

# **NAVSEA's Approach for Managing the Risk of Hazardous Material (HM) Usage in New Acquisition**

**Jessica Klotz (NSWCCD 634)  
Jessica.klotz@navy.mil**

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# What is HM?

*Any material because of its quantity, concentration or physical, chemical, or infectious characteristics, may pose a substantial hazard to the health or the environment when incorrectly used, purposefully released, or accidentally spilled.*

Likely HM if:

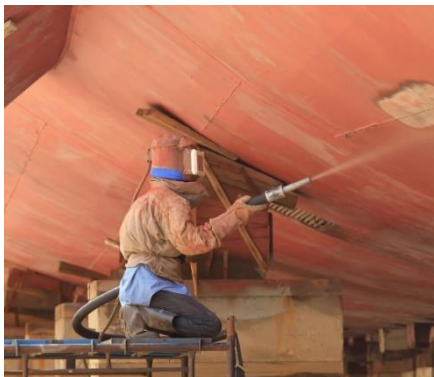
- Accompanied by a safety data sheet (SDS) [formerly material safety data sheet (MSDS)]
- Requires personal protection equipment (PPE)
- Presents environmental, safety, and occupational health (ESOH) concerns



# How is HM used?

Over the life-cycle of a system, HM can be used in various applications

- General Use Consumable HM
  - Cleaning products, hydraulic fluid, paint, etc.
- Operation and Maintenance HM
  - Lubricants, greases, adhesives, batteries, etc.
- Structural articles
  - Cadmium connectors and fasteners, copper beryllium springs, etc.



# So what, who cares?

- Increases Life-Cycle Costs
  - Special handling/stowage
  - Waste disposal
- Adds Compliance Constraints
  - Permitting may be required
- Presents ESOH risks
  - User safety
  - Environmental impact
- Threatens Sustainability
  - Future availability of HM may impact the lifecycle of a system



# HM Challenges and Need to Change

- Lack of common approach to HM avoidance
  - Multiple chemical avoidance lists exist among the different Navy (and DoD) Acquisition Program Offices.
- Expansive universe of chemicals of concern
  - How to decide what chemicals to include or prioritize
- HM managed independently of system safety
- OEM's have to stock various materials for same application based upon individual programs
  - Lack of commonality
  - Potential sustainability concerns
  - Increased cost to DoD for parts and materials
  - Inability to implement other program's lessons learned



# Historical Efforts to Standardize HM Management

- NAVSEA technical community recognized the need to standardize, strengthen, and improve the approach to hazardous materials avoidance in acquisition programs
  - 2008: NAVSEA 04RE Prohibited and Controlled Chemical List Guidance
  - 2010: NAVSEA 05P25 HM Avoidance Process Letter
  - 2012: NAVSEA 05P5 Prohibited and Controlled Chemical List Revision 1
    - Baseline for 2013 National Aerospace Standard (NAS) 411-1
  - 2015: NAVSEA Hazardous Material Avoidance Process Design, Practices, and Criteria (DPC) Manual
    - Knowledge sharing, lessons learned, and process improvement between NAVSEA technical community, Program Executive Offices, NMCPHC, FFC, NAVAIR, SPAWAR, Shipyards, and OEMs

# How We are Standardizing

## NAVSEA 05 HM Avoidance Process DPC Manual (T9070-AL-DPC-020/077-2)

- Applicable to all new ship and weapon system/equipment acquisition programs, modernization programs, logistics revisions and system life-cycle management
- Outlines roles and responsibilities for acquisition programs and the technical community
  - Invoke the requirements of the DPC Manual within all appropriate documents
    - Should be integrated into the Statement of Work and/or Requirement Specifications prior to contracting
    - Can be referenced in contract documentation
    - Should be referenced in the Systems Engineering Program, System Safety Management Plan, Hazardous Materials Management Program Plan , and other design documents (as contractually required and appropriate)
  - **Management of HM is based upon application and associated risk**
    - Defines HM identification, risk assessment, acceptance and tracking process

