Department of Defense
Executive Assessment of Safety and Occupational Health Management Systems

Submitted to:

The Honorable Donald H. Rumsfeld
Secretary of Defense

Prepared by:

National Safety Council
1121 Spring Lake Drive
Itasca, Illinois 60143-3201

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EXECUTIVE SUMMARY

In May 2001, the National Safety Council (NSC) proposed a partnership with the Department of Defense (DoD) to work together on critical safety and health initiatives. The Secretary of Defense accepted the offer, and the NSC began its work in August by assembling a panel of experts from industry, labor and the government. This expert panel was charged with the task of helping the DoD improve its operational readiness capabilities. The focus of this study was an executive assessment of DoD's safety and occupational health management systems.

Although the Panel's review identified many areas of occupational safety and health excellence, **the major finding of the NSC assessment was the lack of an effective Department-wide safety and occupational health management system.** This deficiency has serious consequences for the Department's mission because preventable injuries and illnesses absorb substantial human and financial resources that are needed for operational readiness. The NSC Panel was unable to precisely determine the full cost impact of these preventable incidents throughout the DoD because aggregate data were not available. The NSC Panel has conservatively estimated that the annual cost of injuries and illnesses for the DoD ranges from $10 billion to over $21 billion.[1]

The DoD does not view occupational injury and illness loss as a key readiness concern that requires Department-level management commitment and leadership. The NSC panel found that, in the DoD, safety and occupational health generally have low visibility. There is no central, corporate management system to ensure coordinated policy, advocacy and oversight. The DoD lacks the data system to collect and analyze fundamental information needed for sound decision-making with respect to occupational injuries and illnesses.

The nation's leading businesses see the prevention of injuries and illnesses as a core business value that reduces human, social, financial and productivity costs and improves the bottom line. DoD also has a bottom line: operational readiness. Like industry, it needs to manage injuries and illnesses and reduce their adverse impact on operational readiness. DoD needs to integrate safety and occupational health into its overall management system. This effort will require senior leadership commitment and the development of new system components to ensure continuous improvement of safety and occupational health performance throughout the Department.

The NSC Panel conducted a high-level review of the management systems used in the DoD for safety and occupational health. Its principal recommendations follow.

[1] Appendix E describes the methodologies and assumptions employed in developing this estimate.

PRINCIPAL RECOMMENDATIONS

The Secretary of Defense should take the following actions to demonstrate that safety and occupational health are core values within the DoD:

- Demonstrate a continuing, strong, personal commitment to safety and occupational health within the DoD.

- Establish safety and health as an executive-level business responsibility by assigning overall system oversight to an existing executive-level committee reporting directly to the Deputy Secretary of Defense. Include safety and occupational health as an integral part of both the Defense Planning Guidance and Medical Planning Guidance systems.

- Provide the DoD safety and occupational health office with the authority, personnel and resources to meet its responsibility for the policy, advocacy and oversight of safety and occupational health issues within the Department.

- Establish a uniform performance measurement system within the DoD that provides senior management with the information necessary to ensure continuous improvement of safety and occupational health performance. The system should allow management to determine the human, financial and operational readiness impact of occupational injuries, illnesses and deaths.

ACKNOWLEDGMENTS

The National Safety Council ("NSC"), founded in 1913, is the nation's leading advocate of safety and health in the workplace, on the highways, and in homes and communities. The NSC was chartered by the United States Congress in 1953, by PL-83-259, and is the only safety and health organization chartered by the Federal Government. The NSC is a non-profit, non-governmental public service organization whose mission includes the responsibility

"…to arouse and maintain the interest of the people of the United States in safety and in accident prevention…."

This special report to the Secretary of Defense and the information and insights gained in the course of this review would not have been possible without the knowledge and candor of the officers and civilians within the many staff components of the Office of the Secretary of Defense, the Services' headquarters staff, and the men and women at selected commands and installations who make up the vast network of safety and health professionals within the DoD.

In particular, the Services provided staff to supplement the NSC staff working on the project. The efforts of this technical support staff were invaluable.

The members of the NSC Panel volunteered their valuable time and energy to help improve the lives of the military and civilian personnel with the armed Services. Their effort shows dedication both to continuous safety and health improvement and to their country.

The NSC hopes that the information and recommendations contained in this report will enable the Secretary of Defense and his key assistants to expand the already impressive infrastructure supporting the safety and occupational health of uniformed, civilian and contract personnel, reduce the number and severity of injuries and illnesses sustained by these personnel, and provide improvements in the operational readiness of our nation's military.

EXECUTIVE ASSESSMENT PANEL MEMBERS

Gerard (Jerry) Scannell, President Emeritus (Chair)
National Safety Council

Leo Carey, CIH, Director, Government Services (Vice Chair)
National Safety Council

Karl Bossung, Corporate Manager, Health and Safety
Delphi Automotive Systems

Ernest Clayton, Director, Safety, Health and Environmental Affairs
Boeing Companies

Michael N. Ferrara, Manager, SAFE Fleet
Johnson & Johnson

Deborah L. Grubbe, PE, Corporate Director – Safety and Health
DuPont

Jackie Nowell, CIH, MPH, Director, Occupational Safety & Health Office
United Food and Commercial Workers International Union – AFL-CIO

James Lee McAtee, Acting Director, Environment, Safety and Health
Los Alamos National Lab

Charles F. Redinger, CIH, MPA, Ph.D., Principal
Redinger & Associates, Inc.

Knut Ringen, PhD, President
Stoneturn Consultants

Rosemary Sokas, MD, Associate Director for Science
National Institute for Occupational Safety and Health

James Thornton, CIH, CSP, Director, Environmental Health & Safety
Newport News Shipbuilding

Richard Waxweiler, Ph.D., Director, Division of Acute Care
National Center for Injury Prevention and Control, CDC

NATIONAL SAFETY COUNCIL TECHNICAL SUPPORT TEAM

Elizabeth Agnvall, Technical Writer

Patricia S. Bradley, CIH, Special Assistant to the Deputy Assistant Secretary United States Department of Labor, Occupational Safety and Health Administration, on detail to Department of the Navy, Chief of Naval Operations

Todd Briggs, Government Relations Program Specialist, National Safety Council

Lee Feldstein, Manager, Environmental Programs, National Safety Council

Ken Gladstone, REM, Director, Safety Management Office of Environment and Safety (SEA 00TP), Naval Sea Systems Command United States Navy on detail to the National Safety Council

Captain Philip Goff, BSC, CIH Fellow, Environmental and Occupational Health Division, Air Force Medical Operations Agency, Office of the Surgeon General, United States Air Force

Major Anthony Intrepido, CIH, Program Manager, Industrial Hygiene Field Services Program, U.S. Army Center for Health Promotion and Preventive Medicine, United States Army

Larry Liberatore, Program Specialist, Office of Government Services, National Safety Council, on detail from the United States Department of Labor, Occupational Safety and Health Administration

Mike Quigley, Occupational Safety and Health Director, Naval Air Station, Patuxent River, MD, United States Navy

DoD AND MILITARY SERVICE BRIEFING TEAMS
August 2001

Department of Defense

Mr. Curtis Bowling, Asst. Deputy Under Secretary of Defense, Office of Deputy Under Secretary of Defense (Installations & Environment), Safety and Occupational Health

Mr. Craig Schilder, Asst. for Safety Policy, Office of Deputy Under Secretary of Defense (Installations & Environment), Safety and Occupational Health

Air Force

Maj. Gen. Timothy Peppe, Chief of Air Force Safety, Safety Center

Col. Brian McCarty, Office of the Deputy Assistant Secretary of the Air Force (Installations, Environment, Safety and Occupational Health)

Col. Forrest Sprester, BSC, RLS, PE, DEE, Chief, Environmental and Occupational Health Division, Office of the Surgeon General

Lt. Col. John Coho, Office of the Deputy Assistant Secretary of the Air Force (Installations, Environment, Safety and Occupational Health)

Mr. John Phillips, Chief, Air Force Safety Policy, Plans & Programs, Safety Center

Mr. J.R. Russell, Chief, Air Force Ground Safety, Safety Center

Maj. Tom DeVenoge, Environmental and Occupational Health Division, Office of the Surgeon General

Army

Mr. Raymond Fatz, Deputy Assistant Secretary of the Army, Installation and Environment, Office of the Secretary of the Army

Brig. Gen. Lester Martinez-Lopez, Commander, Center for Health Promotion and Preventive Medicine (CHPPM)

Col. Kotu K Phull, Assistant for Occupational Health (outgoing), Office of the Assistant Secretary of the Army, Installation and Environment, Office of the Secretary of the Army

Col. Paul D. Smith, Occupational/Environmental Medicine Staff Officer, Center for Health Promotion and Preventive Medicine (CHPPM)

Col. Charles Welliver, Deputy Director, Army Safety Center

Col. Hershall Wolfe, Assistant Chief, Medical Service Corps and Consultant for Environmental Science & Engineering, Office of the Surgeon General

DoD AND MILITARY SERVICE BRIEFING TEAMS
August 2001
(continued)

Army (continued)

Mr. Gary Abriz, Assistant for Safety, Office of the Assistant Secretary of the Army, Installation and Environment, Office of the Secretary of the Army

Ms. Donna Doganiero, Director, Occupational Health Sciences, Center for Health Promotion and Preventive Medicine (CHPPM)

Lt. Col. Steven P. Jones, Assistant for Occupational Health (incoming), of the Assistant Secretary of the Army, Installation and Environment, Office of the Secretary of the Army

Lt. Col. Mary Lopez, Ergonomics Program Manager, Center for Health Promotion and Preventive Medicine (CHPPM)

Lt. Col. Paul Smith, Occupational/Environmental Medicine Staff Officer, Office of the Surgeon General

Navy

Mr. Dan Reinhard, Director, Safety, Occupational Health & Fire Policy, Office of the Deputy Secretary of the Navy, (Safety)

Ms. Joy Erdman, Head, Safety and Occupational Health, Office of the Chief of Naval Operations

Capt. Bill Stover, Branch Head, Occupational Health and Safety, Bureau of Medicine and Surgery, Navy Surgeon General's Office

Capt. Kurt Garbow, Liaison to the Chief of Naval Operations, Naval Safety Center

Marine Corps

Mr. Albert Lillibridge, Deputy Director, Safety Division, HQ USMC

Ms. Anna Marie Pratt, Program Manager, Off Duty & Recreational Programs, HQ USMC

Ms. Freya Arroyo, Safety Engineer, HQ USMC

Lt. Col. James Grace, Head, Military Operations/Training Branch, HQ USMC

Capt. Leonard Martin, Aviation Safety Officer, HQ USMC

1.0 INTRODUCTION

Paul H. O'Neill, who was chairman and CEO for Alcoa before taking the U.S. Treasury Secretary post, said the nation's employers should set dramatic goals for reducing injury rates.

"The only legitimate goal is zero," O'Neill said in his address to the April 2001 Workplace Safety Summit held at Georgetown University in Washington, D.C.

Alcoa was able to make dramatic gains in its severity injury rate – reducing it from 1.86 in 1987 to a current rate of 0.14 per 100 – not only by setting hard-to-reach goals but also by taking some unusual steps to ensure that management and workers "bought" into the effort.

"One of the things you have to do is say to everyone in the organization, that if something has to be done" it will be, he said. "I went to managers and said, there are no excuses anymore."

"You start to think you can't afford to get better" because the resources required provide diminishing returns, he said. "But you have to say, safety is not a value. Safety is a precondition" for a company to operate, he said.

"Most of what we need to do to get to zero [employee injuries] is not about huge investments, it's mostly about process and commitment – and constant learning," he said.

Remarks by U.S. Treasury Secretary Paul H. O'Neill
at the April 2001 Workplace Safety Summit,
Georgetown University, Washington, D.C.

With approximately 3.5 million men and women civilians and uniformed personnel (the active military, the National Guard and Reserves) the United States Department of Defense is the largest employer in the country. In addition to its size, the U.S. military is unlike any other employer. It confronts virtually all of the safety and health challenges facing corporate America, ranging from those in the manufacturing and service industries to those in research and development and office administration. At the same time, it must retain a constant state of operational readiness to meet the nation's national security and emergency preparedness needs.

As the U.S. Armed Forces deploy in the war against terrorism and continue to protect Americans at home, all civilian and uniformed personnel are critical components of overall force readiness. In addition, every dollar spent as a result of occupational injuries and illnesses is a dollar that could be spent on military priorities.

Historically, the U.S. military has lost more lives to disease and non-battle injuries than as a direct result of combat.[2] Tragically, the first casualty in the war against terrorism was an airman killed in an accident while engaged in a forklift operation.

What is the financial cost of DoD occupational injuries and illnesses? Currently, the DoD has no ready way to obtain an accurate accounting of this cost. Although injury and illness data abound among the Services, no standard measures are used to describe costs, nor is there a comprehensive DoD-wide data collection and analysis system. Further, the DoD does not use performance measures to link these costs with their overall impact on operational readiness. Nevertheless, we conservatively estimate the total cost of DoD-wide occupational injuries, illnesses and death ranges somewhere from $10 billion to more than $21 billion annually.

Although financial costs are certainly important, readiness is the military's true bottom line. Occupational injuries and illnesses may impact operational readiness in a number of ways: losses in skilled manpower which require the recruitment and training of replacements; losses in efficiency and productivity caused by degradation, damage and loss of equipment; and loss of senior managers' focus on readiness as attention is diverted to dealing with injury and illness issues.

It would be inappropriate, however, to measure occupational injuries and illnesses only in terms of monetary cost. Each of the 400 plus fatalities and thousands of injuries and illnesses military and civilian personnel reported in 2000 has far-reaching human costs as well.

The NSC Panel believes that the DoD and the Services can greatly reduce both the human and monetary costs associated with preventable occupational injuries and illnesses and set an example for others by instituting a world-class safety and occupational health management system.

[2] "Disease and non-battle injuries historically have accounted for three-quarters or more of battlefield admissions (69 percent in Vietnam, over 95 percent in World War II and Somalia.)" Force Health Protection, Healthy and Fit Force, Casualty Prevention, Casualty Care and Management; pg. 17

1.1 BACKGROUND

In May 2001 Alan McMillan, President & CEO of the National Safety Council, sent a letter to the Honorable Donald Rumsfeld, Secretary of Defense, suggesting a partnership between the National Safety Council and the DoD. The purpose of this proposed partnership was to work together on critical safety and health initiatives. Mr. McMillan proposed that an expert panel composed of private sector safety and health experts conduct an analysis of the DoD's safety and occupational health management system with the goal of improving the DoD's operational readiness capabilities.

On behalf of Secretary Rumsfeld, Mr. Raymond DuBois, Jr., Deputy Under Secretary of Defense for Installations & Environment, accepted the NSC proposal to conduct a high-level review of the DoD safety and occupational health management systems.

The National Safety Council convened an expert panel composed of industry safety and health executives, government experts, and labor representatives. Staff members of the National Safety Council and military and civilian support personnel with the safety and health community on loan from the Services to the National Safety Council augmented the team.

1.2 PURPOSE AND OBJECTIVES

The purpose of this NSC initiative was to conduct an assessment of the DoD safety and occupational health management systems, identify strengths and weaknesses and make recommendations for improvements. The expert panel's framework is based on best practices within industry and on national and international standards and guidelines.

The analysis seeks to highlight areas where the DoD and the Services currently conform to the best practices for safety and occupational health management systems and to identify priority areas where improvements would ultimately reduce occupational injuries, illnesses and fatalities. The results of this analysis provide the basis for developing specific recommendations and implementation plans for a comprehensive safety and occupational health management system.

