

Exceptional service in the national interest



Sandia National Laboratories

Terry Hendricks

Alan Kruizenga

11 April 2013



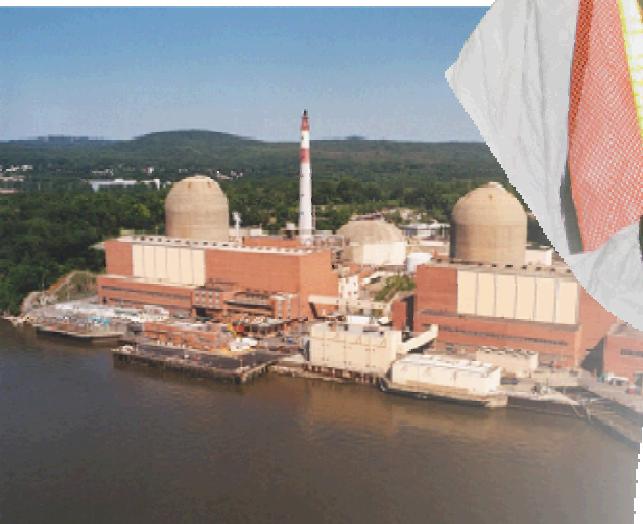
Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2011-0439P

Executive Summary

- SNL specific information
 - Background
 - Opportunities at SNL
- What is life like at SNL?
 - Terry Hendricks
 - Alan Kruizenga
- How to get plugged in?

Four Mission Areas

- Nuclear Weapons
- Defense Systems and Assessments
- Energy, Climate, and Infrastructure Security
- International, Homeland, and Nuclear Security



The Mission Has Evolved for Decades

1950s

Production engineering & manufacturing engineering

1960s

Development engineering

1970s

Multiprogram laboratory

1980s

Research, development and production

1990s

Post-Cold War transition

2000s

Broader national security challenges

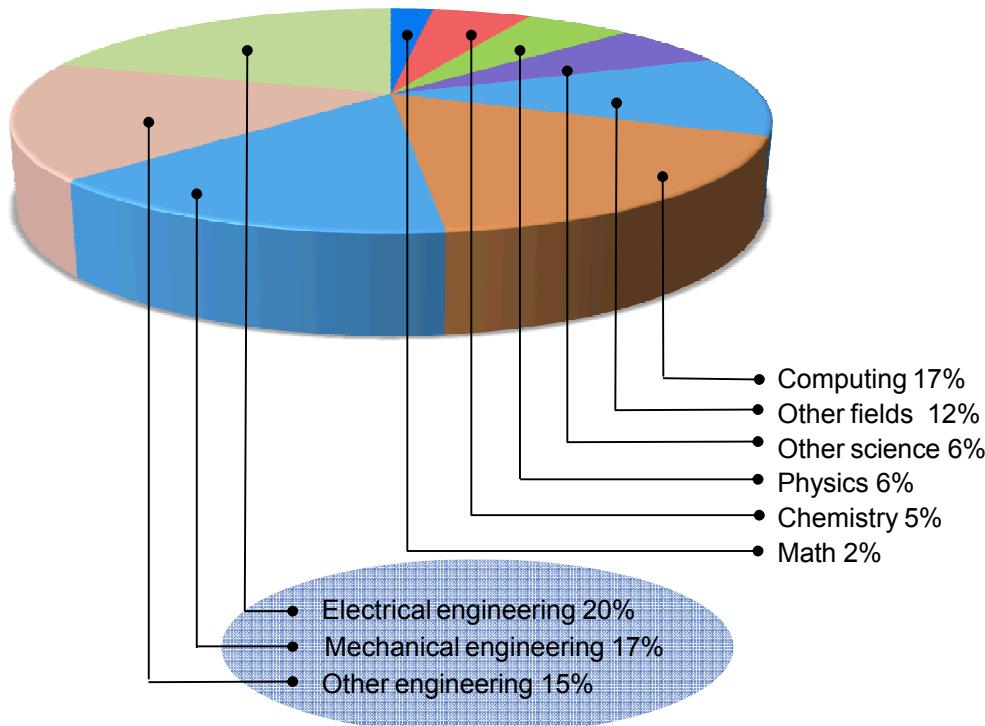


People and Budget

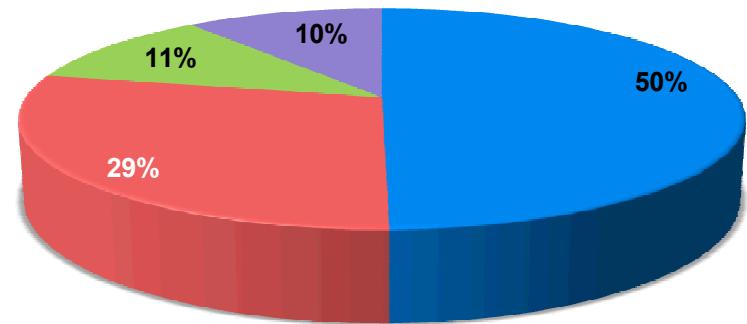
(As of October 11, 2011)

- On-site workforce: 11,876
- Regular employees: 9,122
- Gross payroll: ~\$943 million

Technical staff (4,557) by discipline



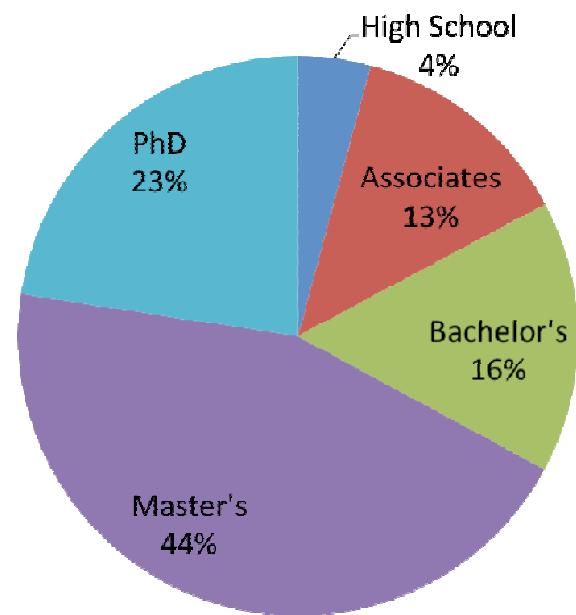
FY11 Operating Revenue
\$2.4 billion
(Operating Budget)



