NDIA

MSIAC
Munitions Safety Information Analysis Center

2018 IM & EM TECHNOLOGY SYMPOSIUM

INNOVATIVE INSENSITIVE MUNITION SOLUTIONS FOR ENHANCED WARFIGHTER EFFECTIVENESS

April 23 – 26, 2018

Doubletree by Hilton Portland

Portland, OR

NDIA.org/IMEM2018

WELCOME TO THE IM & EM TECHNOLOGY SYMPOSIUM

On behalf of the Insensitive Munitions and Energetic Materials Committee and our MSIAC partner, I would like to welcome you to the 2018 Insensitive Munitions and Energetic Materials Technology Symposium. This international gathering of the top chemists, system designers and engineers from government laboratories, private industry and academia will provide a venue for exchange and dissemination of the latest research in synthesis, formulation, system design, testing, characterization and safety – all aimed at advancing munitions effectiveness WHILE improving safety for the warfighter. In recent decades great advances have been made and our munitions are less vulnerable to attack than ever before; however, challenges remain. It is through the continuing work of the authors, presenters, sponsors and attendees at this conference and across our worldwide defense industry that these challenges will be overcome resulting in safer munitions being produced in our factories and fielded to our warfighters.

Melissa Hobbs-Hendrickson
Director Business Development
Orbital ATK

SCHEDULE AT A GLANCE

MONDAY, APRIL 23

Registration and Welcome Reception
First Level Foyer and
Broadway | Weidler | Halsey Ballroom
4:00 pm - 5:30 pm

TUESDAY, APRIL 24

Registration and Breakfast
First Level Foyer and
Broadway | Weidler | Halsey Ballroom
7:00 am

General Session
Lloyd Center Ballroom
8:00 am

Concurrent Presentations
Multnomah & Holladay Ballrooms
10:55 am

Lunch
Cascade Ballroom
12:15 pm

Concurrent Presentations
Multnomah and Holladay Ballrooms
1:45 pm

Symposium Reception
Cascades Ballroom
5:30 pm - 7:00 pm

WEDNESDAY, APRIL 25

Registration and Breakfast
First Level Foyer and
Broadway | Weidler | Halsey Ballroom
7:00 am

Concurrent Presentations
Multnomah & Holladay Ballrooms
8:00 am

Symposium Adjourns for the Day
11:20 am

THURSDAY, APRIL 26

Registration and Breakfast
First Level Foyer and
Broadway | Weidler | Halsey Ballroom
7:00 am

Concurrent Presentations
Multnomah & Holladay Ballrooms
8:00 am

Lunch
Cascades Ballroom
11:40 am

Concurrent Presentations
Multnomah & Holladay Ballrooms
1:00 pm

Spanish Wine Celebration and Awards
Broadway | Weidler | Halsey Ballroom
4:20 pm

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WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. For more information, visit **NDIA.org**

MUNITIONS TECHNOLOGY

MISSION

Works to maintain an open exchange of technical information among government and industry programs and technical managers, and to identify changes and trends in policy, guidance and organizational functions that affect the development, production, maintenance and demilitarization of munitions.

LEADERSHIP AND COMMITTEES

Tim Bagniefski
Division Chair
tbagniefski@gd-ots.com

Roy Streetz
Chair
Fuze

Melissa Hobbs-Hendrikson
Chair
Insensitive Munitions and Energetic Materials

EVENT INFORMATION

EVENT WEBSITE

NDIA.org/IMEM2018

EVENT CONTACT

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PLANNING COMMITTEE

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Matthew Beyard

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Mike Ervin

Ken Graham

Kathryn Hunt

David Hunter

Steve Nicolich

Michael Sharp

Stephen Struck

Tom Swierk

Andrew Wilson

WI-FI

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ATTENDEE ROSTER, PROCEEDINGS & SYMPOSIUM SURVEY

NDIA will be emailing all participants the symposium attendee roster, the link for symposium proceedings (those which have been approved) and the symposium survey information within three week of the conclusion of the symposium.

SPEAKER GIFTS

In lieu of speaker gifts, a donation is being made to the Fisher House Foundation.

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AGENDA

MONDAY, APRIL 23

4:00 pm **CONFERENCE REGISTRATION AND WELCOME RECEPTION**
FIRST LEVEL FOYER AND BROADWAY | WEIDLER | HALSEY BALLROOM

5:30 pm **ADJOURNMENT**

TUESDAY, APRIL 24

7:00 am **CONFERENCE REGISTRATION AND BREAKFAST**
FIRST LEVEL FOYER AND Broadway | Weidler | Halsey Ballroom

SESSION 1 PLENARY

Melissa Hobbs-Hendrickson
Orbital ATK
Session Chair

8:00 am **WELCOME**
LLOYD CENTER BALLROOM

CAPT Frank Michael, USN (Ret)
National Defense Industrial Association

Melissa Hobbs-Hendrickson
Orbital ATK

8:10 am **KEYNOTE ADDRESS**

Dr. Christine Michienzi
OUSD (AT&L) Manufacturing and Industrial Base Policy

8:40 am **20188 IM PLANS AND JIMTP FUTURE IN THE UNITED STATES**

Anthony Di Stasio
OUSD (AT&L)/TWS/LWM

9:00 am **20156 NATO WORKING GROUP ON INSENSITIVE MUNITIONS AND HAZARD CLASSIFICATION REQUIREMENTS, ASSESSMENT AND HAZARD FREQUENCY**

