Headquarters U.S. Air Force

Integrity - Service - Excellence

ISO 14001, OHSAS 18001, and MIL-STD-882D and SE

NDIA SE Conference
San Diego, CA
27 October 2005

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Office of the Deputy Assistant Secretary
(Science, Technology and Engineering)

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Overview

- The Need for Integrated ESOH Risk Management
- Policy, Perceptions, Reality
- Environmental Risk Management
- ESOH Risk Management
- Using MIL-STD-882D to Integrate ESOH

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The Need for Integrated ESOH Risk Management

- DoD needs a way to manage ESOH risks like all other Acquisition Program risks
  - Acquisition Program Management and Systems Engineering (SE) are fundamentally Risk Management activities
  - Everything is in a program's "trade-space"
    - Capability requirements can be renegotiated if technology is insufficiently mature or too expensive
    - Funding can be increased or decreased
    - Schedule can be expanded or compressed
  - ESOH needs to be able to be evaluated with other program risks in the program's "trade-space"
- E, S, and OH risk assessments need to be integrated and de-conflicted

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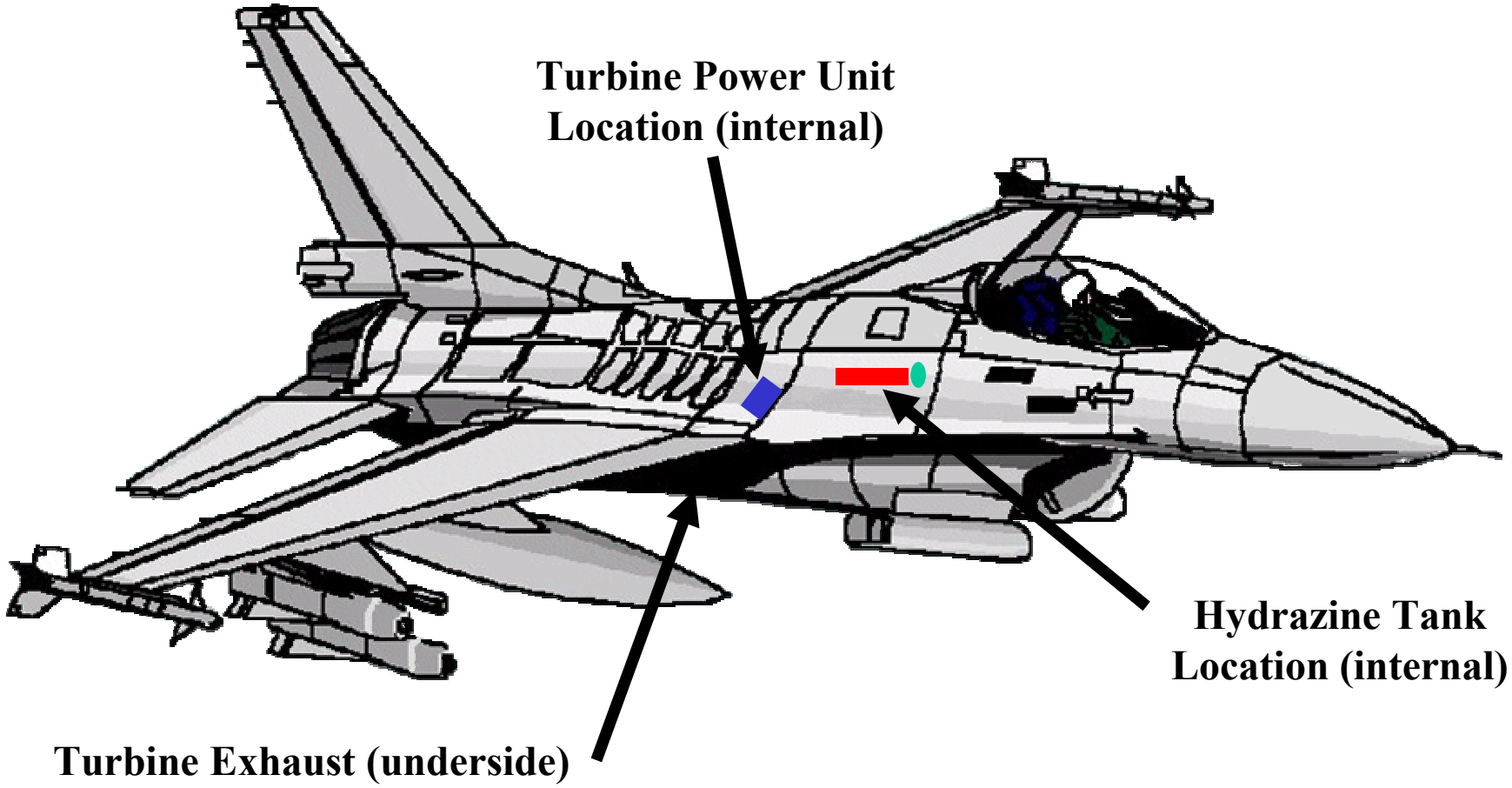
The Need for Integrated ESOH Risk Management

