Safety Message
Ames Arc Jet DC Power Supply Fire
The NASA Arc Jet Complex located at Ames Research Center supports Space Flight missions by developing, evaluating and qualifying advanced thermal protection materials/systems.

A 150 megawatt DC power supply and associated arc heater generates a high temperature, supersonic flow to simulate reentry conditions.
The Mishap

February 3, 2006

During Arc Jet operations a DC Power Supply Module was discovered burning

Internal components were severely damaged

Classified Type C mishap
($25,000 to $250,000 property damage)

There were no injuries to personnel
Sequence of Events

Mid January 2006: An Integrated Systems Test was conducted for new DC Power ‘B’ Modules

- The ‘B’ Modules were connected to the 4070 volt main buses that also feed the older ‘A’ Modules
- The ‘B’ Modules are normally electrically isolated during operations using ‘A’ Modules

January 26, 2006: Temporarily resumed normal operations using older DC Power ‘A’ Modules

- High-voltage AC buses were left connected to the new 2B and 5B Modules

February 3, 2006: Module 2B cooling water turned off after a leak was detected

February 3, 2006, ~11:30 AM: Smoke was reported rising from the DC power modules
The fire in Module 2B was caused by overheated resistors

- Resistor overheated and started the fire because cooling water was not circulating within the resistor case
Root Causes

Contributing Root Causes
• ‘B’ Module high-voltage connected while running with ‘A’ Module power supply
• The 2B Module cooling water was shut off

Primary Root Cause
Breakdown in communication
• Test engineer assumed ‘B’ Modules were not connected to high-voltage AC bus
  — Not concerned about water pump
• Electricians unaware that simultaneous ‘A’ and ‘B’ high-voltage connections generate excessive resistor heating
  — Not concerned about high-voltage bus connections
Lessons for NASA

Extreme vigilance is required during configuration changes to ensure safety controls remain effective

- Develop, document and follow procedures, drawings or checklists when making critical/significant changes

Ensure the system’s true state is understood by everyone involved

- Avoid processes/designs that permit inconsistent or incorrect perceptions about current conditions

Effective communications during high-risk operations are imperative!