Program Book

NETS-2014

Nuclear and Emerging Technologies for Space

Sponsored by
ANS Aerospace Nuclear Science and Technology Division
Universities Space Research Association
NASA

Full proceedings on jump drive/ memory stick

About the Meeting

In February 2014, the Aerospace Nuclear Science and Technology Division (ANSTD) of the American Nuclear Society (ANS) will hold the 2014 Nuclear and Emerging Technologies for Space (NETS 2014) topical meeting at the Infinity Science Center (at NASA Stennis Space Center). This conference represents the first space nuclear research meeting associated with the NASA Stennis Space Center and follows a successful series of meetings in Albuquerque, NM in 2013 and 2011.

Topic Areas

NASA is currently considering capabilities for robotic and crewed missions to the Moon, Mars, and beyond. Strategies that implement advanced power and propulsion technologies, as well as radiation protection, will be important in accomplishing these missions in the future. NETS serves as a major communications network and forum for professionals and students working in the area of space nuclear technology. Every year it facilitates the exchange of information among research and management personnel from international government, industry, academia, and the national laboratory systems. To this end, the NETS 2014 meeting will address topics ranging from overviews of current programs to methods of meeting the challenges of future space endeavors.

Conference Organizers

John Bess, Ph.D.
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Idaho National Laboratory

Mike Houts, Ph.D.
General Chair
NASA Marshall Space Flight Center

Ramona Travis, Ph.D.
General Chair, Local Chair
NASA Stennis Space Center

Steven Howe, Ph.D.
Technical Chair
Center for Space Nuclear Research, USRA

Harold Gerrish
Technical Chair
NASA Marshall Space Flight Center

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Track I: Radioisotope Power Systems

Track Chairs

Steven Howe, Center for Space Nuclear Research, USRA

Tom Sutliff, NASA Glenn Research Center

Session Chairs and Reviewers

Scott Harlow (DOE)
Robert O'Brien (USRA-CSNR)
Dirk Cairns-Gallimore (DOE)
O'Malley (NASA-GRC)
Nathan Jerred (CSNR)

Track II: Fission Power and Electric Propulsion

Track Chairs

Andy Klein, Oregon State University

Aaron Craft, Center for Space Nuclear Research, USRA

Session Chairs and Reviewers

Briana Tomboulin (University of Massachusetts)
John Creasy (Y-12 National Security Complex)
Dave Poston (LANL)
John Bess (INL)

Track III: Nuclear Thermal Propulsion

Track Chairs

Harold Gerrish, NASA Marshall Space Flight Center

Wes Deason, Center for Space Nuclear Research, USRA

Session Chairs and Reviewers

Tony Kim (NASA MSFC)
Stan Borowski (NASA GRC)
Roger Lenard (Little Prairie Services)
David Coote (NASA SSC)
Michael Eads (Ohio State University)
Wesley Deason (CSNR)
Omar Mireles (NASA-MSFC)
Jeramie Broadway (NASA MSFC)
Lou Qualls (DOE ORNL)

Track IV: Advanced Concepts

Track Chairs

John Scott, NASA Jonson Space Center

Session Chairs and Reviewers

John Scott (NASA-JSC)

Aerojet Rocketdyne is a world-recognized aerospace and defense leader providing propulsion and energetics to the domestic and international space, missile defense and strategic systems, tactical systems and armaments areas, and transformational energy technology solutions to address the world's energy needs. GenCorp is a diversified company providing innovative solutions to its customers in the aerospace and defense, energy and real estate markets.

Additional information about Aerojet Rocketdyne and GenCorp can be obtained by visiting the companies' websites at www.Rocket.com and www.GenCorp.com.

The UK's National Nuclear Laboratory (NNL) offers an unrivalled breadth of technical products and services to our customers across the whole nuclear industry.

Covering the complete nuclear fuel cycle from fuel manufacture and power generation, through to reprocessing, waste treatment and disposal and including defence, new nuclear build and Homeland Security. NNL provides these services supported by an impressive range of facilities and links with international research organisations, academia and other national laboratories. NNL's facilities are second to none. The Central Laboratory at Sellafield is the most modern nuclear research facility in the world. The Windscale Laboratory provides Post-Irradiation Examination (PIE) and other services critical to plant life extension. At Workington NNL operates a non-radioactive test rig facility and at Preston NNL operates a uranium active chemistry laboratory. NNL also has staff at the Risley, Stonehouse and Harwell sites providing Head Office functions, graphite technology, radiation chemistry and modelling/simulation.

Appointed by the European Space Agency (ESA), NNL's role has been to find a sustainable power source in batteries to power future European space missions beyond Mars. After finding that americium was the ideal power source, NNL then started examining the logistical and chemical issues involved in the separation of americium from plutonium. NNL is now a key player in a European wide space programme.

The Idaho Section of the American Nuclear Society (IANS) is the largest and one of the most active sections of the American Nuclear Society. The organization is consistently recognized by the American Nuclear Society with best large section awards of achievement.

The organization, despite the Idaho title, also includes members from Utah, Wyoming and Montana.

A strong supporter of educational programs, IANS, supports student ANS members at Idaho State University, University of Idaho, Utah State University and University of Utah. IANS also financially supports student member attendance and ANS national meetings and matches member's financial donations to area universities.

The organization brings in guest speakers each month to focus on energy-related research areas. In addition, the section provides leadership for topical ANS meetings including hosting the last two international GLOBAL meetings.

Volunteers within the section organize nuclear energy merit badge pow-wows for boy and girl scouts, community service projects, share their nuclear energy knowledge in the classroom and for the past 20 years have twice a year cleaned up trash along two miles of highway near Idaho Falls. An educational essay contest focuses on nuclear-related topics and awards $3,000 in prizes each year.

The organization was chartered in 1957 and is a non-profit organization dedicated to the advancement of science, engineering, and education pertaining to peaceful uses of nuclear science and technology.

Contact: idahoamericannuclearsociety@gmail.com

www.ansidaho.org

Monday February 24, 2014		
7:00 - 8:00 am	**Registration**	Registration Desk
	Session Preparation	Exhibitor Hall
8:00 - 10:00 am	**Opening Plenary**	Earth Gallery (1st Floor)
8:00 - 8:10 am	Welcome and Introduction • Dr. Steven Howe, CSNR	
8:10 - 8:30 am	NASA Stennis Space Center Deputy Director • Jerry Cook, NASA SSC	
8:30 -8:50 am	NASA HQ Chief Technologist • Jim Adams, NASA HQ	
8:50 - 9:10 am	Associate Administrator, NASA Human Exploration and Operations • William Gerstenmaier	
9:10 - 9:30 am	DOE/National Nuclear Security Administration • Dr. Jerry McKamy, DOE	
9:30 - 9:50 am	NASA MSFC Engineering Directorate • Chris Singer, NASA MSFC	
10:00 - 10:30 am	Break	
10:30 - 12:00 pm	**Opening Technical Sessions**	Conference Rooms A, B, and D (2nd Floor)
	Track I: Radioisotope Power Systems • Leonard Dudzinski, NASA HQ • Rebecca Onuschak, DOE NE-75 • Larry Trager, Aerojet Rocketdyne	Conference Room B *Hosted by: Tom Sutliff*
	Track I: Radioisotope Power Systems • Don Palac, NASA GRC • Patrick NcClure, DOE LANL • Christopher Robinson, DOE Y-12	Conference Room A *Hosted by: Lee Mason*
	Track III: Nuclear Thermal Propulsion • Dr. Mike Houts, NASA MFSC • Dr. Anthony Belvin, DOE NE-75 • Claude "Russ" Joyner, Aerojet Rocketdyne	Conference Room D *Hosted by: Dr. Steven Howe*
12:00 - 1:00pm	Lunch Break	Infinity Cafe and/or Box lunches available for purchase
1:00 - 3:00pm	**Technical Sessions**	Conference Rooms A, B, D (2nd Floor)

