The CSB believes its training and development program addresses the potential skill gaps that can arise due to retirements and attrition.

Because retirements can affect institutional knowledge, training successors for mission-critical positions is paramount. The CSB uses the OPM *strategic leadership management model* to assist in planning, implementing, and evaluating its succession management program. The model uses a five step approach to the succession management process: 1) Establish strategic alignment; 2) Identify succession targets (positions) and analyze talent pool; 3) Develop a succession management plan; 4) Implement succession management plan; and 5) Evaluate succession strategies. Because it is small and the loss of one or two key people can have a large impact, the CSB is committed to succession planning to avoid the potential for loss of critical skills.

4. Support the CSB mission by maintaining state of the art information technology and effective administrative processes.

The CSB continually strives to improve its information technology and administrative

processes, as an investigative unit is successful only if the support functions are strong. To that end, the CSB will continue to improve its support functions with new technology and innovative administrative techniques, some of which are outlined below:

1. In 2006 the agency began using the state of the art TRIM database for all incident reporting, investigations, and safety recommendations. This system includes data on all 107 historical CSB cases, 624 recommendations, and over 5,000 chemical incidents that have been documented since inception of the agency. TRIM is considered the agency's ultimate repository for chemical and hazardous substance data and events, and the CSB will expand its use of TRIM as a knowledge management platform.
2. The agency will also expand its use of "CSB Connect Pro" as a learning management and training platform, and training modules are regularly added to support competency needs. This system enables the CSB to share screens, chat boards, webcams, and a variety of other collaborative tools in web meeting rooms between the CSB's DC and Denver teams and with the agency's telecommuters. The e-training system allows the agency to record valuable training sessions and creates web training courses for a training catalog. All historical training for each employee is recorded to serve as the permanent record of employee training and achievement.
3. The CSB is transitioning to a new automated time and attendance system that allows all staff work hours to be recorded on a project by project basis, including hours for specific incident investigations. This allows for real-time productivity tracking per project and ensures that resource decisions are made following a close examination of past and expected costs per project.

Other examples of CSB high functional information technology systems include the agency's professional grade, state-of-the-art videoconferencing systems for the DC and



CSB investigation and recommendations staff at a training session

Denver offices. CSB is also working towards incorporating its administrative records into its electronic records management system. Finally, the agency has procured SharePoint, a collaborative platform with user friendly dashboard interfaces that enable web-based sharing of items such as calendars and documents, that will be implemented in the coming years.

In October 2011, over 500 individuals from industry, academia, other government agencies, and the media participated in the CSB's first webinar to discuss the Texas Tech University case study report. Over 25 news stories appeared afterward, which focused on the findings and recommendations from the investigation. The CSB will expand the use of webinars as an information-sharing vehicle in the future.

These various technology solutions have enabled the CSB to closely monitor accomplishments, activities, and expenses and support the use of performance-based decision-making when allocating resources. The agency will continue to improve in this

area by increasing the use of business intelligence applications and efficiency-based performance measure reporting, which will be supported by the SharePoint platform.

5. Foster effective internal communications

The CSB operates in a highly communicative and cooperative work environment, which is especially necessary as its small size necessitates that informal communication channels facilitate the accomplishment of its mission objectives. This philosophy of open communication is transmitted by top leadership on an ongoing basis. For example, the entire agency staff is invited to participate in weekly agency leadership meetings. By opening these meetings to all staff, top leadership broadcasts the transparency of agency decisions and welcomes diverse viewpoints. In addition, the agency uses Skype video-conferencing, a cost-effective vehicle that allows the CSB to conduct meetings using the full range of verbal and non-verbal, such as PowerPoint, communications to connect

PERFORMANCE MEASURES

PERFORMANCE MEASURES GOAL 3			
MEASURE	FY 2011 RESULT	FY 2012 TARGET	PERFORMANCE MEASURE TYPE
3.3 Wellness program	Program initiated	Employee Satisfaction Scores (use OPM Data or Survey Monkey)	Output
3.3 Investigative competency and/or curriculum development	NA	Establish Baseline data Develop IDPS for each professional staff.	Output
3.5 Implement internal communications survey	NA	Establish Baseline data	Output

with field locations. This effective communication system also saves considerable expense as field employees rarely have to travel to headquarters solely to attend meetings. The agency will continue to explore innovative communication approaches and plans to implement an annual survey to learn about new communication strategies from staff. Follow-up surveys will evaluate progress in improved communication over time.

