

# ***Headquarters U.S. Air Force***

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*Integrity - Service - Excellence*

## **19008 — Deficiencies in Understanding and Implementing DoD Acquisition Systems Engineering Environment, Safety, and Occupational Health Policy**



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**Mr. Sherman Forbes  
SAF/AQRE  
sherman.g.forbes.civ@mail.mil  
703-696-7361  
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# ***Bottom Line Up Front (BLUF)***

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**Key deficiencies seen during United States Air Force (USAF) acquisition program reviews:**

- 1) Failure to integrate across Environment, Safety, and Occupational Health (ESOH) disciplines and into Systems Engineering (SE)**
- 2) Failure to manage both ESOH requirements and risks**
- 3) Improper tailoring of MIL-STD-882E risk matrix**
- 4) Inconsistent risk acceptance across the system's life cycle**
- 5) Inadequate use of required documentation**
  - Systems Engineering Plan (SEP)**
  - Programmatic ESOH Evaluation (PESHE)**
  - National Environmental Policy Act (NEPA)/Executive Order (EO) 12114 Compliance Schedule**



- **Department of Defense (DoD) Acquisition SE ESOH policy**
- **Key USAF acquisition program office deficiencies in implementation of acquisition SE ESOH policy**
  - **Observed symptoms**
  - **Proposed remedies**
- **Summary**



# DoD Acquisition SE ESOH Policy

- DoDI 5000.02, 7 January 2015, Enclosure 3, Section 16 ESOH
  - "...As part of risk reduction, the Program Manager will eliminate ESOH hazards where possible, and manage ESOH risks where hazards cannot be eliminated. *The Program Manager will use the methodology in MIL-STD-882E, DoD Standard Practice for System Safety.*"
  - "*Prior to exposing people, equipment, or the environment to known system-related ESOH hazards*, the Program Manager will document that the associated risks have been accepted by the following acceptance authorities: the Component Acquisition Executive for high risks, Program Executive Officer-level for serious risks, and the Program Manager for medium and low risks."
  - *User representative is a critical part of the risk acceptance process and must formally concur prior to acceptance of a serious or high risk.*



## DoD Acquisition SE ESOH Policy (Cont.)

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### ■ MIL-STD-882E

#### ■ Introduction states the following:

- “It should be used not only by system safety professionals, but also by other functional disciplines such as fire protection engineers, occupational health professionals, and environmental engineers to identify hazards and mitigate risks through the SE process. *It is not the intent of this document to make system safety personnel responsible for hazard management in other functional disciplines. However, all functional disciplines using this generic methodology should coordinate their efforts as part of the overall SE process because mitigation measures optimized for only one discipline may create hazards in other disciplines.*”



## *DoD Acquisition SE ESOH Policy (Cont.)*

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- MIL-STD-882E (Cont.)

- ESOH defined as:

- “An acronym that refers to the combination of disciplines that encompass the processes and approaches for addressing laws, regulations, Executive Orders (EO), DoD policies, environmental compliance, and hazards associated with environmental impacts, *system safety (e.g., platforms, systems, system-of-systems, weapons, explosives, software, ordnance, combat systems)*, occupational safety and health, hazardous materials management, and pollution prevention.”



# ***Deficiency #1 – Failure to Integrate Across ESOH into SE***

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## **■ Symptoms**

- USAF Program's often execute ESOH and System Safety as separate, parallel efforts**
  - Lack of integrated hazard assessment may result in an optimized mitigation of one aspect of a hazard, which could introduce or increase risk in other aspects of the hazard**
  - For example, mitigation of an environmental hazard may create a safety hazard or a problem for SE from a cost, schedule, and performance standpoint**

## **■ Remedies**

- Use consolidated ESOH Teams/Working Groups (WGs)/Integrated Product Teams (IPTs) as part of an acquisition program office's overall SE IPT structure**
- Use a consolidated Hazard Tracking System (HTS) for environment, system safety, and occupational health hazards**



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# ***Deficiency #2 – Failure to Manage ESOH Requirements and Risks***

## **■ Symptoms**

- Lack of understanding that ESOH management must address both requirements and risks**
  - Failure to identify ESOH requirements early in the life cycle can drive cost and schedule impacts**
  - For example, ESOH requirements include Hazardous Materials (HAZMAT) management, NEPA/EO 12114 compliance, and certifications (laser safety, air worthiness, munitions, etc.)**

## **■ Remedies**

- Have the ESOH practitioners identify ESOH requirements in the initial SEP (typically Milestone [MS] A)**
- Integrate ESOH requirements into the overall requirements management process and integrated master schedule/plan**
- Review revised Defense Acquisition Guidebook**





