

***Buy Quiet:***  
***On the ground experience at NASA***

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# NASA Buy-Quiet Program

- ≡ Buy-Quiet and Quiet-by-Design requirements added to Agency-wide policy in 2006
- ≡ Precursor work at Glenn Research Center
  - ≡ Mid 1990s effort motivated by surge in installation of new high-noise equipment and systems
- ≡ My role is to assist 14 field centers:
  - ≡ Agency-level program planning and direction
  - ≡ Technical expertise
  - ≡ Development of technical resources and tools
  - ≡ Oversight and evaluation assistance for HQ

# NASA Agency-wide requirements

- ⚙️ Each field center must develop and implement a center-specific program to:
  - ⚙️ ***“Include noise emissions with technical and performance criteria*** when purchasing or designing new equipment that is expected to generate noise emission levels of concern for hearing conservation (80 dBA and above).”
- ⚙️ Noise emissions shall be considered equally with all other requirements.

# NASA Buy-Quiet Vision:

*Everyone thinks like a hearing conservationist*

- ☰ Noise emissions *Intentionally* considered
- ☰ Noise-related consequences of purchase decisions routinely anticipated and evaluated
- ☰ Long-term cost of each option quantified
- ☰ *Informed* purchase decisions are made
- ☰ Noise-related impact properly accommodated
- ☰ Best practices approach promoted for “non-hazardous” equipment noise emissions

# Implementation challenges

- ≡ Agency-wide diversity in operations, culture
- ≡ Responsibility distributed throughout Center
- ≡ Advocacy and training are major tasks
  - ≡ Technical content outside EH&S scope of practice
  - ≡ Program “users” (requestors) are outside EH&S
  - ≡ Centers have multiple contractors and tenants
  - ≡ Stakeholders are unfamiliar or skeptical (or both)
- ≡ Contractor compliance must be monitored
- ≡ Senior management enforcement is critical

# Meeting the BQ requirement

- ≡ Interpretation of “include noise emissions” intentionally left to each site
- ≡ Implementation must be site-specific
  - ≡ Organization, communications, and procedures
- ≡ Responsible POC in each EH&S organization
- ≡ Series of six-month goals established by HQ
- ≡ Periodic (~6 mo) status review telecons
- ≡ Video and conference training sessions
- ≡ Enforcement via HQ audit team site visits
  - ≡ Checklists mirror goals discussed in status reviews



# Implementation steps toward development of site-specific programs

1. Identify POC and EH&S internal team
2. Modify policy document
3. Conduct awareness briefings
4. Develop cross-functional team
5. Develop internal procedures
6. Include Contractor organizations
7. Conduct “how-to” briefings on procedures
8. Incorporate *Buy-Quiet Process Roadmap*
9. (Modify onsite support service contracts)

# Roadmap: meeting field centers' needs

- ≡ Won't it cost more to buy quiet?
  - ≡ Quantify the long-term cost of noise
- ≡ What are other companies, government agencies, and the military doing about this?
  - ≡ Collect some case studies
- ≡ Do manufacturers make low-noise equipment, and how much more does it cost?
  - ≡ Poll some manufacturers for their input
- ≡ How do I navigate the process of locating, evaluating, purchasing, and verifying the performance of low-noise equipment??
  - ≡ Create a Buy-Quiet Process Roadmap for NASA
  - ≡ Make it customizable and generic so it can be used by all NASA centers and contractors and by non-NASA entities



# *NASA Buy-Quiet Process Roadmap*

Web-based tool



Provides stepwise process guidance

Developed for NASA but applicable externally

Technical content by Nelson Acoustics; web design and content editing by Gelfand Design

Incorporates best practices from corporate, military, government programs

Incorporates manufacturer–provided data on availability and cost of low-noise equipment

Contributions from 20+ external organizations

# NASA Buy-Quiet Process Roadmap



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Buy-Quiet Process  
Roadmap

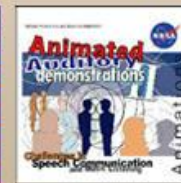
Buy-Quiet Purchasing

## Welcome to EARLAB, the NASA Auditory Demonstration Laboratory.

EARLAB provides **activities, services,** and **products** that support the practice of hearing conservation at NASA field centers. Our **educational resources** and **training tools** are also freely available to hearing conservationists, acoustical engineers, and educators worldwide.

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# Best-practices case studies

- ☰ Solicited 60 individual (corporate, military, federal) contacts plus
  - ☰ ANSI S Committees
  - ☰ AIHA Noise Committee
  - ☰ Institute of Noise Control Engineering members
  - ☰ ORC Occupational Health and Safety Network
  - ☰ NIOSH 'Prevention through Design' project
- ☰ Compiled detailed data on 10 non-NASA Buy-Quiet programs
  - ☰ **Most successful programs use 80 dBA noise emission limit**

# Manufacturer interviews

- ☐ Solicited 60 individual manufacturer contacts plus these lists:
  - ☐ INCE Product Noise Technical Committee
  - ☐ ANSI S Committees
  - ☐ National Academy of Engineering “Technology for Quieter America” project
- ☐ Compiled detailed data from 11 manufacturers re: design/marketing
  - ☐ **Most estimate 10% - 20% markup for “quiet” equipment**