EVALUATING PERFORMANCE MEASURES

During the next four years, the CSB will use a number of important performance measures to evaluate the achievement of Goal 3. In addition, the CSB will enhance its investigation process by completing specific protocols and will improve the human capital process by updating the *Human Capital Plan* and providing training to enhance investigative competencies. Finally, the CSB will establish a baseline for intra-agency communications by conducting and interpreting a web-based communication survey. In follow-up years, the agency will establish target levels for improved communication.

ENVIRONMENTAL AND STAKEHOLDER ASSESSMENT

In creating this strategic plan, the CSB engaged in significant outreach with stakeholders such as trade associations, other government agencies, worker groups, and universities to obtain feedback. This feedback enabled the CSB to ensure that views from stakeholders regarding the agency's effectiveness and perceived challenges could be evaluated and considered in developing the content of the plan. In addition, the stakeholder analysis allowed the CSB to ensure that the goals and objectives in the plan align with stakeholder views and are consistent with the original legislative mandate of the agency under the Clean Air Act Amendments of 1990.

From the stakeholder interviews and assessment about the CSB's mission, "To independently investigate significant chemical incidents and hazards and effectively advocate the implementation of the resulting recommendations to protect workers, the public, and the environment", the agency learned that stakeholders:

- Expect that the CSB's mission will remain consistent with the legislative mandate;
- Are concerned that resource issues could affect the degree of success of the mission;
- Believe the CSB should have a trend analysis and reporting role specified in the mission;
- Think the CSB should have an environmental role in the mission consistent with the legislation; and
- Believe that the mission should reference CSB's role in developing recommendations.

Overall, CSB stakeholders want to see the CSB perform excellent "root cause" investigations and would like to see the CSB as the "go to" expert in the area of process safety. Regarding the existing goals from the CSB 2007–2012 strategic plan, stakeholders believe that CSB:

- Makes good deployment decisions but timeliness of the investigative process is a concern;
- Should consider a "stratified" investigation approach with different efforts and report formats depending upon complexity of cases; tagging (providing keywords in search engines) reports to assist searching would be useful;



CSB investigator collects dust samples from a Hoeganaes facility in Gallatin, TN, which experienced multiple iron dust flash fires during a six month period in 2011.

- Should conduct safety studies but not at the expense of its core investigative work;
- Should increase collaboration with industry while recommendations are being developed, improve the process for the adoption of recommendations, and provide timelier follow up with recipients after recommendations have been issued; and
- Safety videos are universally liked, but little is known about their effectiveness to promote learning or improve safety because of a lack of a formal measurement process.

As a result of the environment and stakeholder assessment CSB streamlined its 2012–2017 strategic plan to focus on three key goals to place emphasis on conducting investigations, securing implementation of recommendations and disseminating

CSB findings; and improving organizational excellent to make the best use of its resources. Regarding specific stakeholder comments, the revised strategic plan includes:

- An objective addressing timely, high quality investigations;
- A description of the scoping analysis CSB uses after returning from a deployment to determine among other things the type of product that will be generated;
- An objective regarding the timely implementation of recommendations, which discusses the need for timely and persistent follow-up to ensuring that CSB recommendations are successfully implemented; and
- A plan to design a survey that will measure and confirm this anecdotal feedback regarding the impact of safety videos.

OTHER FACTORS AND CHALLENGES

STAFFING SHORTAGES

At the CSB, 25% of the workforce was eligible to retire as of March 2012. Although many of these employees did not retire, serious attention to succession planning is warranted to ensure leadership continuity. And because many of the CSB investigative and recommendations personnel occupy positions requiring specialized skills and experience, failure to anticipate and prepare for employee retirements could leave the CSB severely hampered in its ability to accomplish the investigative mission.

