SAND2014-2163C

March 18, 2014

Sandia National Labs support for Precision Strike

David L. Keese

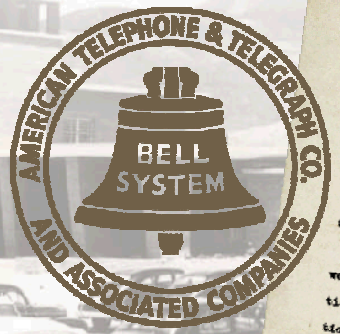
Director, Integrated Military Systems

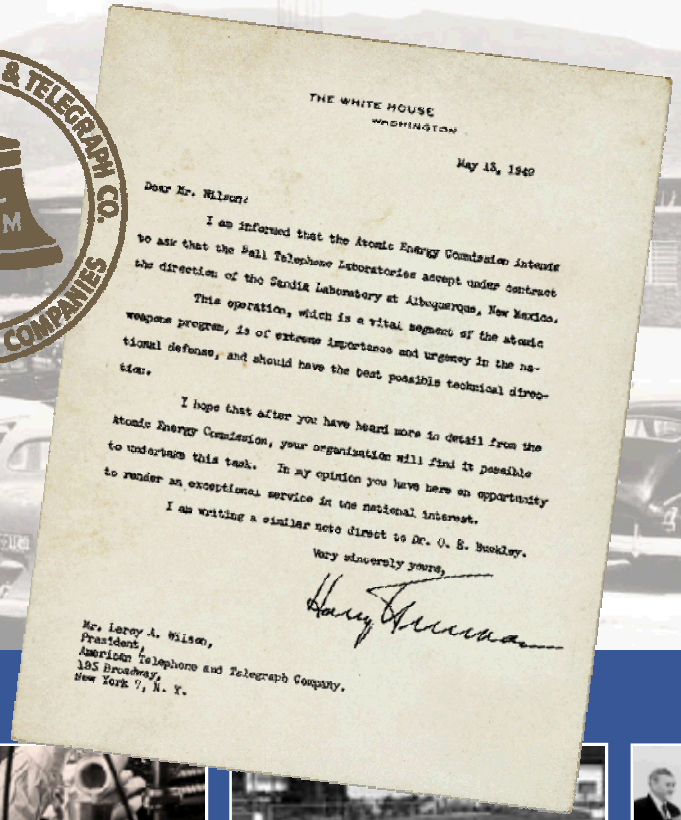
Sandia National Laboratories

Sandia's history

Exceptional service in the national interest

Sandia National Laboratories





THE WHITE HOUSE
WASHINGTON

May 15, 1949

Dear Mr. Wilson:

I am informed that the Atomic Energy Commission intends to ask that the Bell Telephone Laboratories accept under contract the direction of the Sandia Laboratory at Albuquerque, New Mexico.

This operation, which is a vital segment of the atomic weapons program, is of extreme importance and urgency in the national defense, and should have the best possible technical direction.

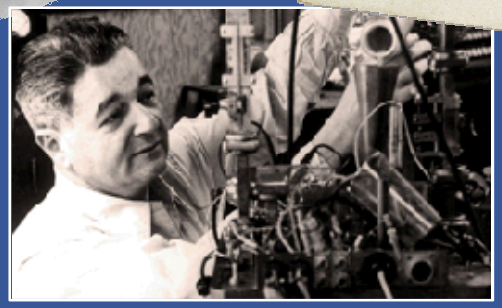
I hope that after you have heard more in detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.

I am writing a similar note direct to Dr. C. E. Buckley.

Very sincerely yours,

Harry Truman

Mr. Leroy A. Wilson,
President,
American Telephone and Telegraph Company,
195 Broadway,
New York 7, N. Y.



