JANNAF INTERAGENCY PROPULSION COMMITTEE
JOINT ARMY-NAVY-NASA-AIR FORCE

Westin Kansas City at Crown Plaza
Kansas City, Missouri
22 - 25 May 2017

Meeting Invitation

64th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
44th Structures and Mechanical Behavior
40th Propellant and Explosives Development and Characterization
31st Rocket Nozzle Technology
29th Safety and Environmental Protection
Joint Subcommittee Meeting

Last updated 5/6/2017

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited
You are invited to attend the May 2017 meeting of the Joint Army-Navy-NASA-Air Force (JANNAF), which will consist of the 64th JANNAF Propulsion Meeting, the Programmatic and Industrial Base (PIB) Meeting; and the Joint Meeting of the 44th Structures and Mechanical Behavior / 40th Propellant and Explosives Characterization and Development / 31st Rocket Nozzle Technology / 29th Safety and Environmental Protection Subcommittees. This meeting will be held Monday through Thursday, 22 - 25 May 2017, at the Westin Kansas City at Crown Center in downtown Kansas City, Missouri.

The Program Chair for the meeting is Dr. Charles J. Trefny, NASA Glenn Research Center, Cleveland, OH. A complete list of Program Committee Members can be found on pages 7-10.

SCOPE
The JANNAF Interagency Propulsion Committee coordinates fundamental research, exploratory development, and advanced development programs; standardizes procedures for nomenclature; promotes and facilitates the exchange of technical information; and accomplishes problem solving in the areas of joint agency interest on propulsion systems for missiles, rockets, boosters, spacecraft, satellites, and guns.

JANNAF Propulsion Meeting
The JANNAF Propulsion Meeting (JPM) encompasses research and applications at the systems level. The JPM is held each year in conjunction with standing JANNAF subcommittee meetings on a rotating basis. The scope of the 64th JPM in 2017 spans seven mission areas: Tactical Propulsion; Missile Defense/Strategic Propulsion; Propulsion Systems for Space Access; Gun and Gun-Launched Propulsion; Propulsion and Energetics Test Facilities; Sensors for Propulsion Measurement Applications; and System-wide Application of Additive Manufacturing for Propulsion Applications.

Programmatic and Industrial Base
The Programmatic and Industrial Base (PIB) 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.

JANNAF subcommittees focus their resources on technical issues of interest to the JANNAF agencies.

Structures and Mechanical Behavior Subcommittee
The Structures and Mechanical Behavior Subcommittee (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 Propellant and Explosives Development and Characterization Subcommittee (PEDCS) comprises work and issues associated with propellants, explosives, and other energetic formulations used in the development, manufacture, performance, and 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 Rocket Nozzle Technology Subcommittee (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 Safety and Environmental Protection Subcommittee (SEPS) sessions will address issues related to the safety, health and environmental impacts associated with the manufacture, storage and use of propellants, explosives and pyrotechnics. Papers addressing 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 will be presented. New and emerging areas of interest include additive manufacturing (3D Printing) of energetic materials, nanomaterials, and insensitive high explosive formulations.

Hotel Information

Sleeping rooms have been reserved with the Westin Kansas City at Crown Center, located at 1 East Pershing Road, Kansas City, MO 64108. Amenities include complimentary high speed internet access in guestrooms. The hotel is conveniently attached to Hallmark's Crown Center, with more than 15 restaurants, 36 shops, and theaters.

JANNAF has arranged for discounted rooms for attendees. Government employees with valid Government employee I.D. are eligible for the government per diem rate of $117 per night. The discounted rate for non-Government attendees is $159 per night. All room rates are subject to applicable state and local taxes, currently 16.975%, plus a Kansas City Development Fee of $1.50 plus tax per night ($1.76 including tax).

These discounted rooms will be held for JANNAF attendees until the deadline of Monday, 1 May 2017 at 5:00 p.m. CDT, or until they sell out, whichever comes first. Each individual is responsible for his/her own reservation.

Make Your Reservation Online:

Click on the appropriate reservation link on the Hotel Page of the meeting website to make your reservation. Using one of these links will give you direct access to the JANNAF meeting discounted room blocks. Changes or cancellations to your reservation can also be made via these weblinks; just input your reservation number.

For additional reservation assistance, please call (888) 627-8538. Be sure to reference the May 2017 JANNAF Meeting.

Need to cancel your reservation? Be sure to do so no later than 6:00 p.m. CDT the day prior to your scheduled arrival to avoid paying a cancellation penalty.
Transportation and Parking

The Kansas City International Airport (MCI) is located 25 minutes from the Westin Kansas City at Crown Center. The hotel does not offer airport shuttle service. However, SuperShuttle is offering a discounted rate to JANNAF attendees between the airport and hotel. See page 4 for more information.