Philip Cheese
Defence Equipment and Support

9:20 am **20249 U.S. NAVY INSENSITIVE MUNITIONS HANDBOOK**

Dr. Jerry Ward
Booz Allen Hamilton

9:40 am **20149 MSIAC – HIGHLIGHTS AND FUTURE PRIORITIES**

Dr. Michael Sharp
NATO Munitions Safety Information Analysis Center

10:00 am **MUNITIONS SAFETY AWARDS**

Dr. Michael Sharp
NATO Munitions Safety Information Analysis Center

10:10 am **NETWORKING BREAK**

BROADWAY | WEIDLER | HALSEY BALLROOM

CONCURRENT BREAKOUT SESSIONS

SESSION 2A IM REQUIREMENTS & ASSESSMENTS

MULTNOMAH

Wade Babcock
NATO Munitions Safety Information Analysis Center
Session Chair

SESSION 2B ENERGETIC MATERIALS

HOLLADAY

Mike Ervin
BAE Systems
Session Chair

10:55 am **20265 Historical Review of Fragment Impact Standardization**

Kathryn Hunt
MARCORSYSCOM

20119 GrIMEx (Green IM Explosive): Development of Novel IM Comp B Replacements Based on Green TNT and RDX Replacements

Dr. David Price, Jr
BAE Systems.

11:15 am **20112 Review and Update of STANAG 4496 Fragment Impact, Munitions Test Procedure**

Christophe Jacq
DGA Missiles Testing

20059 A New IMI Systems Less Sensitive Brisant Explosive Composition

Dr. Gila Strul-Yudkiewicz
IMI Systems

11:35 am

20063 US Navy Insensitive Munitions (IM) Munitions Reaction Evaluation Board (MREB)

Ken Tomasello
Naval Ordnance Safety and Security Activity

20127 CRASH-P and X-ray Laboratory Scale Slow Cook-off Tests to Quantify the Reaction Violence of High Performance Rocket Propellants

Dr. Jonathan Essel
NAWCWD China Lake

11:55 am

20137 MSIAC Workshop 2018: Improved Explosives and Munitions Risk Management

Dr. Michael Sharp
NATO Munitions Safety Information Analysis Center

20164 New Polycarbonate-Based Thermoplastic Polyurethane Binder for HMX Based Explosives

Emily Robertson
Lawrence Livermore National Laboratory

12:15 pm

LUNCH

CASCADE BALLROOM

SESSION 3A LARGE SCALE TESTING 1

MULTNOMAH

Michael Sharp
NATO Munitions Safety Information Analysis Center
Session Chair

SESSION 3B FORMULATIONS

HOLLADAY

Paul Braithwaite
Orbital ATK
Session Chair

1:45 pm

20082 Gun Launch and Setback Actuators

Dr. Ernest Baker
NATO MSIAC

20077 Evaluation of Composition B Using Nano-Energetics

Philip Samuels
ARDEC

2:05 pm

20183 Fragment Impact Testing of the XM25

Nausheen Al-Shehab
US Army

20261 The DOTC Enterprise – Helping You Accelerate Technologies to the Field

James Wilson
DOTC Program Office - Picatinny NJ

2:25 pm

20057 Novel Slow Cook-off Test Method to Replicate Worst Case for Munitions Containing Internal Fuel

Ben Blazek
NAVAIR

20111 Effect of Microstructure Control on the Reaction Characteristics In Al/Ni Reactive Powder

Dr. Sang-Hyun Jung
Agency for Defense Development (South Korea)

2:45 pm **20118 Advancing the Propane Fast Cookoff Burner and Testing**

Dr. Ephraim Washburn
Naval Air Warfare Center Weapons Division

20074 Characterization of MTNP (1-Methyl-3,4,5-Trinitro-1,2-Pyrazole)

Philip Samuels
ARDEC

3:05 pm **20260 Comparative Fire Response of Simulated Rocket Motors in Steel and Carbon Fiber Composite Missile Launching Canisters**

Dr. Jon Yagla
Bowhead Technical Services

20069 Influence of Concentration, Type and Particle Size of Fillers on the Dynamic Mechanical Behaviour of Elastomeric HTPB Binder

Manfred Bohn
Fraunhofer ICT

3:25 pm **NETWORKING BREAK**
BROADWAY | WEIDLER | HALSEY BALLROOM

SESSION 4A THERMAL HAZARD TESTING

MULTNOMAH

Tom Swierk
Hart Technologies, Inc.
Session Chair

SESSION 4B EM PROCESSING I

HOLLADAY

Ron Hollands
BAE Systems
Session Chair

3:45 pm **20080 Slow Heating Testing Survey and Historical Events Review**

Dr. Ernest Baker
NATO MSIAC

20145 Property-Processing Implications in Additive Manufactured Materials for Munitions

Wade Babcock
NATO Munitions Safety Information Analysis Center

4:05 pm **20126 An Investigation into a Proper Heating Rate for Slow Cook-Off Testing**

Dr. David Hubble
NSWC Dahlgren Division

20174 Robust Enhanced Blast Explosive Manufacturing at Holston Army Ammunition Plant

Virgil Fung
BAE Systems

4:25 pm **20267 Insensitive Munitions Industry Contribution for New Stanag - AOP Editionof the Slow Heating Test**

Yves Guengant
ARIANEGROUP SAS

20155 New NTO Workshop and Associated Product Characterizations

Arthur Delage
EURENCO

4:45 pm **20279 Scaling of Fast Cook Off Fires**

Dr. Jon Yagla
Bowhead Technical Services

20179 Characterization of LX-14 FEM / PBXN-9 FEM High Energy Explosives

Brian Alexander
BAE Systems Inc, Ordnance Systems

5:05 pm **20258 Cost of Propane Fast Cook-Off Testing**

Dr. Ephraim Washburn
Naval Air Warfare Center Weapons Division

20157 Development of a CONUS Manufacturing Capability for FOX-7

Dr. Bradley Sleadd
NSWC IHEODTD

5:30 pm **GRAND RECEPTION**
CASCADE BALLROOM

7:00 pm **ADJOURNMENT**

WEDNESDAY, APRIL 25

7:00 am **CONFERENCE REGISTRATION AND BREAKFAST**
FIRST LEVEL FOYER AND BROADWAY | WEIDLER | HALSEY BALLROOM

CONCURRENT BREAKOUT SESSIONS

SESSION 5A LARGE SCALE TESTING II
MULTNOMAH

Ken Graham
Aerojet Rocketdyne
Session Chair

SESSION 5B ENERGETIC MATERIALS II
HOLLADAY

Steve Nicolich
U.S. Army
Session Chair

8:00 am **20275 Passing Sympathetic Reaction Responses in 500 and 1,000-lb General Purpose Bombs with AFX-770**

