SAND2015-4480



Small-scale Sensitivity Testing (SSST) Laboratory

An Overview of the SSST Facility Capabilities

Jason J. Phillips
jjphil@sandia.gov

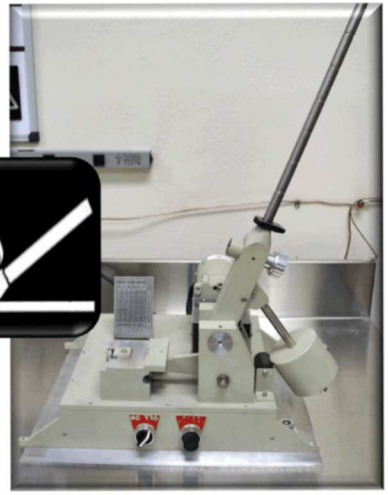
Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Sensitivity Testing

- Explosives are subjected to various stimuli through normal handling and use.
- In the SSST Laboratory, tests are available to evaluate the following hazards:

- These hazards must be assessed in order to perform work safely with explosive materials.
- Once evaluated, these hazards can be mitigated with proper procedures or equipment. This also allows new materials to be scaled up in mass.

Small-Scale Sensitivity Testing Lab



SSST Options

Explosive Material Hazards

Impact

May occur during:
- Handling
- Mixing
- Transportation

Friction

May occur during:
- Handling
- Mixing
- Transportation