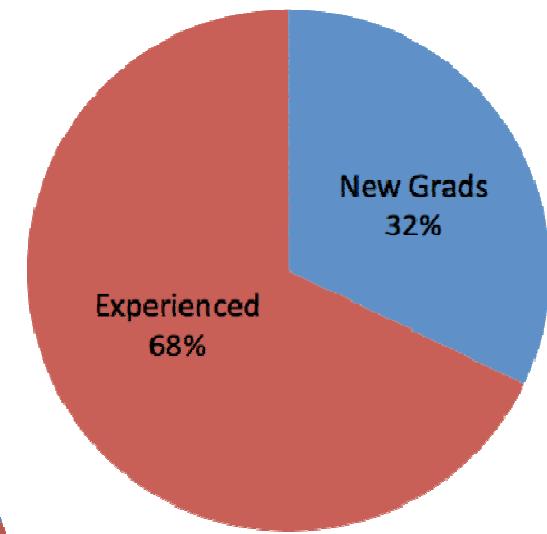
- Nuclear Weapons
- Defense Systems & Assessments
- Energy, Climate & Infrastructure Security
- International, Homeland, and Nuclear Security

FY13 Hiring Projections - SNL

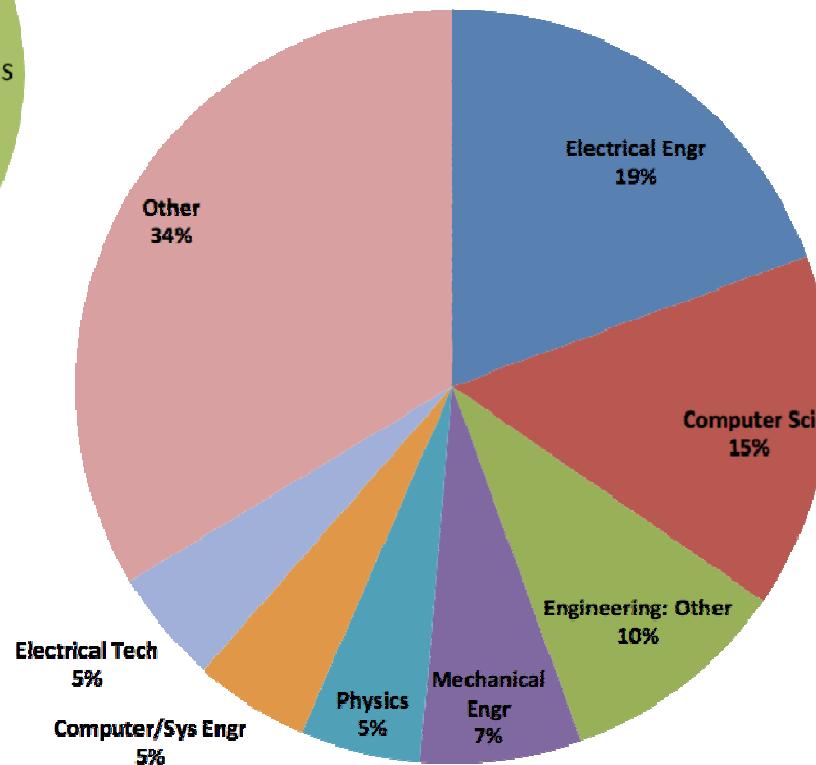
Education



Experienced/New Grads



Discipline



Opportunities at Sandia National Labs

Opportunities

- Variety of majors
- Technical institute programs (8) for internships
- Fellowships
- Full-time / Post-doc
- Wounded-Warrior

Requirements

- Most require U.S. citizenship
- Some projects may require DOE clearance
- Research in areas of interest to national security



Sandia's Sites

Albuquerque,
New Mexico



Livermore,
California



Pantex, Texas



Waste Isolation Pilot Plant,
Carlsbad, New Mexico



Tonopah, Nevada

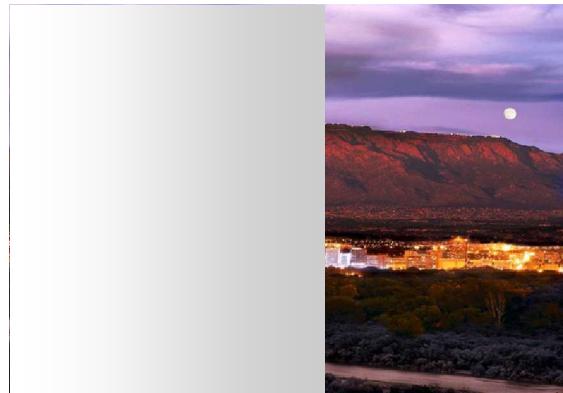


Kauai, Hawaii

Working at Sandia / Living in New Mexico

■ Working at Sandia:

- Diversified portfolio and work opportunity
- Great amount of freedom
- Many opportunities for self-investment
- Meaningful work
- Good work/life balance



■ Living in New Mexico

- Gorgeous scenery and year-round outdoor activities
- 300 days of sunshine
- Unique culture



Terry Hendricks (PhD: ME, 2011)

- Hometown: Milwaukee, WI
- BS, MS, PhD : UW-Madison for all 3
 - MS Thesis: Numerical and Experimental Study of Idle and Transition Circuits in Small Engine Carburetors (Prof. Shedd)
 - PhD Dissertation: Instantaneous Heat Flux Measurements in Internal Combustion Engines (Prof. Ghandhi)....**IC Engines**
- Previous Internships/Co-ops
 - General Electric
 - Steam turbine test lab (Schnectady, NY)
 - Combustion group (Greenville, SC)
 - UW-Madison Formula SAE team

What I do at Sandia Nat'l Labs



- Design engineer for explosive components in the Nuclear Weapons Division @ SNL
- Sandia is the weapons integrator for LANL/ LLNL
 - Also work on R&D for explosives, propellants, pyrotechnics
 - Work with other organizations and groups on other projects



B83 Strategic Bomb - 6,519 Total parts
Sandia developed - 3,922; Sandia specified - 2,378

