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NAS411-1 Hazardous Material Implementation & Alternatives

ISSTS
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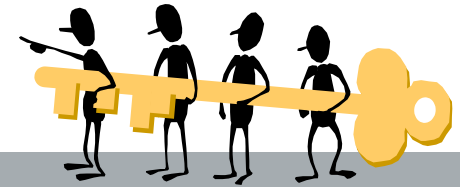
Overview

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- DoD and industry collaboratively revised the Hazardous Material Management Program (HMMP) Standard (“NAS411”) and created NAS411-1 Hazardous Material Target List (HMTL)
 - Consistent with MIL-STD-882E, but available for commercial contracts
 - NAS411 (Rev3) and NAS411-1 published 30Sept2013
- NAS411-1 provides a standard HMTL for the DoD to use as guidance for new programs
 - Contains prohibited, restricted, and tracked HAZMAT
 - Expected to be tailored to meet program needs



Definitions



- **Prohibited HAZMAT** - material that cannot be included or used in Products and Services unless prior customer approval is obtained for each specific application or process. (HAZMATs in this category have been determined to pose potentially unacceptable ESOH, cost, schedule, or performance risks and typically have technically and economically feasible alternatives.)
- **Restricted HAZMAT** - material that the contractor is required to target for elimination or minimization.
- **Quantify** – obtaining an **estimate** of the amount of HAZMAT, based upon **readily available data and/or engineering judgment**. The quantity can be in various terms that can be **used to assess relative risk**, such as weight percent, pieces of hardware or measure of weight.
- **Tracked HAZMAT** - material that does not require specific contractor action other than tracking and reporting to the customer.

NAS411-1 HAZMAT

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- **Prohibited HAZMAT are**
 - Asbestos
 - Class I ODS
 - **Hexavalent Chromium**
 - Mercury and Mercury Compounds
 - Polychlorinated Biphenyls (PCBs)
- **Restricted HAZMAT includes**
 - Beryllium and beryllium compounds
 - Cadmium and cadmium compounds
 - Nickel compounds
 - Lead and lead compounds



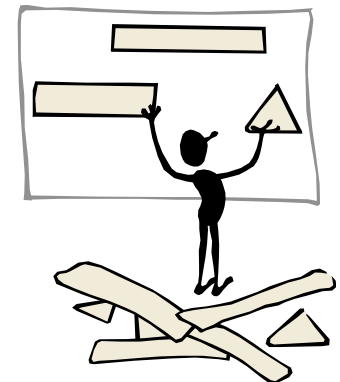
Exceptions

- When prohibited or restricted HAZMAT needs to be **used to support program objectives**, then consider incorporating appropriate exceptions in the contract.
- Examples:
 - Except **hexavalent chromium** required for use per a customer requirement (e.g., coatings required per program Finish Specification) or not subject to 48 CFR 223.73 DFARS (e.g., conversion coating, chromic acid anodize, and adhesive bonding primer) shall be categorized as **restricted** material
 - Except **lead** in electrical and electronic applications, sealed maintenance-free batteries, lead ballast for vessel stability, and industry standard metal alloys with lead $\leq 4\%$ shall be **tracked** material.
 - Except **beryllium** in electrical/electronic components or mirrors shall be categorized as **tracked** materials.
 - Except **nickel compounds** in batteries, electronic/electrical applications, plating, catalysts, coatings, dyes and seals shall be categorized as **tracked** material.

Alternatives

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- Difficult for New Programs to Determine What Alternatives are Available and Feasible for DOD Systems
- Focus on Hexavalent Chromium DFARS Alternatives First
- Identify Alternatives and Application Guidance where Exists
- Coordinate with Government and Industry Experts
- Guidance Tailored by Programs



DoD Example

Typically not used on the system	
Alternatives available and approved	
Alternatives available and approved for limited applications	
No alternatives available	
Alternatives available, but not approved	

