NASA Environmental Management System

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Presentation Overview

- Background
- Initial Assessment
- NASA EMS approach
- Corporate metrics
- Benefits

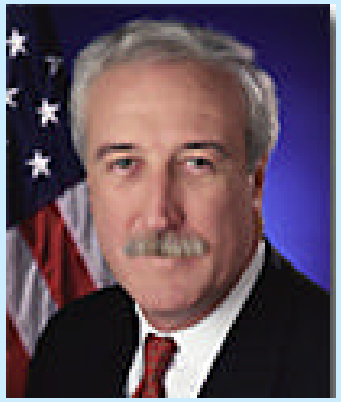
NASA MISSION

- To understand and protect our home planet
- To explore the Universe and search for life
- To inspire the next generation of explorers

… as only NASA can

Direction from the Top

"The mission is to understand and protect the home planet. Protection includes using our scarce resources to improve life on Earth by living in an environmentally sound manner…"



Honorable Sean O'Keefe,

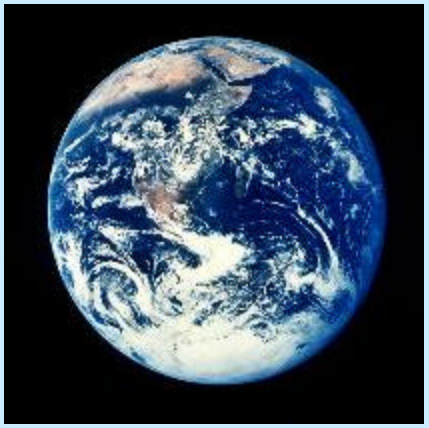
NASA Administrator

Speaking to Maxwell School of Citizenship and Public Affairs, Syracuse University

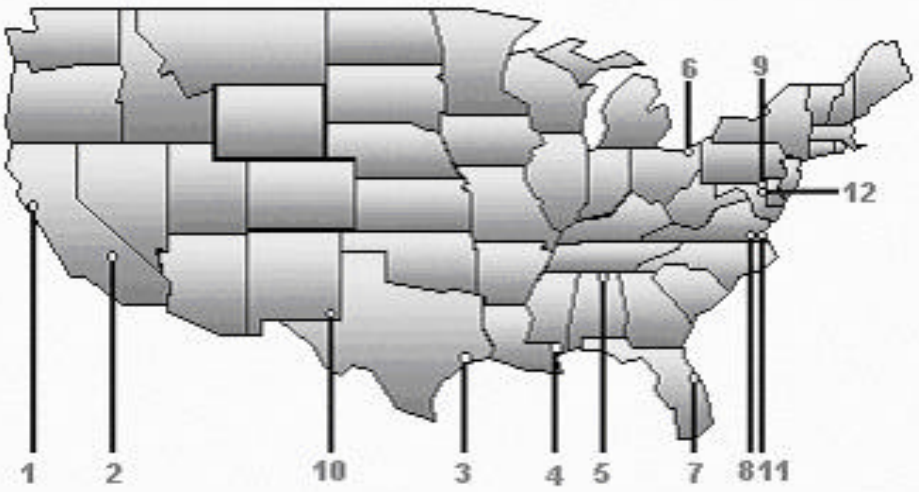
April 12, 2002

NASA Strategic Plan

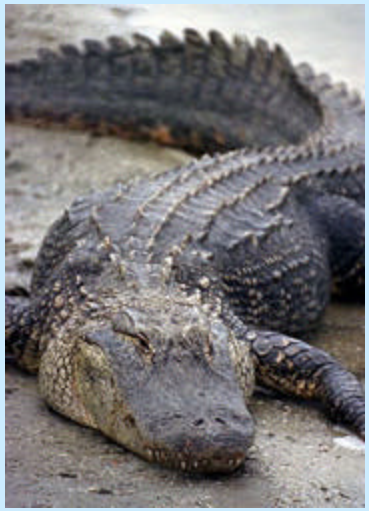
- **Ensure that all NASA work environments, on Earth and in space, are safe, healthy, environmentally sound, and secure**
  - Eliminate environmental incidents, toxic chemical use, hazardous waste, and environmental liability at all NASA sites