3:00-3:30pm	Break	Exhibitor Hall (1st Floor)
3:30 - 5:30pm	**Technical Sessions**	Conference Rooms A, B, D (2nd Floor)
5:30 - 6:00 pm	**No-Host Bar**	Earth Gallery
6:00 - 8:00 pm	**Reception**	Earth Gallery *Courtesy of University of Leicester, National Nuclear Lab, and Idaho ANS*

Tuesday February 25, 2014

7:00 - 8:00am	**Session Preparation**	Exhibitor Hall
8:00 - 11:30am	**Technical Session**	Conference Rooms A, B, D
11:30 - 12:30pm	Lunch Break	Infinity Cafe and/or Box lunches available for purchase
12:45 - 4:30pm	**Technical Tour**	NASA Stennis Space Center
12:45 -1:00 pm	Bus Boarding	Entrance of Infinity Center
1:00 - 1:20 pm	Propulsion Test Complex Briefing	*Randy Galloway, Director NASA SSC Engineering and Test Directorate*
1:20 -4:30 pm	Tour NASA Stennis Space Center	

Wednesday February 26, 2014

7:00 - 8:00am	**Session Preparation**	Exhibitor Hall
8:00 - 10:00am	**Technical Sessions**	Conference Rooms A, B, D
10:00 - 10:30am	Break	Exhibitor Hall
10:30 - 12:00pm	**Technical Sessions**	Conference Rooms A, B, D
12:00 - 1:00pm	Lunch	Infinity Cafe and/or Box lunchesavailable for purchase
1:00 - 3:00pm	**Technical Sessions**	Conference Rooms A, B, D
3:00 - 3:30pm	Break	Exhibitor Hall
3:30 - 5:30pm	**Technical Sessions**	Conference Rooms A, B, D
5:30 - 6:00pm	**No-Host Bar**	Earth Gallery
6:00-8:00pm	Closing Banquet, Guest Speaker: Fred Haise	Earth Gallery *Courtesy of: Aerojet Rocketdyne*

Monday February 24, 2014

Track I: Radioisotope Power Systems
Radioisotope Fuels and Fueled Systems

1:00-3:00pm	**Plutonium-238 Supply Project: Target Design and Scale-up,** *R. M. Wham (ORNL)*	Conference Room B
	Potential Superionic Conductivity in the Actinide Dioxides, *C. E. Whiting, J. M. Douglas, B. M. Cremeans, E. A. Kauffman, C. D. Barklay, and D. P. Kramer (University of Dayton)*	
	The Multi-Mission Radioisotope Thermo-Electric Generator for the Mars Science Laboratory: Lessons Learned That May Be Applicable for the Mars 2020 Mission, *S. G. Johnson, K. L. Lively, and C. C. Dwight (INL)*	
	241Am Production for Use in Radioisotope Power Systems, *M.J. Sarsfield, K. Bell, C.J. Maher, M.J. Carrott, C. Gregson, J. Brown, D.A. Woodhead, S.R. Baker, R.J. Taylor, T.P. Tinsley, T.G. Rice, C.J. Rhodes, M. Clough, (National Nuclear Lab), and K. Stephenson (European Space Agency)*	
	A Status Update on the Production of Cerium Oxide Microspheres for Space Nuclear Power Applications, *J. A. Katalenich, (University of Michigan)*	

Track III: Nuclear Thermal Propulsion
NTP Strategy

1:00-3:00pm	**Nuclear Cryogenic Propulsion Stage Affordable Development Strategy,** *G. E. Doughty, H. P. Gerrish, and R. J. Kenny (NASA-MSFC)*	Conference Room D
	Nuclear Thermal Rocket (NTR) Development Risk Communication, *T. Kim (NASA-MSFC)*	
	Nuclear Thermal Propulsion Development Efforts Within the Department of Energy, *L. Qualls, B. G. Schnitzler, (ORNL), J. W. (INL), D. Poston (LANL), A. Weitzberg (Consultant), and A. Belvin (DOE-NE)*	
	High Performance Computing Simulations of Radiation with GEANT4, Simulating the Apollo Missions and Simulating New Shielding Materials, *M.L. Lund (University of Utah)*	

Track IV: Advanced Concepts
Advanced Fission Power and Propulsion

1:00-3:00pm	**Opening the Solar System: An Advanced Nuclear Spacecraft for Human Exploration,** *R.O. Werka (NASA-MSFC) and T.K. Percy (SAIC)*	Conference Room A
	The Dusty Plasma Fission Fragment Rocket Engine: Design Constraints and Performance, *R. B. Sheldon and R. L. Clark (Grassmere Dynamics, LLC)*	
	Progress on the Pulsed Fission-Fusion (PuFF) Propulsion Concept, *R. B. Adams (NASA-MSFC), J. Cassibry, and K. Schillo, (University of Alabama)*	
	Optical Nuclear Electric Propulsion, *V. Patel, C. Runco (Texas A&M University), R. Davis (University of Idaho), N. Campbell (University of Florida, and S. Howe (CSNR)*	

