JANNAF INTERAGENCY PROPULSION COMMITTEE

JOINT ARMY-NAVY-NASA-AIR FORCE

45th Structures and Mechanical Behavior (SMBS)

41st Propellant and Explosives Development and Characterization (PEDCS)

32nd Rocket Nozzle Technology (RNTS)

30th Safety and Environmental Protection (SEPS)

JOINT SUBCOMMITTEE MEETING

Programmatic and Industrial Base Meeting

10 - 13 December 2018

Abstract Deadline Extended

25 June 2018

Announcement and Call For Papers

Vancouver, Washington (Portland metro area)

Last updated 4/17/2018

The December 2018 meeting of the Joint Army-Navy-NASA-Air Force (JANNAF) will consist of the Joint Meeting of the **Structures and Mechanical Behavior, Propellant and Explosives Development and Characterization, Rocket Nozzle Technology**, and **Safety and Environmental Protection Subcommittees;** and the **Programmatic and Industrial Base (PIB) meeting.** J. Robert Esslinger, Jr., with the Army Aviation and Missile Research, Development and Engineering Center, is the Meeting Chair. **This meeting will be held 10 - 13 December 2018 in Vancouver, Washington (Portland, Oregon metro area) at the Hilton Vancouver Washington.**

ATTENDANCE

The overall security level of the meeting is Unclassified. All sessions will be held at the Hilton Vancouver Washington. Attendance, applicable to presenters as well, is restricted to invited U.S. citizens, qualified to receive unclassified, limited-distribution information. *No foreign nationals will be permitted to attend.*

ALL non-government attendees (which includes contractors, consultants and universities) attending this meeting **must:**

1. Be working on a current government contract or certified by a Sponsoring Government Official
2. Provide their organization's DD 2345 Certification Number for receipt of militarily-critical technical data

DD 2345: For additional information, contact the Joint Certification Program Office (JCP) at 1-800-352-3572 or visit their Web site at http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP.aspx.

ALL Attendees: To register, you must first have a JANNAF Secure Portal account. Please visit the Registration page of the meeting website for additional information and important links. *All presenters are required to register and pay the registration fee.*

Questions concerning attendance eligibility should be directed to the JHU WSE ERG Facility Security Officer, Mary Gannaway, at (410) 992-7304, ext. 211 or mtg@jhu.edu.

PURPOSE

The JANNAF Interagency Propulsion Committee focuses on the technology, development, and production capabilities for all types of propulsion systems and energetics for tactical, strategic and missile defense rockets and missiles, for space boost and orbit transfer, for in-space propulsion, and for gun systems. JANNAF provides a forum for discussion of propulsion issues, challenges, and opportunities across the Military Departments, Defense Agencies and NASA. JANNAF subcommittees focus their resources on technical issues of interest to the JANNAF agencies.

Work in all areas of DoD and NASA are solicited as defined below:

6.1 Basic Research:
Systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products.

6.2 Applied Research:
Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

6.3 Development:
Systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

JANNAF accepts papers that are unclassified/unlimited and unclassified/limited for all meetings; and up to classified Secret as announced in the specific meeting's announcement and call for papers.

SCOPE

Structures and Mechanical Behavior Subcommittee

The SMBS addresses the development, application, and verification of experimental, analytical, and statistical techniques required in the preliminary or detailed structural design of solid propellant rocket motors and gun ammunition, the assessment of their structural integrity, and the prediction of their service life based on structural or chemical aging mechanisms.

Propellant and Explosives Development and Characterization Subcommittee

The scope of PEDCS comprises work and issues associated with propellants, explosives, and other energetic formulations used in the development, manufacture, performance, and

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operation of weapons, propulsion systems, and gas generator devices. This subcommittee covers the technology areas required to develop, manufacture, and characterize propellants and ingredients. The manufacturing technologies of interest include mixing procedures, sampling and quality control, safety and handling practices, and the design and operation of mixing equipment. The characterization tests involve classical wet chemistry, instrumental analysis, chemical stability, compatibility, and calorimetric measurements.

Rocket Nozzle Technology Subcommittee

The RNTS focuses on the application of advanced composite materials, including carbon-carbon, ceramic matrix, and carbon phenolic composites, and other advanced materials, as applied to solid rocket nozzles and their components, nozzle-based propulsion control systems; and related technology developments for liquid and electric propulsion.

Safety and Environmental Protection Subcommittee

The JANNAF 30th Safety and Environmental Protection Subcommittee meeting will address issues related to the safety, health and environmental impacts associated with the manufacture, storage and use of propellants, explosives and pyrotechnics. Papers are invited that address all health effects associated with energetic compounds, precursors, combustion products, and waste products as well as safety concerns present during their intentional use, demilitarization, and accidents. New and emerging areas of interest include additive manufacturing (3D Printing) of energetic materials, nanomaterials, and insensitive high explosive formulations.

Programmatic and Industrial Base

The JANNAF Programmatic and Industrial Base (PIB) Committee was created with the approval of the updated JANNAF Charter by the Department of Defense and the National Aeronautics and Space Administration in 2014. As stated in the Charter, the "Programmatic and industrial base areas of interest include integrated program plans and key decision points; industrial base assessments; risks and opportunities with respect to skills, knowledge, and experience; identification of commonality, innovative acquisition, and partnership opportunities; integrated assessments to identify rocket propulsion industrial base (RPIB) rationalization opportunities; special actions from senior agency, department, or Executive Office of the President (EOP) leadership; and information provided to decision makers for either situational awareness or policy decisions."

For detailed Abstract Submittal instructions, please turn to page 4.