Dr. Christopher Crouse
Air Force Research Laboratory

20172 MDNT: IM Melt-Phase Energetic Binder

Omar Abbassi
US ARMY ARDEC

8:20 am **20268 An Explosive Fragment Projector for IM Testing**

Tal Eliash
Rafael

20171 Melt-Pour Explosive Formulation Development Featuring TNBA

Virgil Fung
BAE Systems

8:40 am

20122 Outgassing Pad for Cook-Off Mitigation in Warheads

Josiah Garfield
NAWCWD-China Lake

20166 Particle Size and Surface Area Effects on the Initiation of Diaminoazoxyfurazan (DAAF)

Elizabeth Francois
Los Alamos National Laboratory

9:00 am

20083 Insensitive Munitions Explosive Ordnance Disposal Challenges

Dr. Ernest Baker
NATO MSIAC

20289 Manufacturing of PAX-3 High Explosive

Sean Swaszek
ARDEC

9:20 am

20273 Explosive Ordnance Disposal (EOD) of Insensitive Munitions: Challenges and Solutions

Patrick Brousseau
DRDC - Valcartier RC

20153 Qualification Of Malleable Plastic Explosive Hexomax and its Application in a Flexible Linear Shaped Charge System

Christelle Songy
EURENCO

9:40 am

NETWORKING BREAK

BROADWAY | WEIDLER | HALSEY BALLROOM

SESSION 6A MITIGATION & TESTING

MULTNOMAH

Patrick Brousseau
DRDC - Valcartier RC
Session Chair

SESSION 6B SYNTHESIS

HOLLADAY

Matthew Andrews
NATO Munitions Safety Information Analysis Center
Session Chair

10:00 am

20141 Mitigation Technologies for Propulsion Applications

Christelle Collet
MSIAC

20123 Modernization and Capabilities of the Lawrence Livermore National Laboratory Pilot Facility for Remotely Controlled Energetic Materials Synthesis

Dr. Nathaniel Zuckerman
Lawrence Livermore National Laboratory

10:20 am

20154 Sheet-metal Ammunition Packing Tray for Mitigation of Secondary Cook-off of Medium-caliber Ammunition

Greg Little
Naval Surface Warfare Center, Dahlgren Division

20180 Synthesis, Formulation, and Testing of 3,4-DNP

Dr. Jacob Morris
BAE Systems

10:40 am **20159 Development and Successsful Demonstration of a Lightweight, Particle Impact Mitigation Sleeve (PIMS) With Specified Hardness and Perforation Features**

Daniel Pudlak
ARDEC

20271 Microfluidic Synthesis of Energetic Materials

Dr. Joe Scavuzzo
Orbital ATK

11:00 am **20147 Stopping KM/S Blunt Fragments and Limiting Shock Lensing with a New Advanced Energy Absorbing Composite**

Dr. Gareth Tear
Synbiosys Ltd

20228 Synthesis Development of Novel Energetic Ingredients

Dr. Sarah Headrick
BAE Systems

11:20 am **ADJOURNMENT**

THURSDAY, APRIL 26

7:00 am **CONFERENCE REGISTRATION AND BREAKFAST**
FIRST LEVEL FOYER AND BROADWAY | WEIDLER | HALSEY BALLROOM

CONCURRENT BREAKOUT SESSIONS

SESSION 7A SYSTEMS I
MULTNOMAH

Steve Struck
Energetic Materials Branch, Munitions Directorate
Session Chair

SESSION 7B HE CHARACTERISTICS
HOLLADAY

Melissa Mileham
Orbital ATK
Session Chair

8:00 am **20182 Additive Manufacturing for Net Shape Munitions**

Dr. Bhanu Chelluri
BAE Systems- Dayton

20081 Gap Test Calculations and Correlations

Dr. Ernest Baker
NATO MSIAC

8:20 am **20140 Reaction Mechanisms for Rocket Motors**

Christelle Collet
MSIAC

20276 PBXN-5 Mechanical Characterization and Proposed Constitutive Model

Dr. Daniel Peairs
L-3 Fuzing and Ordnance Systems

Dr. Ericka Amborn
ARA

8:40 am

20132 Loading Density and Vent Area Ratio Effects on the Structural Response of Reinforced Concrete Structures Storing HD 1.3 Gun Propellant

Cynthia Romo
Naval Air Warfare Center Weapons Division

20113 Investigation of the Hugh James Criteria using Estimated Parameters

Dr. Justin Sweitzer
Practical Energetics Research, Inc

9:00 am

20114 Life Cycle Demilitarization Considerations for IM Development

Gary Mescavage
PD Demil

20290 Electronic Properties and Hirshfeld Surface Analysis of Insensitive High Energy Density Material Dihydroxylammonium 5,5'-bistetrazole-1,1'-diolate under Compression

Bokinala Abraham
Advances Centre of Research in High Energy Materials

9:20 am

20274 New Generation Influence Mine Classified as 1.6N

Björn Granqvist
OY FORCIT AB

OPEN

9:40 am

NETWORKING BREAK

BROADWAY | WEIDLER | HALSEY BALLROOM

SESSION 8A SUB-SCALE TESTING I

MULTNOMAH

Brian Fuchs
Company
Session Chair

SESSION 8B PROPELLANTS

HOLLADAY

Jessica Vaughn
Company
Session Chair

10:00 am

20139 Correlation of Response for Munitions Containing RDX/TNT: Bullet Impact and EMTAP Tube Testing Results

Phil Cheese
UK Ministry of Defence

20135 The Unknown Detonation Transition (XDT) Mechanisms Associated with Damaged Rocket Propellant Impacting a Surface: Understanding and Applications to IM