# *Buy-Quiet Process Roadmap*

## Key external contributors

- ☰ Baltimore Aircoil
- ☰ United Technologies
- ☰ Caterpillar
- ☰ Cisco
- ☰ Honeywell
- ☰ Hewlett Packard
- ☰ Ingersoll Rand
- ☰ Toro
- ☰ Carrier
- ☰ ExxonMobil
- ☰ Colgate Palmolive
- ☰ Trane
- ☰ 3M
- ☰ Becton Dickinson
- ☰ General Motors
- ☰ Air Force
- ☰ Navy
- ☰ National Park Service
- ☰ NIOSH



# NASA Buy-Quiet Process Roadmap

## Key features


- ☰ Relevant to hearing-conservation scenarios
  - ☰ Considers community noise impact
- ☰ Leads user through step-wise process
- ☰ Includes customizable specification template
- ☰ Authorization forms promote *responsible* departures from process
- ☰ “Cost of noise” calculation calculates net present value of long-term exposure
  - ☰ Can compare equipment differing in noise and cost
  - ☰ Total cost = purchase + long-term noise exposure






# NASA Buy-Quiet Process Roadmap

## Key features

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### Buy-Quiet Purchasing

NASA field centers and facilities are required to maintain site-specific "Buy-Quiet" programs that guide the identification, evaluation, and procurement of low-noise products in a manner that is both consistent with NASA procurement policies and compliant with [Agency-mandated hearing conservation directives](#).

#### The NASA *Buy-Quiet Process Roadmap*

A Web-based *Buy-Quiet Process Roadmap* provides purchasers with a guided path through the procurement process and provides flexibility for field centers to customize the resources for site-specific application. The *Roadmap* incorporates elements of several successful best-practices programs, based on a survey of industrial, government, and military organizations in the United States. A common factor in these programs, which has been adopted in the NASA *Roadmap*, is a maximum equipment noise emission specification of 80 dBA. In addition to a stringent noise specification, the *Buy-Quiet Process Roadmap* incorporates field verification requirements as well as a means for estimating the cost of relevant noise exposure over a career, and it provides links to extensive online databases documenting typical noise emission for a wide variety of equipment types.

The *Buy-Quiet Process Roadmap* is intended primarily for use by NASA field centers and facilities. It is intended to be generic and flexible enough to apply to a broad range of industries and equipment classes, but it must be customized to meet the site-specific needs of each audience. Non-NASA organizations are invited to adapt the *Roadmap* to their operations but are cautioned that NASA does not provide technical support for the *Roadmap* or for any auxiliary resources associated with it.



Technical content for the Roadmap was developed for NASA by David Nelson of [Nelson Acoustics](#). Amy Gelfand of [Gelfand Design](#) provided content editing and Web site design.


[Go to the Buy-Quiet Process Roadmap »](#)

#### RELATED RESOURCES

- NASA Buy-Quiet Program Advocacy PowerPoint® slideshow presentation
- A Buy-Quiet Program Incorporating Career-Cycle Noise Costs
- Development and implementation of policy-compliant site-specific Buy-Quiet programs at NASA

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# Roadmap process

1. Research appropriate noise emission criterion
  - a) Links to online databases and other sources
2. Research available equipment that meets criterion
3. Select noise emission criterion
  - a) 80 dBA SPL or EU Machinery Directive listing is baseline
  - b) Adjust baseline if appropriate, and obtain authorization
4. Develop and issue specification
5. Compare long-term cost of noise exposure for candidate proposals; make selection
6. Verify noise emission after delivery/installation

# Incorporating the Roadmap

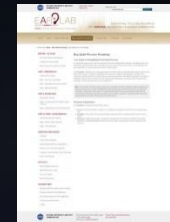
- ⚙️ **Roadmap** is intended to form the core of Center-specific Buy-Quiet procedures
- ⚙️ Should be customized to each organization
- ⚙️ Adapt to culture, organization and operations
- ⚙️ Piggyback on existing processes and controls
- ⚙️ Employ existing cross-functional teams

<http://adl.grc.nasa.gov>

or Google “Buy-Quiet Process Roadmap”

# Additional *Roadmap* features

- Streamlined process includes links to resources
- Advocacy resources provided for use in briefings
  - “Buy-Quiet” advocacy PowerPoint® Presentation
  - “Cost of noise” spreadsheet and analysis
- Customizable training slides provided
- External resources for additional depth
- Example cases provided for study and briefings



Note: *Roadmap* is currently being harmonized with NASA's procurement structures

# Next up: Quiet-by-Design!

- ☐ NASA assumes technical burden “in-house”
- ☐ Applies to engineering of gas flow systems
  - ☐ End-user involvement requires graduate-level engineering (gas dynamics, aero-acoustics)
  - ☐ Buy-Quiet program output provides criterion
- ☐ Applies to engineering of inhabited spaces
  - ☐ End-user involvement is “best-practices” architectural and engineering design
  - ☐ Requires understanding hearing conservation goals





# Next up: Quiet-by-Design!





# Getting there . . .

- ≡ Low-noise product design is possible
- ≡ Manufacturers must advertise quiet products
- ≡ “Level playing field” promotes competition
- ≡ Corporate consumers (we) must be proactive
- ≡ Demand will increase supply
- ≡ Product noise labeling initiative in progress
- ≡ Successful corporate programs do exist
- ≡ Resources, models and help are available!