Life Cycle Management Center

AFLCMC … Providing the Warfighter's Edge!

U.S. AIR FORCE

Use of Draft MIL-STD-882E, Task 108 to Prohibit & Eliminate Cr^{6+}

NDIA System Engineering Conference

Tampa, FL

24 October 2018

Gene McKinley
System Integration Engineer
Combat Rescue Helicopter
(937)713-0280

CRH Program Overview

- **The Combat Rescue Helicopter (CRH) is an advanced variant of the UH-60M Black Hawk and it is a dual-piloted helicopter with weapons and a cabin configuration specifically optimized for combat rescue and recovery operations**
  - **Increased internal fuel capability for greater range**
  - **GE T700-701D engines**
  - **New fatigue- and corrosion-resistant machined aero-structure**
  - **Tactical Mission Kit integrating multiple sensors, data links, defensive systems, and other sources of intel information (Weather, EO-IR, Link-16, SADL, CIB, Warning Systems for radar, laser, and missiles)**
- **The primary mission of the CRH is to recover isolated personnel from hostile or denied territory**
  - **It will also execute humanitarian missions and non-combatant evacuation operations**
  - **The platform will be capable of employment day or night, in adverse weather and in a variety of threat spectrums from terrorist attacks to chemical, biological, radiological, and nuclear threats**

Artist Rendering - CRH

Occupational Safety and Health Act

- **Requires employers provide an informed workplace free from recognized hazards to safety and health**
- **AFI 91-203, *AF Consolidated Occupational Safety Instruction*, and AFOSH STD 48-series add criteria**

Airmen sanding degraded paint coatings within an enclosure to contain hazardous material generated during de-painting.

Airman applying Hexavalent Chromium primer to an aircraft

Exposure to hazardous material requires informed workers and PPE - the last line of defense.

Pollution Prevention Act

- **Then:**
  - **U.S. produced millions of tons of pollution**
  - **Spent tens of billions of dollars controlling**
  - **Focused on treatment and disposal**
- **Now:**
  - **Planning provides**
    - **cost-effective material use**
    - **reduced raw material**
    - **pollution control**
    - **reduced liability**
- **First - prevent or reduce at the source**
- **Next – recycle**
- **Last - treat and dispose**

Brake plate with possibly hazardous inorganic coatings.

MC-130 Combat Talon tool kit with 200 pcs of equipment and **120 HAZMATs.**

Accomplishments

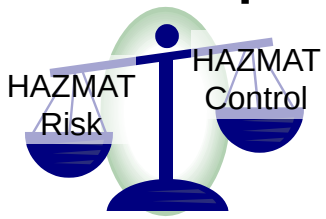
- **Used the MIL-STD-882 system safety process to eliminate hazards or to reduce risk**
- **Eliminated 40% of HAZMATs across airframe, avionics, and maintenance technical documentation**
- **Eliminate Hexavalent chromium (Cr6+) paints from BOTH the exterior and interior structural surfaces of the aircraft**
- **Comprehensive Hazard Tracking Database**
- **Environmental Impact Analysis Report**

HAZMAT Management
CRH Approach Overview

AFLCMC … Providing the Warfighter's Edge!

1. Qualify HAZMAT risks using the system safety process (contractor report)
   - Secure feedback from the users and maintainers
2. Develop the *government* HAZMAT Mgt strategy based on the risk
   - Document the HAZMAT strategy
   - Define HAZMAT *(the nature of HAZMAT differs for different systems)*
   - Establish prohibited, restricted & tracked categories
   - Identify the high-risk materials (e.g., Cr) & material-specific requirements
3. Implement the strategy – integrate into solicitation
4. Identify regulated HAZMAT, wastes, and pollutants (contractor plan/report)
5. Review/comment/accept deliverables; work with the OEM; assess trades; use data to mitigate HAZMAT risks to acceptable levels; coord residual risk with user

HAZMAT Management approach is based on the risk



Many legacy systems do not have an active HAZMAT Mgt Program

3. Implement the Strategy

- **Included the requirement in the CRH SOW**
  - **Hazardous Material section**
    - **Establish a program – comply with NAS 411**
  - ***Hazardous Materials Management Program (HMMP) Plan and* tailored NAS 411 – used data template DI-MGMT-81398B**
  - ***Hazardous Materials Management Program (HMMP) Report* and tailored NAS 411 – used data template DI-MGMT-81397B**
  - **MIL-STD 882D cited**
    - **Used elements from Draft Task 108 to implement CRH strategy**

4. Identify regulated HAZMAT HMMP Plan/Report

AFLCMC … Providing the Warfighter's Edge!

