GUIDE TO DEVELOPMENT OF THE PROGRAMMATIC ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH EVALUATION (PESHE)

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14. ABSTRACT

The purpose of this guide is to assist PMs, ESOH support staff, and other program personnel to formulate an ESOH management strategy; provide guidance, recommendations, and suggestions for PESHE development; help improve ESOH preparation for Army Systems Acquisition Review Council (ASARC) reviews and other milestone decision reviews; and identify sources of assistance and further guidance.

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PREFACE

The content of this guide is based on the latest information contained in Department of Defense (DoD) Directive 5000.1 (The Defense Acquisition System, May 12, 2003), DoD Instruction 5000.2 (Operation of the Defense Acquisition System, May 12, 2003), and the Defense Acquisition Guidebook (in preparation).

This guide is a living document that is modified, as necessary, to incorporate changes in Federal Legislation, Executive Orders, and DoD and Army policy and guidance. Users are advised to periodically visit the ASA(ALT) Digital Library website at http://library.saalt.army.mil

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ACRONYMS AND ABBREVIATIONS

AAPPSO	US Army Acquisition Pollution Prevention Support Office
ACAT	Acquisition Category
ACSIM	Assistant Chief of Staff for Installation Management
ACTD	Advanced Concept Technology Demonstration
AoA	Analysis of Alternatives
AR	Army Regulation
AS	Acquisition Strategy
ASA(ALT)	Assistant Secretary of the Army for Acquisition, Logistics and Technology
ASA(FM&C)	Assistant Secretary of the Army for Financial Management and Comptroller
ASARC	Army Systems Acquisition Review Council
CAIV	Cost as an Independent Variable
CAM	Cost Analysis Manual
CARD	Cost Analysis Requirements Description
CBTDEV	Combat Developer
CCA	Component Cost Analysis
CDD	Capability Development Document
CFR	Code of Federal Regulations
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
COTS	Commercial Off-the-Shelf
CPD	Capability Production Document
CRB	Cost Review Board
CX	Categorical Exclusion
DA PAM	Department of the Army Pamphlet
DASA(ESOH)	Deputy Asst Secretary of the Army for Environment, Safety and Occupational Health
DCMA	Defense Contract Management Agency
DDESB	Department of Defense Explosives Safety Board
DENIX	Defense Environmental Network and Information Exchange
DLA	Defense Logistics Agency
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DOPAA	Description of Proposed Action and Alternatives
DOT&E	Director, Operational Test and Evaluation
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Service
DU	Depleted Uranium
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Program
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESO	Environmental Support Office
ESOH	Environment, Safety, and Occupational Health
FAA	Federal Aviation Administration
FAADS	Forward Area Air Defense System
FCS	Future Combat Systems
FGS	Final Governing Standards
FNSI	Finding of No Significant Impact
FRP	Full Rate Production
FY	Fiscal Year
GOTS	Government Off-the-Shelf
HAZMAT	Hazardous Material
HHA	Health Hazard Assessment
HHAR	Health Hazard Assessment Report
HMMP	Hazardous Materials Management Program

ACRONYMS AND ABBREVIATIONS (Continued)

HQDA	Headquarters Department of the Army
HSI	Human Systems Integration
ICD	Initial Capabilities Document
ICT	Integrated Concept Team
IOT&E	Initial Operational Test and Evaluation
IPPD	Integrated Product and Process Development
IPT	Integrated Product Team
JG-PP	Joint Group on Pollution Prevention
LCCE	Life-Cycle Cost Estimate
LMI	Logistical Management Information
LRIP	Low-Rate Initial Production
MACOM	Major Army Command
MAIS	Major Automated Information System
MANPRINT	Manpower and Personnel Integration
MATDEV	Materiel Developer
MDAP	Major Defense Acquisition Program
MIL-STD	Military Standard
MS	Milestone
NAS	National Aerospace Standard
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NEPA	National Environmental Policy Act
ODC	Ozone Depleting Chemical
OEBGD	Overseas Environmental Baseline Guidance Document
P2	Pollution Prevention
PEO	Program Executive Officer
PESHE	Programmatic Environment, Safety, and Occupational Health Evaluation
PM	Program/Project/Product Manager
PM 2.5	Particulate Matter less than 2.5 microns in diameter
POE	Program Office Estimate
POM	Program Objective Memorandum
POL	Petroleum, Oil, and Lubricants
REC	Record of Environmental Consideration
ROD	Record of Decision
SHPO	State Historic Preservation Officer
SMMP	System MANPRINT Management Plan
SOFA	Status-of-Forces Agreement
SoS	System-of-Systems
SSMP	System Safety Management Plan
STARS	Strategic Target System
T&E	Test and Evaluation
TDS	Technology Development Strategy
TEMP	Test and Evaluation Master Plan
TOC	Total Ownership Cost
TRADOC	Training and Doctrine Command
TRI	Toxic Release Inventory
TSM	TRADOC System Manager
USACHPPM	US Army Center for Health Promotion and Preventive Medicine
USAEC	US Army Environmental Center
USASC	US Army Safety Center
USASMDC	US Army Space and Missile Defense Command
USATCES	US Army Technical Center for Explosives Safety
USC	United States Code
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

CHAPTER 1.0: INTRODUCTION

The Department of Defense (DoD) recognizes, based on its experience in funding expensive pollution cleanups for past weapons system programs, that identification of environment, safety, and occupational health (ESOH) risks early and throughout the acquisition process can avoid significant life-cycle costs, program delays, and negative impacts to system performance. DoD requires that this ESOH risk identification be part of an overall risk management strategy that becomes an integral part of the system's life cycle from concept refinement and technology development, through systems development and deployment, operations, and ultimately to demilitarization and disposal. ESOH risks are part of each program's overall cost, schedule, and performance risks, and the program should review them from within that overall context. A risk management strategy requires not just early and continuous identification of ESOH risks, but also an assessment of the magnitude and impacts of these risks, decision making on risk mitigation or acceptance, implementation of these decisions, and on-going evaluations of the effectiveness of these risk minimization efforts. ESOH risk management requirements and constraints must be identified, communicated, and applied to weapon systems in the same manner as any other system requirement. A weapon system cannot be considered successful if ESOH requirements are not integrated into its development, fielding, and disposal planning.

The DoD 5000 Series requires Program Managers (PMs) and other acquisition officials to identify and consider ESOH issues early in the acquisition process. The May 2003-revised DoDD 5000.1 *(The Defense Acquisition System)* requires the PM to be the "single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment" (Section E1.29). The PM must "provide knowledge about key aspects of a system at key points in the acquisition process" and reduce technology, integration, and manufacturing risk (Section E1.14). As part of the PM's risk reduction responsibilities, the May 2003-revised DoDI 5000.2 *(Operation of the Acquisition System)* requires the PM to "prevent ESOH hazards where possible and manage ESOH hazards where they cannot be avoided. The acquisition strategy must incorporate a summary of the Programmatic ESOH Evaluation (PESHE), including ESOH risks, a strategy for integrating ESOH considerations into the systems engineering process, identification of ESOH responsibilities, and a method for tracking progress" (Section E7.7).

The *Defense Acquisition Guidebook* (in preparation), replacement for the cancelled DoD Regulation 5000.2-R *(Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs)*, states in Chapter 5 that the PM is required to have a PESHE document at Milestone B that describes the management plan for integrating ESOH considerations into the systems engineering risk management process and the status of ESOH risk management. The PESHE transitions from an initial planning document at Milestone B into an ESOH risk management tool as the program matures

The PESHE is a management tool used to assist PMs and their staff in identifying and managing ESOH hazards and risks, and in determining how best to meet ESOH regulatory requirements and DoD standards. It is a living document that is continually updated and maintained throughout the progression of a program or project, from concept to disposal. The PESHE should include the following:

- Strategy for integrating ESOH considerations into the systems engineering process
- Identification of who is responsible for implementing the ESOH strategy
- Approach to identifying ESOH risks, reducing or eliminating the risks, and implementing controls for managing those ESOH risks where the program cannot avoid them

- Decision making authority for ESOH risks
- Method for tracking progress in the management and mitigation of ESOH risks and for measuring the effectiveness of ESOH risk controls
- Compliance schedule for completing National Environmental Policy Act (NEPA) and Executive Order (EO) 12114 (*Environmental Effects Abroad of Major Federal Actions*) documentation
- Identification of hazardous materials (HAZMAT), including energetics, used in the system
- Approach for, and progress in, integrating HAZMAT, energetics, and other ESOH considerations (e.g., environmental impacts, personnel safety, and regulatory compliance) into system demilitarization and disposal planning
- Approach for, and progress in, integrating ESOH into Test and Evaluation (T&E) planning and reporting.

Because the PESHE is a program document, it is not intended to supersede or replace other ESOH documents (e.g., System Safety Management Plan/Assessments, Hazardous Material (HAZMAT) Management Plan, Pollution Prevention Plans, and National Environmental Policy Act (NEPA) documents).

1.1 PURPOSE OF THE GUIDE

The purpose of this guide is to assist PMs, ESOH support staff, and other program personnel in the development of a PESHE that helps in the formulation of a comprehensive ESOH risk management strategy; meets all DoD 5000 Series requirements; and contains the program ESOH information necessary to support applicable Army Systems Acquisition Review Council (ASARC) reviews, and other major milestone decision/interim progress reviews.[1] It provides guidance, recommendations, and suggestions for preparing a PESHE that is useful to Army programs, meets the requirements of DoDI 5000.2, and best communicates to decision makers what ESOH issues affect the program. The information in this guide is presented in a format suitable for use throughout the Army acquisition community.

1.2 USE AND ORGANIZATION OF THE GUIDE

Use of the guide is recommended for all Army acquisition programs in the process of developing or revising their PESHE documents. The guide is intended to help make the PESHE a useful tool for PMs in carrying out their responsibilities for ESOH risk management early in the design process and throughout the weapon system acquisition life cycle.

Following the introduction of the guide in Chapter 1, Chapters 2 through 4 provide comprehensive guidance and information on PESHE development. Chapter 2 identifies key players and describes their level of involvement in the PESHE development process. Chapter 3 reviews the basic steps involved in developing the PESHE. Chapter 4 describes the components of a PESHE document, suggested formats to use, and the types of information that are normally included. Lastly, Chapter 5 lists the references that were used in the preparation of the guide.

[1] A list of typical ESOH-related questions that PMs can be expected to respond to at ASARC and other milestone reviews is provided in Appendix A of the guide.

Users of this guide should understand that the information contained is provided as guidance only for conducting and documenting ESOH evaluations. Because the guidance is not all-inclusive, each PM should tailor his/her compliance review to program-unique system requirements, installation locations, and operational parameters during testing, fielding, maintenance, deployment, operation, and demilitarization and disposal.

1.3 DoD 5000 SERIES POLICY, PROCEDURES, AND GUIDANCE APPLICABLE TO PESHE DEVELOPMENT

The DoD has invested billions of dollars cleaning up pollution resulting from its past weapon system development, production, sustainment, and disposal activities. In 1993, as a result of an audit of selected MDAPs, the DoD Inspector General found that there was inadequate consideration of environmental requirements and effects in acquisition planning, potentially causing significant program costs or delays. In the Fiscal Year (FY) 1995 Defense Authorization Act, Congress directed the Secretary of Defense to issue guidance concerning how to comply with NEPA requirements to analyze environmental impacts of acquisition programs and how to analyze life-cycle environmental costs early in the acquisition process. The DoD has recently rewritten and published policy and mandatory guidance in DoD Directive 5000.1 (*The Defense Acquisition System*) and DoD Instruction 5000.2 (*Operation of the Defense Acquisition System*) to assist PMs and other acquisition officials to fulfill their obligations to consider ESOH effects, risks, and costs in acquisition planning.[2] As noted earlier, the *Defense Acquisition Guidebook* is in preparation and will replace the *Interim Defense Acquisition Guidebook* (dated 30 October 2002), formerly DoD Regulation 5000.2-R.

The recent update of DoDI 5000.2 states that all programs, regardless of ACAT level, are to comply with ESOH requirements throughout the system life cycle. The PM must prevent ESOH hazards when possible and manage ESOH issues where they cannot be avoided as a part of risk reduction. The ESOH risk management process should identify the planned ESOH risk analysis matrices, based on the principles and philosophies of MIL-STD-882D *(Standard Practice for System Safety)*. The risk matrices should use clearly defined probability and severity criteria to categorize ESOH risks. PMs may elect either to establish a single consolidated risk matrix or to use individual ESOH matrices. The PM should strive to eliminate or reduce ESOH risks as part of the system's total life-cycle risk reduction strategy.

DoDI 5000.2, Table E3.T1 indicates that a PESHE document, including a National Environmental Policy Act (NEPA) compliance schedule, is required for Milestone B, Milestone C, and Full-Rate Production Decision Review. DoD directives and instructions do not describe a specific format for the PESHE document itself. The PM documents the PESHE in whatever manner is most useful to the program and best communicates to decision makers what ESOH issues affect the program. The PESHE must be summarized in the Acquisition Strategy, and the summary must include a discussion of ESOH risk, a strategy for integrating ESOH consideration into the systems engineering process, a means to incorporate ESOH considerations into the system engineering process, identification of ESOH responsibilities, development of a method to track progress, and a compliance schedule for NEPA/EO 12114 activities (see par E7.7, DoDI 5000.2).

DoDI 5000.2 requires PMs to prepare and update the PESHE over the system life cycle to reflect changes in the program or compliance requirements. Figure 1-1 shows the program phases and sub-phases, activities, and major milestones of the new "5000 Framework" of the acquisition life-cycle process, as defined in the latest update to DoDI 5000.2.

[2] The most recent versions of the DoD 5000 Series can be accessed at the following DoD website: http://dod5000.dau.mil

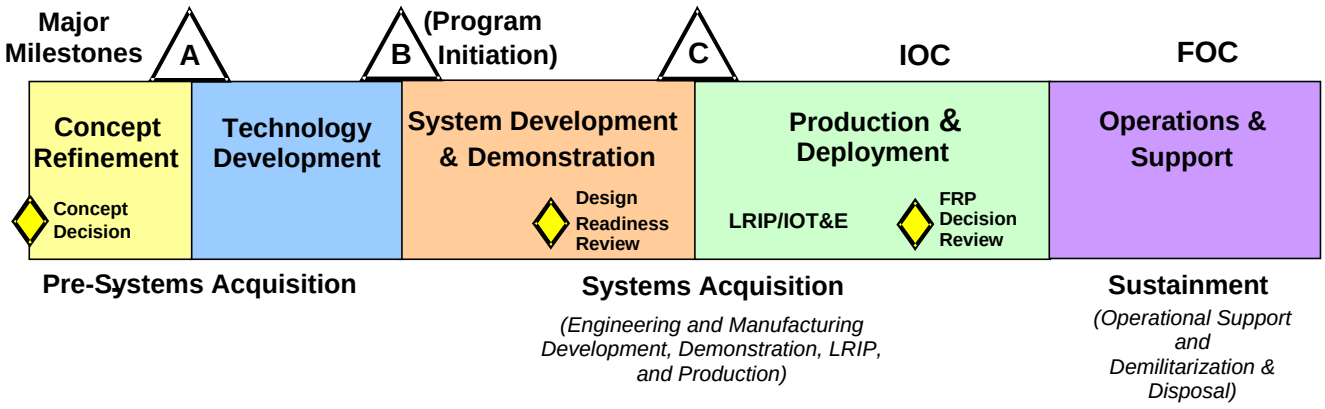

Figure 1-1. DoDI 5000.2 Defense Acquisition Management Framework

1.4 BENEFITS OF ESOH MANAGEMENT IN ACQUISITION PROGRAMS

In addition to successful program reviews, many benefits result from performing a thorough ESOH risk management. The risks associated with "show stoppers" arising from NEPA or other compliance issues are reduced. Contractor production costs may be decreased by the reduction in the need for hazardous materials purchase and handling, and waste stream processing. Proactive hazardous materials and pollution prevention management programs will result in a cost savings to the government in later years by eliminating or greatly decreasing the volume of hazardous materials that have to be handled during the operation, support, and disposal phases of the fielded system. In addition, eliminating or controlling health and safety hazards reduces injuries and illness, compensation claims, lost time, and training restrictions, resulting in improved soldier and system performance and readiness.

ESOH risk management is not just a developmental area of interest, but an operational area as well. Unforeseen ESOH impacts can become operational impacts by restricting or halting missions, reducing the funds available for operations and maintenance, and increasing costs due to restrictive regulations.

Following are some lessons learned on how ESOH issues and requirements have impacted Army programs and actions.

- **Forward Area Air Defense System (FAADS) Testing at White Sands Missile Range.** In May 1989, an Army drone helicopter being used in the FAADS testing crashed and caused a 5,000-acre range fire. The original environmental analysis did not address the potential for range fires. Testing was subsequently delayed for two months while an Environmental Assessment (EA) was prepared, in accordance with NEPA, which implemented adequate mitigation measures for possible range fires during testing.

- **Bradley Fighting Vehicle.** In FY 1996, the Bradley Fighting Vehicle Program Office established a Pollution Prevention Program requiring every prime and major subsystem contractor to establish pollution prevention programs based on National Aerospace Standard (NAS) 411 (*Hazardous Material Management Program*). Since then, the program has achieved significant reductions in the use of zinc chromate, methylene chloride, methyl ethyl ketone, acetone, ethylene glycol, and many other volatile organic compounds (VOCs). With the removal

of hazardous materials from manufacturing operations, direct and overhead costs of prime and subcontractors were reduced. In addition, expenses for hazardous material fees, hazardous waste treatment and disposal, and remediation activities were eliminated.

