PROGRAM STRATEGY

U.S. Army Health Hazard Assessment

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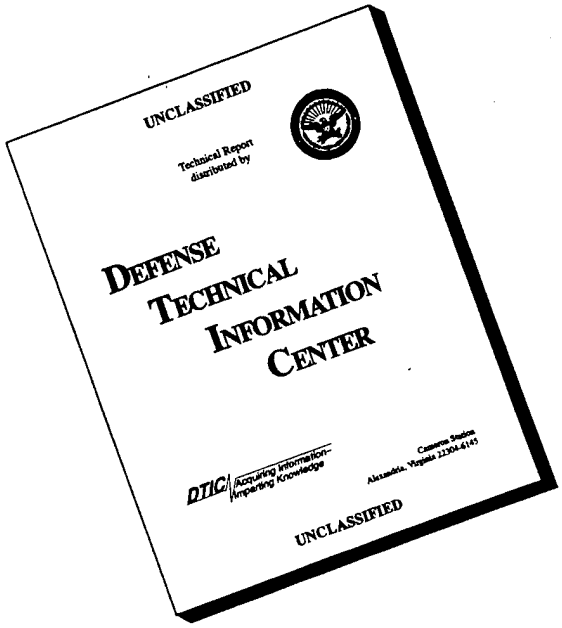

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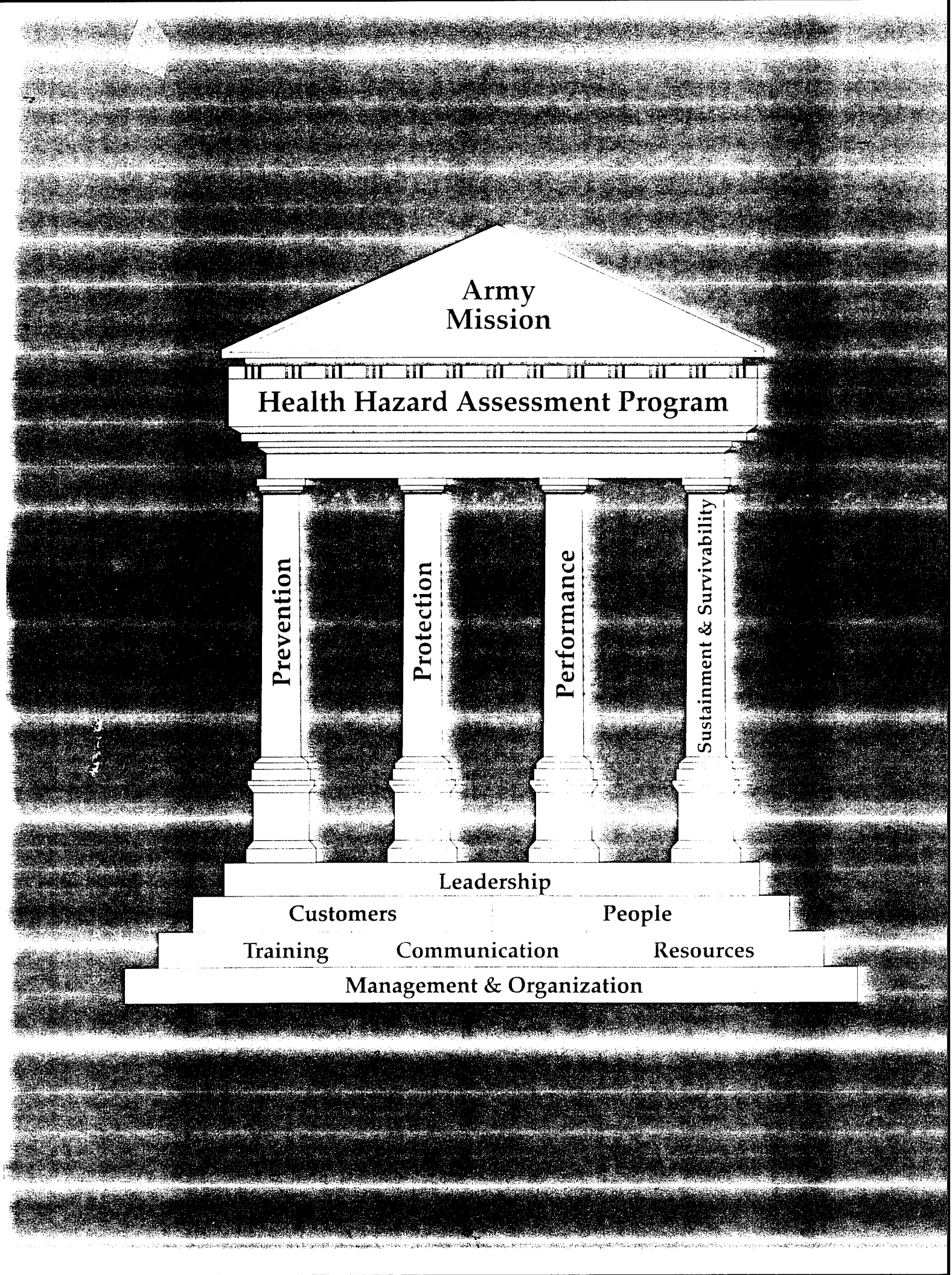
Army
Mission
Health Hazard Assessment Program
Prevention
Protection
Performance
Sustainment & Survivability
Leadership
Customers
People
Training
Communication
Resources
Management & Organization

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The U.S. Army Health Hazard Assessment Program is the cornerstone that provides unity of direction and purpose for all Army activities concerned with health hazard issues in the management of systems throughout their life cycle. This document provides the Army strategies goals, and objectives in pursuing the vision of being a national leader in eliminating health hazards and integrating human performance criteria into the life cycle management of materiel systems. The Army will use the framework set forth in this strategy to dramatically decrease and control health hazards in materiel systems. It will be the basis for planning, programming, and budgeting decisions to support the Army's Health Hazard Assessment Program.

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Health Hazard Assessment Program Strategy

The individual soldier is the *single most important* element in the performance of our Army. Unfortunately, history is replete with examples of weapon systems and other materiels that were developed without consideration of their impact on the soldier's health and performance.

The U.S. Army has established the Heath Hazard Assessment Program to eliminate or control health hazards in the life-cycle management of weapons, munitions, equipment, clothing, training devices, other materiel, and information systems and to integrate human performance criteria into these areas. The Army's effort to eliminate health hazards from materiel systems links the Health Hazard Assessment Program with Army warfighting capabilities and performance. The Health Hazard Assessment Program supports the four elements of combat power: maneuver, firepower, protection, and leadership. It also supports the entire breadth and diversity of the Army technology base.

The Health Hazard Assessment Program is an integrated effort that supports mission needs, concept analyses, research, development, testing, evaluation, production, procurement, training, use, storage, system maintenance, transportation, demilitarization, and disposal issues throughout the life cycle of a system. Its specific objectives are to

- preserve and protect the health of individual soldiers,
- enhance soldier performance,
- maximize system effectiveness,
- enhance the original system design to eliminate health-hazard-based retrofits,
- reduce readiness deficiencies attributable to health hazards, thereby eliminating training or operational restrictions,
- reduce personnel compensation claims by eliminating or reducing injury or illness caused by health hazards associated with the use of Army systems,
- reduce health hazards that may affect soldier sustainment and survivability, and
- reduce environmental contamination and potential health hazards attributable to Army systems.

Health hazard issues, if not managed effectively, can consume funds needed elsewhere, delay fielding of systems, and limit training and mobilization. Faster, longer range, and higher technology weapon systems and other highly sophisticated materiel systems will be developed in the future. More than 1,000 systems are currently under development or in product improvement. We anticipate a decrease in the number of major systems but an increase in the number, complexity, and flexibility of other systems. These other, more sophisticated systems will meet the Army's future needs as we make the transition to a smaller force with an enhanced quick-response capability. Such systems will present greater health hazard challenges that can be met only with additional personnel and funding.

A formal strategy concentrated on the four pillars of prevention, protection , performance, and sustainment and survivability will focus our program efforts on the critical actions necessary to provide materiel systems free of health hazards to our trained and ready Army. We cannot produce systems free of health hazards without consistent command support and commitment and the integration of health concerns into all Army operations and activities. This strategic planning document builds upon past program accomplishments and provides the strategy needed to meet the growing health hazard challenges of the next century. This strategy is also the basis for the action plan, a separate document that implements this strategy.

Lewis D. Walker

Lewis D. Walker
Deputy Assistant Secretary of the Army
(Environment, Safety and Occupational Health)
OASA(I,L&E)

The U.S. Army Health Hazard Assessment Program defines and reinforces the Army's leadership commitment to fielding materiel systems that are free of uncontrolled health hazards. This strategy provides the framework for actions to ensure that health and human performance considerations are integrated into the life-cycle management of materiel systems. It is the cornerstone that provides unity of direction and purpose for all Army activities concerned with health hazard issues in the management of systems throughout their life cycle.