Dr. Mark Pfeil
US Army AMRDEC

10:20 am

20262 Radiant Chamber for Fast Cook of Testing and Simulation

Dr. Jon Yagla
Bowhead Technical Services

20115 Innovative Nitrogen-doped Boron Propellants

Dr. Thelma Manning
US ARMY RDECOM ARDEC

10:40 am **20117 Analysis of Temperature Profiles of Chemical Reaction upon Impact of Reactive Materials**

Ki-bong Lee
Agency for Defense Development(South Korea)

20264 Insensitive Minimum Smoke Propellants

Dr. Thomas Deschner
Nammo Raufoss AS

11:00 am **20121 Validating Experiments for Vulnerability Calculations of Munitions and Lessons Learned**

Gert Scholtes
TNO Defence, Safety & Security

20152 Increased Impulse of Solventless Extruded Double Base Rocket Propellant by Addition of High Explosives RDX And FOX-7.

Erik Tunestål
Eurenco Bofors

11:20 am **20241 Effect of Insensitive HE on Shaped Charge Jets**

Werner Arnold
MBDA - TDW

20134 Initial Steps Towards Large Scale Production of UK Lova Thermoplastic Elastomer (TPE) Propellants

Mr. Owain Sowden
BAE SYSTEMS Land (UK)

11:40 am **LUNCH**
CASCADE BALLROOM

SESSION 9A MODELING & ANALYSIS

MULTNOMAH

Gert Scholtes
TNO Defence, Safety & Security
Session Chair

SESSION 9B SUB-SCALE TESTING II

HOLLADAY

Genevieve Eck
EURENCO
Session Chair

1:00 pm **20259 Fast Cook-Off Modeling and Simulation**

Dr. Jon Yagla
Bowhead Technical Services

20282 Insensitive Munitions (IM) Gun Propellant Optimization Efforts for Medium Caliber Application

Dr. Melissa Liberatore-Moretti
Picatinny Arsenal

1:20 pm **20269 Thermal Modeling of Fast Cook-Offs**

Dr. Markus Graswald
TDW GmbH

20131 Critical Diameter and Gap Tests for Hazard Classification of Solid Propellants and Motors

Cynthia Romo
Naval Air Warfare Center Weapons Division

1:40 pm

20266 An Approach to Predict the Cook-off Response of Confined and Vented Full Scale Munitions Based on Small Scale Tests

Dr. N. Albert Moussa
BlazeTech Corp

20133 Small Scale Assessment of LOVA Thermoplastic Elastomer (TPE) Propellants for Large Calibre Gun Systems

Mr. Owain Sowden
BAE SYSTEMS Land (UK)

2:00 pm

30000 International Sympathetic Reaction Testing Survey

Dr. Ernest Baker
NATO MSIAC

20146 Age-Related Mechanical Damage and Ageing of Munition Materials

Wade Babcock
NATO Munitions Safety Information Analysis Center

2:20 pm

20161 Filling the Gap between the Initiation Behavior of Shaped Charge Jets and Fragments

Werner Arnold
MBDA - TDW

20136 Subscale Testing to Predict Full-Scale Response to Fragment Impact in Solid Propellants

Dr. Jamie Neidert
AMRDEC

2:40 pm

NETWORKING BREAK

BROADWAY | WEIDLER | HALSEY BALLROOM

SESSION 10A SYSTEMS II

MULTNOMAH

Jamie Neidert
AMRDEC
Session Chair

SESSION 10B EM QUALIFICATION & SUSTAINABILITY

HOLLADAY

Andrew Wilson
Exploinsights
Session Chair

3:00 pm

20150 Heavyweight Torpedo Warhead – IM Assessment

Luc Chaffois
EURENCO

20138 Qualification and Energetic Materials Challenges

Dr. Matthew Andrews
NATO MSIAC

3:20 pm

20181 Improving Knowledge of Tactical Rocket Motor Response under Insensitive Munition Threats: BI, FI and FH Tests Results of the Research Program

Laurent Bonhomme
ROXEL

20163 Impacts of REACh, ITAR and Other Regulations on Energetic Materials Sustainability

Geneviève Eck
EURENCO

3:40 pm **20245 IM Characteristics of Large Diameter Extruded Double Base Rocket Motors with Composite Cases**

Joseph Bellotte
BAE Systems Inc. OSI

20233 Qualification of Explosives Formulations Manufacturers and Ingredient Manufacturers for US Navy Use

Michael Kenyon
NSWC IHEODTD

4:00 pm **20263 IM Technology for Stryker Tank Munitions**

Adriana Eng
US Army ARDEC

20151 Influence of Ageing on the Properties of IHE

Hendrik Radies
Rheinmetall Weapon & Munition

4:20 pm **SPANISH WINE CELEBRATION AND AWARDS**
BROADWAY | WEIDLER | HALSEY BALLROOM

4:45 pm **SYMPOSIUM CONCLUDES**

The NDIA has a policy of strict compliance with federal and state antitrust laws. The antitrust laws prohibit competitors from engaging in actions that could result in an unreasonable restraint of trade. Consequently, NDIA members must avoid discussing certain topics when they are together at formal association membership, board, committee, and other meetings and in informal contacts with other industry members: prices, fees, rates, profit margins, or other terms or conditions of sale (including allowances, credit terms, and warranties); allocation of markets or customers or division of territories; or refusals to deal with or boycotts of suppliers, customers or other third parties, or topics that may lead participants not to deal with a particular supplier, customer or third party.