Example of End Use Application

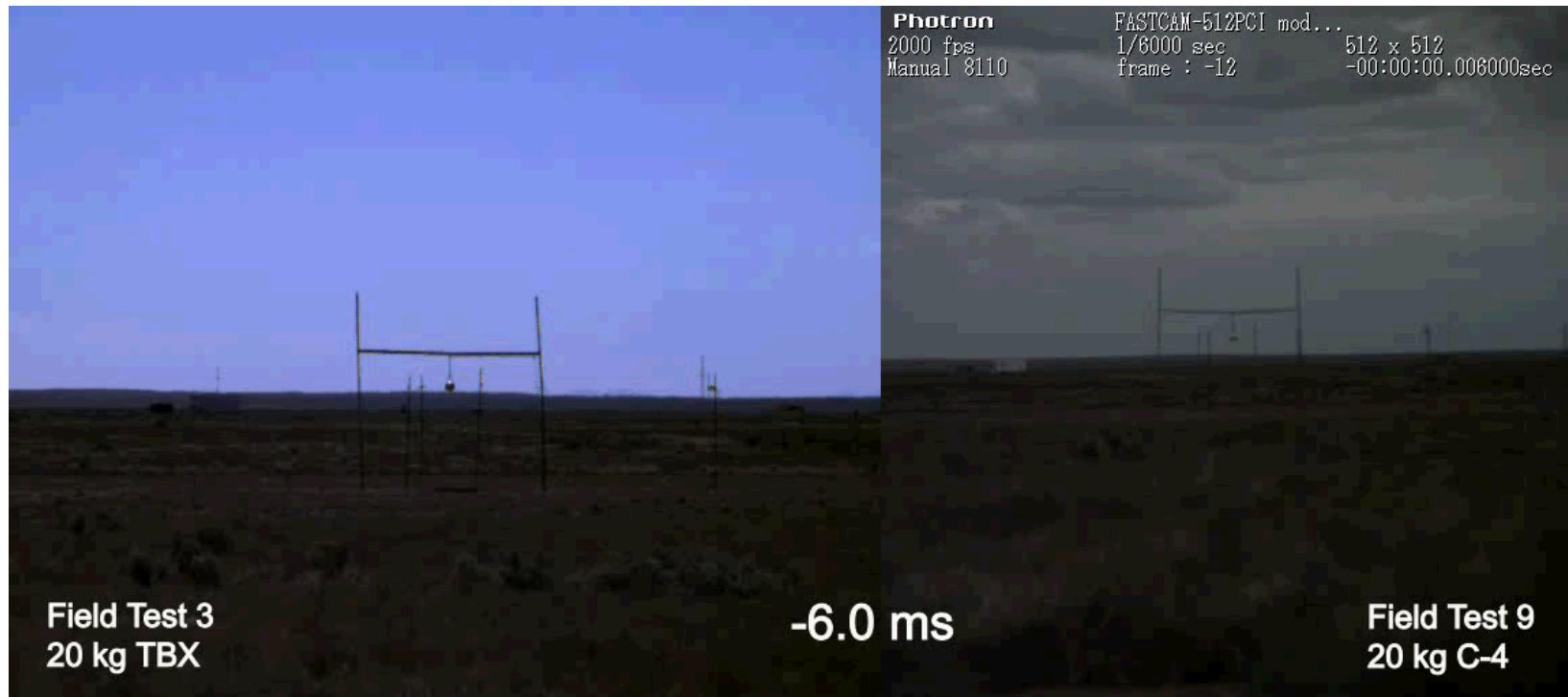
- Trident II D5 launch

<https://www.youtube.com/watch?v=1aPvGGvnAGQ>

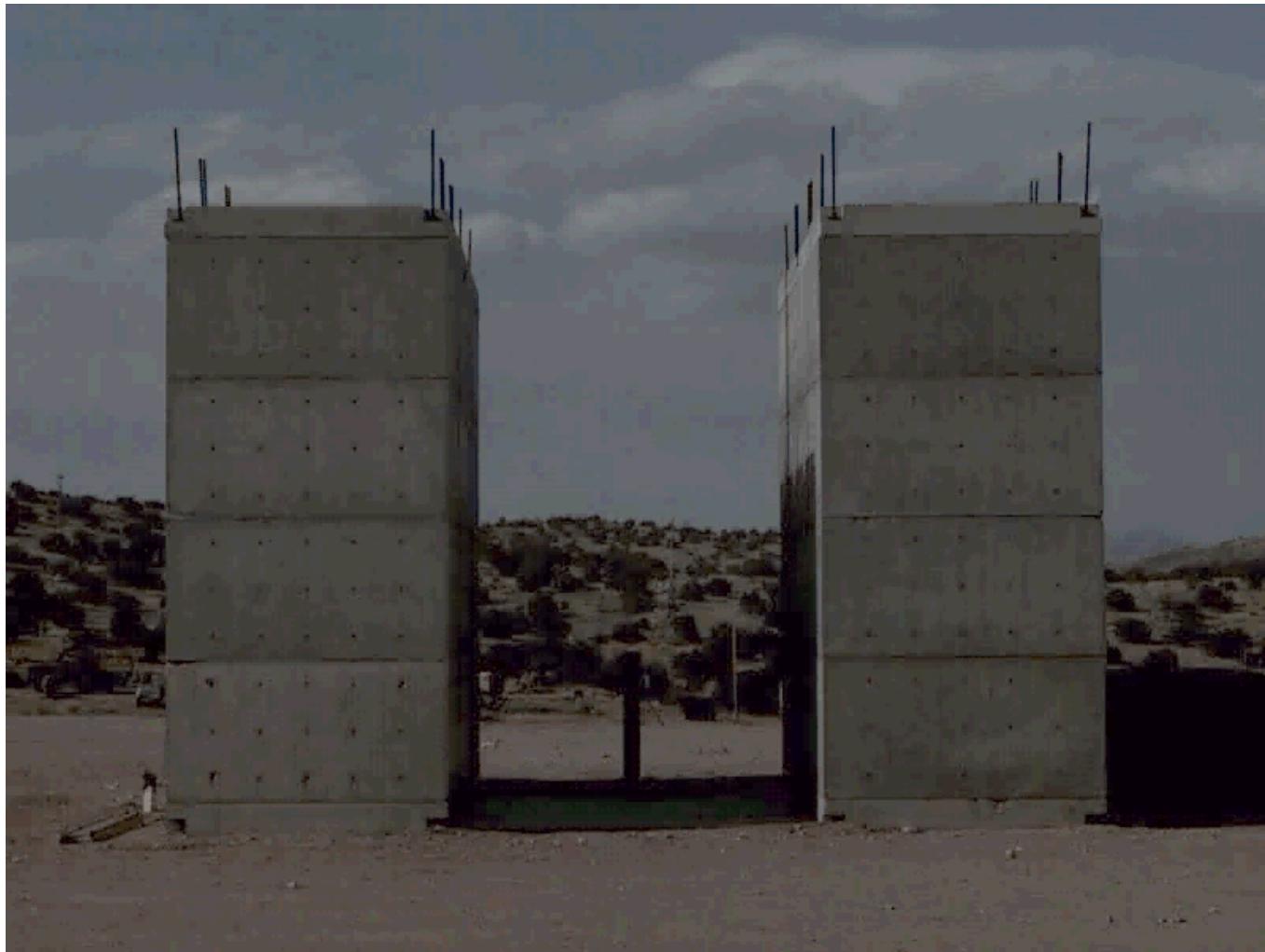


What else does an engineer / scientist do in the explosives division?