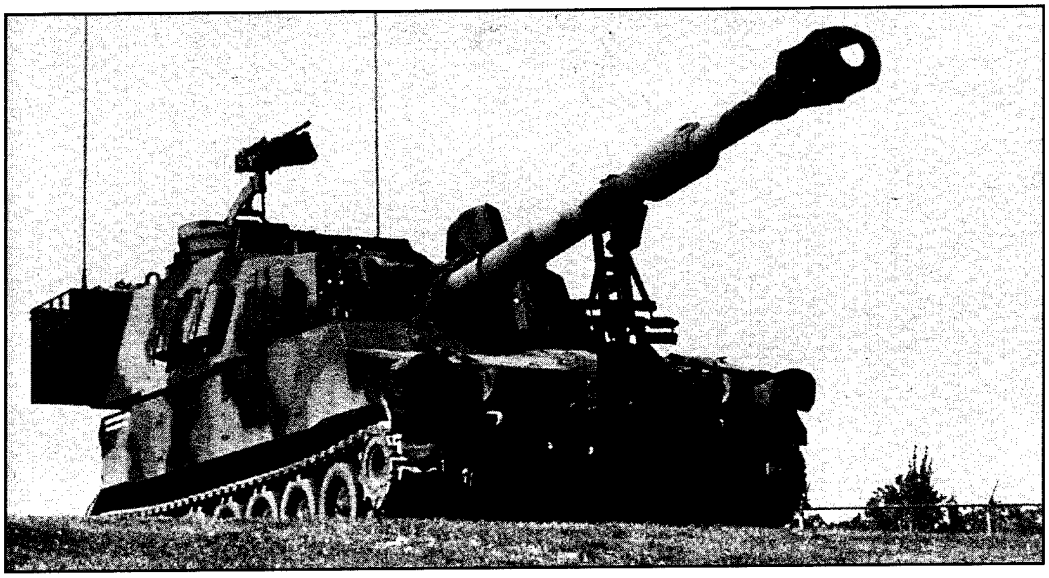
The strategy takes its direction from the Army's vision and consists of goals, objectives, and actions. The Army's desire is to be a national leader in eliminating health hazards and integrating human performance criteria into the life-cycle management of materiel systems. Its strategies, goals, and objectives in pursuing that vision provide the mid-term and long-term direction and form the basis for developing an action plan. That plan, the Army Strategic Action Plan (ASAP), is the primary document used to implement the strategy. It is an 8-year action plan that corresponds to the Army planning, programming, and budgeting cycles, and it describes specific actions, sets timelines, establishes responsible parties, and estimates the cost of implementing the program.

The strategy for eliminating of health hazards in materiel systems is patterned after the Army Environmental Strategy. The Health Hazard Assessment Program strategy is shown metaphorically as a model of a building with a solid foundation and four pillars that support the program and the Army mission. The foundation consists of elements – leadership, customers, people, training, communication, resources, and management and organization – that are shared values common to all of the pillars. We have developed objectives for each of the foundation elements and, like those in the pillar section, these provide the mid-term and long-term direction for these foundation elements. The foundation elements are also integrated into the ASAP, where specific actions are assigned to accomplish the objectives and move the program toward the vision.

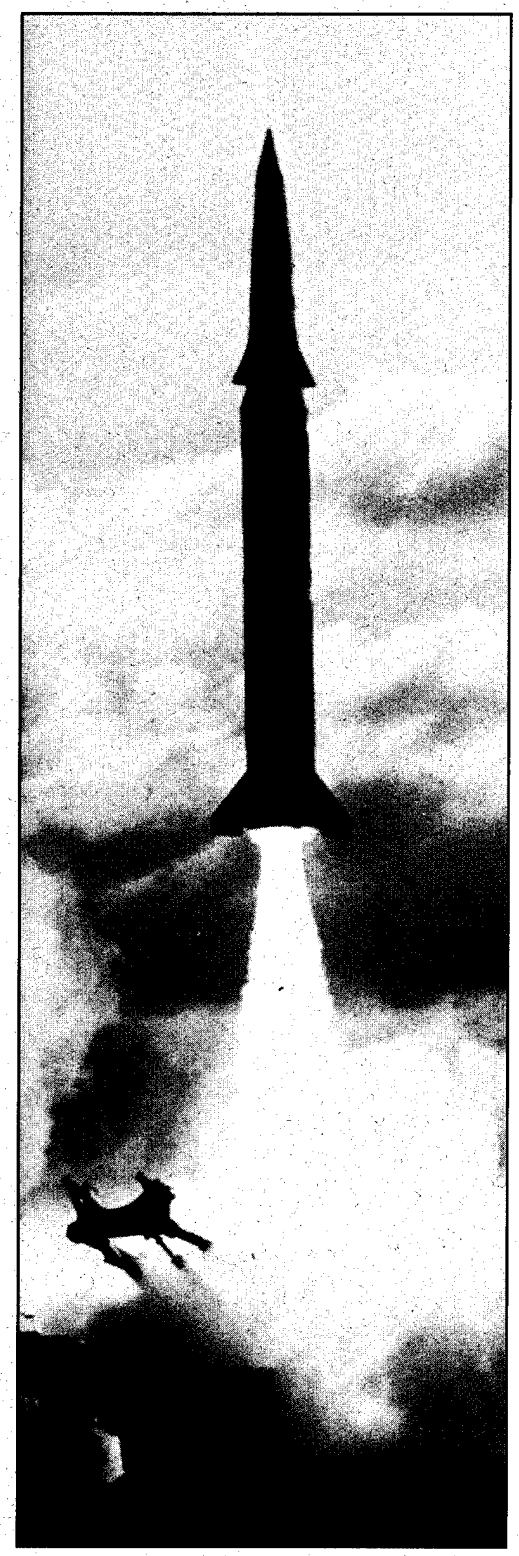
The Army will use the framework set forth in this strategy to dramatically decrease and control health hazards in materiel systems and integrate human performance criteria into the life-cycle management of these systems. Such a strategy emphasizes the Army's commitment to fielding systems that are free of unacceptable health risks and becomes an important part of the overall Army mission. It will be the basis for planning, programming, and budgeting decisions to support the Army's Health Hazard Assessment Program. The Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health will receive periodic briefings on the implementation of this strategy.

MAJOR PROGRAM ACTIONS

- Perform health hazard evaluations on all systems.
- Develop adequate resources to implement the program.
- Review and revise policy and operating documents.
- Increase communication with combat and materiel developers.
- Provide health hazard input to support all milestone decision reviews.
- Focus medical research and development efforts on materiel developers' needs.
- Develop an information management system that meets program management and technical needs.
- Increase the technical and managerial skills of program personnel.



Army Health Hazard Assessment Program



The Army will be the national leader in eliminating health hazards from and integrating human performance criteria into the life-cycle management of materiel systems.

This vision statement communicates the Army's commitment to controlling health hazards and integrating human performance criteria into the materiel acquisition process and pledges its role as a leader in that effort. The vision is intended to inspire, direct, and empower Army personnel at all levels to participate in managing change to ensure the future success of this program and the Army.

Throughout the strategic planning process, three main values and themes have evolved:

- Demonstrating leadership
- Eliminating or controlling health hazards
- Enhancing human performance in materiel systems.

These fundamental values are an integral part of the Army mission and are reflected in the Army Health Hazard Assessment Program vision statement.

MODEL & STRATEGY
Army Health Hazard Assessment Program

THE MODEL

We have developed a model of the Army Health Hazard Assessment Program similar to the model used to describe the Army Environmental Program. It consists of a building with four pillars supporting the program and the Army mission and, in turn, being supported by programmatic and managerial elements.

The overall Army mission is to protect and defend the nation and its fundamental values. Supporting that mission is the Health Hazard Assessment Program, whose goal is to eliminate health hazards from Army systems. The four pillars symbolize the activity areas to which the Army will devote primary emphasis, and the foundation of the model is composed of key building blocks that represent the infrastructure needed to support an effective program.

THE STRATEGY

The Health Hazard Assessment Program strategy provides the Army with the direction it needs to attain its vision. It offers specific goals, objectives, and actions and harnesses the strengths of the Army and its command leadership, organization, and commitment to move rapidly to realize the vision. The Health Hazard Assessment Program strategy focuses on four pillars, or activity areas:

- Prevention
- Protection
- Performance
- Sustainment and Survivability.

The stability of each pillar depends upon the support provided by a foundation of programmatic and managerial elements. Those foundation elements are leadership, customers, people, training, communication, resources, and management and organization.

The strategy, however, is more than far-reaching vision, goals, and objectives. The Army's 8-year strategic action plan (presented subsequently in this document) implements the strategy by defining specific tasks, actions, and policies that must be developed. It identifies the responsible parties and partnerships, estimates the costs, and establishes a commitment to make resources available. The MEDCOM will continually monitor progress toward attaining the objectives and goals of this strategy and will provide status reports to the Army leadership annually or more often. Management indicators will be tracked quarterly as part of the action plan.

THE ARMY HEALTH HAZARD ASSESSMENT PROGRAM: HISTORY

The Army Surgeon General established the Health Hazard Assessment Program in 1981 in response to continuing concern about the effects that operating military weapon systems have on the health of their users. The initial program efforts focused on staffing (13 people), establishing relationships with key organizations, and building credibility.