F-16 Emergency Power Unit (EPU)



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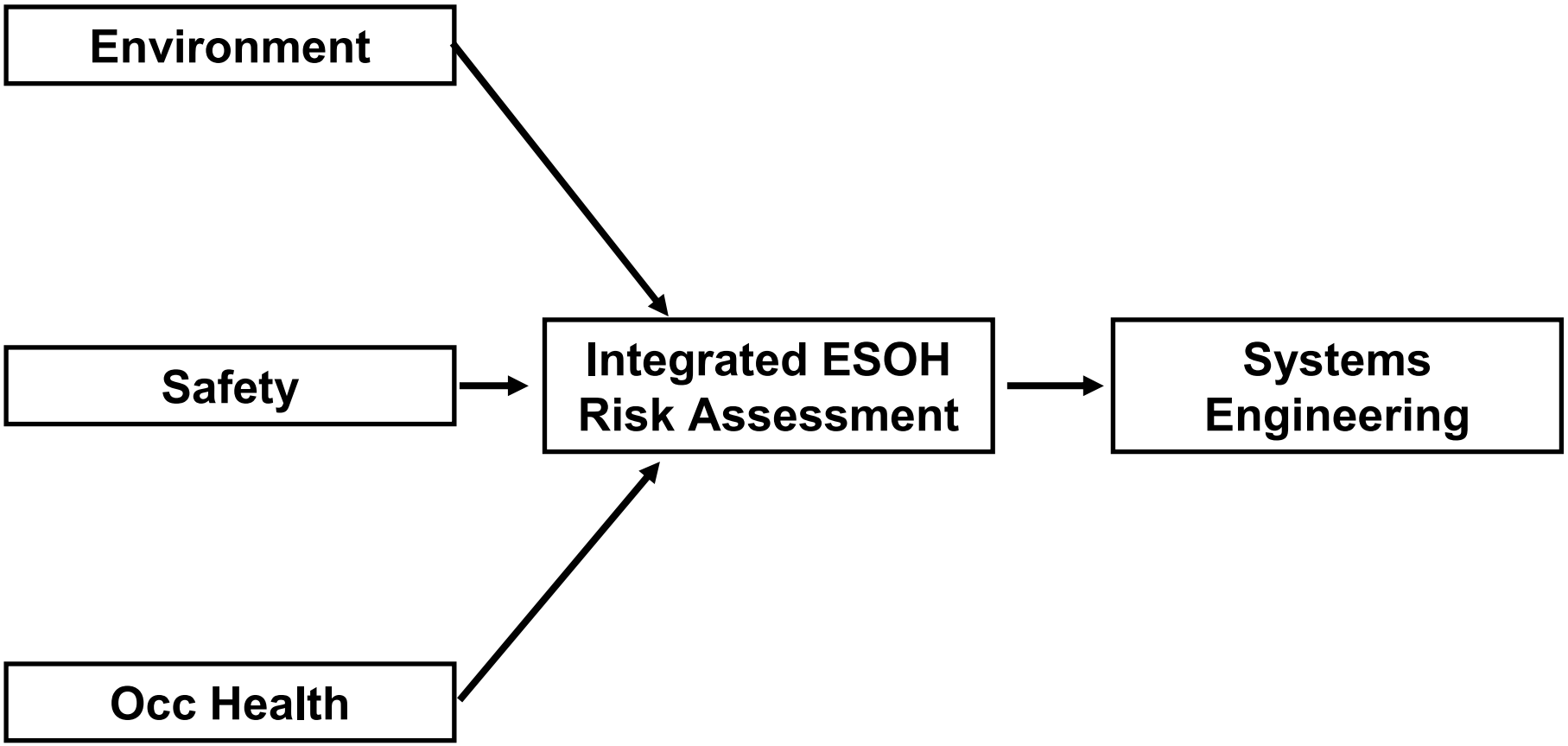
The Need for Integrated ESOH Risk Management