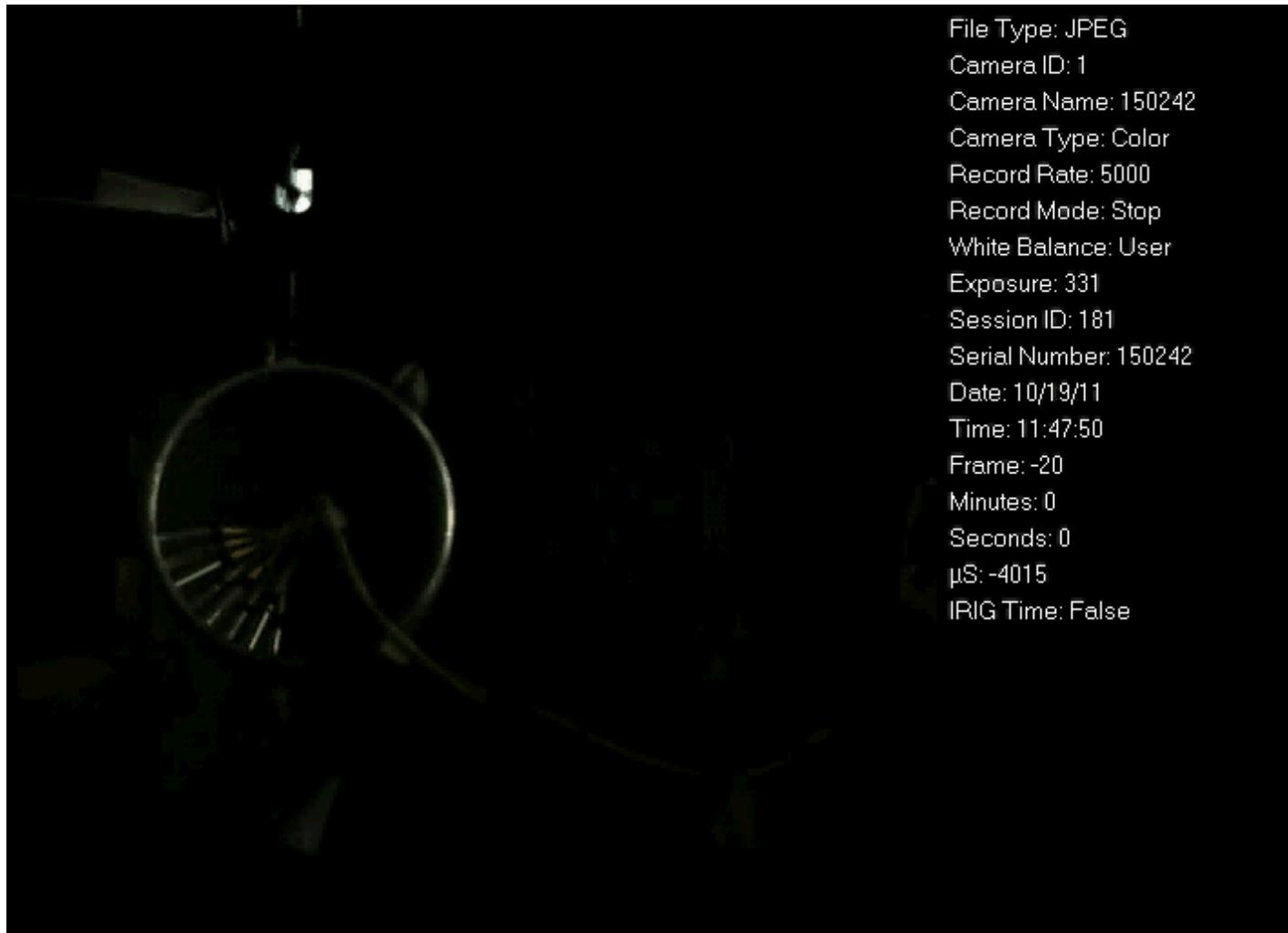
- **Answer:** Blow stuff up or research blowing stuff up
 - The following videos are related to work done or represent work done within my division / organization



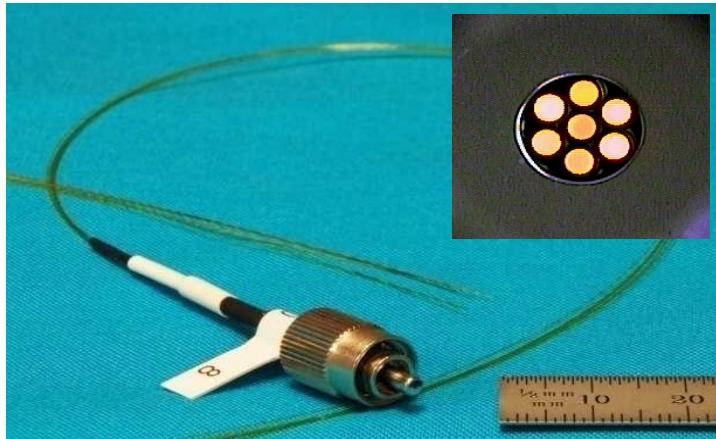
From large scale detonation research...