**Handle HM Risks the Same as All Other System Safety Hazards**

# How We are Standardizing

- DPC Manual promulgates the **NAVSEA List of Targeted Chemicals (N-LTC)**
  - Standardized chemical list for incorporation into Acquisition Program documentation
  - Divided into three tiers: Prohibited, Restricted, and Tracked (aligns with definitions per MIL-STD-882E, Task 108)
  - Complements Aerospace Industry Association Hazardous Material Target List (HMTL) published in NAS 411-1
    - All prohibited/restricted chemicals listed on NAS 411-1 are listed on N-LTC
      - N-LTC updated to reflect changes to chemical tiers as accepted by DoD and implemented in 411-1
    - N-LTC includes chemicals that are unique to shipboard environment
      - N-LTC is the NAVSEA tailored version of the NAS 411-1 as defined by the NAS 411-1 language
      - NAS 411-1 maintained as the smaller chemical universe to control costs associated with HM management
        - Chemicals required to build an aircraft carrier are significantly different from those required to build a tank, jet, or helicopter



- **5 prohibited chemicals/families**

- Hexavalent Chromium, Ozone Depleting Substances (ODS) Class I, Asbestos (including variations), Polychlorinated Biphenyls (PCBs), and Chlordane

- **175 Restricted chemicals/families**

- Identification of NAVSEA 05 application exceptions to restricted tiers

- NAVSEA technical community has identified and approved the risk associated with specific applications for certain restricted chemicals (included as notes in manual)
  - These approvals are specific to NAVSEA
  - Many of these applications are common across DoD
  - **Programs still need to accept risk**
- Reduces waiver burden from chemicals in commonly accepted applications
- Examples include:
  - Industry Standard Metal Alloys (chromium, lead, nickel)
  - Mercury used in general purpose lighting, LCD displays, and battery residual
  - Copper used in piping, cables, printed circuit boards, wire, terminals, or electrical applications that require bonding or grounding

## N-LTC Details (cont.)

- NAVSEA technical community has standardized the assignment of severities associated with chemicals
  - Historical attempts at HM risks assessments did not have proper justifications for severity assignments
  - Prohibited and Restricted chemicals are listed in the N-LTC with a severity based upon MIL-STD-882E definitions
    - Known Carcinogens assigned Catastrophic Severity
      - Exposure to a known human carcinogen can result in cancer which can result in death
    - Likelihood of getting cancer is dependent upon the application including dose, frequency of exposure, routes of exposure, etc.
      - Probability
    - Other chemicals weighted based upon engineering best judgement
    - **It is at the discretion of the program to assign probabilities specific to their applications**

## N-LTC currently being updated

- Chemical Changes
  - ODS Class II elevated to Prohibited/HFCs to Restricted
    - Montreal Protocol and Clean Air Act
  - Persistent Organic Pollutants (POPs) are prohibited
    - Includes chlordane as well as DDT, Heptachlor, Aldrin, etc.
  - Updates to NAS 411-1 from 2013 to 2016
  - Toxic Substances Control Act (TSCA) 10 and TSCA Persistent, Bioaccumulatives, and Toxics (PBT)
  - PFOS (Prohibited)/PFOA (Restricted)
  - Other chemicals as directed by SECNAV and CNO
- Creation of new application exceptions
  - Based upon recommendations of SEA 05 Technical Community

# N-LTC Update (cont.)

- Severity assignments updated per technical paper developed by Navy Marine Corps Public Health Center (NMCPHC)
  - NAVSEA worked with NMCPHC to develop a scheme to correlate the severity definition to chemicals
  - The severity for personnel exposure to HM determined based upon the intrinsic nature of the chemical constituents (ie. What information is on the SDS)
    - Correlate the classifications per the Global Harmonization System (GHS) found on Safety Data Sheets (section 2) to severities
    - Severities have been assigned to chemicals using both MIL-STD-882E and NAVSEA 5100.12-M definitions
    - Based solely on personnel exposure hazards, not environmental constraints
  - Programs may vary specific HM severities from those listed for chemicals based upon information on product SDS