- **Strategic Target System (STARS) Testing at the Pacific Missile Range Facility.** The Pacific Missile Range Facility on Kauai, Hawaii was selected for STARS test launches because the Polaris rocket motors used by STARS had too short a range to be launched from Vandenberg Air Force Base to Kwajalein Atoll, and longer range Minuteman I boosters were not available. Because environmental concerns were not given sufficient consideration, the STARS Program decision to prepare an EA failed to anticipate public controversy, fully identify state and environmental review requirements, or provide adequate opportunity for public involvement. These unrecognized public concerns led to legal and political challenges which ultimately forced the Army to prepare an Environmental Impact Statement (EIS). The STARS program was delayed for two years at a cost of $27 million.

- **Fielding of Smoke Generators.** The Army mission requires the development and use of smokes and obscurants for use on the battlefield, which in turn requires training exercises on installations throughout the United States. During the fielding of new smoke generators on military installations, a crisis developed over the deployment of the new equipment. Traditionally, installations had been responsible for the NEPA analyses associated with new equipment. However, the characteristics and environmental effects of this new equipment were neither well known nor communicated to installations receiving the equipment, rendering a NEPA analysis at the installation level impossible.

  This situation created delays in the fielding of the smoke generators, unacceptable to the PM, and illustrates the value of and need for communication between acquisition PMs and installation environmental offices. This crisis served to strengthen the environmental portions of the Materiel Fielding Plans (MFPs) and led to the provision for needed communications into the revision of AR 200-2 *(Environmental Analysis of Army Actions)*. In addition, this case also exemplifies the opportunity for "programmatic" NEPA analyses—discussing generic characteristics and impacts at the program level, and allowing fielding installation to "tier off" those documents for site-specific analyses as needed. Such approaches can be very efficient and effective, and ensure the timely inclusion of environmental issues into decisions at the appropriate level.

- **Makua EA.** In support of the overall Army mission and the evolving Army Transformation, a firing range was required in Hawaii at Makua. In spite of numerous (40+) endangered species and many cultural resources, the Army published an Environmental Assessment (EA) and an accompanying Finding of No Significant Impact (FNSI). Environmental interest groups, lead by Earth Justice, sued the Army, contesting the FNSI and proposing that potential significant impacts warranted an Environmental Impact Statement (EIS), given the environmental sensitivity of the site and subsequent potential for significant impacts. After some 12-24 months of litigation, the courts ruled in favor of Earth Justice. As a result, the Army has been forced to produce an EIS (at additional cost and time).

  In retrospect, the use of a "mitigated EA" at Makua was ill advised, given the sensitive nature of the environmental setting. This attempt to use an EA, instead of the EIS and associated public involvement, led to litigation that has effectively delayed the full-scale implementation of range activities, first during litigation and now during the preparation of the EIS. Given the sensitive nature of the site and the vocal opposition to the project, the need for an EIS could have been foreseen and initiated, reducing the overall timeline of the NEPA analysis. Delays in the project

were due to attempts to "mitigate away" the significance of potential impacts, and preoccupation with a mitigated EA as a creative alternative to an EIS.

In such a case, the need for an EIS should have been obvious, based upon controversies (the number of endangered species, the existence of cultural resources, and voiced public concerns). An EIS could have been promptly initiated and the project could have been initiated earlier.

- **Fort Polk Multi-Purpose Range Complex**. In the mid-1980s, the Army decided to equip the 5th Mechanized Infantry Division at Fort Polk, LA, with the newest combat vehicles—the Abrams main battle tank, the Bradley fighting vehicle, and the Apache attack helicopter. The Directorate of Engineering and Housing (DEH) at Fort Polk began working on an EA for two sites under consideration for a new Multi-Purpose Range Complex (MPRC)—a modern test range and training facilities for the new vehicles—to support the infantry, armor, and helicopter training requirements. Based on results of the EA, the planners at Fort Polk then decided to prepare an EIS encompassing four potential sites. The key to the real success of the EIS process was early incorporation of environmental analysis into the planning process, an action that facilitated a spirit of cooperation which, with encouragement from the military leadership, led to the EIS being an integral part of mission planning and decision making. The public and environmental groups accepted the results of the EIS and site selection, particularly because mitigation measures were identified to help protect natural resources, including protection of the red-cockaded woodpeckers' nests, soil erosion control, forest management changes, and wildlife protection. However, mitigation measures specified in the EIS were not properly implemented. Consequently, contract change orders were required to better accomplish the required mitigation measures (e.g., erosion controls). Fort Polk learned that merely identifying mitigating actions in the EIS is not enough. Monitoring is required to assure that the actions are adopted and put into effect.

- **Ehime Maru Accident**. In February 2001, the USS *Greeneville*, a Los Angeles class attack submarine, collided with *Ehime Maru*, a Japanese high school fisheries training vessel, south of Honolulu, HI. The accident resulted in the sinking of *Ehime Maru* and loss of nine Japanese students and crew. Within weeks of the accident, NAVSEA and their salvage contractors had completed deep marine surveys of the wreckage (830 ton vessel; 2,003 feet below the surface), and had determined that it was technically feasible to lift and relocate *Ehime Maru* for recovery purposes. The decision to proceed with the deep-water recovery initiated detailed operational and recovery planning. The environmental planning program served as an integral component of the complex recovery mission. Of particular concern were environmental threats related to release of potentially significant quantities of diesel fuel and lubricating oil trapped on-board. Hawaiian waters and beaches are among the most pristine in the world and primary economic resources for HI. The Navy, needing to understand the potential recovery environmental impacts and any mitigation measures needed to control possible spills, employed the Army Space and Missile Defense Command (SMDC) and its contractor team to prepare an EA prior to the recovery operational weather window beginning in July 2001—a mere 10 weeks after initiation. An EA of this scope and complexity historically has taken 9 months to prepare. The impact of this short suspense was that the EA became the critical path upon which a global and costly recovery logistics and mobilization effort depended. The EA was developed concurrent with mobilization of assets and on-going operational planning. The benefits of the EA being developed real time with the operational planners allowed a unique opportunity to make recommendations to approaches, design and preventive measures which improved the mission's potential for success. The EA in effect became the "Recovery Plan" for Navy managers, guiding and influencing actions and responses to avoid or mitigate anticipated releases. In addition, state and federal

regulators were involved early and throughout the environmental planning, thereby expediting completion of the EA under considerable time constraints. The successful Navy recovery effort can be attributed to this highly effective environmental planning that integrated environmental recommendations into all phases of the Navy mission and facilitated the recovery.

In summary, ESOH risk management is similar to logistics management in that design influence is most effective early in the program. Consideration of ESOH issues by key program personnel is critical in the early stages when concepts and designs are fluid. During program definition and the development of operational requirements, a critical review of potential ESOH risks may result in changes that will greatly reduce life-cycle costs and ESOH impacts, while maintaining or even enhancing system performance. When corrections and changes for ESOH problems are dealt with later in the life cycle, they are more likely to be costly and impede the acquisition process, as Figure 1-2 shows.

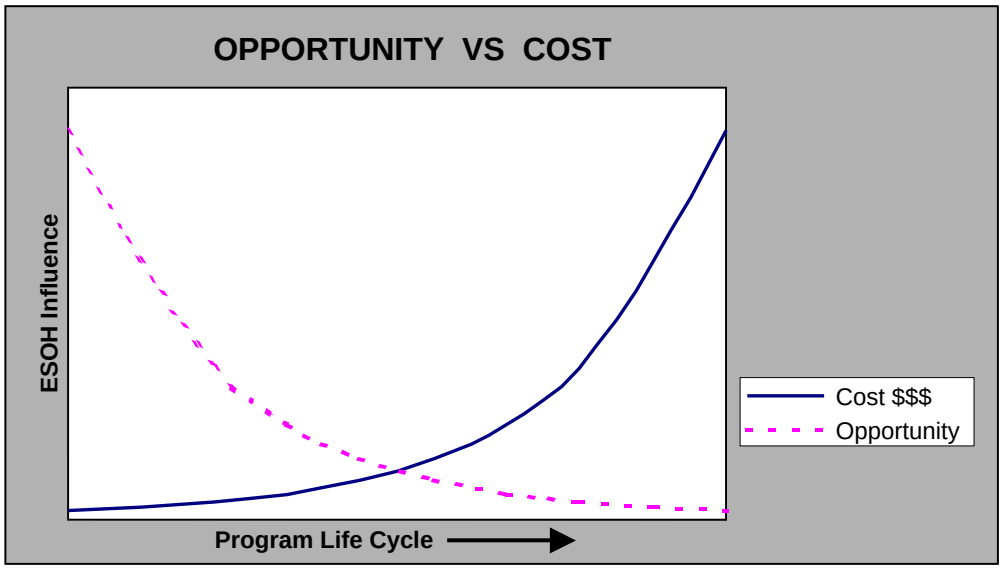

Figure 1-2. ESOH Opportunities for Influence vs. Relevant Costs Over the Program Life Cycle

1.5 SOURCES FOR ADDITIONAL ASSISTANCE, GUIDANCE, AND INFORMATION

Depending on the complexity of the acquisition, developing and maintaining a useful, comprehensive, and informative PESHE can be an involved task. It is recognized that significant expertise is available to the PM, and to members of his/her office, from local support organizations (e.g., major Army command (MACOM) environmental and safety offices) and systems engineering/technical assistance contractors; however, further assistance or guidance may become necessary. This section provides a list of sources for additional assistance, guidance, and information for use during development and maintenance of an acquisition program's PESHE.

Sources for Assistance

- **Environmental Support Office (ESO) of Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA (ALT)), formerly known as AAPPSO.** The mission of the Army Acquisition Pollution Prevention is to promote stewardship within Army weapon system and industrial base. The Environmental Support Office (ESO) (AMCOPS-IEI/SAAL-PE)

oversees the A2P3 by reducing constraints on Army operational readiness through integrating environmental considerations into the materiel life-cycle. Through policy development, direct acquisition and logistics support, and encouraging technology exploitation, the ESO helps to resolve environmental issues through pollution prevention solutions that protect the soldier and civilian workforce, enables training, and sustains mission readiness.

Telephone: (703) 806-9242, DSN 656-9242
Web Information: http://www.environmentalsupportoffice.com/

- **US Army Environmental Center (USAEC).** In helping to implement the Army's Environmental Programs, the USAEC provides a broad range of environmental services (e.g., cleanup, NEPA compliance, and pollution prevention) and products to Headquarters Department of the Army (HQDA), MACOMs, and commanders worldwide. For acquisition programs, the USAEC provides support in several areas, including: (1) support to the Assistant Chief of Staff for Installation Management (ACSIM) and the Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health (DASA (ESOH)) for the ASARC and the Cost Review Boards (CRB); (2) membership on the IPTs of pertinent PMs whose systems or commodities have the potential to significantly impact Army installations and/or the environment; (3) support to Program Management Offices in the review of PESHEs for the purpose of assisting the PM in integrating ESOH requirements into their system engineering process; and (4) support to Program Offices in the review of their NEPA analyses and in the development of NEPA strategies.

  Telephone: (410) 436-6854, DSN 584-6854
  Web Information: http://aec.army.mil/

- **US Army Center for Health Promotion and Preventive Medicine (USACHPPM).** The USACHPPM's mission is to provide worldwide technical support for implementing preventive medicine, public health, and health promotion/wellness services into all aspects of the Army community. The USACHPPM's support to acquisition programs includes: (1) responsibility for the preparation of the required Health Hazard Assessments (HHAs) for Army systems undergoing development or improvement; (2) evaluation of laser and optical radiation hazards to soldiers, aviators, and other Army personnel and civilians; (3) health risk assessments for soldiers and the general public exposed to ionizing radiation; (4) source emission (stack) testing and air pollution health impact assessments; (5) noise monitoring and modeling; (6) evaluation of hazardous waste management procedures; (7) pollution prevention opportunity assessments; and (8) industrial wastewater analyses.

  Telephone: (800) 222-9698
  Web Information: http://chppm-www.apgea.army.mil/

- **US Army Safety Center (USASC).** The USASC is responsible for administering the Army Safety Program. The program is designed to create safe air and ground operations, and promote safe practices by military and civilian personnel both on and off duty. The USASC synchronizes efforts across the Army's MACOMS and the Army staff during the development and day-to-day management of safety policies, while commanders execute those policies and procedures at the unit level. Major responsibilities of the USASC include: (1) conducting independent system safety assessments for ACAT I programs; (2) assisting with on-site internal evaluations of risk management and command safety programs; (3) conducting safety training for military and civilian safety professionals; (4) developing, coordinating, and disseminating Army Safety

Program policy, direction, and guidance; and (5) conducting accident investigations for aviation and certain ground accidents.

Telephone: (334) 255-1390, DSN 558-1390
Web Information: http://safety.army.mil/home.html

- **US Army Technical Center for Explosives Safety (USATCES).** The USATCES is an element of the Defense Ammunition Center, established to review the Army's explosives safety program and implement sound, vigilant explosives/chemical agent/ordnance and explosives safety principles. Some of the USATCES responsibilities include: (1) providing toxic chemical agent safety technical information and assistance to support and enhance the Army Chemical Agent Safety Program; (2) developing HQDA policies, procedures, and regulations addressing safety controls used during cleanup of ammunition and explosives; (3) providing on-site explosives mishap technical assistance in support of the US Army Safety Center; (4) tracking DoD Explosives Safety Board (DDESB) surveys to assist and support MACOMS in accomplishing corrective measures; and (5) maintaining and updating the DoD Joint Hazard Classification System database of final hazard classification data for the military services' ammunition and explosives.

  Telephone: (918) 420-8919, DSN 956-8919
  Web Information: http://www.dac.army.mil/es/default.htm (NOTE: This site is restricted for OPSEC purposes, and access requires a user name and password.)

- **Joint Group on Pollution Prevention (JG-PP).** The JG-PP is a partnership between the military services, the National Aeronautics and Space Administration (NASA), and the Defense Contract Management Agency (DCMA), chartered by the Joint Logistics Commanders to reduce or eliminate hazardous materials or processes within the acquisition and sustainment communities. The JG-PP can assist PMs with the following: (1) identifying pollution prevention opportunities that can be undertaken jointly by multiple system managers in concert with one or more original equipment manufacturers or their facilities; (2) ensuring critical system performance requirements are addressed; (3) identifying environmentally acceptable alternatives that have the potential to replace hazardous materials; (4) identifying testing costs, testing locations, sources of funding, and contract vehicles; (5) conducting or overseeing validation testing; and (6) using the Single Process Initiative to implement validated alternatives on systems.

  Telephone: (703) 617-9651, DSN xxx-xxxx (for the Army point of contact on the JG-PP)
  Web information: http://www.jgpp.com/

- **Department of Defense Explosives Safety Board (DDESB).** The DDESB was established to provide oversight of the development, manufacture, testing, maintenance, demilitarization, handling, transportation, and storage of explosives, including chemical agents, on DoD facilities worldwide. The DDESB mission is to provide objective advice to the Secretary of Defense and Service Secretaries on matters concerning explosives safety, and to prevent hazardous conditions to life and property on and off DoD installations from the explosive and environmental effects of DoD titled munitions. Some of the DDESB's responsibilities include: (1) developing and promulgating explosives safety policies, regulations, and criteria that comply with federal, state, and local legislative requirements; (2) facilitating reporting of explosives safety mishaps; (3) supporting research, development, testing, and evaluation of explosion effects; (4) reviewing and approving site plans for storage of ammunition and explosives; and (5) establishing standards for the clearance of unexploded ordnance (UXO) from contaminated lands.

Telephone: (703) 325-0891, DSN 221-0891
Web Information: http://www.ddesb.pentagon.mil/

Sources for Additional Guidance and Information

- **ASA(ALT) Digital Library.** Ms. Tina E. Ballard, Deputy Assistant Secretary of the Army for Policy and Procurement, recently signed out a policy memorandum reminding Army ACAT III Program Managers that DoDI 5000.2 ESOH requirements apply to all Acquisition Category programs. ASA(ALT) has been participating with a DoD ESOH integrated process team to develop these requirements and guidance for Program Executive Offices (PEOs) and Program Managers (PMs) of all services. As the Army acquisition community awaits the fruition of the Acquisition Community Connection and final revision of DA Pamphlet 70-1, approved guidance from the DoD ESOH IPT has been placed in the ASA (ALT) digital library.

  Web Access: http://library.saalt.army.mil

- **AT&L Knowledge Sharing System (AKSS).** The AKSS is a web-based and compact disc automated reference tool sponsored by the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. AKSS provides acquisition information for all DoD service components and across all functional disciplines. The web site includes direct access to policy and guidance documents (mandatory and discretionary), templates, training, news and other publications.

  Web Access: http://akss.dau.mil/jsp/default.jsp

- **Acquisition Community Connection (ACC).** Sponsored by the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, the ACC offers authoritative acquisition, technology, and logistics information, and access to experts and peers working on critical AT&L processes. As part of recent updates to the ACC, PMs can now access applicable ESOH information including: (1) summaries of ESOH statutory and regulatory requirements, (2) a review of DoD 5000 Series requirements and ESOH-related documents (e.g., PESHE and Acquisition Strategy), (3) guidance for integrating ESOH into the Integrated Product and Process Development (IPPD) Process, (4) a listing of ESOH review considerations, (5) ESOH checklists by acquisition phase, and (6) a variety of lessons learned.

  Web Access: http://acc.dau.mil/simplify/ev_en.php

- **Defense Environmental Network and Information Exchange (DENIX).** DENIX provides DoD personnel in the ESOH arena with timely access to relevant legislative, compliance, restoration, cleanup, and DoD guidance information. It is intended to serve as a central electronic "meeting place" where information can be exchanged among environmental professionals worldwide.[3]

  Web Access: https://www.denix.osd.mil/

- **Risk Management Guide for DoD Acquisition 2003 (Fifth Edition, Version 2).** This document provides risk management guidance for the program management practitioner and is

[3] Because DENIX is a controlled web site, a user name and password is required for access to the DoD menu. To set up an account, contact the DENIX Account Manager via e-mail at acctmgr@www.denix.osd.mil.

the product of a joint effort among the DAU, the USD (AT&L), and acquisition management organizations throughout DoD. It is based on materials developed by the DoD Risk Management Working Group.

