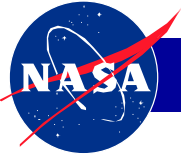


# NASA Headquarters Environmental Management System (EMS)



**Michael J. Green, PE**  
**NASA EMS Lead**  
**NASA Headquarters**  
**Washington, DC**

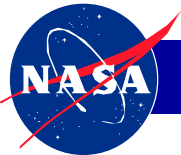
**Michael DeWit, QEP**  
**EMS Lead**  
**ICF Consulting Inc.**  
**Fairfax, VA**



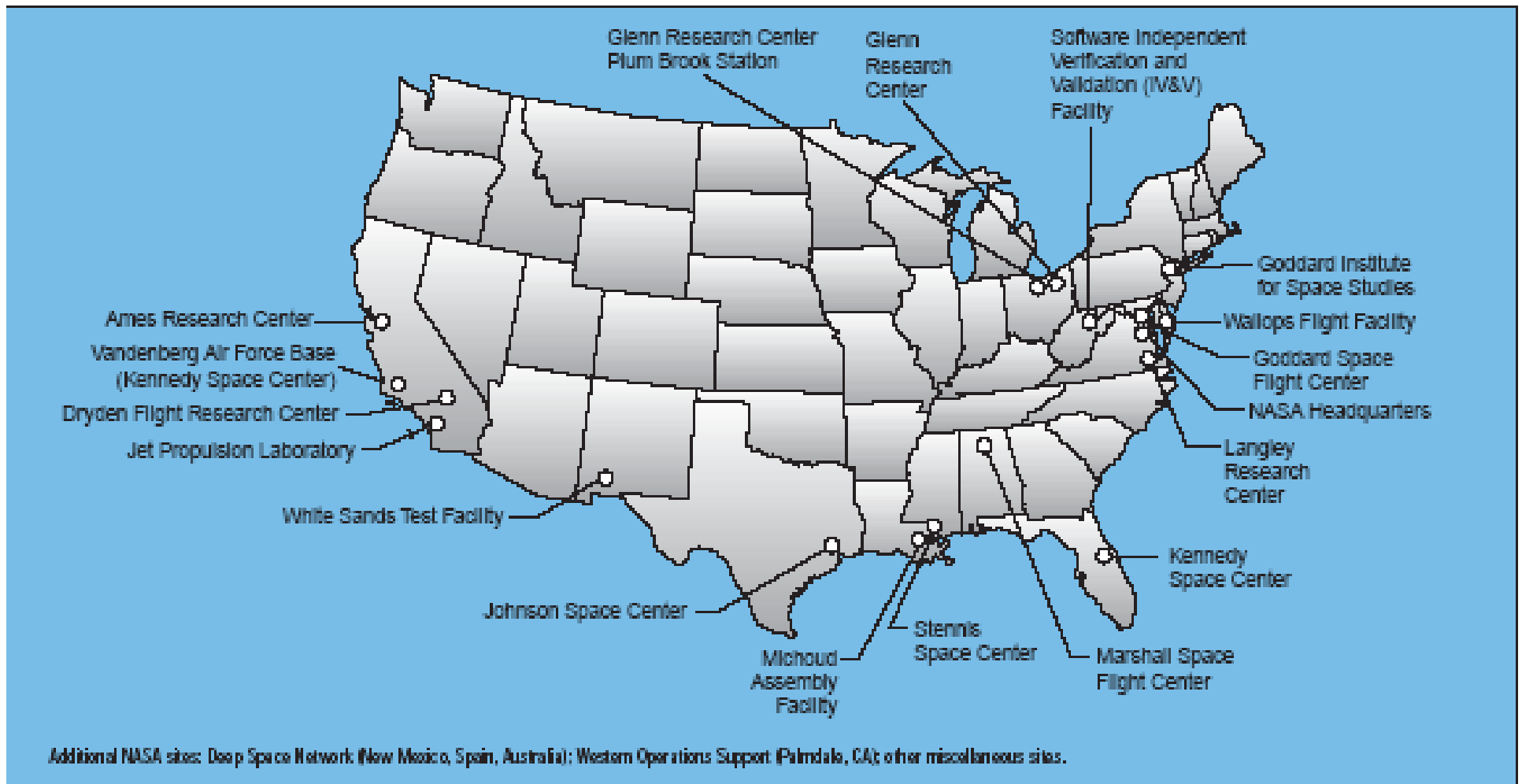
# Presentation Overview

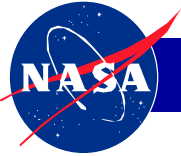
- **Background on NASA EMS**
- **EMS Development and Revision**
- **Headquarters EMS**
- **Programmatic Focus**
- **Benefits**