Monday February 24, 2014

	Track I: Radioisotope Power Systems Stirling – The ASRG	
3:30-5:30pm	**Advanced Stirling Radioisotope Generator Design Overview and Future Plans,** *J. Chan, T. Hoye, E. Schulze, and J. Wiser (Lockheed Martin)*	Conference Room B
	Test Program for Stirling Radioisotope Generator Hardware at NASA Glenn Research Center, *E. J. Lewandowski, S. M. Oriti, and M. D. Dolloff (NASA-GRC)*	
	Summary of Advanced Stirling Converor (ASC) Testing at NASA Glenn Research Center, *N. A. Schifer and S. M. Oriti (NASA-GRC)*	
	Track III: Nuclear Thermal Propulsion NTP Mission Analysis	
3:30-5:30pm	**Mission Characteristics of Small NTP With LOX-Augmentation,** *C. R. Joyner II, D. J. H. Levack, and M. J. Bulman (Aerojet Rocketdyne)*	Conference Room D
	NTR Performance Parameters for Science, Cargo Delivery, and Crewed Exploration Missions, *S. K. Borowski and David R. McCurdy (NASA-GRC)*	
	Nuclear Cryogenic Propulsion Stage Conceptual Design and Mission Analysis, *L. D. Kos and T. E. Russell (NASA-MSFC)*	
	Design of an Evolvable Nuclear Thermal Rocket Ferry for Geosynchronous Transfer, *R. T. Beeson (CSNR, University of Illinois), A. C. Faler (CSNR, University of Southern California), and R. J. Garner (CSNR, University of Leicester)*	
	Track IV: Advanced Concepts Fusion	
3:30-5:30pm	**Analytic Model to Estimate Thermonuclear Neutron Yield in Z-Pinches Using the Magnetic Noh Problem,** *R. A. Agnew and J. T. Cassibry (The University of Alabama)*	Conference Room A
	Progress in the Development of a Lithium Diode for the Charger-1 Pulse Power Facility for Fusion Space Propulsion Research, *W. T. Rogerson, Jr., S. W. Brown, and B. D. Green (Y-12 National Security Complex)*	
	The Fusion Driven Rocket: Nuclear Propulsion Through the Direct Conversion of Fusion Energy, *J. Slough (University of Washington), A. Pancotti, D. Kirtley, and G. Votroubek (MSNW LLC)*	
	The Non-Equilibrium Fusion Plasma Research Center and Development of a Fusion Augmented Thruster, *J. Cassibry (University of Alabama)*	

Tuesday February 25, 2014

	Track I: Radioisotope Power Systems Advancements in Stirling	
8:00-9:30am	**Continuing Development of the Advanced Stirling Convertor (ASC) for NASA RPS,** *W. A. Wong, S. D. Wilson (NASA-GRC), and J. Collins (Sunpower, Inc.)*	Conference Room B
	Design of the Second Advanced Stirling Radioisotope Generator Engineering Unit, *S. M. Oriti and E. J. Lewandowski (NASA-GRC)*	
	NASA GRC Support of the Flight ASRG Project, *S.D. Wilson and W.A. Wong, (NASA-GRC)*	
	Track II: Fission Power and Electric Propulsion Fission I	
8:00-9:30am	**High-Temperature Carbon Fiber Radiator for Nuclear Electric Power and Propulsion: Project Overview and Update,** *B. N. Tomboulian and R. W. Hyers (University of Massachusetts)*	Conference Room A
	Low Cost Radiator For Fission Power Thermal Control, T. Maxwell, *J. R. Hartenstine, C. Tarau, W. G. Anderson (Advanced Cooling Technologies, Inc.), T. Stern, N. Walmsley (Vangaurd Space Technologies), and M. H. Briggs (NASA-GRC)*	
	Turbo-Brayton Power Converter for Spaceflight Applications, *J. J. Breedlove, D. Deserranno, and M. V. Zagarola, (Creare Incorporated)*	
	Track III: Nuclear Thermal Propulsion NTP History	
8:00-9:30am	**Nuclear Thermal Propulsion Ground Test History,** *H. P. Gerrish, Jr. (NASA-MSFC)*	Conference Room D
	Accomplishments and Lessons-Learned From the Space Nuclear Thermal Propulsion (SNTP) Program, *R.X. Lenard (Little Prairie Services)*	
	Historic Solid Core Nuclear Thermal Propulsion Fuel Forms: Functions and Limitation, *K. Benensky (Pennsylvania State University)*	
	Track II: Fission Power and Electric Propulsion Fission II	
10:00-11:30am	**Development of a 12kWe Stirling Power Conversion Unit for Fission Power Systems – Status Update,** *S.M. Geng, (NASA0GRC), J. Stanley, J.G. Wood, E. Holliday, (Sunpower)*	Conference Room A
	Fuel Selection and Development for Small Fission Power System, *J.T. Creasy, R.C. Robinson (Y-12 National Security Complex), and C. Bowman (NASA-GRC)*	
	Manufacturing Techniques for High Density Solid Core Space Reactors, *J. Creasy, C. Robinson, B. Green (Y-12 National Security Complex)*	

Tuesday February 25, 2014

Track III: Nuclear Thermal Propulsion
NTP Ground Test

10:00-11:30am	**Current Ground Test Options for Nuclear Thermal Propulsion (NTP),** *H. P. Gerrish, Jr. (NASA-MFC)*	Conference Room D
	Development of Modeling Approaches for Nuclear Thermal Propulsion Test Facilities, *D. R. Jones, D. C. Allgood, and K. Nguyen (NASA-JSC)*	

Track IV: Advanced Concepts
Advance Solid-State PCS

10:00-11:30am	**Preliminary Analysis: Am-241 RHU/TEG Electric Power Source for Nanosatellites,** *G. A. Robertson, D. Young, K. Cunningham, T. Kim (NASA-MSFC), R. M. Ambrosi, and H. R. Williams (University of Leicester)*	Conference Room B
	Lower Power Operations at the Outer Planets: Trojan Asteroid Mission Enabled Through Radioisotope-Thermal Photovoltaic Power, *A. Ghosh (University of Illinois), J. Rothenberg, O. Giusti (San Jose State University) A. Rajguru (University of Southern California), and S. Howe (CSNR)*	
	Mars Sample Return and Flight of a Small Bimodal Nuclear Rocket and ISRU Plant, *J. A. George, J.J. Wolinsky, M. B. Bilyeu, and J. H. Scott (NASA-JSC)*	

Wednesday February 26, 2014

Track I: Radioisotope Power Systems
The MMRTG – What's Next?

8:00-10:00am	**Getting to an Enhanced MMRTG,** *D. F. Woerner (JPL), D. Cairns-Gallimore (DOE NE-75), J. Zakrajsek, and T. O'Malley (NASA-GRC)*	Conference Room B
	The Enhanced MMRTG – eMMRTG – Boosting MMRTG Power Output, *T. Hammel, S. Ketser, B. Sievers (Teledyne Energy Systems), and B. Otting (Aerojet Rocketdyne)*	
	Skutterudite-Based Advanced Thermoelectric Couples for Integration into an Enhanced MMRTG, *T. Caillat, S. Firdosy, B. C- Y. Li, C. –K. Huang, D. Uhl, K. Smith, J. Paik, J.- P. Fleurial (JPL), R. Bennett, and S. Keyser (Teledyne Energy Systems)*	
	MMRTG – Power for the Mars Science Laboratory, *B. Otting (Aerojet Rocketdyne)*	