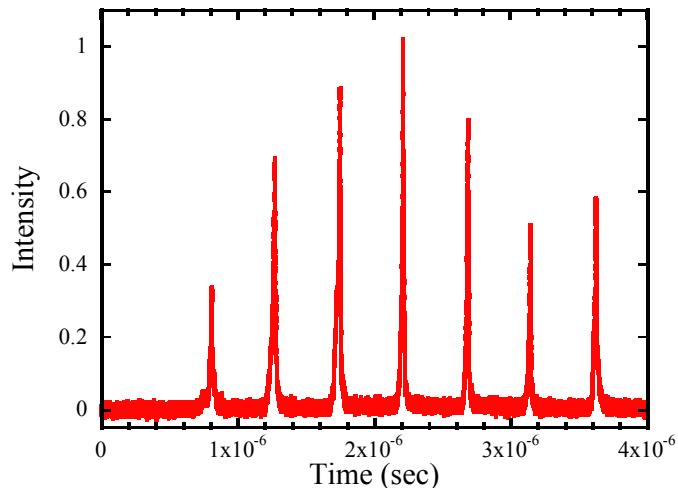
To applied science applications....



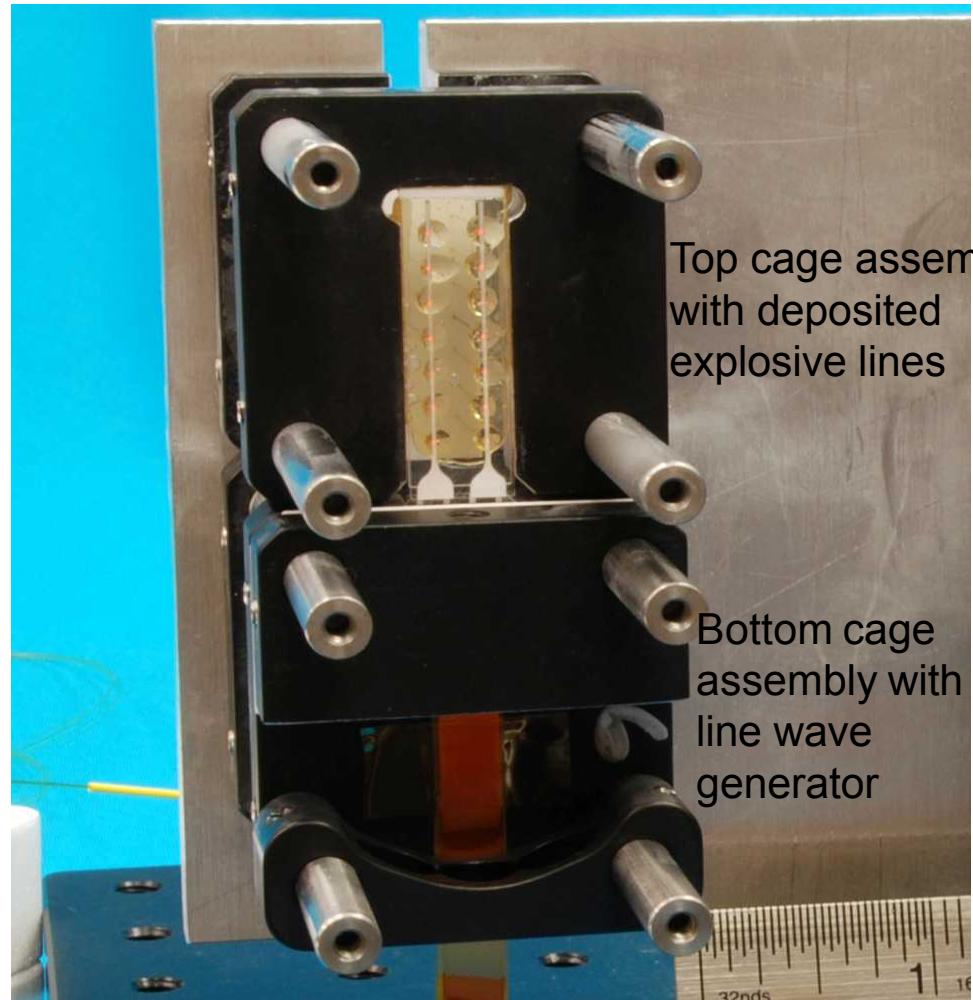
To small scale detonation experiments...



Photograph of optical fiber probe with inset showing six-around-one connector.



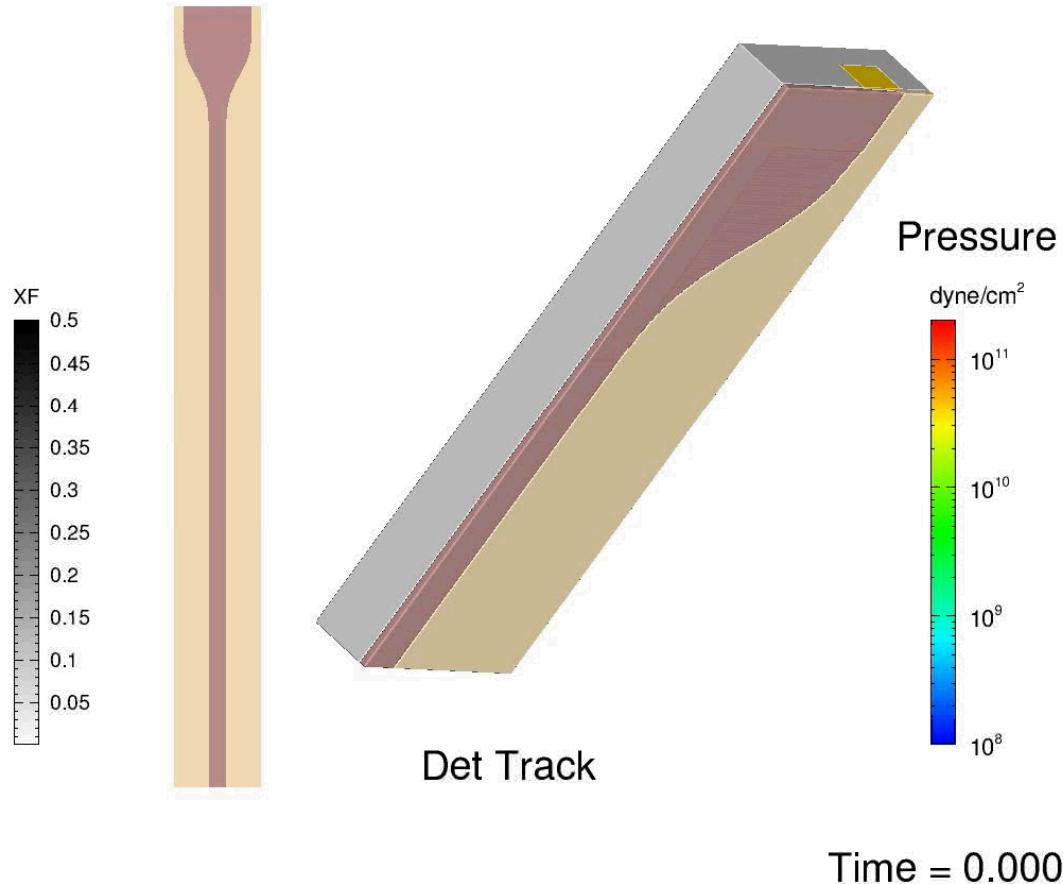
Scope data is used to obtain position vs. time data and determine detonation velocity