BUDGET UNCERTAINTY

Like most Federal agencies, the CSB is subject to the annual Congressional appropriations process. Given the uncertainty in recent years associated with annual funding levels, the CSB is mindful that the success of its strategic plan depends on funding decisions by Congress and the president.

SKILL GAPS

To be successful, the CSB relies on its employees' outstanding skills and professionalism. Because retirements can affect institutional knowledge, training successors is extremely important. Moreover, any workforce will require updated training to close skills gaps in an environment that includes emerging chemical safety issues, advanced management techniques, new software, and updated IT capabilities. The CSB gaps in skills and competencies are discussed in detail in the CSB Human Capital Plan, as are specific strategies to address those gaps. In particular, the CSB needs to attract and retain technical and organizational safety experts from the private sector.

PLAN DEVELOPMENT AND OUTREACH

To develop this strategic plan, the CSB interviewed stakeholders in industry, academia, and other government agencies. The interviews were structured and designed to obtain feedback on the current state of the CSB and its mission and goals, and to explore ways to improve effectiveness. In addition, the CSB conducted internal interviews with key managers and staff and a confidential internal survey to obtain employees' views about what should be included in the new strategic plan. Based on this comprehensive feedback and on best

practice research and written guidance from OMB, the strategic plan was developed during 2011 and 2012. In April 2012, the draft plan was shared with Congress and OMB for feedback. In addition, the strategic plan posted on the CSB's website to gather final feedback from outside parties and was discussed at a public Board meeting in Buffalo, NY on April 19, 2012, at which further public comments were received. The plan was finalized and adopted by the CSB Summer 2012.

LINKS TO SUPPORTING DOCUMENTS

BUDGET SUBMISSION—yearly document submitted concurrently to the Congress and the Office of Management and Budget (OMB) that details the agency budget request for the subsequent fiscal year.

FOIA REPORT—details the policies, procedures, and activity for Freedom of Information Act (FOIA) requests.

GPRA 1993 & 2010—provides for the establishment of strategic planning and performance measurement in the federal government and for other purposes.

INTERNAL CONTROL PLAN—internal agency plan that indicates processes and procedures undertaken to ensure compliance with OMB Circular—*123 Management's Responsibility for Internal Control*.

OMB A-11 SECTION 210—guidance developed and published by the Office of Management and Budget (OMB) that details performance management information for use by government agencies to develop strategic plans, performance and accountability reports, and annual performance reports.

ORIGINAL ENABLING LEGISLATION—The Clean Air Act Amendments of 1990, which created the CSB.

PERFORMANCE AND ACCOUNTABILITY REPORT—published annually; contains significant financial and performance-related data for the CSB and includes a management discussion and analysis, an independent auditor's report, a balance sheet, and other financial information.



The CSB's 2009 public meeting in Institute, WV, to release preliminary findings on the board's investigation into the fire and explosion that fatally injured two workers at the Bayer CropScience facility in Institute, WV.

GLOSSARY OF PLANNING AND CHEMICAL TERMS

ACCIMAP—multi-layered causal diagrams that arrange the various causes of an incident in terms of their level of influence in society.

AGENCY PHILOSOPHY—the expression of core values and operating principles for the conduct of the agency in carrying out its mission and describes how the agency conducts itself as it does its work.

AMMONIA— a compound of nitrogen and hydrogen; a colorless gas with a characteristic pungent odor and used widely in commercial refrigeration and fertilizer production.

AUDIT TRAIL—record of documentation describing actions taken, decisions made, and funds expended and earned on a project; used to reconstruct the project after the fact for lessons learned and other purposes.

BASELINE—starting point from which gains are measured and targets set. The baseline year shows actual program performance or prior condition for the given measure in a specified prior year.

