N91-28245

PRESENTATION 4.2.9

# MATERIALS SUB-PANEL

DAVID PIPPEN - COORDINATOR
NASA - WHITE SANDS

BIL BHAT
NASA - MARSHALL

BRAD COWLES
PRATT & WHITNEY

* BOB DRESHFIELD
NASA - LEWIS

BOB JEWETT
ROCKETDYNE

* PRESENTOR

# MATERIALS
# GENERAL ISSUES

- UNIQUE OPERATING/ STORAGE ENVIRONMENTS
  - VERY HIGH TEMPERATURE GRADIENTS
  - ULTRA-HIGH TEMPERATURE (NUCLEAR)
  - HYDROGEN, OXYGEN, VACUUM, OTHERS
- ADAPT EXISTING MATERIALS/ DEVELOP ROCKET MATERIALS
  - VERY FEW "ROCKET" UNIQUE MATERIALS DEVELOPED
  - DESIGN COMPROMISE VS COST AND SCHEDULE
- LONG LEAD TIME FOR NEW MATERIALS
  - 7 - 15 YEARS FROM LAB IDENTIFICATION
- HIGH COST
  - DEVELOPMENT COSTS
  - SMALL MARKET
- INTEGRATION OF MATERIALS DEVELOPMENT AND MANUFACTURING TECHNOLOGY
- AVAILABILITY OF MATERIALS DATA

# MATERIALS

## TECHNICAL ISSUES

**MATERIALS CHARACTERIZATION FOR OPERATING AND STORAGE ENVIRONMENTS**
- PROPELLENTS, COMBUSTION GASSES
- SPACE
- LUNAR, MARS, OTHER

**ADVANCED MATERIALS DEVELOPMENT**
- COMBUSTOR
- TURBINE
- BEARINGS
- ULTRA-HIGH TEMPERATURES (NUCLEAR)
- HIGH SPECIFIC STRENGTH/ STIFFNESS
- ELECTRICALLY CONDUCTIVE POLYMERS

**AVAILABILITY AND DISSEMINATION OF MATERIALS PROPERTIES**
- DATA BASE

**ADVANCED MATERIALS TEST FACILITIES**

**FIRE HAZARDS**
- IGNITION, COMUSTION
- DETECTION
- EXTINGUISHMENT

**PROPELLENTS**
- GELS
- SOLIDS

# MATERIALS

## MAJOR OBJECTIVES

### MATERIALS CHARACTERIZATION
- COMPOSITES
- OPERATING AND STORAGE ENVIRONMENTS
- TEST AND EVALUATION TECHNOLOGIES
- ADVANCED FACILITIES

### ADVANCED MATERIALS DEVELOPMENT
- COMPOSITES
- ENVIRONMENTALLY RESISTANT MATERIALS
- ELECTRICALLY CONDUCTIVE POLYMERICS

### MATERIALS DATA BASE DEVELOPMENT/ MAINTENANCE
- PHYSICAL PROPERTIES
- MECHANICAL PROPERTIES
- ENVIRONMENTAL EFFECTS

# MATERIALS

## CANDIDATE PROGRAMS

### MATERIALS CHARACTERIZATION

- COMPOSITES
  - * METALLIC MATRIX
  - * INTERMETALLIC MATRIX
  - * CERAMIC MATRIX
  - * POLYMERIC MATRIX
- ENVIRIONMENTAL BEHAVIOR

### ADVANCED MATERIALS DEVEOPMENT

- COMPOSITES
  - * SHAFTS
  - * THRUST CHAMBER LINER
  - * HOUSINGS
  - * TURBINE BLADES, VANES
  - * IMPELLERS
  - * CASES
- BEARINGS
- ULTRA-HIGH TEMPERATURE MATERIAL SYSTEMS

### AEROSPACE MATERIALS DATA BASE

- PHYSICAL, MECHANICAL PROPERTIES
- ENVIRONMENTAL BEHAVIOR

## MATERIALS