Health, Safety and Environmental Requirements for Composite Materials

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- Data required by chemical users to evaluate new materials

- Many data elements are regulatory requirements

- Data elements are grouped by the stage of product development
  - emphasis on practical aspects of use
  - tied to SACMA/AIA working groups
PHASE I (PRE-ENGINEERING) EVALUATION

I. General Data: for the product

- Chemical identification for each chemical

- % (wt.) of each chemical present in product, including impurities

- CAS number for all chemicals

- Physical properties of the material
  - vapor pressure at 25°C
  - VOC content (mass percent which is volatile per 40 CFR 51.165)
II. Toxicology: for resins, fibers, adhesives and their constituents

- Primary skin and eye irritation
- Oral LD-50 or inhalation LD-50; dermal LD-50
- Guinea pig sensitization
- Genotoxicity-Ames test
III. Industrial Hygiene: for the product

- Manufacturer's handling procedures

- Initial glove material and protective clothing material recommendation
PHASE I (PRE-ENGINEERING) EVALUATION

IV. Medical Concerns

- Existing medical condition(s) potentially aggravated by exposure

- First-aid treatment
PHASE I (PRE-ENGINEERING) EVALUATION

V. Fire/Safety: for the product

- Storage requirements
- Incompatibilities
- Flash point
- NFPA rating
- Exotherms
  - Conditions for occurrence
  - How to handle exotherm
  - Chemical identity of chemicals/classes that are released
VI. Environmental: for the product

- Toxic Substances Control Act Status
- SARA 313 listing
- SARA 311/312 hazard classifications
- Shipping codes (DOT, IATA, UN/NA)
- RCRA waste codes
I. Toxicology: for resins, fibers, adhesives and their constituents

- One to four week subchronic toxicity
  - inhalation or dermal
  - tied to effects shown in acute tox tests

- Genotoxicity
  - Mouse Lymphoma
  - In Vivo Rat Bone Marrow Cytogenetics
II. Industrial Hygiene: for the product

- Identification of chemicals that off-gas
  - when taken from cold storage to room temperature
  - during hot-iron operations in lay-up
  - when a heat gun is used during cure
  - during normal cure cycle
II. Industrial Hygiene: for the product (continued)

- Physical characterization of dust from machining operations on cured materials
  - % fibers/ % particulates
  - % respirable

- Chemical characterization of dust from machining operations on cured materials
  (eg., are original sensitizing constituents being released)
PHASE III (PRE-PRODUCTION)
FEASIBILITY

1. Toxicology

   o Need for specific studies to be based on an evaluation by manufacturer's and user's toxicologists

   o Specific studies should be tied to health effects revealed in completed tox tests or effects observed in the workforce
PHASE III (PRE-PRODUCTION)
FEASIBILITY

II. Industrial Hygiene

- Monitoring methods for air and surfaces
  - collection medium
  - analytical method

- Recommended TWA/STEL

- Is a "SKIN" notation needed for TWA?

- Specific glove material and protective clothing material recommendation
PHASE III (PRE-PRODUCTION)  
FEASIBILITY

III. Medical Concerns

- Bio-monitoring methods for early exposure monitoring
- Special clinical exams
  - part of routine, annual physical
  - additional exams indicating exposure
PHASE III (PRE-PRODUCTION)
FEASIBILITY

IV. ENVIRONMENTAL: for the product and constituents

- TSCA PAIR/CAIR Status
- TSCA Inventory status
Section 8(b) and Section 5
- Section 8(d) list status
- Section 4 test rule status
- Section 8(e) submissions
- Aquatic toxicology
  - Acute LC-50 daphnia
  - Acute LC-50 minnows