1.3 METHODOLOGY AND SCOPE

During the week of August 6, 2001, representatives from the Office of the Secretary of Defense (OSD), Army, Navy, Air Force and Marine Corps presented summaries of their safety and occupational health management systems to the NSC Panel. The Service representatives provided details on their safety and occupational health policies, implementation, accountability, goals, objectives, performance, auditing and data collection. The NSC Panel and support team then conducted interviews with representatives from the Office of the Secretary of Defense and each of the Services to examine the details of their systems.

The Panel conducted brainstorming sessions on DoD's programs, identified best practices, and focused on a number of key functional areas. The NSC Panel and the project support team examined each of these subject areas. In addition to attending the briefings, the combined team reviewed briefing materials, military policy, directives and instructions, and conducted personal interviews with civilian and military staff from the Office of the Secretary of Defense, the Inspector General's Office, and each of the Services.

As part of the review, the Panel Chair offered the line leadership of the Services (Chiefs of Staff and Secretaries) the opportunity to provide direct input to the Panel. Also, NSC staff apprised the staff of the Congressional committees responsible for DoD oversight of the project.

The NSC did not review the implementation of specific programs or conduct systematic site visits. The Panel focused its attention on the safety and occupational health management systems affecting DoD's uniformed, civilian, and contractor personnel. In addition, we looked at the issue of off-the-job injuries and illnesses. We did not analyze the organization and interrelationships between DoD and other components of the total force concept, such as the National Guard and the Reserves; limitations of time and resources necessitated this reduction in scope. The Panel's recommendations to improve DoD safety and occupational health management systems may, however, also be applicable to these other components. Nor did the NSC Panel examine external factors that might influence DoD safety and occupational health performance. For example, a number of people who commented felt that occupational safety and health performance in DoD would improve if the Occupational Safety and Health Act, including sanctions, were applied to DoD. Such a recommendation was outside the scope of this document.

2.0 ASSESSMENT OF DoD's SAFETY AND OCCUPATIONAL HEALTH MANAGEMENT SYSTEM

Within the last decade or so, management system concepts, theories, and practices have been applied to the well-established recognition, evaluation, and control-based practice of Occupational Safety and Health (OSH). This is evident in OSHA's Voluntary Protection Program (VPP), the Chemical Manufacturers Association's Responsible Care program, and numerous International Organization for Standardization (ISO)-based standards around the world. Management system approaches in OSH have matured today to the point where common elements can be found in most, if not all, of the prominent management system approaches.

In the simplest terms, management systems are a way to organize OSH management activities. They contain a body of key activities that have been found to improve OSH performance. They also provide a way to measure OSH performance, particularly when leading indicators are measured. From a systems theory point of view, a system can also be described in terms of four components: inputs, process, outputs, and feedback. It is possible to arrange the components of the major management system approaches in terms of these four system components. Such an arrangement can facilitate an understanding of how the components relate to each other. See Appendix F for definitions of some key components of major management system approaches.

Organizations throughout the world have begun to use these management system concepts in their efforts to improve OSH performance. They have found, as have many of the Panel member's organizations, that these arrangements do lead to improved OSH performance and provide a way to measure improvement.

Based on a synthesis of several of the management system approaches, industry best practices, and findings from the Panel's deliberations with DoD, the following eight areas were assessed:

Leadership	Personnel Involvement
Culture	Acquisitions
Performance Measurement Systems	Contractor Management
Communication Systems	Off-the-Job Safety

2.1 LEADERSHIP

Companies with successful safety and health programs have active senior management participation. Without this active involvement, mid-level managers and front-line supervisors tend to ignore safety and health as an issue.

National Safety Council, "14 Elements of a Successful Safety & Health Program"

Management commitment to occupational health and safety may be operationally defined as: 1) the allocation of sufficient resources for the proper functioning of an OHS program or management system; 2) the establishment of organizational structures whereby managers and employees are supported in their OHS duties; and, 3) a senior management representative, who is responsible for overseeing the proper functioning of the OHSMS, is designated.

Occupational Health and Safety Management System Performance Measurement,
Drs. Charles Redinger & Steven Levine.

DISCUSSION

Organizations that are successful in occupational safety and health have three things in common: top leadership commitment exemplified by regular review of safety and health performance by senior managers; a common and integrated system of collecting loss control data with continuous evaluation of those data; and involvement of employees in the development of continuous improvements in safety and health practices.

Of all the categories considered for review, leadership is perhaps the most important subject area. The term "leadership" embraces all the other focus areas. Leadership promotes the effective use of communication, conveys a set of cultural values, elicits and values employee involvement and makes necessary adjustments based on feedback mechanisms such as performance measures. Leaders demonstrate their commitment by being personally involved and by providing the organizational structure and resources necessary to ensure that goals are met.

It is the collective experience of the NSC Panel that in the best organizations in the private sector, safety and occupational health are integrated programs, and managers have direct access to senior management. In addition, leaders are ultimately held responsible for the occupational safety and health of their personnel.

FINDINGS

Senior leaders within the DoD and the Services have expressed support for safety and occupational health through statements, policies, directives and memos. However, senior leadership in DoD has not taken specific actions that signal personal commitment to safety and occupational health and demonstrate the value placed on safety and occupational health within the organization. As a result, safety and occupational health performance often suffers.

The DoD has not established a rigorous system of accountability for safety and occupational health that is sufficiently tied to performance within the lines of authority at all levels of command, including the individual and unit level. The NSC Panel found little evidence that there is a clear link between safety and health performance and how senior leaders are held accountable. At the same time, responsibility for safety and occupational health is fragmented throughout the DoD and the Services and appears in many cases to be a staff and not a line responsibility.

Safety and occupational health have not been effectively integrated into the overall management system of the DoD. Currently, safety and occupational health follow separate paths and lines of authority within the chains of command. The DoD has also not instituted a system to ensure the continuous improvement of safety and occupational health systems. DoD needs an integrated, cohesive, and comprehensive approach to safety and occupational health that encompasses all units of the DoD.

Within the Office of the Secretary of Defense (OSD), the office that has responsibility for safety and occupational health lacks appropriate resources, access to senior management and the visibility to fulfill its mission of safety and health oversight, advocacy and policy development. One byproduct of this is that the Army, Navy and Air Force Designated Safety and Health Officials (DSHOs) have been primarily involved with environmental projects at the expense of safety and occupational health initiatives.

Nevertheless, the NSC Panel recognizes a number of activities that demonstrate leadership in the safety and health area in each Service. Some examples:

Army

- The Chief of Staff, Army Staff principals and selected Assistant Secretaries of the Army, and the DSHO, are briefed quarterly on the status of the Army Safety Program, including a review of safety performance. The Chief of Staff directs specific actions to improve Army safety performance at these briefings.

Navy

- The Navy has recently established and filled a new position for a Deputy Assistant Secretary for Safety.
- The newly appointed Secretary of the Navy has issued a strong statement emphasizing his personal commitment to safety and occupational health.

Air Force

- The Air Force Chief of Staff and Secretary are briefed on all fatality investigations and review performance measures during weekly staff meetings with other senior staff.

Marines

- The Commandant of the Marine Corps established a Marine Corps Executive Safety Board consisting of commanding generals from operations commands, major bases and supporting organizations. The Board's mission is to provide safety policy and guidance for the Marine Corps.
  - The Marine Corps Safety Office reports directly to the Assistant Commandant of the Marine Corps (ACMC) and is an integrated office, staffed with several safety and occupational health professionals. The ACMC is directly briefed on and actively involved with the accident prevention program.
  - The Marine Corps includes a statement in every Executive Officer's fitness report on safety and occupational health performance within their unit. This integrates accountability for this function into line management.

RECOMMENDATIONS

The Secretary of Defense should take actions to demonstrate that safety and occupational health are core values within the DoD, including:

- Demonstrate a continuing, strong, personal commitment to safety and occupational health within the DoD. As a first step, the Secretary should issue a statement establishing safety and occupational health as core values within the DoD;

- Establish safety and health as an executive-level business responsibility by assigning safety and occupational health management system oversight to an existing committee reporting directly to the Deputy Secretary of Defense. Include safety and occupational health as an integral part of both the Defense Planning Guidance and Medical Planning Guidance systems;
- Ensure that safety and occupational health issues are addressed at the highest levels of the Department and Services and are viewed as an integral component of operational readiness;
- Establish safety and occupational health goals for the DoD and provide a system of accountability for meeting them to line managers throughout the DoD; and
- Ensure that OSD provide oversight and advocacy for safety and occupational health to ensure that Service safety and occupational health program funding is allocated effectively and that programs are effectively implemented.

- Incorporate into DoD's existing individual accountability systems a component for safety and occupational health that is equal in importance to the other components used to evaluate the performance of senior managers of the Department and the Services.

- Provide the OSD safety and occupational health unit with the authority, personnel and resources to meet its responsibility for the policy, advocacy and oversight of safety and occupational health issues within the Department.
  - Ensure that this unit is placed at a level within the Department that allows it to raise safety and occupational health issues to the top levels of the Department management.
  - Structure the Services' safety and occupational health organizations so that they have access to the top levels of the Service.
- Improve management system capability to include comprehensive financial data that provide corporate budget visibility so DoD leadership can advocate for safety and health requirements at all levels.

- Functionally integrate DoD safety and occupational health components so they can better communicate and coordinate their activities. One way to achieve this is to implement the data integration recommended elsewhere in this report.

- Establish a forum that allows for ongoing communication and exchange of lessons-learned and best practices between top-level experts in industry and the DoD.

BEST PRACTICES

DuPont: Leadership with Full Accountability

- The Chief Executive Officer (CEO) sees himself as ultimately accountable for the safety and health of employees.
  - He often reiterates safety and health as a core value.
  - He begins every meeting with a safety message.
  - He sees safety as a competitive advantage in attracting new talent and in differentiating DuPont from its competitors in the markets it serves.
  - He sees investment in safety and health as good business. It is estimated that DuPont saves $4 - $5 for every dollar invested in safety.
- DuPont has a decentralized safety and health management system.
  - The corporate core safety and health group consists of six people who have direct access to the CEO.
  - A safety excellence center of 25 people supports the line organization by managing the safety standards approval process, proposing common safety

solutions for the business units, and compiling statistics and managing the incident tracking system.

- The majority of the safety work occurs at every facility, where:
  - Each plant manager is responsible for the safety and health of the employees at the facility.
  - Each plant manager has a safety and health professional who assists him/her on a tactical level in an internal consulting role.
  - Managers are held accountable for the safety and health performance of their units.
  - Managers with poor safety records are removed from their positions.

Newport News Shipbuilding: Integration of Safety and Health Costs

- An Executive Safety and Health Steering Committee has been formed to raise the visibility of occupational safety and health issues and to review progress toward goals.
  - The Committee is comprised of the Chief Operating Officer (COO), Vice President of Operations, Vice President of Human Resources, Director of Environmental Health and Safety and several operations managers.
  - The Committee meets at least every six weeks solely to discuss employee safety and health issues.
- Safety performance is linked to productivity.
  - The cost of injuries is charged back to the project where they occurred.
  - A department with a high number of occupational injuries does not generally meet its financial goals.
- Line managers are accountable for the occupational safety and health of employees.
  - Managers' performance agreements include financial, quality, productivity and safety goals.
  - Failure to meet safety and health goals adversely affects promotions, bonuses and raises.

Johnson & Johnson: Safety Leadership from the Top

- Safety and health are corporate values embodied in the Johnson & Johnson culture. They are transformed into workplace reality at every Johnson & Johnson company throughout the world.
- The Safety Vision Statement created by Johnson & Johnson Chief Executive Officer, Ralph Larsen, reads: "We are committed to making Johnson & Johnson the world leader in health and safety by creating an injury-free workplace." To attain and hold this leadership position the company affirms that:

  - We hold safety and health as our highest values
  - All accidents and injuries are preventable
  - We operate on the basis of continuous improvement
  - Safety is everyone's responsibility
  - Job training and positive feedback are essential
  - Safety is a key indicator of organizational excellence.
  - We consider safety in every task we perform and in every decision we make
- Executive Committee members champion specific safety processes (i.e. Machine Safety, SAFE Fleet).
- Executive Committee and/or CEO reviews serious injuries/illnesses and incidents with operating company president and worldwide vice president of safety & industrial hygiene.

For more detailed best practices from panel member companies in each of the subject areas, see Appendix D.

2.2 CULTURE

Implementing a systematic approach to workplace safety [and health] will require a cultural change in many organizations, among regulators and within the safety profession. All organizations need to nurture a "safety culture." Company policy and workstation practice must dictate that safety never takes a back seat to other interests. No one should be asked – and no one should tolerate – a potentially disabling or life-threatening risk in the name of cost-cutting, productivity or any other priority.

Safety Agenda for the Nation, National Safety Council

DISCUSSION

Core values of an organization stand the test of time, are not compromised and do not compete with other priorities or need to show a return on investment. Occupational safety and health should be core values consistent with an organization's mission. Leaders instill occupational safety and health as core values by setting specific measurable goals in occupational safety and health, providing the necessary resources, and holding themselves and each organizational level responsible and accountable for achieving results.

FINDINGS

Safety and occupational health are not fully integrated into the cultural value system of the DoD. There is no sense of urgency to improve safety and health performance by reducing existing injury and illness rates. (In fact, rates have essentially reached a plateau over the last few years.) Neither the DoD nor any Service has truly adopted a zero-injury workplace culture. The Services have been unsuccessful in making safety and occupational health a core value within their operational units.

Because the Services do not link safety and occupational health to operational readiness, safety and occupational health are not seen as key parts of the military's primary business. For example, the generally accepted definitions of readiness do not include a safety and health component. The clear link between injury and illness and operational readiness has not been made within the DoD and the Services.

Within the DoD and the Services, safety and occupational health is approached differently for uniformed personnel, civilians and contractors. Although the same standards of care exist on paper for uniformed and civilian personnel, these standards are implemented differently in practice. The DoD expects its contractors to comply with federal regulations but accepts only limited responsibility for the safety and health performance of its contractors. This contrasts with the best practices of leading private sector organizations, which clearly see contractor oversight as the responsibility of the organization hiring the contractor.

Within DoD, the occupational health program operates within a culture that emphasizes treatment rather than prevention. The preventive-medicine community has made great strides in prevention programs aimed at behavior modification (e.g., smoking, alcohol and drug cessation), but more emphasis is needed on prevention when dealing with traditional safety and occupational health concerns. This focus on treatment rather than prevention is apparent in the allocation and distribution of resources, including both personnel and funds.

Cultural change is evident, however, in several areas:

- The Marine Corps safety and occupational health philosophy is consistent with a Corps' slogan: *Marines take care of their own*.[3] "Nothing is so critical as to place the life of a Marine at risk in a training situation." – United States Marine Corps Safety Campaign Plan, August 2000
- Some service training centers are leaders in integrating preventive concepts and preventive medicine into their operations. A few examples are:
  - At Parris Island, occupational physicians developed ways to reduce heat stroke in Marines by using temperature/humidity assessments that govern when training can occur.
  - Preventive medicine review found that placing people according to height during drills dramatically reduced pelvic stress fractures that had caused a number of female recruits to fail basic training.

RECOMMENDATIONS

- The DoD should develop a strategy to clearly communicate that safety and occupational health are core values and are integrated into the primary business practices of the organization. Leadership at all levels of the DoD and the Services should demonstrate by personal action that safety and health is a core value of the organization.

- The Secretary of Defense should adopt a DoD-wide goal of zero injuries and illnesses.

- Senior leadership should incorporate safety and occupational health into the definition of readiness and recognize that the safety and health of military, civilian and contract personnel is an important component of operational readiness.

- The strategy for instituting safety and health as a core value within the DoD and Services should span military personnel, civilians and contractors. Although different

[3] Safety Update to the 32ns Commandants Guidance, Ref (A); General J.L. Jones, Commandant of the Marine Corps; October 2000.

rules and regulations govern each of these groups, the institution of a core value goes far beyond solely following regulations.