## ***Deficiency #3 – Improper Tailoring of MIL-STD-882E Risk Matrix***

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### **■ Symptoms**

- Tailored matrices not approved by appropriate organization**
- Failure to document matrix in either SEP or PESHE**

### **■ Remedies**

- MIL-STD-882E allows tailoring, without approval, of probability levels using quantitative data consistent with the word definitions in MIL-STD-822E**
- Must obtain formal approval by Milestone Decision Authority or in accordance with Component policy for use of tailored severity and probability definitions and risk matrix**
- Document tailored matrix and approval in SEP or PESHE**
- Note: USAF Component policy prohibits tailoring of severity category definition to ensure the risk acceptance authority sees consistent ESOH risks across USAF programs**



# ***Deficiency #4 – Inconsistent Risk Acceptance***

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## **■ Symptoms**

- Failure to accept risk prior to exposing people, equipment, or the environment to a known hazard**
- Use of outdated terminology: “closed” and “residual” risk**

## **■ Remedies**

- Use the three MIL-STD-882E risk types during hazard assessment**
  - Initial – Assessed risk level when hazard is first identified, establishing a fixed baseline for the hazard**
  - Target – Projected risk level once mitigations are implemented, verified, and validated**
  - Event – Risk applicable to an event (e.g., test and evaluation) for hazard as applied to specific hardware/software configuration**
- Must accept Event risk levels for all hazards present in a specific event involving people, equipment, or the environment**



## ***Deficiency #4 – Inconsistent Risk Acceptance (Cont.)***

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### **■ Remedies (Cont.)**

- Understand “residual risk” is not meaningful**
- Understand hazards and their associated risks are never “closed” – must reassess in response to any system change with potential to affect hazard**
- Assess proposed changes to a system, as part of life cycle configuration management effort, for potential to:**
  - Alter current risk level of any affected hazards**
  - Compromise effectiveness of affected mitigation measures**
  - Eliminate known hazards**
- Understand that any change to a risk level must be reaccepted**
- Note: The term, Current risk, refers to the status of a given hazard as reported at formal program or technical reviews – risk does not require acceptance unless it is also an Event risk**



# ***Deficiency #5 – Inadequate Use of Required Documentation***

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## **■ Symptoms**

- ESOH documentation does not comply with DoD policies and expectations**
  - Use of boilerplate language in SEPs**
  - Failure of the PESHE to be the ESOH data repository to include the HTS**
  - Incomplete NEPA/EO 12114 Compliance Schedule and failure to include in the integrated master schedule/plan**

## **■ Remedies**

- Use the three mandatory ESOH documents (SEP, PESHE, and NEPA/EO 12114 Compliance Schedule) as intended**



## *Deficiency #5 – Inadequate Use of Required Documentation (Cont.)*

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- Remedies (Cont.)
  - Use the SEP starting at MS A to include:
    - ESOH management planning and requirements early-on
      - Critical at MS A to ensure ESOH execution during the Technology Maturation and Risk Reduction phase
        - Ensures ESOH data is available to support Preliminary Design Review (PDR) where a significant portion of the system design is already completed
        - Ensures NEPA/EO 12114 compliance requirements identified
        - Enables development of PESHE and NEPA/EO 12114 Compliance Schedule in support of MS B
      - ESOH management approach as part of SE process, including the ESOH organizational structure, certifications, contractual requirements, and other relevant considerations
    - Note: SEP includes PESHE and NEPA/EO 12114 Compliance Schedule at MS B and C



## *Deficiency #5 – Inadequate Use of Required Documentation (Cont.)*

- Remedies (Cont.)
  - Use the PESHE as the ESOH data repository to include:
    - HTS data
    - HAZMAT data not in the HTS
      - System specific data (e.g., environmental, performance, design characteristics) needed for NEPA/EO 12114 analysis (in addition to the HTS and HAZMAT data)
  - Use the NEPA/EO 12114 Compliance Schedule for top level program planning to include:
    - Planned and completed analyses for program events
    - Time periods for each program event and level of analysis
    - Organization responsible for the analysis
    - Approval authority for the analysis
    - Updates in response to programmatic changes
    - Note: This schedule information should be included in the integrated master schedule/plan as appropriate



- For the ESOH community to more effectively contribute to program success, it must:
  - Integrate across the ESOH disciplines and into SE
  - Address management of both ESOH requirements and risks
  - Tailor appropriately the MIL-STD-882E risk matrix
  - Ensure risk acceptances prior to exposing people, equipment, or the environment to known ESOH hazards
  - Use required ESOH documentation appropriately and efficiently

***Final Thought – Effective ESOH management is critical for successful system compliance and sustainment across the life cycle***