- Pressing/machining

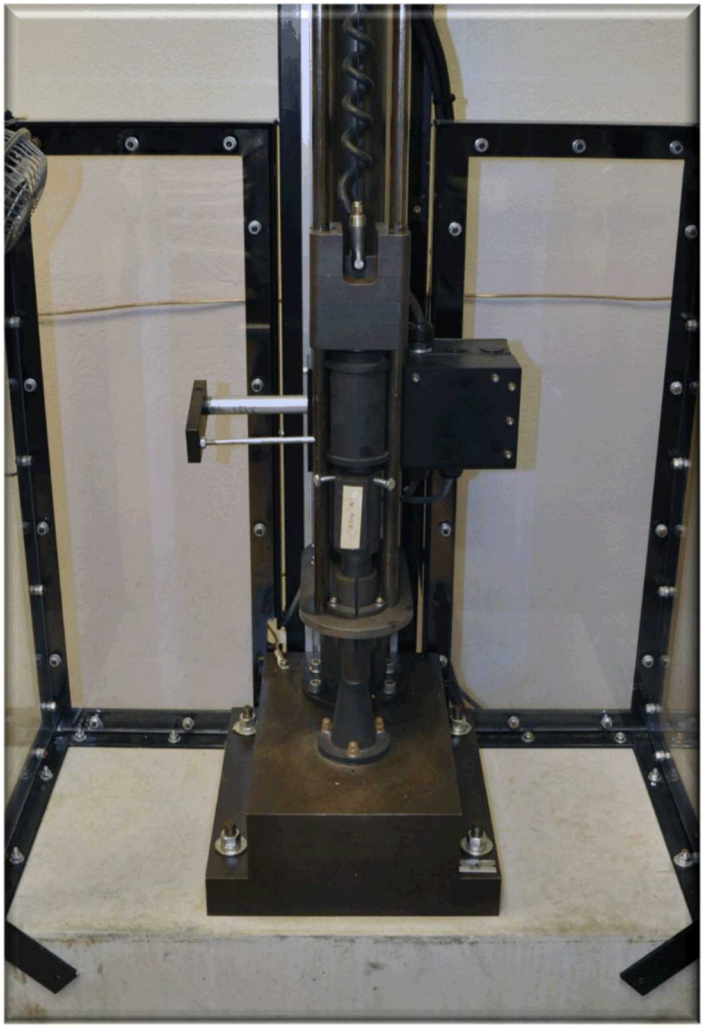
ESD

May occur during:
- Handling
- Mixing
- Transportation

Thermal

May occur during:
- Synthesis
- Mixing
- Transportation
- Storage

Impact Testing

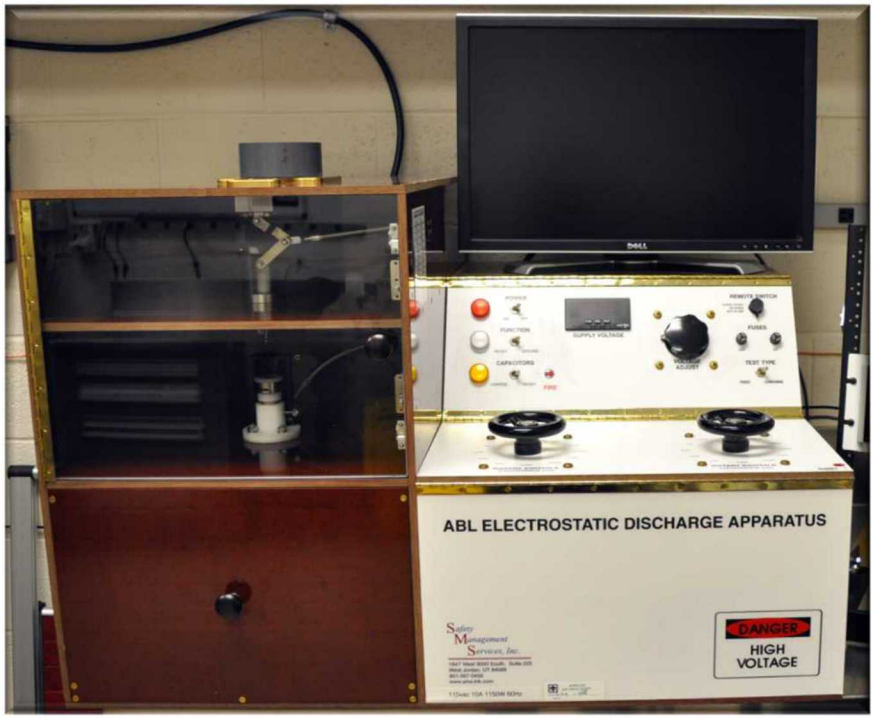


- Test types available:
  - Type 12A,B - UN Series 3(a)(v)
  - BOE - UN Series 3(a)(i)
  - MBOM (Modified Bureau of Mines)
- Up to 115cm drop height with 1-5kg masses.

Friction Testing

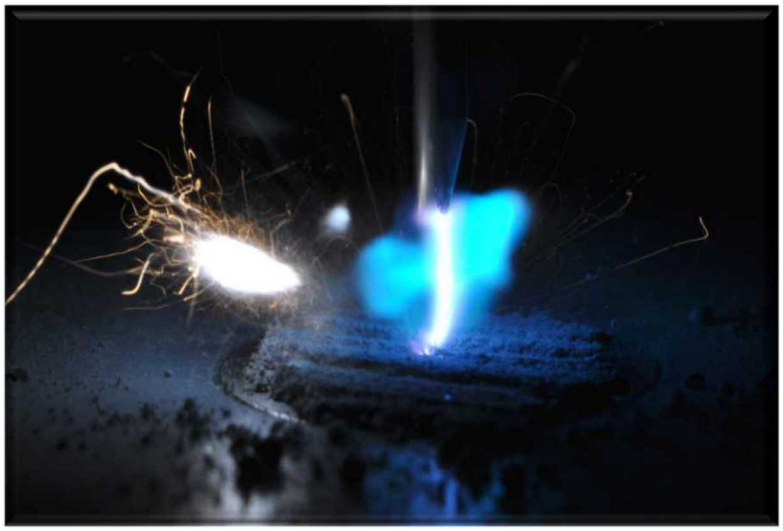
- Test Type - UN Series 3(b)(i)
- 0.5 – 36.0 kg of normal force
- Uses disposable porcelain pins and plates

Electrostatic Discharge (ESD) Testing



- Allegany Ballistics Laboratory (ABL) Machine
- 9.375 - 0.0025 Joules at 5kV, typical test range
- Approaching or fixed-needle testing
- $CO/CO_2/NO_x/SO_2$ gas analyzer and camera systems available for material response detection