In 1985, the Army established the Manpower and Personnel Integration Program (MANPRINT). It emphasizes the man-system integration that incorporates human considerations — including those relating to health hazards — in the design and development of materiel systems. The Health Hazard Assessment Program became an emphasis area, or domain, of MANPRINT. Although inclusion of the program as a domain in MANPRINT was a significant step forward, no additional resources were provided to meet the new requirements and increasing workload.

As of 1994, the Health Hazard Assessment Program supports 17 Service schools, 26 Training and Doctrine Command (TRADOC) system managers, 207 program/project/product managers, and 12 program executive officers. It provides technical advice on a case-by-case basis to combat and materiel developers, supports meetings with those developers, prepares health hazard assessment reports, and supports about 100 of the more than 1,000 system programs in various stages of development. Because of limited resources and lack of emphasis, the current program as presently structured cannot fully accomplish the goals and objectives and attain the vision. Specifically, the current program does not provide

- early intervention in life-cycle management to influence system design,
- day-to-day interaction with combat and materiel developers,
- support to soldier survivability assessments,
- support to pollution prevention assessments,
- data bases and predictive methods for health hazard assessments,
- evaluation of all systems under development, or
- a viable organization that interacts with decision-makers daily.

Historically, the assessment of health hazards has been looked upon as the sole responsibility of the Army Medical Department (AMEDD). AMEDD personnel will lead the effort in identifying and recommending control of the health hazards associated with military systems, but everyone involved with system acquisition — logisticians, acquisition managers, and combat and materiel developers — is also responsible for controlling health hazards. Identification and control of these hazards must be a

team effort. We risk producing substandard products if the team does not consider health hazards, other MANPRINT domains (e.g., manpower, personnel, training, human engineering, systems safety, and soldier survivability), and pollution prevention as integral parts of the life-cycle management of materiel systems. Health hazards that are not controlled will affect the one resource we cannot afford to risk, the soldier.

The Army is proud of its Health Hazard Assessment Program and program accomplishments. This comprehensive strategy will build upon these accomplishments and provide a structure and framework for the Army to meet the growing health hazard challenges we will face as we enter the next century. A formal strategy focusing on prevention, protection, performance, and sustainment and survivability provides the mechanism to gain the resources and emphasis required to implement a fully functional program, accomplish the program objectives, and attain the goals and vision.

GOALS, OBJECTIVES, & ACTIONS

Army Health Hazard Assessment Program Pillars

The success of the Army's Health Hazard Assessment Program depends upon the support provided by each of the four pillars, or activity areas: *prevention, protection, performance, and sustainment and survivability.* In each area, we have established a goal and supporting objectives. The goal summarizes the intent of the activity area and addresses opportunities for improving and enhancing specific aspects of that area.

The objectives in each of the four activity areas are the incremental steps needed to meet the broader goal. Within each objective, we have defined some actions that are needed to achieve the objective.

PREVENTION

The Process

The Army strives to field materiel systems that are free of health hazards and that enhance human performance and prevent environmental contamination. *Prevention* emphasizes the elimination of hazards early in the developmental process. It also includes actions to control hazards to within acceptable limits. Common preventive measures include elimination or product substitution, isolation of the user from the harmful agent, enclosure of the harmful process, provision of adequate ventilation to remove combustion products or vapors, and changing the process to reduce the hazards.

The *prevention* process has two key elements:

- Identification of potential health hazards early enough in the process to eliminate or control them.

- Integration of the health hazard assessment process into all phases of the life-cycle management of materiel. The Army must place special emphasis on certain critical events in the life cycle: design, testing, manufacturing, operation, maintenance, storage, demilitarization, and disposal.

The Goal

The goal of *prevention* is to eliminate or control health hazards in all Army systems through a process of early identification and continuous evaluation.

The Objectives

To prevent occupational and environmental health hazards.

Supporting Actions:

- Influence critical design and acquisition documents [e.g., system MANPRINT management plans (SMMP), standards, specifications, test plans, operational requirements documents (ORDs), statements of work (SOWs), and requests for proposals (RFPs)].
- "Design out" demonstrated occupational health hazards (by means of elimination, substitution, process change, etc.).
- Identify pollution *prevention* opportunities in all health hazard assessment actions.
- Eliminate or reduce hazardous substances and other health hazards in weapon system acquisition programs (e.g., new acquisition, modifications, upgrade, system change, and nondevelopmental items).
- Eliminate or reduce hazardous substances and other health hazards in weapon system management.

Participate early and continuously in the life-cycle management process.

Supporting Actions:

- Develop a strategy for providing health hazard input for nondevelopmental items and government-furnished equipment.
- Assist preventive medicine personnel in their efforts to provide early health hazard input to combat developers.
- Develop approaches for special-access and Joint-Service programs.
- Support key milestone decisions by providing health hazard input to key activities and documents such as ORDs, MANPRINT Joint Working Group (MJWG) efforts, and SMMPs.

PROTECTION

The Process

The Army seeks to apply control measures to minimize any hazards that cannot be completely eliminated from materiel systems. System design standards, human performance standards, and other health-related guidelines are used to specify the control measures. However, none of these

criteria by themselves are sufficient to develop adequate health hazard controls. These standards must be complemented with effective surveillance and evaluation programs to validate the performance of the control systems and verify that personnel are adequately protected.

In this context, surveillance is the continuing process used to determine the types of hazards present in military systems and the extent to which they can adversely affect health; evaluation is the detailed process of comparing a system function with its design specifications and human health exposure criteria. In the event surveillance indicates that a system's controls do not function properly, the system must be modified to meet design and health standards. Some common modifications to current controls used in materiel systems include increasing ventilation, enclosing hazards, altering work practices to avoid or reduce exposure to the hazard, using protective clothing and equipment, requiring the use of administrative measures such as limits on the lengths of work shifts, training personnel, and posting warning signs.

The use of military systems often results in the creation of military-unique hazards (blast overpressure, for example). Thus, the development of military-unique health criteria is another important focus of *protection*. Since the Army Medical Research and Development (R&D) programs have been tasked to develop criteria for military-unique systems, their close coordination with materiel developers is critical. The Medical R&D activities must maintain current technical information data bases, conduct applied research to determine acceptable exposure levels, and stay at the cutting edge of medical technology.

The Goal

The goal of *protection* is to eliminate or reduce injury and illness attributable to health hazards in Army materiel systems and to reduce their associated compensation costs.

The Objectives

Anticipate, identify, evaluate, and control health hazards in Army materiel systems.

Supporting Actions:

- Perform health hazard assessments of all Army systems.
- Develop and implement effective risk assessment code procedures.
- Identify the need for military-unique system health standards and establish those standards.
- Develop health hazard domain exit criteria for each milestone decision review.

Establish a feedback and lessons-learned network throughout the acquisition community.

Supporting Actions:

- Monitor Army and DoD accident reports.
- Monitor occupational health and environmental health injury reports.
- Relate health hazard assessment report historical data to new systems.
- Establish systems for tracking customer responses to Health Hazard Assessment Program report recommendations.

Enhance the health hazard assessment process with the use of science and technology developments.

Supporting Actions:

- Develop a surveillance program data base that integrates human performance and exposure data with materiel system configuration data.
- Integrate the health hazard assessment data base into the Occupational Health Management Information System (OHMIS).
- Monitor and develop biological indicators of potential exposures.
- Develop health and performance effects data bases for Army-unique hazards.

PERFORMANCE

The Process

Performance is the primary measure of the effectiveness of military weapons, materiel, and other systems, based on their design and the ability of the soldier to use them. System *performance* is primarily a function of how well the system fits the soldier. Thus, *performance* is determined by the man-machine interface, and that interface is the major focus of the *performance* pillar.

The integration of human *performance* criteria into the design of Army systems is one of the greatest challenges to face the Health Hazard Assessment Program. To establish and apply those criteria, Medical R&D activities and weapon developers must work together closely. Man-machine issues must be identified early in the development process so that medical problems can be isolated and systems adequately tested and redesigned to ensure that their fielding is not delayed.

The Goal

The goal of *performance* is to enhance soldier *performance* and system effectiveness by eliminating health hazards.

The Objectives

Identify human performance effects and develop performance assessment models to link performance to system requirements.

Supporting Actions:

- Develop methods to predict health-hazard-induced outcomes in systems.
- Develop a better linkage between Medical R&D and system developers.
- Define the effects of health hazards on human performance.

Enhance readiness by reducing health hazards that cause training and operational restrictions.

Supporting Actions:

- Provide early input to the combat developers on potential health hazards in proposed systems and recommend actions to control the hazards.
- Provide early input to the Test and Evaluation Master Plan (TEMP) and other key testing documents to ensure that required health hazard assessment data are collected and evaluated.
- Provide early input to the development of training, operational, and maintenance manuals for each system.
- Provide materiel developers timely recommendations for controlling health hazards.

Improve engineering designs so that system retrofits to control or eliminate health hazards are not needed.