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	Ground and Amphibious Vehicles	Ships/Landing Craft	Aircraft		
	(Army and Marine Corps)	(Navy)	Air Force	Army	Navy and Marines
CR ⁺⁶ DFARS					
Sealants (Nonconductive)					
Sealants (Conductive)					
Fuel Tank Coating			No alternative to AMS-C-27725 fuel tank coating		
Metallic Ceramic Paints					
Paint Primer					
Wash Primer					
Additional CR ⁺⁶					
Adhesive bonding primer					
Anodize (MIL-A-8625)					
Anodize Seal (MIL-A-8625)					
Chrome Plating					
Conversion Coating (Aluminum MIL-DTL-5541)					
Conversion Coating Touch-up					
Deoxidize & Desmut					
Etch					
Passivation					
Pickle					
Post Treatment (Cadmium)					
Post Treatment (Zinc Nickel)					
Prep for Surface Bonding					

NAS411 WG Next Steps

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- NAS411 and NAS411-1 will be periodically reviewed and updated as needed
 - Feedback form available at www.aia-nas.org. (Ref. NAS411-1 Section 7)
- Develop a separate “Tracked HAZMAT” list
- Develop list of chemical names and CAS numbers for NAS411-1 compounds
 - Hexavalent Chromium Compounds List
- Explore opportunities to harmonize NAS411-1 where feasible with other lists/requirements
- Develop additional NAS411-1 guidance
- Facilitate identification, communication, and implementation of alternatives early in the design – collaborate with DoD and industry SMEs

QUESTIONS???





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Back-Up Charts

Collaborative Effort

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▪ Department of Defense

- Air Force
- Army
- Marines
- Navy
- Office of the Secretary of Defense (OSD)

▪ Industry NAS411 WG Members

- AIA
- BAE
- Boeing
- Harris
- HII
- Lockheed Martin
- Materion
- Raytheon
- Rockwell Collins



NAS411-1

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- **Developed HMTL by dividing the Navy Prohibited and Controlled Chemicals List (PCCL) into three main categories:**
 - Prohibited HAZMAT
 - Restricted HAZMAT
 - Not categorized (Insignificant usage or negligible hazard)
- **Restricted HAZMAT ranked on a Priority of 1 to 3**
 - Priorities are based upon potential initial severity
 - Highest potential severity is 1 (carcinogens)
 - If a restricted HAZMAT must be used, then use the least hazardous HAZMAT that meets performance criteria

Prohibited HAZMAT

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Prohibited HAZMAT	CAS
Actinolite (Asbestos variation)	77536-66-4
Amosite (Asbestos variation)	12172-73-5
Anthophyllite (Asbestos variation)	77536-67-5
Asbestos (friable)	1332-21-4
Chrysolite (Asbestos variation)	12001-29-5
Crocidolite (Asbestos variation)	12001-28-4
Hexavalent Chromium	Multiple CAS
Mercury and Mercury Compounds	Multiple CAS
Ozone Depleting Substances Class I	Multiple CAS
Polychlorinated biphenyls (PCB)	Multiple CAS
Tremolite (Asbestos variation)	77536-68-6

Restricted HAZMAT

Priority	Restricted HAZMAT	CAS
1	1,3-Butadiene	106-99-0
1	4,4'-Methylenebis(2-chloroaniline) (MBOCA)	101-14-4
1	4-Aminobiphenyl	92-67-1
1	Acetaldehyde	75-07-0
1	Arsenic and Arsenic Compounds	Multiple CAS
1	Benzene	71-43-2
1	Beryllium and Beryllium Compounds	Multiple CAS
1	Cadmium and Cadmium Compounds	Multiple CAS
1	Ethylene oxide	75-21-8
1	Formaldehyde	50-00-0
1	Nickel Compounds	Multiple CAS
2	1,1,2-Trichloroethane	79-00-5
2	1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4
2	2,4-Dinitrotoluene	121-14-2
2	3,3'-Dichlorobenzidine	91-94-1
2	4,4'-Methylenedianiline	101-77-9
2	Acrolein	107-02-8
2	Chlorobenzene	108-90-7
2	Chloroform	67-66-3
2	Cyanide Containing Compounds (includes Nitrile and Cyano Compounds)	Multiple CAS
2	Dimethyl sulfate	77-78-1
2	Dimethylhydrazine	57-14-7
2	Epichlorohydrin	106-89-8
2	Ethylene dichloride	107-06-2
2	Hydrazine	302-01-2
2	Isocyanate Compounds	Multiple CAS
2	Lead and Lead Compounds	Multiple CAS
2	Lithium Compounds	Multiple CAS
2	Methylene chloride	75-09-2
2	Naphthalene	91-20-3
2	Perchloroethylene	127-18-4
2	Phenol	108-95-2
2	Phthalate Esters	Multiple CAS

Restricted HAZMAT (cont.)