For transportation between the airport and hotel, take advantage of the discount offered for JANNAF attendees by SuperShuttle: one way per person fare for shared ride service is $15 ($3 savings each way); or pay just $36.50 each way for non-stop service for up to 3 passengers travelling together. NOTE: discounted SuperShuttle fares only applicable when booking a round trip. Other options include Uber ($22-29) or taxi ($50-60). More information can be found on the Hotel Page of the meeting website, including the link to book discounted transportation via SuperShuttle.

For those driving personal vehicles or renting a car, self-parking for hotel guests is $18 per night in the hotel’s garage and includes in/out privileges (guest room key required). For those not staying at the hotel, an hourly rate will be charged, up to the daily maximum of $18. Parking rates are subject to change. Other parking options in the Crown Center area charge comparable rates.

Meeting Site

All sessions will be held at the Westin Kansas City at Crown Center in downtown Kansas City, Missouri. For attendance at this meeting, please see the Security/Attendance Requirements and Registration instructions below.

Security/Attendance Requirements

The overall security classification of this meeting is Unclassified.

To qualify to attend this meeting, all attendees must be employed by a DoD, DoE, or NASA facility, or with a DoD, DoE, or NASA contractor facility eligible for receipt of militarily-critical technical data. All attendees must also be invited U.S. citizens qualified to receive unclassified, limited-distribution information. No foreign nationals are permitted to attend.

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.

Registration

Registration is now open. Register by Monday, 8 May to take advantage of the lowest fee.

To register, you must have a JANNAF Secure Portal account. Please visit the Registration Page of the meeting website for additional information and important links.

Registration for this JANNAF meeting is a two-part process; to complete this process:

1. Register for the meeting via the JANNAF Secure Portal.
2. Pay the registration fee (Portal account not required).

Additional information and important links for completing your meeting registration can be found at https://www.jannaf.org/mtgs/2017May/pages/registration.html.

Registration Fee

For details of what the registration fee includes, please go to the Registration Page of the meeting website. Please reference the registration fee chart below to determine the amount applicable to your registration. The dates noted below are based on payment being received.

<table>
<thead>
<tr>
<th>Payment Received</th>
<th>Regular Attendee</th>
<th>Student*</th>
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<tr>
<td>on or before 5/8/17</td>
<td>$1,200.00</td>
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<td>5/9/17 or later</td>
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* A discounted registration fee is offered for full time students, interns, and cooperative education students. Students must meet the security/attendance requirements noted above and present current student identification upon registration on-site.

Registration payment will be accepted via check payable to JHU WSE Energetics Research Group, purchase order (government only), or by credit card (VISA, MasterCard, American Express) using the Registration Payment site available online. Go to the Registration Page of the meeting website, and click on “Pay Registration Fee.”

Attendees are encouraged to complete step one of the registration process via the JANNAF Secure Portal, and submit payment, on or before Monday, 8 May 2017 to take advantage of the lowest fee, and to ensure prompt registration upon arrival at the meeting. Credit card payments made electronically via the Web will be charged immediately; a receipt will be sent to you via email.
CANCELLATION POLICY

Please note our cancellation policy—Written (email) cancellations submitted on or before 8 May 2017 will receive a full refund minus an administrative fee of $50.00. Cancellations made after 8 May 2017 will not be refunded. Substitutes are welcome as long as the request for substitution is from the original attendee; attendance eligibility is appropriately met by the substitute; and the original and substitute attendee are from the same organization to facilitate transfer of registration funds. Please contact Shelley Cohen via email to scohen@erg.jhu.edu to transfer or cancel your registration.

ON-SITE REGISTRATION / CHECK-IN

The JANNAF Registration desk will be located on the Ballroom level of the Westin Kansas City at Crown Plaza. Photo identification is required upon registration or check-in. The desk will be open Monday, 22 May through Thursday, 25 May from 7:00 a.m. - 5:00 p.m.

ATTENTION DOD

An approval package to certify the May 2017 JANNAF Meeting as a “government approved” conference has been submitted by Mr. Drew DeGeorge, member of the JANNAF Executive Committee from the Air Force Research Laboratory at Edwards AFB.

We anticipate timely approval of the meeting. In the meantime, interested DoD attendees are strongly encouraged to obtain a JANNAF Secure Portal account now and register for the meeting (step 1). This step does not require travel or training office authorization as it does not include a financial commitment. Payment of the registration fee may be completed as soon as permitted.

There are specific travel guidelines/restrictions for DoD employees. Please check the meeting website, with respect to restrictions regarding use of personal vehicles and rental cars.

ATTIRE

There is no official dress code for JANNAF conferences; however, most attendees wear business or business casual attire. When packing, keep in mind that it can be difficult to regulate the temperature in meeting rooms to everyone’s liking, and any changes may not be noticeable quickly, so it is best to bring a sweater or jacket and dress in layers.

DINING

Approximately one and one-half hours for lunch has been built into the program each day. Dining options in the hotel include The Brasserie Restaurant (breakfast, lunch, and dinner), Coffee Bar (breakfast), and Lounge (lunch, dinner, and late night). Additionally, the attached Crown Center complex has more than 15 restaurants, and there are two additional restaurants at Union Station, connected to the hotel by The Link elevated walkway.