VOTE NOW

PEOPLE'S CHOICE AWARD

Vote for your favorite presentation by going to **surveymonkey.com/r/9553S8P** or by using the QR Code.

The People's Choice Award will be presented at the Spanish Wine Celebration and Awards at the end of the Symposium on Thursday, April 26th!

ABSTRACT PRESENTATIONS

ABSTRACT #	TITLE	AUTHOR	SESSION
20057	Novel Slow Cook-off Test Method to Replicate Worst Case for Munitions Containing Internal Fuel	Blazek	3A
20059	A New IMI Systems Less Sensitive Brisant Explosive Composition	Strul-Yudkiewicz	2B
20063	US Navy Insensitive Munitions (IM) Munitions Reaction Evaluation Board (MREB)	Tomasello	2A
20069	Influence of concentration, type and particle size of fillers on the dynamic mechanical behaviour of elastomeric HTPB binder	Bohn	3B
20074	Characterization of MTNP (1-methyl-3,4,5-trinitro-1,2-pyrazole)	Samuels	3B
20077	Evaluation of Composition B using Nano-Energetics	Samuels	3B
20080	Slow Heating Testing Survey and Historical Events Review	Baker	4A
20081	Gap Test Calculations and Correlations	Baker	7B
20082	Gun Launch and Setback Actuators	Baker	3A
20083	Insensitive Munitions Explosive Ordnance Disposal Challenges	Baker	5A
20111	Effect of microstructure control on the reaction characteristics in Al/Ni reactive powder	Jung	3B
20112	Review and Update of STANAG 4496 Fragment Impact, Munitions Test Procedure	Jacq	2A
20113	Investigation of the Hugh James Criteria using Estimated Parameters	Sweitzer	7B
20114	Life Cycle Demilitarization Considerations for IM Development	Mescavage	7A
20115	Innovative Nitrogen-doped Boron Propellants	Manning	8B
20117	Analysis of Temperature Profiles of Chemical Reaction upon Impact of Reactive Materials	Lee	8A
20118	Advancing the Propane Fast Cookoff Burner and Testing	Washburn	3A
20119	GrIMEx (Green IM Explosive): Development of Novel IM Comp B Replacements Based on Green TNT and RDX Replacements	Price	2B
20121	Validating experiments for vulnerability calculations of munitions and lessons learned	Scholtes	8A
20122	Outgassing Pad for Cook-Off Mitigation in Warheads	Garfield	5A
20123	Modernization and Capabilities of the Lawrence Livermore National Laboratory Pilot Facility for Remotely Controlled Energetic Materials Synthesis	Zuckerman	6B
20126	An Investigation into a Proper Heating Rate for Slow Cook-off Testing	Hubble	4A
20127	CRASH-P and X-ray Laboratory Scale Slow Cook-off Tests to Quantify the Reaction Violence of High Performance Rocket Propellants	Essel	2B
20131	Critical Diameter and Gap Tests for Hazard Classification of Solid Propellants and Motors	Romo	9B
20132	Loading Density and Vent Area Ratio Effects on the Structural Response of Reinforced Concrete Structures Storing HD 1.3 Gun Propellant	Romo	7A
20133	Small scale assessment of LOVA Thermoplastic elastomer (TPE) propellants for Large Calibre Gun Systems	Sowden	9B

ABSTRACT #	TITLE	AUTHOR	SESSION
20134	Initial steps towards large scale production of UK LOVA Thermoplastic Elastomer (TPE) propellants	Sowden	8B
20135	The Unknown Detonation Transition (XDT) Mechanisms Associated with Damaged Rocket Propellant Impacting a Surface: Understanding and Applications to IM	Pfeil	8B
20136	Subscale Testing to Predict Full-Scale Response to Fragment Impact in Solid Propellants	Neidert	9B
20137	MSIAC workshop 2018: Improved Explosives and Munitions Risk Management	Sharp	2A
20138	Qualification and Energetic Materials Challenges	Andrews	10B
20139	Correlation of Response for Munitions Containing RDX/TNT: Bullet Impact and EMTAP Tube Testing Results	Cheese	8A
20140	Reaction Mechanisms for Rocket Motors	Collet	7A
20141	Mitigation Technologies for Propulsion Applications	Collet	6A
20145	Property-processing implications in additive manufactured materials for munitions	Babcock	4B
20146	Age-related mechanical damage and ageing of munition materials	Babcock	9B
20147	Stopping km/s blunt fragments and limiting shock lensing with a new advanced energy absorbing composite	Tear	6A
20149	MSIAC – Highlights and Future Priorities	Sharp	1
20150	Heavyweight Torpedo warhead – IM assessment	Chaffois	10A
20151	Influence of ageing on the properties of IHE	Radies	10B
20152	Increased impulse of solventless extruded double base rocket propellant by addition of high explosives RDX and FOX-7.	Tunestål	8B
20153	Qualification of malleable plastic explosive hexomax and its application in a flexible linear shaped charge system	Songy	5B
20154	Sheet-metal Ammunition Packing Tray for Mitigation of Secondary Cook-off of Medium-caliber Ammunition	Little	6A
20155	New NTO workshop and associated product characterizations	Delage	4B
20156	NATO Working Group on Insensitive Munitions and Hazard Classification Requirements, Assessment and Hazard Frequency.	Cheese	1
20157	Development of a CONUS Manufacturing Capability for FOX-7	Sleadd	4B
20159	Development and successful demonstration of a lightweight, particle impact mitigation sleeve (pims) with specified hardness and perforation features	Pudlak	6A
20161	Filling the Gap between the Initiation Behavior of Shaped Charge Jets and Fragments	Arnold	9A
20163	Impacts of REACh, ITAR and other regulations on Energetic Materials Sustainability	Eck	10B
20164	New Polycarbonate-Based Thermoplastic Polyurethane Binder for HMX Based Explosives	Robertson	2B
20166	Particle size and surface area effects on the initiation of Diaminoazoxyfurazan (DAAF)	Francois	5B