- The safety and occupational health and medical communities should use their collective expertise to improve prevention programs to reduce occupational injuries and illnesses.

BEST PRACTICES

DuPont: "The Goal is Zero"

- In 1994 DuPont commissioned a Discovery Team to research why the numbers of safety and occupational injuries and illnesses were rising.
- The team, consisting of senior leaders, line managers and safety and support personnel, created a new level of safety and health expectation within DuPont, "The Goal is Zero."
- Even with some initial management resistance, the company soon began to see a drop in the numbers of injuries and illnesses.
- Culture change was initiated by the team, and worked with the CEO, who drove it from the top. Team members explained the new goal to their peers.
- Through leadership commitment, intensive training, employee involvement and recognition and reward, the zero-injury culture has permeated throughout global DuPont.
- A zero-injury culture is considered a world-class benchmark.

Delphi Automotive Systems: A Culture Shift

- In 1994 the General Motors board of directors commissioned a team to visit Allied Signal, DuPont, Boeing, Alcoa and other best-in-class companies to investigate their safety and health management systems.
- The team found that these companies had several things in common, including:
  - A plant safety and health review board (or the equivalent)
  - Detailed safe operating practices
  - Thorough incident investigation
- The team developed a new safety and health management system and rolled out the process over the next several years.
- Plant safety review board:
  - Is comprised of top union and management leadership, including the plant manager.

- Holds high-level, safety-only meetings once a month. If plant manager can't attend, meeting is rescheduled.
- Oversees development of detailed safe operating procedures.
- Commissioned every department to create a team that would train employees, implement and enforce procedures.

Johnson & Johnson: Creating a Safety Culture in the Field Sales and Service

- In 1995 Johnson Executive Committee decided to design a program to create cultural change within the sales/service force to reduce driving accidents and injuries.
- Each operating company vice-president of sales/service champions a SAFE Fleet team that implements the six-step SAFE Fleet process.
- SAFE Fleet performance is a factor in merit and bonus increases.
- Formal behind-the-wheel training is provided to each sales/service representative every three years
- Formal motivation and recognition programs were created for safe driving performance.

2.3 PERFORMANCE MEASUREMENT SYSTEMS

The ability to measure Occupational Safety and Health performance over time is essential to eliminating occupational injuries and illness, and to verify continuous improvement. To achieve this, the organization should develop performance measures that are consistent with the variables expressed in the Occupational Safety and Health policy and goals and objectives, and measure both preventive ("upstream") and trailing performance indicators.

Occupational Health and Safety Management System Performance Measurement,
Drs. Charles Redinger & Steven Levine.

DISCUSSION

Organizations should collect and analyze data that allow for an assessment of the overall performance of safety and occupational health management systems. Injury and illness data are commonly used in industry to form the basis of performance measures. The best programs use a combination of leading and trailing indicators. Trailing indicators include measures that describe injuries, illnesses, near-misses, or other mishaps that have occurred, while leading indicators measure safety and health activities that the organization is undertaking to prevent injuries and illnesses from occurring.

Organizations should collect data that are beneficial and meaningful to their continuous improvement efforts. The measures selected by the organization should be useful and meaningful to personnel, management and the overall organization, as well as to interested outside parties. Many organizations rely on audits or self-assessments to provide feedback on their occupational safety and health performance.

FINDINGS

The NSC Panel found little evidence of a uniform set of occupational safety and health measures within the DoD. Instead, many measurement systems for safety and occupational health data exist within the Services. For example, definitions for the same measure may vary by Service. Most of the measures used are trailing indicators, such as the number of fatalities, lost-time cases, personal vehicle accidents, on- and off- duty accidents. The NSC Panel found little evidence that any service uses leading indicators as part of their safety and health measurement system. In addition, little or no data are collected on contractor safety and health performance.

Some Services have instituted audit programs that have the potential to raise safety and health performance. However, there is no consistency across the Services or Department in the use of audits or self-assessments and no common understanding of the importance of auditing and the auditing process. Many programs also lack an evaluation system and thus lose the opportunity to identify and correct deficiencies and design more effective interventions.

The Services collect an extensive amount of medical data on active-duty military personnel. The NSC Panel found that medical surveillance data on injuries are not integrated into the safety and occupational health measurement system. Consequently, the DoD lacks the information needed to fully understand the nature of injuries, develop prevention strategies, assess performance against policy goals and improve performance.

The Army Medical Surveillance Activity's (AMSA) Defense Medical Surveillance System (DMSS) operates a comprehensive disease, injury and medical event database and analytical capability for all of the Services. The AMSA identifies and evaluates obstacles to readiness by linking various databases that communicate information that has the potential to affect soldiers' health. The DMSS tracks hospitalizations, ambulatory visits, reportable diseases, HIV tests and results, acute respiratory diseases, health risk appraisals, and longitudinal data on personnel and deployments. The DMSS's primary functions are to analyze, interpret, and disseminate information on the status, trends, and determinants of the health and fitness of America's Army and to identify and evaluate obstacles to readiness.

The NSC Panel believes that the DMSS offers the potential for filling the void on uniformed personnel injury and illness costs. It has the data collection and analytical foundation to prepare executive-level management reports for the DoD. The AMSA collects much hospitalization cost data for uniformed personnel. However, it is neither tasked nor funded to prepare high-level management reviews and is underutilized by the DoD.

Some efforts are underway to improve DoD's safety and occupational health measurement systems:

- The OSD is developing a Web-based reporting system for civilian lost-workday cases for all of the Services.

- The Navy is testing a set of performance measures (leading indicators) for use by all levels of command.

- The Air Force Safety Center has a Web-based reporting system for accidents that could be used as a model for Web-based indicators.

- The Air Force's Environmental Safety Occupational Health Compliance Assessment and Management Program (ESOH CAMP) is an example of an effective audit system that provides wing commanders with reports on the wing's safety and occupational health compliance status.

- The Army Reserve Command's Internet systems use the web to record incidents and conduct analysis.

- The Army's definition of readiness, which includes "deployability," could be used to link safety and occupational health to operational readiness.

RECOMMENDATIONS

- Improve the performance measurement system used by DoD and the Services so that it is uniform, effective, and includes both leading and trailing indicators and allows for goal-setting and tracking. It should also be capable of showing how the injuries, illnesses and fatalities of military, civilian and contractor personnel are linked to levels of operational readiness and mission accomplishment.

- Integrate medical, personnel, financial, safety and health, and mishap data into DoD-wide safety and occupational health data systems.

- Analyze the data to evaluate progress against policy goals and to design intervention programs. Continually benchmark these policies, programs and performance with those of industry leaders.

- Determine the full costs of injury and occupational illness by conducting research to establish the ratio between direct and indirect costs for injury and illness for each Service.

- Task and fund a DoD-wide data center (like the Army Medical Surveillance Activity) to collect and analyze uniform, civilian and contractor injury and illness incident and cost data to support senior management decision making

BEST PRACTICES

Dupont: Leading and Lagging Indicators

- Lagging indicators include lost time cases, OSHA recordable injuries, and process incidents and environmental releases.
  - Incidents are investigated, categorized and recorded.
  - Information enters a corporate data collection system within a specified time frame.
  - The Safety Health Environmental Center creates periodic reports for managers and business leaders.
  - Measures are kept simple to allow easy comparison within DuPont and with other industries.

- Leading indicators are before-the-fact measures, which help managers and leaders understand if there is a higher risk or chance of a future injury or incident.
- Managed at the site level (weekly or monthly) by line managers and safety professionals, four factors are reviewed:
  - Performance of key safety tasks, e.g. number of completed audits, completion of job cycle checks, percentage of audit items closed, etc.

  - Index trends based on prior safety injury and incident performance.
  - Work force morale -- high, medium, low.
  - Level of distraction – e.g. holiday period or weekend, percentage of people in new jobs, community distraction, etc.
- These factors are rated, averaged and used within the site to drive special management actions, or to alert the workforce to be extra cautious.

Newport News Shipbuilding: Built-in Financial Accountability

- Newport News uses a combination of leading and trailing indicators.
- The trailing indicators are:
  - Number of recordable cases
  - Number of lost-time cases
  - Reports submitted by medical clinics that are trained to report numbers
- The leading indicators are:
  - Number of health and safety training hours delivered
  - Quality of accident reports
- The cost of each injury is charged back to the department. Costs include:
  - Wage replacement
  - Medical costs
- High injury costs adversely affect department profitability.

Johnson & Johnson: Leading and Trailing SAFE Fleet indicators

- Series of leading and trailing indicators.
- Key metrics: accidents per million miles driven, percent of fleet in accidents, percent of high-risk drivers
- High-risk drivers within existing field sales and service receive special training and focused coaching by management.
- All drivers receive two commentary (coaching) drives per year conducted and rated by their manager. Used as a leading indicator to prevent accidents in areas where sales representatives need additional training (i.e. following too closely, speeding).
- The following leading indicators are used to identify and eliminate the hiring of high-risk drivers:

  - Vehicle condition and maintenance treated as leading indicator: dents and scratches, poor maintenance indicates potential problems.

  - SAFE Fleet team assessment scores

  - Percent of drivers trained and successful completion of training

- Results – significant reduction in high-risk drivers; over five years fleet grew by 88 percent and the accident rate has been reduced by 39 percent.

2.4 COMMUNICATION SYSTEMS

Arrangements and procedures should be established and maintained for:

a) receiving, documenting and responding appropriately to internal and external communications related to occupational safety and health

b) ensuring the internal communication of occupational safety and health information between relevant levels and functions of the organization; and

c) *ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to.*

Guidelines on Occupational Safety and Health Management Systems,
International Labour Office

DISCUSSION

A well-functioning communication system with defined feedback channels is essential to a successful occupational safety and health management system. For the system to survive and potentially grow, there must be mechanisms that allow system components to receive feedback from each other and from the external environment. In its most basic form a communication system should be able to transmit information to those responsible for the proper functioning of the safety and occupational health management system.

FINDINGS

The DoD and the Services lack a fully integrated safety and occupational health system for receiving, analyzing and transmitting information on safety and occupational health. The Services have procedures, activities and written policies for communicating safety and occupational health information, but this information is poorly communicated up and down the chain of command within and across the Services. The presence of such communication networks is critical to continual improvement. Safety and occupational health functions are separate units in each of the Services, and professionals from the two disciplines rarely collaborate on program performance.

Success stories, lessons-learned in investigations, and service injury and illness data are not shared DoD-wide. The Services could improve the sharing of safety and occupational health information and training from the various centers of expertise. For example, the Navy has a Crane Safety Center in Philadelphia that conducts crane safety training, data collection and root-cause analysis of crane accidents, but the other Services do not use the Center's expertise in their crane work.

Within the OSD, the Prevention Safety Health Promotion Council could be used to share information within the DoD, but this group's focus should be expanded to include safety and occupational health.

There are obstacles to the sharing of successful techniques and lessons-learned among health and safety peers both among and within the Services and with the private sector. For example, there is no DoD-wide safety and occupational health conference, and professionals from the DoD do not regularly meet with their private sector counterparts to benchmark practices and processes.

Although all of the compensation and disability cases administered by the Department of Veterans Affairs (VA) consist of injured, ill, or disabled veterans transferred from the Services, the DoD and the VA have not established an effective channel of communication on safety and occupational health data between the two agencies. Such a channel could provide the DoD with valuable information on the costs, origin, prevention and treatment of occupational injury and disease.

RECOMMENDATIONS

- Establish and maintain a communications management and oversight capability within the designated DoD safety and health units that links the separate service communication networks to each other and across the DoD.
- Establish a clearinghouse to collect and disseminate safety and occupational health information among all the Services. Information to and from the clearinghouse should flow from all levels of the organization, e.g., the service safety centers, hospitals, installations, commands, etc. The clearinghouse, in turn, would share lessons-learned across the DoD and with industry.
- Develop an installation-level award program similar to the Occupational Safety and Health Administration's Voluntary Protection Program, to help communicate the steps necessary to achieve safety and occupational health excellence throughout the Services.
- Establish effective interactions between health and safety professionals across DoD and the Services through regular joint activities. For example, establish a joint annual service safety and health symposium or conference.
- Establish and maintain open lines of communication for the exchange of pertinent safety and health and cost information with the VA and other federal agencies, such as the Department of Transportation.

BEST PRACTICES

Boeing: Communication Up, Down, Across System

- Boeing uses regular meetings – both Web-based and in person – to ensure effective communications both with the company's safety and health professionals and with all Boeing personnel.
- Every Tuesday, the corporate director of safety, health and environment meets with the Process Council, which:

  - Is comprised of the heads of safety, health and environment within each Boeing business unit;
  - Makes safety and health policy decisions; and
  - Communicates policies/plans/goals throughout the organization
- Executive safety councils on each site run safety and health systems.
  - These councils include the site operations director and all of his/her staff; meetings are run by the site director.
  - The councils:
    - Analyze measurement charts
    - Determine whether policies are being executed
    - Search for system improvements
- Crew safety meetings mimic executive safety council meetings.
  - These consist of small working groups, e.g., a group that puts together a wing.
- Web-based communications system regularly sends safety messages to all employees.
- Safety professionals have cross-sectional safety teams that:
  - Encourage interaction/sharing between business units
  - Have subcommittees (e.g., ergonomics, industrial hygiene, physical safety)
  - Make recommendations to Corporate safety office
- Once a year all Boeing safety and health managers meet for a three or four day conference.

Redinger & Associates, Inc.: Communication System Best Practices

- Several communication system trends observed in our management system assessment work follow.
  - The communication system is defined. That is, the organization has given thought to what OSH information needs to be communicated, and how.
  - Examples of information that is communicated: properties of hazardous materials, physical hazards in the workplace (e.g. noise, radiation), audit findings, accident reports, exposure assessment findings, corrective actions, emergency response information, facility evacuation information and contractor-related safety and health information
  - Ways that information is communicated: training programs, signs, labels, electronic mail, bulletin board postings, formal and informal meetings (e.g. daily "tailgate" meetings vs. more formal monthly meetings), Job Hazard Analysis, closed-circuit T.V. systems, informal communication from supervisors to workers.

- Organizations with robust communication systems can demonstrate that senior managers receive, evaluate, and take appropriate actions on OSH matters. Examples include the review of:
  - Information relating to fatalities and serious accidents
  - Audit findings
  - Agency citations
  - Emergency response simulation drill performance
- Organizations find ways to solicit input and participation from employees regarding the communication system. Examples include:
  - Employee input on the development of communication system procedures
  - Employee involvement in training delivery
  - Employee participation in accident investigations

Johnson & Johnson: SAFE Fleet Communications

- SAFE Fleet uses Web-based communications and e-based technology to communicate with drivers every month.
- Formal newsletters and executive communications are distributed every quarter.
- Every six weeks the SAFE Fleet Task Force (the steering group for the program in North America) meets and holds an open conference call for one hour with sales management and representatives company-wide.
- Annually, each SAFE Fleet Team meets at a Champions Conference to share best practices and launch new programs.

2.5 PERSONNEL INVOLVEMENT

The Occupational Safety and Health Administration's Voluntary Protection Program (VPP) requires that employees have at least three active and meaningful ways to participate in safety and health problem identification and resolution. This must be in addition to the process enabling employees to notify management of hazardous conditions and practices and to have issues addressed.

Occupational Safety and Health Voluntary Protection Program Directive

Worker Participation

1. Worker participation is an essential element of the OSH management system in the organization.

2. The employer should ensure that workers and their safety and health representatives are consulted, informed and trained on all aspects of OSH, including emergency arrangements, associated with their work.

3. The employer should make arrangements for workers and their safety and health representatives to have the time and resources to actively participate in the processes of organizing, planning and implementation, evaluation and action for improvement of the OSH management system.