NETWORKING ROOM

Mingle with other attendees in the JANNAF networking room throughout the week, where you can also check email, get a caffeine boost, and have a snack. A light continental breakfast and mid-morning coffee break along with mid-afternoon refreshments will be served at the times stated in the program. This area will be open Monday - Thursday from 7:00 a.m. - 5:00 p.m. Please note that scheduled breaks are included in session agendas where time permits. The Final Program and signs on-site will direct you to the location.

NETWORKING NIGHT

Enjoy an evening and meal with fellow JANNAF attendees on Wednesday, 24 May 2017, from 6:30-8:00 p.m. at the hotel. There is no charge for meeting attendees; however, guest tickets may be purchased on the Registration Payment site for $40 (admission is free for children five and under). Be sure to wear your JANNAF badge to attend the event. See the Final Program and on-site signage for the location.

READING ROOM

All papers presented in the technical sessions and received in time will be available to read via JANNAF touch-screen tablets in the Reading Room, which will be open Monday from 10:00 a.m. - 4:30 p.m., and Tuesday through Thursday from 8:00 a.m. - 4:30 p.m. Reproduction of reading room papers is not permitted.

SIDE MEETINGS

A limited number of meeting rooms of varying sizes are available for JANNAF-related side meetings. Audiovisual equipment will not be provided. Please contact Shelley Cohen at scohen@erg.jhu.edu to reserve a room as soon as possible. Requests may also be made on-site during the meeting. Rooms will be assigned first-come, first-served.

DISTRIBUTION STATEMENT C: Distribution authorized to US Government agencies and their US contractors; WARNING: Information subject to export laws; DESTRUCTION NOTICE: destroy by any method that will prevent disclosure of contents or reconstruction of the documents.

VISIT https://www.jannaf.org/mtgs/2017May/pages/index.html
JANNAF Preliminary Program - May 2017

Program Changes
Meeting programs will be distributed to attendees upon registration/check-in on-site. Note that Final Programs are Distribution Statement C and should be secured when not in your possession. Changes to the Final Program will be posted on touch screen monitors located on the Ballroom level. Attendees should periodically check for program updates and administrative announcements and note these updates in their copy of the Final Program.

Meeting Proceedings
Proceedings from this meeting will be published by the JHU WSE Energetics Research Group. Papers, and in limited cases presentations, will be provided complimentary to attendees of this meeting who have paid the full registration fee (early or regular). These attendees will have access to these materials beginning approximately 12 weeks following the meeting via the JANNAF Digital Online Collection (JDOC) Database accessible through your account on the JANNAF Secure Portal. This benefit is not available for student attendees.

Questions
Questions concerning this program and/or payment of the registration fee should be directed to Shelley Cohen at (410) 992-7302, ext. 215 or email: scohen@erg.jhu.edu.

Questions pertaining to registering via the JANNAF Secure Portal should be directed to:
Mary Gannaway: Call (410) 992-7304, ext. 211 or email mtg@jhu.edu
OR
Tricia Reider: Call (410) 992-7300, ext. 222 or email treider@erg.jhu.edu

Upcoming JANNAF Meetings
64th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
44th Structures and Mechanical Behavior
40th Propellant and Explosives Development and Characterization
31st Rocket Nozzle Technology
29th Safety and Environmental Protection
Joint Subcommittee Meeting
   22-25 May 2017
   Westin Kansas City at Crown Center
   Kansas City, Missouri

49th Combustion
37th Airbreathing Propulsion
37th Exhaust Plume and Signatures
31st Propulsion Systems Hazards
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting
   4-8 December 2017
   Newport News Marriott at City Center
   Newport News, Virginia

65th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
12th Modeling and Simulation
10th Liquid Propulsion
9th Spacecraft Propulsion
Joint Subcommittee Meeting
   Spring 2018
   Specific Dates and Location TBA

45th Structures and Mechanical Behavior
41st Propellant and Explosives Development and Characterization
32nd Rocket Nozzle Technology
30th Safety and Environmental Protection
Programmatic and Industrial Base Meeting
   3-7 December 2018
   Location TBA
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Mr. Bruce K. Tiller, Deputy Manager of the SLS Solid Rocket Boosters Office in the NASA Space Launch System Program at NASA Marshall Space Flight Center, will present the keynote at this year’s conference.

The title of Mr. Tiller’s address is “SLS Overview and Progress to Date.” NASA is on a journey to Mars and its new deep space exploration system, consisting of the heavy-lift Space Launch System (SLS), the human-rated Orion spacecraft and modernized launch facilities at Kennedy Space Center, will play a key role in this amazing endeavor. In this presentation, Mr. Tiller will provide an overview of the first mission and discuss progress toward first launch. Mr. Tiller will focus on the status of the major elements that comprise SLS, which will provide unparalleled performance to send Orion beyond the moon – farther than humans have ever ventured.