Wednesday February 26, 2014

	Track III: Nuclear Thermal Propulsion NTP Business and Risk	
8:00-10:00am	**Risk Assessment for the Ground Launch of a Single Stage To Orbit Nuclear Thermal Rocket,** *J. C. King and S. I. Labib (Colorado School of Mines)*	Conference Room A
	United States Nuclear Rocket Company (USNRC), *L.A. Hardin (US NRC)*	
	Business Case for a Commercially Developed Nuclear Thermal Rocket, *R. T. Beeson (CSNR, University of Illinois), and A. C. Faler (CSRN, University of Southern California)*	
	A Research Reactor Concept to Support NTP Development, *M.J. Eades, T. E. Blue (Ohio State University), H. P. Gerrish (NASA-MSFC), L.A. Hardin (US NRC)*	
	Track III: Nuclear Thermal Propulsion NTP Engine Design I	
8:00-10:00am	**Overview of Nuclear Thermal Propulsion Engine Modeling and Design Activities at Oak Ridge National Laboratory,** *B. G. Schnitzler (ORNL)*	Conference Room D
	Preliminary Design of a NERVA Type Carbide LEU-NTR, *P. Venneri and Y. Kim (Korea Advanced Institute of S&T)*	
	Design of a Tungsten CERMET LEU-NTR, *P. Venneri, Y. Kim (Korea Advanced Institute of S&T), W. Deason, R. O'Brien, S. Howe (CSNR), P. Husemeyer (University of Cambridge), and C. G. Rosaire (Texas A&M Univeristy)*	
	Driver Fuel Design for a CERMET Nuclear Thermal Rocket, D.I. Poston (LANL)	
	Track I: Radioisotope Power Systems Advancement in Thermoelectrics	
10:30-12:00pm	**Skutterudites: How Do They Fare Against State-of-Practice Thermoelectric Materials in Radioisotope Thermoelectric Generators?** *T. Caillat, S. Firdosy, J. Ni, V. Ravi, J. Paik, and J.- P. Fleurial (JPL)*	Conference Room B
	High Efficiency Rare-Earth-Based Thermoelectric Materials for Space Power Generation Applications, *S. K. Bux, T. Vo, A. Zevalkink, D. Uhl, B. C.-Y. Li, C.-K. Huang, P. Von Allmen (JPL), J. M. Ma, S. C. Clark, J.-P. Fleurial (JPL, University of California), Y. Hu, J. Grebenkemper, and S. Kauzlarich (University of California)*	
	Advanced Thermoelectric Couples – Current Status, *S.A. Firdosy, T. Caillat, B.C-Y. Li, C.K. Huang, V. Ravi, J. Paik, D. Uhl, S. Bux, K. Smith, and J.-P. Fleurial (JPL)*	

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	Track III: Nuclear Thermal Propulsion NTP Engine Design II	
10:30-12:00pm	**Fuel Zoning of NTP Concepts with Variable Channel Diameters,** *D. Poston (LANL)*	Conference Room A
	Thermal Hydraulic Design and Optimization of a Tungsten CERMET LEU-NTR, *P. Husemeyer (University of Cambridge) and W. R. Deason (CSNR)*	
	Neutronic Analysis of a Tungsten CERMET LEU-NTR, *C. G. Rosaire IV (Texas A&M University), P. Husemeyer (University of Cambridge), W. Deason (CSNR), and P. Venneri (Korea Advanced Institute for S&T)*	
	Track III: Nuclear Thermal Propulsion Simulated NTP Fuel Testing	
10:30-12:00pm	**Nuclear Thermal Rocket Element Environmental Simulator (NTREES) Upgrade Activities,** *W.J. Emrich, Jr. (NASA-MSFC)*	Conference Room D
	Induction Heating Model of CERMET Fuel Element Environmental Test (CFEET), *C. F. Gomez (NASA-MSFC)*	
	Compact Fuel Element Environment Tester 2.0, *D. P. Cavender, C. F. Gomez (NASA-MSFC), and D. E. Bradley (Yetispace, Inc.)*	
	Track I: Radioisotope Power Systems RPS Programs and Studies	
1:00-3:00pm	**NASA's Radioisotope Power Systems Program – a 5 Year Status Assessment,** *J. A. Hamley, P. W. McCallum, C. E. Sandifer, T. J. Sutliff, and J. F. Zakrajsek (NASA-GRC)*	Conference Room B
	Radioisotope Power Systems Program Technology Advancement Project Present and Future, *T.F. O'Malley, L. Mason, J. Zakrajsek (NASA-GRC), and J. Fleurial (JLP)*	
	Versatile Stirling Technology for Radioisotope and Fission Power Systems, *L. S. Mason, J. F. Zakrajsek, and D.T. Palac (NASA-GRC)*	
	Space Nuclear Power Systems Based on Americium-241: Enabling European Space Exploration Missions, *R. M. Ambrosi, H. R. Williams, Piyal Samara-Ratna, and Nigel Bannister (University of Leicester)*	

Wednesday February 26, 2014

	Track II: Fission Power and Electric Propulsion Fission III	
1:00-3:00pm	**Specific Mass Requirements for Human Nuclear Electric Propulsion Missions to Mars,** *C. G. Morrison, W. Ji (Rensselaer Polytechnic Institute), A. V. Ilin, F. R. Chang Díaz and M. D. Carter (Ad Astra Rocket Company)*	Conference Room A
	A New Reactor Power System Concept for Manned Lunar Base Application, *Hu Gu and Xie Jiachun (China Institute of Atomic Energy)*	
	Notional Design of the Kilopower Space Reactor, *D.I. Poston, P.R. McClure, M.A. Gibson (LANL), L. Mason, C. Bowman (NASA-GRC), J. Creasy, and C. Robinson (Y-12 National Security Complex)*	
	MEGAHIT: Update on the Advanced Propulsion Roadmap for HORIZON2020, *F. Masson, E. Cliquot (Centre National d'Etudes Spatials), and T. Tinsley (National Nuclear Lab)*	
	Track III: Nuclear Thermal Propulsion NTP Fuel I	
1:00-3:00pm	**Affordable Development and Optimization of CERMET Fuels for NTP Ground Testing,** *R. Hickman, J. Broadway, and O. Mireles (NASA-MSFC)*	Conference Room D
	Fabrication of Tungsten- Uranium Dioxide (W-UO2) CERMET Fuel Materials for Nuclear Thermal Propulsion, *J. W. Broadway, R. R. Hickman, O. R. Mireles and D. J. Vermilion (NASA-MSFC)*	
	Fabrication of dUO2-W Cermet Fuel Elements via Spark Plasma Sintering: Advances and Progress Made, *R.C. O'Brien, S.K. Cook, and L.C. Hone (CSNR)*	
	Design Evolution of Hot Isostatic Press Cans for NTP CERMET Fuel Fabrication, *O. R. Mireles, J. Broadway, R. Hickman (NASA-MSFC)*	
	Track I: Radioisotope Power Systems RPS Mission and Systems Study	
3:30-5:30pm	**Power System Overview for the Small RPS Centaur Flyby and the Mars Polar Hard Lander NASA COMPASS Studies,** *R. L. Cataldo, A. J. Colozza, P. C. Schmitz, S. R. Oleson (NASA-GRC), Y. H. Lee, B. K. Bairstow (JPL), Ralph Lorenz, Andy Rivkin, (JHU Applied Physics Laboratory)*	Conference Room B
	High-Power Laser Experiments on Rotating Small-Scale GPHS Modules, *D. P. Kramer, C. D. Barklay, S.M. Goodrich, C.E. Whiting (University of Dayton), and D. Cairns-Gallimore (DOE)*	
	Applying Current Crew Survivability Efforts to Improve Safety of Radioisotope Payloads During Launch, *M. E. Bangham and J. M. Blackwood (Bangham Engineering, Inc.)*	
	Radioisotope-Driven Dual-Mode Propulsion System for CubeSat-Scale Payloads to the Outer Planets, *N. D. Jerred, T. M. Howe, S. D. Howe (CSNR), and A. Rajguru (University of Southern California)*	