Detonation velocity/critical thickness experiment



CTH modeling of microenergetics



To creating innovative solutions...



About me (Alan Kruizenga)



Educational Experience

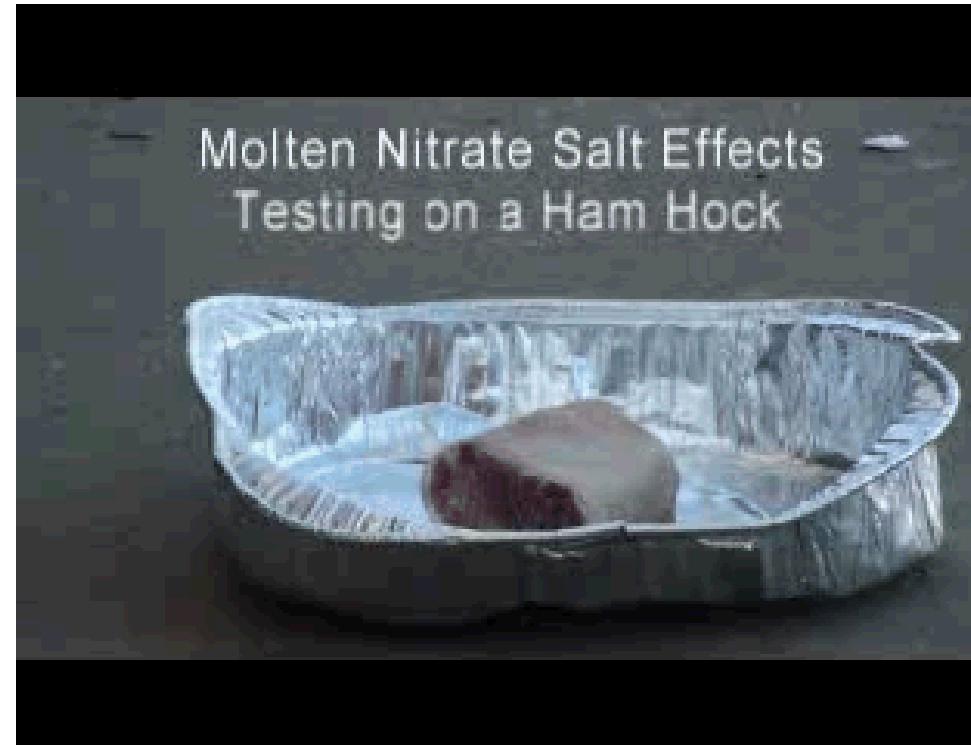
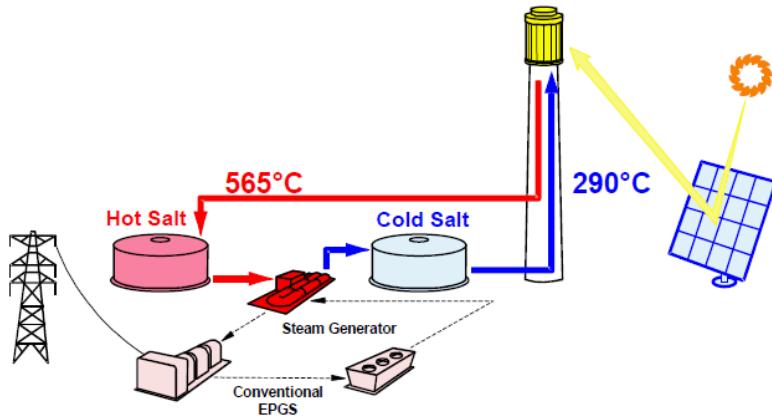


- 2005: BS - Physics, minor Math
 - Internships: 3M, Michigan State
 - Thesis: PET Optical Properties