Priority	Restricted HAZMAT	CAS
2	Radioactive Materials	Multiple CAS
2	Styrene	100-42-5
2	Sulfur Hexafluoride	2551-62-4
2	Toluene	108-88-3
2	Trichloroethylene	79-01-6
3	1,2-Dichlorobenzene	95-50-1
3	2-Ethoxyethanol	110-80-5
3	2-Nitropropane	79-46-9
3	Aniline	62-53-3
3	Antimony and Antimony Compounds	Multiple CAS
3	Chloroprene	126-99-8
3	Cobalt Compounds	Multiple CAS
3	Copper Compounds	Multiple CAS
3	Cresol (mixed isomers)	1319-77-3
3	Ethylbenzene	100-41-4
3	Hydrofluoric acid	7664-39-3
3	Maleic anhydride	108-31-6
3	m-Cresol	108-39-4
3	Methanol	67-56-1
3	Methyl hydrazine	60-34-4
3	o-Cresol	95-48-7
3	Ozone Depleting Substances Class II	Multiple CAS
3	p-Cresol	106-44-5
3	Phosphorus	7723-14-0
3	Propylene oxide	75-56-9
3	Quinone	106-51-4
3	Selenium and Selenium Compounds	Multiple CAS
3	Silver Compounds	Multiple CAS
3	Thallium and Thallium Compounds	Multiple CAS
3	Tin Compounds	Multiple CAS
3	Unbound Nanoparticles	Multiple CAS
3	Xylene (Mixed Isomers)	1330-20-7
3	Zinc Compounds	Multiple CAS

PROHIBITED AND RESTRICTED HAZMAT SPREADSHEET



Prohibited and
restricted HAZMAT

NAS411 Provisions

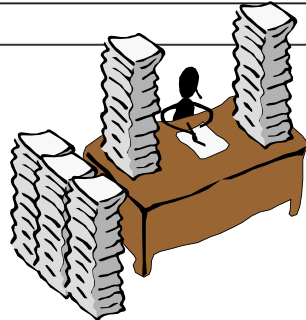
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- HAZMAT used for production or manufacturing only included when specifically required by contract
- Exempts contractor from responsibility for determining content of customer-furnished items
- Not limited to military contracts and can be used on non-military government and commercial product and service contracts
- Prohibited, Restricted and Tracked HAZMAT are all tracked, but tracking method consistent with hazard posed
- MIL-STD-882E Task 108 data elements identified in NAS411 Appendix A provide guidance on tracking methods

NAS411 APPENDIX A GUIDANCE

TABLE I – TYPICAL CONTRACT DELIVERABLE OF TASK 108 DATA ELEMENTS

Data Elements	Structural Hardware¹	Consumables²
HAZMAT item or substance name	HMMP Report	HMMP Report
HAZMAT Category (prohibited, restricted, or tracked)	HMMP Report	HMMP Report
Special Material Content Code (SMCC)	Logistics Support Analysis (LSA) Report or Logistics Product Data (LPD) Report	LSA Report or LPD Report
Location of HAZMAT within the system	HMMP Report	HMMP Report
Quantity of HAZMAT	Hazard Tracking System or HMMP Report ³	HMMP Report ⁴
Application, process, or activity whereby quantities of HAZMAT are embedded in the system, or used during operations, and support of the system	HMMP Report	HMMP Report
Reasonably anticipated HAZMAT (whether categorized or not) generated during the system's life-cycle	Hazard Tracking System	Hazard Tracking System
Reasonably anticipated HAZMAT (whether categorized or not) generated during mishap occurrence	Hazard Tracking System	Hazard Tracking System
Special HAZMAT control, training, handling measures, and Personal Protective Equipment (PPE) needed	Hazard Tracking System or HMMP Report	HMMP Report
Material Safety Data Sheets (MSDSs)	Not applicable	HMMP Report
NSN ⁵	Not applicable	HMMP Report
Product Vendor or CAGE ⁵	HMMP Report	HMMP Report