Supporting Actions:

- Define data quality objectives in the test and evaluation activities.
- Influence the development/revision/conversion of standards, specifications, and other criteria documents that influence the design of systems.
- Influence the development of SOWs and RFPs for weapons and other materiel systems.
- Develop improved system design review procedures that focus on early identification of health-related deficiencies.

- Provide lessons-learned design information to materiel developers.

SUSTAINMENT & SURVIVABILITY

The Process

One aspect of The Army Vision – "A Total Force Trained and Ready to Fight" – relates to *sustainment and survivability*. It implies the importance of and necessity for the individual soldier's performing at optimized levels at all times and being capable of protecting himself from the adverse effects of threat weapons and environmental conditions. The Army Science and Technology Base Master Plan defines *sustainment and survivability* as follows:

Sustainment is the ability to maintain the soldier in a tactical environment. *Sustainment* systems must be adaptable to all levels of operations on the dynamic battlefield. Features include, but are not limited to, systems such as advanced rations with nutritional tailoring capability to enhance physical and mental performance; individual water purification systems; improved field feeding systems; and individual soldier power systems.

Survivability is the soldier's ability to protect himself against threat weapons effects and environmental conditions. *Survivability* integrates multiple-threat protection against ballistic, flame/thermal, chemical/biological, directed-energy, surveillance, and environmental hazards. Examples of such systems include microclimate conditioning for the individual soldier to relieve heat stress and enhance productivity, combat soldier identification systems to minimize fratricide, and medical systems that help wounded soldiers remain combat-effective.

Soldier *sustainment and survivability* encompasses the measures taken to enhance individual soldier performance and systems that enable the soldier to withstand or avoid adverse military actions (friend or foe), and/or other effects of the tactical environment. A soldier's ability to withstand an enemy's attack will depend in part upon the nature of health hazards inherent in the support systems. If systems are not designed to enhance soldier performance, then the soldier's ability to withstand an enemy attack will be reduced. Likewise, if the tactical environment involves extreme heat, cold, high altitude, or other environmental threats and the soldier is not equipped with systems to mitigate them, he may not be able to repel or defeat the enemy. The Health Hazard Assessment Program attempts to identify, control or eliminate these health-related issues that have an impact upon soldier *sustainment and survivability*.

The Health Hazard Assessment Program strives to define the health-related changes and human performance degradation that result from exposure to environmental or materiel systems' induced physical, chemical, and biological threats. Establishing human performance criteria for the development and operation of Army systems will enable materiel developers to better design the man-machine interface and enhance the overall effectiveness of the systems. An optimized system will promote enhanced soldier performance, *sustainment*, and *survivability*.

The Goal

The goal of *sustainment and survivability* is to improve soldier *sustainment and survivability* by reducing health hazards and thereby conserving the soldier's fighting strength.

The Objectives

Define soldier sustainment and survivability health hazards issues.

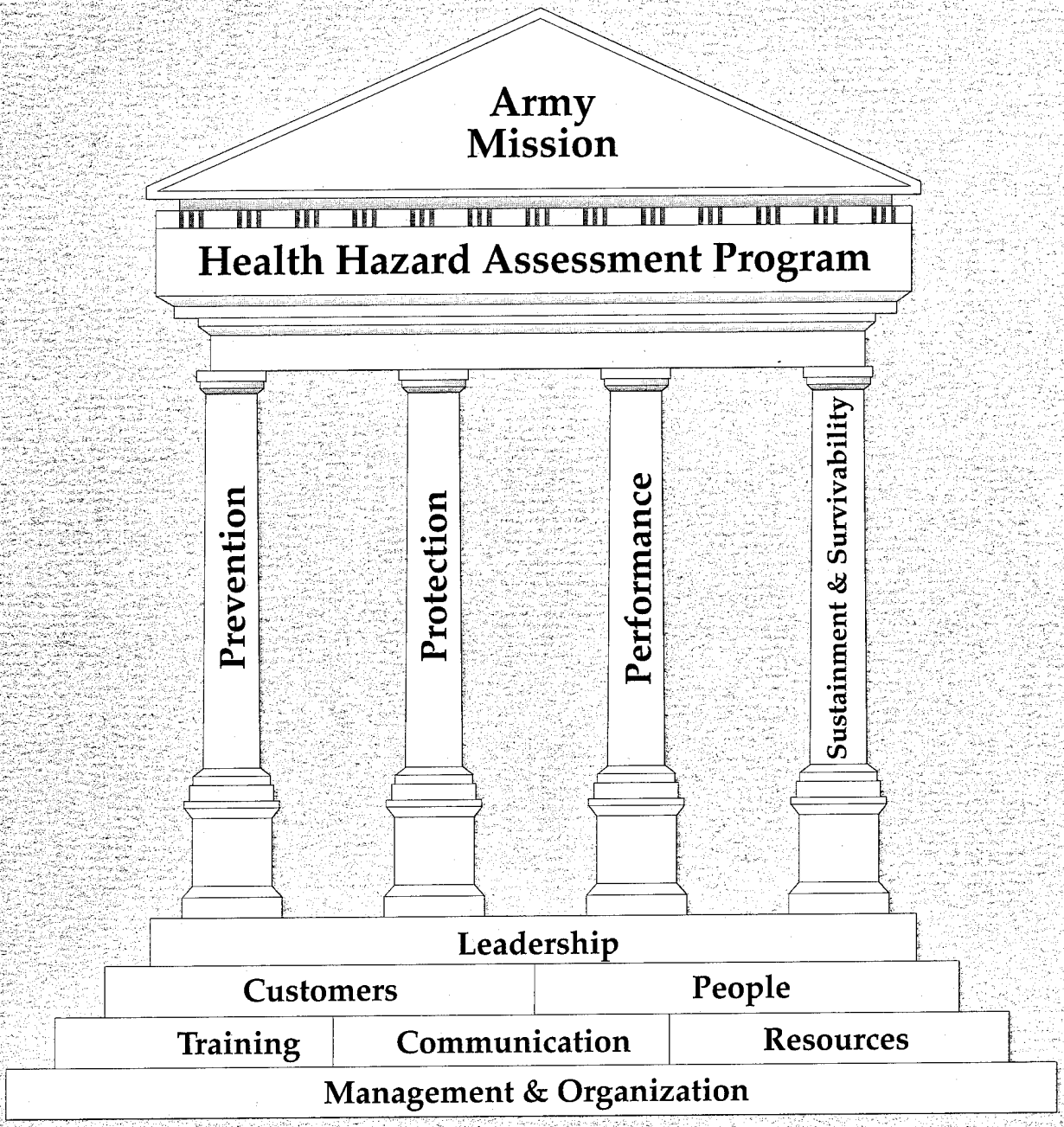
Supporting Actions:

- Identify and coordinate with the medical and nonmedical agencies within the combat development, R&D, and acquisition communities that develop soldier *sustainment and survivability* parameters.
- Determine the current *sustainment and survivability* program actions in the identified agencies.
- Determine how *sustainment and survivability* issues are addressed in systems under development and provide health hazard input if appropriate.
- Define the key health hazard issues relative to *sustainment and survivability*.
- Develop the health hazard policy to address these key *sustainment and survivability* issues.

Develop models that predict the health impacts associated with soldier sustainment and survivability actions.

Supporting Actions:

- Determine the types of predictive models that should be developed.
- Determine the Army organization responsible for developing each model and provide input based on identified health hazards.
- Identify and accomplish other Health Hazard Assessment Program coordination with identified medical and nonmedical organizations.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FOUNDATION ELEMENTS

Army Health Hazard Assessment Program

The foundation elements of the Army Health Hazard Assessment Program are all essential to achieving success in each of the four pillars of our model. To be effective, the program must be supported by a solid foundation of leadership, customers, people, training, communication, resources, and management and organization.

In this section, we describe each of the foundation elements and its relationship to the pillars and the Army Vision. The specific objectives identify areas in which senior Army leadership must provide emphasis to support and strengthen the entire Health Hazard Assessment Program.

LEADERSHIP

The Process

The key to reducing health hazards is *leadership* at all levels of the program. Leaders must actively support the goals and objectives of the Health Hazard Assessment Program if it is to succeed. AMEDD personnel will provide basic information on health hazards associated with military systems to combat and materiel developers and other nonmedical personnel. Their emphasis will be placed on identifying potential health hazards and the need to control those hazards and on identifying the medical personnel to contact for assistance.

Army leaders must be committed to eliminating health hazards from all materiel systems and integrating human performance criteria into the life-cycle management of those systems. In an era of force reduction and budget cuts, we cannot continue to absorb the losses of productivity, delays in fielding systems, and costs of injury and illness that result from preventable health hazards. Senior Army leaders are committed to eliminating and controlling system hazards.

The Objectives

The objectives of the *leadership* element are as follows:

- To mentor the AMEDD military and civilian personnel so that they become familiar with the health hazard assessment process.
- To obtain the *leadership* commitment to eliminate health hazards from Army systems.
- To develop an ethic in all workers to eliminate health hazards from Army systems.

