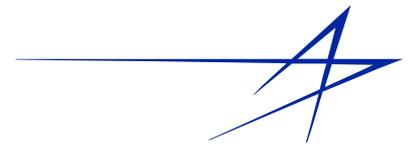


**Lockheed Martin Policy
for
Managing Environmental, Safety and
Health Risks Associated With
Nanomaterials**

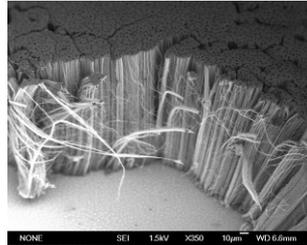
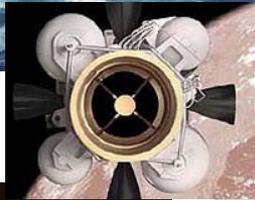
Nanotechnology at Lockheed Martin



Space Systems

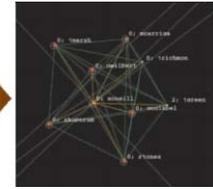
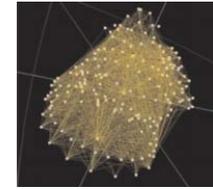


Materials
Sensors
Power



IS&GS

Control Algorithms for Missions



Aeronautics

**University
Collaboration**

Materials
Sensors
Coatings



Structures

Electronic Systems

Processors
Memory
Energy

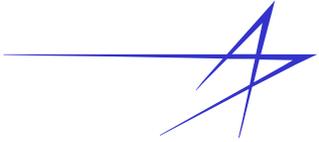
Materials
Sensors
Platforms



Modeling and Simulation

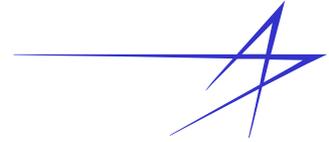
Small Business Partnership

Nanotechnology Positively Impacts Every LM Business



Nanotechnology – ESH Objectives

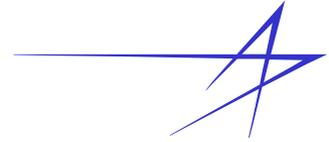
- ***Understand and Manage ESH Risks To:***
 - *Protect people and the environment*
 - *Ensure economic viability of products*
- ***Proactively Anticipate, Address and Minimize Risks***
- ***Employ Conservative Measures Given Unknowns***
- ***Conduct Innovative Research***



Our Approach

- ***2006 -- Developed a Corporate ESH Procedure for Management of Nanotechnology***
 - ***Utilized a cross-functional team***
 - ***ESH professionals, technologists, business development, legal, communications***
 - ***Focused on effective risk management***
 - ***Addressed current and future LMC processes by implementing best available risk assessment practices***
 - ***Adapted pharmaceutical industry best practices for exposure control***
- ***Communicated results through ESH and Technology channels***

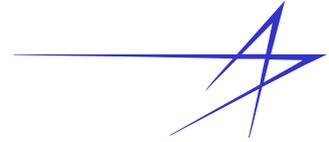
Integrate ESH Considerations into the Business Life Cycle



Current Status

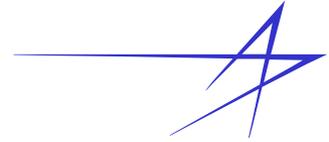
- ***Each Business Area EVP appointed a senior nanotechnologist responsible for compliance***
- ***A collaborative cross-functional process is used to conduct/evaluate:***
 - ***Hazard Analysis***
 - ***Exposure Assessment and Control***
 - ***Waste Minimization and Disposal***
 - ***Worker Training***
 - ***Life-cycle management***
 - ***Data collection based on intended and unintended uses***
- ***Audits are conducted by Corporate Internal Audit***

Continuing Commitment



- ***Stay Current with ESH Research***
 - *ESH and Nanotechnology professionals meet monthly for facilitated information exchange*
 - *Internal website is used to post publications, regulatory guidance, research results*

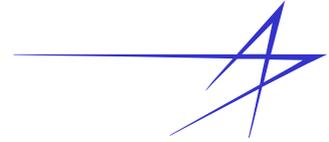
- ***Participate in Public-Private Partnerships***
 - *NIOSH exposure monitoring at key LMC site*
 - *Member of NNI planning committee for 2010 Capstone Workshop*
 - *DTSC Symposium*
 - *ICON Steering Committee and Best Practices Guide*



Policy Implementation

Examples

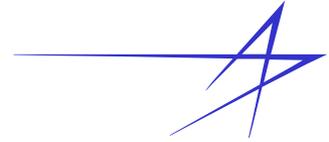
Hazard Analysis



- ***Collect information on the Material***
 - ***Environmental Defense-DuPont Framework***
 - ***British Standards Institution (BSI)-Guide To Safe Handling And Disposal Of Manufactured Nanomaterials***

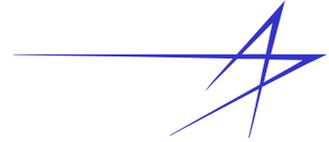
- ***Assess The Hazard***
 - ***Evaluate the toxicity of the parent material (larger particle form)***
 - ***Is the parent material classified as carcinogenic, mutagenic, a respiratory sensitizer, or a reproductive/developmental toxin?***
 - ***Evaluate Nano-sized versions' physical characteristics***
 - ***Is the nanomaterial an insoluble/durable fiber?***
 - ***What is the size or aspect ratio?***
 - ***Anticipate behavior: particle or gaseous?***

Exposure Assessment



- **Collect detailed process information:**
 - *Identify all chemicals, even those that are not nanomaterials*
 - *Identify all chemical intermediates, by-products, end-products and waste products*
 - *Document tasks, processes and process equipment*
 - *Amount of material used*
 - *Material form (solid, powder, liquid, etc)*
 - *Degree of containment*
 - *Duration of use*
 - *Work space: laboratory and manufacturing*
 - *Number of people in the area*
- **Collect task-specific ancillary information**
 - *Processes such as cleaning, maintenance, transport, storage*
- **Identify and eliminate potential exposure points for each task**

Exposure Control



- ***Established designated areas for Control Banding***
 - ***Examples: entire laboratory or manufacturing area, or portion of the larger area, such as a laboratory hood or glove box***
 - ***Designated areas are posted with warning signs informing employees that they are entering a nanomaterial work area.***
 - ***Signs specify administrative controls and personal protective equipment (PPE) required for entry***
- ***Implemented “Clean-as-you-go” procedures***
 - ***Validated with wipe samples and “micro-vac” sampling***
- ***Waste is incinerated, including waste water***