# NASA Organization





# NASA Environmental Policy

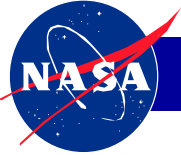
**Prevention of  
Pollution**

**Conservation and  
Sustainability**

**NASA  
Environmental  
Strategy**

**Compliance  
with Laws and  
Regulations**

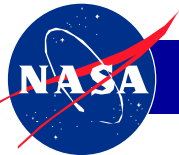
**Restoration  
and Remediation**



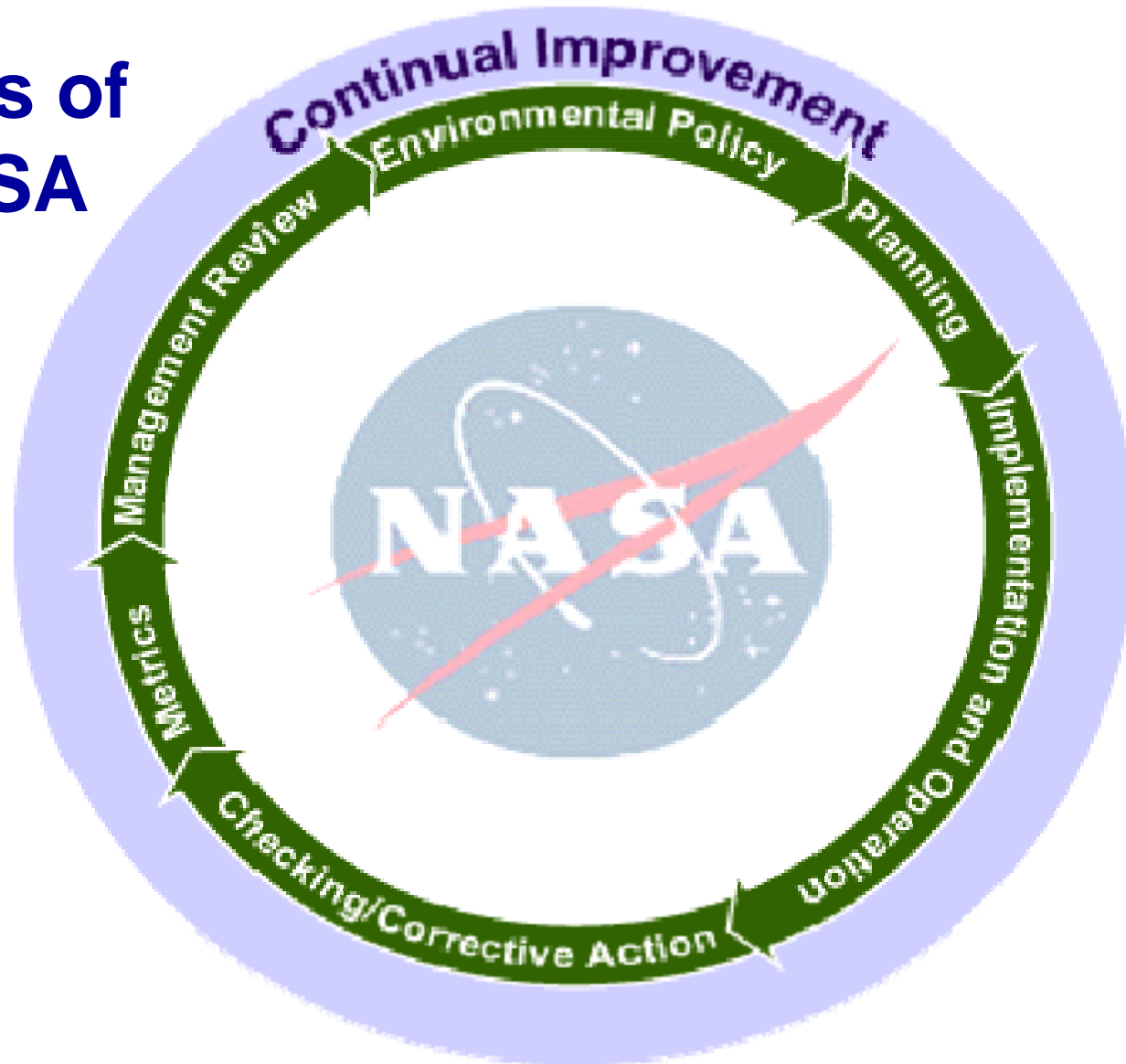
# NASA Environmental Policy

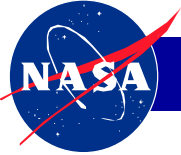
- **Everyone at NASA is responsible for complying with environmental regulations and NASA policy**
- **Each NASA organization has responsibility for incorporating the environmental policy into**
  - **planning and budgeting;**
  - **allocating appropriate authority and funding;**
  - **assuring appropriate training;**
  - **development / execution of programs / projects;**
  - **minimizing hazardous waste; and**
  - **improvements in energy and water usage.**





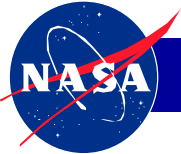
# Elements of the NASA EMS





# EMS Development Activities

- **EMS Business Case completed in November 1988**
- **Developed NASA EMS Process – 1999 - 2001**
  - **Developed by team from 5 Centers, piloted at 3 Centers**
  - **Based on ISO 14001 allowing Centers to be registered**
  - **Consistent but flexible Agency approach**
- **Developed Implementation Guide – 2000 - 2001**
- **Cost and Benefits Report – 2001**