SMBS / PEDCS / RNTS / SEPS / PIB AUTHOR TIMELINE

Week Of	Weeks before Meeting	Action
25 June 2018	24	Extended Deadline for receipt of Abstract Submittal Form. Deadline for receipt of Workshop and Specialist Session Request Forms.
20 August 2018	16	Acceptance/rejection letters sent to authors.
3 September 2018	14	Deadline for changes to Meeting Invitation and Preliminary Program
17 September 2018	12	Invitation, Preliminary Program, and registration materials forwarded to propulsion community.
8 October 2018	9	Deadline for award nominations.
29 October 2018	6	Deadline for submission of changes to the Final Program.
12 November 2018	4	Deadline for receipt of manuscripts and paper/ presentation clearance forms. **Papers not received by this date may be removed from the program.**
16 November 2018	3	Anticipated deadline for reservations at host hotel.
20 November 2018	2	Deadline for receipt of presentations.
7 December 2018	1	Deadline for completion of online Registration Form. Deadline for reduced registration fee.
10 December 2018	0	Start date for SMBS/ PEDCS/RNTS/SEPS Joint Subcommittee and PIB Meeting

ABSTRACT SUBMITTAL INSTRUCTIONS

- The technical areas to be addressed are defined in this announcement. Individuals who wish to submit an abstract should carefully review the topic areas listed on pages 6-13.
- The submission of an abstract represents an agreement to **submit a final paper for publication by 12 November 2018**, attend the meeting, and deliver a 30-minute presentation. Your presentation will be heard by all qualified individuals within industry, government, and university organizations. *If your paper cannot be presented to all qualified attendees, it cannot be presented in this program* without specific approval from members of the JANNAF Technical Executive Committee.
- Submit only unclassified abstracts. **Abstracts will not be published** and will only be used by the program committee members for paper selection purposes.
- Limit the abstract to 250-300 words and exclude tables and figures. State the objective of the work. Describe the scope, method of approach, and any new advances in the state of the art. Highlight important conclusions, and include a brief summary of the data used to substantiate them.
- Please submit using the Abstract Submittal Form, which can be downloaded from the December Meeting website.
- Indicate confirmation of management support on the Abstract Submittal Form to ensure availability of resources for your participation in the meeting.
- **Many organizations require abstracts to be processed through an approval system prior to submission.** This process takes additional time, so authors should **plan accordingly and begin the process early in an effort to meet the abstract deadline date.**
- Remember, ***you must be a qualified U.S. Citizen to attend and present at this meeting***. No foreign nationals are permitted to attend.
- The **EXTENDED deadline** date for submission of Abstract Submittal Forms to JHU WSE ERG is **25 June 2018.**

JHU WSE ERG accepts only **electronic submission** of abstracts and papers. **Abstracts must be submitted on the** Abstract Submittal Form:

- Via email to: scohen@erg.jhu.edu; *(Distribution A only)*; **OR**
- Uploaded to the ERG secure server as follows:

1. Go to https://webdatabase.cpia.jhu.edu/docorg/program/cgi-bin/Login.pl
2. **Choose Infobase:** *JANNAF Mtg Abstract Uploads*
3. **Type in User Name:** *Abstract*
4. **Type in Password** [contact ERG at (410) 992-7300 or 7302 for current password, changed daily].
5. Click the "Login" button.
6. Click on "December 2018 JANNAF Meeting"; choose "Add Document" (to the left of the page)
7. Complete the "Add Document" form, being sure to Title your Document, select "Upload from Client", click the "Browse" button and navigate to where you have saved your completed Abstract Submittal Form on your computer. Select the file and click "Open". Choose the appropriate file format (MS Word or PDF) under Document Type, and click on "Apply".
8. Email scohen@erg.jhu.edu to notify that the file has been successfully uploaded.

RECOMMENDATIONS FOR WORKSHOPS OR SPECIALIST SESSIONS

Recommendations for workshops or specialist sessions are solicited at this time. Individuals interested in organizing and chairing a workshop or specialist session should contact the JHU WSE ERG Technical Staff member in their respective subcommittee with suggestions for topics by **11 June 2018.** See pages 13-14 for additional information and requirements.

AWARDS

Nominations for JANNAF Technical Executive Committee (TEC), PIB Executive Committee (PEC), SMBS, PEDCS, RNTS, and SEPS recognition awards are being solicited. Individuals interested in nominating an award recipient should follow the guidelines and instructions on pages 14 and 15.

HOTEL INFORMATION

Discounted room rates at or below the region's government per diem rate are being arranged for all JANNAF attendees at the host hotel in the Portland, Oregon metropolitan region. Please visit the Hotel page of the website for more information; details will be announced soon.

REGISTRATION INFORMATION

Registration will open in mid- to late-September. Please plan to complete the two-step registration process (online Registration Form and payment of the registration fee) on or before 7 December 2018.

Please be aware that there is a pre-requisite to registering for JANNAF meetings. You must have an active JANNAF Secure Portal Account. Visit the Registration page of the December meeting website for more information about this requirement. To apply for a JANNAF Secure Portal Account, go to https://www.jannaf.org and click on "Create new account" in the top right corner of the screen. Follow the instructions posted there to begin the application process. More information can be found on the JANNAF website by viewing the Portal Account Tutorial, found under "Resources".

If your account has expired or you don't remember your password, please review the document posted **here** for guidance, or contact info@erg.jhu.edu or call (410) 992-7300.

SUBCOMMITTEES / MISSION AREAS AT THIS MEETING

Click on the Mission Area of interest in the chart below to jump to that section in this Call for Papers.