CUSTOMERS

The Process

The *customers* element addresses the important link between those who provide health hazard assessment services and those who benefit from those services. As providers, we must develop better working relationships with our *customers* and establish effective communication and feedback systems to improve the exchange of information. We must also educate our *customers* about our expectations. The critical step in this process is the identification of all the *customers* in the acquisition process.

The Objectives

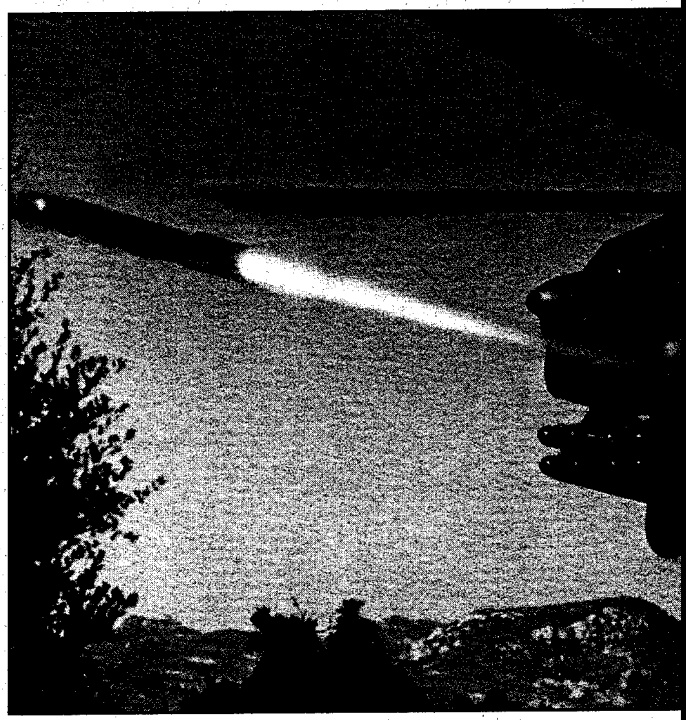
The objectives of the *customers* element are as follows:

- To identify and educate our *customers* about the health hazard assessment process and capabilities so their expectations will be realistic.
- To help the *customers* understand the need for health hazard assessment of systems.
- To elicit feedback from *customers* to improve Health Hazard Assessment Program support.
- To provide *customers* with improved access to health hazard information.
- To ensure health hazard information is available in developers' guides, other documents, and the Army school system.

PEOPLE

The Process

The *people* element focuses on the need for trained and competent personnel to support the Health Hazard Assessment Program. These professionals with expertise in science, engineering, logistics, acquisition, and other professional disciplines must work closely with the acquisition community professionals to manage and execute a quality program. All Army personnel, military and civilian, at all grade levels and all contractor personnel must be properly trained

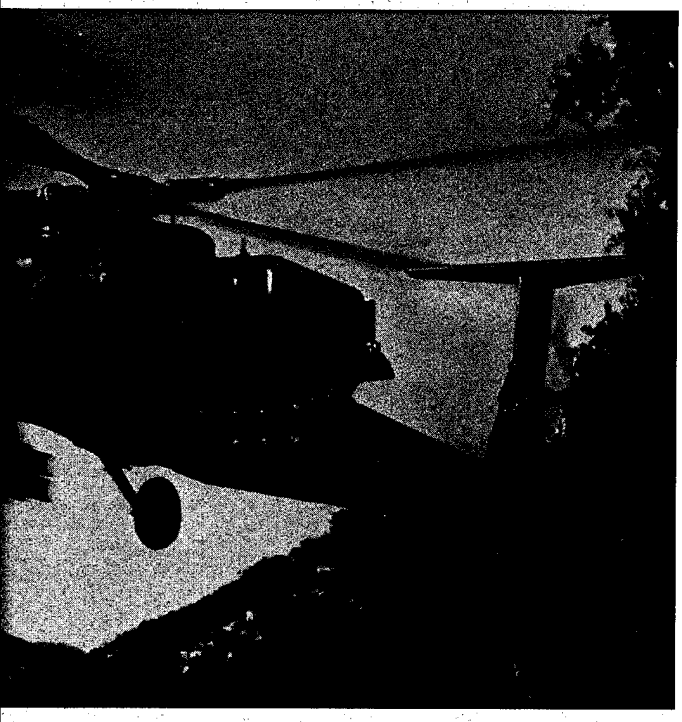


and dedicated to eliminating health hazards. A solid staffing structure combined with a rigorous recruiting and training program will ensure that health professionals are available to support all aspects of the program.

The Objectives

The objectives of the *people* foundation element are as follows:

- To recruit quality professionals in sufficient numbers in all disciplines, at all grade levels.
- To implement a program of continuous professional development.
- To emphasize teamwork and develop synergy.



Training

The Process

Training is a critical need for AMEDD personnel and nonmedical personnel involved in any aspect of the health hazard assessment process. Currently, the AMEDD does not have enough trained medical personnel to meet program requirements. Additional medical personnel must be cross-trained, recruited, and dedicated to the program if it is to succeed. The AMEDD cannot eliminate the health hazards without help from the acquisition, logistics, and MANPRINT personnel. These people must also be trained in eliminating health hazards from Army systems. We must increase the amount and quality of training and education of all personnel involved in the program if we are to achieve the objectives, goals, and vision of the program.

The Objectives

The objectives of the *training* element are as follows:

- To provide health hazard assessment awareness training to nonmedical personnel.
- To provide health hazard assessment training to AMEDD personnel.
- To establish a system to publicize available training courses and opportunities.

COMMUNICATION

The Process

Effective *communication* must be established between all of the organizations involved in the health hazard assessment process. Enhanced internal *communication* is essential to sharing technical information in data bases and professional articles, providing consistent and timely technical administration guidance, and maintaining an open dialog on all health hazard assessment issues. Enhanced external *communication* is needed for effective program management, cooperation with contractors, keeping others abreast of new health hazard assessment medical developments, sharing knowledge and lessons learned, and engaging in joint problem solving.

The Objectives

The objectives of the *communication* foundation element are as follows:

- To inform the Army leadership of the trends in and status of the Health Hazard Assessment Program.
- Enhance technical *communication* between all AMEDD personnel involved in the program.
- Improve and promote *communication* between Health Hazard Assessment Program personnel and personnel within the acquisition community.

RESOURCES

The Process

This foundation element establishes the objectives for incorporating the Health Hazard Assessment Program requirements into the Army Planning, Programming, Budgeting, and Execution System (PPBES) process. Adequate *resources* in accordance with good business practices are essential to the support, balance, and execution of the four primary activity areas (pillars). Without those *resources*, the work we identify in this document cannot be performed and the overall program will fail. *Resources* considerations must be addressed at the foundation level to provide a firm footing for the pillars.

The Objectives

The objectives of the *resources* foundation element are as follows:

- To identify, promote, quantify, and gain programming support for validated health hazard program funding and personnel requirements.

- To maximize utilization of existing resources.

- To include health hazard considerations and costs in all decisions throughout the acquisition life cycle.

MANAGEMENT AND ORGANIZATION

The Process

Effective *management and organization* are necessary to successful execution of the actions in all four activity areas (pillars). The *management and organization* foundation element provides the appropriate structures for an efficient Health Hazard Assessment Program that is completely integrated throughout the Army. It involves building and maintaining a quality, multidisciplinary organization; integrating health hazard assessment policy into all affected Army activities; and interacting with other Federal agencies. Attention to the objectives of this element will ensure the appropriate *management and organizational* structures are in place to implement this strategy.

The Objectives

The objectives of the *management and organization* foundation element are as follows:

- To determine the most efficient organizational structure.

- To establish a single office that combines resource management and policy coordination for the Health Hazard Assessment Program.

- To develop an action plan (business plan) that implements this strategy.

- To build a more effective working relationship with the entire acquisition and R&D community.

- To enhance our interdisciplinary approach to health hazard assessment.

- To develop and document the methods and rationale for health hazard assessments of materiel systems.

Resourcing & Implementing

EIGHT-YEAR STRATEGIC ACTION PLAN

The Health Hazard Assessment Program strategy is implemented through the *Eight-Year Army Strategic Action Plan*. It establishes the major actions, projects and activities, resources, and schedules for implementing the strategy. Those major actions are linked to the pillars, goals, objectives, and actions shown in this document and to each of the foundation elements. They are supported by specific tasks and, in some cases, subtasks that must be performed to implement the strategy. The major actions, their tasks, and subtasks are addressed in priority order in the plan. Timelines for performing the tasks are provided, and responsibilities for each task are assigned to supporting personnel and activities.

The *Eight-Year Army Strategic Action Plan* integrates ongoing, new, and unresolved activities into one comprehensive program management document. It is the primary means for identifying additional strategic health hazard issues and monitoring the progress of the program in implementing the strategy. Management indicators are used to rate the status of each major action in the plan. Additionally, in-process reviews are to be presented to the Army leadership.