In his role as the Deputy Manager Booster Office, Mr. Tiller leads the design, development, test, and evaluation of the solid rocket boosters for SLS, NASA’s deep-space flagship for a new era of science and exploration.

Prior to this assignment, Mr. Tiller served as the Deputy Manager for the Ares I rocket’s first stage. Since beginning his civil service career at NASA, Mr. Tiller has held several key positions within Marshall’s Engineering Directorate, including supervisor of the Thermal and Combustion Analysis Branch, supervisor of the Systems Analysis Branch and team leader in the Thermal Analysis Branch. Prior to joining NASA, Mr. Tiller was a thermal analyst for two different NASA contractors.

Mr. Tiller earned a bachelor’s degree in geology from the University of North Carolina in Chapel Hill; a bachelor’s degree in mechanical engineering from the University of Alabama in Birmingham; and a master’s degree in mechanical engineering from the University of Alabama in Huntsville. He has received numerous honors and awards during his NASA career, including the NASA Outstanding Leadership Medal and the NASA Exceptional Service Medal.

All attendees are invited to participate. The Keynote Address begins at 8:00 a.m. on Tuesday, 23 May, in Century Ballroom C on the Ballroom level of the hotel.

Additional Highlights

On Monday, 22 May, Stanley Graves, Orbital ATK, Launch Systems, Brigham City, UT, will present Creating a World Class Safety Culture - Lessons Learned from Launch Vehicle Failures and Industrial Accidents (1P). This Specialist Session is offered jointly by the Rocket Nozzle Technology (RNTS) and Structures and Mechanical Behavior (SMBS) Subcommittees. As Chief Engineer for the Space Shuttle Solid Rocket motor, Stan was intimately involved in the Challenger and Columbia disasters. He lived through and scrutinized a myriad of other industrial accidents, fires, and explosions. Stan will share his methodology for identifying organizational and cultural risks. He will also outline specific initiatives that can be undertaken to prevent crisis and create a healthy, high performing safety culture. More information can be found on page 22 of the Preliminary Program.

PEDCS will present a three-part Specialist Session on Monday, 22 May (1B and 1K) and Wednesday, 24 May (3B) on Additive Manufacturing of Energetic Materials. This Specialist Session will provide a secure closed session forum for researchers across the government, academia,
and industry to share work and collaborate in the areas of explosives, propellant, and pyrotechnic materials development, AM processing, safety in implementation, equipment, and end uses and applications. A draft agenda is provided on pages 17, 19, and 31 of the Preliminary Program.

The JANNAF Programmatic and Industrial Base (PIB) presents a Specialist Session on Tuesday, 23 May, entitled **Booster Propulsion Technology Maturation Projects Status** in two parts (2A and 2J). As part of a comprehensive Air Force plan to transition U.S. space launch systems off of the Russian RD-180 propulsion system, the Air Force Space and Missile Systems Center, Advanced Systems and Development Directorate (SMC/AD) has initiated several Booster Propulsion Technology Maturation (BPTM) projects in support of SMC Launch Systems Enterprise Directorate (SMC/LE). This Specialist Session will highlight the accomplishments achieved by industry as part of the BPTM Broad Agency Announcement efforts. In addition, SMC/AD will discuss validation efforts and transition plans for the Combustion Stability Tool Development project. The progress of the full-scale Oxygen-Rich Staged Combustion preburner and thrust chamber project will also be discussed. For more details, go to pages 23 and 27 of the Preliminary Program.

The Safety and Environmental Protection (SEPS) and Propellant and Explosives Development and Characterization (PEDCS) Subcommittees will together present a technical session on **Green Energetic Materials** (2O). The session will focus on the development of environmentally sustainable energetic ingredients, formulations, and processing technologies. The agenda can be found on page 29 in the Preliminary Program.

On Wednesday, 24 May, RNTS will present a half-day Specialist Session (3K) on **Thrust Control**. This session will present a review of current rocket motor nozzle materials, tactical thrust management by Orbital ATK and Aerojet Rocketdyne, and include a presentation of the strippable thermal barrier by AMRDEC. A draft agenda can be found on page 34 in the Preliminary Program.

An additional highlight on Thursday is the **Advanced Thermal / Structural Modeling of Carbon Cloth Phenolic** Workshop, presented by RNTS in session 4D. The purpose of this workshop is to develop an industry accepted physics based, nonlinear, fully integrated coupled thermal and structural material model for accurate prediction of the response of heated phenolic material used in ablative thermal protection systems (TPS). See page 38 in the Preliminary Program for more information.

RNTS and SMBS will also offer a workshop on Thursday entitled, **Verification, Validation, and Uncertainty Quantification** (4O). Participants will work in conjunction with the Modeling and Simulation Subcommittee’s Verification, Validation, and Uncertainty Quantification Team to define approaches for Verification, Validation and Uncertainty Quantification that can be used in the propulsion analytical community with an emphasis on Rocket Nozzle Technology and Structures and Mechanical Behavior. Additional information including a draft agenda for this workshop can be found on page 42 of the Preliminary Program.
**Technical Program**

This year's technical program currently consists of 38 technical sessions with more than 200 presentations, plus 7 specialist sessions, 2 workshops, and 16 panel meetings. A detailed daily schedule of all sessions, workshops, meetings and networking activities is provided below and continues through page 16. Detailed agendas of the technical sessions, specialist sessions, and workshops are listed in the Program Section of the Preliminary Program beginning on page 17.