NASA Centers



1. Ames Research Center
2. Dryden Flight Research Center
3. Johnson Space Center
4. Stennis Space Center
5. Marshall Space Flight Center
6. Glenn Research Center at Lewis Field
   Glenn Research Center, Plum Brook Station
7. Kennedy Space Center
8. Langley Research Center
9. Goddard Space Flight Center
10. Johnson Space Center, White Sands Test Facility
11. Goddard Space Flight Center, Wallops Flight Facility
12 Headquarters



INITIAL ASSESSMENT

- **Business Case & Gap Analysis conducted in 1998**
  - Included Headquarters and 12 NASA installations
- **ISO 14001 recommended as NASA's EMS model**
  - NASA was accomplishing 80% of ISO 14001 requirements
  - Many elements of ISO 9000 can be utilized (e.g., corrective action, document and records management)
  - Existing processes can be utilized (e.g., emergency response)
  - Internationally recognized
  - Protocols can be used for evaluation & performance tracking
  - Allows flexibility
  - Contractor acceptability

FACTORS AFFECTING EMS

- **Size of installations**
  - Land area - 150 to 150,000 acres
  - Population - 1,000 to over 10,000 on-site personnel
- **Complexity of installations**
  - Laboratories, test stands, wind tunnels, hangars, shops
  - Includes tenant organizations and private enterprises
- **Large contractor work force**
  - Several GOCO facilities
  - About 4 contractor employees per civil service employee
- **Geographic variability - 10 states**

EMS DEVELOPMENT ACTIVITIES

- **Development of Agency EMS Manual**
  - Developed by NASA team from 5 Centers
  - Consistent but flexible Agency approach
- **Implementation at Glenn, Johnson and Stennis**
  - Included independent EMS audit by a registrar
- **Development of Center Implementation Guide**
  - Step-by-step approach to implementation
  - Sharing of lessons learned
- **Cost and Benefits Report**
- **Agency-wide implementation**

ELEMENTS OF NASA EMS

- **Environmental Policy**
- **Planning**
  - Aspects & Impacts
  - Legal & Other Requirements
  - Objectives & Targets
  - Environmental Mgmt Program
- **Implementation & Operation**
  - Structure & Responsibility
  - Training & Awareness
  - Communication
  - EMS Documentation
  - Document Control
  - Operation Control
  - Emergency Preparedness & Response
- **Corrective Action**
  - Monitoring & Measurement
  - Nonconformance, Corrective & Preventive Action
  - Records
  - EMS Audits
- **Management Review**
- **Metrics**

Aspects & Impacts Analysis

- List activities, products & services
- Identify impacts
- Group impacts
- Categorize into aspects
- Categorize into focus areas
- Categorize environmental consequences
- Categorize severity
- Determine frequency
- Determine risk ranking
- Determine objectives & targets

Strategic Focus Areas

- **Prevention** – reduce future problems through an active pollution prevention program
- **Conservation** – preserve our rich natural and cultural heritage for future generation
- **Compliance** – bring all operations into compliance with environmental requirements
- **Restoration** – clean up all problems resulting from past operations

Environmental Aspects

- **Prevention**
  - Materials substitution
  - Process changes
  - Recycling
  - Pollution prevention
- **Compliance**
  - Clean air
  - Clean water
  - Hazardous waste
  - Storage tanks
  - State & local regulations
- **Conservation**
  - Natural resources
  - Cultural resources
  - Endangered species
  - Energy efficiency
  - Sustainability
  - Water conservation
- **Restoration**
  - CERCLA
  - RCRA
  - Storage tanks

Environmental Consequence

- Safety & Health
- Natural & Cultural Resources Impacts
- Cost to NASA
- Mission Impacts
- Reputation & Stake-holder Relationship
- Legal & Regulatory Implications

Environmental Consequence

- **Safety & Health**
  1. Death or disabling injury
  2. Severe injury/lost time
  3. Minor injury/health impact
  4. No injury or health effect
- **Natural & Cultural Resources Impacts**
  1. Irreparable damage
  2. Substantial Impact
  3. Minimal impact
  4. No impact