ABSTRACT #	TITLE	AUTHOR	SESSION
20171	Melt-pour explosive formulation development featuring TNBA	Fung	5B
20172	MDNT: IM Melt-Phase Energetic Binder	Abbassi	5B
20174	Robust enhanced blast explosive manufacturing at holston army ammunition plant	Fung	4B
20179	Characterization of LX-14 FEM / PBXN-9 FEM High Energy Explosives	Alexander	4B
20180	Synthesis, Formulation, and Testing of 3,4-DNP	Morris	6B
20181	Improving knowledge of tactical rocket motor response under Insensitive Munition threats: BI, FI and FH Tests results of the research program	Bonhomme	10A
20182	Additive Manufacturing for Net Shape Munitions	Chelluri	7A
20183	Fragment Impact Testing of the XM25	Al-Shehab	3A
20188	IM Plans and JIMTP Future in the United States	Di Stasio	1
20228	Synthesis Development of Novel Energetic Ingredients	Headrick	6B
20233	Qualification of Explosives Formulations Manufacturers and Ingredient Manufacturers for US Navy Use	Kenyon	10B
20241	Effect of Insensitive HE on Shaped Charge Jets	Arnold	8A
20245	IM Characteristics of Large Diameter Extruded Double Base Rocket Motors with Composite Cases	Bellotte	10A
20249	U.S. Navy Insensitive Munitions Handbook	Ward	1
20258	Cost of Propane Fast Cook-Off Testing	Washburn	4A
20259	Fast Cook Off Modeling and Simulation	Yagla	9A
20260	Comparative Fire Response of Simulated Rocket Motors in Steel and Carbon Fiber Composite Missile Launching Canisters	Yagla	3A
20261	The DOTC Enterprise - Helping You Accelerate Technologies to the Field	Wilson	3B
20262	Radiant Chamber for Fast Cook of Testing and Simulation	Yagla	8A
20263	IM Technology for Stryker Tank Munitions	Eng	10A
20264	Insensitive Minimum Smoke Propellants	Deschner	8B
20265	Historical Review of Fragment Impact Standardization	Hunt	2A
20266	An Approach to Predict the Cook-off Response of Confined and Vented Full Scale Munitions Based on Small Scale Tests	Moussa	9A
20267	Insensitive Munitions Industry Contribution for New Stanag - AOP Edition of the Slow Heating Test	Guengant	4A
20268	An Explosive Fragment Projector for IM testing	Eliash	5A
20269	Thermal modeling of fast cook-offs	Graswald	9A
20271	Microfluidic synthesis of energetic materials	Scavuzzo	6B
20273	Explosive Ordnance Disposal (EOD) of Insensitive Munitions: Challenges and Solutions	Brousseau	5A
20274	New generation Influence Mine classified as 1.6N	Granqvist	7A

ABSTRACT #	TITLE	AUTHOR	SESSION
20275	Passing Sympathetic Reaction Responses in 500 and 1,000-lb General Purpose Bombs with AFX-770	Struck	5A
20276	PBXN-5 Mechanical Characterization and Proposed Constitutive Model	Peairs / Amborn	7B
20279	Scaling of Fast Cook Off Fires	Yagla	4A
20282	Insensitive munitions (im) gun propellant optimization efforts for medium caliber application	Liberatore-Moretti	9B
20289	Manufacturing of PAX-3 High Explosive	Swaszek	5B
20290	Electronic properties and Hirshfeld surface analysis of insensitive high energy density material Dihydroxylammonium 5,5'-bistetrazole-1,1'-diolate under compression	Abraham	7B
30000	International Sympathetic Reaction Testing Survey	Baker	9A

BIOGRAPHY

DR. CHRISTINE MICHIENZI

Senior Industrial Analyst, Missiles and Munitions
OUSD(AT&L), Manufacturing and Industrial Base Policy

Dr. Michienzi began her career with the Department of Defense (DoD) at the Naval Surface Warfare Center, Indian Head Division, where she initially worked as a formulation chemist, developing new explosive and propellant formulations for DoD weapons systems, for which she holds five patents. She transitioned to program manager, establishing and leading the Navy's gun propellant development program, and eventually became the acting Research, Development, Test and Evaluation Department Head. She has also served as the munitions technical expert for the Technical Director, Program Executive Office, Integrated Warfare Systems (PEO IWS) for Surface Ship Weapons.

She is currently in the Office of the Under Secretary of Defense for Acquisition Technology and Logistics (OUSD(AT&L)), where she has held several positions. She served as a munitions expert and the Insensitive Munitions (IM) lead for the DoD for the Deputy Assistant Secretary of Defense, Tactical Warfare Systems (DASD TWS) and is currently the Senior Industrial Analyst for Missiles and Munitions for DASD Manufacturing and Industrial Base Policy (MIBP). Dr. Michienzi is responsible for assessing the health of the industrial base for all components of all DoD munitions, identifying issues and potential mitigation plans for senior OSD leadership. She also reviews acquisition strategies for new munitions and yearly DoD budget submissions to identify and work to solve any industrial base issues.

Dr. Michienzi received her Bachelor of Science degree in Chemistry from the University of Maryland, College Park (UMCP) and her Doctorate in Analytical Chemistry, also from UMCP.

TABLE TOP DISPLAYS

DEFENSE OPTIMIZATION INC.

Defense Optimization Inc. is a National Defense corporation - a Think Tank and a next-generation weapon-system group. Our mission is to serve as a catalyst for victory and world-wide peace, by fielding the best weapon systems known to man. We assess the performance of various classes of weapon systems and sub-systems, providing assistance to the Department of Defense and to weapon-system contractors.