Mission Area	SMBS	PEDCS	RNTS	SEPS
I	Service Life / Missile Sustainment	Liquid Propellants	Nozzle Thermal, Sructural, Fluids Analysis and Modeling	Toxicology
II	Materials Properties and Characterization	Explosive Development and Characterization	Nozzle Design, Test and Evaluation	Atmospheric Dispersion Modeling and Hazards Assessment
III	Structural Analysis and Design	Propellant and Explosives Process Engineering	Thrust Control	Instrumentation
IV	Experimental Structural and Mechanical Analysis and Test Methods	Energetic Materials Characterization and Raw Material Obsolescence	Innovative Nozzle Materials and Manufacturing	Environmental
V	Nondestructive Evaluation	Solid Propellant Ingredients and Formulations	Damage Tolerance / Fracture / Failure [Joint Mission Area with SMBS]	Industrial Hygiene
VI	Damage Tolerance / Fracture / Failure [Joint Mission Area with RNTS]	Propellant and Explosive Surveillance and Aging		Range Safety and Explosives Safety
VII		Gun Propulsion		Green Energetic Materials (GEM) Joint PEDCS - SEPS Mission Area
VIII		Green Energetic Materials (GEM) Joint PEDCS - SEPS Mission Area		Demilitarization, Reclamation, and Reuse Technologies
IX				Review of Accidents and Incidents

SMBS MISSION AREAS

The 45th Structures and Mechanical Behavior Subcommittee sessions relate to the structures and materials comprising propulsion systems, including composite structures. Papers are solicited on developing, applying, and verifying techniques for preliminary or detailed structural design of propulsion units (rocket motors, liquid- or gel-fueled engines and gun propulsion) and related composite structures, for assessing their structural integrity and reliability, and for predicting their service life. Additional information concerning these areas or the topics being solicited should be directed to the appropriate Area Chair. Specific areas of interest are listed below.

Mission Area I: Service Life / Missile Sustainment

Chair: Dr. Donald G. Messitt, Aerojet Rocketdyne / Sacramento, CA
Telephone: (916) 355-2435
Email: donald.messitt@rocket.com

Methodology for service life prediction and assessment.

- Aging systems - surveillance, service life prediction, extension
- Factors which limit the service life of propulsion systems and propellants, such as chemical/structural aging, changes in binder/filler interaction, crystallization, migration/diffusion of ingredients or moisture
- Development approaches for improving service life of solid rocket motors and liquid rocket components
- Motor monitoring - NDE methodologies applicable to service life evaluation
- Factors which limit service life of structural sub-components (nozzles, cases, igniters, combustion chambers, tanks, etc)
- Hazards related to service life and aging

Mission Area II: Materials Properties and Characterization

Co-Chairs: Dr. Soe T. (Tom) Bhe, Aerojet Rocketdyne / Rancho Cordova, CA
Telephone: (916) 355-4159
Email: soe.bhe@rocket.com

Mr. David J. Braithwaite, Orbital ATK / Brigham City, UT
Telephone: (435) 863-6904
Email: david.braithwaite@orbitalatk.com

New developments or application experiences related to mechanical properties and characterization.

- Effects of propellant formulation on gun tube wear and erosion (GTWE)
- Fundamental molecular modeling related to gun tube wear and erosion
- New and/or improved test methods for evaluating materials used in liquid engine components or liquid engine propellant tanks
- New and/or improved test methods for evaluating propellant and case or component construction materials mechanical properties including tensile, shear, friability, dilatation and bulk, fracture, microstructure, aging, propellant/case bond, etc.
- New and/or improved approaches to material properties optimization during solid rocket motor or gun propellant development
- Advancements in test equipment and procedures, test instrumentation, data acquisition and processing techniques, and data reduction and analysis
- Test specimen preparation techniques and dynamic characterization
- Mechanical properties related to propulsion systems hazards, e.g., material characterization under impact loads or high loading rates

Mission Area III: Structural Analysis and Design

Chair: Dr. Brian C. Liechty, Orbital ATK / Brigham City, UT
Telephone: (435) 863-3459
Email: brian.liechty@orbitalatk.com

Evaluation and validation of structural analysis methods applicable to initial design, structural integrity, and service life prediction of propulsion systems.

- Advancements in the state-of-the-art in structural analysis, particularly in nonlinear viscoelastic analysis and incorporation of nonlinear constitutive behavior
- Cumulative damage, failure criteria, and thermal and moisture diffusion analysis are included in these areas
- Structural reliability analyses and analysis of nondestructive evaluation results relative to structural reliability are two areas of particular interest
- Approaches to incorporating the results of NDE in a structural analysis code and methods of evaluating the effects of defects on structural integrity are of particular interest
- Applications of nonlinear elastic-plastic analysis to design of metal components, such as cases and pressure vessels
- Application of structural analysis methods to health-monitoring sensors, including sensor design, influence of sensors on motor integrity, and interpretation and application of sensor data

Mission Area IV: Experimental Structural and Mechanical Analysis and Test Methods

Chair: Mr. Vincent McDonald, NSWC / Indian Head, MD

Telephone: (301) 744-1463

Email: vincent.mcdonald1@navy.mil

Evaluation of stress measurement tools and techniques for liquid rocket engines and solid rocket motors, analog rocket motor design, analysis and testing.

- State-of-the-art experimental structural methods
- Technology for experimental stress analysis
- Experimental validation of stress analyses and failure analyses
- Experimental investigation of rocket motor structural/ ballistic interactions operating pressures (gun barrel and motor case)
- Statistical considerations in experimental stress analysis
- Experimental structural analysis and test methods for rocket motor cases, nozzles, and gun propulsion systems
- Experiments related to the fundamental chemistry occurring between gun barrel materials and combustion products
- Macroscopic erosion experiments leading to chemical mechanisms occurring in gun tube wear and erosion

Mission Area V: Nondestructive Evaluation

Chair: Mr. Scott H. McClain, ARDEC / Picatinny Arsenal, NJ

Telephone: (973) 724-8428

Email: scott.mcclain3.civ@mail.mil

Nondestructive evaluation and inspection techniques to solid propellant rocket motors, liquid or gel engines, and gun propulsion systems and components.