The *Eight-Year Army Strategic Action Plan* covers a period that corresponds to the two-year funded program in the budget and the six-year programming requirement in the program objective memorandum (POM). This plan is the primary vehicle for identifying the budgetary requirements for meeting the Army Vision and the goals and objectives of the Health Hazard Assessment Program.

Example: Prevention Pillar

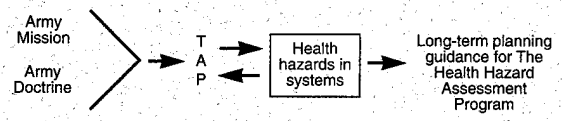
Goal	Objective	Action	Task
To eliminate or control health hazards in all Army systems.	Prevent occupational and environmental health hazards.	Eliminate the use of hazardous substances in the acquisition of weapons systems.	Review ORDs, SOWs, and RFPs for munitions propellants to eliminate or reduce hazardous substances.

THE ARMY BUDGET CYCLE

The Army Health Hazard Assessment Program strategy provides the framework for planning, programming, budgeting, and evaluating the program. That strategy links the program managers with the Army's key planning, budgeting, and decision-making processes. The program will be executed primarily through the *Eight-Year Army Strategic Action Plan*, which will provide information to and reflect The Army Plan, programming guidance from the POM, budget guidance, and the long-range R&D plan. The Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health will periodically review this strategy.

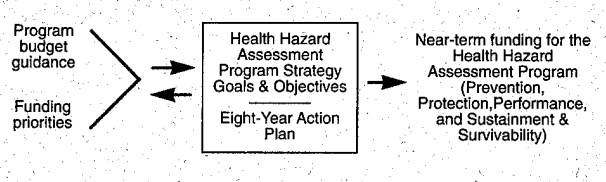
Planning

The Army Plan (TAP) defines the Army mission and doctrine and provides the philosophical framework for Army activities. The relevant elements of the Health Hazard Assessment Program will be considered in future development of the TAP.



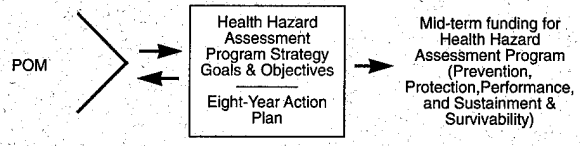
Budgeting

Budgeting for the Army Health Hazard Assessment Program will translate program budget guidance (PBG) and funding priorities into requests for appropriation of funds to accomplish the program strategy for the two budget years of the Eight-Year Action Plan.



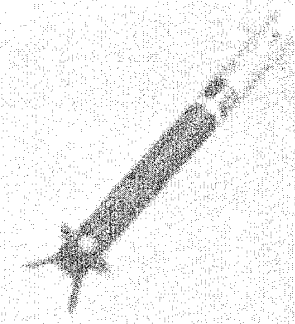
Programming

The POM translates the Army planning decisions and Office of the Secretary of Defense (OSD) programming guidance into an allocation of forces, manpower, and funds for a six-year period. The Health Hazard Assessment Program strategy goals and objectives and the mid-term part of the Eight-Year Action Plan will help to shape this allocation and define appropriate priorities for Health Hazard Assessment Program activities.



Execution and Review

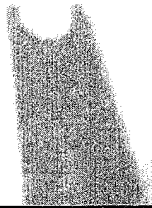
Progress in executing the entire budget, including the Health Hazard Assessment Program, is reviewed on a quarterly basis. This review will ensure that the program strategy is implemented effectively and that new and unresolved issues receive appropriate consideration in future planning and budgeting activities. Detailed program reviews will be provided to the Deputy Assistant Secretary of the Army for Environment, Safety and Occupational Health.



STRATEGY MONITORING AND UPDATING

The Army's health hazard strategy is a living document. The Army Vision is enduring and the pillar goals are stable. The objectives of each goal will be modified periodically, however, to reflect new health hazard challenges, changes in regulations, completion of objectives, or guidance from senior Army leadership. As a result, the strategy's objectives will be reviewed annually and modified as appropriate.

The Army Medical Command will monitor the strategic action plan to ensure that the strategy is implemented and the terms of the plan are carried out effectively. The Assistant Secretary of the Army for Environment, Safety and Occupational Health will be briefed annually on the progress made in implementing the strategy and on new challenges that require management emphasis from the senior Army leadership.



APPENDIX A
Strategy Elements & Definitions

STRATEGY

The strategy provides a framework for planning, programming, budgeting, setting priorities for actions, and evaluating the Health Hazard Assessment Program. The strategy begins with a vision statement and includes goals, objectives, and actions.

VISION STATEMENT

The strategy begins with the Army leadership's vision for the Health Hazard Assessment Program. The vision must provide a clear direction for the program and serve as a basis for unifying the efforts within the program.

PILLARS

The pillars are the major areas of emphasis for the Army Health Hazard Assessment Program. They are protection, prevention, performance, and sustainment and survivability. All of the major actions in the program fall within one of these four pillars.

FOUNDATION

The foundation comprises the essential elements that are common to achieving success in each of the pillar areas: leadership, customers, people, training, communication, resources, and management and organization. Those elements provide the solid foundation upon which the Health Hazard Assessment Program is based.

GOALS

Each pillar has a summary goal that establishes the major direction and focus for each pillar. These goals set the guidelines for the supporting objectives and actions.

OBJECTIVES

Each goal is supported by a series of objectives that begin the process of focusing efforts on specific actions to implement the strategy.

ACTIONS

Actions form the basis of the Army Strategic Action Plan, which is the implementing companion document to this strategy. Many of these actions are time-sensitive and have specific milestones for their performance. The actions will be supported by tasks and subtasks that will be detailed in the ASAP.

Making the Soldier Part of the System

The Army Health Hazard Assessment Program is proud of its record of accomplishments in recognizing health hazards early in the materiel acquisition process and taking decisive action to eliminate or control them. This appendix offers a few examples of how health hazards have been controlled in weapons systems and other materiel items. It is divided into the nine types of health hazards that typically occur in military systems. The nine most commonly found health hazards are acoustic energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes, physical trauma, and vibration.

ACOUSTIC ENERGY

Description: The potential energy that is transmitted through the air and interacts with the body to cause hearing loss or damage to internal organs (blast overpressure). Some examples of acoustic energy are steady-state noise created by engines and helicopter rotors; impulse noise created by small arms fire; and blast overpressure created by mortars, towed artillery, and heavy crew-served weapon systems.

Example: **Battalion Mortar System M-120.**

The M-120 Series 120mm Battalion Mortar System (BMS-120) consists of the M-120 Towed Mortar and the M-121 carrier configuration mounted on a modified M-113 Armored Personnel Carrier. The mortar, when fired, especially in the carrier configuration, produces a blast overpressure (impulse noise level) in excess of the allowable limits. Operators subjected to this blast overpressure could have suffered permanent hearing loss if this health hazard had not been identified. The health hazard assessment performed on this system recommended that

- mortar crew members and soldiers in the immediate firing area be informed about the risk of hearing loss from exposure to the noise generated by mortar firing,
- mortar crew members wear properly fitted E-A-R brand disposable earplugs,
- soldiers in the immediate vicinity of the mortar firing

Health hazard assessment action saves soldiers' hearing

(within 200 meters) wear properly fitted hearing protection, and

- medical personnel verify the proper fit of earplugs and ensure that soldiers understand that failure to use the earplugs could result in permanent hearing loss.

BIOLOGICAL SUBSTANCES

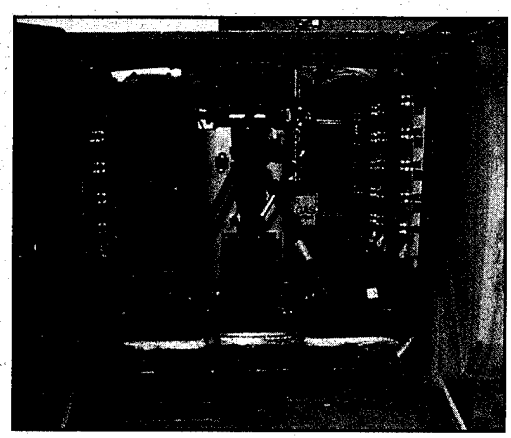
Description. This hazard category encompasses the concerns of diseases caused by pathogenic organisms and their toxins and enzymes. Generally, these concerns are confined to the issues of waste disposal, food handling, climatic control systems, and personal hygiene.

Example: **Electrical Generator/Environmental Control System (EG/ECS).**

This system provides electrical power, heating, and air conditioning for the components of the Deployable Medical System (DEPMEDS). The EG/ECS system consists of a 100-kilowatt generator system, a power distribution center, and an environmental control unit (heater and air conditioner), or ECU. The ECU is located outside the DEPMEDS enclosures and supplies conditioned air through a duct to nylon ceiling plenums. Return air is recirculated through a floor level duct and dehumidified by passing the air over an evaporator coil. As the air is cooled, water vapor condenses and collects in drip pans under the coil. Ideally, this water should drain freely from the ECU. However, water accumulated in the drip pan, became stagnant and was an ideal growth medium for microorganisms. The microorganisms were capable of causing hypersensitivity pneumonitis and Legionellosis as well as a variety of other respiratory diseases. The Health Hazard Assessment report recommended

- modification of the drip pans to ensure that the water drained properly and did not accumulate and

- performance of routine inspections of the drain pan, hoses, and evaporator coil to ensure that water does not collect and bacterial growth does not develop.