4. The employer should ensure, as appropriate, the establishment and efficient functioning of a safety and health committee and the recognition of workers' safety and health representatives, in accordance with national laws and practice.

Guidelines on Occupational Safety and Health Management Systems
International Labour Organization

DISCUSSION

Companies that are recognized as leaders in occupational safety and health view worker involvement as essential to the success of any safety and occupational health management system performance. Involvement by every person at all levels of the organization is the hallmark of successful private sector safety and health programs. For such programs to be successful, however, management must demonstrate its commitment to safety and health and to personnel involvement. Safety and health performance is improved when the contributions of everyone are integrated throughout the safety and health management system. When all personnel are involved in such systems from their developmental stage through implementation and ongoing program evaluation, they feel a positive sense of ownership in the system and therefore have a greater investment in the success of the program. Programs that do not emphasize and encourage full personnel involvement risk being ineffective.

FINDINGS

The blend of DoD's workforce of uniformed, civilian and contractor personnel magnifies the challenge of stimulating personnel involvement in safety and health. Within the Services, senior leaders view participation primarily as a top-down activity – orders are expected to be obeyed. Personnel involvement in the military occurs primarily in the context of training and the communication of instructions/orders.

The military culture of following orders runs contrary to an environment in which subordinate personnel speak up when they identify an unsafe work practice or are asked to perform an unsafe act. The Commandant of the Marine Corps, General James Jones, addressed this concern in a letter to the Corps: "It takes a bold individual to recommend to the commander that we cancel or halt an evolution. Yet, this aggressive and thoughtful spirit is just the sort of attitude that we expect from Marines in combat."[4]

Many military installations and activities have established safety and health committees or councils that meet regularly to discuss safety and health issues and facilitate the exchange of information between senior management/commanding officer and work units/work centers. Each of the Services has established suggestion programs and award recognition programs for individuals, groups and installations.

RECOMMENDATIONS

- Establish safety and health committees at all levels that involve a cross section of personnel. These committees would serve as the focal point to stimulate new and innovative ways to involve personnel in safety and health programs and to consider such industry practices as:
  - establishing *ad hoc* safety and health problem-solving groups
  - having shop level/work center enlisted personnel participate in audits and worksite inspections
  - having shop level/work center enlisted personnel participate in accident and incident investigations
  - developing and/or participating in improvement suggestion programs
  - training other personnel in safety and health
  - analyzing job/process hazards
  - serving on safety and health committees beyond the activity/installation level

[4] United States Marine Corps Safety Campaign Plan; General J.L. Jones, Commandant of the Marine Corps; Letter from the Commandant; August 2000.

- Increase the visibility of personnel and activity safety and health award/reward recognition systems, consistent with the level of recognition/reward given for operational readiness, battlefield performance, production goals and performance.

- Encourage personnel at all levels of management to make full use of existing systems to identify safety and health problems.

- Establish a mechanism to continually benchmark personnel involvement within the safety and occupational health management system with the best personnel involvement practices in industry.

BEST PRACTICES

Delphi Automotive Systems: Personnel Involvement an Intricate Part of the Process

- Employee involvement is a cornerstone of Delphi Automotive System's safety and health culture change; employee representatives are involved in design process
- Joint union safety and health representatives report to plant managers
- Safety and health programs have as many union as management representatives
- Safety and health trainers (in ergonomics, lock-out, hazardous materials, etc.) are hourly employees that Delphi trained to be trainers

Newport News Shipbuilding: Health and Safety Teams Give Return on Investment

- Labor/management health and safety task teams work to improve health and safety performance
  - Forty health and safety task teams cover entire shipyard
  - Each team has hourly and salaried employees, including union representatives and a manager
  - Each team elects leaders: the leader is often not a manager
  - Teams work toward process improvement
  - Teams conduct root-cause analysis accident investigations
  - Teams conduct weekly inspections, noting improvements needed in equipment, compliance, etc.
- Measured by both leading and trailing indicators, safety and health task teams have produced the greatest return on investment of any aspect of the Newport News health and safety system

Johnson & Johnson: SAFE Fleet – A Team Approach

- Each sales/service organization has a cross-functional SAFE Fleet team.
- Membership includes Vice Presidents of Sales, Directors, Managers and Sales representatives, Safety Professionals, Health & Wellness Professionals and Human Resources representatives.
- Large fleets have regional field safety coordinators (similar to a plant safety rep), representatives that have volunteered to provide additional focus and support to their peers out in the field regarding SAFE Fleet.
- Team implements formal six-step process and is awarded for their process design (using scoring system) and accident/injury reduction.

2.6 ACQUISITIONS

Recognizing the extensiveness of the culture change needed to successfully implement a newly adopted safety through design concept and the hazard analysis and risk assessment procedures integral in the design process, some companies issue policy and procedure statements....that hazards must be identified and addressed early in the design process, and as an integral part of the concurrent engineering program.

...it is necessary for personnel having design responsibilities to consider hazards during the early concept stages when developing new products, manufacturing processes, technology, and facilities that may impact on occupational safety and health...

Safety Through Design, NSC, 1999, National Safety Council, 1999

DISCUSSION

Leading companies incorporate a safety and occupational health review of major acquisitions, starting with initial design, then following through development and implementation. Occupational safety and health is built into the entire life cycle of acquisitions. Occupational safety and health management brings a unique perspective to the acquisition process. The acquisition process requires cooperation with other players in the process to ensure that risks and hazards are identified and managed before design, manufacture or customer use.

Significant results have been achieved in industry by integrating the disciplines of occupational safety and health (OSH) into the acquisition process. An effective strategy for successful integration of OSH into acquisition systems is top-management oversight throughout the process. Investment in safety is most effective early in the design phase.

FINDINGS

The DoD acquisition system is unique. There is no other organization in the world that acquires the same range and complexity of weapons systems, products, and services. The DoD spends billions of dollars annually to replace aging systems.

The DoD has developed an interwoven system to ensure that the Services acquire quality products. The process is driven by the interaction of three basic program management systems: (1) the Requirements Generation System, (2) the Acquisition Management System, and (3) the Planning, Programming and Budgeting System. Each of these three management systems incorporates a management process that defines mission needs, operational requirements and performance capabilities.

Unfortunately, safety and occupational health needs and requirements are often not fully integrated into these management systems, nor is the safety and occupational health perspective adequately represented at major programmatic and milestone reviews. The

DoD and Service program managers who are directly involved with decision making in the acquisition process are often not versed in safety and occupational health concerns. At the same time, the input of the safety and occupational health community is not consistently incorporated into the Requirements Generation System. All too often, the senior managers involved with the milestone reviews assume that safety and occupational health needs have been met and have been adequately addressed in the concept and design phase. Problem recognition often surfaces only after there is a system or equipment failure that results from a safety and health omission.

For the most part, safety and occupational health concerns follow separate paths. Since 1996, DoD Inspector General audits have found weaknesses in how program offices performed Programmatic Environment, Safety, and Occupational Health Evaluations (PESHEs). Despite the requirement for these evaluations during the acquisition process, these reports noted that there is neither a uniform format or consistent review criteria for these documents. A flag level DoD panel (December 2000) also found a lack of consistent communication of safety requirements and lack of integration of safety and occupational health professionals into the acquisition process as well as deficiencies in the relationship between research and development and design safety.

Some examples of positive DoD acquisitions initiatives:

- The Army Manpower and Personnel Integration (MANPRINT) Program integrates occupational health and system safety considerations throughout a system's entire lifecycle. To achieve this integration, the Army Medical Command's Health Hazard Assessment (HHA) Program and Army Safety Program provide support to acquisition programs and teams. The Army's senior leadership attention to these issues is ensured by having health hazard and system safety assessments, required under Army acquisition and MANPRINT regulations, presented and reviewed at each program milestone.
- The Air Force, as the preparing office for MIL-STD-882D, Standard Practice for System Safety, worked with government and industry representatives to tailor it for risk assessment of system safety and occupational health hazards.

RECOMMENDATIONS

- DoD should implement a Department-wide program (similar to the Army's MANPRINT program) that will support the integration of system safety and occupational health considerations throughout a system's lifecycle.
- DoD should reconsider the Services' recommendations regarding the addition of a separate section on system safety in DoD 5000.2-R and the application of MIL-STD–882D to system safety methodology.
- The DoD and Service program managers should include safety reviews as an integral part of the milestone review process.

- Field safety and occupational health professionals should be involved in the acquisition review process, particularly in the Requirements Generation System.
- System safety and occupational health training should be a mandatory part of the Defense Acquisition Management College curriculum for program managers.
- The DoD and Service safety and occupational health professionals should benchmark with industry and exchange information involving safety and occupational health in acquisition processes.

BEST PRACTICES

DuPont: Building Safety and Health into Requirements

- Acquisitions process staff ensures that safety, health and environmental considerations are integrated into specifications or requisitions for purchasing equipment and services.
  - Acquisitions staff is trained always to include safety and occupational health requirements in each contract or purchase order. Accountability is built into the system
  - Line management aids the acquisitions staff with suggestions.
  - Vendors design equipment based on specifications written or reviewed by DuPont.

If a safety flaw is found, steps are immediately taken to rectify the error with a short-term fix combined with a long-term acquisition system or specification improvement.

Newport News Shipbuilding: Using MSDSs to Track Acquisition Hazards

- Safety and health integrated into acquisition process through the hazard communication program.
  - Every product must have a MSDS prior to use **(**no payment made until company receives it).
  - Information transferred to a Web-based hazard communication system.
    - Users in yard access MSDS information on company Intranet.
  - Destructive and non-destructive testing of materials judges:
    - Flammability
    - Toxicity
    - Other elements
  - Testing information and hazard-communication information passed on to users.

2.7 CONTRACTOR MANAGEMENT

One way that an owner can carry out this responsibility (to provide a safe work environment to minimize injuries) is to hire contractors who have a record of good safety performance. This requires attention during the processes of qualifying contractors for bidding work and selecting contractors for a contract award.

Both the contractor and the owner will reap cost savings from better safety performance. Owners can take measures to achieve better safety performance, such as:

- *Provide safety and health guidelines that the contractor must follow.*
- *Require the use of permit systems for potentially hazardous activities.*
- *Require the contractor to designate a responsible supervisor to coordinate safety on the site.*
- *Discuss safety at owner-contractor meetings.*
- *Require prompt recording and full investigation of accidents.*

Owners should recognize that the principles of management control commonly applied to costs, schedules, quality, and productivity are equally applicable to safety and that, if used, will improve safety performance. By showing more concern for construction safety, owners can help reduce injuries and loss of life and the billions of dollars needlessly wasted by construction accidents.

The Business Roundtable: Improving Construction Safety Performance
A Construction Industry Cost Effectiveness Report

DISCUSSION

Frequent outsourcing is now standard practice both in industry and the government. Multi-employer worksites, consisting of multiple contractors and personnel of the contracting organization, are also common, with contractors and organizational personnel working side-by-side. Contractors often have key roles within the organization and can be responsible for critical tasks, which can vary in specialization and level of hazard.

Generally, the host employer is in the best position to ensure that communication and coordination of workplace safety and health is taking place. This is because the host employer often controls the means and methods of work and has specific knowledge of workplace hazards. Contract employers also have a significant role in workplace safety and health. The contract employers may also introduce hazards into the workplace that could endanger the host contractor's employees.

The nation's leading companies accept the responsibility of monitoring contractor occupational safety and health. They do it for a variety of reasons – complying with regulations, maintaining a zero-injury worksite, protecting the bottom line, and maintaining the company's image within the community. Contractor safety is more than a legal or contract issue. It affects the productivity, corporate image and morale of the

worksite. These companies consider the contractor's safety and health record in the bidding process and include the contractor's health and safety data in their measurement system.

FINDINGS

As in industry, the trend within DoD and the Services has been toward increased outsourcing for a variety of services. The multi-employer worksite is generally the rule. Contractors are hired to perform a variety of tasks, including high-risk services such as hazardous materials and munitions shipping, asbestos/lead paint removal, and shipyard maintenance. Contractors often work side-by-side with civilian and military personnel and are increasingly expected to accompany military personnel during deployment.

The presence of multiple employers on a site introduces additional problems and complexities into the communication and coordination of worker safety and health. There needs to be two-way communication between DoD (the host employer) and contract employers, as well as a reasonable allocation of workplace safety and health responsibilities among these employers that takes account of this added complexity.

Contractors deploy into the field alongside the personnel in the Services and are responsible for conducting specialized and hazardous jobs. Injuries and illnesses among these individuals can have an impact on the operational readiness of the deployed unit. Although the contractor has a contractual obligation to fulfill its contract, injuries to contractor personnel can result in added costs, delays, and inadequate performance, and these costs are, for the most part, passed on to the government.

DoD contracting offices often do not take advantage of individual contractor information (e.g., their compliance history and safety record), even though some of this information is readily available.

Significant improvements in hazard prevention and injury reduction have been achieved by including requirements related to safety and health in contract provisions. Similar reductions in injuries and illnesses have occurred when the DoD exercises safety and health contractor oversight.

Management in DoD and in the Services has, for the most part, taken a "hands-off" approach to contractor safety and occupational health. This attitude is consistent across the Services. These managers argue that increased oversight of contractor occupational safety and health programs could increase the government's exposure to liability risks.

The DoD and the Services are consequently unaware of the full financial and other impacts of contractor injuries and illnesses on DoD. Although contract costs are tracked, the direct and indirect costs of on-the-job illnesses and injuries to contractors, the impact of these injuries on military and civilian personnel, and therefore, on readiness, is unknown.

RECOMMENDATIONS

DoD should:

- Take a larger role in rewarding safe contractors and disciplining unsafe contractors. DoD should also take each contractor's occupational safety and health record, performance, and programs into account.
- Develop guidelines for safe contractors and disqualify companies that do not meet these standards.
- Publish guidelines to ensure that contract employees are covered under appropriate military service and activity-level occupational safety and health policies and procedures.
- Strengthen the involvement and clarify the role of DoD safety and occupational health professionals in contractor oversight.
- Include performance measures of contractor accidents in an integrated DoD safety and occupational health information system.
- Include safety and occupational illness performance requirements in all contracts. The DoD and the Services must ensure oversight for these requirements and develop a quality assurance program for contractors' safety and health.
- Continue to benchmark performance with leading companies on a periodic basis. DoD and the Services should establish a mechanism to collect and exchange best practice information among themselves and with industry on a periodic basis.

BEST PRACTICES

Dupont: Holding Contractors To Higher Standards

- Contractors are included in the safety and occupational health management systems.
- Contractors will not make the bidder's list without at least three things:
  - EMR (Experience Modification Rate) of less than one
  - Submitted documentation of the contractor's corporate safety and health program
  - Agreement to obey all applicable laws and regulations, as well as any specialized requirements outlined by DuPont in the contract language and conditions
- Contractor on-the-job lost workday cases are reported to the DuPont CEO and the business Vice President within 24 hours of occurrence (same as is done for DuPont employees).
- Contractor injury and illness metrics are reported monthly to the DuPont Operations Network, a group of senior leaders. These leaders self report, look for trends, and take action if needed. The head of the acquisitions process is a member of this team.
- There are six steps in the DuPont Contractor Safety Process:

1. Contractor Selection
2. Contract Preparation
3. Contract Award
4. Orientation and Training
5. Managing the Work
6. Post-Contract Evaluation

- Contractors perform their own audits. DuPont may oversee these and sometimes participate.
- Unsafe acts by contractors may cause DuPont to shut down the job for an indefinite period of time.
- Contractors who regularly have poor outcomes or are regularly seen conducting unsafe acts are removed from the job and/or removed from a list of approved contractors for a period of time.