Web Access: http://www.dau.mil/pubs/gdbks/risk_management.asp

- **Rules of the Road—A Guide for Leading Successful Integrated Product Teams (Revision 1, October 1999).** This guide is designed to assist the PM and supporting acquisition community in developing and executing high-performance IPTs.

  Web Access: http://www.acq.osd.mil/ap/

- **US Army Space and Missile Defense Command (USASMDC)—Explosives Safety.** This USASMDC web page provides links to various DoD and Army explosives safety directives, regulations, standards, and other pertinent documents.

  Web Access: http://www.smdc.army.mil/SAFETY/explosiv.html

- **Army Cost Analysis Manual (CAM) (May 2002).** The Army CAM provides the basic methodologies and procedures for implementing cost analysis policies. The recently revised Chapter 6 provides an overview of topics on environmental quality costing for any weapon system.

  Web Access: http://www.ceac.army.mil/pubs/default.asp

CHAPTER 2.0:
ROLES AND RESPONSIBILITIES

This chapter contains information on the roles and responsibilities of those key participants involved in the Army PESHE development process. For ESOH risk management to be successful, participants must understand their responsibilities and work as a team by maintaining a high degree of communication, interaction, and coordination. Experts in the program areas of engineering, testing, manufacturing, environmental management, system safety, health, program management, etc., as well as the eventual system user, should interface early and frequently via IPT meetings and through other means as part of the systems engineering process. This approach both assists in documenting the ESOH evaluation and ensures that ESOH risk management strategies are implemented in the day-to-day program activities.

2.1 COMBAT DEVELOPER/TRADOC SYSTEM MANAGER

The Combat Developer (CBTDEV)/Training and Doctrine Command (TRADOC) System Manager (TSM) has a role in the assimilation of much of the ESOH data/information that the PM must rely on in preparing his initial PESHE document and in preparing the summary of the PESHE analyses (DoDI 5000.2, E.7.7) in preparation for Milestone (MS) B (DoDI 5000.2, Table E3.T1.).

The 32 Code of Federal Regulations (CFR) Part 651 (*Environmental Analysis of Army Actions*) states the following responsibilities for the Commander of TRADOC:

1) Ensure that NEPA requirements are understood and options incorporated in the Officer Foundation Standards (OFS).
2) Integrate environmental considerations into doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) processes.
3) Include environmental expert representation on all Integrated Concept Teams (ICTs) involved in requirements determinations.
4) Ensure that TRADOC CBTDEVs retain and transfer any environmental analysis or related data (such as alternatives analysis) to the MATDEV upon approval of a materiel need. This information and data will serve as the basis for the MATDEV's Acquisition Strategy and subsequent NEPA analyses.
5) Ensure that environmental considerations are incorporated into the Mission Needs Statements/Initial Capabilities Documents (ICDs) and Operational Requirements Documents/Capability Development Documents (CDDs).

Paragraph 2-37 of Army Regulation (AR) 70-1 (*Army Acquisition Policy*) states the Commanding General of TRADOC shall support the PM and provide necessary data to support the ESOH evaluation and shall provide TRADOC representative(s) to IPT(s) as required. It would also be prudent for the PM to have his designated ESOH manager participate in ICT meetings.

The ESOH representative of the ICT and ESOH manager from the PM’s office should jointly try to identify ESOH data requirements that need to be spelled out in the Technology Development Strategy (TDS) that must be approved at MS A to enter into the Technology Development Phase. These requirements could include documentation of how ESOH was considered as part of the systems engineering process (i.e. Analysis of Alternatives), documentation of any NEPA analyses which needed to be performed to support test and evaluation (T&E) of the selected technology components,

documentation of hazardous materials in selected technology components or anticipated impacts associated with materiel solution accepted, and surveys or observation of environmental impacts following T&E activities.

The CBTDEV should, in the spirit of NEPA, develop a preliminary NEPA analysis that includes the description of the proposed action (i.e., the Technology Development selected) and an evaluation of alternatives (material solutions which could meet the ICD). These preliminary NEPA analyses would be instrumental in assisting the PM in developing an early programmatic NEPA analysis.

2.2 PROGRAM/PROJECT/PRODUCT MANAGER

As required by DoDD 5000.1, the PM, reporting to the Milestone Decision Authority (MDA), is the "single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment." PMs must reduce:

- Technology risk and identify technology alternatives (prior to program initiation),
- Integration risk and demonstrate product design (prior to the design readiness review), and
- Manufacturing risk and demonstrate producibility (prior to full-rate production).

As part of the PM's risk reduction responsibilities, DoDI 5000.2 requires the PM to prevent and manage ESOH hazards. ESOH risk management is an integral component of the PM's Acquisition Strategy. The *Defense Acquisition Guidebook* Chapter 6 (in preparation) notes that the best time to reduce acquisition program risks—life-cycle costs and program schedule—is early in the acquisition process, during which the PM and the operational requirements developer can coordinate and evaluate early in the program any life-cycle trade-offs.

In preparing the PESHE document, the PM must understand that no one person is likely to be knowledgeable of all areas to be covered for ESOH risk management. However, those involved with developing the PESHE should be knowledgeable of the DoD ESOH requirements, and should be given access to key personnel involved in the program planning and ESOH-related activities.

For a program to be successful in achieving and maintaining ESOH risk management compliance, the PM must take a proactive, visible role to instill an ESOH ethic throughout his/her staff. This point cannot be overemphasized. The success of integrating ESOH risk management requirements into the program is questionable without constant support and direction from the PM.

It is also imperative that the PM prepares programmatic NEPA analyses/documentation as early in the program as possible so that early identification of potential ESOH compliance risks can be identified and monitored/assessed during early T&E activities. Record keeping and lessons-learned from all T&E activities during Technology Development and System Development and Demonstration should be encouraged. PMs should review Test and Evaluation Master Plans (TEMPs) and identify requirements for measurement/quantification of potentially significant environmental impacts, during T&E activities, when significant environmental impacts are anticipated to occur based on engineering analyses or experience with legacy systems. Examples of information that could be gathered are as follows: taking pictures of rutting in training areas; taking soil sedimentation loading measurements in rivers that are crossed; measuring noise profile data; monitoring engine emission data; monitoring particulate matter less that 2.5 microns in diameter (PM 2.5) emissions or dust generated from vehicles traveling down the range; documenting any petroleum, oil, and lubricants (POL) leaks or other releases of hazardous materials; documentation of effects on sensitive plant or biological

species; etc.. This information will help to shed light on which program actions are likely to have potentially significant environmental impacts when fielded to various installations, and will support installations in their scoping analyses and in the preparation of their site-specific NEPA analyses/documentation

Consistent with 32 CFR Part 651, a generic (and general) impact analysis of the actions should be included in the programmatic NEPA document. As noted below, the MATDEV is responsible for this documentation.

- 651.5(m)(2): "MATDEVs are responsible for the documentation regarding general environmental effects of all aspects of the system (including operation, fielding, and disposal) and the specific effects for all activities for which he/she is the proponent."
- 651.5(n): "AR 700-142 requires that environmental requirements be met to support materiel fielding. During the development of the Materiel Fielding Plan (MFP), and Materiel Fielding Agreement (MFA), the MATDEV and the materiel receiving command will identify environmental information needed to support fielding decisions. The development of generic system environmental and NEPA analyses for the system under evaluation, including military construction requirements and new equipment training issues, will be the responsibility of the MATDEV. The development of site-specific environmental analyses and NEPA documentation (EA/EIS), using generic system environmental analyses supplied by the MATDEV, will be the responsibility of the receiving Command."
- 651.14(c), footnote 2: "As an example, an appropriate way to address diverse weapon system deployments would be to produce site-specific EAs or EISs for each major deployment installation, using the generic environmental effects of the weapon system identified in a programmatic EA or EIS prepared by the MATDEV."

Preparation of early programmatic NEPA analyses/documentation by the PM, also helps to avoid schedule-risk and allows for identification of environmental impact mitigation measures early enough so that they can be programmed for in the Program Objective Memorandum (POM).

2.3 ESOH SUPPORT STAFF

In addition to relying on in-house environmental staff, the PM can usually obtain PESHE support through the MACOM environmental and safety offices, systems engineering/technical assistance contractors, or other environmental contractor support. In some cases, development of the PESHE will require a teaming of government and contractor personnel.

If the task of developing the PESHE document is assigned to a government and/or environmental contractor team, the team is going to need an in-depth understanding of many technical aspects of the program so that the outside ESOH experts can determine what regulatory requirements apply. Once this is done, the team will need to communicate the PESHE results back to the PM, system planners and engineers, in ways that are meaningful to the program design, production, and operational efforts.

2.4 SYSTEM USER

The user will eventually inherit the weapon system. Decisions made early in the program will have ramifications for the life of the system. Because life-cycle analyses are a fundamental part of the ESOH evaluation, the user must contribute his or her sensitivities to ESOH issues as early as possible in the design process. For example, users at installations may identify possible impacts that can be proactively resolved by changes in system design or logistical support. Alternatively, they can plan

and manage system fielding by modifying permits or preparing other mitigation procedures that eliminate local constraints on the use of the system.

2.5 TESTING/GAINING INSTALLATIONS

It is often the case that developmental testing, fielding, maintenance, and the operation of weapon systems result in environmental impacts, with the most significant impacts occurring after fielding. To minimize such impacts at home and at host installations (including military facilities, ranges, training lands, and maintenance/supply depots), the environmental characteristics of a new or modified weapon system should be coordinated with Environmental Office staff at testing/gaining installations as early in development as possible, so potential impacts can be evaluated for special management or mitigation consideration. In developing a program ESOH strategy, early planning and cooperation with installations may reduce the total ownership cost (TOC) and help maintain program schedules.

2.6 OTHER SUPPORTING AGENCIES

At the request of the PM, other agencies including the ESO office of ASA (ALT), USAEC, USACHPPM, and the Army Safety Center can provide subject matter expertise in identifying ESOH compliance requirements and in developing ESOH strategies (see also Section 1.5 of this guide). The Defense Logistics Agency (DLA) can play a critical role in establishing supply support, and technical and logistics service requirements for weapons programs.[1] As a field activities service of the DLA, the Defense Reutilization and Marketing Service (DRMS) can provide insight into current and expected future problems of system disposal.[2]

[1] The DLA web home page is accessible at http://www.dla.mil/.

[2] The DRMS web home page can be accessed at http://www.drms.dla.mil/, or contact the local Defense Reutilization and Marketing Office (DRMO) for information.

CHAPTER 3.0:
STEPS IN DEVELOPING THE PESHE DOCUMENT

In the sections to follow, the basic steps for preparing and updating the PESHE document are described. It is important to remember that as part of an overall program risk management strategy, all acquisition program participants should take an active role as early as possible in identifying and understanding potential program uncertainties – whether due to cost, schedule, performance considerations, or ESOH issues. Risk evaluation can vary depending on the program's phase, acquisition strategy, technology, level of integration, and other factors. But the best practice for effective risk management is to follow a plan that at least includes a continuous assessment process to evaluate all risks (cost, schedule, performance, or ESOH), a method for handling the risks, and a monitoring process for decisions made.

3.1 STEP 1—ESTABLISH A CLEAR UNDERSTANDING OF THE PROGRAM SCOPE

Once the PM has tasked an individual or small team to prepare the PESHE (refer to Section 2.2 of this guide), the team's first step is to develop a clear understanding of the program's acquisition strategy, including its major milestones, decision points, and actions. The *Defense Acquisition Guidebook* (in preparation), Chapter 12 refers to a knowledge-based acquisition process—a management approach that requires adequate knowledge at critical junctures (i.e., knowledge points) throughout the acquisition process to make informed decisions. DoDD 5000.1 calls for sufficient knowledge to reduce the risk associated with program initiation, system demonstration, and full-rate production. Knowledge provides the decision maker with higher degrees of certainty, and enables the PM to deliver timely, affordable, quality products.

All individuals involved in preparation of the PESHE can and should make use of existing requirements documents that have been part of the acquisition process, including:

- Initial Capabilities Document (ICD) [previously the Mission Need Statement]
- Analysis of Alternatives (AoA)
- Capability Development Document (CDD) [previously the Operational Requirements Document]
- Test and Evaluation Master Plan (TEMP)
- Acquisition Strategy (AS)
- Cost Analysis Requirements Description (CARD).

These documents can provide much of the information necessary to build a good understanding of the program and its life cycle.

Though it is not necessary to actually construct a detailed outline of the program's life cycle, doing so provides a chronological structure for evaluating program ESOH issues and events as they occur. Within each phase of the acquisition life-cycle (see Figure 1-1), major tasks and activities are identified, such as trade-off studies, fabrication of test articles, materials development, materials and subsystem tests, development and implementation of manufacturing processes, and activities associated with the disposal of the system.

To supplement the information gathered from existing acquisition requirements documents, the PESHE team will most likely need to speak with key program office and contractor personnel involved in the program planning.

The scope of the acquisition program will determine the approach to take in developing the PESHE. New and complex weapon system programs will be highly involved, while minor system upgrades and modifications should prove much easier. Specific guidance for different types of acquisition programs is provided in the subsections that follow.

3.1.1 New Systems

Developing the PESHE for a system of mostly new components and some new technologies requires an in-depth effort of defining the major tasks and related program activities through the system life cycle, just as mentioned earlier. In accordance with the *Defense Acquisition Guidebook* (Chapter 5, in preparation), the process of identifying ESOH risks begins with a review of "lessons learned" from the following sources of information:

- Legacy systems that the new system will replace
- Similar systems
- Pre-system acquisition activities (e.g., the Technology Development Strategy)
- Demilitarization and disposal of similar systems
- ESOH regulatory issues at potential locations receiving the system for testing, training, and fielding/basing.

The use of commercial-off-the-shelf (COTS) items in new systems can provide significant cost savings. However, risk assessments for COTS items gets trickier, especially if the equipment meets commercial safety requirements but has not been proven to meet all Army requirements. The decision to use COTS items does not negate system ESOH requirements, and the costs for obtaining the hazard analysis/risk assessment data must be factored into the overall cost for the COTS item. DoD policy requires that all programs comply with ESOH requirements. Even for COTS items, hazards must be identified and risks assessed for the item to be acceptable. COTS items are not exempt from ESOH analyses.

The PESHE team should use the acquisition requirements documents for COTS ESOH information. The PM should have requested that COTS firms provide information regarding ESOH issues—such as any hazardous materials associated with the COTS item—as part of the solicitation for commercial items. If additional information is required, the PESHE team should contact the firms. For example, the firms must have Material Safety Data Sheets on potentially hazardous materials used in the COTS or to maintain it.

3.1.2 Upgrades and Modifications to Existing Systems

Just as for a new system, the entire acquisition life-cycle for a system upgrade or modification (i.e., development, manufacturing, testing, support, operations, maintenance, and disposal) needs to be evaluated. The process of identifying ESOH risks for system upgrades and modifications begins with understanding the risks associated with the existing system. This requires gathering the existing PESHE documentation and other ESOH risk analyses that have already been completed. In some cases, depending on the age of the existing system, the availability of such information may be very

limited. Under such circumstances, a review of information from similar or other legacy systems, as described above for new systems, may be the best approach.

It is important to develop an in-depth understanding of the existing system in order to determine how the upgrade or modification will affect the life cycle of the overall system. The ESOH risks inherent in the existing system cannot be overlooked. Developing a composite of all ESOH risks may be necessary in order to determine how any new risks associated with the upgrade or modification will affect overall risk levels.

3.1.3 System of Systems

One aspect of the current Army Transformation process involves the integration of related acquisition programs into an organizational framework referred to as a "family of systems" or "system of systems" (SoS). A prime example of this is the Future Combat Systems (FCS) program. FCS includes advanced, networked air- and ground-based maneuver, maneuver support, and sustainment systems that will include manned ground vehicles, unmanned air and ground vehicles, tube weapons and ammunition, missiles, sensors, communications, networks, and information processing applications. The FCS has interface systems to operate or support the overall system. FCS will operate as a SoS, networking existing systems, systems under development, and new systems to be developed.

The complexity of the SoS approach should not be underestimated. In the case of FCS, the Program ESOH/MANPRINT Team developed a top-level PESHE document that establishes overarching ESOH policies and goals for the program, and a means of tracking and mitigating SoS-level ESOH risks. Individual Interface Systems PMOs will be responsible for the development of system-specific PESHEs and related ESOH documentation. In order to collect necessary ESOH information and integrate all of the FCS systems into a single PESHE document, a well-structured ESOH management process was used. This process included:

- Conducting continuous ESOH reviews at the SoS level
- Developing the NEPA completion schedule and conducting appropriate programmatic analyses, including coordinating NEPA considerations for test, training, fielding, sustainment and decommissioning and disposal activities with interface system PMs
- Conducting top-level compliance tracking
- Assessing, tracking and mitigating SoS-level ESOH risks and interface with the PM FCS Risk Management Program, including coordination with system PMs and installations to determine ESOH risks associated with interface systems and FCS test, training, operations, maintenance, and support activities
- Mitigating high level SoS level ESOH risks for their resolution to meet mission requirements
- Developing and maintaining the PM FCS Environmental Management System (EMS)
- Supporting the review of ESOH contractual documentation provided by suppliers and system PMs to ensure ESOH requirements are being met.

3.2 STEP 2—ASSESS THE PROGRAM'S CURRENT ESOH STATUS

Following Step 1 above, the PESHE team will need to gather all of the existing ESOH information prepared for the program since its initiation. This will include the relevant ESOH objectives, requirements, and analyses contained in the various acquisition requirements documents (described in

Section 4.2 of this guide), program NEPA documents, contractor procurement documents and environmental management plans, the SSMP, the HHAR, and any other ESOH information that is currently available.