ESD Camera Detection System

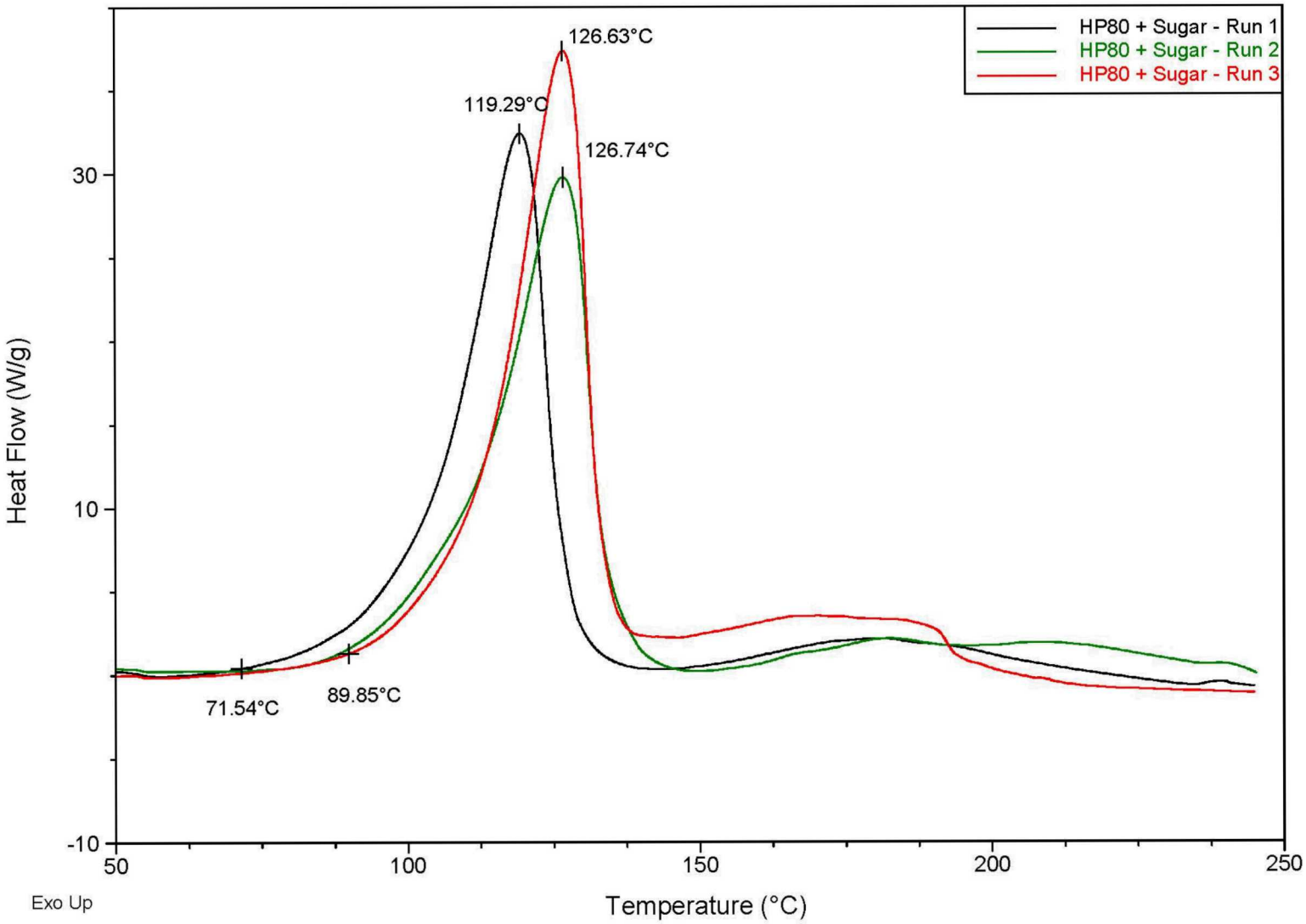


- Used to enhance interpretation of material response
- Provides a photographic record of each test shot
- Used in conjunction with, or in place of, the gas analyzer
- High speed video detection is also available

Thermal Analysis

- Differential Scanning Calorimeter (DSC)
- Shows a material's response to ramping temperature
- Can detect phase/glass transitions and endo/exothermic reactions

DSC Thermal Analysis Output



Contact Information

- Jason J. Phillips
  Sandia National Laboratories
  PO Box 5800
  Mail Stop 1455
  Albuquerque, NM 87185-1455

- jjphil@sandia.gov
- Office: 505-844-3844