- Application of NDE techniques during any portion of the life cycle of the propulsion components
- Application of NDE technology and methods for enhancing propulsion system and/or subcomponent quality and reliability
- Use of NDE methods during the propulsion system life cycle from manufacturing to acceptance (buy-off)
- The monitoring and control of manufacturing processes
- Automated NDE sensing systems for quality control and conformance testing
- Use of embedded sensing system (including Micro-Electromechanical Systems – MEMS) for performance testing
- NDE methods used during static test
- NDE standards for system or component acceptance
- NDE methods for health management
- Role of NDE in service life assessment and extension
- Evaluation of propulsion system aging characteristics
- The post-acceptance evaluation of grain integrity, inert materials aging, chemical attack and migration, corrosion, and environmental storage effects
- Use of NDE technologies in strategic sustainment
- Advanced NDE systems and technologies, including but not limited to, real-time radiography, digital ultrasonics, holography, shearography, computed tomography, acoustic emission, electro-optic fiber embedments, thermography, lasers, and advanced digital image analysis techniques
- Emerging NDE technologies and their potential application to the propulsion community

Mission Area VI: Damage Tolerance / Fracture / Failure [Joint Mission Area with RNTS]

Chair: Dr. David E. Richardson, Orbital ATK / Brigham City, UT

Telephone: (435) 863-6995

Email: david.richardson@orbitalatk.com

This mission area will focus on experimental and modeling studies into damage tolerance and/or fracture pertaining to non-metallic materials which can be used on space systems such as rocket motors or re-entry vehicles. Examples of areas of research could include investigation into fracture behavior of propellants, liners, insulation, adhesives, nozzle ablative liners, re-entry insulators, etc. Emphasis will be placed on material characterization of flaw behavior and analytical methods used to simulate these behaviors. Areas of study would include into propagation, arrest, and fatigue and related topics. Current and historical investigations into anomalies and failures as related to damage tolerance and fracture will also be addressed.

Structures and Mechanical Behavior Subcommittee Chair

Dr. Jeremy R. Rice, AMRDEC / Redstone Arsenal, AL

Telephone: (256) 876-6077

Email: jeremy.r.rice4.civ@mail.mil

JHU WSE ERG Technical Representative

Mr. Thomas Alsbrooks, JHU WSE ERG / Columbia, MD

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Email: talsbrooks@erg.jhu.edu

PEDCS MISSION AREAS

The 41st Propellant and Explosives Development and Characterization Subcommittee sessions will be organized into the topic areas described below. Please submit your abstract according to the interest area.

Mission Area I: Liquid Propellants

Chair: Dr. Benjamin Greene, Jacobs Technology, Incorporated / Las Cruces, NM

Telephone: (575) 524-5761

Email: benjamin.greene-1@nasa.gov

Papers are sought that address research in liquid monopropellants and bipropellants in areas including:

- Research and improve existing analytical test methods, and support developing new propellant specifications and their associated test methods
- Development and characterization of new and existing liquid engine and gun propellants
- Assessment of materials compatibility and reactivity with various propellants including hydrazine fuels, dinitrogen tetroxide oxidizers, gels, ionic and other monopropellants, and liquid gun propellants
- Evaluation of liquid propellant supply status and qualification of new or alternate suppliers

Mission Area II: Explosive Development and Characterization

Chair: Dr. Mark H. Mason, Jr., NAWCWD / China Lake, CA

Telephone: (760) 939-4330

Email: mark.h.mason@navy.mil

Topics of interest include the development, characterization and testing of explosive and reactive material formulations; relationship of composition to sensitivity, metal acceleration, air-blast performance, mechanical properties, and initiation; phenomenology of non-ideal explosives, influence of ingredients, non-energetic components and additives, on composite explosive materials. Abstracts are especially sought in the following areas:

- The characterization of explosives made in a Resonance Acoustic Mixer
- The physics of understanding how structural artifacts effect performance and sensitivity using Additive Manufacturing
- The characterization of large critical diameter explosives
- Initiation and growth in non-ideal explosives
- Advances with CL-20
- Formulation and Characterization of Thermally Robust Explosives
- Advances in explosive synthetic chemistry

Mission Area III: Propellant and Explosives Process Engineering

Co-Chairs: Dr. Jamie B. Neidert, AMRDEC / Redstone Arsenal, AL

Telephone: (256) 876-5455

Email: jamie.b.neidert.civ@mail.mil

Mr. Richard S. Muscato, NSWC / Indian Head, MD

Telephone: (301) 744-2585

Email: richard.muscato@navy.mil

Papers of interest include summaries of research in the areas of propellant and energetic formulation development and processing technologies. Abstracts are especially sought in the following areas:

- Advanced flow and microfluidic reactors
- Novel and emerging processing techniques including, but not limited, to additive manufacturing, resonant acoustic mixing (RAM) to produce energetic compositions and devices
- Scale up and processing of non-energetic and energetic ingredients
- New methods for material characterization including ongoing modernization efforts
- Processing techniques for additives, ballistic modifiers, and
- Lessons learned in propellants and explosives manufacturing including but not limited to extruded, cast, melt cast or pressed items.

