

NDIA's 52nd Annual Fuze Conference

US NAVY OVERVIEW



**John Hendershot for
Dr. Robert Gates**

Energetics IPT Lead and NSWC IHDIV TD



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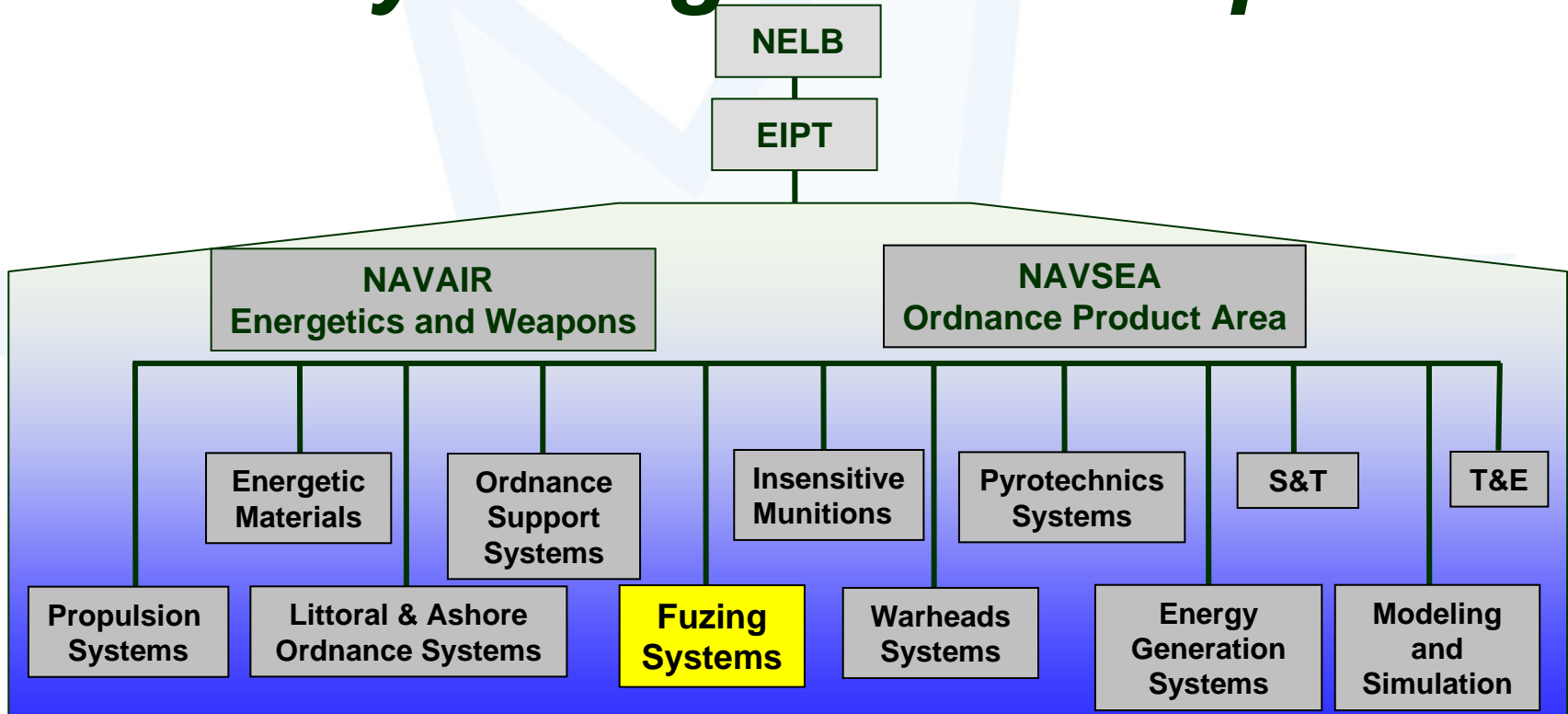