With the understanding of program life-cycle activities identified in Step 1, the PESHE team will also need to review the applicable laws and regulations (see Appendix C for a list of federal, DoD, and Army requirements) to assess the status of ESOH compliance for the program and determine if there are any outstanding ESOH requirements that might have been overlooked. In an effort to ensure that *all* relevant ESOH information is identified and gathered, many organizations and programs will apply checklists of possible ESOH requirements. A sample ESOH requirements checklist is provided in Appendix E. Using these checklists to gather outstanding information, the PESHE team can coordinate directly with the responsible ESOH management personnel within the program office, on the program IPT(s), at the contractor facilities, at the MACOM environmental and safety offices, and at affected installation environmental offices. As part of this effort, any ongoing and future ESOH actions and activities planned for the program should be identified.

3.3 STEP 3—PREPARE THE DRAFT PESHE DOCUMENT

Starting with the PESHE outline example shown in Table 4-1, the PESHE team can begin describing and summarizing the program and ESOH information collected earlier in Steps 1 and 2. Depending on program ESOH issues and requirements, the PESHE outline can be tailored to meet the PM's needs and approach to risk management.

In preparing the PESHE, areas of uncertainty or missing information should be highlighted until they are resolved. Follow-on coordination with program experts for additional information and clarification is to be expected. In some cases, it might be prudent to have the appropriate program experts pre-review certain sections of the draft PESHE document for accuracy and completeness.

The major objective of this step is to formulate the program's ESOH risk management strategy, which is Chapter 3.0 of the PESHE (based on the Table 4-1 outline example). Depending on the maturity of the PM's strategy for integrating ESOH considerations into the program, the PESHE team may need to identify ESOH areas that could be strengthened and make appropriate recommendations for improvement. With the PM's approval, or approval from his/her designee, the proposed changes can be formally integrated into the PESHE document overall risk management approach.

3.4 STEP 4—STAFFING THE PESHE FOR REVIEW AND APPROVAL

Once the draft PESHE is considered complete, the PM's office should formally staff the document for review. All of the appropriate program experts that had not yet reviewed the document or, at least, their particular areas of responsibility, should participate in the review. Comments are to be expected on the initial draft, and provided to the PESHE team for comment resolution. In some cases, additional drafts of the PESHE might become necessary prior to obtaining approval.

With approval of the final document, all of the necessary signatures can then be added to the signature pages (described in Section 4.4 of this Guide) near the front of the PESHE document.

3.5 STEP 5—UPDATING THE PESHE DOCUMENT

DoDI 5000.2 indicates that a PESHE document is required for MS B, MS C, and Full Rate Production Decision Review. The PESHE transitions from an initial planning document at MS B into

an ESOH risk management tool as the program matures. It is a living document that is continually updated and maintained throughout the progression of a program or project, from concept to disposal.

Because the PESHE is considered a living document, the components of the evaluation should be continually reviewed and updated as the acquisition program evolves. The PESHE should *not* be left idle and considered for update only in preparation for milestone reviews. Regularly reviewing PESHE elements at program IPT meetings, for example, helps to flush out ESOH issues and actions needing updates, and encourages IPT members to use it as a planning and tracking tool. Posting the most current PESHE on a program web site, or distributing hard copies in loose-leaf format, can simplify the process of disseminating change pages and other updates to the document.

The extent of changes made to the PESHE document will affect the level of staffing and review needed. A few minor changes may require only limited staffing, with no updates to signature pages needed. On the other hand, changes in strategies, extensive document changes, or the long-term accumulation of many smaller changes, would likely require a formal staffing and approval process, similar to that described in Step 4 above (Section 3.4).

CHAPTER 4.0:

RECOMMENDED COMPONENTS AND ORGANIZATION OF THE PESHE DOCUMENT

This chapter provides detailed descriptions of the individual components of an Army PESHE document, based on the outline example shown in Table 4-1. The outline example, and accompanying guidance, incorporates the latest information from DoDD 5000.1, DoDI 5000.2, and the *Defense Acquisition Guidebook* (in preparation). The PESHE outline is generally applicable to all programs, regardless of ACAT level, and should be used as an example in the development of Army PESHE documents. It is important to note that this format might not be fully suited for some Army programs, in which case some variation in format is appropriate.

The format and content of a PESHE document will also vary depending on the program's current life-cycle phase and level of maturity. More mature programs will be able to provide greater detail regarding compliance status, issues, and potential risks. As programs mature, the level of detail provided in the PESHE should increase. Regardless of the stage of the program, the PESHE should address the required ESOH elements in sufficient detail to provide a "roadmap" for the PM to follow and to adequately summarize the ESOH risk management activities in support of milestone reviews.

4.1 PROGRAM OVERVIEW *(PESHE CHAPTER 1.0)*

For those PESHE reviewers not familiar with the program, this chapter provides an overall understanding of the program, including its history and its future.

4.1.1 Acquisition Strategy and Background *(PESHE Section 1.1)*

This section should briefly discuss historical and projected acquisition activities, decision points, and milestones. It should include an explanation of:

- The type of acquisition - e.g., commercial off-the-shelf (COTS), modified COTS, Government off-the-shelf (GOTS), militarized, whole system or subsystem upgrade, technology program transition to acquisition program, or new developmental program
- Production quantities expected
- An overview of fielding plans and locations.

4.1.2 System Description *(PESHE Section 1.2)*

For this section, provide a brief overview of the system, describing it in terms of basic operational characteristics and general design requirements (e.g., weight, dimensions, number of crewmen, etc.), including any unique system components or subsystems (e.g., propulsion systems, fuel requirements, batteries, ordnance, and sensor/tracking systems). This information should be supported with a photo or diagram of the system hardware. In addition, any new or added support equipment or facility requirements (e.g., portable generators and munitions storage) associated with the system should be described.

Table 4-1. Example of an Outline for the PESHE Document

COVER

APPROVAL SIGNATURE PAGE

PREPARER'S SIGNATURE PAGE

EXECUTIVE SUMMARY

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- C Key Points of Contact
- D References

4.1.3 Program Master Schedule *(PESHE Section 1.3)*

This section provides a figure or chart of the master schedule for system development, or at least some description of it. Information should be addressed using fiscal or calendar years, acquisition phases and decision points, and other major milestones. It should include timeframes for major test and evaluation actions, procurement awards, system deliveries, and other key events. Depending on the schedule's complexity, length, physical size, and dynamics for change, it might be prudent to place it in an appendix to the PESHE, and refer to it here in this section.

4.2 STRATEGY FOR INTEGRATING ESOH INTO THE SYSTEMS ENGINEERING PROCESS *(PESHE CHAPTER 2.0)*

4.2.1 ESOH Management Strategy *(PESHE Section 2.1)*

As part of the overall acquisition strategy for a program, the ESOH management strategy should be defined here in terms of the approach and organizational structure used to integrate and communicate ESOH requirements and considerations into the systems engineering process. The PM, or his/her designee, generally provides overall leadership for defining and implementing the program ESOH strategy. The PM's ESOH designee should participate in various TSM ICTs to ensure ESOH considerations are evaluated during technology development.

In most cases, an IPPD approach (noted in the *Defense Acquisition Guidebook*, in preparation - Chapter 6, Life-cycle Logistics and Chapter 12, Program Management Activities) is established, where one or more multi-disciplined IPTs are formed. The IPTs and other similar forums are used to discuss ESOH issues, and to ensure each element of the program understands and fulfills the necessary ESOH requirements associated with design, testing, manufacturing, operation, maintenance, and disposal of the system. Normally chaired by the PM, the IPT process should have regular participation and effective communications between all members, including the user community, the prime contractor, and all functional areas of ESOH management. Members of each IPT and other ESOH support groups should be identified, along with the frequency of meetings.

Include within this section any crucial ESOH-related goals or objectives expected to be met during system development and over the life of the program, such as those stated in the Capability Development Document (CDD) or other acquisition requirements documents.

Acquisition Requirements Documents

To better understand program ESOH considerations normally associated with the requirements documents, a brief overview of documents prepared during the acquisition process is provided below, based on DoDI 5000.2, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01C, (*Joint Capabilities Integration and Development System*), and Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01 (*Operation of the Joint Capabilities Integration and Development System*). Depending on the ACAT status and level of the program, some of these documents may not apply.

1) Initial Capabilities Document (ICD)

- Replaced the Mission Needs Statement
- Identifies a capability gap or other deficiency (e.g., potential ESOH constraints)
- Describes evaluation of doctrine, organization, training, materiel, leadership, personnel, and facilities approaches

- Supports Analysis of Alternatives (AoA), Concept Refinement, and MS A.
- Not updated once approved

2) Capability Development Document (CDD)

- Replaced the Operational Requirements Document at MS B
- Builds on the ICD and provides detailed operational performance parameters necessary to design the proposed system
- System specific – system design, cost, and risk issues (e.g., life-cycle ESOH considerations)
- Results from Technology Development and supports MS B
- DoDI 5000.2 requires that during system design, the PM must document hazardous materials used in the system and plans for system's demilitarization and disposal
- Updated or rewritten for subsequent increments

3) Capability Production Document (CPD)

- Replaced the Operational Requirements Document at MS C and Full Rate Production Decision Review
- Identifies operational performance attributes – system engineering, cost, and risk issues (e.g., life-cycle ESOH considerations)
- Prepared during System Development and Demonstration
- Rewritten for each increment in an evolutionary program

4) Acquisition Strategy (AS)

- Includes Product Support Strategy for life-cycle sustainment
- Addresses all applicable support requirements, including ESOH
- Guides activity during System Development and Demonstration (SDD)
- Requires summary of PESHE, including ESOH risks, strategy for integrating ESOH considerations into the systems engineering process, identification of ESOH responsibilities, method for tracking progress, and a compliance schedule for NEPA and EO 12114
- Approved at MS B, updated for MS C and Full Rate Production Decision Review

5) Test and Evaluation Master Plan (TEMP)

- Documents the overall structure and objectives of the test and evaluation program
- Provides a framework within which to generate detailed test and evaluation plans
- Contains test event or scenario descriptions and resource requirements, and test limitations that impact system evaluation
- Supports MS B, MS C, and Full Rate Production Decision Review
- AR 385-16 (*System Safety Engineering and Management*) requires PM to ensure safety and health issues are identified

- *Defense Acquisition Guidebook, Chapter 10* (in preparation) – TEMP should assess the PM's acceptance of residual ESOH risks and control measures, to include safety releases, for the system or item
- *Defense Acquisition Guidebook, Chapter 10* (in preparation) – TEMP should include NEPA/EO12114 documentation requirements, and describe how analyses will be conducted to support test site selection decisions

6) Performance Specifications

- Used when purchasing new systems, major modifications, upgrades to current systems, and commercial and non-developmental items for programs in all acquisition categories
- May include environmentally responsive performance specifications that set limits for the usage of hazardous materials and ODCs, air pollutant emissions, noise generation, optical and electromagnetic radiation, and waste production

7) Logistics Planning and Support Documents

- Provide information needed to understand weapon system material, transportation, facility, maintenance, and repair requirements
- Delineate responsibilities of the government and contractors
- Contains information critical in conducting pollution prevention and hazardous materials management evaluations
- Logistics support information often used to specifically monitor contractor environmental management – typically a database on all hazardous materials required to support the system or any component

8) Analysis of Alternatives (AoA)

- Evaluation of the operational effectiveness, operational suitability and estimated costs of alternative systems to meet a mission capability
- Advantages and disadvantages of alternatives being considered to satisfy capabilities, including sensitivity of each alternative to possible changes in key assumptions or variables
- Assesses critical technologies [maturity, risks (including ESOH risks)]
- Structure to review design, acquisition, and life-cycle cost options
- Refines selected concepts documented in the ICD
- Results provide basis for Technology Development Strategy (TDS) for MS A
- Required at MS B or MS C

9) Cost Analysis Requirements Description (CARD)

- Describes salient features of the program and of the system being acquired
- DoD 5000.4-M (*Cost Analysis Guidance and Procedures*) specifies CARD content
- Source of a system's description for the development of Life-Cycle Cost Estimates (LCCEs)
- All program cost estimates required to be consistent with CARD

- Essential that CARD explicitly identify all environmental quality requirements, goals, and directives. Environmental quality professionals and cost estimators must work together to identify the environmental quality content of the CARD.[1]
- Required for MDAPs at MS B, MS C, and at Full Rate Production Decision Review

10) Demilitarization and Disposal Planning

- DoDI 5000.2 requires that during system design, the PM must plan for the system's demilitarization and disposal
- PM must coordinate with the DLA to determine reutilization and hazardous property disposal requirements for system equipment/by-products (DoD 4140.1-R and DoD 4160.21-M)
- For munitions programs, the PM is required to document parts of the system that will require demilitarization and disposal, and address inherent dangers associated with ammunition and explosives; required before start of developmental test and evaluation
- Normally does not require or result in a formal requirements document

International Considerations

Overseas, the DoD's ESOH management responsibilities are a product of DoD policy, US law, host nation law, and international agreements (which regulate the conduct of visiting forces in a host nation). Agreements affecting military activities may be broad in scope, such as Status-of-Forces Agreements (SOFAs), or narrowly drafted basing agreements. These agreements may require the United States to comply with host-nation ESOH requirements.

Although most agreements have generally not included specific ESOH provisions, general obligations are often sufficiently broad to address ESOH issues. For example, the North Atlantic Treaty Organization (NATO) SOFA obligates US forces to "respect the law of the receiving State". The Supplementary Agreement with Germany also specifically obligates visiting forces in Germany to cooperate with German authorities when seeking permits for an installation, to use low-pollutant fuels, to comply with emission regulations, to comply with regulations regarding transportation of hazardous materials, and to pay the costs of assessing and remediating environmental contamination resulting from their actions.

Actions conducted at DoD installations in foreign nations are subject to the minimum standards for environmental compliance promulgated by DoDI 4715.5 *(Management of Environmental Compliance at Overseas Installations*), which directs the DoD to comply with Final Governing Standards (FGS) when established for a particular foreign country.[2] Since these FGSs are developed for each country, it is difficult to identify which requirements stem from US law or the host-nation law. Therefore, unless each FGS is reviewed against US law, the unique regulatory requirements for the host nation are often difficult to determine, complicating the consideration of life-cycle ESOH impacts for those weapon systems to be deployed or stationed overseas.

[1] For a suggested approach to identifying life-cycle environmental requirements for the CARD, refer to USAEC's *Methodology for Developing Environmental Requirements for a Cost Analysis Requirements Description (CARD)* (November 2001).

[2] For a list of foreign countries where FGSs have been established, go to the following DENIX web site: https://www.denix.osd.mil/denix/DOD/Library/Intl/FGS/final-gov-stds-dod.html.

In countries where FGSs have not been established, standards have been developed from a comparative analysis of environmental compliance obligations under applicable international agreements, host nation "pollution control standards of general applicability," and those standards presented in DoD 4715.5-G [*Overseas Environmental Baseline Guidance Document* (OEBGD)]. When requirements differ or conflict, the installation must comply with the standard that is more protective of human health or the environment.

The Army's responsibility to comply with environmental standards in foreign nations, as defined in international agreements, the FGSs, and the OEBGD, is also described in Chapter 14 of AR 200-1 (*Environmental Protection and Enhancement*). Because of the variations in foreign nation environmental regulations and policy, it is important for each program office involved in co-development, foreign military sales, or international deployment to develop a strategy to minimize potential ESOH impacts and avoid non-compliance problems overseas. A summary of this strategy should be included in this section of the PESHE.

4.2.2 Organization Roles and Responsibilities for ESOH *(PESHE Section 2.2)*

It is the ESOH community's responsibility to assist the program office in producing a system that can be tested, operated, deployed, maintained, and disposed of with an acceptable level of risk to the environment and personnel. For those offices and management positions responsible for program ESOH requirements, this section should identify their primary roles and responsibilities for supporting this effort. The section may include descriptions for the Technology Developer, PM, the ESOH Manager (if one is designated), system users, testing/gaining installations, MACOM Environmental and Safety Offices, and other supporting agencies involved in managing and implementing program ESOH requirements. Since the range of ESOH support can vary widely—depending on the size, complexity, and phase of the program—lines of communication should be made clear.

For example, in accordance with MIL-STD-882D, the developer and PM must document the system safety engineering approach to include identification of each hazard analysis and mishap risk assessment process used, the method for integrating system safety into the overall program structure, and a discussion of how hazards and residual mishap risk are tracked and communicated to and accepted by the appropriate risk acceptance authority. The developer and PM also must reduce the mishap risk through a mutually agreed mitigation approach.

The *Risk Management Guide for DoD Acquisition* (Fifth Edition, Version 2.0, June 2003) reinforces the need for developers to become involved in the risk management process at the beginning, when users define performance requirements, and continue during the acquisition process. Critical product and process risk information from developers allows PMs to identify and assess the critical risks early in the acquisition process, and to formulate risk management approaches.

4.2.3 ESOH in Contract Procurement and Management *(PESHE Section 2.3)*

The procurement process and resulting contracts provide mechanisms for the Army to identify its program goals and requirements, including those for ESOH. It is critical that ESOH risk management requirements be included at each step of the procurement process, from the beginning steps of soliciting proposals from potential offerors to final preparation and monitoring of contracts awarded. Using ESOH considerations as part of contractor selection and establishing ESOH requirements early in a contract are some of the best ways to develop a strong ESOH ethic for the program. Examples of ESOH provisions used in various contracting documents are provided in Appendix B.

By making contract ESOH information more widely available to PM office personnel and other government reviewers of the PESHE, greater visibility is given to contractor responsibilities for ESOH. It also provides another tool for the government to track and monitor contractor progress in ESOH risk management.

4.2.4 ESOH Tracking Methodology *(PESHE Section 2.4)*

This section should explain the methods and procedures used by the program office to document and track ESOH issues, required under DoDI 5000.2. This is often accomplished using an electronic tracking system that is regularly updated, along with other forms of records keeping. The PESHE must describe how often the ESOH IPTs meet to track open ESOH issues, describe how the electronic tracking system can be accessed for review of ESOH risk status, and method for communicating close-out of ESOH risks and remaining ESOH risks to higher level IPTs between MS reviews.