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Policy

- DoD 5000.2R (1996) integrated ESOH into Systems Engineering for the first time
  - Defined environmental compliance in risk management terms
  - Established System Safety hazard identification and risk assessment, mitigation, and acceptance requirements
- 12 May 03 DoDI 5000.2, E7 built on requirements from 1996 DoD 5000.2-R
- 23 Sep 04 USD (AT&L) Defense Acquisition System Safety memo requires ALL DoD PMs to:
  - Integrate ESOH into SE using System Safety
  - Use MIL-STD-882D as the System Safety methodology
  - Incorporate ESOH integration strategy into the new Systems Engineering Plan (SEP)
  - Address ESOH risk acceptance decisions in technical and program reviews

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E - SOH Perceptions

- From its inception, Safety has been understood as a risk management activity
- Although it often has a compliance focus, Occupational Health involves risk management
- Environmental management is the "odd man out"
  - Compliance focus predominates
  - Reigning methodologies seen as incompatible with S-OH risk management methodologies

Biggest perceived gap is between E and SOH

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E - SOH Perceptions

Weapon System Pollution Prevention:

JUST DO IT!

"Environment, Safety, and Occupational Health are three totally different things"

Violating environmental laws isn't a "risk" to be managed

Environmental Management: Keeping the Program Manager out of jail

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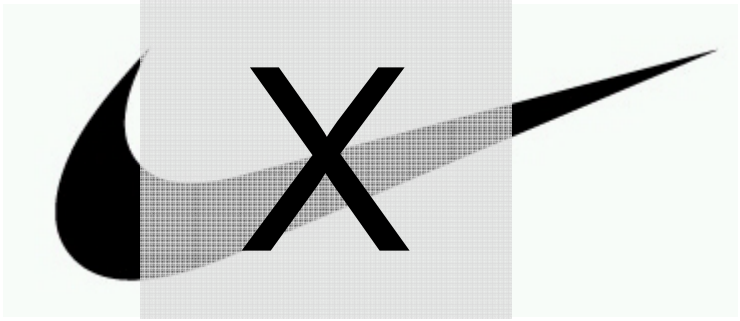
ESOH Reality

Weapon System Pollution Prevention:



JUST DO IT!

Violating environmental laws isn't a "risk" to be managed

"Environment, Safety, and Occupational Health are three totally different things"

Environmental Management: Keeping the Program Manager out of jail

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Environmental Risk Management

- Environmental Management is becoming a more formalized Risk Management activity
- 1970 NEPA Environmental Impact Analysis Process has risk management-like elements
  - Potential environmental impacts
  - Significance of the impacts
  - Potential mitigation measures
  - Approval authorities

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Environmental Risk Management

- 1980s-1990s emphasis on Pollution Prevention was based on a hierarchy of mitigation measures
  - Eliminate at the source
  - Re-use/Recycle
  - Treatment
  - Disposal
- 1996 Environmental Management System (EMS) adopted a risk management approach (without calling it “risk management”)

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ESOH Risk Management

- **The E, S, and OH disciplines have now formally adopted risk management approaches**
  - **Since 1977 - MIL-STD-882 – *Standard Practice for System Safety***
  - **1996 - International Organization for Standardization ISO 14001 – *Environmental Management System***
  - **1999 Occupational Health and Safety Assessment Series (OHSAS) 18001 – *Occupational Health and Safety Management Systems***

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ESOH Risk Management

- **Risk Management Terminology**

System Safety MIL-STD-882D	Environmental ISO 14001	Occupational Health OHSAS 18001
Hazard	Aspect	Hazard
Mishap	Impact	Accident
Risk	Significance	Risk

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ESOH Risk Management

- Order of Precedence Terminology

System Safety MIL-STD-882D **Mitigation Measures**	Environmental ISO 14001 **Preventive Actions**	Occupational Health OHSAS 18001 **Controls**
Design selection	Eliminate at the source	Eliminate hazard
Safety devices	Re-use/Recycle	Engineering controls/isolation
Warning devices	Treatment	Administrative
Procedures & training	Disposal	Personal Protective Equipment