Correction of design error prevents bacterial contamination

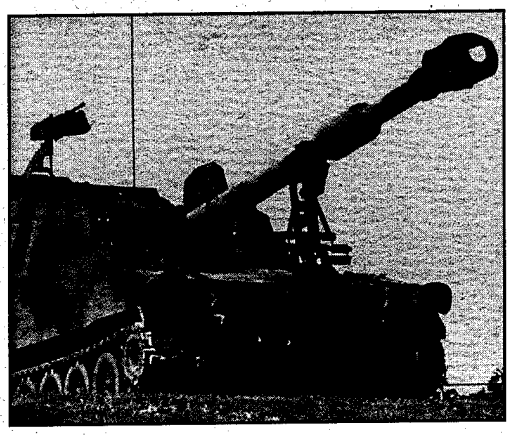
CHEMICAL SUBSTANCES

Description: The primary concern relates to exposure to the thousands of hazardous chemicals used in develop-

ing and operating Army systems. Exposures occur from inhalation, ingestion, and direct contact with these chemicals, which may exist as solids, liquids, gases, vapors, mists, fumes, or smokes. Common examples include exposure to combustion products from weapons firing or engine exhaust, chemicals contained in military smokes and obscurants, or vapors and mists from paints and coatings and exposures associated with manufacturing and maintenance activities.

***Example 1:* M-109A6 Paladin 155mm Self-Propelled Howitzer Munitions.**

The M-109A6 Paladin is a self-propelled armored and full-tracked howitzer. Previous health hazard assessment work had identified lead as a hazard attributable to the lead foil decoppering agent in the propellant charge for the munitions. Inorganic tin foil was suggested as a substitute for the lead foil. Testing revealed exposures to tin well below acceptable levels (one tenth of the standard) as compared to lead exposures that exceeded acceptable levels by a factor of 10. On the basis of this testing, tin foil is being considered as a substitute for lead foil.



Lead out, tin in – Simple substitution controls chemical health hazard

***Example 2:* JAVELIN Advanced Antitank Weapon System.**

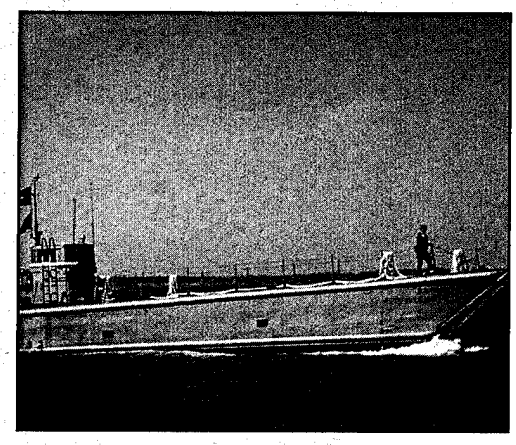
The JAVELIN is a man-portable, shoulder-fired antitank weapon. The weapon is designed to be fired from enclosed positions, from foxholes, or from positions in open terrain. Early developmental testing identified the potential for excessive lead exposures when the JAVELIN is fired from an enclosed position. Additional testing to determine the extent of the health hazard was performed. Air sampling results, coupled with blood lead analyses, were used to develop a model that predicted the operator's lead exposure levels. Modeling results indicated that up to 12 rounds could be fired safely from an enclosed position that meets the system's combat design criteria.

Potential lead exposure easily controlled

OXYGEN DEFICIENCY

Description: Oxygen deficiency is technically the reduction of the concentration of oxygen in the air below the normal concentration of 21 percent. Many technical organizations debate how great the reduction must be before adverse health effects occur. The primary health effects of concern are shortness of breath, impaired vision, and loss of coordination and judgment. At very low oxygen concentrations, unconsciousness and death may result. Common examples of conditions that create oxygen deficiency include high altitudes, confined spaces that are poorly ventilated, or displacement of oxygen by other gases.

Example: **Landing Craft Mechanized (LCM-8) Mod-1 Service Life Extension Program.**



Spaces or rooms designed only for equipment can become death traps

The LCM-8 is a Navy-designed watercraft approximately 73 feet in length and capable of carrying 60 tons. The vessel is designed to carry personnel and cargo in resupply or tactical operations. The Service Life Extension Program was a product improvement program designed to upgrade the engine and transmission performance of the vessels and extend their service life by 20 years. The health hazard assessment identified confined space and the use of fire extinguishing equipment as potential hazard issues. Liquid fuel fires are extinguished with carbon dioxide from portable fire extinguishers. Discharging these fire extinguishers in confined spaces causes the carbon dioxide to displace oxygen, creating an oxygen-deficient condition that can be very hazardous. The health hazard assessment report recommended that

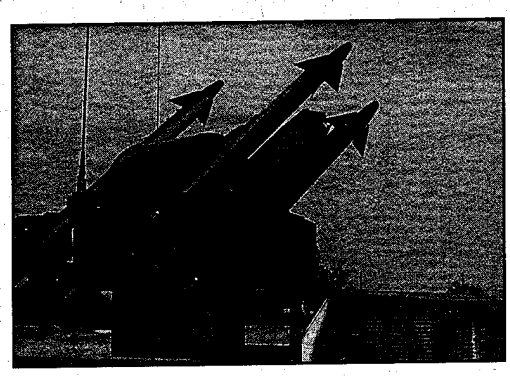
- all personnel be trained in the hazards associated with confined spaces and oxygen deficiency,
- personnel consider spaces where carbon dioxide fire extinguishers have been used to be oxygen deficient until properly ventilated and tested, and
- enclosed spaces, crew spaces, and spaces containing diesel fuel tanks be ventilated in accordance with current U.S. Coast Guard regulations.

RADIATION ENERGY

Description. Radiation energy is normally divided into two categories, ionizing and nonionizing radiation. Ionizing radiation has sufficient energy to ionize molecules in matter, disrupting chemical structures and possibly leading to cell damage. The principal health effects of concern are cancers, genetic alteration, and birth defects. Common examples of radiation hazards include certain medical diagnostic equipment such as X-ray equipment, electron microscopes, some radiofrequency generators, and meters and gauges that contain radioactive materials for illumination. There are two types of nonionizing radiation of primary concern to the Army: laser radiation and radio frequency radiation (RFR). Laser radiation hazards are primarily confined to burns of the skin and eyes, which vary in severity with the energy of the laser and time of exposure. Lasers are commonly used in military weapon systems for target acquisition, ranging, and detection purposes. RFR hazards are primarily confined to heating of the body tissue, burns, and electrical shock hazards from the equipment that generates the microwave radiation. RFR is used primarily in communication, surveillance, fire control, and target acquisition. Common examples of Army equipment using RFR include radar, radios, industrial heaters and sealers, and electronic countermeasure sets.

Example: **Phase III HAWK Air Defense Guided Missile System.**

The HAWK system defends against low- and medium-altitude attacking aircraft. The phase III product improvement provided a highly mobile air defense system that can search for, detect, and designate hostile targets. The primary search, detection, and designation equipment consists of one continuous-wave acquisition radar and one high-power illuminator radar. The primary health concerns are exposure to RFR during tactical operations, field maintenance, and depot level maintenance activities. The health hazard assessment identified several situations in which excessive exposures could occur and recommended the following actions to control those exposures:



Control of radar beams is needed to keep crew and nearby personnel safe

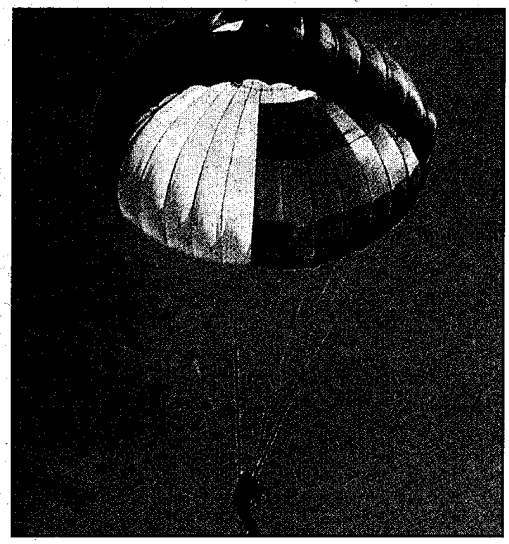
- Publish warning messages in all appropriate technical and field manuals.
- Enroll maintenance personnel in a medical surveillance program.
- Use warning lights, signs, barricades, and alarms to prevent soldiers from entering potential exposure areas in the field.

SHOCK

Description: Simply stated, shock is the general term used to describe rapid and violent application of force to the human body. These applications of force are normally characterized by short duration and high magnitude and result in acute nonpenetrating physical injury. The most common injuries that occur in the operation of military systems include head and chest injury, spinal column fractures, and lower and upper extremity injuries, primarily broken bones. The two most common examples of shock in systems are weapon recoil and the opening of parachutes.