BENCHMARKING PROCESS—integral part of the internal and external assessment conducted during the Strategic Planning process. An iterative method of identifying, analyzing and emulating the standards and best practices of external organizations that achieve a high degree of productivity or innovative success in program and service changes to internally managed processes; helps define any needed improvements to individual sub-functions within an organization.

CALCIUM CARBIDE—chemical compound colorless in pure form. Because of presence of other chemicals it has a distinctive smell that some find unpleasant. Used primarily industrially in the production of acetylene and calcium cyanamide.

CHLORINE—highly toxic chemical element that is a strong oxidizing agent and used in the production of a wide variety of industrial and consumer products.

CLEAN AIR ACT AMENDMENTS OF 1990—original legislation that created the CSB in 1990.

COMBUSTIBLE DUST—type of material that can generate a dust fire or explosion, such as coal, sawdust, and magnesium. Many otherwise mundane materials can also lead to a dangerous dust cloud such as grain, flour, sugar, and powdered milk. Many powdered metals (such as aluminum and titanium) can also form combustible or explosive clouds.

COMPETENCY—a set of behaviors, including knowledge, skills, abilities, and/or attitudes that describe excellent performance in a particular work context (e.g., job, role, or group of jobs, function, or whole organization). Competencies can help ensure that the individual and team performance aligns with the organization’s mission and strategic directions.

CONTROL SYSTEM *see* Internal Control System.

CUMULATIVE MEASURE—measure for which one quarter’s performance can be added to a previous quarter’s performance to obtain year-to-date performance; otherwise, a measure is non-cumulative.

EFFICIENCY—criterion used to measure a program’s inputs relative to its outputs. An efficient program is one that uses the least possible resources while achieving its intended outcomes.

EFFICIENCY MEASURE—indicators of agency productivity expressed in terms of dollars, employee time, or equipment used per unit of product or service output. Indicators of average cost and average time normally serve as efficiency measures for agency processes or as outcome measures when cost-per-unit-of-outcome is the focus. The average time to respond to requests is an efficiency measure.

END OUTCOMES—grounded in mission and statute that assess progress toward strategic goals.

ETHYLENE—most produced organic compound; has many industrial uses, including the processes of 1) polymerization, 2) oxidation, 3) halogenation 4) alkylation, 5) hydration, 6) oligomerization, and 7) hydroformylation.

ETHYLENE OXIDE—highly flammable material used industrially to make many consumer products and non-consumer chemicals.

FEDERAL INFORMATION SECURITY MANAGEMENT ACT (FISMA)—requires federal agencies to develop, document, and implement agency-wide program to provide information security for the information and information systems that support the operations and assets of the agency.

FISCAL YEAR (FY)—federal budgeting and accounting period that begins October 1 and ends September 30 and specified by the calendar year in which the fiscal year ends (e.g., October 2011 through September 2012 is fiscal year 2012).

FLOWCHART—diagram consisting of symbols depicting a physical process, a thought process, or an algorithm that shows how the various elements of a system or process relate and can be used for continuous process improvement.

GOAL—general end toward which an agency directs its efforts that addresses issues by stating policy intent.

GOVERNMENT PERFORMANCE AND RESULTS ACT OF 1993 & 2010—provides for the establishment of strategic planning and performance measurement in the federal government and for other purposes.

HYDROGEN FLUORIDE—a hazardous chemical used in the oil refining industry.

INPUTS—resources an agency uses to produce services, including human, financial, facilities, or material.

INPUT CONTROLS—processes developed by an entity to provide reasonable assurance that the data introduced into the performance measurement system is accurate.

INPUT MEASURE—quantifiable indicator of the resources used or requests received by an agency to produce its goods or services.

INTERMEDIATE OUTCOME—changes in individual, community, or organizational attitudes, behaviors, and/or conditions required to achieve outcomes.

INTERNAL AUDIT—self-audit conducted by members of the project team or a unit in the organization.

INTERNAL CONTROL—process of monitoring and dealing with deviations from project plan or process.

INTERNAL CONTROL SYSTEM—all procedures developed by entities to ensure the accuracy of reported data, including input, process, and review controls.