- **NASA Procedural Requirements (NPR) 8553.1, NASA EMS, issued April 2002**
- **NPR 8553.1, NASA EMS, revised March 2005**

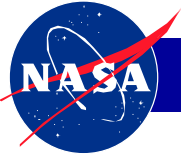


## 2005 Revisions to NASA EMS

- **Requirements for self-declaration of EMS, or 3<sup>rd</sup> Party recognition**
- **Streamlining and Clarification of NASA Center EMS Requirements**
- **Enhancements to EMS**
- **Headquarters Specific EMS Requirements**
  - **Program / project development**
  - **Agency oversight**
  - **Headquarters operations**



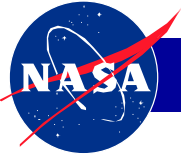




# Streamline and Enhance

- **Driven by Continual Improvement**
  - **Improve clarity of language for NASA Centers (NASA Headquarters is considered a Center)**
  - **Strictly “shall” language in the main body of NPR 8553.1**
  - **Guidance in appendices**
  - **Added clarity in summarizing aspects across the agency**
  - **Beneficial impacts added to risk ranking process**

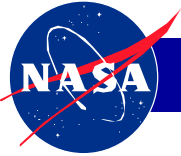




# Aspect Categories

To summarize and “roll up” aspect data across NASA

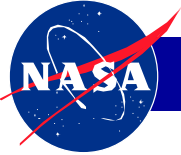
- Air emissions
- Fuel, oils, and lubricants
- Hazardous materials
- Hazardous waste
- Historical, archaeological, and cultural resources
- National Environmental Policy Act
- Natural resources
- Remediation/ restoration
- Solid Waste
- Sustainability
- Toxic substances
- Water