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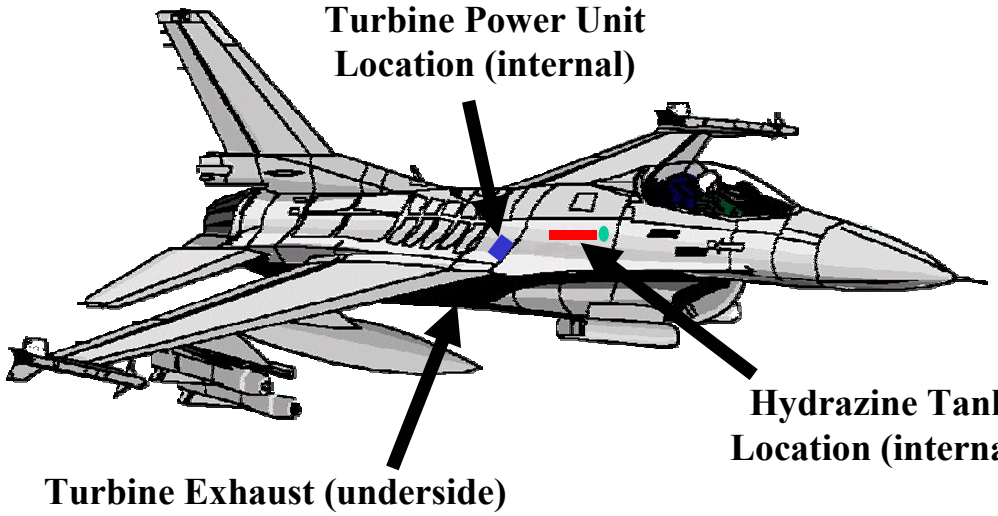
Using MIL-STD-882D to Integrate ESOH

- **Needed a vehicle to do two things:**
  - **Link environment to safety and health**
  - **Embed ESOH in the engineering process in order to influence the design process**
- **Chose 882 approach over NEPA because 882 had**
  - **Existing direct connections to the DoD Acquisition Engineering process lacking in NEPA**
  - **Risk acceptance concept that ensures senior leadership involvement mirroring NEPA approval process**
  - **Analysis process analogous to NEPA**

The Need for Integrated ESOH Risk Management



Environment

Safety

Occ Health

Integrated ESOH Risk Assessment

Systems Engineering

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Using MIL-STD-882D to Integrate ESOH

MIL-STD-882D Severity Categories expanded to include Environmental Risk

Description	Category	Environmental, Safety, and Health Result Criteria
Catastrophic	I	Could result in death, permanent total disability, loss exceeding $1M, or irreversible severe environmental damage that violates law or regulation.
Critical	II	Could result in permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, loss exceeding $200K but less than $1M, or reversible environmental damage causing a violation of law or regulation.
Marginal	III	Could result in injury or occupational illness resulting in one or more lost work days(s), loss exceeding $10K but less than $200K, or mitigatible environmental damage without violation of law or regulation where restoration activities can be accomplished.
Negligible	IV	Could result in injury or illness not resulting in a lost work day, loss exceeding $2K but less than $10K, or minimal environmental damage not violating law or regulation.

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Using MIL-STD-882D to Integrate ESOH

Hazard Risk Index and Acceptance
DoDI 5000.2, E7.7 & MIL-STD-882D

FREQUENCY OF OCCURRENCE	HAZARD CATEGORIES			
	I CATASTROPHIC	II CRITICAL	III MARGINAL	IV NEGLIGIBLE
(A) Frequent	1	3	7	13
(B) Probable	2	5	9	16
(C) Occasional	4	6	11	18
(D) Remote	8	10	14	19
(E) Improbable	12	15	17	20

HIGH(CAE)

SERIOUS (PEO)

MEDIUM (PM)

LOW (PM)

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Summary

- Integrate across E,S, and OH to optimize and balance decision-making
- Integrate ESOH into the SE process in order to influence the design process
- System Safety is the process best positioned to accomplish this

BACK UP CHARTS

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ESOH Rosetta Stone

- **Aspect – An element of a facility's activities, products, or services that can interact with the environment (create an environmental impact). An aspect can be thought of as the "cause" of an environmental impact. [ISO 14001, Environmental Management Systems and Office of the Federal Environmental Executive (OFEE) - Introduction to EMS Training Materials]**

- **Hazard –Any real or potential condition that can cause injury, illness, or death to personnel; damage to or loss of a system, equipment or property; or damage to the environment. [MIL-STD-882D, DOD Standard Practice for System Safety]**

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ESOH Rosetta Stone

- **Impact – any change to the environment wholly or partially resulting from an organization's activities, products or services. An impact can be thought of as an "effect" or "outcome" of an environmental aspect. [ISO 14001, Environmental Management Systems and OFEE - Introduction to EMS Training Materials]**

- **Mishap – An unplanned event or series of events resulting in death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. [MIL-STD-882D, DOD Standard Practice for System Safety]**

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ESOH Rosetta Stone

- **Significance – A significant aspect is one that has or can have a significant impact on the environment. Sites select the exact criteria for determining significance. Examples of criteria are tendency to occur, severity of impact, regulatory issues, etc. [OFEE - Introduction to EMS Training Materials]**

- **Risk – An expression of the impact and possibility of a mishap in terms of potential mishap severity and probability of occurrence. [MIL-STD-882D, DOD Standard Practice for System Safety]**