INTERNAL DOCUMENTATION—written information associated with the development process, the quality system, and the product, retained in project files and not a part of the final product.

KNOWLEDGE—facts, concepts, and principles needed to perform a task.

KNOWLEDGE MANAGEMENT—collection of systems, processes, and procedures designed to acquire and share the intellectual assets of an organization. In project management, having a formal lessons-learned process is a form of knowledge management that can significantly aid project managers in avoiding the mistakes of others.

LESSONS LEARNED—documented information, usually collected through meetings, discussions, or written reports, to show how both common and uncommon project events were addressed. This information can be used by other project managers as a reference for subsequent project efforts.

LIQUEFIED PETROLEUM GAS, LPG, LP GAS, LIQUID PROPANE GAS—flammable mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles.

MEASURE—indicator of agency efforts and performance achieved, planned, or required by legislative directive.

MEASURE TYPE—identifies if the measure is an output, outcome or efficiency.

METRICS—units of measurement used to assess, calculate, or determine progress performance in terms of monetary units, schedule, or quality results.

MISSION—reason for an agency’s existence that succinctly identifies what the agency does, why, and for whom.

NATIONAL EMPHASIS PROGRAM

(NEP)—A targeted enforcement program by the Occupational Safety and Health Administration.

NATURAL GAS—consists primarily of methane and found in hydrocarbon fuel, coal beds, and natural underground rock formations.

NITROGEN—colorless, odorless, tasteless, and mostly inert gas part of the Earth’s atmosphere but that can be deadly in confined spaces.

NON-CUMULATIVE MEASURE—measure for which the year-to-date performance must be calculated for the entire reporting period and not based on combining the performance from separate reporting periods.

OBJECTIVE—clear and quantified target for specific action(s) within a specific period that mark interim steps toward achieving an agency’s long-range mission and goals. Linked directly to agency goals, measurable objectives, and time-based statements of intent.

OFFICE OF MANAGEMENT AND BUDGET

(OMB)—predominant mission is to assist the President in overseeing the preparation of the federal budget and to oversee the administration of Executive Branch agencies. In helping formulate the President’s spending plans, OMB evaluates the effectiveness of agency programs, policies, and procedures, assesses competing funding demands among agencies, and sets funding priorities. OMB ensures that agency reports, rules, testimony, and proposed legislation are consistent with the President’s Budget and Administration policies.

OMB CIRCULAR A-11 (PART 6)—designates budgetary and performance information for federal agencies from the Executive Office of the President. Part 6 in particular is the Preparation and Submission of Strategic Plans, Annual Performance Plans, and Annual Program Performance Reports.



CSB Board Members preside over the 2010 hearing in Washington DC to hear expert testimony on regulation of offshore oil and gas safety practices

OMB CIRCULAR A-136—designates financial reporting requirements for federal agencies from the Executive Office of the President (i.e., the Performance Accountability Report (PAR)).

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)—federal agency of the US that regulates workplace safety and health and is part of the US Department of Labor.

OUTCOME EFFICIENCY MEASURE— tracks the ratio of outcomes to inputs and assesses the overall program.

OUTCOME MEASURE—indicates the actual impact or affect upon a stated condition or problem. These measures assess the effectiveness or quality of an agency's performance and the public benefit derived. Outcome measures are indicators of the public benefits and are typically expressed as a percentage, rate, or ratio.

OUTCOMES—quantified results or impacts of government actions.

OUTPUTS—documents of deliverable items that result from a process.

OUTPUT EFFICIENCY MEASURE—tracks the ratio of output to inputs and assesses how well the program performs.

OUTPUT MEASURE—level of activity provided over time. A tool or indicator used to count the services and accomplishments produced by an agency. The number of people receiving a service or the number of services delivered is often used as measures of output as is the number of vaccinations given.

PERFORMANCE—determination of achievement to measure and manage program and project results.

PERFORMANCE AND ACCOUNTABILITY REPORT—financial and performance report required by OMB for all government agencies due by mid-November each calendar year.