Mission Area IV: Energetic Materials Characterization and Raw Material Obsolescence

Chair: Mr. Christopher A. Marshall, AMRDEC / Redstone Arsenal, AL

Telephone: (256) 842-0094

Email: christopher.a.marshall4.civ@mail.mil

Areas of interest include chemical and combustion test methods to analyze and characterize energetic materials and their formulations including solid and liquid propellants, warheads, pyrotechnics, fuzes, and initiators, especially those pertaining to tactical and strategic propellants and associated energetics that contain novel ingredients; modifications of current test methods or alternate procedures that minimize/eliminate the use of ozone depleting solvents or other adverse organic chemicals; statistics of sample selection; techniques of sample preparation; methods development for microcalorimeter instruments, gun propellant, and rocket propellant; and related subjects. A newly added focus will be an emphasis to document and track on-going propellant and warhead raw material obsolescence and related testing of new replacement materials.

Mission Area V: Solid Propellant Ingredients and Formulations

Co-Chairs: Dr. Gregory W. Drake, AMRDEC / Redstone Arsenal, AL
Telephone: (256) 842-0647
Email: gregory.w.drake.civ@mail.mil

Dr. Nirupam J. Trivedi, ARL / Aberdeen Proving Ground, MD
Telephone: (410) 306-3108
Email: nirupam.j.trivedi.civ@mail.mil

Identification of advances and challenges in the area of solid propellant ingredients and formulations with emphasis on ingredient synthesis and production, industrial base and supplier status, chemical and physical characteristics (including reactivity), and recovery, reuse, and disposal of ingredients as well as the qualification and use of new and novel ingredients in propellant formulations.

Mission Area VI: Propellant and Explosive Surveillance and Aging

Co-Chairs: Dr. Kerry A. Clark, NSWC IHEODTD / Indian Head, MD
Telephone: (301) 744-4273
Email: kerry.a.clark@navy.mil

Dr. Heather F. Hayden, NOSSA / Indian Head, MD
Telephone: (301) 744-4102
Email: heather.f.hayden@navy.mil

Papers are sought on analysis techniques for the determination of the chemical aging behavior and safe storage of solid propellants. Of particular interest are the decomposition of solid propellants that contain nitrate esters and the autoignition risk that may result from their degradation.

Mission Area VII: Gun Propulsion

Co-Chairs: Dr. Pamela J. Kaste, ARL/Aberdeen Proving Ground, MD
Telephone: (410) 306-0749
Email: pamela.j.kaste.civ@mail.mil

Ms. Christine D. Knott, NSWC IHEODTD / Indian Head, MD
Telephone: (301) 744-2555
Email: christine.knott@navy.mil

Research in the areas of formulation and processing of propellants and associated components (igniters, case and packaging materials, etc.) for use in gun propulsion. This can include new compositions, new ingredient development, novel geometries and structures, propellant development protocols, performance diagnostics, aging and shelf life, increased performance, reduced wear and erosion, as well as insensitive munitions response.

Mission Area VIII: Green Energetic Materials (GEM) Joint PEDCS - SEPS Mission Area

Co-Chairs: Mr. Noah Lieb, Jensen Hughes / Baltimore, MD
Telephone: (410) 737-8677
Email: nlieb@jensenhughes.com

Dr. Jesse J. Sabatini, ARL / Aberdeen Proving Ground, MD
Telephone: (410) 278-0235
Email: jesse.j.sabatini.civ@mail.mil

Dr. Sara K. Pliskin, NSWC / Crane, IN
Telephone: (812) 854-3190
Email: sara.pliskin@navy.mil

Papers are sought on the development of environmentally sustainable energetic ingredients, formulations, and processing technologies with an emphasis on the following: reduction of impacts from energetic materials and unexploded ordnance on military ranges, manufacturing and demilitarization facilities; enhancement of recycling, recovery, reuse and reduction of waste; and response to specific impacts that environmental regulations have had on military readiness, such as limiting training with live ordnance, outsourcing of manufacturing overseas or explicit banning of the use of specific materials.

Propellant and Explosives Development and Characterization Subcommittee Chair

Dr. Mark H. Mason, Jr., NAWCWD / China Lake, CA
Telephone: (760) 939-4330
Email: mark.h.mason@navy.mil

Propellant and Explosives Development and Characterization Subcommittee Deputy Chair

Mr. Chuck Davis, NASA / Kennedy Space Center, FL
Telephone: (321) 867-4748
Email: chuck.davis@nasa.gov

JHU WSE ERG Technical Representative

Mr. William A. Bagley, JHU WSE ERG / Columbia, MD
Telephone: (443) 718-5009
Email: wbagley@erg.jhu.edu

RNTS MISSION AREAS

The 32nd Rocket Nozzle Technology Subcommittee sessions will focus on materials, processing, testing, evaluation, design, analysis, and other topics of interest in the rocket nozzle technology area. Additional information concerning these areas or the topics being solicited should be directed to the appropriate Area Chair. Papers are sought in the specific areas listed below.

Mission Area I: Nozzle Thermal, Structural, Fluids Analysis and Modeling

Chair: Dr. Heath T. Martin, NASA MSFC / Huntsville, AL
Telephone: (256) 544-5993
Email: heath.t.martin@nasa.gov

Suggested topics for papers in this session:

- Advances in Charring Material Ablator (CMA) style modeling of nozzle composite materials
- Advances in CFD modeling of nozzle heat and mass transfer processes
- Advances in structural composite materials modeling and failure criteria
- Coupled thermo-structural modeling of heated composites using explicit methods
- Coupled fluid-thermal surface ablation modeling with two-phase surface interaction
- Porous media, pyrolysis gas, and pore pressure modeling
- Semi-empirical laboratory methods used for gathering of heated composite property data

Mission Area II: Nozzle Design, Test and Evaluation

Chair: Mr. Clyde E. Carr, Jr., Orbital ATK / Elkton, MD
Telephone: (410) 392-1877
Email: clyde.carr@orbitalatk.com

Nozzle design, test, and evaluation areas of interest include:

- Evaluation - Health monitoring for material aging and material characterization
- Nozzle Design 'lessons learned'
- Test - performance based acceptance test/post-test evaluation and new, improved test methods
- New materials characterization and fabrication, including constituent/composite material behavior throughout all phases of processing
- In-process characterization techniques and instrumentation
- Assessment of the state-of-the-art, vision of the future, and research/development paths is requested

Papers addressing qualitative and quantitative goals relevant to technical, and system level challenges are specifically sought. Discussion of new technologies/materials and future expectations is also invited.