OUTLINE

- **Naval Energetics Enterprise Overview**
- **Fuze Safety Review Process & Panel**
- **In Service / Production Support**
- **R&D Programs**
- **Science & Technology Programs**
- **Summary**



Navy Energetics Enterprise

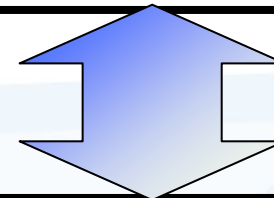
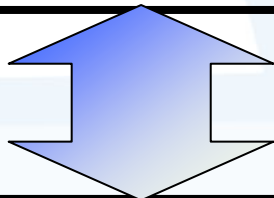


- Collaboration to provide best technical solutions for Warfighter needs
- Achieve long-term cost avoidance resulting from shared people and facilities

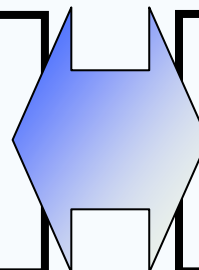


Navy Fuze Safety Review Process

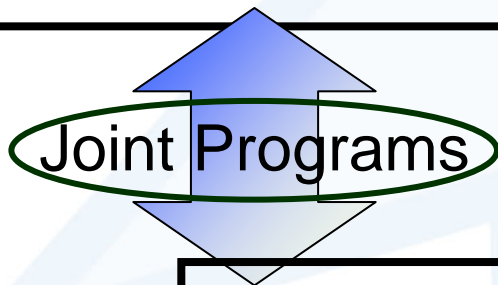
Weapon System Explosives Safety Review Board – WSESRB



Fuze Initiator System
Technical Review Panel
FISTRP



Software System Safety
Technical Review Panel
SSSTRP



Army Fuze Safety Review Board

AF Non Nuclear Weapons Safety
Board



Fuze Initiator System Technical Review Panel

FISTRP

Panel Chair – Jack Waller

Panel Members –

Raymond Ash

Randy Cope

John Hendershot

John Kandell

Scott Pomeroy

Melissa Milani

Ralph Balestieri

Micheal Demmick

John Hughes

David Libbon

Gabriel Soto

Tinya Coles-Cieply

Bradley Hanna

George Hennings

Eugene Marquis

Brian Will

Current Topics of Interest/Challenge

Non-Reconfigurable Logic

Higher Level Design Languages

500 Volt Electrical Insensitivity

Remote Firesets

Voltage Multipliers



In Service / Production Support





TOMAHAWK FUZE

- Provide production support for the FMU-148A/B Warhead Fuze
 - Used in Tomahawk Block III and Block IV Missiles
- Conduct Lot Acceptance Testing
 - Maintain independence for safety critical component
- Conduct Quality Evaluation
 - Ensure continued safe and reliable use in Fleet



R&D Programs



ANTI-SWIMMER GRENADE (ASG)



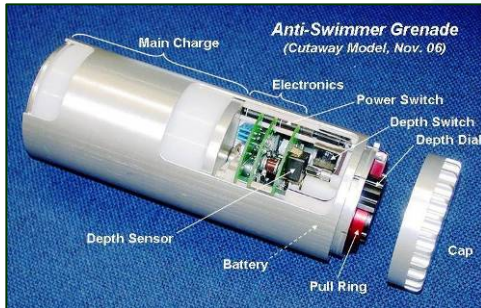
Designed to protect assets from attack by SCUBA swimmers

