Energetic Materials

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Proposed Research Projects

Chained and Unchained Fireworks

- Test and evaluate various types of chained and unchained display shells in accordance with the United Nation's Test Series 6 tests, to determine proper classification

Proposed Research Projects

Black Powder Equivalency Testing

- **Develop simple test(s) to compare the explosive characteristics (properties) of conventional black powder(s) to more modern formulations of black powder. The test method(s) should determine if these formulations are "equivalent". Black powder is the primary component used to make fireworks approved under the APA standard.**

Background (Problem)

Chained and Unchained Fireworks

- Many applications have been submitted under the APA 87-1 standard for display firework shells.
- A small group of those applications have been submitted for display shells that are chained together.
- The goal of this research is to determine if the classification of the chained and unchained shells is the same.

Background (Problem)

Black Powder Equivalency Testing

- **Black powder is the primary component used to make fireworks approved under the APA standard. The APA standard allows "equivalent" formulations to be used in place of conventional black powders, but no test exist to demonstrate when different black powders are equivalent.**

Project Schedule/Funding Estimates

Chained and Unchained Fireworks

- The offeror must test representative aerial display shells (3 and 6 inch shells) with the option to test 4 and 5. (The 3 inch shells must include salute shells.)
- Testing should include all UN Test series 6 tests:
  - UN 6(a) Single Package Test three (3) trials
  - UN 6(b) Stack Test two (2) trials
  - UN 6(c) Bonfire Test (with 0.15 cubic meters of packages)
  - Two (2) trials
- Funding Estimates 250K

Project Schedule/Funding Estimates

Black Powder Equivalency Testing

- The offeror must conduct a literature search to review tests used to measure the explosive properties of black powder;
- Research common formulations of “black powders” used in fireworks.
- When suitable test(s) have been selected, conduct test(s) on commercial and common formulations of “black powders” used in fireworks. (Research must include potassium nitrate and potassium perchlorate based black powders.)
- Funding Estimates 25K

Outputs (Expected)

Chained and Unchained Fireworks

- To know if chained and unchained displayed shells should be classified the same under the APA 87-1 standard.

Black Powder Equivalency Testing

- To have an simple test(s) to measure the explosive properties of “black powders” which can be used to determine that those powers can be consider equivalent under the APA 87-1 standard.