(based on NAS 411)

Includes the following content, as a minimum:

- HAZMAT targeted for elimination and reduction
- The PM and contractor processes to properly identify, control, analyze, and track the HAZMAT to protect human health and the environment and to support end user needs
- The process for approving HAZMAT use where HAZMAT cannot be eliminated
  - Trade-off approach
- Milestones for process steps and deliverables

MIL-STD-882E Task 108 and NAS 411 can be the basis for the plan

The plan should balance cost, schedule, & performance considerations with the potential for adverse environmental & human impacts

MIL-STD 882E HAZMAT Planning

(NAS 411+)

AFLCMC … Providing the Warfighter's Edge!

Data provided to contractor:

- **Identification of the Government HAZMAT review and approval authority(ies)**
- **Listing of proposed prohibited, restricted, and tracked materials**
- **Special data elements, format, or data reporting requirements**
- **System life-cycle phases included in the projection of HAZMAT usage or generation**
- **Listing of HAZMAT management assumptions, limitations, exceptions, exemptions, or thresholds**
- **Requirement to report HAZMAT used by the contractor for production or manufacturing processes**

Government HAZMAT Management Planning

Determine and document:

- **The Program's HAZMAT definition**
- **The materials that the Program plans to Prohibit, Restrict, Track**
- **The approach for special materials like ODS, Cadmium, Beryllium, Lead & Hexavalent Chromium (Cr^{6+})**
- **Contractor requirements**

Document the approach to identify and manage HAZMAT risk, including ODS and hex chromium

“THE” CRH List

U.S. AIR FORCE

AFLCMC … Providing the Warfighter’s Edge!

Prohibited

Actinolite (Asbestos variation)	Tremolite (Asbestos variation)
Amosite (Asbestos variation)	4,4'-Methylenebis(2-chloroaniline) (MBOCA)
Anthophyllite (Asbestos variation)	Nickel Compounds
Asbestos (friable)	Chloroform
Chrysolite (Asbestos variation)	Dimethylhydrazine
Crocidolite (Asbestos variation)	Hydrazine
Hexavalent Chromium Chromium Chromium Compounds	Methylene chloride dichloromethane
Mercury and Mercury Compounds	Aniline
Class I Ozone Depleting Substances See AFI 32-7086	Methyl hydrazine
Polychlorinated biphenyls (PCB)	

Restricted (not complete)

1,3-Butadiene	Ozone Depleting Substances Class II
4-Aminobiphenyl	Methyl Ethyl Ketone (MEK) 2-Butanone
Acetaldehyde	Acrolein
Arsenic and Arsenic Compounds	Lead and Lead Compounds
Benzene	Lithium Compounds
Beryllium and Beryllium Compounds	Naphthalene
Cadmium and Cadmium Compounds	Perchloroethylene (PCE) Tetrachloroethylene
Ethylene oxide	Radioactive Materials
Formaldehyde	Nitric Acid
Zinc Compounds	Sulfur Hexafluoride
1,3,5-trinitro-1,3,5-triazine (RDX)	Toluene
2,4-Dinitrotoluene	Trichloroethylene

CRH HAZMAT Reduction by the Numbers

U.S. AIR FORCE

AFLCMC … Providing the Warfighter's Edge!