Wednesday February 26, 2014

Track II: Fission Power and Electric Propulsion
Fission IV

3:30-5:30pm	**Benchmark Evaluation of Distribution Measurements for a Beryllium-Reflected Space Reactor Mockup,** *M. A. Marshall and J. D. Bess (INL, CSNR)*	Conference Room A
	Status Update for the Fission Surface Power Technology Demonstration Unit, *M. H. Briggs, M. A. Gibson, and S. M. Geng (NASA-GRC)*	
	Development of NASA's Small Fission Power System for Science and Human Exploration, *M.A. Gibson, L. Mason, C. Bowman (NASA-GRC), D.I. Poston, P.R. McClure (LANL), J. Creasy, and C. Robinson (Y-12 National Security Complex)*	
	The Use of the Nevada National Security Site as a Reactor Test Center, *P. R. McClure (LANL) and J. L. Holt (National Security Technologies)*	

Track III: Nuclear Thermal Propulsion
NTP Fuel II

3:30-5:30pm	**Historical Material Property Date for CERMET and Graphite-Based NTP Fuels,** *M. E. Stewart (Vantage Partners)*	Conference Room D
	Development of Advanced Coating for NERVA-Type Fuel Elements, *S. V. Raj, J. A. Nesbitt (NASA-GRC), and M. E. Stewart (Vantage Partners)*	
	Production of dUO2 Fuel Kernels for the NASA NCPS Program Cermet Fuels Development using an Ammonium Alginate Process, *R.C. O'Brien, S.K. Cook, and L.C. Hone (CSNR)*	
	Development Status of a CVD System to Deposit Tungsten Onto UO_2 Powder Via the WCl6 Process, *O. R. Mireles, A Kimberlin, J. Broadway, and R. Hickman (NASA-MSFC)*	

Fred W. Haise
Retired

Fred W. Haise retired in 1996 as President of Northrop Grumman Technical Services (GTS). He joined Grumman in 1979 as Vice President, Space Programs, and had a succeeding assignment as President of the Space Station Support Division in 1987.

Mr. Haise was born in Biloxi, Mississippi. He graduated with honors in Aeronautical Engineering from the University of Oklahoma in 1959. He completed postgraduate courses in the USAF Aerospace Test Pilot School at Edwards Air Force Base in 1964 and the Harvard Business School PMD Program in 1972. Mr. Haise completed US Navy flight training and served as a US Marine Corps Fighter Pilot in VMF-533 and VMF-114. He had further assignments as a Tactics and All-Weather Flight Instructor at NAS Kingsville, Texas. While flying with the Ohio Air National Guard, Mr. Haise was recalled into the USAF with the 164th TAC Fighter Squadron. He has logged 9100 hours of flying time in over 80 types.

A 20-year NASA career was begun as an Aeronautical Research Pilot at Lewis Research Center in 1959. Further assignments were held as a Research Pilot at the NASA Flight Research Center and as an Astronaut at Johnson Space Center. Mr. Haise served as backup crew for the Apollo 8, 11, and 16 Missions. He flew as the Lunar Module Pilot on the aborted Apollo 13 Mission in 1970 that was dramatized in the Hollywood movie titled “Apollo 13”. He also flew five flights as the Commander of the Space Shuttle Enterprise in 1977 for the Approach and Landing Test Program at Edwards Air Force Base.

Among his awards are the Presidential Medal of Freedom, the American Institute of Aeronautics and Astronautics (AIAA) Haley Astronautics Award, the General Thomas D. White Space Trophy, the Society of Experimental Test Pilots Kinchloe “Test Pilot of the Year” Award, the NASA Distinguished Service Medal, the NASA Exceptional Service Award, the NASA Special Achievement Award, the Aerospace Walk of Honor and the US Astronaut Hall of Fame.

He is an Associate Fellow of the AIAA and Fellow of the Society of Experimental Test Pilots and the American Astronautical Society. Mr. Haise is a member of Tau Beta Pi, Sigma Gamma Tau, and Phi Theta Kappa honor societies. Mr. Haise resides in Pasadena, Texas with his wife, the former Patt Price of Rogers, Texas

Jerry R. Cook
Deputy Director
John C. Stennis Space Center

Jerry R. Cook serves as deputy director of NASA's John C. Stennis Space Center near Bay St. Louis, Miss. He is responsible, with the center director, for coordinating all of NASA's rocket propulsion testing capabilities and Stennis' roles in NASA's applied science programs, as well as managing Stennis.

Prior to this appointment, Cook served as the associate program manager of the Space Launch System (SLS) Program Office at NASA's Marshall Space Flight Center in Huntsville, Ala. He has served in a dual role as Manager of the SLS Program Planning and Control Office, responsible for administering a multi-billion-dollar, multi-year budget.

He began his NASA career in 1985 as a test engineer at Marshall. While at Marshall, he worked his way up to hold various management-level positions, including manager of the Space Shuttle Main Engine Project Office.

He also worked in the Space Transportation Directorate at NASA Headquarters in Washington, first as a goals manager in the Program Planning and Development Office and then as a Second-Generation Reusable Launch Vehicle representative.

Cook received a bachelor's degree in mechanical engineering from the University of Alabama in Tuscaloosa. The recipient of numerous awards, he has received NASA's Exceptional Service Medal, two NASA Exceptional Achievement Medals for significant contributions to the NASA mission, and the Silver Snoopy award from the Astronaut Corps for his contributions to the success of human space flight missions. He was named Aerospace Engineer of the Year for 2006-07 by the American Institute of Aeronautics and Astronautics (AIAA) in recognition of his technical skill and leadership in the practice of the aerospace engineering profession.

He is married to Felicia Riggs Cook and they have two children. His son Preston attends the University of Alabama. His daughter Peyton, a senior at Huntsville High School, will attend the University of Alabama in fall 2013.