Sandia's governance structure

Sandia Corporation

- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–present

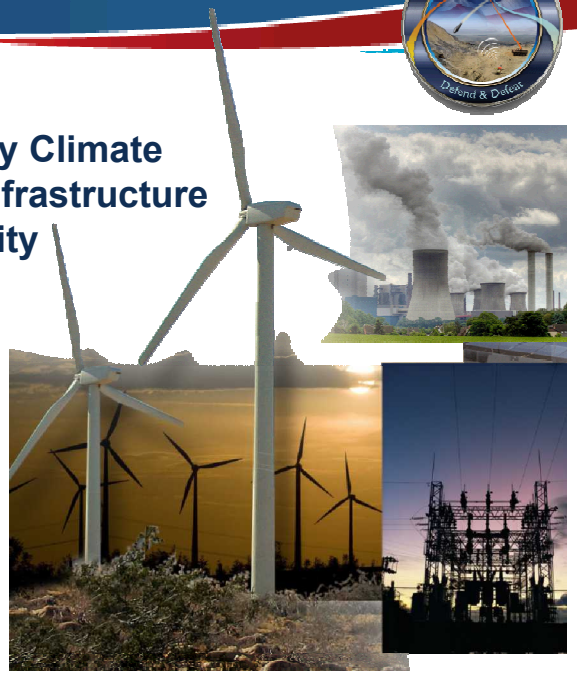
Government Owned, Contractor Operated (GOCO)

Federally Funded Research and Development Center (FFRDC)

Sandia's Broad National Security Mission

Nuclear Weapons

Energy Climate and Infrastructure Security



International Homeland and Nuclear Security

Defense Systems and Assessments

FFRDC Roles & Responsibilities

- FFRDCs meet a long-term R&D need which cannot be met as effectively by existing government or contractor resources
- Maintains long-term relationships with the Government to preserve familiarity with sponsor needs, provide quick-response capability, maintain independence and objectivity, and attract high-quality personnel
- Has access to Government and supplier data, beyond that which is common to a normal contractual relationship
- Conducts business in a manner befitting its special relationship with the Government
- Operates in the public interest with objectivity and independence
- Cannot use its privileged information or access to facilities to compete with the private sector

National Lab Role in Tech Development and Transition

- ✓ Facilitates Rapid Tech Development & Response
- ✓ Emphasizes Prototypes & Demos
- ✓ Enables Government to Be Smarter Buyer
- ✓ Enables Industry to Be More Effective Supplier
- ✓ Government, University, Industry, Lab Development (GUILD) team

"No member of a crew is praised for the rugged individuality of his rowing."

Ralph Waldo Emerson

Long-term Technology Investment

Challenge: Develop and Demonstrate advanced technologies for precision strike.

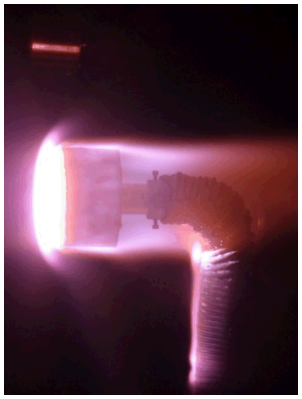
LDRD Investment:

- FY 2005–2007— PGR Grand Challenge
- FY 2006-2009 — Thermal Protection Systems
- FY 2009-2012 — Boundary Layer Transition
- FY 2008-2009 — Hypersonic Dispense
- FY 2008-2009 — Hypersonic Transition Receiver
- FY 2005-2010 — Kinetic Energy Projectiles
- FY 2012-2013 — Optimal Adaptive Control Strategies

System Application:

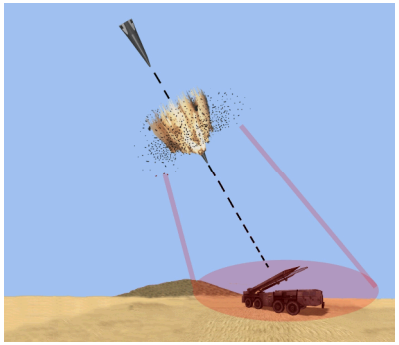
- SWERVE (DOE/DARPA)
- HyTEx (NASA Marshall)
- SHARP B1 and B2 (NASA Ames)
- RFTx (Navy SSPO)
- Falcon HTV-2 and ArcLight (DARPA)
- Advanced Hypersonic Weapon (OSD & SMDC)