A Schedule Color Key has been provided below and on pages 14 and 16.

### SCHEDULE - Monday, 22 May

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Location</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>On-Site Check-In and Registration Desk Open</td>
<td>Century Foyer</td>
<td></td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>I.T. Office Open (for Presenters and Session Chairs needing technical assistance)</td>
<td>Penn Valley</td>
<td>Open</td>
</tr>
<tr>
<td>7:00 a.m. - 10:35 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>7:15 a.m. - 7:30 a.m.</td>
<td>Session Chair Meeting (Monday Sessions)</td>
<td>Westport</td>
<td>Closed</td>
</tr>
<tr>
<td>8:00 a.m. - 5:00 p.m.</td>
<td>PIB Industry Issues Briefing</td>
<td>Pershing Place</td>
<td>Open</td>
</tr>
<tr>
<td>8:30 a.m. - 12:05 p.m.</td>
<td>Monday Morning Technical Sessions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:30 a.m. - 12:05 p.m.</td>
<td>1B PEDCS SPECIALIST SESSION: Additive Manufacturing of Energetic Materials - I</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>9:00 a.m. - 12:05 p.m.</td>
<td>1C RNTS/SMBS Damage Tolerance / Fracture / Failure</td>
<td>Shawnee</td>
<td>Open</td>
</tr>
<tr>
<td>10:00 a.m. - 11:35 a.m.</td>
<td>1E PEDCS Minimum Signature Ingredients Modeling</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 11:35 a.m.</td>
<td>1F PEDCS Novel Explosives - I</td>
<td>Pershing Place West</td>
<td>Open</td>
</tr>
<tr>
<td>10:00 a.m. - 4:30 p.m.</td>
<td>Reading Room</td>
<td>Westport</td>
<td>Open</td>
</tr>
<tr>
<td>12:05 p.m. - 1:30 p.m.</td>
<td>Lunch Break - On Your Own</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 6:05 p.m.</td>
<td>Monday Afternoon Technical Sessions and Panel Meetings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00 p.m. - 4:00 p.m.</td>
<td>1J PEDCS KICKOFF MEETING: Updating the Explosives and Propellant Security Classification Guide</td>
<td>Liberty</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 5:35 p.m.</td>
<td>1K PEDCS SPECIALIST SESSION: Additive Manufacturing of Energetic Materials - II</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>4:00 p.m. - 5:05 p.m.</td>
<td>1L JPM Gun Propulsion Modeling and Simulation</td>
<td>Shawnee</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 3:35 p.m.</td>
<td>1M SMBS Materials Characterization - I</td>
<td>Roanoke</td>
<td>Open</td>
</tr>
<tr>
<td>3:45 p.m. - 4:15 p.m.</td>
<td>1M SMBS PANEL MEETING: Materials Characterization</td>
<td>Roanoke</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 4:35 p.m.</td>
<td>1N PEDCS Minimum Signature Propellants</td>
<td>Pershing Place East</td>
<td>Open</td>
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<tr>
<td>4:35 p.m. - 5:35 p.m.</td>
<td>1N PEDCS PANEL MEETING: Solid Propellant Ingredients and Formulations</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 5:05 p.m.</td>
<td>1O PEDCS Novel Explosives - II</td>
<td>Pershing Place West</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 6:05 p.m.</td>
<td>1P RNTS/SMBS SPECIALIST SESSION: Creating a World Class Safety Culture - Lessons Learned from Launch Vehicle Failures and Industrial Accidents</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>3:05 p.m. - 4:05 p.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
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</table>

### Schedule Color Key

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting Services</td>
<td>Concurrent Sessions or Panel Meetings</td>
</tr>
<tr>
<td>Networking Opportunities</td>
<td>Session Details</td>
</tr>
<tr>
<td>Closed Meetings</td>
<td>Panel and Other Open Meetings</td>
</tr>
</tbody>
</table>

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## SCHEDULE - Tuesday, 23 May