4.3 ESOH RISK MANAGEMENT *(PESHE CHAPTER 3.0)*

4.3.1 Overview of the Risk Management Program *(PESHE Section 3.1)*

Risk management is a systematic approach and program management tool to identify, assess, and mitigate events (i.e., risks) that might adversely impact a program and decrease its likelihood of success. Risk is defined as a probability that a situation will produce harm under specified conditions. It is a combination of the probability that an adverse event will occur and the severity of the adverse event. Risk includes impacts on the environment, safety, and health, and arises both from the existence of a hazard and exposure to the hazard. Risk management includes the following steps:

1) Identify Hazards – potential exists, mission impact
2) Assess Hazards – probability and severity, identify options
3) Make Risk Decisions – describe risk, no action, mitigation controls, residual risk
4) Implement Controls – standard operating procedures, new training, new standards, etc.
5) Supervise – monitor controls, mitigation effectiveness, reevaluate, lessons learned.

DoDI 5000.2 establishes requirements for PMs to manage ESOH risks for their system's life cycle. The PM is required to have a PESHE document at MS B that describes:

- Management plan for integrating ESOH considerations into the systems engineering risk management process using the methodologies described in MIL-STD-882D
- Schedule for completing the NEPA and EO 12114 documentation
- Status of ESOH risk management.

The *Defense Acquisition Guidebook*, Chapter 5 (in preparation) discusses an approach to risk management, based on the guidance in MIL-STD-882D. The three basic types of ESOH risks are:

- Potential ESOH impacts and adverse effects from routine system development, testing, training, operation, sustainment, maintenance, and demilitarization/disposal
- Potential ESOH and mission readiness impacts from system failures or mishaps, including critical software failures

- Potential impacts to program life-cycle cost, schedule, and performance from ESOH compliance requirements.

The scope of potential risks, as noted in the *Guidebook*, includes all ESOH regulatory compliance requirements associated with the system throughout its life cycle, such as, but not limited to:

- HAZMAT use and hazardous waste generation
- Safety (including explosives safety, and ionizing and non-ionizing radiation)
- Human health (associated with exposure to chemical, physical, biological, and/or ergonomic hazards, etc.)
- Environmental and occupational noise
- Impacts to the natural environment (e.g., air, water, soil, flora, and fauna).

Risk management, therefore, is the essential tool to respond to ESOH regulatory requirements. In effect, through risk management, ESOH regulatory compliance can be achieved. Within DoD, risk identification and management is based on various system safety hazard analyses. All identified hazards are defined in risk terms by evaluating the severity of potential mishaps associated with the hazard and the probability that the hazard could create a mishap. The mishap severity category provides a measure of a mishap resulting. An example of mishap severity categories based on MIL-STD-882D is shown in Table 4-2.

Table 4-2. Example of Mishap Severity Categories

Description	Category	Safety and Health Criteria
Catastrophic	I	Could result in death, permanent total disability, loss exceeding $1 million
Critical	II	Could result in permanent partial disability, injuries, or occupational illness that may result in hospitalization of at least three personnel, loss exceeding $200,000 but less than $1 million major system or subsystem loss
Marginal	III	Could result in injury or occupational illness resulting in one or more lost work day(s), loss exceeding $20,000 but less than $200,000
Negligible	IV	Could result in injury or illness not resulting in a lost work day, loss exceeding $2,000 but less than $20,000

The probability category provides a measure of the likelihood of a condition or event occurring. The probability is defined as potential occurrences per unit of time, events, items, population, or activity. An example of mishap probability levels from MIL-STD-882D is shown in Table 4-3.

The combination of severity and probability establishes the overall risk for an identified hazard, which is used to prioritize resolution of hazards and the appropriate management decision authority on identified hazards. The use of a matrix with hazard severity on one axis and hazard probability on the other axis is used to represent the risk associated with each hazard and to identify the level of management decision required for risk actions. A representative ESOH risk decision matrix, derived from MIL-STD-882D, is shown in Figure 4-1.

Table 4-3. Example of Mishap Probability Levels

Description*	Level	Specific Individual Item	Fleet or Inventory**
Frequent	A	Likely to occur often in the life of the item, with a probability of occurrence greater than 10^{-1} in that life	Continuously experienced
Probable	B	Will occur several times in the life of an item, with a probability of occurrence less than 10^{-1} but greater than 10^{-2} in that life	Will occur frequently
Occasional	C	Likely to occur some time in the life of an item, with a probability of occurrence less than 10^{-2} but greater than 10^{-3} in that life	Will occur several times
Remote	D	Unlikely but possible to occur in the life of an item, with a probability of occurrence less than 10^{-3} but greater than 10^{-6} in that life	Unlikely, but can reasonably be expected to occur
Improbable	E	So unlikely, it can be assumed occurrence may not be experienced, with a probability of occurrence less than 10^{-6} in that life	Unlikely to occur, but possible

*Definitions of descriptive words may have to be modified based on quantity involved.
**The size of the fleet or inventory should be defined.

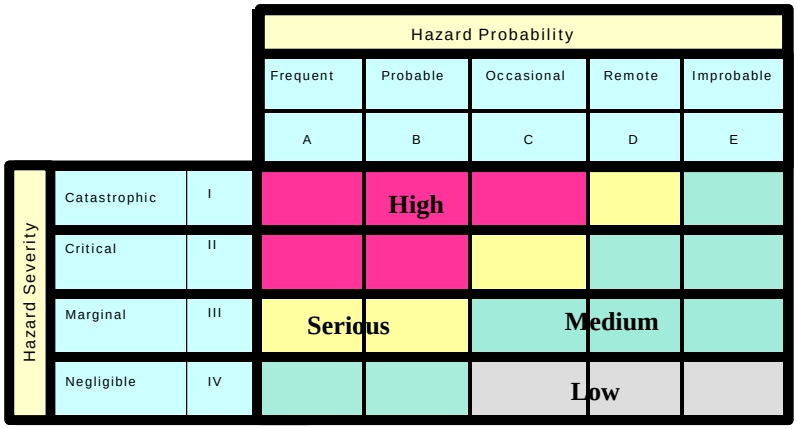

Figure 4-1. ESOH Risk Decision Matrix

Responsibilities for risk acceptance, according to DoDI 5000.2, are as follows:

- High: CAE or designee
- Serious: PEO or equivalent
- Medium and Low: PM or equivalent.

If actions are proposed and undertaken to mitigate risks, the PM should monitor and assess the effectiveness of mitigation measures to determine whether additional control actions are required. The PM then documents the effectiveness of mitigation measures in the PESHE. Relevant information can

include any related mishap data; adverse health effects, and significant environmental impacts from system development, testing, training, operation, sustainment, maintenance, and demilitarization and disposal. To provide a resource to others of lessons learned, programs can also convey information about the effectiveness of risk management efforts with metrics, achievements, success stories, etc.

In summary, the focus on risk management should be throughout the life of the program, not just in preparation for program and milestone reviews. Program risks should be continuously assessed, and the risk-handling approaches developed, executed, and monitored throughout the acquisition process. All involved in the acquisition process must understand the risks as a program progresses through the various phases and milestone decision points, and must modify the management plan and acquisition strategy accordingly.

For PESHE Section 3.1, the overall risk management approach being applied to the program should be described. The section should detail the methods used to identify and assess risk (e.g., severity and probability), and to produce a risk decision matrix.

Table 4-4 shows the severity categories developed for the Stryker PESHE, and is included to provide an example to program offices on how to prepare severity categories as part of their overall ESOH risk management programs.

Table 4-4. Environmental Impact Severity Categories from Stryker PESHE

Description	Category	Environmental Criteria
Catastrophic	I	Event results in irreversible severe environmental damage that violates law or regulation (e.g., uncontrolled use of compounds that exceed 3.5 pounds of VOCs per gallon).
Critical	II	Event results in reversible environmental damage that violates law or regulation (e.g., POL leak above reportable quantity limits), or irreversible environmental damage that does not cause a violation of law or regulations (e.g., inadvertent release of materials with high global warming potentials), or environmental damage that requires development and implementation of new management programs and plans (e.g., generation of new hazardous waste streams).
Marginal	III	Event results in reversible environmental damage without violation of law or regulation where mitigation activities can be accomplished through use of existing plans and resources (e.g., release of waste with hazardous material concentrations below reportable quantity limits).
Negligible	IV	Event results in minimal environmental damage not violating law or regulation (e.g., unnecessary vehicle fluid changes).

Source: *Programmatic Environment, Safety and Occupational Health Evaluation (PESHE) for the Stryker Family of Vehicles*. US Army, 2003. Brigade Combat Team. SFAE-GCS-BCT. 26 Nov 2003. p. 7.

4.3.2 Status of ESOH Risks *(PESHE Section 3.2)*

4.3.2.1 Environmental Regulatory Compliance

Acquisition programs are required to comply with applicable federal, state, interstate, and local ESOH codes, statutes and regulations as well as EOs, treaties, and statutory agreements. A list of federal, DoD, and Army laws and regulations applicable to acquisition program ESOH, is provided in Appendix C. To the extent that materials/processes/uses associated with weapon systems could have

an effect on the environment, these ESOH requirements may affect system design, construction, modification, testing, operation, support, maintenance, repair, demilitarization, and disposal.

The focus of this section of the PESHE should be on identification and assessment of ESOH risks, and risk reduction and mitigation undertaken. This section should discuss the cost, schedule, and performance risks associated with ESOH compliance for the program. Emphasis should be on those current and potential future risks categorized as high, serious, or medium level. It should also include discussion on actions being taken to reduce or eliminate the risks.

To facilitate compliance, ESOH requirements should be fully evaluated early in the design of the program, and then periodically reevaluated. The PM must establish procedures for identifying and mitigating ESOH risks throughout all life-cycle phases. ESOH issues can be showstoppers—delaying testing and fielding, constraining realistic training, and causing violations of ESOH regulatory requirements—thereby putting missions at risk. ESOH issues should be coordinated with the testing/gaining command and installations as early in development as possible so potential impacts can be evaluated for special management or mitigation. The user community should be actively involved in the design process in the PM's IPT. It is helpful if the PM and user community document ESOH constraints and considerations in the ICD and CDD.

Cooperation is needed between the PM and installation ESOH professionals. The PM's focus tends to be on the acquisition program meeting operational performance requirements, timely fielding to appropriate organizations and installations, and operating in a realistic training environment. Installation ESOH professionals, whom work with field users, mainly are concerned with the installation's continuing ability to comply with federal, state and local ESOH regulatory requirements. Working as an Army team, the PM and installation ESOH professionals can identify potential ESOH issues so that these issues can be proactively resolved by changes in design, logistic support, or system fielding procedures; or through permit modifications or mitigation development to minimize/eliminate fielding and operational constraints.

To help PMs and field users identify program ESOH issues, Appendix D contains a list of information, obtained from the ASA(ALT) Digital Library, that had been compiled by an IPT consisting of acquisition and installation professionals. This ESOH information is important because the program could be at risk should non-compliance problems occur. If operations, for example, had to be interrupted to incorporate capital improvements to meet compliance requirements, the program could risk schedule delays and cost impacts. Furthermore, should citations for violations of environmental law be issued, the adverse publicity generated could reflect poorly on the Army.

4.3.2.2 National Environmental Policy Act (NEPA) and Executive Order 12114 Compliance

The NEPA of 1969 requires federal agencies to consider and document the potential environmental effects associated with federal actions conducted within the United States, its territories, and its possessions. In accordance with DoDI 5000.2, the acquisition strategy must incorporate a summary of the PESHE, including a compliance schedule for NEPA and EO 12114. The Army's implementing regulation for NEPA is 32 CFR Part 651 (*Environmental Analysis of Army Actions*). For the implementation of EO 12114, the CFR refers to DoD Directive 6050.7 (*Environmental Effects Abroad of Major Department of Defense Actions*). To assist PMs and other proponents, 32 CFR Part 651 contains descriptions of the general types of proposed actions requiring environmental impact analysis under NEPA, screening criteria for determining the application of categorical exclusions (CXs), and lists of actions normally requiring an EA or EIS.

In an acquisition program, the NEPA analysis process begins in the early phases of the program, not only to ensure required analyses are completed in time for program decisions, but also to identify and incorporate system design features that could reduce or eliminate adverse environmental effects. Where it is not feasible to implement these design features, it is important to identify mitigation measures, which are then formally committed to in a decision document. NEPA analyses must be considered throughout the life cycle of a system acquisition program.

It is the responsibility of the PM to ensure that all reasonable and viable alternative actions undergo appropriate NEPA analyses, regardless of who accepts responsibility for conducting them. At test ranges, for example, installation environmental offices might offer to take the lead in addressing any NEPA requirements at their range. In such cases, existing range-wide NEPA documentation might adequately address program actions with only minor supplemental documentation (e.g., Record of Environmental Consideration [REC]) being required. Even in such cases, however, the PM is still responsible for funding the analyses, and must ensure the resulting NEPA documentation adequately and accurately covers his or her program.

This section of the PESHE serves to plan and record the NEPA analysis activities and any EO 12114 requirements of the program as it proceeds through its life cycle. Similar to the discussion on ESOH compliance program risks in Section 4.3.2.1 of this Guide, this section should summarize any NEPA/EO 12114-related compliance requirements that might present risks to program cost, schedule, and performance. For example, in the preparation of an EA, significant impacts are identified; or a project is expected to be highly controversial. Just as before, emphasis should be on those current and potential future risks categorized as high, serious, or medium level.

The overall NEPA/EO 12114 strategy or approach to compliance for the program should be explained. Ongoing and planned analyses should be identified, and any others that potentially could be required. For each document expected, a brief description of the action to be analyzed should be included, with an appropriate completion schedule for any NEPA and EO 12114 analyses. Showing the expected start and completion dates for each document is recommended.

The status of individual mitigation measures should be documented in a tabular or matrix format, where such measures can be more easily tracked until their completion. This is particularly important if a mitigation-monitoring plan is not already in place. Placing the matrix in the appendices to the PESHE makes it easy to update and expand, as necessary. Mitigation measures established in a NEPA document, and committed to as part of the decision, must be accomplished. The implementation of mitigation measures for an acquisition program is usually the responsibility of the PM. The PM is also responsible for monitoring mitigation measures for completion and effectiveness. Failure to properly implement mitigation measures can increase risk and lead to litigation, schedule delays, and monetary fines.

4.3.2.3 Safety and Health Management

The focus of this section of the PESHE should be on program safety and health risks (including explosives safety) identification and assessment, and risk reduction and mitigation undertaken per the outline example in Table 4-1. This section should discuss the cost, schedule, and performance risks associated with safety and health management for the program. Emphasis should be on those current and potential future risks categorized as high, serious, or medium level. It should also include discussion on actions being taken to reduce or eliminate the risks.

The plans, actions, and accomplishments for safety and health that are relevant and specific to the program should be described in the PESHE. Ongoing actions and plans for meeting safety and health

requirements should be explained. If possible, include approximate timeframes for the completion of individual safety and health requirements.

As part of this discussion, a brief review of the program System Safety Management Plan (SSMP), all system or component level health hazard assessments, and any internal or independent safety assessments conducted on the system should be provided. It should also describe the procedures used to identify, evaluate, eliminate, and control hazards; define risk levels (e.g., severity and probability); identify high, serious, and medium risk hazards; track progress of hazard resolution and control; and summarize the impacts of projected accidental loss in terms of lives, medical costs, time, program mission, and equipment lost to accidents.

Army safety and health programs focus on issues that affect those who operate, maintain, and dispose of weapon systems. Issues relating to public safety and health, while critical to program success, are typically not a part of the safety and health programs. These issues are more fully addressed through the NEPA process described in the previous section.

The *Defense Acquisition Guidebook, Human Systems Integration* (Chapter 7, in preparation) states "Safety and health hazard parameters should address all situations that are inherent to the life-cycle of the weapon system including test activities operation, support, maintenance and final demilitarization and disposal maintenance of a system." While DoDI 5000.2 usually groups safety and health under one heading (because of similar issues involved), they are often evaluated and reviewed under separate procedures and regulations, and have different proponents and technical channels within the Army. PMs have the flexibility to determine whether to combine safety and health issues into one program or to separate them for evaluation purposes. But the *Guidebook* also seeks cooperation and coordination on safety and health issues: "The Human Systems Integration (HSI) Strategy and the PESHE should jointly define how the program intends to avoid duplication of effort and to ensure the effective and efficient flow of information between the HSI and ESOH personnel working the integration of human safety and health considerations into the systems engineering process."

AR 385-16 (*System Safety Engineering and Management*) describes system safety program activities and responsibilities. PMs are responsible for developing and using three primary management tools in implementing the safety program: the SSMP, the System Safety Working Group, and the Hazard Tracking System. PMs must ensure that the SSMP is developed and updated as part of the AS, and that safety and health issues are identified in all TEMPs. The focus of the safety program should be on early hazard identification and elimination, risk assessment, and risk management to influence design or allow the PM to make informed decisions as to acceptability of the safety risk. The hazard risk acceptance level should be determined for each individual program using AR 385-16 as a guide.

In terms of system safety, MIL-STD-882D provides both general and detailed DoD-wide guidance for PMs to develop and implement an acceptable system safety program that imposes design requirements and management controls on identified system hazards. These requirements and procedures give PMs the ability to eliminate hazards or reduce their associated risks on safety, health, and the environment, and apply them equally to contractor and in-house programs.

The Manpower and Personnel Integration (MANPRINT) process, described in AR 602-2 (*Manpower and Personnel Integration [MANPRINT] in the System Acquisition Process)*, has as its purpose to integrate all actions in the materiel acquisition process affecting human performance and reliability. System safety and health hazards, two of the MANPRINT domains, should be applied and tailored to all Army systems and integrated into other MANPRINT concerns. Objectives of the MANPRINT program include influencing system design and improving control of the TOC of weapon systems. MANPRINT assessments must be conducted prior to milestone decision reviews on all acquisition

programs. While MANPRINT does not replace other Army safety and health programs, information developed during the MANPRINT process should be used in fulfilling safety and health evaluation requirements, and vice-versa.