PERFORMANCE MEASURE—indicators, stats, and metrics used to gage program performance.

PERFORMANCE MEASURE DEFINITION—describes in detail what the measure intends to measure, significance, origination of the data, how data will be collected and calculated, data limitations, and how frequently the measure will be reported.

PERFORMANCE PLANS—GPRA requires agencies to develop and maintain annual performance plans, which describe relationships to the strategic plan; performance goals and indicators (for each Program Activity in

the budget); operational processes, skills, and technology; the people, capital, information, or other resources needed to meet goals; and the means to be used to verify and validate measured values.

PERFORMANCE REPORTING—collecting and disseminating information about project performance to provide project stakeholders with information about how resources are being used to achieve project objectives; includes status reporting, progress reporting, and forecasting.

PETROLEUM OR CRUDE OIL—naturally occurring, flammable liquid consisting of a complex mixture of hydrocarbons that are found in geologic formations beneath the Earth’s surface. Used to make fuels such as gasoline and in processed form as machine oil, asphalt, wax, and plastics.

PHOSGENE—chemical compound that exists as a colorless gas and was first used as a chemical weapon during World War I; now used as an industrial reagent and building block in synthesizing pharmaceuticals and other organic compounds.

PROCEDURES—step-by-step instructions about how to perform a given task or activity; may be accompanied by a statement of purpose and policy for a task, examples of the results of a task, etc.; prescribed method to perform specified work.

PROCESS CONTROLS—mechanisms developed by an entity to provide reasonable assurance that its performance measurement system uses the appropriate information and follows procedures established such that each measure can be calculated.

PROCESS SAFETY—generally refers to the prevention of unintentional releases of chemicals, energy, or other potentially dangerous materials (including steam) during the course of chemical processes that can have a serious effect on the facility where the release occurred and the environment. It involves, for example, the prevention of leaks, spills, equipment malfunction, over-pressures, over-temperatures, corrosion, metal fatigue and other similar

conditions. Process safety programs focus on design and engineering of facilities, equipment maintenance, effective alarms, effective control points, procedures, and training.

PROGRAM—group of related projects managed in a coordinated way to obtain benefits not available from managing the projects individually; may include an element of ongoing activities or tasks.

PROGRAM EVALUATION—assessment, through objective measurement and systematic analysis, of the results, impact, or effect of a program or policy.

PROGRAM MANAGEMENT—management of a related series of projects over time to accomplish broad goals to which the individual projects contribute.

PROGRAM MANAGER—individual typically responsible for a number of related projects, each with its own project manager.

PROJECT—temporary undertaking to create a unique product or service with a defined start and end point and specific objectives that, when attained, signify completion.

PROJECT CHARTER—document issued by senior management that authorizes the project manager to apply organizational resources to project activities and formally recognizes the existence of a project. Includes a description of the business need that the project was undertaken to address and of the product or service to be delivered by the project.

PROJECT EVALUATION—periodic examination of a project to determine whether the objectives are being met and conducted at regular intervals, such as at the beginning or end of a major phase.

PROJECT LIFE CYCLE—collection of generally sequential project phases whose specific name and number are determined by the organization or organizations involved; generally includes the major steps of initiating, planning, implementing, monitoring and controlling, and closing.

PROJECT MANAGEMENT—application of knowledge, skills, tools, and techniques to project activities to meet or exceed stakeholder needs and expectations from a project.

PROJECT MANAGER—individual responsible for managing the overall project and its deliverables. Acts as the customer’s single point of contact for the project and controls planning and execution of the project’s activities and resources to ensure that established cost, time, and quality goals are met.

PROJECT PLAN—formal, approved document, in summarized or detailed form, used to guide both project execution and control. Documents planning assumptions and decisions, approved scope, cost, and schedule baselines and facilitates communication among stakeholders.

PROJECT PLANNING—developing and maintaining the project plan; identifying the project objectives, activities needed to complete the project, and resources and quantities required to carry out each activity or task within the project; approach to determine how to begin, sustain, and end a project.