# Environmental Impact Categories

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

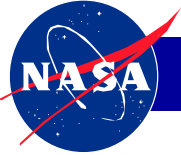




## Beneficial Environmental Impacts

- **Eliminate source of injury / health hazard**
- **Prevent damage to / expand natural or cultural resources**
- **Support sustainability**
- **Cost savings**
- **Avoid mission delay**
- **Improve reputation / stakeholder relationship**
- **Avoid / eliminate regulatory requirement**





# Beneficial Environmental Impacts

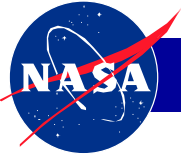
- **Pluto mission**

- Radioactive power source controversial
- Environmental review key element in early mission planning to address this issue
- Major environmental groups satisfied
- limited negative response to launch

- **Energy /Green Building Program**

- Buildings designed to LEED standards
- Energy Savings Performance Contracts
- Energy usage reduction / savings substantial
- Efforts cited by local environmental organizations





# NASA Risk Ranking

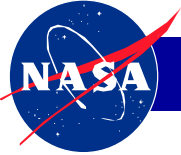
- Aspect risk ranking
  - Based on impact severity and frequency

The Risk Ranking Matrix

Impact Frequency Score ↑ Increasing Frequency	1	VL	M	H	H
	2	VL	L	M	H
	3	VL	VL	L	M
	4	VL	VL	VL	L
		4	3	2	1
		→ Increasing Severity Impact Severity Score			

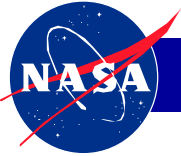
Action Priority Categories

<b>H</b>	Environmental aspects with one or more environmental impacts with this risk ranking shall be managed with an environmental management system objective and target
<b>M</b>	Related environmental aspects shall be managed to avoid becoming high
<b>L</b>	Related environmental aspects shall be managed as appropriate
<b>VL</b>	Related environmental aspects shall be managed as appropriate



# Headquarters Requirements

- **Headquarters EMS Scope**
  - **Headquarters operations not affecting Centers**
  - **Headquarters activities and programmatic decision-making affecting Center operations**
    - Program / project development
    - Agency oversight
- **Requirements**
  - **Headquarters-specific requirements added to NPR 8553.1 to address programmatic decision-making and oversight activities**

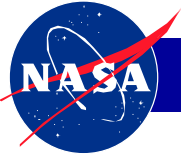


# Headquarters Operations

- **Aspects**
  - **Solid waste management**
  - **Recycling program**
  - **Energy consumption**
  - **Transportation**
  - **Purchase / disposal of electronic equipment**
- **No operational aspects have high risk ranking due to current programs**
- **Awareness training to improve existing program participation**



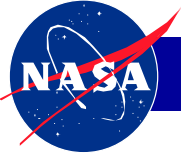




# Mission Directorates

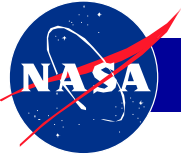
- **Program / project decisions at Headquarters may result in impacts at the NASA Centers**
  - **New programs and projects – NEPA, Sustainability**
  - **Amend programs/projects – NEPA**
  - **Program termination – NEPA, historic preservation, remediation/restoration**
  - **Grants, Use Permits, Agreements – NEPA**





# Mission Support Offices

- **Provides Agency Oversight**
  - **Environmental Management Division – includes Energy**
  - **Facilities Engineering and Real Property – Construction of facilities, real property, historic sites, Green buildings**
  - **Logistics Management – Transportation, personal property, hazardous materials**
- **Reviews common issues across NASA Centers**
  - **Centers submit list of “high priority environmental aspects”**
  - **All 12 Aspect Categories considered**
  - **Environmental audit results used to determine if there are any agency trends related compliance issues**
  - **Agency requirements established, if appropriate**