Health Hazard Assessments (HHAs) are required throughout the life-cycle of acquisition programs, including modification programs, Advanced Concept Technology Demonstrations (ACTDs), and programs for both developmental and non-developmental items. AR 40-10 (*Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process*) provides guidance on integration of health issues into all phases of the acquisition process. Health hazards must be considered in the AS and in the System MANPRINT Management Plan (SMMP) that supports program requirements documents.

Initial HHAs provide input into the early acquisition decision process. An HHA Report (HHAR) is prepared based on input from materiel developers, testers, and independent evaluators in the development phase. It provides a standard structure and approach for assessing system-generated threats to the health of soldiers and DoD personnel. The proponent for the Army's HHA Program is the Army Surgeon General. Program requirements for an independent HHAR are in AR 40-10.

During early stages of the acquisition process, adequate information may not be available to perform a thorough HHA (required in MIL-STD-882D). As additional information becomes available, initial analyses should be updated to identify health hazards; assess risks; and determine how to mitigate risks, formally accept residual risks, and monitor the effectiveness of the mitigation measures *(Defense Acquisition Guidebook*, in preparation).

Explosives Safety

DoDI 5000.2, the *Defense Acquisition Guidebook* (in preparation), and MIL-STD-882D all refer to the need for the PM to have an explosives safety program, and obtain explosive hazard data to include identification of safety hazards involved in handling, shipping, and storage related to production, use, and disposal of the item. In the PESHE, the more important program explosives safety issues or areas of concern that currently exist or are expected in the future should be highlighted as part of any discussion on Safety and Health Management. For example, this might include concerns over the need to extend explosive safety quantity distances into areas of unrelated operation in order to accommodate an increase in explosives classification at existing magazines. The discovery of a significant violation related to quantity-distance requirements might have a measurable impact on program cost and/or schedule. Again, emphasis should be on those current and potential future risks categorized as high, serious, or medium level.

PESHE discussions should address ongoing actions and plans for meeting explosives safety requirements. If possible, include approximate timeframes for the completion of individual explosives safety requirements.

Include a summary of any prior, ongoing, or planned waivers and/or exemptions to explosives safety requirements; hazard classification and compatibility groups of explosives involved; personnel protection measures; siting of explosives-related facilities and quantity-distance considerations; lightning protection; measures taken and planned for hazard identification for fire fighting and emergency planning; mishap reporting and investigation requirements; provisions and procedures for the storage of any waste military munitions and for the cleanup of UXO; and the demilitarization and disposal of explosives items.

4.3.2.4 Hazardous Materials and Waste Management

The focus of this section of the PESHE should be on identification and assessment of hazardous materials and waste management (including pollution prevention) risks, and risk reduction and mitigation undertaken. The following information should be identified (per *Defense Acquisition Guidebook*, in preparation):

- The locations and quantities of hazardous material, where applicable
- Anticipated hazardous byproducts/discharges and expected quantities of hazardous waste generated during normal use/maintenance, in addition to those anticipated under emergency situations
- Special hazardous material training and handling requirements
- Demilitarization and disposal requirements for the hazardous material (per DoDI 5000.2).

This section should discuss the cost, schedule, and performance risks associated with hazardous materials and waste management for the program. Risk levels (e.g., severity and probability) should be defined. Emphasis should be on those current and potential future risks categorized as high, serious, or medium level. The section should also include discussion on actions being taken to reduce or eliminate the risks.

Discussions should address ongoing actions and plans for meeting hazardous material and waste requirements. Any hazardous materials/hazardous waste/pollution prevention-related compliance requirements should be summarized that might present risks to program cost, schedule, and performance. For example, the continued application of Class II ODCs in a system may result in significantly higher maintenance and disposal costs later in the program. Also, trade-off analyses may be required for the use of beryllium in missile seeker components, or halon as a fire-extinguishing medium on aircraft. Again, emphasis should be on those current and potential future risks categorized as high, serious, or medium level. If possible, include approximate timeframes for the completion of individual hazardous material, hazardous waste, and pollution prevention requirements.

For ESOH risk management, during concept and technology development, the PM should initiate a Hazardous Material Management Program (HMMP) (in accordance with NAS 411) to identify those hazardous materials categorized as high risk. The HMMP identifies the hazardous materials, ranks them relative to their impact on the program, and systematically eliminates or reduces the use of them. As the system matures through the various acquisition phases, the PM should update the HMMP. In this way, PMs can eliminate program reliance on materials that may adversely increase the risk to operational readiness.

Unfortunately, many hazardous materials used in system design or operations do not presently have alternatives that can be implemented. When the use of hazardous materials cannot be avoided, the PM should develop and implement plans and procedures detailed in the HMMP for identifying, minimizing use of, tracking, storing, handling, packaging, transporting, and disposing of such material. By planning for the life-cycle management of those hazardous materials, it helps to reduce or eliminate harm to human health and the environment from releases of pollutants to the environment, consistent with the goals of EO 13148 (*Greening the Government Through Leadership in Environmental Management*).

Information from the HMMP should be included in the PESHE. For example, an overview and status of the HMMP for tracking, storing, handling, and disposal considerations at program locations affected by the system should be provided. Also consideration should be given to whether the program has taken steps to identify all of the EPA 17 targeted chemicals; TRI chemicals; Emergency

Planning and Community Right-to-Know Act (EPCRA) chemicals; Class I and II ODCs; and similarly listed materials used in the system. Any initiatives and progress made in eliminating, replacing, or reducing use of these hazardous materials should be documented in the PESHE.

AR 70-1 (*Army Acquisition Policy*) states: "Pollution prevention is the Army's preferred approach to maintaining compliance with environmental laws and regulations … Use of hazardous materials (HAZMAT) will be minimized and all alternative options will be considered before using any HAZMAT. Pollution will be eliminated or reduced at the source. Wastes and by-products that cannot be eliminated will be recycled. Pollutants that cannot be recycled will be treated to minimize environmental hazards. Disposal or other release to the environment will be employed only as a last resort and will be conducted in an environmentally safe manner. All Army acquisition organizations will incorporate pollution prevention throughout the acquisition process." AR 200-1 (*Environmental Protection and Enhancement*) details Army policy for managing hazardous materials and wastes (and waste minimization) in Chapter 5, and pollution prevention in Chapter 10.

DoDI 5000.2 notes that "during the design process, PMs shall document hazardous materials contained in the system and shall estimate and plan for demilitarization and safe disposal." For hazardous materials, the preferred mitigation strategy is source reduction or elimination of the hazards, also referred to as pollution prevention when dealing with potential environmental impacts." MIL-STD-882D requires hazardous material use to be "minimized, eliminated, or associated mishap risks reduced through design, including material selection or substitution" (i.e., pollution prevention). When using potentially hazardous materials, those materials that pose the least risk throughout the life cycle of the system should be selected.

4.4 OTHER PESHE SECTIONS

4.4.1 Signature Pages

Since the completed PESHE will dictate ESOH activities and procedures for the project office to follow, it is imperative that all appropriate departments concur with the PESHE content, preferably via a signature block. The PESHE signature pages serve as documentation that key participants, including the PM, PEO, ESOH Manager, and other supporting offices, have approved the evaluation. The PM should determine which personnel should be included on the approval page. A separate signature page for the office/organization responsible for preparing the PESHE should also be included. A PESHE revision page can be added later to track formal updates over the long term.

4.4.2 Executive Summary

In no more than four or five pages, the Executive Summary should provide the following information:

1) Identification of the program.
2) Identification of the office(s)/organization(s) responsible for managing the program or project, including ESOH requirements.
3) A brief overview of the program ESOH goals and management strategy for integrating ESOH into the systems engineering process.
4) A review of the major issues and accomplishments identified in Chapter 3.0 (ESOH Risk Management). A key part of this discussion should be on identifying the risks to the program in terms of cost, schedule, and performance. Particularly for larger programs, the PM may also want to include an ESOH risk assessment summary that gives the reader a quick, overall synopsis of program risks (high, serious, medium, or low).

5) A review of the methods and procedures used to track progress on ESOH issues.
6) The completion schedule for NEPA and EO 12114 compliance.

By including the above information in the PESHE Executive Summary, it can be easily incorporated (verbatim) into the Acquisition Strategy. In accordance with DoDI 5000.2, the program Acquisition Strategy document must incorporate a summary of the PESHE and the status of ESOH risk management.

4.4.3 Appendices

A list of possible appendices to include in the PESHE is provided below:

- Excerpts of ESOH requirements from the ICD, CDD, or other acquisition-related documents
- A mitigation measure tracking list or matrix
- Key points of contact for obtaining information used in the PESHE
- A list of laws, regulations, data sources, and other reference documents cited in the PESHE or used in its preparation.

CHAPTER 5.0: REFERENCES

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Department of the Navy, 2000. *Environmental, Safety, and Health Requirements for Acquisition Programs—A Program Managers Guide* (Draft). Prepared by the Naval Air Systems Command. 20 June.

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 2003. Web-based ESOH guidance presented on the Acquisition Community Connection. URL: http://acc.dau.mil/simplify/ev_en.php, accessed 17 December.

Note: The various laws and regulations cited in this guide are included in Appendix C.

APPENDIX A

TYPICAL ESOH QUESTIONS FROM ARMY SYSTEM ACQUISITION REVIEW COUNCIL (ASARC) AND COST REVIEW BOARD (CRB) REVIEWS, AND OTHER MILESTONE REVIEWS

Appendix A. Typical ESOH Questions from Army System Acquisition Review Council (ASARC) and Cost Review Board (CRB) Reviews, and Other Milestone Reviews

The following questions address system ESOH requirements.

1) How are you handling ESOH issues and risk management within the program office? Is the office adequately resourced to cover ESOH requirements?

2) What ESOH-related plans are you planning to prepare (e.g., Pollution Prevention (P2) Plan, System Safety Plan, Hazardous Material Management Plan, etc.)?

3) What is the status of the demilitarization/disposal plan for your system?

4) Have any ESOH-related trade-off studies been performed? Describe them?

5) What ESOH alternatives are being considered and how are they being/were they evaluated? Do you have any cost/benefit analyses completed or underway on those alternatives?

6) Are you sponsoring any research or development on ESOH alternatives that will be considered for incorporation in/on your system?

7) What items, if any, will be recycled during the system's life–cycle?

8) Is there a Hazardous Material Management Plan for your program? Is it based on National Aerospace Standard 411? If not, what is it based on?

9) Have Safety and Occupational Health Data Sheets been prepared?

10) Are there any residual system-related safety and health hazards? How are they documented?

11) Has an Independent System Safety Assessment been completed?

12) Has a safety and health program been established to identify, track, and resolve system-related hazards?

13) Are there any high or serious ESOH risks identified in your PESHE? What actions have been taken to mitigate and minimize those risks?

14) Is there any required staffing of installation safety and civil engineering offices associated with your system? Do the installations know of those plans?

15) Are you planning to require the installations receiving your system to have an emergency response team for safety and health-related hazards? Do the installations know of those plans?

16) Have Health Hazard Assessments been completed as appropriate? Are all health hazards identified, tracked, and resolved?

17) Will your system have similar hazardous materials to the system to be replaced? If so, why? Will your system have new hazardous materials? Why and what are they?

18) How is your system minimizing the use of Class II ODCs, which will be banned effective calendar year 2015?

19) How do you plan to investigate non-hazardous materials to replace ODCs and hazardous materials?

20) How much system ESOH-related training must installation personnel receive to handle hazardous materials from your system? Do the installations know of those requirements?

21) Are personnel in the system's work place/facilities to be exposed to hazardous, radiological, or toxic substances?

22) Is personal protective equipment required to operate or maintain the system? How is it identified and documented?

23) If personal protective equipment is required by your system, what are the productivity losses that may be experienced?

24) Do you have projected accident, incident, or personal injury rates for your system? What are those rates and how are they to be controlled?

25) Do you have a P2 program to address and/or correct P2 system deficiencies? What is it? What are the projected types and quantities of pollutants to be released to the environment over the life of the system?

26) Are all required National Environmental Policy Act (NEPA) analyses and documentation completed for the next phase? Have any analyses, past or current, caused public concerns?

27) Is your system in compliance with federal, state, and local environmental laws and regulations and with all environmental related federal Executive Orders?

28) Have all Class I Ozone Depleting Chemicals (ODCs) been eliminated from use by your system?

29) How has the system design been affected by minimizing noise and maintaining workspace noise levels below 84 decibels?

30) Has the operator's manual for the system been reviewed for ESOH warnings and cautions?

31) Has a formal ESOH risk management process with defined categories, descriptions, matrices, and assigned responsibilities been implemented? Is it described in the PESHE? Is it in accordance with guidance provided in MIL-STD 882D? Does it integrate ESOH considerations into the overall systems engineering risk management process?

32) Describe the method of tracking ESOH risks and regulatory compliance requirements applicable to the system. This includes not only HAZMAT and hazardous waste, but other ESOH compliance issues such as environmental and occupational noise, air emissions and impacts to the natural environment (e.g. Clean Air Act; Endangered Species Act; Clean Water Act; Marine Mammal Protection Act; Resource Conservation and Recovery Act; National Historic Preservation; Pollution Prevention Act; Title 29 Code of Federal Regulations Part 1900, et. seq. Occupational Safety and Health Administration, etc.). Are these ESOH risk tracking databases

(e.g., Environmental Compliance Database, Safety and Hazard Tracking System, Hazardous Materials Management Database) continually updated so that progress in closing out/controlling ESOH risks can be monitored periodically between Milestone Reviews?

ESOH Cost-Related Questions

The following questions are related to system ESOH costs.

1) What is the system's environmental quality cost as identified in the program cost estimate? Has it changed since the last milestone review? If so, how?

2) What are the ESOH system cost drivers? For the ESOH cost drivers, can you identify the ESOH costs at the subsystem/component/level by Milestone C?

3) Where are the ESOH-related labor and material costs?

4) Who is responsible for and budgets for the disposal of your system when it is ready (the operating command, Army Materiel Command, etc.)? Is an estimate of those costs available at the Milestone B review?

5) When you identify an installation(s) needed to support your system during its life–cycle, have you identified funding needed for all ESOH-related costs associated with that installation support? What are those costs by fiscal year?

6) Are any modifications/upgrades directly related to ESOH for existing systems? Can the ESOH costs be identified for those modifications/upgrades by Milestone C?

7) How does your system's environmental quality life–cycle cost compare to analogous systems, if such systems exist?

8) Did you analyze the ESOH-required depot-level costs to support your system and did you get any insight to ESOH-related costs and percentages? If so, what is the result?

9) Have any medical costs been identified for system-specified hazardous materials and, considering those costs, have those system-specified hazardous materials been prioritized for the purpose of eliminating or minimizing their use?

10) Have NEPA mitigation actions, if any, been costed? What are those costs by fiscal year?

11) Have costs for implementation of Engineering Change Proposals (ECPs) associated with hazardous materials elimination and pollution prevention been quantified, as appropriate?

12) Have the costs associated with the identification, assessment, and resolution of ESOH risks been included in cost estimates?

APPENDIX B

EXAMPLES OF ESOH PROVISIONS USED IN CONTRACTING DOCUMENTS

Appendix B. Examples of ESOH Provisions Used in Contracting Documents

Instructions, Conditions, and Notices to Offerors (Section L)

No later than 30 days prior to proposal receipt, you must provide the Contracting Officer with (a) an environmental assessment addressing all hazardous and/or toxic materials and fluids used in the Bid Samples, (b) a Safety Assessment and/or Hazard Assessment Report, and (c) a Material Safety Data Sheet (MSDS) pursuant to FAR 52.223-3 entitled "Hazardous Material Identification and Material Safety Data Sheets". In the event the above documentation is not provided to the Contracting Officer 30 days prior to proposal receipt, the anticipated 30-day evaluation of the Offeror's Bid Samples may be shortened, on a day for day basis, for each day the documentation was delinquently provided. Under these circumstances, data to validate the written portion of the Offeror's proposal will not be collected on those days where no Bid Sample evaluation was conducted.

Contract Clauses

Federal Acquisition Regulation (FAR) Contract Clauses

52.223-3	Hazardous Material Identification and Material Safety Data
52.223-5	Pollution Prevention and Right-to-Know Information
52.223-7	Notice of Radioactive Materials
52.223-11	Ozone-Depleting Substances
52.223-13	Certification of Toxic Chemical Release Reporting
52.223-14	Toxic Chemical Release Reporting

Defense Federal Acquisition Regulation Supplement (DFARS) Contract Clauses

252.223-7001	Hazard Warning Labels
252.223-7002	Safety Precautions for Ammunition and Explosives
252.223-7006	Prohibition on Storage and Disposal of Toxic and Hazardous Materials

Statement of Work (SOW)

A.1 **Environmental Compliance.** The contractor (and its subcontractors) shall comply with all federal, state, and local environmental laws, regulations, and policies for all activities defined in this SOW, whether conducted at government or contractor facilities. Upon request, the contractor shall make available to the government applicable environmental permits and documentation. The contractor shall be solely responsible for the management, cleanup, protection, and disposal of any and all emissions, effluents, wastes, and hazardous materials used in, generated by, or associated with the actions required by this SOW. The contractor shall report the current status and impacts to program cost, schedule, and performance from the above mentioned at each management review.

A.2 **Safety Engineering.** The contractor shall develop and implement a safety program that is integrated with the concurrent engineering process used to develop, mature, and support the system. The program shall address each system variant/configuration. The contractor shall use MIL-STD-882D in determining whether safety engineering objectives are met. As a minimum, the contractor shall do the following:

a. Identify hazards associated with the system by conducting safety analyses and hazard evaluations. Analyses shall include both operational and maintenance aspects of each system variant/configuration.

b. Eliminate or reduce significant hazards by appropriate design or materiel selection. If hazards to personnel are not avoidable or eliminated, take steps to control or minimize those hazards.

