



A Loaded Magazine

The Honolulu Fireworks Disposal Explosion

Senior Management ViTS Meeting

July 2013

Sandra M Hudson

Range Safety Program Executive

Explosive Safety Program Manager



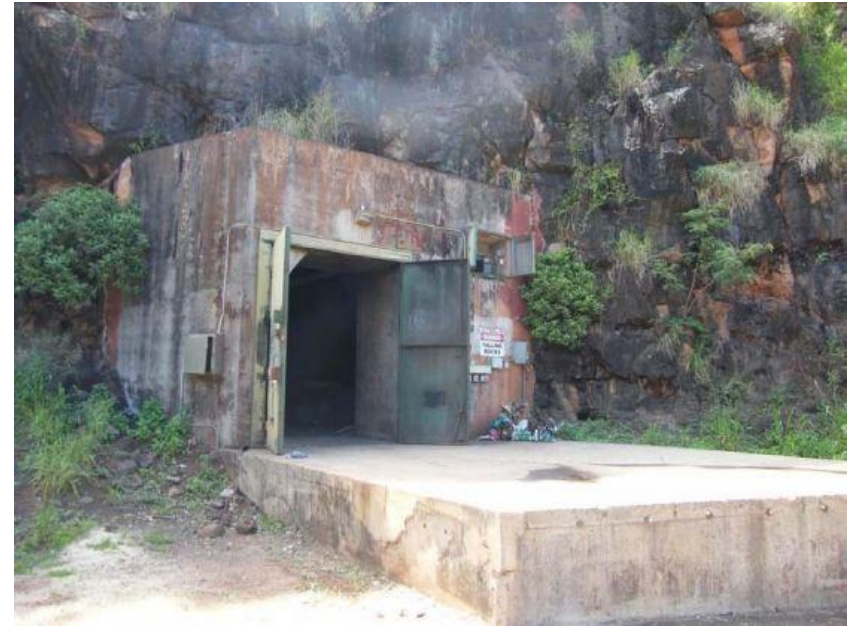
This and previous presentations are archived at
sma.nasa.gov/safety-messages

Explosive and Hazardous Material Safety

Although NASA has technical standards and procedures that govern the use and handling of energetic and hazardous material, the March 2013 Office of the Inspector General (IG) *Review of NASA's Explosives Safety Program* drew attention to violations at four NASA Centers and citing a lack of resources, oversight and training as main contributors to the violations.

The Agency is currently working through a series of actions to correct the deficiencies found by the IG.

We can also learn from occurrences of poor energetic material handling beyond Agency gates, such as the 2011 fireworks disposal accident near Honolulu, Hawaii. Poor oversight and a lack of regulation led to unsafe handling practices and a mass detonation of accumulated explosive material. The accident claimed the lives of 5 Donaldson Enterprises, Inc. (DEI) workers. The company specialized in Unexploded Ordnance (UXO) removal and the workers were experienced in civilian and military Explosive Ordnance Disposal (EOD).



Location of the 2011 Honolulu Fireworks Disposal Mishap. Source: Chemical Safety Bureau (CSB).

What Happened and Proximate Cause

What Happened

- Summer 2010: DEI—tasked with disposing of contraband fireworks seized by federal law enforcement—planned to separate the cakes of mortars, soak them in diesel, and burn them. Although DEI expected that this process would provide a slow burn and eliminate explosions, they still observed several explosions. Work was performed outside the storage magazine where the fireworks were being stored.
- December 2010: After changing their process multiple times, DEI settled on removing the aerial shells from the mortar tubes, slicing the shells open, and then soaking them in diesel. Black powder from the burst charges was collected and stored without disposal. To expedite disposal, DEI was disassembling large quantities of fireworks while waiting for batches of shells to soak.
- April 8, 2011, Waipahu, Hawaii: Five DEI workers were killed and one other was injured when an excess of explosive material detonated in a mass explosion during disposal operations.

Proximate Cause:

- A surplus of explosive components accumulated inside the magazine entrance, near tools and containers capable of producing sparks and static discharge.
- DEI's hazard analysis of its disposal activities failed to identify and control key hazards of the disposal process.



DEI workers disassembling fireworks. Source: CSB.

Underlying Issues

Inadequate Contractor Selection and Oversight

- The Chemical Safety Board's (CSB's) investigation revealed that the VSE Corporation (VSE) (*Prime Contractor*) personnel who selected DEI (*Subcontractor*) were unaware that DEI had no prior firework disposal experience prior to the contract. VSE deferred to DEI as experts. VSE lacked the technical expertise to properly select or oversee DEI's disposal work, and VSE's procurement review of DEI did not address health or safety.

Deficit of Industry Regulation

- The CSB found a lack of regulations or industry standards that adequately address safe fireworks disposal—only fireworks manufacturing. Federal or local codes, regulations, or industry standards do not establish safety requirements, provide guidance on proper ways to dispose of fireworks, or address the hazards associated with the disassembly of fireworks and the accumulation of explosive components. Specific CSB findings:
 - Federal contractor selection regulations did not require VSE procurement personnel to conduct safety related review prior to awarding DEI the subcontract.
 - Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) standard does not apply to fireworks disposal activities. DEI was not required to conduct a robust Process Hazard Analysis (PHA), which would have helped in identifying, evaluating, and controlling the hazards involved in its disposal activities or a formal or Management of Change (MOC) analysis when it modified its processes.
 - Neither the Federal Acquisition Regulation (FAR), nor the Department of the Treasury Acquisition Regulation (DTAR) supplement, impose sufficient requirements for safe practices and subcontractor selection and oversight with respect to the unique hazards associated with handling, storing, and disposing of hazardous materials.

Aftermath and Relevance to NASA

CSB recommendations:

- For the Federal Acquisition Regulatory Council, the Department of the Treasury Office of the Procurement Executive (OPE), TEOAF, VSE Corporation, the National Fire Protection Association (NFPA), the U.S. Environmental Protection Agency (EPA), and the ATF:
- Create or modify existing regulations to include best practices, guidance, required safety reviews for soliciting organizations and organizations storing, transporting, and disposing of contraband and waste fireworks.

Relevance to NASA

- Some violations identified in the NASA IG review included the storage of incompatible energetic material together, the storage of explosives at a facility not originally designed to house energetic material, and the storage of decomposing and potentially highly unstable energetic materials.
- The NASA IG found that in addition to a lack of resources, a lack of oversight and training were the primary contributing factors to the violations.
- It is imperative that the Centers work together to share expertise, training, and lessons learned. As old projects and programs end, NASA should remove energetic material that is not needed for current work. It is vital that personnel identify lapses in correct storage and handling processes and procedures and establish means of mitigation. By doing so, they will help NASA Centers and Facilities protect their operations, their fellow NASA personnel, and the public.



One of 99 bunkers built at Plum Brook Station by the Army during WWII, currently used and operated by the Glenn Research Center (GRC). Source: IG Report.