Newport News Shipbuilding: Contractor Accountability

- Contractors are held accountable for matching Newport News and OSHA VPP safety and health standards and programs
- To be considered for work at NSS contractors must have:
  - Statistics that show their safety and health rates relative to their industry;
  - Written safety and health programs;
  - Hazard-specific programs (lead, asbestos) for specialized contractors;
  - Accident rates below the respective industry average.
- Each contractor has a trained contractor coordinator, who:
  - Ensures that contractors follow company standards
  - Removes contractor workers from the shipyard who are conducting unsafe work
- Newport News removes unsafe contractors from the yard and removes them from the list of approved contractors.
- Newport News requires contractors' lost-time case rates and total case rates to be reported to the shipyard throughout the time the contractor is onsite.

2.8 OFF-THE-JOB SAFETY

America's safety challenge is also Corporate America's challenge. No matter where an injury or tragedy occurs, your employees lose. They might lose their lives, or the life of a loved one. Or they might lose some of their health or mobility. Or the emotional trauma will affect them in some way for a period of time.

Even if the injury is relatively minor, the process of recovery, or the need to help treat a spouse or child, will likely cause your people to be absent from work. Or if they are at work, they will be distracted and not fully productive. When an injury strikes, your employees lose a part of themselves. And you lose part of your employees.

The fact is that a company is affected in many tangible ways when an injury strikes a member of its corporate family – ways that go well beyond the obvious, and enormous, costs of health care.

Remarks by Alan McMillan, President and CEO, National Safety Council
to the Organization Resources Counselors' Occupational Safety and Health Group
Washington, D.C., August 9, 2001

DISCUSSION

The NSC Panel firmly believes that it is important to incorporate off-the-job safety and health elements in occupational safety and health management systems. Accidents that occur off-the-job have large personnel costs, impact corporate productivity, and may adversely impact delivery of customer services. A total "24/7" safety and health systems approach includes a thorough review of off-the-job injuries and illnesses, analyses of root cause, application of findings and results, and evaluation of the effectiveness of preventive measures.

FINDINGS

Off-the-job fatalities impact operational readiness. They take more service member lives than any other cause – 60 percent of DoD fatalities happen while driving, boating, hunting, or during other recreational activities. For example, the Navy estimates that private motor vehicle accidents cost $131 million between fiscal years 1996 and 2000, and traffic and recreation accidents comprised 73 percent of Navy fatalities between FY1996 and 2000.

Because the Services are responsible for uniformed personnel 24 hours a day, seven days a week, they are in a unique position – much stronger than that of industry – to influence off-duty well being. The military can also influence the future behaviors of uniformed personnel and civilian employees once they leave the Services.

The Services have the ability to capture data for uniformed personnel and their families. Not only does the military have access to data that industry does not have; it also has the capability to analyze these data and develop prevention and intervention programs to address specific problem areas (e.g., drunk driving). Because of their ability to gather and analyze data and their progress in prevention programs, the Services have the potential to be world leaders in the prevention of off-the-job injuries and fatalities.

Throughout the entire safety and occupational health system, however, the Services could more effectively share and benchmark prevention information from one service to another. The existing off-the-job prevention programs also lack military-wide uniformity and analysis for effectiveness. Finally, just as with occupational injuries within the DoD, there is no system to quantify the impact of off-the-job fatalities, injuries, and illnesses and relate them to operational readiness.

The Services are in a singular position to be able to design programs, determine effectiveness and share lessons-learned about reduction of off-the-job injuries, fatalities and illnesses (including injuries to family members and dependents). The military can serve as a laboratory for developing these injury-prevention programs that have applicability to industry.

A military-wide system to reduce off-the-job injuries, illnesses and fatalities could put the U.S. military in a position to be the world-leader in off-the-job injury and illness prevention. Industry – and, in fact, organizations around the world – would benchmark their programs against the DoD system.

Examples of existing programs:

- The U.S. Marine Corps program consists of the following key elements:
  - The Marine Corps uses Code of Military Justice (UCMJ) accountability techniques to induce personnel to exercise proper safety behavior. Traffic safety is covered by a Marine Corps Order that directs the wearing of seat belts and makes non-use a punishable offense.
  - For both traffic safety and recreational safety – Unit Commanders and MCSC managers are encouraged to use Operational Risk Management in the development of their safety programs.
  - HQMC Safety Office sends staff to the field to personally review status of implementation, encourages force commanders to take active role per Commandant's directive and reminds them of consequences for failure to comply.
  - Marine Corps Privately Owned Vehicle (POV) programs implemented at the unit level have reduced off-duty deaths by 50 percent from FY 2000 to FY 2001.
- The Air Force has developed and administers a number of traffic-related and defensive training courses. In addition, installations develop peer-sponsored Drivers Against Drunk Drivers programs and work with community law enforcement organizations and support groups to target at-risk populations.

RECOMMENDATIONS

DoD should:

- Develop and share lessons-learned with off-the-job injury prevention programs among the Services.
- Evaluate the off-the-job injury prevention programs for uniformed personnel and consider ways to extend them to the DoD civilian workforce and military families.
- Quantify the operational readiness impact of off-the-job incidents. As part of existing readiness indicators, include statistics on what percent of the force is not deployable due to off-the-job injuries and illnesses.
- Expand measures to include data collection for off-duty incidents in a consistent fashion for both military and civilian personnel.
- Continue to benchmark performance with leading companies. Establish a mechanism to collect and exchange best practice information about off-the-job injury prevention systems among Services and with industry.
- Increase analysis of medical data on uniformed personnel and their families to develop effective prevention and/or intervention programs to reduce off-the-job injuries, illnesses and fatalities.

BEST PRACTICES

DUPONT: OFF-THE-JOB SAFETY

- DuPont company tracks off-the-job fatalities and lost time injuries that cause employees to miss a day of scheduled work.
  - Categories measured include: slips and falls, sports-related, and motor vehicle related
  - Employee off-the-job fatalities are reported to the CEO and the employee's Vice President and business leader within 24 hours of occurrence
  - Off-the-job lost-time injuries are reported monthly to the corporate operations senior leaders for analysis and potential action. The CEO sees these numbers as part of the same management communication.
- DuPont places significant effort in educating its employee population to "take safety home with you." Examples of education efforts:
  - Home electrical outlet protection
  - Use of personal protective equipment at home
  - Value of healthy diet, exercise and appropriate rest
  - Dangers of falls in the home
  - Seat belt usage and defensive driving techniques

Los Alamos National Laboratory: Off-the-Job Safety as a Core Value

- Zero off-the-job injuries has been adopted as a key Laboratory policy.
- Training, education, and safety meetings include home safety subjects.
- Off-the-job education is integrated into the Ergonomics Program. Education examples include:
  - Defensive driving
  - Healthy lifestyles and preventive care
  - Home electrical safety
  - Field safety
- Sharing of lessons-learned from off-the-job accidents and injuries.
- Community involvement to promote off-the-job health and safety. For example, participation in:
  - Health Fairs
  - Waste disposal assistance
  - Seatbelt and child restraint usage
- The Laboratory is initiating a pilot in reporting/tracking off-the-job lost workday cases

3.0 CONCLUSION

The goal of this NSC cooperative effort with DoD was to improve the DoD's operational readiness capabilities through reduction in the human and financial costs resulting from non-combat injuries and illnesses. The NSC convened a panel of experts from industry, labor, and government to conduct an assessment of the DoD's Safety and Occupational Health Management Systems.

The NSC review identified many DoD programs and initiatives that have a positive impact on reducing work-related deaths, injuries and illnesses. Despite these pockets of excellence, however, the NSC panel found that the DoD lacks an effective department-wide safety and occupational health management system. No overall system ensures continuing improvement in performance. The performance of the DoD in safety and occupational health is, therefore, less than it should be.

The DoD injury and illness rates are only slightly better than average but more than eight times the rates of the best companies. The occupational fatality rate is unacceptable at 16 times higher than these same industry leaders. The total costs associated with DoD occupational injuries and illnesses are largely unknown but are conservatively estimated at anywhere from $10 billion to more than $21 billion annually. Finally, and perhaps most telling, the DoD has almost no knowledge of the impact of these occupational fatalities, injuries, and illnesses on operational readiness.

Many of the NSC panel members commented that the current DoD situation is not unlike the one that their own companies faced about a decade ago. The NSC's recommendations in this report are consistent with the steps that many of the panel member's companies have taken to become leaders in occupational safety and health.

In order for the DoD to take safety and occupational health to the next level of performance, the NSC panel recommends that the DoD adopt a systems approach to improving performance. Such an approach would be consistent with the one that best-in-class companies have taken. It requires top-level leadership commitment, system integration focused on continuing safety and occupational heath performance improvement, and executive level oversight of overall system improvement. This is the formula many of the NSC panel members' companies followed to improve their safety and occupational health performance.

The NSC panel is confident that the DoD can rise to the level of best-in-class companies if it follows the report's recommendations. The NSC panel also felt that DoD is uniquely positioned to provide leadership in "off-the-job" and "family" safety and occupational health issues.

The Department has done well; it is time to do better.

APPENDIX A- LETTER TO HON. DONALD H. RUMSFELD

National Safety Council

May 29, 2001

The Honorable Donald Rumsfeld
Secretary of Defense
Department of Defense
1000 Defense, Pentagon
Washington DC 20301-1000

Dear Secretary Rumsfeld:

I would like the opportunity to meet with you to discuss how we can work together on critical safety and health initiatives. I believe the Council is uniquely qualified to help improve DoD's operational readiness capabilities.

The National Safety Council, founded in 1913, is the nation's leading advocate of safety and health in the workplace, on the highways, and in homes and communities. NSC was *chartered by the United States Congress* in 1953, by PL 83-259 and is the only safety and health organization chartered by the Federal Government. NSC is a nonprofit, non-governmental public service organization whose mission includes the responsibility "…to arouse and maintain the interest of the people of the United States in safety and in accident prevention…"

We have a network of 50 affiliated chapters, encompassing 37,500 member companies, unions, and associations. These members include the largest, technologically advanced corporations in the Fortune 500. Together, our world-class members and professional staff determine best practices in safety and health. A team of our innovative leaders is available to assist you.

Last year, DoD experienced over 450 deaths to civilians and military personnel. Besides the human tragedies, DoD has experienced loss of operational capability due to injuries and fatalities to your soldiers, sailors, aviators and marines. In addition, the economic impact of civilian injuries alone has exceeded $3 billion in workers' compensation costs over the last five years. The National Safety Council can help you to reduce these human tragedies, loss of operational capability and economic impact.

We would begin with a quick, executive assessment of DoD safety and health programs conducted by our executive team. I look forward to discussing this proposal with you. We

could begin in July and brief you in August. Then we could meet with your safety officials at our National Safety Congress in September to discuss the next steps.

I will follow-up with your office in the next few weeks to discuss how the National Safety Council can assist you and the Department of Defense. I look forward to speaking with you then.

Sincerely,

Alan C. McMillan
President & CEO

APPENDIX B- LETTER TO NATIONAL SAFETY COUNCIL

OFFICE OF THE UNDER SECRETARY OF DEFENSE
3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

ACQUISITION,
TECHNILOGY
AND LOGISTICS

Alan McMillian, President & CEO
National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143-3201

JUN 26 2001

Dear Mr. McMillan:

On behalf of Secretary Rumsfeld, I am responding to your letter of May 29, 2001 offering an executive assessment of the Department of Defense (DoD) safety and health program. The safety and health of our military, civilians and their families as well as our contractors are very important to the Secretary and to the readiness of the Defense Department.

We appreciate the fact the National Safety Council is Congressionally chartered by PL 83-259 as a non-profit service organization for accident prevention with a membership of major corporations, unions, and other associations. Over the years, various DoD installation safety offices have used your expertise. This administration desires to learn from industry successes.

We agree with your proposal to conduct your review in July, outbrief the appropriate individuals in August and meet with our Service Safety Officials in September at the National Safety Congress. We understand this review is to be at no cost to DoD.

The Installations and Environment staff will arrange for an introductory meeting between our key directors and your team. The point of contact is Mr. Curtis Bowling, who can be reached at 703-604-1624 or by email at Curtis.Bowling@osd.mil.

Sincerely,

Raymond F. Dubois, Jr.
Deputy Under Secretary of Defense
(Installations & Environment)

APPENDIX C - BIOGRAPHICAL SKETCHES OF PANEL MEMBERS

Jerry Scannell
President and Chief Executive Officer (Emeritus)
National Safety Council
Panel Chair

Jerry Scannell joined the National Safety Council as President in 1995 and brings more than 30 years of government and private sector safety and health experience.

During 1992-1994, he served as Vice-President of Worldwide Safety Affairs at Johnson & Johnson in New Brunswick, New Jersey and also served as Director of Corporate Safety, Fire, and Environmental Affairs from 1979 to 1989.

In 1989, Mr. Scannell was nominated by President George Bush to serve as Assistant Secretary of Labor for the Occupational Safety and Health Administration (OSHA).

Mr. Scannell graduated from the Massachusetts Maritime Academy with a Bachelor of Science degree and completed postgraduate training in epidemiology and environmental economics at George Washington University.

Leo Carey
Director, Government Services
National Safety Council

Mr. Carey received a BS in Chemistry from Allentown College and an MS in Occupational Health from Temple University. He pursued additional graduate studies at the Pennsylvania State University.

As Director of Government Services, Mr. Carey is the central liaison between the National Safety Council (NSC) and the various branches of the U.S. government. In this role, Mr. Carey is responsible for developing policy and business opportunities with the government for the NSC. Mr. Carey is responsible for coordinating the process for the development of NSC policies. He also serves as liaison for the NSC with other safety and health organizations.

Prior to coming to the National Safety Council, Mr. Carey was part of several significant projects on domestic and international occupational safety and health. In 1995 he served as team leader for the team that developed the "New OSHA" document, which became the blueprint for the Occupational Safety and Health Administration under the Clinton Administration. Mr. Carey was appointed by the governing body of the International Labor Organization to serve as Chairman of the Eleventh Session of the Joint ILO/WHO Committee on Occupational Health in Geneva, Switzerland, reviewing worldwide occupational health development. He also served on an ANSI International Advisory Committee Task Force on Occupational Health and Safety Management Systems. He currently serves on the ANSI Z10 Accredited Standards Committee on Occupational Health and Safety Systems. For nine years he was OSHA's Director of Field Programs, providing direction to OSHA's regional offices. Mr. Carey is a member of the American Industrial Hygiene Association and the American Conference of Industrial Hygienists and is certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.

Karl L. Bossung
Corporate Manager, Health and Safety
Delphi Automotive Systems

Karl Bossung began his career with General Motors as a Cooperative Education Student in 1974. After graduating with a Bachelors Degree in Business Administration from General Motors Institute in 1979, he was promoted to Manufacturing Supervisor at the General Motors, Central Foundry Division, Saginaw Malleable Iron Plant in Saginaw, Michigan. Mr. Bossung spent the next 10 years in various manufacturing assignments ranging from skilled trades to production and quality. He was then promoted to Salaried Personnel Administrator in 1987, which included the oversight of all health and safety activities for the foundry.

In 1991, Mr. Bossung was transferred to the UAW-General Motors, Human Resource Center for Health and Safety as a Program Manager and Staff Assistant. In this assignment, Mr. Bossung was responsible for all Health and Safety program development at UAW represented General Motors facilities. In 1992, Mr. Bossung was promoted to Coordinator and Senior Staff Assistant at the Health and Safety Center with the responsibilities of supervising and coordinating the management staff of safety professionals. He held this position for the next three years.

In 1995, Mr. Bossung was promoted and appointed to the newly created position of Manager, Health and Safety, for Delphi Automotive Systems, a division of General Motors. In 1999, when Delphi separated from General Motors, Mr. Bossung was promoted to the new position of Corporate Manager, Health and Safety, Delphi Automotive Systems, the position that he holds today. In this position, Mr. Bossung is responsible for coordinating all safety activities in Delphi locations around the world.