HH-60W

- 31 Technical Manuals
  - 488 unique consumables
  - 288 unique MSDS/SDS
  - 207 updated/removed/deleted
- Integrated Electronic Technical Manuals
  - 434 Materials (Airframe)
    - 31 materials of concern
  - 20 materials (Avionics)
    - 2 materials of concern
  - 155 Materials (Maintenance)
    - 297 unique consumables
  - 192 updated/removed/deleted

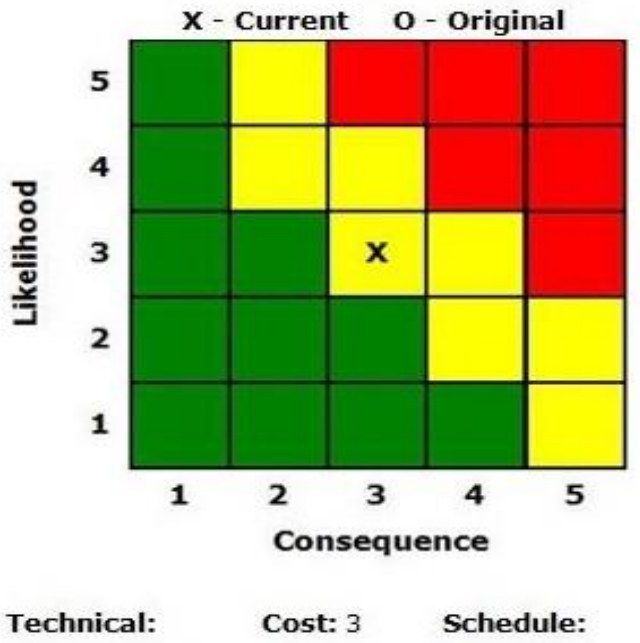
CRH APPROVAL
Non-Cr^{6+}

- 1st USAF platform to approve the use of complete non-chromium coating system stackup for interior airframe
- CRH System Specification changed
- Expect to carry moderate Program/Airworthiness risk until enough field data verifies assessment results (~2025)
- Annual Corrosion Prevention Advisory Board to oversee performance under the purview of Aircraft Structural Integrity Program

CRH Program Risk

- **Program Risk Generated and Accepted by Program Director**
  - **If corrosion on the aircraft interior occurs with the use of non-chromated coatings, then increased maintenance cost could occur**

Multilayer Structure	*HH-60W Paint System Stack-up*		
	Specification	Manufacturer	Trade Name
CIC	MIL-DTL-85054 / SS8536 Type II	Zip-Chem	Cor-Ban 35
Topcoat	MIL-DTL-53039 Type IV MIL-DTL-64159 Type II	Any QPL	Any QPL
	MIL-PRF-85285	Any QPL	Any QPL
Primer	MIL-PRF-23377 Type II Class N	Hentzen	17176KEP
	MIL-PRF-23377 Type I Class N	PPG	02-GN-084
	MIL-PRF-85582 Type I Class C2	Any QPL	Any QPL
Reactivate	MIL-DTL-5541	Henkel	Alodine T5900
Anodize	MIL-A-8625 Type IC	Approved Supplier	



Risk Closure criteria: no change in performance compared to HH-60G (Legacy)

Corrosion Analysis

CRH vs HH-60G

+ Av-Dec® gaskets for avionics
+ Improved avionics/shelf sealing
+ High Speed Machining
  cabin tub and aft transition
+ ForceMate® bushings
+ Same environment
+ Polyurethane on HSM
+ Primer on Details
+ Corrosion inhibiting materials
+ New finishes and materials
- More electrical connections
- Increased airflow for cooling

Better | Slightly Better | Equivalent | Slightly Worse | Worse

Elements of a Successful HAZMAT Program

- HAZMAT Management Program
- System Safety Program
- System Specification
- Statement of Work
- FAR/DFAR Clauses

Deliverables:

- HMMP Plan
- HMMP Report
- SSPP
- SSHA/SAR
- Env. Impact Analysis Report

Gene McKinley

SYSTEMS INTEGRATION ENGINEER

Email: gene.mckinley@us.af.mil
Phone: 937.713.0280 DSN 713.0280
2240 B St, Bldg. 11, Room 130
Wright-Patterson AFB, OH 45433

QUESTIONS?