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>On-Site Check-In and Registration Desk Open</td>
<td>Century Foyer</td>
</tr>
<tr>
<td>7:00 a.m. - 5:00 p.m.</td>
<td>I.T. Office Open (for Presenters and Session Chairs needing technical assistance)</td>
<td>Penn Valley</td>
</tr>
<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
</tr>
<tr>
<td>7:15 a.m. - 7:30 a.m.</td>
<td>Session Chair Meeting (Tuesday Sessions)</td>
<td>Westport</td>
</tr>
<tr>
<td>8:00 a.m. - 10:00 a.m.</td>
<td>KEYNOTE ADDRESS: “SLS Overview and Progress to Date” Mr. Bruce K. Tiller, NASA Awards and Announcements</td>
<td>Century C</td>
</tr>
<tr>
<td>8:00 a.m. - 4:30 p.m.</td>
<td>Reading Room</td>
<td>Westport</td>
</tr>
<tr>
<td>9:30 a.m. - 10:00 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
</tr>
<tr>
<td>10:00 a.m. - 6:00 p.m.</td>
<td>JANNAF Technical Executive Committee Meeting</td>
<td>Presidents</td>
</tr>
<tr>
<td>10:00 a.m. - 12:35 p.m.</td>
<td>Tuesday Morning Technical Sessions, Specialist Session, and Panel Meeting</td>
<td></td>
</tr>
<tr>
<td>10:00 a.m. - 12:30 p.m.</td>
<td>2A PIB SPECIALIST SESSION: Booster Propulsion Technology Maturation Projects Status - I</td>
<td>Liberty</td>
</tr>
<tr>
<td>10:00 a.m. - 11:35 a.m.</td>
<td>2B JPM Missile Defense / Strategic Propulsion</td>
<td>Mission</td>
</tr>
<tr>
<td>10:00 a.m. - 12:05 p.m.</td>
<td>2C JPM Novel Gun Propulsion Concepts</td>
<td>Shawnee</td>
</tr>
<tr>
<td>10:00 a.m. - 12:05 p.m.</td>
<td>2D SMBS Nondestructive Evaluation</td>
<td>Roanoke</td>
</tr>
<tr>
<td>12:05 p.m. - 12:35 p.m.</td>
<td>2D SMBS PANEL MEETING: Nondestructive Evaluation</td>
<td>Roanoke</td>
</tr>
<tr>
<td>10:00 a.m. - 12:05 a.m.</td>
<td>2E PEDCS Chemistry Test Methods</td>
<td>Pershing Place East</td>
</tr>
<tr>
<td>10:00 a.m. - 12:05 a.m.</td>
<td>2F SEPS Demilitarization, Reclamation, and Reuse Technologies</td>
<td>Pershing Place West</td>
</tr>
<tr>
<td>10:00 a.m. - 11:35 a.m.</td>
<td>2G RNTS Innovative Nozzle Materials</td>
<td>Pershing Place North</td>
</tr>
<tr>
<td>12:05 p.m. - 1:30 p.m.</td>
<td>Lunch Break - On Your Own</td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 6:00 p.m.</td>
<td>Tuesday Afternoon Technical Sessions, Panel, Specialist Session, and Panel Meetings</td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 6:00 p.m.</td>
<td>2J PIB SPECIALIST SESSION: Booster Propulsion Technology Maturation Projects Status - II</td>
<td>Liberty</td>
</tr>
<tr>
<td>1:30 p.m. - 3:35 p.m.</td>
<td>2K SEPS Toxicology</td>
<td>Mission</td>
</tr>
<tr>
<td>4:05 p.m. - 5:05 p.m.</td>
<td>2K SEPS PANEL MEETING: Toxicology and Occupational Health</td>
<td>Mission</td>
</tr>
<tr>
<td>1:30 p.m. - 5:05 p.m.</td>
<td>2L JPM Energetics for Gun Propulsion</td>
<td>Shawnee</td>
</tr>
<tr>
<td>1:30 p.m. - 4:05 p.m.</td>
<td>2M SMBS Service Life Assessment Technology</td>
<td>Roanoke</td>
</tr>
<tr>
<td>4:05 p.m. - 5:05 p.m.</td>
<td>2M SMBS PANEL MEETING: Service Life Assessment Technology</td>
<td>Roanoke</td>
</tr>
<tr>
<td>1:30 p.m. - 3:35 p.m.</td>
<td>2N JPM Building Propulsion Systems for Future Space Access</td>
<td>Pershing Place East</td>
</tr>
<tr>
<td>1:30 p.m. - 5:05 p.m.</td>
<td>2O PEDCS/SEPS Green Energetic Materials</td>
<td>Pershing Place West</td>
</tr>
<tr>
<td>5:05 p.m. - 5:35 p.m.</td>
<td>2O PEDCS/SEPS PANEL MEETING: Green Energetic Materials</td>
<td>Pershing Place West</td>
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<tr>
<td>1:30 p.m. - 4:05 p.m.</td>
<td>2P RNTS Nozzle Thermal, Structural, Fluid Analysis, and Modeling</td>
<td>Pershing Place North</td>
</tr>
<tr>
<td>4:05 p.m. - 5:05 p.m.</td>
<td>2P RNTS PANEL MEETING: Nozzle Design, Material Analysis, and Testing</td>
<td>Pershing Place North</td>
</tr>
<tr>
<td>3:05 p.m. - 4:10 p.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
</tr>
<tr>
<td>6:00 p.m. - 8:00 p.m.</td>
<td>RNTS Technical Steering Group Meeting</td>
<td>Westport</td>
</tr>
</tbody>
</table>

### Schedule Color Key

- **Meeting Services**: Indicates the location of meeting services.
- **Networking Opportunities**: Indicates networking opportunities.
- **Closed Meetings**: Indicates closed meetings.