Mr. Bossung is a charter member of the National Safety Council's Occupational Health and Safety Advisory Board and has recently been nominated for a position on its Board of Delegates. Additionally, Mr. Bossung has been elected to a position on the Automotive Industry Action Group's (AIAG) newly created Occupational Health & Safety Steering Committee.

Ernie O. Clayton
Director, Safety, Health and Environmental Affairs
The Boeing Company

Ernie Clayton was appointed Director for Safety, Health and Environmental Affairs (SHEA) in August 1998. In this assignment, he is responsible for overall policy and management of The Boeing Company's efforts related to employee safety and health, energy and the protection of the environment.

Before his current assignment, Mr. Clayton served as the SHEA Director for the Boeing Commercial Airplane Group (BCAG), the company's largest product division.

He joined the Boeing Company in 1980 as Safety Manager for Boeing Engineering and Construction. He was Safety Manager for Boeing Helicopters in Philadelphia, PA from 1984 to 1989, and Safety Manager and SHEA Director at the Commercial Airplane plant in Everett, Wash. from 1989 to 1996, when he became SHEA Director for BCAG.

A native of Torrance, CA., Mr. Clayton earned a Bachelor of Science in Chemistry from California State College at Fullerton. He currently serves on the Board of Directors of the Evergreen Safety Council.

Michael N. Ferrara Jr.
Manager, SAFE Fleet – North America
Johnson & Johnson

Michael has 13 years of experience in the field of occupational safety and health. He has held positions with the Connecticut State Police in the Public Safety and Transportation Group and the University of Connecticut Health Center in the Radiation Safety Department. Over the last 10 years, he has held positions within Johnson & Johnson in the areas of safety and industrial hygiene and operations.

Over the last five years he has specialized in the area of fleet safety within the sales/service organizations at Johnson & Johnson. In his current position, Mr. Ferrara and his team manage the overall SAFE Fleet program in North America. He has responsibility for 27 Johnson & Johnson operating company SAFE Fleet Teams and over 10,000 field sales/service representatives. He is a member of the Somerset County Business/Education Partnership where he teaches basic management techniques and key job performance skills to students entering the workforce.

A native of Ansonia, CT., Mr. Ferrara holds a B.S. in Safety Engineering and a B.S. in Manufacturing Engineering.

Deborah L. Grubbe, P.E.
Corporate Director – Safety and Health
DuPont

Deborah Grubbe is Corporate Director – Safety and Health for DuPont. She is accountable for leading new initiatives in global safety and occupational health for the $27 billion corporation. Ms. Grubbe was formerly the Operations Director for two of DuPont's global businesses, where she was accountable for manufacturing, engineering, safety, environmental and information systems. She has 24 years of experience in five of DuPont's 20 Business Units. Ms. Grubbe is also a past director of DuPont Engineering's 700 person engineering technology organization. Her 15 different assignments range from capital project implementation through manufacturing management and human resources.

Ms. Grubbe currently serves on the National Institute of Standards and Technology Visiting Committee for Advanced Technology. She also serves the National Academy of Sciences as a member of the oversight committee for the Demilitarization of US Chemical Weapons Stockpile. Ms. Grubbe sits on the Board of Directors of the Engineering and Construction Committee of the American Institute of Chemical Engineers, and is on the Business Management Advisory Committee of Wilmington College. She is the former co-chair of the Benchmarking and Metrics Committee of the Construction Industry Institute, and currently serves as a member of its Fully Integrated and Automated Project Processes committee. She is currently a member of the Purdue University School of Chemical Engineering New Directions Executive Committee. Ms. Grubbe was the first woman and youngest elected member on the State of Delaware Registration Board for Professional Engineers (1985-1989). During her tenure on the State Board, she was the Chair of the Law Enforcement and Ethics Committee. She is active with the Society of Women Engineers, and is a former board member of the Women in Engineering Program Advocates Network (WEPAN). Ms. Grubbe has been featured in the books "Engineering Your Way to Success" and "Journeys of Women in Science and Engineering – No Universal Constants." She is one of the named supporters of Engineer's Week, 2002, "Introduce a Million Girls to Engineering" initiative.

In 1994, Ms. Grubbe was named an outstanding Chemical Engineering Alumna by the Purdue University School of Chemical Engineering, and is a recipient of the 1986 Trailblazer Award from the Delaware Alliance of Professional Women. She is a recent recipient of the Purdue Engineering Alumni Association Service Award.

Ms. Grubbe was born in suburban Chicago and graduated with a Bachelor of Science in Chemical Engineering with Highest Distinction from Purdue University. She received a Winston Churchill Fellowship to attend Cambridge University in England, where she received a Certificate of Post Graduate Study in Chemical Engineering. She is a registered professional engineer in Delaware and is the engineer of record for DuPont. She is married to James B. Porter, Jr., and resides in Chadds Ford, Pennsylvania.

J. Lee McAtee
Deputy Director of Environment, Safety & Health
Los Alamos National Laboratory

Lee McAtee has undergraduate degrees in Health Physics and Psychology and a Master of Science degree in Radiology and Radiation Biology from Colorado State University. In the mid-1970s, Mr. McAtee worked as a radiation protection specialist for a variety of companies in the nuclear industry. Since 1980, he has worked at the Los Alamos National Laboratory, where he served as a staff health physicist and manager of radiation protection. Since 1996, Mr. McAtee has been the Deputy Director of the Environment, Safety, & Health Division. This 800-person organization provides leadership, expertise, and support throughout the Laboratory in all ES&H disciplines, including health physics, industrial hygiene and safety, occupational medicine, nuclear safety, hazmat response, and environmental protection.

In his current role, Mr. McAtee has helped lead the Laboratory's development and implementation of a new integrated safety management system that has resulted in dramatic improvements in ES&H performance, including more than a three-fold reduction in recordable injuries and more than a four-fold improvement in environmental violations during the past few years.

Mr. McAtee is active in the Health Physics Society, where he has served as President and Director of the Rio Grande Chapter and is currently a nominee for Board of Directors of the national society. He has also participated in numerous ES&H reviews throughout the Department of Energy (DOE) complex, holds patents for development of several radiation monitoring techniques, taught health physics at the University of New Mexico, Los Alamos Branch, served as a senior advisor to the DOE Radiological Assistance Program, and participated in or chaired a number of American National Standards Institute (ANSI) committees.

Jacqueline (Jackie) Nowell, MPH, CIH
Director, Occupational Safety and Health Office,
United Food and Commercial Workers International Union (UFCW)

Jacqueline Nowell joined the UFCW in 1990. She is currently Director of the Occupational Safety and Health Office for the Field Services Department.

A Certified Industrial Hygienist, Ms. Nowell earned her Masters in Public Health at the University of California, Los Angeles. She previously served as Assistant Professor, Environmental and Occupational Health Sciences Division, Hunter College, CUNY; and Staff Industrial Hygienist, New York Committee for Occupational Safety and Health, a coalition of labor unions that provides technical assistance and training on occupational safety and health to member local unions.

Charles F. Redinger, CIH, MPA, Ph.D.
Principal, Redinger & Associates, Inc.

Charles Redinger is a principal with Redinger & Associates, Inc., in San Rafael, California. Since the early 1990s, he has been at the forefront of environmental health and safety management system and performance measurement research and methods development. He works for a wide range of public and private sector organizations in their efforts to improve environmental health and safety performance.

He has a Ph.D. in Industrial Health from the University of Michigan, a Master's Degree in Public Policy from the University of Colorado and a BA in Chemistry from the University of California at Santa Cruz. He is a member of the Public Policy honor society Phi Alpha Alpha, and has been a Kemper Fellow in Public Health and an Erb Fellow in Environmental Management. He is a Certified Industrial Hygienist (CIH) by the American Board of Industrial Hygiene.

He writes and teaches extensively on EHS performance improvement and system implementation. Most recently, he was a co-editor of a performance metrics book and is the author of a management system assessment instrument. His research activities continue with colleagues at the National Institute for Occupational Safety and Health, the University of Michigan, and Loma Linda University on management system effectiveness, validation, as well as occupational exposure assessment.

Dr. Redinger has worked for several international organizations on the development of EHS policies and standards. He is a technical advisor to the International Labour Office in their development of an international occupational health and safety management system, as well as the ANSI Z-10 Committee in the development of a similar American standard.

Knut Ringen, Dr., P.H., M.H.A., M.P.H.
Principal, Stoneturn Consultants

Dr. Knut Ringen is a principal with Stoneturn Consultants in Seattle, specializing in environment, safety and health risk management, workers' compensation and group health insurance. He also is managing member of The Risk Advisors, LLC in Washington D.C.

He was executive director of the Laborers' Health and Safety Fund of North America 1987-92, and director, The Center to Protect Workers' Rights, 1992-97. He served as Chairman, National Advisory Committee on Construction Safety and Health from 1993 to 1997.

Among many honors, he is elected to the European Academy of Sciences and Arts and the Collegium Ramazzini. He specializes in the development of research and service programs with an emphasis on workers and other special populations, and has been instrumental in developing many health programs that have achieved national significance. He has lectured extensively throughout North America, Europe, Asia and South America. He is an author or editor of more than 80 scientific publications, including *Occupational Medicine State of the Art Reviews: Construction Safety and Health*, Hanley and Balfus, Philadelphia, 1996 and *Chapter 93: Construction, Encyclopedia of Occupational Health and Safety, 4th Edition*, International Labor Organization, Geneva, 1997.

He has focused extensively on the use of data to characterize the construction industry, develop industry-wide safety and health objectives and programs, and evaluate the industry's safety and health performance, including the role of compliance inspections.

He received the Doctor of Public Health degree from Johns Hopkins University for his research on the development of health policy. He also holds a Master of Hospital Administration degree from the Medical College of Virginia and a Master of Public Health degree from Johns Hopkins University.

Rosemary K. Sokas, MD, MOH
Associate Director for Science
National Institute of Occupational Safety and Health

Rosemary Sokas, MD, MOH, is the Associate Director for Science at NIOSH and adjunct professor of medicine at George Washington University. She received her MD from Boston University School of Medicine and her Master's of Occupational Health from the Harvard School of Public Health, and is board certified in internal medicine and in preventive medicine (occupational).

Dr. Sokas previously directed the Office of Occupational Medicine at OSHA. She has served as full-time faculty at the George Washington University, where she directed the Occupational Medicine Residency Program and the Institute for the Environment, and at the University of Pennsylvania, where she coordinated occupational health consultation programs and directed the Philadelphia VA hypertension clinic.

Her research publications include health care worker safety, medical education, lead toxicity, and the effects of occupational exposures on blood pressure. She is the co-team leader for the National Occupational Research Agenda Priority Team focusing on Special Populations at Risk. She has served on an Institute of Medicine committee evaluating the primary care provided to Persian Gulf veterans, and served as a member of the Armed Forces Epidemiology Board from 1996 to 2001.

Jim Thornton
Director of Environmental Health and Safety
Newport News Shipbuilding

Jim Thornton is the Director of Environmental Health and Safety at Newport News Shipbuilding. He holds a Bachelor of Science degree in Aerospace Engineering from Auburn University and a Master of Science degree in Industrial Hygiene from Texas A&M University. Mr. Thornton began his career with NNS in 1976 as Manager of Industrial Hygiene. In a restructuring move, he next served as Manager, Health Safety & Environmental. His current position of Director, which he has held since 1993, includes responsibility for the Medical Department and Workers' Compensation as well as Environmental, Industrial Hygiene and Safety.

From June 1999 – June 2000, Mr. Thornton served as President of the American Industrial Hygiene Association. The organization is the world's largest association of occupational and environmental health professionals who come from government, labor, industry, universities and private business. AIHA has 12,000 members, an annual budget of $12 million and members' equity of $8 million.

At NNS, Mr. Thornton directed efforts and programs to obtain "STAR" status in the OSHA Voluntary Protection Program. NNS is the largest site and the only shipyard in the program. In addition, the Environmental and Workers' Compensation programs have won awards acknowledging their excellence.

Richard J. Waxweiler, Ph.D., M.S.I.E.
Director, Division of Acute Care, Rehabilitation Research, and Disabilities Prevention and
Acting Deputy Director
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention

Richard Waxweiler received Bachelor's and Master's degrees in engineering from the University of Michigan and a Doctorate in epidemiology from the University of North Carolina. His career at the Centers for Disease Control (CDC) began in 1971 as an epidemiologist/industrial hygienist at the National Institute for Occupational Safety and Health (NIOSH), where he led a research staff that focused on the identification and control of occupational carcinogens. Afterwards, he investigated radiation-related health effects while at the Los Alamos National Laboratory and toxic waste site health effects for the National Center for Environmental Health at CDC.

Dr. Waxweiler joined the injury control program at CDC in 1985, where he first directed the Epidemiology Branch. As Special Assistant for Scientific Affairs for the injury program, he led the development of the National Agenda for the 1990s and National Plan for Injury Control. He has directed DACRRDP/NPIPC since its creation in 1993. He has authored/co-authored more than 80 papers in occupational/environmental/injury epidemiology and has been active in the American Public Health Association where he served as Chairman of the Injury Control and Emergency Health Services Section, and in the Association for the Advancement of Automotive Medicine and Brain Injury Association of Georgia as a board member.

APPENDIX D – BEST PRACTICES

2.1 LEADERSHIP

DuPont: Leadership with Full Accountability

DuPont is a $27 billion company with 90,000 employees. Approximately half of these work outside the United States. The company operates in 70 countries and has 210 manufacturing and processing facilities with 40 research and development and customer service labs in the United States, and more than 35 labs in 11 other countries. DuPont delivers science-based solutions in markets such as food and nutrition, health care, apparel, home and construction, electronics and transportation.

The ultimate responsibility for safety and health at DuPont rests with the chief executive officer. The CEO begins every meeting by reinforcing the safety message and often reiterates that safety is one of the organization's core values.

Everyone in the core corporate safety, health, environment group of six has direct access to the CEO. The bulk of the work for running the world-class safety and health management system is decentralized. A safety excellence center with 25 people compiles statistics and manages the incident tracking system, manages the standards approval process and proposes common safety solutions for the business units. The center is funded and paid for by DuPont's businesses. The businesses use center services to help meet goals.

At a regular operations network meeting of manufacturing and engineering leaders, safety is always the first topic of discussion. The leader of the 25-member group is the Vice President of Operations for DuPont, who reports directly to the CEO.

If a major incident has occurred, the group will often spend a majority of the meeting talking about safety. The team member who is accountable for the site where the incident occurred stands before the group and explains what happened, why it happened, and what actions will be taken to prevent it from occurring in the future. As of the printing of this report, DuPont has not had an employee fatality in more than 3 years.

The leader of each DuPont facility, usually the plant manager, has responsibility for safety and health at the facility level. Each plant manager has a safety and health manager who assists the manager on a tactical level.

Managers are held accountable for safety and health performance. DuPont has found that when safety performance is poor at a plant, production, quality and labor relations are also suffering. Managers with poor safety records are usually removed from their positions, because DuPont leaders consider the poor safety record an indication that the manager is not using management systems appropriately.

One of the reasons safety at DuPont has strong management support is that the company considers safety to be a good investment – they save four or five dollars for every dollar they spend on safety. The results: in 1999, DuPont's worker's compensation costs were $9 million for 50,000 employees – one of the lowest in the country per employee.

Another example: DuPont's construction management group, which builds facilities and conducts major maintenance globally, controls 12,000 to 15,000 contractor workers for capital projects. The company pays $12 million for 100 people who manage construction contractors and ensure they are following the DuPont safety and health culture. Partly as a result of this group's work, DuPont's workers' compensation rate for contractors is extremely low – $21 million less than the yearly industry average.

DuPont leadership shows commitment to safety not only by investing money, but also by being willing to stop production at a plant. If two or three OSHA recordable injuries happen within a short period of time, many plants will hold "stop the music" meetings.