Defense Optimization Inc's capabilities eliminate major root causes that prevent thoughtful weapon system conception, development, production, fielding and application. We mentor top weapon-system professionals and DoD agency leaders.

All current weapon systems are susceptible to a host of system instabilities (noises) which wreak havoc with weapon system performance in the field - whether that field includes underwater, on the ground, in space, or across global and spatial electromagnetic spectrums.

Our team members have over 50 years combined experience in weapon-system conception and performance optimization.

The results of our efforts lead to:

- Lower system costs,
- Higher performance,
- Higher System reliability,
- Extended weapon-system lifetimes, and
- Capable systems for all environments.

Our Secret Sauce includes leading-edge conceptional, optimization and data tools, which we pass along to our partners.

DSIAC

The Defense Systems Information Analysis Center (DSIAC) is a component of the U.S. Department of Defense's Information Analysis Center (IAC) enterprise. Our organization's purpose is to provide information research and analysis for DoD and Federal government users to stimulate innovation, foster collaboration, and eliminate redundancy. DSIAC's mission is to generate, collect, analyze, synthesize, and disseminate Scientific and Technical Information (STI) to DoD and Federal government users and industry contractors. The scope of DSIAC includes nine subject areas, six of which were part of the legacy DoD IAC operations: Advanced Materials; Energetics; Military Sensing; Reliability, Maintainability, Quality, Supportability, Interoperability (RMQSI); Survivability and Vulnerability; and Weapon Systems; plus three more focus areas of Autonomous Systems; Directed Energy; and Non-lethal Weapons.

DSIAC is chartered to become the premier information research partner and curator of technology advancements and trends for the defense systems community. Our website is www.DSIAC.org where you can find the DSIAC Digest, published twice-monthly, for the latest news and technical articles, and the quarterly DSIAC Journal of technical publications. Requests for STI and literatures searches can be submitted through our website

NTS

For more than a half-century, NTS has been a trusted partner to the Department of Defense, U.S. military, defense industry, aerospace, and other industries; providing comprehensive services and testing. Our network of national and international labs offer:

- Engineering services
- Extreme & combined environmental & dynamics testing
- Single location insensitive munitions & hazard classification testing
- Transportation & packaging safety testing
- Mechanical stress, strain & function testing
- Performance, safety & functional testing
- Static & dynamic firings of weapons & ordnance
- Body armor & firearm safety
- Function & reliability testing
- Integrated program management, planning & procedures

Within our facilities or on a customer's site, we integrate into each client's internal team. From technical expertise and exclusive accreditations, to an extensive physical infrastructure and engineering excellence, NTS is adept at maximizing quality and efficiency across our extensive customer base.

Our defense laboratories maintain multiple contract levels with the government, strictly adhere to National Industrial Security Operating Manual (NISPOM) regulations, and are accredited to a wide range of regulatory standards, including MIL-STD-810, MIL-STD-461, MIL-STD-2105, MIL-DTL-901E, MIL-STD-167, MIL-STD-120, MIL-STD-248, MIL-STD-516 and MIL-STD-767.

NTS also provides many related services, supporting all phases of customer-defined engineering projects that require a range of specialized services.

ORBITAL ATK

Orbital ATK is a global leader in aerospace and defense technologies. The company designs, builds and delivers space, defense and aviation systems for customers around the world, both as a prime contractor and merchant supplier. Its main products include launch vehicles and related propulsion systems; missile products, subsystems and defense electronics; precision weapons, armament systems and ammunition; satellites and associated space components and services; and advanced aerospace structures. For more information, visit www.orbitalatk.com.

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Headquartered in Radford, Virginia, BAE Systems Ordnance Systems Inc. (OSI) operates the Holston and Radford Army ammunition plants in support of U.S. Department of Defense (DoD) and commercial requirements. In addition to production, OSI provides a host of ammunition related services including modernization program management, inventory management, and energetics research and development.

Holston Army Ammunition Plant is the single source for U.S. DoD high explosives. Portfolio product mix includes RDXs, HMXs, IMXs, and PBXs. Radford Army Ammunition Plant is the single source for high-volume U.S. DoD Nitrocellulose / Propellants. Portfolio product mix includes Nitrocellulose, single-base propellants, multi-base propellants and rocket propellants.

OSI is an innovation leader in next generation explosives and propellants development thru its robust IR&D program. OSI is an active supporter of U.S. DoD and commercial product development through a wide variety of CRAD programs. In addition, OSI has provided total Program Management for all modernization projects conducted at its two ammunition plants. This extensive program includes modernization planning, project management, design, construction, and prove-out of a wide variety of projects.

ORBITAL ATK

As battlefield threats evolve, our warfighters need the best tools and technologies to successfully execute their missions safely. The U.S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) has leaned forward in maturing insensitive munitions (IM) technology and delivering it to the front line where the threats are high. With the recent introduction of IM technology to Orbital ATK's rocket motors for the Guided Multiple Launch Rocket System (GMLRS) and HELLFIRE® missiles – among the first rocket motors ever to fully integrate IM technology – our nation is taking a major step in meeting new standards of weapon safety.

A common misconception is that new technology requires a complete overhaul. To the contrary, Orbital ATK's IM rocket motor technology can be tailored to fit both new and existing tactical systems affordably. In fact, Orbital ATK has successfully introduced all the safety benefits of IM technology to the rocket motors without significantly changing the current design of legacy systems without sacrificing effectiveness or performance.

Orbital ATK is proud to serve the warfighter. That responsibility drives our team to invest, improve and innovate. This summer, the company will expand its capabilities at the Allegany Ballistics Laboratory (ABL) in Rocket Center, West Virginia when it opens its new Large Tactical Motor Manufacturing Facility specializing in high efficiency manufacturing of IM-compliant motors. Looking ahead, Orbital ATK will continue to develop and qualify similar rocket motor technology for other military applications, fielded systems and next generation upgrades to improve the strength of our armed forces.