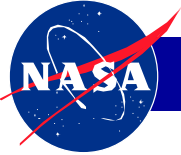
## Identifying Areas for Environmental Improvement at Headquarters

Headquarters  
Specific Issues

Mission Directorates  
and Support Office  
Issues

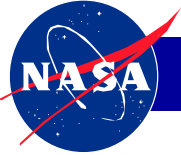
High Priorities  
at Centers

- Consider severity of impacts or benefits associated with
- Safety and Health?
  - Natural and Cultural Resource?
  - Costs to NASA?
  - Mission Impacts?
  - Effects on NASA Reputation and Stakeholder Relationships?
  - Legal Implications?



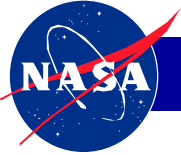
# Headquarters High Priorities

- **Key Environmental Aspects**
  - Environmental Impact Reviews
    - National Environmental Policy Act ( NEPA)
  - Institutional Sustainability
  - Historical, Archaeological & Cultural Resources
  - Remediation / Restoration



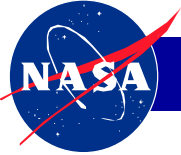
# Headquarters High Priorities

- **Environmental impact reviews (NEPA)**
  - NEPA is the one environmental law that applies directly Mission Directorates
  - NEPA review required for all Federal actions, including new and amended programs, and program termination
  - Public participation required
- **Institutional Sustainability**
  - Minimize potential future risk to NASA due to increased costs, lack of resources, and regulatory prohibitions
  - Includes energy and water conservation, pollution prevention, solid waste management, recycling
  - Sustainability is a high priority aspect at most Centers



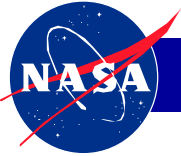
# Headquarters High Priorities

- **Historical, Archaeological & Cultural Resources**
  - **NASA facilities are nearing 50 year threshold when NHPA requires review for historic significance**
  - **Shuttle termination will add to NASA's historic resources**
  - **NASA experiencing public interest in preservation of facilities**
- **Remediation / Restoration**
  - **Past NASA activities have resulted in a large number of contaminated sites**
  - **Major effort for Headquarters Environmental Management Division and NASA Centers**



# Headquarters High Priorities

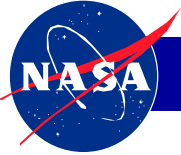
- **Proper management should**
  - **Identify potential risks and alternatives early**
  - **Minimize mission delays**
  - **Reduce costs for NASA programs and projects and operational activities**
  - **Improve, or at least minimize, adverse effects to NASA reputation**



# Environmental Management Programs

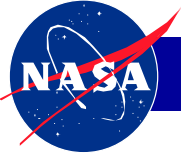
- **Action plan developed for 4 key aspects**
  - **Establishes objectives and targets**
  - **Evaluates root causes**
  - **Identifies resource requirements (time, staffing, funding)**
  - **Establishes roles and responsibilities**
  - **Identifies training and communication activities**
  - **Establishes monitoring and measurement activities**
- **Discipline related agency-wide working groups to develop program details**
- **Programs are multi-year in nature**





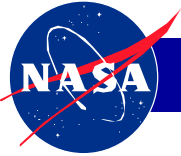
## Headquarters EMS Today

- **Internal EMS review and self declaration completed in December 2005**
- **Follow-up internal and external reviews planned over next 2 years**
- **Annual EMS update needs to reassess affect of recent Headquarters reorganization**
- **Program implementation underway with participation from NASA Centers**
- **Ongoing work to develop / improve internal training and communication**



## **Benefits of Headquarters EMS**

- **Recognition of the potential impact of Headquarters activities on NASA's environmental footprint**
- **Improved coordination between Environmental Management Division and Mission Directorates**
- **Environmental Management Programs developed for 4 key Headquarters environmental aspects**
- **High priority environmental aspects identified across the NASA Centers**
- **Headquarters environmental awareness training implemented**



# Points-Of-Contact

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