James Adams
Office of the Chief Technologyis
NASA

James Adams came to the Office of the Chief Technologist from NASA's Science Mission Directorate. There, he served as the Deputy Director of the Planetary Science Division, overseeing the Discovery, New Frontiers, Lunar Science and Mars programs. He was responsible for the development of several key technologies including Ion Propulsion, Radioisotope Power Systems and Pu-238 production strategies. Prior to this post, Adams served as the Project Manager for the Tracking and Data Relay Satellite, as well as a Space Station Freedom Systems Integration Manager at NASA's Goddard Space Flight Center (GSFC).

Adams' career experience spans both industry and government. In 1979, he joined General Electric as an engineer working on a variety of military and civilian space systems. He has worked on the design, development, testing, and operations of over 24 launched spacecraft, across three scientific disciplines and human spaceflight.

Adams earned his Bachelor of Science in Physics from Westminster College in New Wilmington, Penn. and his Master of Science degree in Electrical Engineering from Villanova University.

He has been bestowed a number of awards and honors, from the NASA Outstanding Leadership Medal, the NASA Exceptional Achievement Medal, NASA Exceptional Service Medal and the "Business Solutions in the Public Interest" award from the Council for Excellence in Government.

Jim's father worked in the aerospace industry and he says that space has always been a part of his life. He even had the chance to sit in the Mercury capsule during a "Family Day" at GSFC in the 1960s, recalling that it was very small in comparison to his family's Oldsmobile. Jim likes swimming, kayaking, gardening, and cooking with his wife and son, and he holds a private pilot's license.

William H. Gerstenmaier
Associate Administrator for Human Exploration and Operations
NASA Headquarters

William H. Gerstenmaier is the associate administrator for the Human Exploration and Operations Directorate at NASA Headquarters in Washington, DC. In this position, Gerstenmaier provides strategic direction for all aspects of NASA's human exploration of space and cross-agency space support functions of space communications and space launch vehicles. He provides programmatic direction for the continued operation and utilization of the International Space Station, development of the Space Launch System and Orion spacecraft, and is providing strategic guidance and direction for the commercial crew and cargo programs that will provide logistics and crew transportation for the International Space Station.

Gerstenmaier began his NASA career in 1977 at the then Lewis Research Center in Cleveland, Ohio, performing aeronautical research. He was involved with the wind tunnel tests that were used to develop the calibration curves for the air data probes used during entry on the Space Shuttle.

Beginning in 1988, Gerstenmaier headed the Orbital Maneuvering Vehicle (OMV) Operations Office, Systems Division at the Johnson Space Center. He was responsible for all aspects of OMV operations at Johnson, including development of a ground control center and training facility for OMV, operations support to vehicle development, and personnel and procedures development to support OMV operations. Subsequently he headed the Space Shuttle/Space Station Freedom Assembly Operations Office, Operations Division. He was responsible for resolving technical assembly issues and developing assembly strategies.

Gerstenmaier also served as Shuttle/Mir Program operations manager. In this role, he was the primary interface to the Russian Space Agency for operational issues, negotiating all protocols used in support of operations during the Shuttle/Mir missions. In addition, he supported NASA 2 operations in Russia, from January through September 1996 including responsibility for daily activities, as well as the health and safety of the NASA crewmember on space station Mir. He scheduled science activities, public affairs activities, monitored Mir systems, and communicated with the NASA astronaut on Mir.

In 1998, Gerstenmaier was named manager, Space Shuttle Program Integration, responsible for the overall management, integration, and operations of the Space Shuttle Program. This included development and operations of all Space Shuttle elements, including the orbiter, external tank, solid rocket boosters, and Space Shuttle main engines, as well as the facilities required to support ground processing and flight operations.

In December 2000, Gerstenmaier was named deputy manager, International Space Station Program and two years later became manager. He was responsibility for the day-to-day management, development, integration, and operation of the International Space Station. This included the design, manufacture, testing, and delivery of complex space flight hardware and software, and for its integration with the elements from the International Partners into a fully functional and operating International Space Station.

Named associate administrator for the Space Operations Directorate in 2005, Gerstenmaier directed the safe completion of the last 21 Space Shuttle missions that witnessed assembly complete of the International Space Station. During this time, he provided programmatic direction for the integration and operation of the International Space Station, space communications, and space launch vehicles.

Gerstenmaier received a bachelor of science in aeronautical engineering from Purdue University in 1977 and a master of science degree in mechanical engineering from the University of Toledo in 1981. In 1992 and 1993, he completed course work for a doctorate in dynamics and control with emphasis in propulsion at Purdue University.

Gerstenmaier is the recipient of numerous awards, including three NASA Certificates of Commendation, two NASA Exceptional Service Medals, a Senior NASA Outstanding Leadership Medal, the Meritorious Executive Presidential Rank Award, and Distinguish Executive Presidential Rank Award. He also was honored with an Outstanding Aerospace Engineer Award from Purdue University. Additionally, he was twice honored by Aviation Week and Space Technology for outstanding achievement in the field of space. His other awards include: the AIAA International Cooperation Award; the National Space Club Astronautics Engineer Award; National Space Club Von Braun Award; the Federation of Galaxy Explorers Space Leadership Award; AIAA International Award; the AIAA Fellow; Purdue University Distinguished Alumni Award; and Honored at Purdue as an Old Master in the Old Masters Program; recipient of the Rotary National Award for Space Achievement's National Space Trophy; Space Transportation Leadership Award; the AIAA von Braun Award for Excellence in Space Program Management; and the AIAA von Karman Lectureship in Astronautics.

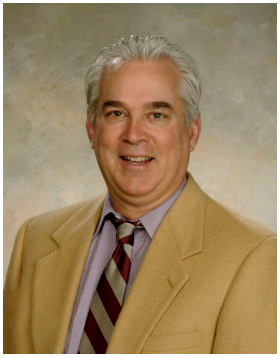
He is married to the former Marsha Ann Johnson. They have two children.

Dr.Jerry N. McKamy
Director of the Office of Environment, Safety and Health National Nuclear Security Administration

Dr. Jerry N. McKamy is the Director of the Office of Environment, Safety and Health (NA-00-10) within the National Nuclear Security Administration (NNSA). The ESH Office provides safety and oversight support to NNSA line management. Dr. McKamy is qualified in the Department's Technical Qualification Program as a Senior Technical Safety Manager and in the functional area of Criticality Safety. Dr. McKamy holds the positions of the DOE Nuclear Criticality Safety Program (NCSP) Manager and Government Program Manager (GPM) for a Special Access Program (SAP). Dr. McKamy received his Ph.D. in experimental nuclear astrophysics from The Ohio State University (1982) and B.S., Summa Cum Laude, in physics from the University of Texas at Arlington (1976). Dr. McKamy was awarded the 2006 NNSA Federal Safety Professional of the Year Award and the "Victor Stello, Jr. Award for Safety Leadership" in 2010 by the Defense Nuclear Facilities Safety Board.