PROJECTION—estimate of future performance based on the review of historical information, present situation, and future outlook.

QUALITY—timeliness, accuracy, and/or conformance to requirements; quality requirements may be used to measure several aspects of performance, such as outputs, process, intermediate outcomes, and in some cases, end outcomes.

REACTIVE CHEMICALS—inherently unstable and susceptible to rapid decomposition; also refers to chemicals which, under specific conditions, can react alone, or with other substances in a violent uncontrolled manner, liberating heat, toxic gases, or leading to an explosion.

RECORD RETENTION—period that records are kept for reference; may vary per record being kept.

RELIABILITY—ability of a person or system to perform and maintain its functions in routine circumstances.

REPORTING—communicating information regarding project status and progress.

REVIEW—critical examination to determine suitability or accuracy.

REVIEW CONTROLS—procedures developed to verify that an activity occurred to provide reasonable assurance that accurate data is reported.

RISK ASSESSMENT (ALSO CALLED RISK EVALUATION)—review, examination, and judgment to see if identified risks are acceptable according to proposed actions; identification and quantification of project risks to ensure that they are understood and can be prioritized.

ROOT CAUSE ANALYSIS—structured approach to identify underlying causes of incidents and what systems need to be changed to prevent recurrence of similar harmful outcomes.

SPECIFIC, MEASURABLE, ACCOUNTABLE, RESULTS-ORIENTED & TIME-BOUND (SMART)—mnemonic used to develop effective performance measures; coined by Peter Drucker for Project Management in evaluating objectives.

SOURCE DOCUMENTATION—materials maintained by an entity to substantiate the accuracy of reported performance data.

STRATEGIC PLAN—formal document that communicates an agency’s mission, goals, objectives, strategies, and performance measures.

STRATEGIC PLANNING—long-term, iterative, and future-oriented process of assessing information gathering, goal setting, and decision-making that maps an explicit path between the present and a vision of the future that relies on careful consideration of an organization’s capabilities and environment, and leads to priority-based resource allocation and other decisions.

STRATEGY—method by which an entity seeks to accomplish its goals and objectives. The Strategy executes the mission.

STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS (SWOT) (ALSO CALLED LANDSCAPE ANALYSIS)—analysis used to determine where to apply special efforts to achieve desired outcomes; lists (1) strengths and how best to take advantage of them; (2) weaknesses and how to minimize their impacts; (3) opportunities presented by the project and how best to take advantage; and (4) threats and how to deal with them.

TARGET LEVEL—expected level of performance established for a particular measure.

TRAINING METHODS—any of the many instructional approaches or combinations of approaches to achieve learning such as classroom presentations, technology-based lessons, case-study exercises, etc.

TRAINING OBJECTIVE—clearly communicated statement of the desired changes in the target audience’s skills, knowledge, or abilities. Often includes a description of the activity to be demonstrated, the conditions under which the activity will be performed, and the standards for judging if the activity has been performed at the desired level.

VISION—inspiring picture of a preferred future. A vision is not bound by time, represents global and continuing purposes, and serves as a foundation for a system of strategic planning.

ACRONYMS

AIChE	American Institute of Chemical Engineers
CBI	Confidential Business Information
CSB	Chemical Safety and Hazard Investigation Board
CY	Calendar Year (January 1 to December 31)
EEO	Equal Employment Opportunity
EPA	Environmental Protection Agency
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FY	Fiscal Year (October 1 to September 30)
GPRA	Government Performance and Results Act
MD	Managing Director
MWL	Most Wanted List
NEP	National Emphasis Program
NFPA	National Fire Protection Association
NTSB	National Transportation Safety Board
OGC	Office of General Counsel
OMB	Office Management and Budget
OPM	Office of Personnel Management
OSHA	Occupational Health and Safety Administration (within the U.S. Department of Labor)
PMEW	Performance Measure Evaluation Worksheet
PSM	Process Safety Management
SMART	Specific, Measurable, Accountable, Results-Oriented & Time-Bound
SWOT	Strengths, Weaknesses, Opportunities, Threats