Advanced Hypersonic Weapon Flight 1A Nov 2011

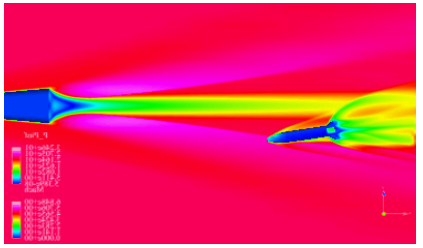


TPS in Arc Jet Tests

AHW Glide Body

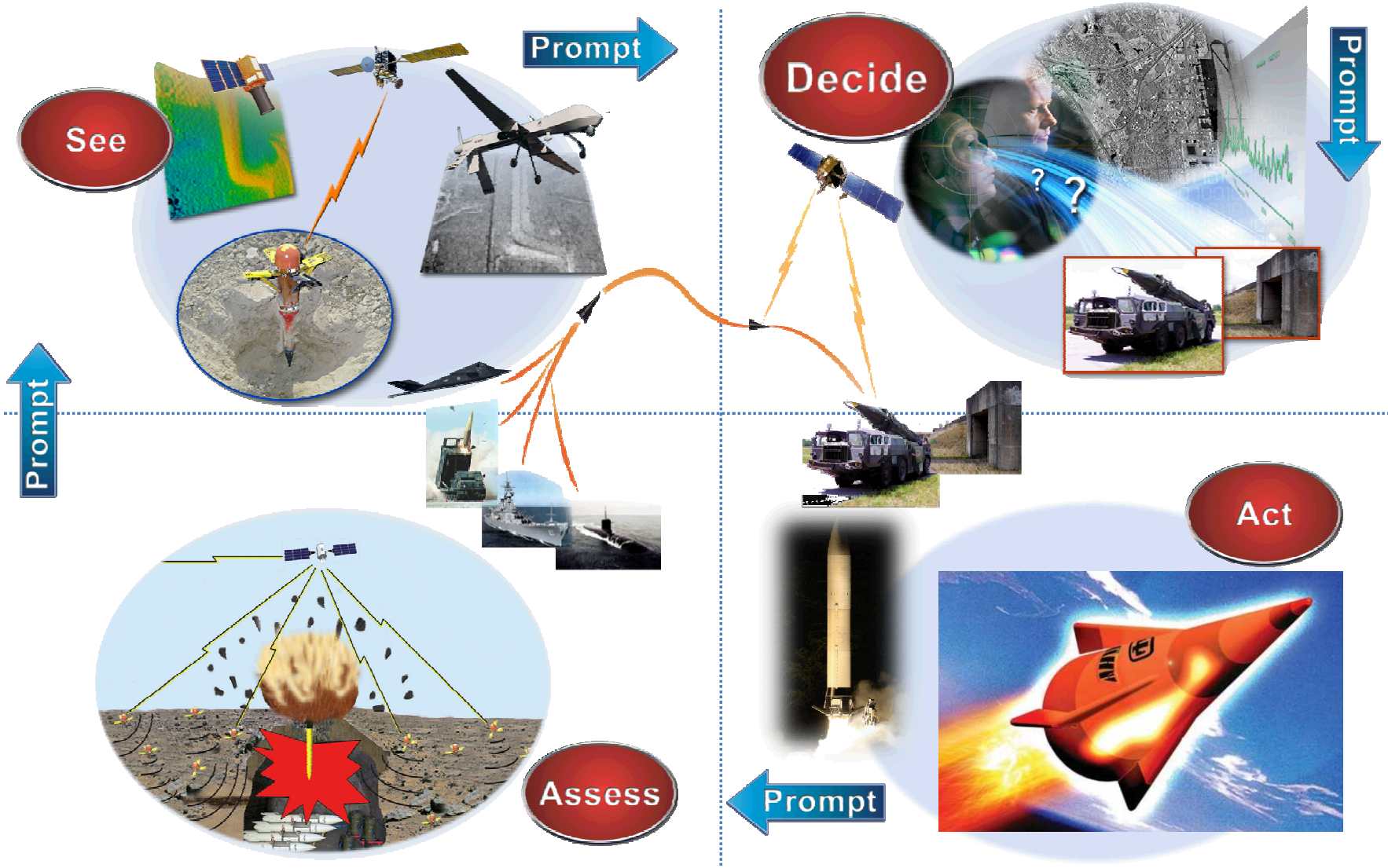


Kinetic Energy Projectiles



Hypersonic Dispense

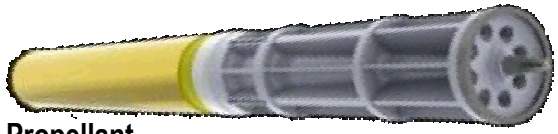
Precision Strike … Systems View of the Challenge