Safety

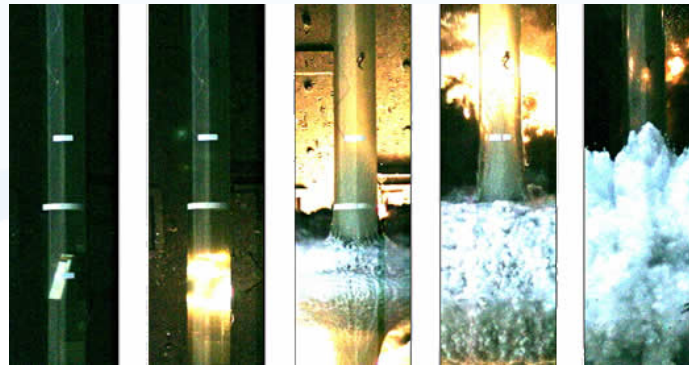
- ASG will detonate only underwater beneath a predefined safety depth
- Will harmlessly render itself safe if it is activated but fails to see the correct arming environments

Features

- Electronic In-Line Safe-Arm Device (no primary explosives)
- Hand-Emplaced Ordnance design meets MIL-STD-1911
- User-selectable function depth (10-ft to 100-ft in 10-ft increments)
- 1.5-lb Main Charge



ASG Prototype



Detonation at 10' Depth in Water Tube (June 07)

- Critical Asset Defense
- Force Protection
- Port Security



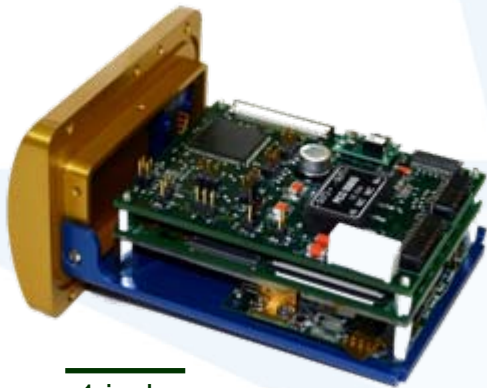
Deep Water Testing to 50' (Dec 07)

Status

- ASG successfully tested at various depths (3 shots in 10' Water Tube at NAWCWD China Lake; 5 shots from 20' to 50' at NSWC Crane's Lake Glendora)
- ASG now at Technical Readiness Level 6
- Project on hold indefinitely until more funding is provided



Anti-Torpedo Torpedo (ATT) Fuze/S&A



1 inch

- ATT is 6.75" Diameter Torpedo for hard-kill defense against threat torpedoes
- ATT is first variant of Navy Common Very Light Weight Torpedo (CVLWT)



S&A Attributes:

- Use of MEMS technology to reduced S&A size
 - Allows for a larger warhead to enhance lethality
- S&A design flexibility for upgrades to accommodate mission, platform and weapon changes
- Safety Approach: MEMS and electronic safety features combined with Navy qualified high voltage initiators



Science and Technology Programs

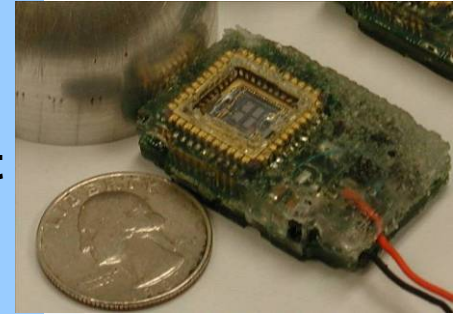


Miniature Munitions and Low Cost Applications

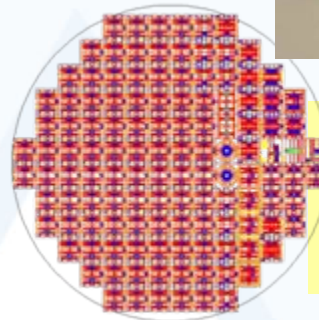
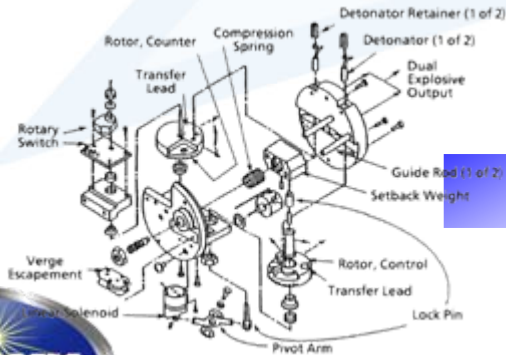
- **Developing low-cost solutions for miniature applications**
 - Utilizing COTS components
- **Component Evaluation**
 - High-Voltage Ceramic Capacitors
 - Size, Cost, Energy Output, Temp and Voltage Coefficients and durability
 - Transformers
 - Charge time w/ available input power
 - Fast charge time applications
 - Low power applications
 - Size and Cost
 - High-Voltage Switches
 - Planar, MCT, Gas Breakdown Tubes, and Sprytron
 - Size, Cost and Efficiency
- **Full-custom ASIC design**