## Identification of HM application

- Use vendor supplied information to identify HM containing a prohibited or restricted chemical
  - SDS, Bill of Materials, drawings, other technical data
  - Identify the severity listed in the N-LTC
- Determine probability of personnel exposure specific to the HM application
  - Is it fully encapsulated or a throw-away at end of life
  - Frequency of Application
  - Routes of Exposure
  - What maintenance is performed
  - Personal Protective Equipment

# HM Risk Assessment

RISK ASSESSMENT MATRIX				
SEVERITY \ PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

**MIL-STD-882E**

		Severity							
		CVN Loss <sup>2</sup> (1)	Ship Loss <sup>2</sup> (2)	Catastrophic (3)	Critical (4)	Significant (5)	Marginal (6)	Negligible (7)	N/A
Frequency and Probability	Frequent (A)	High	High	High	High	High	Serious	Medium	
	Probable (B)	High	High	High	High	Serious	Serious	Medium	
	Occasional (C)	High	High	High	Serious	Serious	Medium	Medium	
	Infrequent (D)	High	High	Serious	Serious	Medium	Medium	Low	
	Rare (E)	High	Serious	Serious	Medium	Medium	Low	Low	
	Remote (F)	Serious	Serious	Medium	Medium	Low	Low	Low	
	Improbable (G)	Serious <sup>3</sup>	Serious <sup>4</sup>	Medium	Low	Low	Low	Low	
	Eliminated <sup>5</sup> (H)								

**NAVSEA 5100.12-M**

- Copper Piping
  - Copper and Copper Compounds is a restricted material with a severity of marginal
    - CWA Priority Pollutant, DOT Severe Marine Pollutant, and OSHA PEL<1ppm
  - Copper piping is pervasive across navy platforms
  - Copper and Copper Compounds on N-LTC contains an exception for piping
    - Risk Assessment performed by PNS determined it was medium risk
  - Per acceptance process, programs identify the use and approximate volume of copper piping used and input into tracking system with no further review required

# Process Examples (cont.)

- Methylene Chloride for paint stripping during maintenance
  - Methylene Chloride is a restricted chemical with a severity of **Critical**
    - NTP Anticipated Carcinogen, CAA Hazardous Air Pollutant, CWA Priority Pollutant, Greenhouse Gas, OSHA Specific Standard, Highly Flammable
    - One of the Toxic Substances Control Act (TSCA) 10
  - Some paint strippers contain 60-80% methylene chloride
  - Methylene Chloride evaporates off after use so will not be in delivered products
    - Maintenance/Logistics requirements determined during construction
  - Paint stripping commonly occurs during maintenance but appropriate PPE and ventilation is implemented across all Navy facilities so probability of exposure will be **Remote** resulting in a Risk Assessment Code of **Medium**
    - Medium risks require NAVSEA 05 TWHs concurrence on assessments and acceptance by the Program Manager
  - TWH will not concur with the risk based upon readily available authorized substitutes

**Process will encourage Programs to utilize already approved materials that do not contain N-LTC chemicals to avoid labor and time impacts**



- This process will assist future development, acquisition, modernization and life cycle management programs to eliminate/minimize HM used in their systems.
  - Standard approach for all programs at inception
  - Ensure regulatory compliance
  - Increase sustainability and create commonality
  - Reduction of cost for HM management over entire life-cycle



# Questions or For Copies of the HM Avoidance DPC Manual

NAVSEA 05P5 HM Technical Warrant Holder (acting):

Nick Saponara

(215) 897-8784/(202) 781-2990;  
nicholas.saponara@navy.mil

NSWCCD 634 TPOC: Jessica Klotz

(301) 227-0753; jessica.klotz@navy.mil