TACMS-P Precision Strike ACTD

Hypervelocity Projectiles for Rail and Propellant Guns

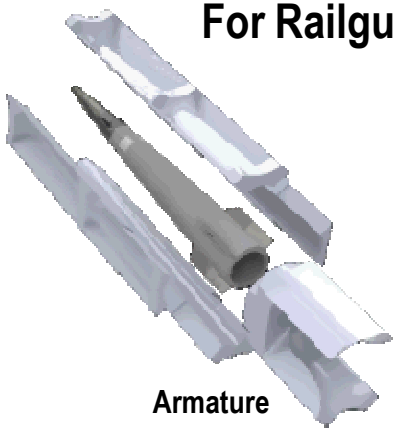
For Mk 45 5-inch gun



Propellant

Projectile in sabot

For Railgun



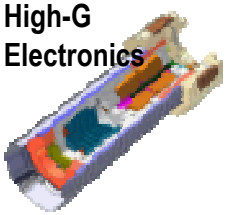
Armature

Missions

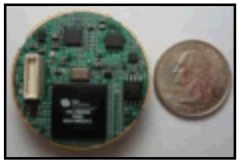
Future Threats

Technologies

High-G Electronics

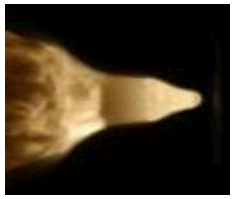


Packaging



Miniaturization

Thermal Protect



Adv. Energetics

Weapon Systems

5 inch OD at fins
x 24.4 inch long

GEU

HE or KEPs Warhead

HYPER VELOCITY PROJECTILE

UNUM TELUM, MULTI MODI

Slide courtesy of ONR

CHAMP, Non-KE Precision Effects

Counter-electronic High Power Microwave Advanced Missile Project

- **What is CHAMP?** A Joint Capability Technology Demonstration (JCTD), led by AFRL, to demonstrate integration of High Power Microwave (HPM) into a missile for use as a directed energy weapon.

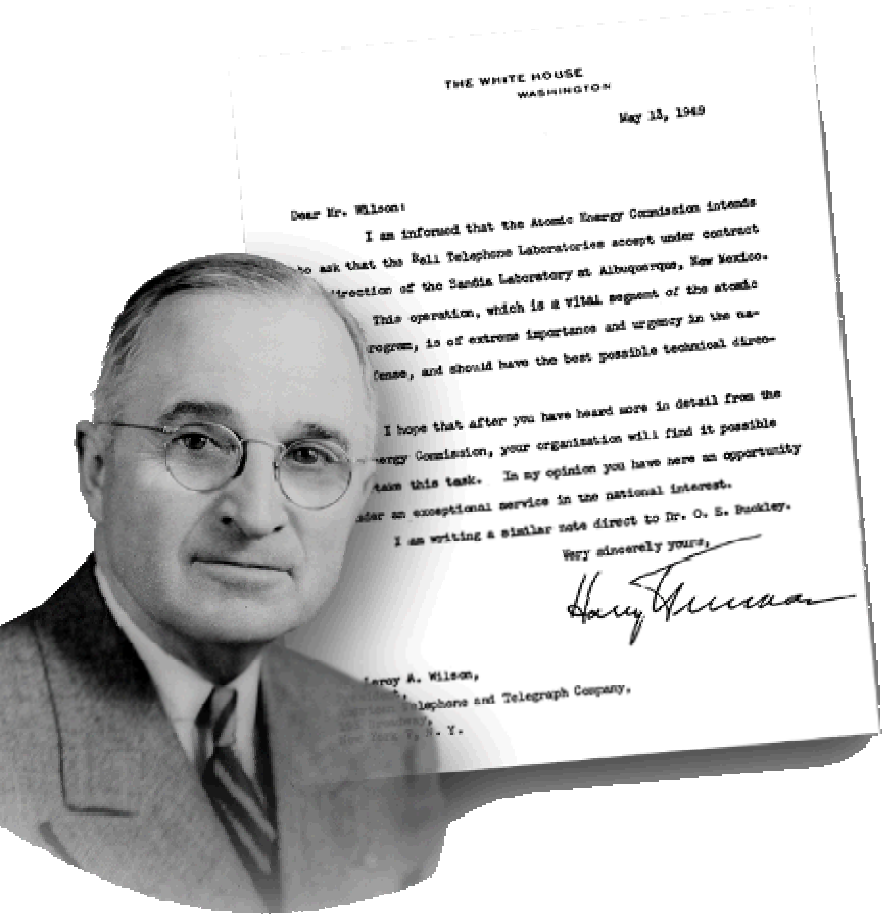
- **Why is it important?** The first demonstration of a directed energy weapon integrated into an air launched missile platform capable of engaging multiple targets and affecting electronic systems within those targets without direct kinetic-energy effects.