- Capitalizes on commercially available IC large scale batch fabrication techniques
- In-Situ (formed in place) micro detonator technology ... no energetic waste material ... no processing equipment exposed to energetics
- Reduces fuze cost and size
- Successfully demonstrated in 40,000 G setback environment



MEMS in-situ detonator based S&A device technology currently TRL 5



From tens of mechanical parts per fuze to 100's of fuze chips per single wafer

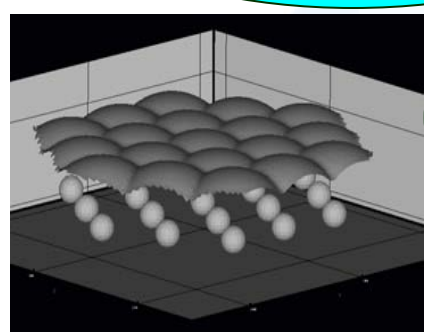
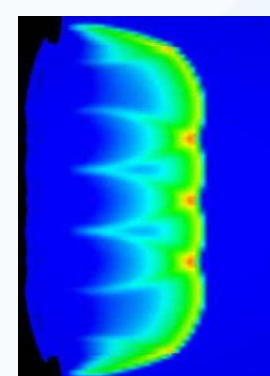
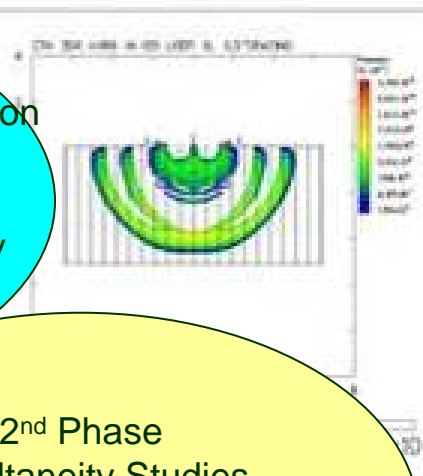
Extremely Insensitive Detonating Substance (EIDS) Initiation System



- An Initiation System that emulates large diameter boosters for use in initiating EIDS materials
- OSD funded through Joint Insensitive Munition Technology Program
- Joint Navy (NEE) led effort with Air Force, Army, & Los Alamos participation
- Improved IM performance through elimination of large, relatively sensitive booster
- System requires simultaneous initiation of multiple detonation points

1st Phase (Current Phase)

Modeling to develop theoretical configuration
Development of fireset electronics
Initiation System Configuration
Initiation Growth & Corner Turning Study
EFI PIC Development
Feasibility Study



2nd Phase

Simultaneity Studies
Detonation Merging & Wave Shaping
Initiation Growth Modeling & Testing
Fireset & Initiation System Optimization

3rd Phase

Large Scale EIDS Material Testing
Large Scale Critical Diameter Testing
MIL-STD-2105 Testing (Limited)



Summary

Today's Navy

- **NEE - Leveraging the abilities of multiple installations**
- **FISTRP / FESWG / Joint Reviews - Safety conscious**
- **Cradle to grave support of the warfighter**

- **Advanced Development**
- **Science and Technology**
- **Research & Development**
- **In-Service Support & Quality Assurance**