The entire production process shuts down and everyone in the plant goes into a safety meeting, where small groups talk about what has happened and work to find solutions that will prevent further incidents. The company philosophy is that the money lost during the production stoppage will be more than recouped in savings from injury prevention.

Newport News Shipbuilding: Injury Costs Integrated Into System

Newport News Shipbuilding is a $2 billion company with 17,000 employees based in Newport News, Virginia. The company constructs and repairs a full complement of naval and sub-surface vessels as well as commercial vessels.

At Newport News Shipbuilding, leaders continually show their commitment to safety in both big and small ways. Leaders make routine safety visits throughout the shipyard, always wearing personal protective equipment. The higher the level of the manager making the visit, the more attention the visit receives. At each level of the company, the managers have responsibility for safety and health.

Three years ago Newport News formed an executive safety steering committee to raise visibility of safety within the company and review progress toward goals on a high-level basis. The company sees the committee as a valuable way to show leadership commitment within the company. The committee, comprised of the COO, Vice President of Operations, Vice President of Human Resources, Director of Environmental Health Safety and several of the operations managers, meets at least every six weeks to discuss safety.

Additional meetings are called on a case-by-case basis – responding to a serious accident or new safety-related legislation, for example.

The group monitors progress against specific company health and safety goals, and determines where program adjustments are needed. If the goals are not being met, the

group discusses problems and solutions. Each group member has the power to take actions.

Another way leaders show commitment is through resources commitment. At the corporate level, safety and health has its own budget. This budget pays for the corporate safety and health staff as well as equipment such as sampling pumps and test kits.

Line operators don't have a separate safety and health budget. Ergonomic corrections to machines, for example, come out of general maintenance budgets.

A leadership commitment that safety is equal in priority to productivity ensures that management feels those expenditures are necessary and prudent.

To ensure accountability within the company, each manager has a performance agreement. This agreement includes goals for each manager in financial progress, productivity, quality etc. Each manager's performance agreement includes health and safety goals. If the manager does not meet health and safety goals, promotions, bonuses and raises are adversely affected. The CEO also has a health and safety target for the company for which he is responsible.

Costs of injuries are charged back to the project where they occurred, so the head of a department with high injury rates is held financially accountable for safety performance along with production levels and quality goals. (See Performance Measurement section for more details on the system.)

2.2 CULTURE

Dupont: The Zero-Injury Culture

In 1994 DuPont noticed that safety numbers were deteriorating. The DuPont CEO commissioned the Discovery Team, which created a new safety and health process and said the goal of the process would be zero occupational injuries and illnesses for the company.

Although there was some management resistance to the zero-injury goal – a few managers felt the goal would be impractical and impossible – the company saw an immediate drop in safety numbers.

The culture change was initiated by a team and driven from the top. A cross-section team of corporate leadership, plant management and safety leaders began telling their constituents within DuPont about the zero-injury goal. Through leadership commitment, intensive training and employee involvement, the 0-injury culture permeated through every level of the company and is now treated as a benchmark in safety and health by organizations all over the world.
The new culture has dramatically reduced significant incidents at DuPont. From a level of more than 100 significant incidents annually in the early 1990s, the company had only

one distribution incident and zero process and environmental incidents in 2000. The businesses are now focused on reducing the less severe incidents to zero.

The zero-injury goal affected other areas of the company as well – people began asking if the company could also set a zero-goal in sexual harassment, off-the-job injuries, ethics violations, environmental releases and transportation.

Delphi Automotive Systems: A Culture Shift

Delphi Automotive Systems is a $29.2 billion mobile electronics and transportation components and systems manufacturer with approximately 200,000 employees working on 196 wholly-owned manufacturing sites, 43 joint ventures, 53 customer centers and 32 techical centers in 43 countries.

In 1994, when Delphi Automotive Systems was still part of General Motors, Paul O'Neill, Secretary of the Treasury, was on the General Motors board. At the time, Secretary O'Neill was also CEO of Alcoa.

At one of the board meetings a leader profiled GM's safety record. Mr. O'Neill pointed out that the automotive industry had one of the worst records for safety and health of any industry in the country: thus GM was only the best of the worst.

Mr. O'Neill inspired the board members to begin to benchmark against the country's leading companies in safety and health. The General Motors board of directors commissioned a team of 10 people, including senior executives of manufacturing, several union representatives, several safety and health managers and representatives from legal and finance departments, to visit Allied Signal, DuPont, Boeing, Alcoa and others.

After extensive visits and investigation, the team decided the safety and health management systems of best-in-class companies had several things in common including: a plant safety review board (or central safety committee), detailed safe operating practices, thorough incident investigation and safety observation tours. The Delphi and union team took those four elements and created a new joint leadership process.

At each of Delphi's 196 manufacturing sites throughout North America, South America, Asia Pacific and Europe, the company rolled out this leadership process over the next several years.

The plant safety review board acts as the overall safety steering committee for a site. Ad-hoc committees on ergonomics, falls, lock-out, etc…report to that board. The board is comprised of the site's top management and union leadership.

The plant safety review boards are charged to hold stand-alone, high-level meetings at least once per month for one to two hours. If the plant manager can't attend, the meeting is rescheduled.

The boards also oversaw the development of detailed safe operating procedures and commissioned every department at each site to create a team, who would train employees, implement procedures and enforce them.

Next, Delphi began conducting a thorough root-cause analysis of every injury. In the past, Delphi's accident investigations had often blamed the employee; thus the investigations did not reach the real root cause. Delphi decided that the real root cause could seldom be employee fault or human error. Within the hierarchy of health and safety controls, the new accident investigations were not permitted to cite warning signs, training or personal protective equipment as the sole correction to a root cause. The solutions should either be elimination or substitution of a hazard.

For example, if an employee cut his hand on a part while not wearing a glove, the root cause of the incident would not be that the employee failed to wear the glove, but that the part had a hazard, a sharp edge or burr. In the past the company would discipline, counsel and reinstruct the employee in wearing the required personal protective equipment. The solution within the new process would be to eliminate the sharp edges on the part the employee handles.

Finally, every month, every level of leadership on a site conducts safety observation tours. Previously, leaders often visited the shop floors but never conducted safety-based tours.

Instead of chastising incorrect behavior, the leaders now praise employees following safe operating procedures. The employees who consistently follow the safe procedures are picked to train new employees in safe behavior.

If the managers observe problems on the tours, they document the problem, find a corrective solution and assign someone to implement the solution and follow-through to check that the solution occurred.

Initially, the safety observation tours met with resistance. Managers felt that the tours were a waste of their valuable time and some employees felt the managers were spying on them. The union expressed concern that the tours would be used to discipline employees. Management agreed that the tours would not be used in the disciplinary process and the unions accepted them. Now the safety observation tours are considered a crucial and valuable part of Delphi's safety and health management system.

The culture change at Delphi is an ongoing process. It began in 1994. In 1995 leaders touted the change throughout the organization. After several months of "waving the flag for safety" they began to implement the change. The company is now in phase 2 of the 3-phase operation.
Even though the safety culture change is not complete, the company has seen definitive results. Since 1993, Delphi has reduced lost-workday cases by 89 percent. Since 1993 Delphi's total OSHA recordables have dropped 86 percent, which means 28,500 fewer recordable injuries each year.

The safety and health culture change at Delphi has increased the company's competitive advantage, improved employee loyalty, improved public image, lowered costs, improved quality and improved management relationship.

Johnson & Johnson: Dramatically Reducing Work-Related Driving Accidents

In 1995, the Johnson & Johnson Executive Committee decided to create a culture change within their field sales and service organization to reduce motor vehicle accidents and injuries. The Executive Committee appointed the member responsible for the Pharmaceutical Franchise as program champion. The champion was responsible for creating the culture change, funding programs and making sure the program received high-level visibility and support from senior management.

He formed a corporate SAFE Fleet Task Force, and they developed a comprehensive 16-step process, which recently has been improved and streamlined to six steps. The Task Force set goals for the year, benchmarked against other companies, conducted baseline assessments and instituted systems to collect and report metrics and develop recognition and incentive programs.

Each operating company vice-president of sales sponsors a SAFE Fleet team, and each team follows the six-step process. There are currently 27 SAFE Fleet teams. The process includes senior management involvement, field management involvement, team performance, driver training, motivation and recognition systems, and safety and health. Each team is formally assessed every two years on program progress and accident and injury reduction. Management commitment is one of the main reasons the program works. Senior management views the safe driving program as a core value and provides financial support and leadership.

The SAFE Fleet Task Force reviews the SAFE Fleet performance of each operating company. They then rank the companies based on program metrics (See Performance Measurement section for more details on this system). Since the program began, the Johnson & Johnson fleet has more than doubled in size from 3,000 to 10,000. In that time, the accident rate has dropped by 39 percent.

2.3 PERFORMANCE MEASUREMENT

DuPont: Leading and Lagging Indicators

DuPont uses a combination of leading and lagging indicators. The lagging indicators include lost-time cases and OSHA recordable injuries. The incidents are recorded and incorporated into the corporate data collection system. The safety, health and environment excellence center uses those numbers to create reports that are sent to all the plant managers, as well as the company Vice Presidents and CEO. A simple set of metrics makes injuries and illnesses easily comparable both within DuPont businesses and with the rest of industry.

Leading indicators are judged at the site level on four factors: performance of key safety tasks, index trends, "success attitude" displayed and level of distraction.

Performance of key safety tasks includes adherence to employee audit schedule and relief valve/vessel inspections, state of housekeeping, serious incident follow-up, training tasks completed and safety meetings held. The performance is rated either as "dependent" – done with much effort and follow-up, "independent" – understand and execute with minimum follow-up and, the highest rating, "team" – adding scope to work, upgrading approaches and integrating across functions.

Index trends include unsafe acts (measured by management audits), serious defects (observed on individual audits) and serious incidents. The performance is rated as "concern" – high number of defects found routinely, open violation of rules, no knowledge of rules, "normal" – predictable, reasonable number of defects found, organization knowledgeable and defects on improving edges, or "excellent" – defects hard to discover, except by trained professionals.

Success attitude includes spirit of the work force, percentage of the work force involved in safety activities, obvious interest in safety activities, repeat violations of rules/procedures, equipment condition, employee use of repair systems for equipment, participation in safety and health opportunities (i.e. contests). The performance is rated as "dependent" – must urge to comply or participate, "independent" – employees participate in areas of personal interest, or "team" – employees volunteer to participate and plan and conduct safety activities without direction. They also take initiative to make improvements and enlist other employee's help.

Level of distraction includes high job turnover, employment insecurity, union/management problems, high overtime numbers and overhauls within the department. The performance is rated as "high" – employees have their minds on some key issue, "normal" – employees are integrating safety and health tasks with some difficulty or "low" – safety and health activities are normal and repeating, requiring little extra attention and there are no identified external issues.

Each of the above ratings is assigned a numerical score of 5, 3 or 1.

The manufacturing manager, safety professional, maintenance manager and operational unit manager all judge each factor monthly. Results are averaged for a consensus score at the site.

Newport News Shipbuilding: Financial Accountability Built Into Metrics

Newport News uses a combination of leading and trailing indicators in its metric system. Trailing indicators include total number of recordables rate, as defined by the Occupational Safety and Health Administration. If any kind of medical treatment or first-aid is needed, the injury is recordable.

Leading indicators include number of health and safety training hours given and quality of accident reports. For example, if an employee falls and incurs a scalp laceration requiring suturing and lost-time, some would say the root cause was that the person wasn't wearing safety equipment. A more mature report would cite instead the equipment or situation that caused the fall.

The medical clinic reports the numbers to the corporate safety and health department. Company nurses are trained in recording procedures and reports are routinely audited.

Monthly reports are distributed throughout management of the company. The level of leadership determines the level of detail of the report. Whereas the CEO receives a one-page report summarizing all company injuries and illnesses for the month, a supervisor of a department with multiple injuries will receive a report with dozens of pages. Each recordable case warrants an extensive report, including a statement from the nurse who handled the injury.

Within the corporate health and safety department, the data is compiled into a database that can analyze numbers in various ways – by type of injury, department, etc.

Costs of each injury, including direct cost (workers' compensation), wage replacement and medical cost are charged back to the department. High injury costs adversely affect department profitability.

Johnson & Johnson's Safe Fleet Program: Leading and Trailing SAFE Fleet Indicators

Johnson & Johnson's SAFE Fleet Program uses a series of leading and lagging indicators to reduce motor vehicle accidents within their fleet. The key metrics for the SAFE Fleet program is accidents per million miles (APMM) driven, percent of fleet vehicles in accidents and percent of high-risk drivers.

The corporate SAFE Fleet team tracks the metrics of each field sales/service organization and reports the metrics to the Vice Presidents of sales/service of each of these organizations monthly.

The company use leading indicators such as high-risk driver screening, commentary drives and vehicle condition/maintenance reports. Johnson & Johnson staff review the driving records of all prospective new hires. High-risk drivers are disqualified from the hiring process. SAFE Fleet offers additional training and coaching to those fleet drivers within Johnson & Johnson who exhibit the high-risk behaviors they have identified.

Managers observe all drivers twice a year by conducting commentary drives. In addition, Johnson & Johnson conducts vehicle inspections and reviews maintenance records as a leading indicator. For example, dents and scratches on the vehicle, lack of routine oil changes or low tire pressure can indicate a potential problem/high-risk driver. Some additional metrics are:

- mileage driven
- number of accidents
- types of accidents
- circumstances of accidents
- percentage of vehicles in accidents
- regional and driver demographics related to accidents
- number and types of injuries
- whether certain regions have more accidents than others
- whether time of day is a factor in accidents
- whether those in accidents drive more or less than the average in the company
- percent of accidents caused by the other driver
- percent of accidents caused by high-risk drivers

2.4 COMMUNICATION SYSTEMS

Boeing: Communication Up, Down, Across System

Every Tuesday, the corporate director of safety, health and environment meets through video conferencing with the Process Council, which includes the heads of safety, health and environment within each Boeing business unit. Site safety and health directors may also tune in if they wish.

Every business unit has executive safety councils for each site. At larger sites, the executive safety councils generally have separate safety meetings; smaller sites often integrate safety into a regular business meeting.

The executive safety councils of 25-40 are comprised of the site operations director and all of their staff. The councils analyze metrics charts provided by the corporate safety and health department, determine whether policy is being properly executed and search for system improvements.

Often the head of safety and health for the site keeps minutes, but sometimes they lead the meeting. Ideally, the heads of safety and health are considered subject matter experts who are knowledgeable about best practices, changes in laws and government policies. The site directors analyze trends and implement improvements.
The executive safety council meetings are mimicked throughout the organization with crew safety meetings. A crew safety meeting might consist of the group who puts wings together and their supervisor.

In addition to the series of meetings, the company has a web-based communications system that delivers daily news to managers and employees. Recently, the corporate safety and health department used this web-based system to send out information about the anthrax threat and company response to all employees.

Safety professionals in the organization also have cross-section teams organized by subject. These teams hold a monthly web-based meeting. They include a safety

committee, environmental, medical and materials. Within each of these large subject areas are subcommittees. For example, the safety committee has subcommittees for ergonomics, industrial hygiene and physical safety.

The corporate safety department uses the groups a resource. If a new ergonomics law is passed, the ergonomics group will develop suggestions to ensure that the company is in compliance. The group reports to the Process Council, which takes the input, builds the plan and communicates the plan throughout the organization.

Therefore, changes in the system are not solely top down. The ideas come to the corporate safety and health department from a cross-section of safety professionals within the business units and are then distributed throughout the company.

Once a year all the safety and health managers at Boeing meet for three or four days to discuss best practices and lessons-learned.