Mission Area III: Thrust Control

Chair: Mr. J. Robert Esslinger, Jr., AMRDEC / Redstone Arsenal, AL
Telephone: (256) 842-1358
Email: john.r.esslinger.civ@mail.mil

Specific topics of interest include nozzle designs that use active or passive control to achieve thrust control; weight, volume, size, and cost reduction techniques; component and system modeling and analysis, to include system performance benefits of thrust management control or thrust vector control; control techniques, to include control systems, control algorithms, actuation methods or mechanisms; thrust management control via pulsing, and motor extinguishment and re-ignition; pintle controlled nozzles; VAN (variable area nozzle) designs; nozzle designs that incorporate thrust vector control (exclusive of jet vane systems) as well as thrust level control; developments in jet vane/tab, moveable nozzle, hot gas valve, probe, fluid injection, or any other standard or novel TVC technologies; TVC appliations of micro-electromechanical systems (MEMS); and component and system test results.

Mission Area IV: Innovative Nozzle Materials and Manufacturing

Co-Chairs: Ms. Amanda B. Napier, AMRDEC / Redstone Arsenal, AL
Telephone: (256) 876-1641
Email: amanda.b.napier.civ@mail.mil

Mr. Timothy W. Lawrence, NASA MSFC / Huntsville, AL
Telephone: (256) 684-5221
Email: tim.lawrence@nasa.gov

Specific topics of interest include new/innovative materials addressing the following area(s) for aluminized, reduced-smoke or minimum-smoke solid rocket motors:

- Lightweight and high temperature capability components
- Low erosion materials for use as liners or monolithic components
- Structural insulators
- Manufacturing techniques
- Reduced cost for advanced/high temperature materials

Mission Area V: Damage Tolerance / Fracture / Failure [Joint Mission Area with SMBS]

Co-Chairs: Dr. David E. Richardson, Orbital ATK / Brigham City, UT
Telephone: (435) 863-6995
Email: david.richardson@orbitalatk.com

Mr. David M. McCutcheon, NASA MSFC / Huntsville, AL
Telephone: (256) 544-8835
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This mission area will focus on experimental and modeling studies into damage tolerance, fracture, and/or failure pertaining to non-metallic materials which can be used on space systems such as rocket motors or re-entry vehicles. Examples of areas of research could include investigation into fracture or failure behavior of propellants, liners, insulation, adhesives, nozzle ablative liners, re-entry insulators, etc. Emphasis will be placed on material characterization of flaw behavior and failure initiation and analytical methods used to simulate these behaviors. Areas of study would include propagation, arrest, failure, and fatigue and related topics. Current and historical investigations into anomalies and failures as related to damage tolerance and fracture will also be addressed.

Rocket Nozzle Technology Subcommittee Chair

Mr. J. Robert Esslinger, Jr., AMRDEC / Redstone Arsenal, AL
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JHU WSE ERG Technical Representative

Mr. David B. Owen, JHU WSE ERG / Columbia, MD
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SEPS MISSION AREAS

The 30th Safety and Environmental Protection Subcommittee sessions will be organized into the topic areas described below. Please submit your abstract according to the interest area. Topics to highlight:

Mission Area I: Toxicology

Co-Chairs: Dr. David R. Mattie, AFRL, 711HPW / Wright-Patterson AFB, OH
Telephone: (937) 904-9569
Email: david.mattie@us.af.mil

Dr. Mark S. Johnson, Army Public Health Center / Aberdeen Proving Ground, MD
Telephone: (410) 436-5081
Email: mark.s.johnson@us.army.mil

Toxicology of propellants, propellant ingredients, propellant combustion products, and related subjects. Also of interest are the use of risk assessment methodologies in the management of toxic hazards and the rationale for the establishment of toxic material exposure criteria for the workplace and the environment.

Mission Area II: Atmospheric Dispersion Modeling and Hazards Assessment

Chair: Mr. Daniel E. Strub, 30th Space Wing / Vandenberg AFB, CA
Telephone: (805) 605-2407
Email: daniel.strub@us.af.mil

Atmospheric dispersion modeling and hazards assessment applied to propulsion activities. Subjects of interest include modeling transport and diffusion of propellant spills including both dense and trace gases, chemically reactive species, and aerosols; wind flow and dispersion modeling in complex terrain; model validation; source modeling; ozone depletion, ground cloud dispersal, and acid rain from launch vehicles; and models for emergency response systems. Experimental or theoretical work on other atmospheric hazards such as thunderstorms, lightning, wind shear, and precipitation are also welcome.

Mission Area III: Instrumentation

Chair: Dr. Karen L. Mumy, Naval Medical Research Unit - Dayton / Wright-Patterson AFB, OH
Telephone: (937) 904-9474
Email: karen.mumy@us.af.mil

Instrumentation requirements, basic research, and hardware development of equipment used to measure hazardous environments. Presentations regarding work done in the measurement of hypergolic or other hazardous propellant vapors, oxygen/hydrogen propellant vapors, hydrochloric acid and other propellant combustion products, and other chemical hazards of interest to the propulsion community are sought.