<table>
<thead>
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<td>7:00 a.m. - 5:00 p.m.</td>
<td>I.T. Office Open (for Presenters and Session Chairs needing technical assistance)</td>
<td>Penn Valley</td>
<td>Open</td>
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<tr>
<td>7:00 a.m. - 8:00 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>7:15 a.m. - 7:30 a.m.</td>
<td>Session Chair Meeting (Wednesday Sessions)</td>
<td>Westport</td>
<td>Closed</td>
</tr>
<tr>
<td>8:00 a.m. - 4:30 p.m.</td>
<td>Reading Room</td>
<td>Westport</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 12:00 p.m.</td>
<td>PIB Large Liquids Propulsion Working Group Meeting</td>
<td>Boardroom</td>
<td>Closed</td>
</tr>
<tr>
<td>8:00 a.m. - 12:00 p.m.</td>
<td>PIB Test and Evaluation Working Group Meeting</td>
<td>Crossroads</td>
<td>Closed</td>
</tr>
<tr>
<td>8:00 a.m. - 12:00 p.m.</td>
<td>PIB Small Solids Working Group</td>
<td>Presidents</td>
<td>Closed</td>
</tr>
<tr>
<td><strong>8:00 a.m. - 12:05 p.m.</strong></td>
<td><strong>Wednesday Morning Technical Sessions</strong></td>
<td></td>
<td></td>
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<tr>
<td>8:00 a.m. - 11:35 a.m.</td>
<td>3A JPM High-Speed Airbreathing Propulsion - Experiments and Analysis</td>
<td>Liberty</td>
<td>Open</td>
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<tr>
<td>8:00 a.m. - 11:05 a.m.</td>
<td>3B PEDCS SPECIALIST SESSION: Additive Manufacturing of Energetic Materials - III</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 11:35 a.m.</td>
<td>3C PEDCS Advanced Testing and Materials</td>
<td>Shawnee</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 10:05 a.m.</td>
<td>3D RNTS Nozzle Design and Testing</td>
<td>Roanoke</td>
<td>Open</td>
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<tr>
<td>8:00 a.m. - 10:35 a.m.</td>
<td>3E SMBS Structural Analysis and Design - I</td>
<td>Pershing Place East</td>
<td>Open</td>
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<tr>
<td>10:35 a.m. - 11:00 a.m.</td>
<td>3E SMBS PANEL MEETING: Structural Analysis and Design</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 12:05 a.m.</td>
<td>3G PEDCS Gun Propulsion Component Formulation and Development - I</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>9:35 a.m. - 10:35 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>12:05 p.m. - 1:30 p.m.</td>
<td>Lunch Break - On Your Own</td>
<td>Pershing Place South</td>
<td>Closed</td>
</tr>
<tr>
<td>1:30 p.m. - 3:30 p.m.</td>
<td>AM Energetics Security Meeting</td>
<td>Pershing Place South</td>
<td>Closed</td>
</tr>
<tr>
<td>1:30 p.m. - 5:00 p.m.</td>
<td>PIB Small Liquids Working Group Meeting</td>
<td>Boardroom</td>
<td>Closed</td>
</tr>
<tr>
<td>1:30 p.m. - 5:00 p.m.</td>
<td>PIB Large Solids Working Group Meeting</td>
<td>Crossroads</td>
<td>Closed</td>
</tr>
<tr>
<td>1:30 p.m. - 5:00 p.m.</td>
<td>PIB Science and Technology Working Group Meeting</td>
<td>Presidents</td>
<td>Closed</td>
</tr>
<tr>
<td><strong>1:30 p.m. - 6:05 p.m.</strong></td>
<td><strong>Wednesday Afternoon Technical Sessions, Specialist Session, and Panel Meetings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 6:05 p.m.</td>
<td>3J JPM Tactical Solid Rocket Propulsion</td>
<td>Liberty</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 3:05 p.m.</td>
<td>3K RNTS SPECIALIST SESSION: Thrust Control</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>3:35 p.m. - 4:05 p.m.</td>
<td>3K RNTS PANEL MEETING: Thrust Control</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>4:05 p.m. - 4:35 p.m.</td>
<td>3K RNTS PANEL MEETING: Next Generation Nozzle Materials/Materials Obsolescence</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 - 5:35 p.m.</td>
<td>3L PEDCS Shock Physics</td>
<td>Shawnee</td>
<td>Open</td>
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<tr>
<td>1:30 - 5:05 p.m.</td>
<td>3N SMBS Structural Analysis and Design - II</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 - 4:05 p.m.</td>
<td>3O SEPS Environmental Aspects of Munitions</td>
<td>Pershing Place West</td>
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</tr>
<tr>
<td>4:05 p.m. - 4:35 p.m.</td>
<td>3O SEPS PANEL MEETING: Environmental Protection</td>
<td>Pershing Place West</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 - 5:05 p.m.</td>
<td>3P PEDCS Gun Propulsion Component Formulation and Development - II</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>5:05 p.m. - 5:30 p.m.</td>
<td>3P PEDCS PANEL MEETING: Gun Propulsion Component Formulation and Development</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>3:05 p.m. - 4:05 p.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>4:00 p.m. - 5:00 p.m.</td>
<td>JPM Program Committee Meeting</td>
<td>Pershing Place South</td>
<td>Closed</td>
</tr>
<tr>
<td>4:30 p.m. - 6:00 p.m.</td>
<td>SEPS Technical Steering Group Meeting</td>
<td>Westport</td>
<td>Closed</td>
</tr>
<tr>
<td>6:00 p.m. - 8:00 p.m.</td>
<td>Networking Night - Dinner and Cash Bar</td>
<td>Century Ballroom C</td>
<td>Open</td>
</tr>
</tbody>
</table>
## SCHEDULE - Thursday, 25 May