NAS411 APPENDIX A TABLE I NOTES

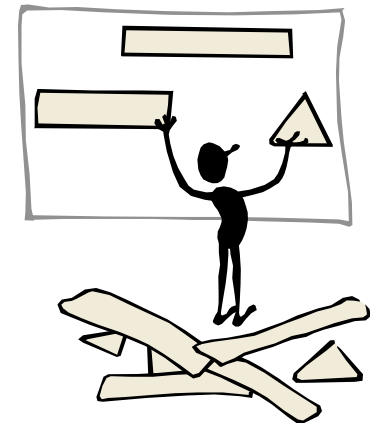
Notes:

- 1) "Structural hardware" refers to the materials of construction used in delivered hardware.
- 2) "Consumables" refers to materials that are intended to be consumed or depleted as a result of their use during operations and support or during the performance of services.
- 3) The quantity in structural hardware may be incorporated in the Hazard Tracking System or provided in the HMMP report. Provide the quantity sufficient to support the HAZMAT risk assessment, but avoid overly detailed quantities that do not add value to the risk assessment process. For example, if a restricted HAZMAT is present in a primer used on 3,000 pieces of hardware throughout a vehicle, then an understanding of the total quantity of restricted HAZMAT in the primer is needed to assess the relative risk. The quantity of restricted HAZMAT on each of the 3,000 pieces of hardware on the vehicle is not required. However, combining material quantities is only allowable when the potential exposure mechanism (pathway, receptor) is similar for all pieces. In addition, each of the specific 3,000 parts in this example would have to be identified as a location of a given HAZMAT. Appropriate grouping of pieces, e.g., all quarter-inch bolts, is acceptable.
- 4) The NSN is associated with a quantity and unit of measure that may be used to determine the total quantity of material.
- 5) The NSN and/or Product Vendor or CAGE code are not required by Task 108 but may be contractually required by the program.

Note:

Alloy is defined as a solid or liquid mixture of two or more metals, or of one or more metals with certain non-metallic elements, as in carbon steel, beryllium copper.

A **compound** can be defined as a substance composed of atoms or ions of two or more elements in chemical combination. The constituents are united by bonds or valence forces. For example, beryllium acetate and beryllium sulfate are compounds.



MIL-STD-882E Task 108

108.1 Purpose. Task 108 is to implement a Hazardous Materials Management Plan (HMMP) which shall be made available to the Government on request. Hazardous Material (HAZMAT) management is an integral part of the risk management effort within the program's System Engineering (SE) process using this Standard's methodology.

108.2 Task description. The contractor shall use the HMMP to define contractor roles, responsibilities, and procedures needed to accomplish HAZMAT management and tracking. The plan shall account for contractually required HAZMAT management tasks and responsibilities. At a minimum, the HMMP shall identify the following:

- a. The processes to properly identify, analyze, and control HAZMAT risks to protect human health, safety, and the environment, as well as to support end user needs.
- b. Procedures for tracking and reporting HAZMAT.

108.2.1 HAZMAT identification. A HAZMAT is defined as any item or substance that, due to its chemical, physical, toxicological, or biological nature, could cause harm to people, equipment, or the environment.

108.2.2 HAZMAT Categorization. Following contract award, a list of HAZMAT within the delivered hardware and/or required for system operation and support, categorized as prohibited, restricted, or tracked, will be mutually agreed upon by the Government and contractor.

- a. **Prohibited** HAZMAT require the contractor to obtain Government approval before those materials can be included in the system, subsystems, and support equipment or planned for system operation or support.
- b. **Restricted** HAZMAT are those materials that the contractor will target for elimination or minimization.
- c. **Tracked** HAZMAT are those materials that do not require specific contractor action other than tracking and reporting.
- d. HAZMAT used for production or manufacturing will only be included in the HMMP when mutually agreed upon by both the Government and contractor.

108.2.3 Modification of HAZMAT list or categorizations. Proposed changes to the HAZMAT list or categorization will be mutually agreed upon by the Government and contractor.

MIL-STD-882E Task 108 cont.