Mission Area IV: Environmental

Co-Chairs: Dr. William S. Eck, Army Public Health Center / Aberdeen Proving Ground, MD
Telephone: (410) 436-7169
Email: william.s.eck.civ@mail.mil

Dr. Karen L. Mumy, Naval Medical Research Unit - Dayton / Wright-Patterson AFB, OH
Telephone: (937) 904-9474
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For the December 2018 meeting, the Environmental Mission Area is particularly interested in papers that address environmental fate and transport of insensitive munitions or proposed propellant replacements. Environmental issues that address any of the following: permitting requirements; hazardous waste treatment; water and air pollution prevention and control technologies involving energetic material production and use; waste minimization; operational ingredient reclamation or recycling in the production of energetic materials; environmental effects on flora and fauna resulting from propulsion-related activities; and impact of emerging environmental regulations on energetic materials operations.

Mission Area V: Industrial Hygiene

Co-Chairs: Ms. Lindsey Kneten, Army Public Health Center / Aberdeen Proving Ground, MD
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CPT Kenneth Kirk, AFRL, 711HPW / Wright-Patterson AFB, OH
Telephone: (937) 904-9555
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Industrial hygiene aspects of energetic material production, transportation, use, and disposal. Areas of interest include personal protective strategies and equipment used in manufacturing and handling operations; ingredient and product monitoring methods and experience; operational ventilation strategies and experience; hazardous materials control; hazardous waste management; substitution of less hazardous materials in industrial processes and maintenance; and hazardous materials information, including labeling and material safety data sheets.

Mission Area VI: Range Safety and Explosives Safety

Chair: Mr. Daniel E. Strub, 30th Space Wing / Vandenberg AFB, CA
Telephone: (805) 605-2407
Email: daniel.strub@us.af.mil

Range safety and explosives safety issues relevant to launch range safety risk assessments and other energetic material safety problems. Papers are sought that address hazards inherent in solid and liquid propellant/explosive/ pyrotechnic (PEP) materials manufacturing, processing, handling, storage, use and disposal; liquid and solid propellant explosive hazards; air blast effects; quantity-distance criteria; shielding; and the hazards of damaged or aged propellants.

Mission Area VII: Green Energetic Materials (GEM) Joint PEDCS - SEPS Mission Area

Co-Chairs: Mr. Noah Lieb, Jensen Hughes / Baltimore, MD
Telephone: (410) 737-8677
Email: nlieb@jensenhughes.com

Dr. Jesse J. Sabatini, ARL / Aberdeen Proving Ground, MD
Telephone: (410) 278-0235
Email: jesse.j.sabatini.civ@mail.mil

Dr. Sara K. Pliskin, NSWC / Crane, IN
Telephone: (812) 854-3190
Email: sara.pliskin@navy.mil

Papers are sought on the development of environmentally sustainable energetic ingredients, formulations, and processing technologies with an emphasis on the following: reduction of impacts from energetic materials and unexploded ordnance on military ranges, manufacturing and demilitarization facilities; enhancement of recycling, recovery, reuse and reduction of waste; and response to specific impacts that environmental regulations have had on military readiness, such as limiting training with live ordnance, outsourcing of manufacturing overseas or explicit banning of the use of specific materials.

Mission Area VIII: Demilitarization, Reclamation, and Reuse Technologies

Co-Chairs: Dr. Jeffrey L. Lee, AMRDEC / Redstone Arsenal, AL
Telephone: (256) 842-6514
Email: jeffrey.l.lee.civ@mail.mil

Mr. Gary Mescavage, ARDEC / Picatinny Arsenal, NJ
Telephone: (973) 724-3349
Email: gary.s.mescavage.civ@mail.mil

Demilitarization, reclamation, and reuse technologies for propellant, explosive, and pyrotechnic (PEP) materials. Interest areas include: thermal degradation/treatment and incineration of PEP materials; chemical or mechanical separation, reclamation, and neutralization technologies; technologies that utilize sub- or super-critical fluids for reclamation or oxidation of PEP materials; biodegradation technology; reuse of energetic materials or ingredients for military and commercial applications; and regulations that address traditional disposal options, such as open burning/open detonation and static firing.

Mission Area IX: Review of Accidents and Incidents

Chair: Mr. Daniel E. Strub, 30th Space Wing / Vandenberg AFB, CA
Telephone: (805) 605-2407
Email: daniel.strub@us.af.mil

Review of accidents and incidents involving propellant manufacturing, storage, transportation, use, hazardous material spills, and transportation accident response. Topics of interest include lessons learned, post-accident procedures for liquid propellant spills, propellant spill response systems, spill mitigation activities, and transportation accident response computer systems.

Safety and Environmental Protection Subcommittee Chair

Dr. Sara K. Pliskin, NSWC / Crane, IN
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Safety and Environmental Protection Subcommittee Deputy Chair

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WORKSHOPS/SPECIALIST SESSIONS

Recommendations for workshops or specialist sessions are solicited at this time. **Individuals interested in organizing and chairing a workshop or specialist session should contact the JHU WSE ERG Technical Staff member in their respective subcommittee with suggestions for topics by 11 June 2018.**

Workshops

The JANNAF Workshop is reserved for bringing the community together to address a specific task or problem, the outcome of which is important and substantial enough to warrant the publication of a final report detailing the discussions, conclusions, and recommendations that resulted from the workshop.

Requirements for JANNAF workshops and established best practices can be found in the Guide for JANNAF Workshop Chairs; this document will guide you through the planning and approval process for workshops held at a JANNAF meeting.

To request a workshop you must submit a Workshop Request Form to your JHU WSE ERG Technical Liaison or Shelley Cohen at scohen@erg.jhu.edu. This form must be submitted to ERG by the extended due date of **Monday, 25 June 2018**. The agenda and invitation list is due **Monday**, **3 September 2018** for inclusion in the Preliminary Program, and must be approved no later than **Monday, 29 October 2018** for inclusion in the Final Program.