A.3 **Safety Assessment Report (SAR).** The contractor shall develop and implement a SAR IAW the CDRL. The safety assessment shall identify all safety features and inherent hazards, and shall establish special procedures and/or precautions to be observed by test agencies and system users. The assessment shall address each system variant/configuration. As an appendix to the SAR, the contractor shall identify and incorporate Health Hazards associated with the system. The contractor shall provide a description and discussion of each potential or actual health hazard of concern for each subsystem or component. The following are examples of some areas of concern that may contain safety and health hazards. This is not an all-inclusive list:

a. Fire protection issues
b. Toxic fumes (i.e., engine exhaust, weapons firing)
c. Noise levels (i.e., steady-state, impulse)
d. Electrical issues
e. Weapons characteristics (i.e., blast overpressure, misfire procedures, hangfire procedures, cook off, breech/barrel life, safety mechanisms, weapon/vehicle integration)
f. Ammunition storage
g. Operator's devices/procedures to ensure safe operation
h. Analyses and tests conducted, with quantities involved, to demonstrate safety

A.4 **Radioactive Materials.** The contractor shall not use any radioactive materials without the approval of the Government. If any items furnished under this contract will contain Thorium, or other source material (see Title 10, Code of Federal Regulations, Part 40) in excess of 0.05 percent by weight or any other intentionally added radioactive material, the contractor shall provide a list to the Government for approval IAW the CDRL. If a Nuclear Regulatory Commission license is required, the contractor shall submit request for license within 30 days of contract award.

A.5 **Health Hazards.** The contractor shall identify potential health hazards that are indigenous to and generated by the system, and eliminate or reduce such health hazards to an acceptable level as determined by the Government. Health hazards shall be reported as part of the SAR.

A.6 **Hazardous Materials.** The contractor shall not use cadmium, hexavalent chromium, or other highly toxic or carcinogenic materials without Government approval. No Class I or Class II ODCs shall be used. The contractor shall not use materials that are identified in the Registry of Toxic Effects of Chemical Substances, published by the National Institute for Occupational Safety and Health, as materials that will produce toxic effects via the respiratory tract, eye, skin, or mouth. Moderately toxic materials may be used provided the design and control preclude personnel from being exposed to environments in excess of that specified in 29 CFR 1910, Occupational Safety and Health Standards.

A.7 **Hazardous Materials Management Program/Plan.** The contractor shall establish, implement and maintain a Hazardous Materials Management Program using National Aerospace Standard 411, *Hazardous Material Management Program*, as a guide. The contractor shall develop a Hazardous Materials Management Plan which, at a minimum, shall identify and describe the organizational relationships and responsibilities for eliminating hazardous materials, define the

process used to identify the hazardous materials utilized in the manufacturing process, and establish prioritization criteria for ranking the relative risks of these hazardous materials.

A.8 **Pollution Prevention Program/Plan.** The contractor shall establish a Pollution Prevention Plan to minimize program environmental and cost impacts and ensure that all pollution that cannot be prevented will be recycled or disposed of in an environmentally safe manner. The contractor shall define the process they will use to identify the pollution prevention initiatives which will eliminate hazardous materials in the performance of the contract. The Plan shall describe the analysis techniques that will be used to evaluate the risks associated with identified non-hazardous material/process substitutes to ensure no detriment to performance. The Plan shall include the contractor's process for materials/processes selection and evaluation. The contractor shall define their overall process for assigning responsibility to analyze and document the potential costs associated with trading a hazardous material for a less hazardous material over the life cycle of the product. A trade-off analysis is required as part of the Hazardous Materials Management Program to determine the availability of substitute materials and the feasibility of using them based on cost, schedule, performance requirements, and associated risk impacts to the system's development.

A.9 **Material Safety Data Sheet.** The contractor shall provide a Material Safety Data Sheet (MSDS) for each hazardous material item, without a National Stock Number, procured under this contract (IAW the CDRL). If applicable, a copy of the MSDS shall be submitted with each affected Special Group item. Content of MSDS shall be in accordance with Occupational Safety and Health Act (OSHA) 1910.1200(g) and annotated onto the contractor MSDS format.

A.10 **Environmental Planning Report.** The contractor shall consider environmental effects and trade-offs at all levels of planning and test hardware development. Appropriate environmental considerations shall be implemented by establishing environmental objectives and performance criteria. These objectives and criteria shall be developed with consideration of constraints including but not limited to federal, state, and local environmental laws, regulations, and guidelines; environmental resource management; and cumulative environmental effects. The contractor shall use best commercial practices in documenting these considerations. How they relate to the overall program shall also be included in an Environmental Planning Report (IAW the CDRL).

A.11 **Support for National Environmental Policy Act (NEPA) Compliance.** If data is needed by the government to develop applicable environmental analysis required under provisions of the NEPA, the contractor shall provide a description of proposed contractor actions along with qualitative and quantitative data describing the constituent materials, emissions, effluents, wastes, and hazardous materials used in and produced from these activities.

Contract Data Requirements List (CDRL)

A016 Safety Assessment Report (draft report due 150 days after contract award)
A017 Radioactive Materials (due 60 days after contract award)
A018 Hazardous Materials Management Report (initial report due 240 days after contract award)
A025 Material Safety Data Sheet (as required with each hazardous material item)
A027 Environmental Planning Report (due 90 days after contract award)

Statement of Work Appendix A Extracts

Safety and Health

The most important consideration to be regarded throughout all activities is the safety and health of affected on-site personnel, potential off-site receptors, and the protection of the environment. Accordingly, detailed safety and health criteria, practices, and procedures shall be developed and implemented to provide proper control of and protection against the unique safety, chemical, physical, and biological hazards. This subsection describes in general terms, the minimum Contractor safety, health and emergency response requirements associated with this contract.

The Contractor shall have an ongoing Safety and Health Program (SHP) meeting the most current requirements of federal, state, and local laws, regulations, and guidance. In addition, the Contractor shall prepare, implement, and enforce, a Site Safety and Health Plan (SSHP) for all site work performed under this contract. Once a site wide SSHP is written, additional sections may be written as addenda to the site wide SSHP. The Contractor shall ensure that their subcontractors, suppliers and support personnel follow all safety and health provisions.

Development and Implementation of the Safety and Health Program

When required for individual task orders, the Contractor shall prepare a written SSHP, or addendum, as appropriate. The Contractor shall review all information provided and develop the necessary documents which contain the health and safety criteria, procedures, and practices sufficient to protect on-site personnel, the environment, and potential off-site receptors from chemical, physical, and biological hazards. The Contractor shall utilize the services of qualified personnel to oversee the development and implementation of required safety and health documents.

Site Safety and Health Plan Elements: The Contractor shall prepare a written SSHP, or addendum as appropriate. As a minimum, the SSHP shall contain the following elements.

1) Site Description and Contamination Characterization: The Contractor shall describe the site location, topography, approximate size, and the past uses of the site. Furthermore, the Contractor shall compile a complete list of the contaminants found or know to be present in site areas to be impacted by work performed. Compilation of this listing shall be based on results of previous studies or, if not available, select the likely contaminants based on site history and prior site uses/activities.

2) Hazard Assessment and Risk Analysis: The Contractor shall provide a complete description of the work to be performed. The Contractor shall identify the chemical, physical, biological, ordnance/explosives and safety hazards that may be encountered for each task. Each task is to be discussed separately. A table showing all hazards anticipated on-site along with chemical names, concentration ranges, media in which found, locations on-site, estimated quantities/volumes, the applicable regulatory standards, routes and sources of exposure, and physical and toxicological properties shall be provided. Selection of chemicals as indicators of hazard shall be based on media concentrations, toxicity, volatility, or potential for air entrainment at hazardous levels, and frequency of detection.

3) Staff Organization, Qualification, and Responsibility: Each person assigned specific safety and health responsibilities shall be identified, and their qualifications and experience documented by resume in the SSHP. The organizational structure, with lines of authority and overall responsibilities for safety and health of the Contractor and all subcontractors shall be discussed.

An organizational chart showing the lines of authority for safety shall be provided. The Contractor shall obtain the Contracting Officer's acceptance before replacing any member of the safety and health staff. The request shall include the name and qualifications of each proposed replacement.

4) Chemical Information and Material Safety Data Sheets: Prior to the commencement of work, all available information concerning the chemical, physical, and toxicological properties of each substance known or expected to be present on site shall be made available to the affected employees. Material Safety Data Sheets are required for chemicals brought onsite. This information shall also be included in the SSHP.

5) Accident Prevention: Daily safety and health inspections shall be conducted to determine if site operations are in accordance with the approved SSHP, OSHA, USACE, and contract requirements.

6) Training: Personnel shall receive training in accordance with the Contractor's written safety and health training program and regulatory requirements.

7) Standard Operating Safety Procedures (SOPs), Engineering Controls and Work Practices: The Contractor shall use a combination of engineering controls, written work practices and SOPs and personal protective equipment to minimize employee exposure to chemical, physical and biological hazards. Engineering controls will take precedence over other control means where possible. The Contractor shall establish SOPs and work practices for high hazard activities (confined spaces, hot work, lockout/tag out, fall protection, drum sampling/handling, excavation, electrical work, etc.) that employees will follow when engineering controls are not feasible, will require time to install or cannot reduce the risk to acceptable levels for employees. SOPs and work practices shall be included in the SSHP.

8) Emergency Response and Contingency Plan: The Plan shall identify key site personnel roles in the event of an emergency, lines of authority and emergency communications, criteria for site evacuation, evacuation routes, safe distances, emergency notification list, emergency decontamination and medical treatment procedures, criteria for alerting the community, and route maps to nearest emergency medical facility. The Plan shall be coordinated with local emergency responders (fire, police, Emergency Medical Technicians, and emergency medical personnel).

Activity Hazard Analyses

The Contractor shall prepare an Activity Hazard Analysis for each phase of work. The analysis shall define the activities to be performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the activity hazard analysis has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the government onsite representatives. The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the Certified Industrial Hygienist, the Site Superintendent, and the Contracting Officer. Activity hazard analyses shall be attached to and become a part of the SSHP.

APPENDIX C.

LIST OF FEDERAL, DoD, AND ARMY LAWS AND REGULATIONS

Appendix C. List of Federal, DoD, and Army Laws and Regulations

FEDERAL LAWS

7 USC 4201, et seq.	Farmland Protection Policy Act
15 USC 2601-2671	Toxic Substances Control Act of 1976 (TSCA)
16 USC 470 et seq.	National Historic Preservation Act of 1966
16 USC 470aa, et seq.	Archaeological Resources Protection Act of 1979
16 USC 661 et seq.	Fish and Wildlife Coordination Act
16 USC 670a-670o	Sikes Act of 1960
16 USC 703-712	Migratory Bird Treaty Act of 1918
16 USC 1361-1407	Marine Mammal Protection Act of 1972
16 USC 1001 et seq.	Watershed Protection and Flood Prevention Act (WPFPA)
16 USC 1451-1464	Coastal Zone Management Act of 1972 (CZMA)
16 USC 1531 et seq.	Endangered Species Act of 1973
16 USC 3101-3233	Alaska National Interest Lands Conservation Act of 1980
16 USC 3501 et seq.	Coastal Barrier Resources Act (1988), reauthorized as Coastal Barrier Improvement Act of 1990
16 USC 3501 et seq.	Coastal Wetlands Planning, Protection, and Restoration Act (1988)
16 USC 4401-4412	North American Wetlands Conservation Act (1989)
16 USC 4901 et seq.	Wild Bird Conservation Act of 1992
25 USC 3001- 3013	Native American Grave Protection & Repatriation Act of 1990
29 USC 651-678	Occupational Safety and Health Act of 1970
33 USC 1251-1376	Clean Water Act of 1977, as amended (CWA)
33 USC 2702 to 2761	Oil Pollution Act of 1990 (OPA)
42 USC 134	Energy Policy Act
42 USC 300f et seq.	Safe Drinking Water Act of 1974 (SDWA) 6939b: 15 USC 1261 et seq.
42 USC 1996	American Indian Religious Freedom Act
42 USC 4321-4347	National Environmental Policy Act of 1969, as amended (NEPA)
42 USC 4901	Noise Control Act of 1972
42 USC 4913	Quiet Communities Act of 1978
42 USC 6961, 6927(c)	Federal Facilities Compliance Act of 1992
42 USC 6901 et seq.	Resource Conservation and Recovery Act of 1976 (RCRA)
42 USC 7401-7671g	Clean Air Act of 1970 (CAA), as amended by the Clean Air Act Amendments of 1990 (CAAA)
42 USC 7412 (r)	Chemical Safety Information, Site Security and Fuels Regulatory Relief Act (Public Law 106-40, amendment to Section 112 (r) of the CAA)
42 USC 9601-9675	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA)

FEDERAL LAWS (Continued)

42 USC 9620	Community Environmental Response Facilitation Act of 1992 (CERFA)
42 USC 11001-11050	Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)
42 USC 13101-13109	Pollution Prevention Act of 1990
49 USC 5101 et seq.	Hazardous Materials Transportation Authorization Act of 1994
Public Law 94-265	Magnuson-Stevens Fishery Conservation and Management Act
Public Law 98-616	Hazardous and Solid Waste Amendments of 1984
Public Law 101-615	Hazardous Materials Transportation Uniform Safety Act of 1990

FEDERAL REGULATIONS

10 CFR 20	Standards for Protection Against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Occupational Safety and Health Standards for Construction
29 CFR 1960	Department of Labor Regulations on Federal Employee Occupational Safety and Health Programs
32 CFR 651	Environmental Analysis of Army Actions
40 CFR	Protection of Environment (Various Sections)
49 CFR	Transportation (Various Sections)

EXECUTIVE ORDERS

EO 11514	Protection and Enhancement of Environmental Quality, as amended by EO 11541 and EO 11991
EO 11593	Protection and Enhancement of the Cultural Environment
EO 11738	Providing for Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contract, Grants, or Loans
EO 11988	Floodplain Management, as amended by EO 12148
EO 11990	Protection of Wetlands, as amended by EO 12608
EO 12114	Environmental Effects Abroad of Major Federal Actions
EO 12196	Occupational Safety and Health Programs for Federal Employees, as amended
EO 12777	Implementation of Section 311 of the Federal Water Pollution Control Act of October 18, 1972, as amended, and the Oil Pollution Act of 1990
EO 12898	Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, as amended by EO 12948
EO 13007	Indian Sacred Sites
EO 13045	Protection of Children from Environmental Health Risks & Safety Risks
EO 13089	Coral Reef Protection
EO 13101	Greening the Government through Waste Prevention, Recycling, and Federal Acquisition

EXECUTIVE ORDERS (Continued)

EO 13123	Greening the Government through Efficient Energy Management
EO 13148	Greening the Government through Leadership in Environmental Management
EO 13158	Marine Protected Areas
EO 13175	Consultation and Coordination with Indian Tribal Governments
EO 13186	Responsibilities of Federal Agencies to Protect Migratory Birds

DoD DIRECTIVES, INSTRUCTIONS, REGULATIONS, MANUALS, GUIDANCE, HANDBOOKS, & STANDARDS

CJCSI 3170.01C	Joint Capabilities Integration and Development System
DoD 4140.1-R	Department of Defense Materiel Management Regulation
DoD 4145.26-M	Department of Defense Contractor's Safety Manual for Ammunition and Explosives
DoD 4160.21-M	Defense Reutilization and Marketing Manual
DoD 4160.21-M-1	Defense Demilitarization Manual
DoD 4715.5-G	Overseas Environmental Baseline Guidance Document (OEBGD)
DoD 4715.6-R	Low-Level Radioactive Waste Disposal Program
DoD 5000.4-M	Cost Analysis Guidance and Procedures
DoD 6050.5-G	Hazardous Materials Information System Users Guide
DoD 6050.5-G-1	DoD Federal Hazard Communication Training Program Trainer's Guide
DoD 6050.5-H	DoD Hazardous Chemical Warning Labeling System
DoD 6050.5-M	DoD Hazardous Materials Information System Procedures
DoD 6055.9-STD	DoD Ammunition and Explosives Safety Standards
DoDD 4540.1	Use of Airspace by US Military Aircraft and Firings Over the High Seas
DoDD 4700.4	Natural Resource Management Program
DoDD 4710.1	Archaeological and Historic Resources Management
DoDD 4715.1	Environmental Security
DoDD 4715.11	Environmental and Explosive Safety Management of Department of Defense Active and Inactive Ranges within the United States
DoDD 5000.1	The Defense Acquisition System
DoDD 5030.19	DoD Responsibilities on Federal Aviation and National Airspace System Matters
DoDD 5030.41	Oil and Hazardous Substances Pollution Prevention and Contingency Program
DoDD 6050.7	Environmental Effects Abroad of Major Department of Defense Actions
DoDD 6055.9	DoD Explosive Safety Board (DDESB) and DoD Component Explosives Safety Responsibilities
DoDD 6055.11	Protection of DoD Personnel from Exposure to Radio Frequency (RF) Radiation and Military Exempt Lasers

DoD DIRECTIVES, INSTRUCTIONS, REGULATIONS, MANUALS, GUIDANCE, HANDBOOKS, & STANDARDS (Continued)

DoDD 6230.1	Safe Drinking Water
DoDI 3030.2	Community Planning and Impact Assistance
DoDI 4145.26	Department of Defense Contractor's Safety Requirements for Ammunition and Explosives
DoDI 4150.7	DoD Pest Management Program
DoDI 4165.57	Air Installations Compatible Use Zones
DoDI 4170.10	Energy Management Policy
DoDI 4715.2	DoD Regional Environmental Coordination
DoDI 4715.3	Environmental Conservation Program
DoDI 4715.4	Pollution Prevention
DoDI 4715.5	Management of Environmental Compliance at Overseas Installations
DoDI 4715.6	Environmental Compliance
DoDI 4715.7	Environmental Restoration Program
DoDI 4715.9	Environmental Planning and Analysis
DoDI 4715.10	Environmental Education, Training, and Career Development
DoDI 5000.2	Operation of the Defense Acquisition System
DoDI 6050.5	DoD Hazard Communication Program
DoDI 6055.1	DoD Safety & Occupational Health (SOH) Program
DoDI 6055.5	Industrial Hygiene and Occupational Health
DoDI 6055.7	Mishap Investigation, Reporting, and Record Keeping
DoDI 6055.8	Occupational Radiation Protection Program
DoDI 6055.11	Protection of DoD Personnel from Exposure to Radio Frequency (RF) Radiation and Military Exempt Lasers
MIL-STD-882D	Department of Defense Standard Practice for System Safety
MIL-STD-1472F	Department of Defense Design Criteria Standard—Human Engineering
MIL-STD-1474D	Department of Defense Design Criteria Standard—Noise Limits