2.5 PERSONNEL INVOLVEMENT

Delphi Automotive Systems: Personnel Involvement an Intricate Part of the Process

Employee involvement has been one of the cornerstones of Delphi Automotive System's safety and health culture change. Delphi worked extensively with the union when designing the culture change and every aspect of the system involves employee representation.

Every plant has joint management and union health and safety representatives who report to the plant manager. All of the safety and health programs, such as ergonomics, have as many union representatives as management representatives. All of the safety and health trainers in ergonomics, lockout, hazardous materials, etc., are hourly employees who Delphi trained to be trainers.

Hourly employees are involved in writing safe operating practices because no one knows the job better than the ones performing it. Union representatives work beside management when conducting the safety observation tours and union representatives helped design a new root-cause analysis investigation process that never blames the employee (see Culture Change section).

"We would not be anywhere near the improvement we've had if we had not worked with our unions," says Karl Bossung, manager, health and safety for Delphi.

Newport News Shipbuilding: Health and Safety Teams Give Return on Investment

Newport News Shipbuilding has 40 health and safety task teams that represent the entire shipyard. Each team has both hourly and salaried representatives, including union representatives, as well as a manager. Each team elects its own leaders – often the elected leader is not the supervisor.

The teams work toward process improvement. For example, rather than telling employees "you need to wear your hard hat" they work to remove hazards from the process so the hard hat becomes unnecessary. They also conduct root-cause accident investigations of more severe accidents – those that involve property loss, for example. Generally, accident investigations are the responsibility of the foreman.

The health and safety task teams conduct weekly inspections of their area, noting improvements that are needed in compliance, equipment, etc. They compile inspection data and report to management. Task team leaders meet in a quarterly summit to compare data and lessons-learned. At an end of the year task team celebration, a judging panel made up of company management and employee representatives recognizes the best achievers.

It is a sign of management commitment at Newport News that the employees on the task teams spend considerable time away from their regular jobs. Management feels that the time spent is well worth it: Measured by both leading and trailing indicators, the health and safety task teams have produced the greatest return on investment of any aspect of the Newport News Shipbuilding health and safety program.

2.6 ACQUISITIONS

DuPont: Building Safety and Health into Requirements

DuPont's acquisitions total $11-$12 billion per year, including everything from complex chemicals to cardboard boxes. At DuPont the people who work with the acquisitions process ensure that safety, health and environmental considerations are integrated into specifications or requisitions to buy or lease the equipment.

Because line management is responsible for safety and health, they will often aid the acquisitions staff – the better the engineering on the front end, the less need for controls such as personal protective equipment.

Vendors sometimes build equipment specifically for DuPont and then sell the newly designed equipment to other companies, advertising that DuPont considers it safe.

If a safety flaw is found in a piece of equipment at DuPont, steps are taken immediately to solve the problem. Solutions range from retrofit fixes to scrapping the equipment altogether.

Newport News Shipbuilding: Using MSDSs to Track Acquisition Hazards

Newport News Shipbuilding integrates safety and health into their acquisition requirements process through their hazard communication program. Every product Newport News purchases must be accompanied by a MSDS (Material Safety Data Sheet) before payment is made on the product. That material is transferred into a web-based hazard communications system on the company's Intranet, so that anyone in the yard can access the information.

Newport News conducts both destructive and non-destructive testing of materials to judge flammability, toxicity and other elements. If a material is judged inadequate it is replaced. Both the testing information and hazard communication (MSDS) information about materials are passed to customers.

2.7 CONTRACTOR MANAGEMENT

DuPont: Holding Contractors to High Standards

DuPont's contractors are integrated into DuPont's safety and health management system. The safety and health record of a contractor is a factor in whether the contractor is chosen for a job. They must have an experience modification rate[5] of less than one and they must show documentation of their corporate safety program.

If those two things are not in place, the contractor will not make the bidding list. The sourcing departments within the line organization make contract decisions.

The sourcing groups within the line organization make the contract decisions with the input of key stakeholders. Contractor on the job lost time injuries and fatalities are reported to the CEO within 24 hours. The statistics are updated monthly for recordkeeping and trend comparison. Contractors have a number of requirements as part of their safety and health programs at DuPont.

Contractors perform their own audits, which DuPont oversees.

DuPont supervisors also watch contractors for any signs of unsafe acts. If a supervisor notices something amiss, DuPont shuts down the job for the day. If safety numbers don't match DuPont standards during a job, a contractor is removed from the list of approved contractors for some period of time.

Newport News Shipbuilding: Contractor Accountability

Every contractor who applies for work within Newport News Shipbuilding must provide the company with a written safety and health program and some statistics that show where the contractor's safety and health rates are relative to industry – total case rate or experience modification rate of one or less, for example. Prospective contractors are also required to disclose any Occupational Safety and Health Administration willful violations within the past three years.

In addition, the companies often must provide industry-specific plans and qualifications. Asbestos contractors need to provide a written asbestos plan, along with certifications. Lead-abatement has its own industry-specific requirements, etc.

[5] Experience modification rate is an insurance measurement that relates a company's health and safety loss performance against their industry average. 1.0 is the average, less than one is better than average, and greater than one is worse than average.

Two people on the corporate health and safety staff work exclusively with verifying the qualifications of contractors. If applicants are below industry standards in safety and health, they are rejected as a qualified contractor.

Once a contractor begins a job, each contractor has a company liaison who works to ensure that contractors follow safety and health rules. If a contractor worker commits unsafe acts, he or she is removed from the shipyard. If a contractor as a whole does not live up to safety and health requirements, they are either removed from the job or removed from the list of approved contractors.

Metrics of lost-time case rates and total case rates must be reported to Newport News Shipbuilding throughout the time the contractor is on site.

The company's contractor safety and health program improves safety and health of both Newport News and the contractors.

2.8 OFF-THE-JOB SAFETY

DuPont: Working to Prevent Off-the-job Injuries

As part of their evolving program, DuPont is working to integrate off-the-job safety into their safety and health management system. Whether an employee is hurt on or off the job, the collective productivity of the company is reduced. While DuPont does not tell employees what they can do with their time off work, they do educate employees so they can make good choices away from the office or factory.
DuPont tracks off-the-job fatalities and injuries that cause employees to miss work. Those injuries and fatalities are reported at the corporate level and to the CEO along with numbers of occupational injuries and fatalities.

The injuries and fatalities are categorized as falls and slips, sports related, driving and other. Just as with an on-the-job fatality, the company CEO receives a report on an on-the-job fatality within 24 hours.

Along with the on-the-job metrics, the corporate safety and health director always has the current off-the-job injury and fatality numbers at her fingertips. As of September, of 90,000 DuPont employees around the world, the company had six fatalities, including four driving fatalities, one motorcycle fatality, zero pedestrian and one other.

Of 360 off-the-job injuries that cause employees to lose time off work through the end of August, 23 percent were from falls and slips, 19 percent from sports, 19 percent driving and 16 percent other.

In order to influence employee behavior outside work, DuPont must walk a fine line between helping employees and invading their privacy. One of the ways to accomplish this is by education at work that benefits DuPont employees away from work.

An example: May is electrical safety month at DuPont. The education campaign includes training on how to use good electrical safety practices at work, as well as education on electrical safety at home.

DuPont employees also learn about home electrical outlet protection, use of personal protective equipment at home, value of healthy diet and exercise, dangers of falls in the home, the importance of wearing a seat belt and defensive driving techniques.

APPENDIX E - COST METHODOLOGY

DoD Safety and Occupational Health Costs

It is important to state at the outset that the NSC panel was unable to find a way to assess the total OSD and military service cost of injuries and illnesses – direct and indirect – consistent with standard industry practices. Much of the data needed for this analysis was unavailable. NSC could not find the proper data, nor could the OSD (or the Military Services) provide it. The NSC Panel considers this omission a major managerial shortfall because injury and illness loss data is fundamental information needed for sound, executive decision-making.

The lack of data forced the NSC to make many assumptions, and we did so very conservatively. We used two methodologies. Both methodologies are problematic because key data elements are missing. In addition, both methodologies are very conservative. Our estimates for annual OSD and Services injury and illness loss range from $10 billion to $21 billion. The methodologies are described below.

Methodology A: Civilian FECA extrapolation - $10 billion per year.

The FY 2000 FECA cost for DoD's 659,000 civilians is $615,000,000. With 1.4 million uniformed personnel, the civilian to uniformed personnel ratio is 1:2.12. Using the civilian FECA costs as a base, the annual cost for hospitalization, disability and compensation for uniformed personnel is $1.3 billion. This total does not include such cost elements as death and/or termination compensation, sick leave, outpatient medical expenses and long term compensation, which are paid for by the government for uniformed personnel. Data for these costs were not available for the assessment.
Total direct costs are $2 billion per year.

The NSC multiplied direct costs by a factor of 4** to obtain indirect costs, which include such avoidable costs as those to train and compensate a replacement worker, repair or replace damaged property, investigate the accident and implement corrective action, and maintain insurance coverage. Other productivity loss costs include those expenses related to schedule delays, added administrative time, increased insurance premiums, lower morale, increased absenteeism, and poorer customer relations. The NSC felt that a factor of 4 was conservative, especially considering the unique and specialized infrastructure and equipment requirements of the Services.
Total indirect costs are $7.7 billion annually.

Total annual injury and illness costs are $10 billion.

** Only further research will reveal the exact indirect cost ratio. Studies show that the ratio of indirect costs to direct costs varies widely, from a high of 20:1 to a low of 2:1. For the purposes of this assessment, we are using a conservative ratio of 4:1.

Sources: OSHA's webpage: "$afety Pays" Expert System

Business Roundtable, Improving Construction Safety Performance: A Construction Industry Cost Effectiveness Project Report, Report A-3, January, 1982

Methodology B: Partial Aggregate Cost Computation - $21 billion per year.

For this approach, the NSC searched for aggregate costs that would be considered an injury or illness expense. Fortunately, the OSD and the services do collect an abundance of information. However, much of it is inconsistent and cannot be consolidated into a cohesive and comprehensive picture of injury and illness cost for uniform and civilian personnel either within a single service, much less across the DoD. The data is derived from multiple databases, each with different data definitions, elements and collection methodologies. Consequently, the NSC had to make many assumptions.

The chart below outlines the NSC's data sources and computations. The methodology, including assumptions, is described in the footnotes.

Type of Cost	Civilian	Military	Total
Direct Costs: 1.Worker Compensation --- 2. Boarded out to the Veterans Administration	$ 615 million [1] --- N/A	$ 888 million [2] $ 432 million [2] --- $ 2.2 billion[3]	$ 1.93 billion --- $ 2.2 billion
Subtotal	$ 615 million	$3.2 billion	$ 4.1 billion
Indirect Costs: Include training, retraining, replacement, work stoppage and productivity loss. A factor of 4 times the Direct Cost	x 4 [4]	x 4 [4]	x 4 [4]
Subtotal	$ 2.46 billion	$ 14.08 billion	$ 16.5 billion
Total	$ 3.1 billion	$ 17.6 billion	$ 20.6 billion

About the data. Loss data for DoD civilian employees is derived directly from FECA data (Federal Employees' Compensation Act). This data is equivalent to workers' compensation data in the private sector. Since comparable data is not collected for uniformed personnel, we have partially replicated this cost from discrete sources. Off-duty losses for uniformed personnel have been included in the total cost because these employees need to be available 24 hours a day.

[1]**Civilian Workers' Compensation** data is from U.S. Department of Labor (the Office of Workers' Compensation Programs), FECA. Data provides workers' compensation for occupational injury costs charged to Federal employing agencies for FY2001. Total = $614,966,821

[2]**Uniformed personnel workplace compensation.** Uniform workers' compensation costs are based on best available data and are a combination of Class A-C Mishap and hospitalization data.

Of the total, $888 million is from Class A, B and C Mishaps for FY94. (Source: *Atlas of Injuries in the U.S. Armed Forces*, Air Force pp 3-77; Marines pp 3-51; Navy pp 3-23; Army pp 3-21). Class A data consists of fatality or permanent total disability, incidents with a loss of at least $1 million, and/or aircraft, missile or spacecraft destroyed. Class B includes permanent partial disability, or five or more people hospitalized as inpatients and incidents resulting in costs over $200,000 but under $1 million. Class C includes lost time and incidents resulting in cost between $10,000 and $200,000.

Unlike FECA data, however, Class A Mishap data includes equipment losses, which can be significant. Because equipment expenses could not be separated from disability and compensation costs, they were kept as a direct expense, rather than an indirect cost, which may be more appropriate.

$432 million is based on FY 94 uniformed personnel hospitalization rates. (Source: *Atlas of Injuries in the U.S. Armed Forces*, Air Force pp 5-95; pp 5-71 Marines; Navy pp 5-49; Army pp 5-13). We are treating all of the hospitalization as injury and trauma events.

In FY 1994, there were 170,000 hospitalization events, and we are assuming that this is an average annual rate that can be applied to FY 2000. Deduct an all service average of 10 percent for pregnancies. (Source: *Atlas of Injuries in the U.S. Armed Forces)*. Deduct another 8 percent for hostile, assault and self-inflicted injuries (Source: Amoroso, Paul, et al. Viewpoint: A comparison of Cause-of-injury coding in U.S. Military and Civilian Hospitals, *Am J Pre Med* 2000;18(3S):169). Multiply the total of 139,230 events by $3,100 - FY 2000 per event average. (Source: Surgeon's General Office, U.S. Navy).

[3]**Veterans Administration**. The life-cycle cost of injuries and illnesses includes costs for long term compensation and medical care for uniformed personnel who have been discharged from the military for their disability. The Veterans Administration is responsible for these cost, which for FY 2000 exceeded $22 billion. Since the VA does not track causes of disability, we conservatively estimated that 10 percent of the population administered by the VA were discharged from the service for an occupational injury or illness.

[4]**Indirect Costs.** Indirect costs are described above. These costs are substantial and have not been researched by the OSD or the Services. We are assuming that their costs will be higher than those in general industry because of DoD's mission, and we are using an indirect cost factor of 4.

APPENDIX F – OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEMS -- MAJOR COMPONENTS

Management Leadership and Commitment: This addresses 1) the establishment of organizational structures where managers and employees are empowered and supported by senior management in the execution of their OSH duties and the designation of a management representative who is responsible for overseeing the proper functioning of OSH arrangements; and 2) the allocation of sufficient resources for the proper functioning of the OSH management system.

Employee Participation: This addresses the way workers at every organizational level are actively involved in the development, implementation and continuous improvement of OSH arrangements. Many OSH professionals believe that management leadership and commitment, and worker participation, are among the most, if not the most, important elements of a sound OSH management system.

Continual Improvement: This addresses the way OSH performance improves. This can be defined and expressed in numerous ways. The basic idea here is that an organization seek ways to achieve ongoing improvement of OSH performance. The primary goal of continual improvement activities is the elimination of worker injury, illness, disease, and death.

Evaluation: Within a systems framework, the evaluation functions can be thought of as part of the feedback loop that allows system elements to find out how they are performing. These functions include an overall performance measurement system, traditional audits, incident investigations, and medical surveillance.

Integration: This addresses the manner in which OSH activities are integrated into the fabric of an organization. These are typically activities that happen as OSH activities and management systems mature. The extent to which OSH activities are integrated on an ongoing basis is one example of a measure of continual improvement. An example within the DoD would be the extent to which OSH issues are integrated with operational readiness functions.

Management Review: Management review is a function that provides an overall assessment of the management system's performance in relation to organizational norms, regulatory expectations, and stakeholder concerns. The general purpose of the management review is to assess the overall OSH management system, to aggregate lessons-learned, improve performance, and modify existing systems in response to changing conditions and activities. It is through this activity that the OSH arrangements, the organization, and the environment external to the organization are linked. This involves evaluating the OSH arrangement's ability to meet the overall needs of the organization, its stakeholders, its employees, and regulating agencies.