Specialist Sessions

A JANNAF Specialist Session is an opportunity for experts in a specific technical area to meet to stimulate ideas and contributions from the audience. These sessions are dedicated to a single topic and often include invited presentations. The organization of these sessions is similar to a regular JANNAF paper session with time allocated to individual presentations; however, specialist sessions often include moderator led discussion periods or a question and answer session with expert panelists.

To request a Specialist Session for this JANNAF meeting, a Specialist Session Request Form must be submitted to JHU WSE ERG. This form requires a statement of justification for the Specialist Session as well as a well thought out agenda. Requests will be reviewed by the designated JANNAF subcommittee TSG chair and ERG for approval; this approval is necessary for any Specialist Sessions to be included in the Final Program.

The EXTENDED deadline for submission of a Specialist Session request is 25 June 2018. If you have any questions about planning a Specialist Session please contact your ERG Technical Liaison or Shelley Cohen at scohen@erg.jhu.edu.

JANNAF AWARDS PROGRAM

In the tradition of recognizing the outstanding achievements of the propulsion community, the JANNAF Technical Executive Committee (TEC) and the Structures and Mechanical Behavior (SMBS), Propellant and Explosives Development and Characterization (PEDCS), Rocket Nozzle Technology (RNTS), and Safety and Environmental Protection (SEPS) subcommittees are soliciting nominations for awards to be presented at the meeting. A TEC Award is justified if the achievement or service is in a technical area that is not covered by an existing subcommittee, or is of such scope or magnitude that merits this recognition.

Special Recognition Awards

The Special Recognition awards for Sustained Contribution and Lifetime Achievement honor individual achievements, either in the last 18 months or for a lifetime of dedicated service. These awards are the most prestigious subcommittee awards and reflect on the awardees contributions to JANNAF.

Special recognition award winners will be selected by respective subcommittee Awards Committees based on review of the nomination in consideration of the following:

- Technical value of the achievement(s) including level of technical complexity and challenge, quality of results, degree of innovation and timeliness of research.
- Impact of the achievement on the broader propulsion community.
- For individuals nominated for lifetime achievement, demonstrated participation in technical societies as evidenced by positions held and papers published will be considered favorably.

Outstanding Achievement Award

The Outstanding Achievement Award is given for the most outstanding technical achievement in the subcommittee's area by an individual, by a team within an organization, or by a team of organizations. To recognize the varied nature of the JANNAF subcommittees and the accomplishments of their communities, nominations may be solicited and given in the two focus areas of R&D Technology and Operational Systems.

The achievement shall have been accomplished in the previous 18 months. The nominees must have worked for the organization during the same 18-month period of performance.

Certificate of Commendation

The Certificate of Commendation is given to recognize an individual whose contributions within the last 18 months have been pivotal in ensuring the success of a JANNAF activity.

Certificate of Appreciation

The Certificate of Appreciation is given to recognize individuals for outstanding contributions and dedicated service to JANNAF.

Nominations

To nominate an individual for one of the above awards please use the "JANNAF Executive Committee and Subcommittee Award Nomination Form," Nomination submissions should include the following:

- A description of the achievement or distinguished service, of no less than 200 and no more than 1000 words. The description must be typed or provided in electronic format (Acrobat PDF or MS Word) via Email.
- Supporting data (if desired) of no more than 10 pages.
- Supporting curriculum vitae, list of publications, and/or professional activities as required to support the nomination.
- Contact information for the nominee(s) and the nominator, including organization affiliation, phone number, and Email address.

Nominations should be submitted to the appropriate JHU WSE ERG technical representative no later than **Monday, 8 October 2018**.

Best Paper Awards

In addition to the nomination awards listed above, JANNAF recognizes authors of papers that exhibit excellence and significant merit with the Best Paper Awards. Best Paper Awards from this meeting will be given at the next JANNAF Subcommittee meeting.

Best Student Paper Awards

The Best Student Paper Award will be given to undergraduate or graduate students who author papers that exhibit excellence and significant merit. One paper will be selected to receive the Best Student Paper Award. All student-authored works will automatically be included in the initial round of consideration with the submission of an abstract; in order to facilitate identification of student-authored works please be sure to clearly state on your abstract that you wish to be considered for the Best Student Paper Award or contact the appropriate JHU WSE ERG technical representative.

As a reminder: student authors must conform to the same JANNAF eligibility requirements as other authors, per the policy on non-government attendees at JANNAF meetings given on page 2. Student authors are encouraged to work with their advisors to ensure they meet these requirements, and should contact JHU WSE ERG at their earliest convenience with questions regarding their eligibility and participation.

Student papers will be reviewed upon submission of their cleared manuscripts. In order to be considered for the student best paper selection, the completed paper must be provided to JHU WSE ERG by **8 October 2018**. The Best Student Paper Award will be presented at the JANNAF meeting at which the paper is given.

UPCOMING JANNAF MEETINGS

65th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
12th Modeling and Simulation
10th Liquid Propulsion
9th Spacecraft Propulsion
Joint Subcommittee Meeting

21 - 24 May 2018
Hilton Long Beach
Long Beach, California

45th Structures and Mechanical Behavior
41st Propellant and Explosives Development and Characterization
32nd Rocket Nozzle Technology
30th Safety and Environmental Protection
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting

10 - 14 December 2018
Portland, Oregon region

66th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
49th Combustion
37th Airbreathing Propulsion
37th Exhaust Plume and Signatures
31st Propulsion Systems Hazards
Joint Subcommittee Meeting

Spring 2019
Location TBA