108.2.4 HAZMAT data tracking. The contractor will be required to track and report all prohibited, restricted, and tracked HAZMAT included in the delivered system, subsystems, and support equipment or planned for system operation or support. The minimum data elements required for HAZMAT tracking and reporting will include:

- a. HAZMAT item or substance name.
- b. HAZMAT Category (prohibited, restricted, or tracked).
- c. Special Material Content Code (SMCC) as designated in DoD 4100.39-M, Volume 10.
- d. Location of HAZMAT within the system.
- e. Quantity of HAZMAT within the system with traceability, as applicable, to version specific hardware designs.
- f. Application, process, or activity whereby quantities of HAZMAT are embedded in the system, or used during operations, and support of the system.
- g. Reasonably anticipated HAZMAT (whether categorized or not) generated during the system's life-cycle (e.g., installation, Government test and evaluation, normal use, and maintenance or repair of the system).
- h. Reasonably anticipated HAZMAT (whether categorized or not) generated during mishap occurrence.
- i. Special HAZMAT control, training, handling measures, and Personal Protective Equipment (PPE) needed, including provision of required Material Safety Data Sheets (MSDSs).

108.3. Details to be specified. The Request for Proposal (RFP) and Statement of Work (SOW) shall include the following, as applicable:

- a. Imposition of Task 108 to establish contractual HAZMAT management requirements as early in the program life-cycle as possible. (R)
- b. Identification of the Government HAZMAT review and approval authority(ies). (R)
- c. Listing of proposed prohibited, restricted, and tracked materials.
- d. Special data elements, format, or data reporting requirements.
- e. System life-cycle phases included in the projection of HAZMAT usage or generation.
- f. Listing of HAZMAT management assumptions, limitations, exceptions, exemptions, or thresholds.
- g. Requirement to report HAZMAT used by the contractor for production or manufacturing processes.

DoDI 5000.02 Enclosure 12 (Dec 8, 2008)

6. ESOH. The PM shall integrate ESOH risk management into the overall systems engineering process for all developmental and sustaining engineering activities. As part of risk reduction, **the PM shall eliminate ESOH hazards where possible, and manage ESOH risks where hazards cannot be eliminated.** The PM shall use the methodology in MIL-STD-882D, “DoD Standard Practice for System Safety” (Reference (bz)). PMs shall report on the status of ESOH risks and acceptance decisions at technical reviews. Acquisition program reviews and fielding decisions shall address the status of all high and serious risks, and applicable ESOH technology requirements. Prior to exposing people, equipment, or the environment to known system-related ESOH hazards, the PM shall document that the associated risks have been accepted by the following acceptance authorities: the CAE for high risks, PEO-level for serious risks, and the PM for medium and low risks. The user representative shall be part of this process throughout the life cycle and shall provide formal concurrence prior to all serious- and high-risk acceptance decisions.

a. Programmatic ESOH Evaluation (PESHE). The PM for all programs, regardless of ACAT level, shall prepare a PESHE which incorporates the MIL-STD-882D process and includes the following: identification of ESOH responsibilities; the strategy for integrating ESOH considerations into the systems engineering process; identification of ESOH risks and their status; a description of the method for tracking hazards throughout the life cycle of the system; **identification of hazardous materials**, wastes, and pollutants (discharges/emissions/ noise) associated with the system and plans for their minimization and/or safe disposal; and a compliance schedule covering all system-related activities for the NEPA (sections 4321-4347 of Reference (ac) and Reference (ad)). The Acquisition Strategy shall incorporate a summary of the PESHE, including the NEPA/E.O. 12114 (Reference (ad)) compliance schedule.

b. NEPA/E.O. 12114. The PM shall conduct and document NEPA/E.O. 12114 analyses for which the PM is the action proponent. The PM shall provide system-specific analyses and data to support other organizations’ NEPA and E.O. 12114 analyses. The CAE (or for joint programs, the CAE of the Lead Executive Component) or designee, is the approval authority for system-related NEPA and E.O. 12114 documentation.

c. Mishap Investigation Support. PMs will support system-related Class A and B mishap investigations by providing analyses of hazards that contributed to the mishap and recommendations for materiel risk mitigation measures, especially those that minimize human errors.