Example: **Tactical Assault Personnel Parachute (TAPP).**

The TAPP was developed for use in low-altitude mass tactical assault airborne operations. The parachute was designed to lower the rate of decent and reduce the potential for injuries upon landing. The health hazard assessment performed identified shock to the neck due to rapid deceleration when the parachute opens and impact velocity upon landing as the primary health hazards associated with this system. The report recommended that additional testing be performed to determine whether use of the new lighter paratrooper helmet would reduce the shock to the neck to acceptable levels when the parachute opens. The report also recommended evaluation of the use of crushable foam in the helmet as a method to reduce head injuries that may occur during landing falls.



Helmet redesign helps avoid soldier injury during jumps

TEMPERATURE EXTREMES

Description: In dealing with temperature extremes, we are primarily concerned with the effects of heat and cold on soldier performance. Heat injuries are the product of the mission (work rate, clothing, load, and terrain), environmental conditions (temperature, humidity, solar load, and wind speed), and human factors (fitness, hydration, rest, nutrition, health, and acclimatization). The most common heat injuries are heat cramps, heat exhaustion, and heat stroke. Examples of Army systems that can contribute to heat strain and heat injuries include shelters, vehicles, and clothing systems, all of which limit ventilation and reduce the capability of the soldier to dissipate heat and maintain a normal body temperature. Cold injuries are also a product of mission, environmental conditions, and human factors. The most com-

mon cold injuries are frostbite and immersion foot. Army shelters, vehicles, and inadequate cold-weather clothing systems are the most common systems in which these hazards occur.

Example 1: **Pedestal Mounted Stinger (AVENGER).**

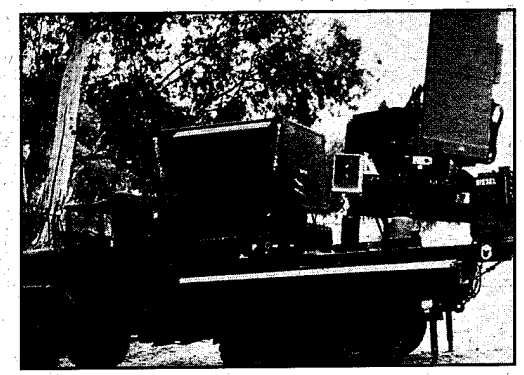
The AVENGER is a Stinger missile that is turret-mounted on a high-mobility multipurpose wheeled vehicle (HMMWV). It is designed for use against enemy fixed- and rotary-wing aircraft. The AVENGER is operated by a two-man crew. The gunner operates from inside the turret, and the driver operates from the driver's

Heat stress control enhances soldiers' performance

compartment. The health hazard assessment identified heat stress as a potential health hazard. Testing indicated that both the gunner and driver became uncomfortably hot following 60 minutes of firing when the outside temperatures near 85°F. When the gunner and driver operated in Mission-Oriented Protective Posture (MOPP), significantly higher heat loads were observed. Actual firing missions for the AVENGER may last up to 12 hours, and the associated heat loads on the gunner and driver may be well in excess of acceptable levels. The health hazard assessment report recommended installation of a cooling system at all crew positions.

Example 2: **Forward Area Air Defense (FAAD) Command, Control and Intelligence (C^2I) System, Block I.**

The FAAD C^2I System provides real-time airborne threat data to battlefield commanders and operates world-wide in hot, basic, and cold (-50°F to 120°F) climates. A health hazard assessment identified both hot and cold temperature extremes as significant hazards for personnel occupying soft-top shelters (STSs) mounted on HMMWVs. Recommendations from the health hazard assessment report caused the 101st Airborne Division to purchase electric heaters for use in conjunction with the STSs and for the 10th Mountain Division to switch to use of rigid-walled shelters that have internal heaters.



The FAAD C^2I System

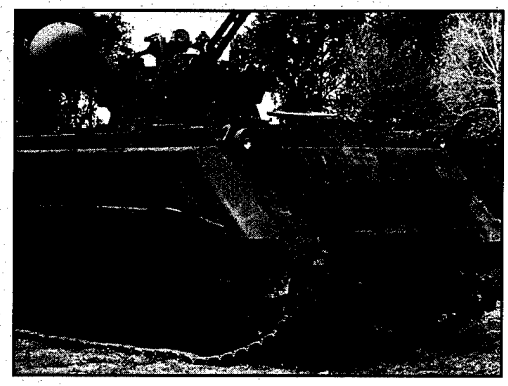
PHYSICAL TRAUMA

Description: For health hazard purposes physical trauma has three components: hazards from impacts to the eye or body from sharp objects, impacts to the eye or body from blunt objects, and injuries associated with repeated motion injuries (cumulative trauma disorders). Injuries associated with impacts from sharp and blunt objects are well understood. These hazards can be present in a wide variety of Army systems but predominate in crew-served weapons and systems designed to transport soldiers. Cumulative trauma disorders (CTDs) result from repetitive motions, forceful exertions, continuous mechanical stress or pressure, or from holding awkward body positions for long periods. The most common examples of CTD injuries are back injuries, carpal tunnel syndrome, and tendonitis. Many military systems have the potential to create environments where CTDs occur.

Example: **M 163A2 Self-Propelled 20mm Vulcan Air Defense System (VADS).**

This system consists of an M-168 20mm cannon mounted on a tracked vehicle chassis. The VADS provides air defense against low-altitude aircraft and ground defense against personnel, trucks, and lightly armored vehicles. The 20mm cannon is capable of delivering fire at rates of up to 3,000 rounds per minute. The health hazard assessment identified back injuries as a potential adverse health effect associated with this system. Crew members must lift ammunition boxes weighing 97 pounds from the ammunition carrier to the feed chute, a height of nearly 3 feet. The health hazard assessment report recommended

- redesign of the ammunition carrier and feed chute configuration to limit the maximum height of the lift,
- use of a two-person lift, if the lift height is increased to over 3 feet, and
- limiting the height of the lift to as low as possible, but always less than 3 feet.



Lowering lift height prevents back injuries

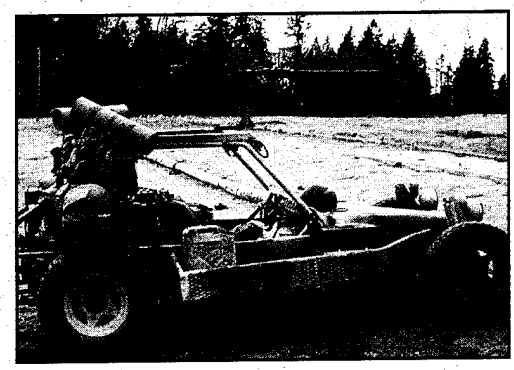
VIBRATION

Description. Vibration is most easily described as contact of a mechanically oscillating surface with the human body. It occurs primarily in operating hand held equipment or weapons that vibrate (segmental vibration) or from riding in vehicles over rough terrain (whole-body vibration). The primary health effects due to segmental vibration are circulatory disorders, bone and joint disorders, nerve conduction disorders, and muscle degeneration. Whole-body vibration health effects are primarily associated with back injuries. Other health effects attributable to whole-body vibration include abdominal pain, urinary difficulty, headaches, visual disturbances, and loss of balance. Most Army all-terrain vehicles create some whole-body vibration.

Example: **Fast Attack Vehicle (FAV).**

The FAV is a light-weight, all-terrain vehicle capable of high-speed, cross-country travel with high maneuverability and agility. The vehicle serves as a weapons or communications platform and carrier for anti-armor, reconnaissance, and other missions that require speed, agility, and all-terrain capability. The health hazard assessment revealed whole-body vibration as a significant health hazard. Vehicle crew members also suffered kidney and back injuries attributable to shock and vibration sustained during testing. The health hazard assessment report recommended

- redesigning the seats to include the addition of more padding to reduce both vibration and shock,
- redesigning the vehicle suspension system to increase its shock absorbency, and
- entering FAV operators into a medical surveillance program tailored to the identification of whole-body vibration health effects.



Better shocks, springs, and seats reduce crew injuries in desert dune buggy

U.S. Army Health Hazard Assessment Program Strategy

Comments and Suggestions

This strategy is a living document that must be continually updated to address current and changing issues. It was developed through an extensive participatory process involving personnel at all levels and from a wide range of functional specialties. The Army's senior leadership is committed to this strategy.

Please use this form to provide your comments, concerns, or suggestions. Your assistance is needed to keep the strategy current, responsive, and effective.

Please fill in your FAX number so we may respond to your suggestions and comments:

FAX this form to the Health Hazard Assessment Division at the U.S. Army Center for Health Promotion and Preventive Medicine (Provisional), DSN: 584-4117 or (410) 671-4117 or

Mail this form to Commander, U.S. Army Center for Health Promotion and Preventive Medicine (Provisional), ATTN: MCHB-MO-A (Bldg. E 1570), Aberdeen Proving Ground, MD 21010-5422.