Dr. McKamy's areas of expertise include nuclear criticality safety and non-destructive assay. He started his nuclear career at the Critical Mass Laboratory at Rocky Flats in 1983. From 1983 through 1987 he performed critical experiments, validated Monte Carlo criticality safety codes, and was the responsible criticality safety engineer for various Rocky Flats pit production buildings. In 1987, Dr. McKamy joined the Safeguards Measurements Group as the Principal Engineer for neutron non-destructive assay. In 1989 as Manager of Safeguards Measurements, Dr. McKamy led the development and implementation of the Rocky Flat's non-destructive assay program to measure the plutonium holdup in the ventilation ducting. Late in 1990, Dr. McKamy returned to the Criticality Engineering Group at Rocky Flats as Manager. His major accomplishment as Manager of Criticality Engineering was changing to a formalized, standards based criticality safety program that was foundational to the successful Resumption of Operations in Buildings 559 and 707. During this time, Dr. McKamy worked closely with the Defense Nuclear Facilities Safety Board (DNFSB) on Recommendation 90-6 and has continued regular and fruitful interactions with the DNFSB since.

Since joining DOE in the fall of 1996 in the Office of Environment, Safety and Health (EH), Dr. McKamy provided criticality safety assistance to most DOE Field/Site Offices. In addition, Dr. McKamy was a principal in drafting the DOE Implementation Plan in response to DNFSB Recommendation 97-2. Dr. McKamy initiated and organized the Department's criticality safety self-improvement workshop, Your Mission and Nuclear Criticality Safety, held in Las Vegas in August of 1999. Dr. McKamy led the development of DOE criticality safety Technical Standards. Dr. McKamy joined NNSA in March of 2005. He assumed the role of NCSP Manager and GPM shortly thereafter before becoming the Director of the Facilities Operations Division in 2008 responsible for the NNSA Readiness in Technical Base and Facilities (RTBF) budget.



Christopher E. Singer
Director, Engineering Directorate
NASA's Marshall Space Flight Center

Christopher (Chris) E. Singer is director of the Engineering Directorate at NASA's Marshall Space Flight Center in Huntsville, Alabama. Appointed to the position in 2011, Mr. Singer leads an organization of over 2000 employees responsible for the design, testing, evaluation and operation of hardware and software associated with space transportation, spacecraft systems, science instruments and payloads. The Engineering Directorate also manages International Space Station Payload Operations Center at Marshall, which is the command post for scientific research activities on board Station.

Mr. Singer began his NASA career in 1983 as a rocket engine specialist. In 1992 served a one-year assignment at NASA Headquarters in Washington as senior manager for the development space shuttle main engine safety improvements and upgrade. He has authored several papers on space transportation, propulsion systems, systems engineering, and cultural factors in high risk systems development.

In 2006, he received the Presidential Rank Award for Meritorious Executives – the highest honor for career federal employees. He was awarded the NASA Outstanding Leadership Medal in 2001 and 2008 for his leadership. In 1989, he received the prestigious Silver Snoopy Award from the Astronaut Corps for his contributions to the success of human spaceflight missions.

He has written numerous papers relative to technology, culture, and flight systems development including "Success through Failure", "Getting to First Flight", and "When Failure means Success".

A native of Nashville, Tennessee, Mr. Singer earned a bachelor's degree in mechanical engineering in 1983 from Christian Brothers University in Memphis, Tennessee. Mr. Singer is married to the former Jody Adams of Hartselle, Alabama. They have three children and live in Decatur, Alabama.

Advanced Cooling Technologies, Inc. (ACT) is a premier thermal management solutions company. We serve customers in diverse markets including Aerospace, Electronics, HVAC and Energy Recovery, Led Thermal Management and Temperature Calibration and Control. Our highly engineered products include Heat Pipes, Heat Exchangers and Cold Plates. Our diverse R&D and Technical Services programs range from developing thermal protection materials for space reentry vehicles to investigating nanoscale heat transfer in next generation electronic devices to designing high temperature heat recovery systems for industrial processes. Innovation, Teamwork, and Customer Care are our core values that drive the continuous growth of our company.

Idaho National Laboratory (INL) serves as the nation's command center for advanced nuclear energy research, development, demonstration and deployment, and is home to the unparalleled Advanced Test Reactor and allied post-irradiation examination, fuel fabrication and materials testing and development assets. Leveraging these and numerous other distinguishing features, the lab and its more than 3,500 scientists, engineers and support personnel build on the potential and promise of the theoretical for the benefit of the real world. INL is one of only ten multiprogram national laboratories owned by the U.S. Department of Energy. Geographically, INL is the largest lab — its nearly 570,000-acre desert operations site also serves as a national environmental research park. As with its sister laboratories, INL performs work in support of DOE's mission — to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

The National Aeronautics and Space Administration (NASA) missions, programs and projects are ensuring the United States will remain the world's leader in space exploration and scientific discovery for years to come, while making critical advances in aerospace, technology development and aeronautics. The United States has been developing and utilizing space nuclear systems for over 50 years, and remains an international leader in that area. Space nuclear systems have supported missions ranging from the Apollo moon landings to the Mars Science Laboratory to outer planet probes. Future space nuclear power and propulsion systems may enable even more exciting missions within our solar system and beyond.

Idaho National Laboratory and the Universities Space Research Association created the Center for Space Nuclear Research (CSNR) in 2005 to foster collaboration with university scientists. CSNR scientists and engineers research and develop advanced space nuclear systems, including power systems, nuclear thermal propulsion, and radioisotopic generators. The CSNR is located at the Center for Advanced Energy Studies (CAES) building in Idaho Falls, Idaho.

The UK's National Nuclear Laboratory (NNL) offers an unrivalled breadth of technical products and services to our customers across the whole nuclear industry.

Covering the complete nuclear fuel cycle from fuel manufacture and power generation, through to reprocessing, waste treatment and disposal and including defence, new nuclear build and Homeland Security. NNL provides these services supported by an impressive range of facilities and links with international research organisations, academia and other national laboratories. NNL's facilities are second to none. The Central Laboratory at Sellafield is the most modern nuclear research facility in the world. The Windscale Laboratory provides Post-Irradiation Examination (PIE) and other services critical to plant life extension. At Workington NNL operates a non-radioactive test rig facility and at Preston NNL operates a uranium active chemistry laboratory. NNL also has staff at the Risley, Stonehouse and Harwell sites providing Head Office functions, graphite technology, radiation chemistry and modelling/simulation.

Aerojet Rocketdyne is a world-recognized aerospace and defense leader providing propulsion and energetics to the domestic and international space, missile defense and strategic systems, tactical systems and armaments areas, and transformational energy technology solutions to address the world's energy needs. GenCorp is a diversified company providing innovative solutions to its customers in the aerospace and defense, energy and real estate markets.

Additional information about Aerojet Rocketdyne and GenCorp can be obtained by visiting the companies' websites at www.Rocket.com and www.GenCorp.com.

