

Regulations and Paint Operations - Considerations for Aerospace and Defense

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Agenda

- Nature of coatings application and removal in defence settings
- Overview of Environmental Safety and Occupational Health (ESOH) issues for application/removal operations
- Regulatory considerations
- Risk management



(U.S. Air Force photo by Meredith Zimmerman)

Coating Operations – Defence Systems

■ Types of coatings:

- Primers
- Finishes
- Conversion coatings
- Sealants
- Adhesives
- Insulants
- Antifoulants
- Etc.

■ Purposes

- Functional: protect surfaces, bond, reduce friction, control corrosion, etc.
- Decorative



(U.S. Air Force photo/Airman 1st Class Christopher Griffin)

Application Techniques

- Spray
- Manual applications – brushing, roller, pens, etc.
- Powder/electrostatic deposition
- Baths – plating, dip tanks, etc.



(U.S. Air Force photo/Staff Sgt. Brandon Shapiro)



(U.S. Air Force photo/Senior Airman Joel Pfister)



(U.S. Air Force photo/Micah Garbarino)

Surface Preparation/ Removal

- Expose and prepare the surface (substrate)
 - Pressure: water, air
 - Abrasive: media blasting, sanding, scraping, etc.
 - Chemical: stripping, cleaning, etching, descaling
 - Thermal: heat/lasers
 - Other: degreasing, desmutting, washing
- Purposes
 - Apply/reapply coatings
 - Inspection



(U.S. Air Force photo/Lance Cheung)



(U.S. Air Force photo/Senior Airman Micaiah Anthony)



(Air Force photo/Margo Wright)

Operations

- Support aspects
 - Personnel training and support
 - Logistics – equipment/materials, procurement, storage, handling and preparation
 - Equipment preparation, operations, maintenance and repair
 - Contingency/emergency preparedness and support
 - Facilities/locations – utilities, process segregation, emission and exposure controls, regulations, security/protection, neighbors!
- Field vs. “fixed” operations



(U.S. Air Force photo/Senior Airman Alexandra M. Boutte)

Other Considerations

- Operations can be noisy, dusty/dirty, smelly
 - Confined space entries/isolated work
 - Specialized equipment sometimes needed
 - Quality and space requirements
 - Materials/operations may have regulatory restrictions – REACH, ESOH laws, local laws, etc.



(U.S. Air Force photo/Airman
1st Class Kevin Sommer Giron)

Hazardous Nature of Coating Operations

- Coatings often contain hazardous chemical constituents:
 - Carcinogen, mutagenic, allergenic, etc., reactive, flammable
 - Solvents – e.g., trichloroethylene, methylene chloride, n-hexane
 - Heavy metals – e.g., hexavalent chromium, strontium, lead
 - Other hazardous constituents – monomers, particulates, colorants, binders, caustics, etc.
- Application and removal techniques may:
 - Release hazardous materials – evaporation, volatilization, particle generation
 - From both removed coating and substrate
 - Create hazardous wastes

ESOH Issues

■ Health and Safety Impacts

- Exposure limits – Can exposures below applicable inhalation occupational exposure limits be attained?
- Can exposure controls be selected and maintained to comply with regulatory requirements?