ARMY REGULATIONS & PAMPHLETS

AR 11-9	The Army Radiation Safety Program
AR 11-34	The Army Respiratory Protection Program
AR 40-5	Preventive Medicine
AR 40-10	Health Hazard Assessment Program in Support of the Army Materiel Acquisition Decision Process
AR 50-6	Chemical Surety
AR 50-7	Army Reactor Program
AR 55-228	Transportation by Water of Explosives and Hazardous Cargo
AR 70-1	Army Acquisition Policy

ARMY REGULATIONS & PAMPHLETS (Continued)

AR 75-1	Malfunctions Involving Ammunition and Explosives (RCS CSGLD-1961(MI))
AR 200-1	Environmental Protection and Enhancement
AR 200-2 (Deleted)	Superseded by 32 CFR Part 651, Environmental Analysis of Army Actions (see 67 FR 15290)
AR 200-3	Natural Resources—Land, Forest, and Wildlife Management
AR 200-4	Cultural Resources Management
AR 200-5	Pest Management
AR 380-5	Department of the Army Information Security Program
AR 385-10	The Army Safety Program
AR 385-14	Transportation Accident Prevention and Emergency Response Involving Conventional Munitions and Explosives
AR 385-16	System Safety Engineering and Management
AR 385-40	Accident Reporting and Records
AR 385-61	The Army Chemical Agent Safety Program
AR 385-64	US Army Explosives Safety Program
AR 602-2	Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process
AR 700-141	Hazardous Materials Information System (HMIS) (RCS DD-FM&P (A,Q,&AR) 1486)
AR 700-143	Packaging of Hazardous Material
AR 740-32	Responsibilities for Technical Escort of Dangerous Materials
DA PAM 40-501	Hearing Conservation Program
DA PAM 40-503	Industrial Hygiene Program
DA PAM 70-3	Army Acquisition Procedures
DA PAM 200-1	Environmental Protection and Enhancement
DA PAM 200-4	Cultural Resources Management
DA PAM 385-16	System Safety Management Guide
DA PAM 385-61	Toxic Chemical Agent Safety Standards
DA PAM 385-64	Ammunition and Explosives Safety Standards

OTHER FEDERAL AGENCY REQUIRMENTS

FAA Order 7400.2C	Procedures for Handling Airspace Matters
FAA Order 7610.4J	Special Military Operations

APPENDIX D

ESOH INFORMATION TO SUPPORT MATERIEL FIELDING
(June 1, 2002, ASA(ALT) Digital Library)

Appendix D. ESOH INFORMATION TO SUPPORT MATERIEL FIELDING

General Characteristics

Installations are already operating under constraints and adding new equipment may increase those constraints. General characteristics of the system are used to estimate cumulative ESOH impacts when new materiel is added. Installation ESOH professionals will begin negotiating permit modifications with local regulators so system operation can begin immediately with minimal ESOH constraints. The PM should attempt to answer the following:

1. What is the system?
2. What does it do?
3. How many systems will be procured?
4. What locations will receive the system?
5. What units will receive the system?
6. How many systems will be fielded to each unit?
7. What is the time frame for fielding at each location and unit?
8. What mission equipment is installed on the system?
9. Are there types and variants on the basic platform?
10. Has the vendor documented hazardous materials in system?
11. Has the vendor documented hazardous materials in system support?
12. Has the vendor documented hazardous materials in system mission equipment?
13. Has the vendor documented hazardous materials in system mission equipment support?
14. Are any specially classified materials used in design, configuration and support of the system?
15. Are the systems mobile or stationary?
16. Will the system be self-propelled?
17. Will the system require transportation?
18. What are the size characteristics of the system?
    a. Total surface area?
    b. Length, width, height
    c. Ground clearance?
    d. Turning radius or maneuver restrictions?
19. What are the weight characteristics of the system?
    a. What is the weight distribution?
    b. What are contact surface characteristics (size, shape)?
    c. For vehicles, is the system wheeled or tracked?
20. What are the storage characteristics of the system?
    a. Fuel capacity?
    b. Fluid capacity (oils, lubricants, anti-freeze, coolants, etc.)?
    c. Munition capacity and type(s)?
21. What is the anticipated operational tempo for the system?
22. What is maximum range and maximum effective range of weapon systems?
23. What times of the year will system be used and how often?
24. How many hours of operation are anticipated during training or between maintenance actions?
25. Is there an anticipated average speed of operation?
26. Is there an anticipated distance (miles) of average operation?
27. If known, how many times does a unit need to use the system to be considered deployable?
28. Is there a training schedule?
29. What is the training schedule?

Infrastructure Capacity

Infrastructure or carrying capacity refers to the ability of environment and infrastructure on-post to accommodate the potential impact of the system. An over-capacity infrastructure cannot support new equipment. The following questions should be answered by the installation ESOH professionals with support from the PM.

30. What type of physical impact or facility needs is anticipated by the system for operation and support?
31. Are new facilities needed?
32. Are roadway improvements or additional tarmac required? Will special facilities and equipment be needed for support?
33. Does operation of the system result in land disturbance?
    a. What type of, if any, ground disturbance will occur as a result of this system? (refers to the amount/degree of physical impact to soils, which may contain cultural deposits, i.e. archaeological remains)
    b. Will the system's use on the Installation incorporate or require digging (to include both the digging of fighting positions AND/OR trenching for utilities)? If yes, to what extent and/or how often?
    c. Will the system's incorporation into the Installation require any physical intrusion into buildings? If yes, to what extent? How many buildings?
34. Does operation or maintenance of the system require large quantities of water, fuel or power?
35. What kind of fuel is required?
36. How much area does the system require for storage or operation?
37. Does the system require an impact area?
38. Does the system require a Surface Danger Zone?
39. Was the system designed for a particular landscape?
    a. Urban
    b. Desert
    c. Mountainous
    d. Forest
    e. Jungle
    f. None
40. Was the system designed for off-road use?
41. Was the system designed for sloped terrain?
42. Was the system designed to swim or ford rivers?
43. What type facilities are required to train to standard?
44. What type facilities are required for storage?
45. What type facilities are required for maintenance?

Inputs, Emissions and Wastes

For the purposes of the following sections, PMs should conduct mass balance analysis of the system and its mission equipment. Inputs to the system may be fuels, lubricants, munitions and other consumable items including replacement parts. Emissions are releases from the operation of the system and may include fluids, gases, particles, radiation, electrical impulses, light waves and noise. Emissions may be released to the air, land or water. Emissions may also result from maintenance and maintenance processes. Wastes are incidental to operation and maintenance of the system and may be hazardous or non-hazardous. Wastes include spills of input chemicals, unused systems that exceed shelf life, damaged equipment, replacement parts, or systems or items that are disposed of for any reason.

The PM is required to identify federal statutes, executive orders, and other general requirements (e.g., the Clean Air Act) during the environmental compliance review. Installation managers will identify state and local statutes and local public opinion about ESOH impacts that may constrain training. The PM and installation ESOH professionals should attempt to answer the following general questions about inputs, emissions and wastes:

46. What types of materials/chemicals are used in the system design?
47. What type of materials/chemicals can be released during operation or result from system failure?
48. What types of materials/chemicals are required for support?
49. Are tangible waste streams generated from the operation of the equipment/system?
50. What is the quantity of each material/chemical?
51. Assuming a system failure, what distribution can be expected during the release of materials/chemicals?
52. What federal law or regulation applies to the material?
53. Are the materials/chemicals in the Army inventory?
54. Does an Material Safety Data Sheet exist for the material/chemical?
55. Has the US Army Center for Health Promotion and Preventive Medicine performed a toxicity assessment of the material/chemical used in its intended process?
56. What are the potential storage and disposal issues associated with waste chemicals or materials (Resource Conservation and Recovery Act (RCRA) permitting issues)?

Noise Emissions

Noise emissions are becoming critical as local populations approach installation fence lines. Noise issues can influence operating schedules, possibly risking ability to perform nighttime exercises. Installation ESOH professionals will be able to discuss local noise considerations in detail with the PM.

57. Is the emission noise?
    a. What is the decibel level (at a particular distance)?
    b. Is it above 84 decibels? At what distance in feet?
    c. What type of noise (blast, continuous, etc.)?
    d. What is the frequency range of the noise emission (human hearing, ultra-high frequency, low frequency)?

Air Emissions

Air emissions may require modification of the installation's Clean Air Act Title V permit. Title V permit negotiations can take as long as six months. During negotiations, training schedules may be constrained. In addition, visible emissions (smoke) and odors can trigger public concern. The PM should attempt to answer the following:

58. Does the system plan to use Class l Ozone Depleting Chemicals?
59. Does the system plan to use Class II Ozone Depleting Chemicals?
60. Does the Health Hazard Assessment identify the emission as a priority pollutant?
    a. An organic analog of active human hormones (such as estrogen)?
    b. An organic analog of invertebrate hormones (such as pheromone)?
    c. A hazardous air pollutant?
    d. An air toxic?
    e. A volatile organic compound?
    f. A microbe (virus, bacteria, fungi)?

g. A biological or biochemical compound?

61. Is the emission a toxic organic compound?
    a. Is the emission volatile (such as chloroform)?
    b. Is the emission acidic (such as phenol)?
    c. Is the emission basic/neutral (such as naphthalene)?
    d. Is the emission a pesticide (such as toxaphene)?
    e. Is the emission an airborne molecule (such as oxygen, nitrogen, argon) heated above ambient temperatures?
62. Is the emission a particulate?
    a. Is the emission a smoke-like obscurant?
    b. What is the particle size (>100 microns, 10-100 microns, 1-10 microns or <1 micron)?
    c. What is the particulate material?
    d. What is the expected distribution per liter at ___meters?
63. Is the emission sulfur oxide (SOx) or nitrogen oxide (NOx)?
    a. What is the quantity released?
64. Is the emission radiation?
    a. Laser light?
    b. Alpha rays?
    c. Beta rays?
    d. Gamma rays?
    e. Microwave radiation?
65. Is emission control equipment included in the system design?
    a. What type?
    b. Why?

Water or Land Emissions/Wastes

Water and land emissions/wastes may require modification of the installation's permits and may affect waste treatment, hauling and disposal permits. Permit and contract negotiations may constrain training schedules during negotiations. In addition, visible spills, inadequate containment, community drinking water monitoring and landfill sites closure all affects installation environmental management practices are raises community awareness of on-post activities. Visible emissions in waterways and land based spills trigger negative public reaction.

66. Waterborne Pollutants:
    a. Does the system contain or produce wastewater containing human/animal urine or feces?
    b. Does the system contain or produce pass-through water or wastes at elevated temperatures?
    c. Does the system contain or produce suspended solids?
    d. Does the system contain or produce detergents (laundry or surface cleaners)?
    e. Does the system contain or produce water-soluble pesticides?
    f. Does the system contain or produce salts (such as sodium or calcium chloride)?
    g. Does the system contain or produce acids (phosphoric, nitric, hydrochloric, sulfuric)?
    h. Does the system contain or produce bases (such as sodium hydroxide)?
    i. Does the system contain or produce chlorinated water?
    j. Does the system contain or produce oils and greases?

67. Hazardous Waste:
    a. Does the system contain or produce wastes or by-products that may be ignitable?
    b. Does the system contain or produce wastes or by-products that may be corrosive?
    c. Does the system contain or produce wastes or by-products that may be reactive?
    d. Does the system contain or produce wastes or by-products that may be toxic under RCRA?

e. Does the system contain or produce wastes or by-products that may be listed under RCRA?
f. Does the system contain or produce wastes or by-products that may require Toxicity Characteristic Leaching Procedure analysis?

68. Solid Wastes

a. What type of non-hazardous wastes result from system operation and support?
b. Will the waste be solid or liquid?
c. Can the waste be recovered and recycled?
d. What is the quantity of liquid waste that can be expected?
e. What is the quantity of solid waste that can be expected?

Hazardous Materials

The following questions may be redundant but details concerning specific hazardous materials will help installation ESOH professionals.

69. Does the system need any of the following regulated materials for operation and/or maintenance?
    a. Batteries containing:
        i. Lithium
        ii. Magnesium
        iii. Lead-acid
        iv. Mercury
        v. Nickel Cadmium
        vi. Nickel Magnesium Hydride
        vii. Alkaline
        viii. Others (?)
    b. Fuels
        i. Fissionable elements
        ii. Electricity
        iii. Diesel
        iv. Gasoline
        v. Jet Fuel A
        vi. Kerosene
        vii. JP-8
        viii. JP-4
        ix. Propane
        x. Natural Gas
        xi. Hot Water
        xii. Steam
        xiii. Others (?)
    c. Others
        i. Asbestos containing materials
        ii. Friable Asbestos
        iii. Lead-based Paint
        iv. Chemical Agent Resistant Coating (CARC) Paint
        v. Polychlorinated Biphenyls (PCBs)
        vi. Microbes
        vii. Biochemically active molecules (such as enzymes)
        viii. Antigenically reactive molecules (such as proteins)

ix. Hazardous materials as defined by the Occupational Safety and Health Administration (OSHA)
x. Radioactive isotopes or sources
xi. Any material listed under Toxic Substances Control Act (TSCA)
xii. Items/materials classified as Department of Transportation (DOT) Class 1 Explosives

APPENDIX E

SAMPLE ESOH REQUIREMENTS CHECKLIST

Appendix E. Sample ESOH Requirements Checklist

	Information/Action Required	MS A	MS B	MS C
ENVIRONMENT, SAFETY, & OCCUPATIONAL HEALTH (ESOH) GENERAL CONSIDERATIONS	ESOH Objectives in the Approved Initial Capabilities Document (ICD)	C		
	ESOH Objectives in the Approved Capabilities Development Document (CDD)		C	U
	Integrated Product Team(s) and Management Structure in Place to Manage, Track, and Oversee ESOH Activities	S	C	C
	ESOH Support Strategy (Acquisition Strategy)	S	C	U
	Ensure Compliance with ESOH Federal, State, and Local Laws and Regulations and Federal Executive Orders (EOs)	C	C	C
	Programmatic Environment, Safety, and Health Evaluation (PESHE)	S	C	U
	Sponsor Research/Development of ESOH Alternatives for Integration into the System	S	S	S
	Consider the ESOH Alternatives with Associated Cost/Benefit Studies	S	S	S
	ESOH Exit Criteria, if Applicable	C	C	C
	Test and Evaluation Master Plan (TEMP) Supports Development of the Test ESOH Requirements	S	C	U
	ESOH Requirements Reflected in the Cost Analysis Requirements Document (CARD)	S	C	U
	ESOH Requirements Stated in System Performance Specifications	S	C	U
	ESOH Requirements Stated in Source Selection Criteria and Contracts	S	C	C
	Life-Cycle ESOH Activities Cost Identified and Reflected in the Budgets	S	C	U
	ESOH Information/Cautions Incorporated in Manuals and Personnel Training	S	S	C
	ESOH Activities Identified and Planned for System Modernization/Growth Improvements/Modifications	S	S	S
	Demilitarization/Disposal Plan ESOH Considerations	S	S	C

C = Completed; U = Updated; and S = Should be considered, if applicable

Appendix E. Sample ESOH Requirements Checklist (Continued)

	Information/Action Required	MS A	MS B	MS C
EXPLOSIVES SAFETY	Explosives Safety and Hazard Classification Documents	S	S	S
	Program Risks (Cost/Technical/Schedule) Associated with Explosives Safety Requirements Identified	S	S	S
NEPA AND EO 12114	Program NEPA and Executive Order 12114 Compliance Schedule	S	C	U
	Required NEPA/E.O. 12114 Analysis/Documentation	S	C	C
	NEPA Mitigations Scheduled, Budgeted, Funded, Accomplished, and Monitored	S	S	S
SAFETY & HEALTH	Health Hazards and Safety considered in the Acquisition Strategy	S	C	U
	System Safety Management Plan	S	C	U
	Safety Program Identifies, Tracks, and Resolves System-Related Safety Hazards, Particularly High and Medium Risks	S	C	C
	Safety Mitigations Identified, Budgeted, Funded, Executed, and Monitored	S	S	S
	The Range Safety Data, Safety Assessment Report, and Safety Release Exists for Each Test Mission	S	C	C
	Health Hazard Assessment (HHA) Report	S	C	C
	Health Hazard Program Identifies, Tracks, and Recommends Resolution of System-Related Health Hazards	S	C	C
	Health Hazard Mitigations Identified, Budgeted, Funded, Executed, and Monitored	S	S	S
	Identification of Procedures, Equipment, and Training to Protect Personnel from Potential Exposure to Safety and Health Hazards	S	S	S
	Health Hazards Considered in the System MANPRINT Management Plan (SMMP)	S	C	U
HAZMAT/ HAZWASTE	Hazardous Material Management Program (HMMP) Plan	S	C	U
	Hazardous Waste Management Strategy/Plan – handling, disposal, minimization (coordination with HMMP and P2)	S	C	U
	Class I Ozone Depleting Chemicals (ODCs) Eliminated	C	C	C
	Program to Minimize Use of HAZMAT and Class II ODCs	S	C	C
P2	Pollution Prevention (P2) Plan	S	C	U
	P2 Program to Address and Correct System P2 Issues/Deficiencies	S	C	C

C = Completed; U = Updated; and S = Should be considered, if applicable