Learn more about our IM technology at www.OrbitalATK.com

AEROJET ROCKETDYNE

Making munitions that are safer for our warfighters to handle is a shared goal of the military and industry. Aerojet Rocketdyne has an extensive history in developing insensitive munition solutions for both warheads and rocket motors. Our insensitive munitions and energetic materials solutions provide an increased margin of safety for our men and women who are deployed across the globe to protect the interests of America and its allies.

- Capabilities include:
- Tailored insensitive energetic formulations for warheads and rocket motors
- Innovative solutions to make systems meet IM criteria
- Composite case manufacturing
- Insensitive munitions mitigation methods
- Modeling and simulation
- Small-scale development testing
- Insensitive munitions tests per NATO STANAGS
- Production of components and systems for government and industry customers worldwide

Aerojet Rocketdyne is an innovative company delivering solutions that create value for its customers in the aerospace and defense markets. The company is a world-recognized aerospace and defense leader that provides propulsion and energetics to the space, missile defense and strategic systems, tactical systems and armaments areas, in support of domestic and international markets. Additional information about Aerojet Rocketdyne can be obtained by visiting our websites at www.Rocket.com and www.AerojetRocketdyne.com.

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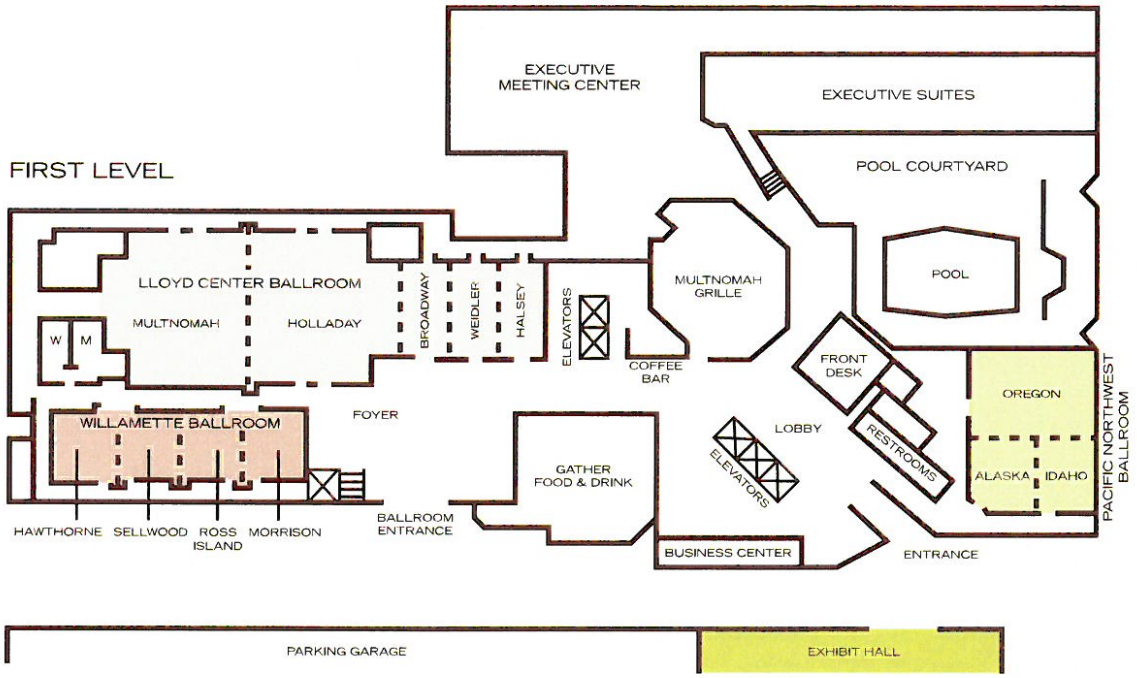
VENUE MAP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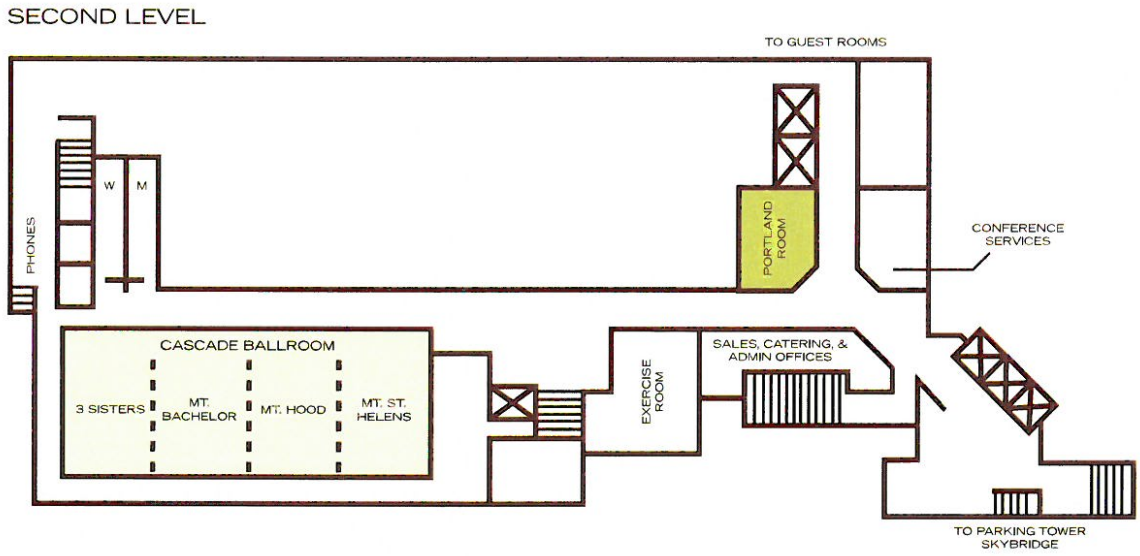
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