Environmental Consequence

- **Cost to NASA**
  1. Greater then $250,000
  2. $100,000 to $250,000
  3. $50,000 to $100,000
  4. Zero to $50,000

- **Mission Impacts**
  1. Delay in mission-critical activity
  2. No delay, but large cost to avoid delay
  3. No delay, but minimal cost to avoid delay
  4. No delay, no cost

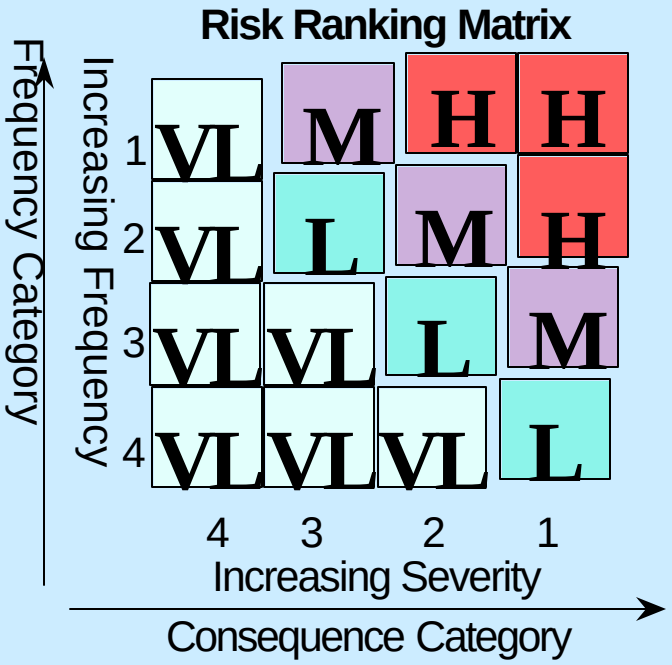
Environmental Consequence

- **Reputation & Stake-holder Relationship**
  - Increase in negative public inquiries/ meetings
  - Adverse effect on NASA reputation or relations
  3. Minimal effect on NASA reputation or relations
  4. No effect on NASA reputation or relations
- **Legal & Regulatory Implications**
  1. Fine, consent agreement, or unilateral order
  2. Notice of violation with no fine
  3. Informal notice
  4. No regulatory action

Frequency of Occurrence

Category	Potential Frequency of Occurrence
1	Minimum of once a year
2	Minimum of once, time period 1 to 5 years
3	Minimum of once, time period 5 to10 years
4	Minimum of once in 10+ years

Risk Ranking Matrix



Action Priority Categories

H	**High**	Shall be managed with an environmental management system objective and target
M	**Medium**	Shall be managed to avoid becoming high
L	**Low**	Shall be managed as appropriate
VL	**Very Low**	Shall be managed as appropriate

EMS Performance Metrics

- **Objectives & Targets**
  - Rate of meeting objectives & targets within specified timeframe
- **Corrective & Preventive Action**
  - Rate of closure of non-conformances
- **Management Reviews**
  - Verifying Centers conducting management reviews

Expected Benefits

- Mission delay reductions
- Change order reductions
- Environmental impact reductions
- Reduced liability
- Increased compliance
- Increased management support and involvement
- Increased pro-activity
- Reduction of single-point failures
- Continual improvement
- Decreased energy use, water use, and materials reductions
- Health benefits
- Decreased # of fines and NOVs
- Decreased employee time (fewer inspections)
- Reduced # of inspections
- Written procedures, process consistency, & repeatability
- Increased efficiency
- Improved communications

Expected Benefits

- Increased # of pollution prevention initiatives
- Cost reductions
- Increased safety
- Reduced # of regulations
- Reduced # of spills
- Increased affirmative procurement
- Increased recycling revenue
- Solid waste reduction
- Prioritization of funding projects
- Increased # of green building designs
- Increased # of sustainability projects
- Better NASA reputation (Center and Agency)
- Better relationship with stakeholders
- Increased trust and satisfaction from customers

POINT-OF-CONTACT

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