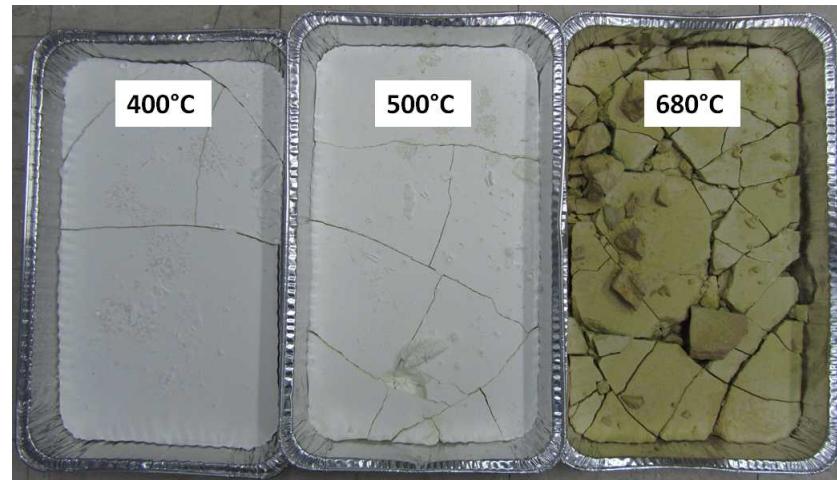
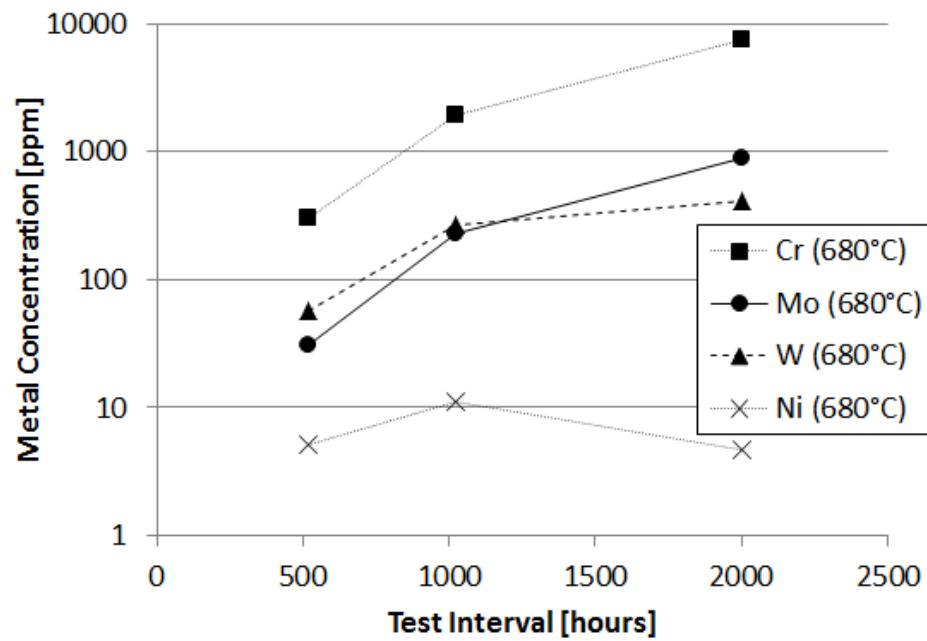
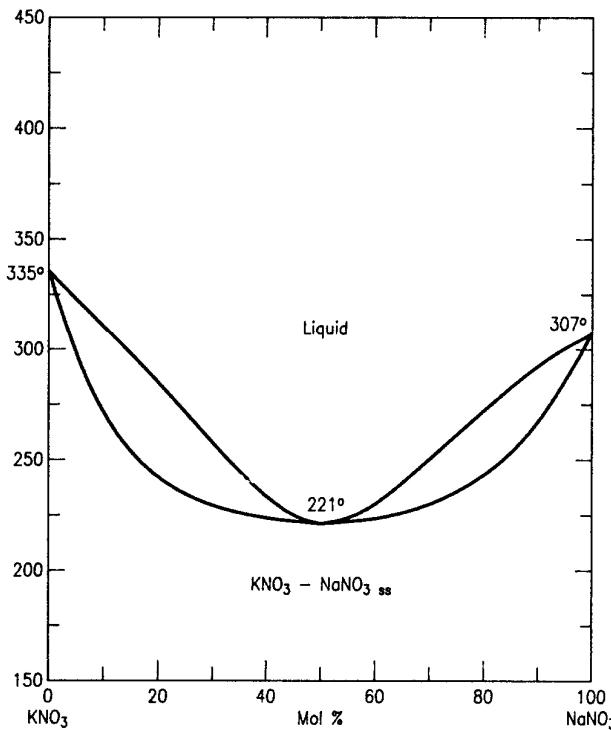
- 2007: MS - Nuclear Engineering (NEEP)
 - Alloy corrosion in supercritical water
 - Materials science, Microscopy, High Temperature Fluids
- 2010: MS - Mechanical Engineering, Ph.D. NEEP
 - Heat Exchanger design and measurements for supercritical CO₂ Brayton Power Cycles

- Concentrating Solar Power (CSP) uses mirrors to focus sunlight for thermal power.
- Materials corrosion and heat transfer fluid chemistry