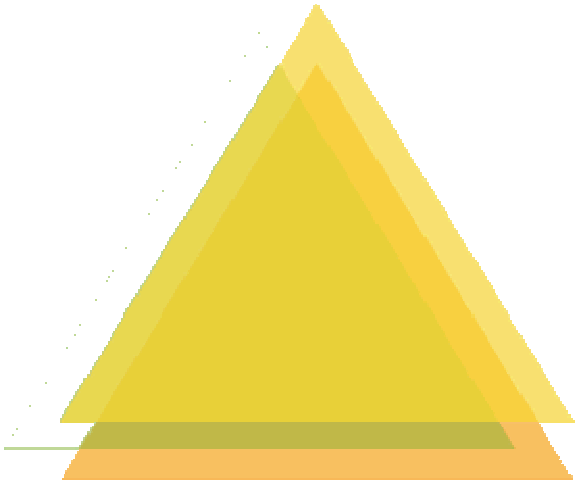
- **Why Sandia?**
  - Our world class expertise in Pulsed Power, HPM Sources, and Field Testing
- **Partners**

CPGS Program (AHW Flight 1A)
Successfully flown November 17, 2011

Demonstration of CPGS Technologies/Systems

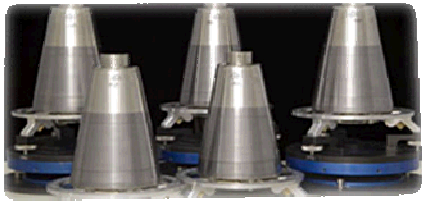
Exceptional Service in the National Interest





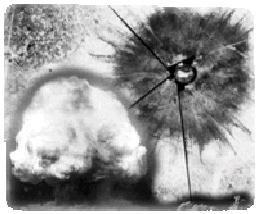
Backup Charts

Capability Leverage



AF&F

Radars

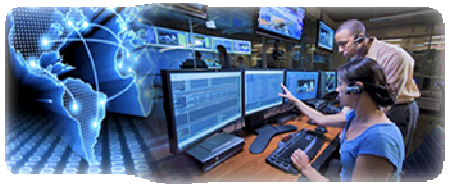


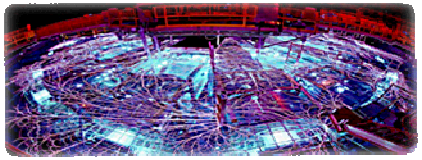
Nuclear Detection

Space Sensors

Use Control/PAL

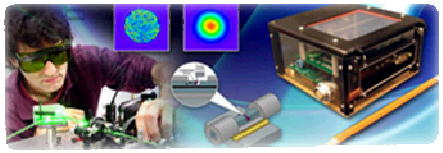
Cyber

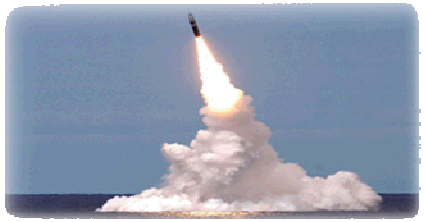




Pulsed Power/ Extreme Environments

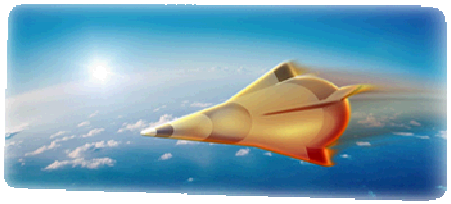
Directed Energy





Reentry Vehicles

Hypersonic Systems



Integrated Military Systems Program Area

Strike Systems & Aerospace Technologies

Successful AHW Launch
Nov 17, 2011

Sandia-developed booster system, glide vehicle and range support

Missile & Air Defense

- Advanced Target Capability Cell
- Threat Design & Analysis
- Integrated Target Systems
- Target Launch Vehicles
- Target Reentry Vehicles

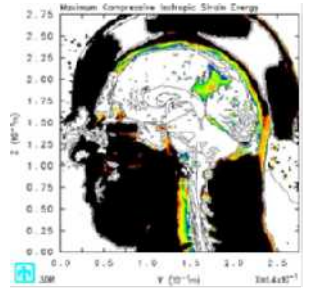
Military Systems & Technologies

- **Campaign Portfolio Analysis Tool (CPAT)**
- **"Game-Changer"… Gen Pete Chiarelli**

ONR Advanced Containment Launcher

Warheads and Energetics

Over 1500 Explosive Events in FY11



Traumatic Brain Injury