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Location</th>
<th>Status</th>
</tr>
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<td>Session Chair Meeting (Thursday Sessions)</td>
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</tr>
<tr>
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<td>Reading Room</td>
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</tr>
<tr>
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<td>PIB Executive Committee Meeting</td>
<td>Pershing Place South</td>
<td>Closed</td>
</tr>
<tr>
<td>8:00 a.m. - 12:05 p.m.</td>
<td>Thursday Morning Technical Sessions, Workshop, Specialist Session, and Panel Meetings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 a.m. - 11:35 a.m.</td>
<td>4B PEDCS Propellant and Explosives Process Engineering - I</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 12:05 p.m.</td>
<td>4C PEDCS Explosive Formulation</td>
<td>Shawnee</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 10:50 a.m.</td>
<td>4D RNTS WORKSHOP: Advanced Thermal Structural Modeling of Carbon Cloth Phenolic</td>
<td>Roanoke</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 11:05 a.m.</td>
<td>4E SMBS Experimental Structural and Mechanical Analysis and Test</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>11:05 a.m. - 12:05 p.m.</td>
<td>4E SMBS PANEL MEETING: Defect Evaluation</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 12:05 p.m.</td>
<td>4F PEDCS High Performance Propellants</td>
<td>Pershing Place West</td>
<td>Open</td>
</tr>
<tr>
<td>8:00 a.m. - 11:05 a.m.</td>
<td>4G PEDCS Liquid Propellants</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>11:05 a.m. - 12:05 p.m.</td>
<td>4G PEDCS PANEL MEETING: Liquid Propellants</td>
<td>Pershing Place North</td>
<td>Open</td>
</tr>
<tr>
<td>10:05 a.m. - 10:35 a.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>12:00 p.m. - 1:30 p.m.</td>
<td>SMBS Technical Steering Group Meeting</td>
<td>Boardroom</td>
<td>Closed</td>
</tr>
<tr>
<td>12:05 p.m. - 1:30 p.m.</td>
<td>Lunch Break - On Your Own</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 5:35 p.m.</td>
<td>Thursday Afternoon Technical Sessions, Workshop, Specialist Session, and Panel Meeting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30 p.m. - 2:35 p.m.</td>
<td>4K PEDCS Propellant and Explosives Process Engineering - II</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>2:35 p.m. - 3:35 p.m.</td>
<td>4K PEDCS PANEL MEETING: Propellant and Explosives Process Engineering</td>
<td>Mission</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 5:35 p.m.</td>
<td>4L PEDCS Explosives Chemistry</td>
<td>Shawnee</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 3:05 p.m.</td>
<td>4M PEDCS Surveillance and Aging</td>
<td>Roanoke</td>
<td>Open</td>
</tr>
<tr>
<td>3:35 p.m. - 4:35 p.m.</td>
<td>4M PEDCS PANEL MEETING: Explosive and Propellants Aging and Surveillance</td>
<td>Roanoke</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 4:35 p.m.</td>
<td>4N PEDCS Minimum Signature Ingredients</td>
<td>Pershing Place East</td>
<td>Open</td>
</tr>
<tr>
<td>1:30 p.m. - 5:35 p.m.</td>
<td>4O RNTS/SMBS WORKSHOP: Verification, Validation, and Uncertainty Quantification</td>
<td>Pershing Place West</td>
<td>Open</td>
</tr>
<tr>
<td>3:05 p.m. - 4:05 p.m.</td>
<td>Networking Area Refreshments</td>
<td>Century B</td>
<td>Open</td>
</tr>
<tr>
<td>6:00 p.m. - 8:00 p.m.</td>
<td>PEDCS Technical Steering Group Meeting</td>
<td>Presidents</td>
<td>Closed</td>
</tr>
</tbody>
</table>

### Schedule Color Key

- **Meeting Services**: Concurrent Sessions or Panel Meetings
- **Networking Opportunities**: Session Details
- **Closed Meetings**: Panel and Other Open Meetings

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