Monday, February 24, 2014

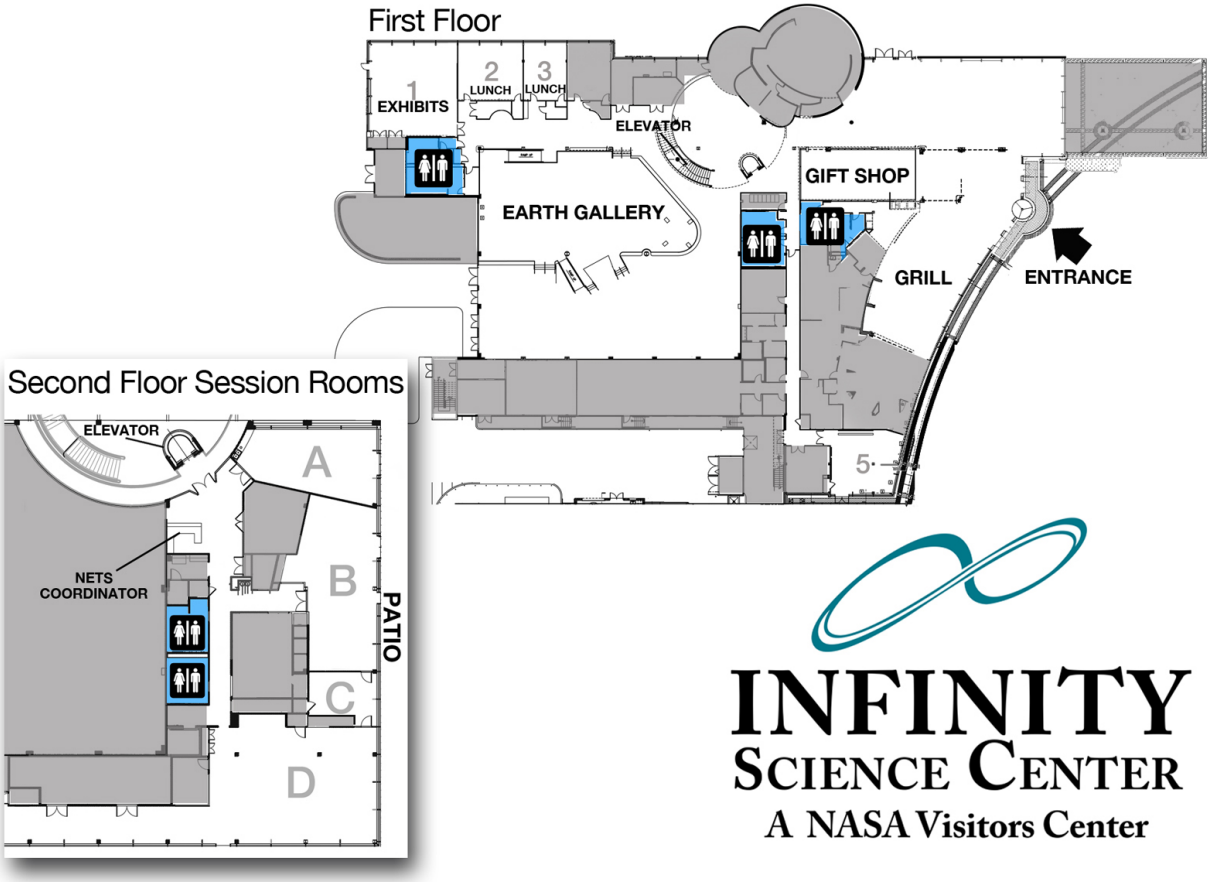
Time	Event	Infinity Center Rooms		
7:00-8:00am	Registration/ Session Preparation	Registration Desk / Exhibitor Hall		
8:00-10:00am	Plenary Speakers	Earth Gallery (1st Floor)		
10:00-10:30am	Break	Exhibitor Hall (1st Floor)		
10:30-12:00pm	Opening Technical Sessions	**Track I** Radioisotope Power Systems	**Track II** Fission Power & Electric Propulsion	**Track III** Nuclear Thermal Propulsion
12:00-1:00pm	Lunch	Infinity Café and/or box lunches available		
1:00-3:00pm	Technical Sessions	Room A	Room B	Room D
		Track IV (Advanced Fission Power and Propulsion)	Track I (Radioisotope Fuels and Fueled Systems)	Track III (NTP Strategy)
3:00-3:30pm	Break	Exhibitor Hall (1st Floor)		
3:30-5:30pm	Technical Sessions	Room A	Room B	Room D
		Track IV (Advanced Fission Power and Propulsion)	Track I (Radioisotope Fuels and Fueled Systems)	Track III (NTP Strategy)
5:30-6:00pm	No-Host Bar	Earth Gallery (1st Floor)		
6:00-8:00pm	Welcoming Reception	Earth Gallery (1st Floor)		

Tuesday, February 25, 2014

Time	Event	Infinity Center Rooms		
7:00-8:00am	Session Preparation	Exhibitor Hall		
8:00-9:30am	Technical Sessions	Room A	Room B	Room D
		Track II Fission I	**Track I** Advancements in Stirling	**Track III** NTP History
9:30-10:00am	Break	Exhibitor Hall (1st Floor)		
10:00-11:30am	Technical Sessions	Room A	Room B	Room D
		Track II Fission II	**Track IV** Advanced Solid-State PCS	**Track III** Ground Test
11:30-12:30pm	Lunch	Infinity Café and/or box lunches available		
12:45-4:30pm	Technical Tour			
12:45-1:00pm	Board buses	In front of Infinity Science Center		
1:00-1:20pm	Briefing	Propulsion Test Complex		
1:20-4:30pm	Tour	NASA Stennis Space Center		

Wednesday, February 26, 2014

Time	Event	Infinity Center Rooms		
7:00-8:00am	Session Preparation	Registration Desk / Exhibitor Hall		
8:00-10:00am	Technical Sessions	Room A	Room B	Room D
		Track III NTP Business & Risk	**Track I** MMRTG - What's Next?	**Track III** NTP Engine Design I
10:00-10:30am	Break	Exhibitor Hall (1st Floor)		
10:30-12:00pm	Technical Sessions	Room A	Room B	Room D
		Track III NTP Engine Design II	Track I Advancements in Thermoelec-trics)	**Track III** Simulated NTP Fueld Testing
12:00-1:00pm	Lunch	Infinity Café and/or box lunches available		
1:00-3:00pm	Technical Sessions	Room A	Room B	Room D
		Track II Fission III	**Track I** RPS Programs and Studies	**Track III** NTP Fuel I
3:00-3:30pm	Break	Exhibitor Hall (1st Floor)		
3:30-5:30pm	Technical Sessions	Room A	Room B	Room C
		Track II Fission IV)	**Track I** RPS Mission & Systems Studies	**Track III** NTP Fuel II
5:30-6:00pm	No-Host Bar	Earth Gallery (1st Floor)		
6:00-8:00pm	Closing Banquet	Earth Gallery (1st Floor)		



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