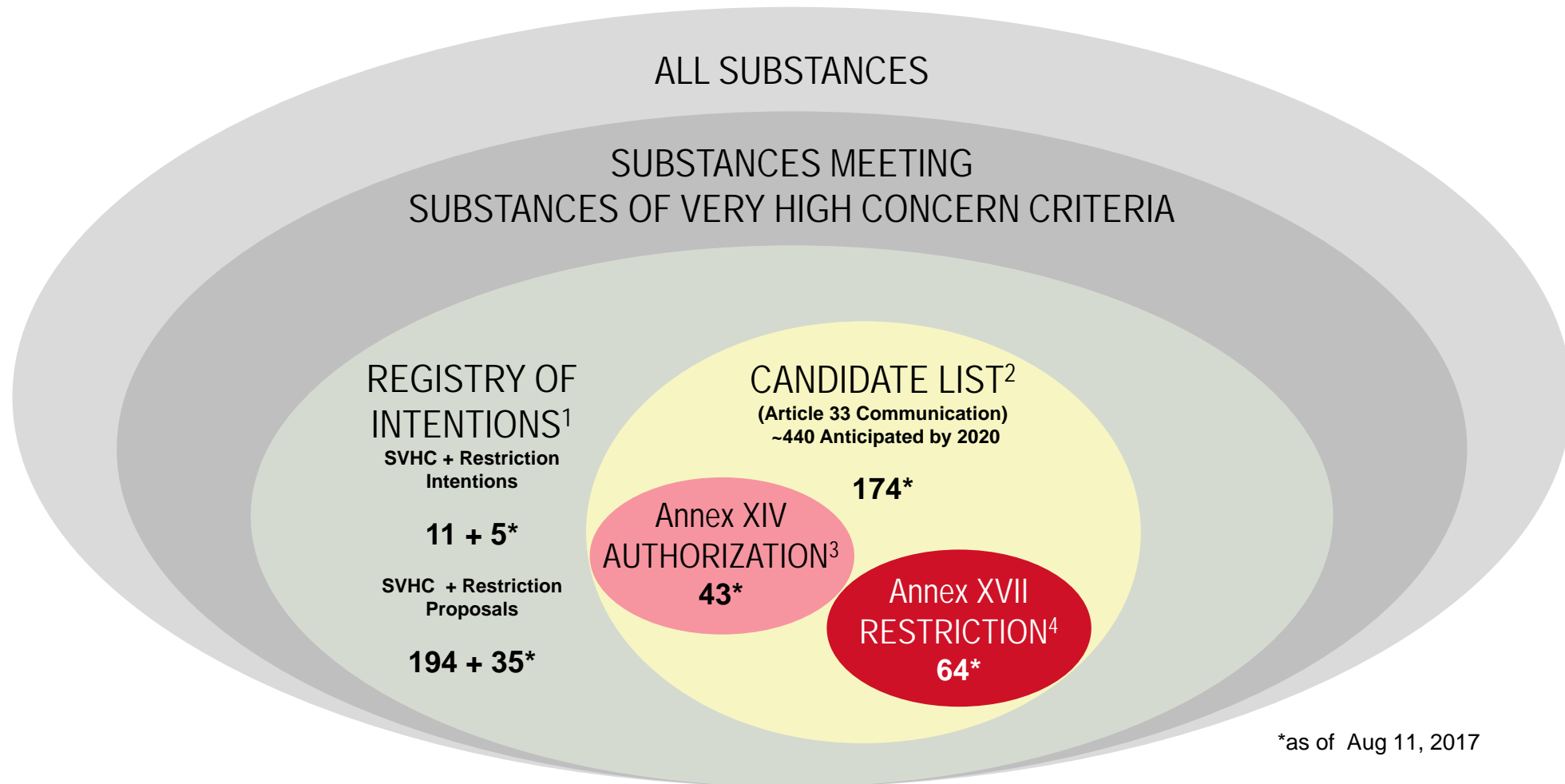
■ Environmental Protection

- What are the applicable environmental requirements? How would they impact operations?
- Will there be potential emissions (air, wastewater, solids...)?
- What controls are required for regulatory compliance (variable by location)? Can they be maintained?
- How is waste contained, collected, characterized? How will waste be disposed?

Other Regulatory Considerations

- Substance registrations?
- Permits / authorisations?
- Reporting required to regulatory entity and/or customer?
- Restrictions or prohibitions?
- Communication?
- Labeling?
- Manufacturing / operational requirements?
- Specific regional requirements where used?
- Import/Export requirements? Is material available where needed?

European Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Lists



¹ <http://echa.europa.eu/addressing-chemicals-of-concern/registry-of-intentions>

² <http://echa.europa.eu/candidate-list-table>

³ <http://echa.europa.eu/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisation-list/authorisation-list>

⁴ <http://echa.europa.eu/addressing-chemicals-of-concern/restrictions/list-of-restrictions>

Example: Hexavalent Chromium

- Highly Regulated: EU REACH, US EPA, OSHA, US Department of Defense Federal Acquisition Regulation Supplement (DFARS)
 - Effluent, air emissions, soil/residues, consumer goods/food, drinking water
- Inhalation occupational exposure limits are low: 0.05 to 0.005 milligrams per cubic meter (mg/m³) averaged over an 8 hour work period
- EU REACH Authorisation
 - Multiple “hex” compounds on the REACH Authorisation list (Annex XIV)
 - Use prohibited after sunset dates unless Authorisation is granted (for each use)
 - Sunset dates currently range from 21 May 2015 through 22 Jan 2019
 - Industry consortiums seek aerospace and defence uses past sunset dates:
 - Chromium Trioxide Authorization Consortium (CTAC)
 - Chromium VI Compounds for Surface Treatment (CCST)
 - Global Chromates Consortium for Aerospace (GCCA)

Regulations & Proposals Affecting Paint Operations*

	Trichloroethylene TCE	N-Methyl Pyrrolidone NMP	Methylene Chloride MeCl	Cadmium Compounds Cd
EU REACH	<ul style="list-style-type: none"> Substances of Very High Concern (SVHC) (18 Jun 2010) Authorisation list (Annex XIV); Sunset date 21 April 2016 	<ul style="list-style-type: none"> SVHC List (20 Jun 2011) 	<ul style="list-style-type: none"> Restrictions (Annex XVII) for paint strippers containing MeCl in 0.1% by weight 	<ul style="list-style-type: none"> Restrictions (Annex XVII) in paint
US	<ul style="list-style-type: none"> OSHA and EPA requirements High-priority chemical for risk evaluation EPA proposing to ban use of TCE in commercial vapor degreasing and as an aerosol degreaser 	<ul style="list-style-type: none"> EPA proposing to prohibit the manufacture (including import) processing, and distribution in commerce of NMP when used as a paint remover; require notifications to downstream processors and users; address risks to workers and consumers EPA is also proposing to exempt certain national security uses of NMP 	<ul style="list-style-type: none"> Proposed rule for MeCl in paint and coating removal EPA is also proposing to exempt certain national security uses of methylene chloride 	<ul style="list-style-type: none"> Occupational Exposure Limits

*not all inclusive

Risk Management

- Manage exposures:
 - Hazardous substances – inhalation, skin/eye contact, ingestion
 - Hazardous energies – lasers/light, noise, pressure, heated/cryogenic materials, electricity, fire
- Use protective measures
 - Process selection – select technologies and materials to minimize risks
 - Engineering controls – process design, segregation, isolation, ventilation
 - Process control – work techniques and procedures, training
 - Personal Protective Equipment – respirators, gloves, eye protection, etc.
- Emergency planning and preparedness
 - Preparation for fires, materials releases, etc.



(U.S. Air Force photo/Airman 1st Class Christopher Griffin)

Environment Protection

- Manage environmental risks
 - Releases to the air, water
 - Additional public health/mission concerns – e.g., noise
- Use protective measures
 - Process design selection – select technologies and materials to minimize emissions and wastes
 - Process controls – work techniques and procedures, training to minimize emissions, wastes
 - Emission controls – emission control devices (e.g., air filtration, water treatment, etc.), waste management systems
- Emergency preparedness – planning and resources to limit risks to external parties and missions (e.g., base inhabitants, general public)



(U.S. Air Force photo/Tech. Sgt. Cecilio M. Ricardo Jr.)

Conclusion

- Many considerations needed to successfully conduct coatings operations
 - Operational
 - Health and Safety
 - Environmental protection



(U.S. Air Force photo/Maj. Kelly Scott)

Thank you!



(U.S. Air Force photo/Micah Garbarino)