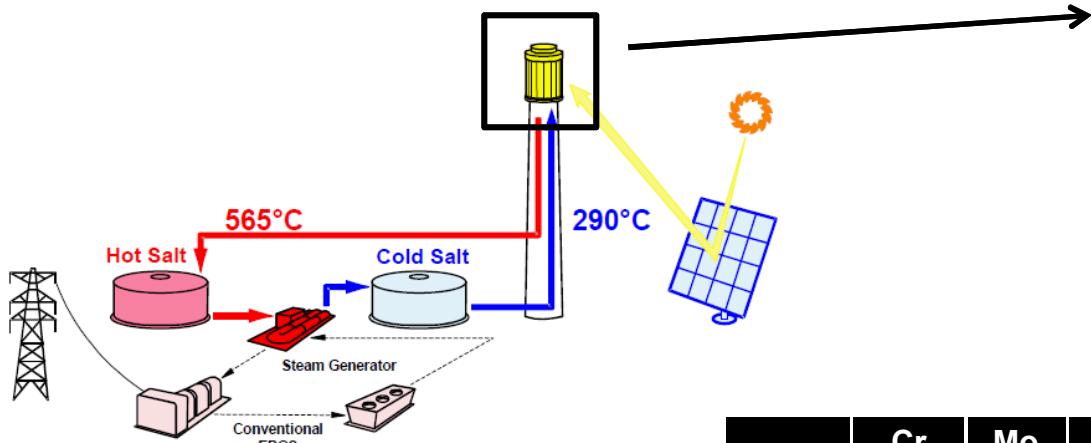


Operating Limits of Nitrate Salts

KNO₃-NaNO₃

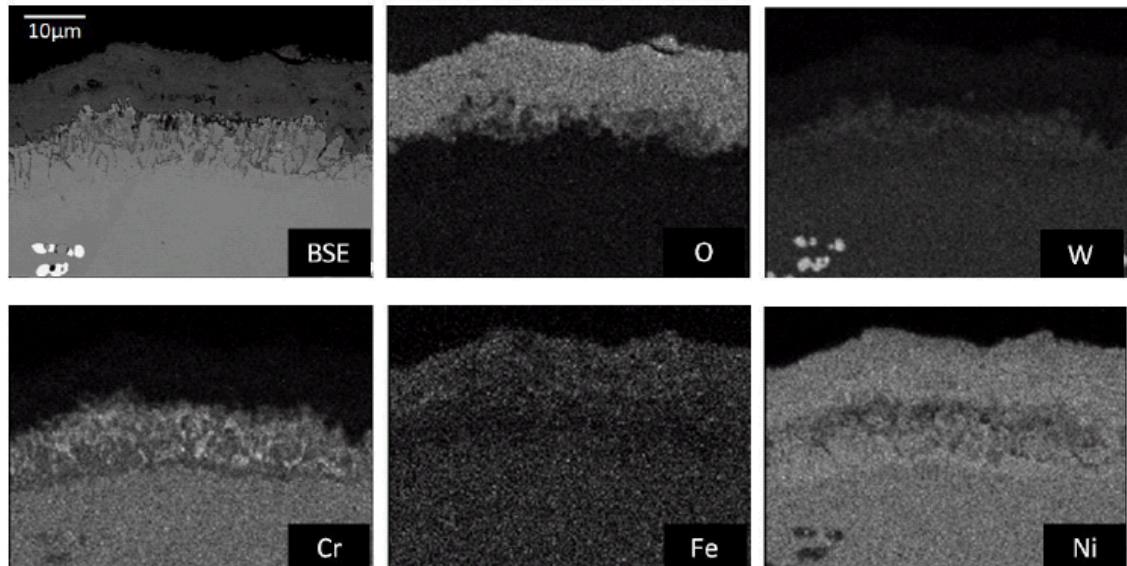
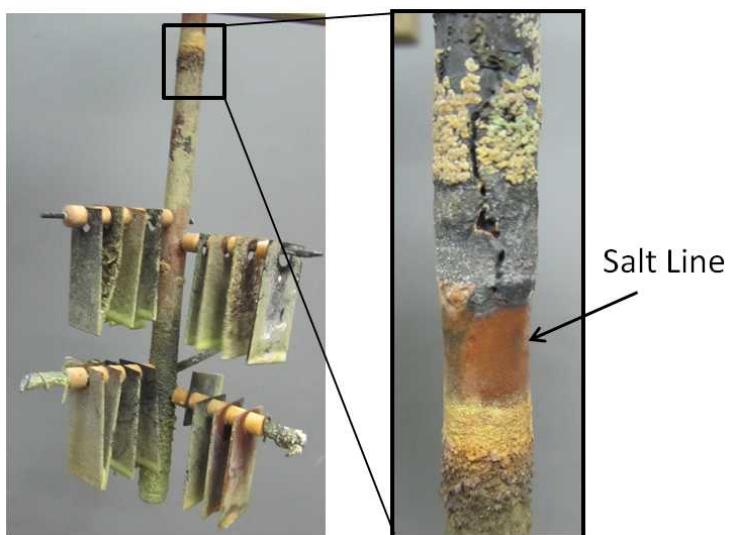


Materials Implications



	Cr	Mo	Ni	Mn	Si	Fe	Co	W	Al	Cu
HA230	22.37	1.27	59.41	0.49	0.42	1.32	0.19	14.16	0.32	0.05

HA230 (10), 2995 hours, 2000x



Large Impact in many areas...

- (insert Official Sandia 'Impact' video here) too big for insertion

How to get plugged in?

1. Speak to us after the presentation
2. Create an account, and identify job opportunities @ sandia.gov/careers
3. Apply
4. Interview (Sandia will be here in February)
5. If not graduating, focus on internships
6. If graduating, focus on fellowships, postdocs, and full-time

Questions?



Internships

Features

- 16+ to PhD
- Variety of majors
- Technical institute programs (8)
 - Perform leading-edge research
 - Guidance of a Sandia research mentor
 - State-of-the-art equipment and facilities
- Tours, workshops, seminars

Requirements

- U.S. citizenship
- Full-time enrollment status
- GPA: 3.5 grad, 3.2 undergrad
- Some projects may require DOE security clearance



Fellowships & Postdocs

Features

- Ph.D.-level candidates
- Harry S. Truman
 - Salary: 110K
- Alexander Hollander Distinguished
 - Focus on life, biomedical, and environmental sciences
- John Von Neumann Postdoctoral
 - One-year
 - Applied/computational mathematics

Requirements

- U.S. citizenship
- GPA: 3.7 grad, 3.5 undergrad
- Obtain DOE security clearance
- Research in areas of interest to national security



Full-time

- US citizenship (but check posting)
- 13 majors listed on website
- Work-life balance
- Diversity programs, community outreach, 401(k) matching, patent royalties, wellness programs



Wounded Warrior Career Development Program



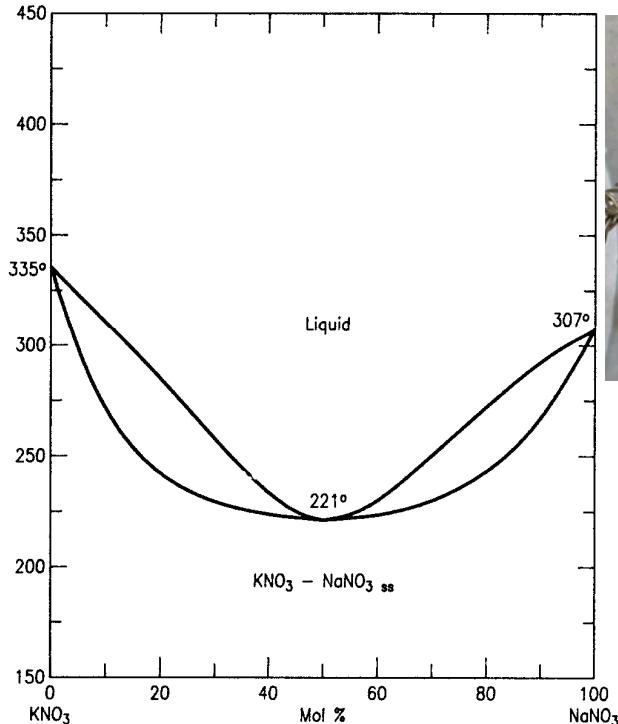
- A unique limited-term career development employment opportunity that enables veterans to acquire career-based skills at Sandia through training, mentoring and real-world work experience while supporting mission success.



- Actively pursue an appropriate college degree
- Continue to develop and refine job related skills through training
- Share experiences to improve understanding of combat theater and enhance connections with Sandia work

Nitrate Salts

KNO₃-NaNO₃



Liquid Nitrate Salt

