Health Physics Society
52nd Midyear Meeting
17-20 February 2019 · San Diego, California
Sheraton San Diego Hotel & Marina

FINAL PROGRAM
Counts.Pro converts your existing meter inventory to digital wireless GPS enabled dataloggers to capture and easily share your survey data.

Refurbished Radiological Instruments at half price or less, fully warranted. If it’s in stock, you save big!

Portal and Tool Monitors
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Air Samplers, Lab Equipment

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Our Senior Consulting Team can help you with your projects large or small. Extensive experience in App design, D&D, Instrument Development, Etc.

CHP DOSIMETRY provides a full suite of radiation dosimetry products including traditional TLD and the new Instadose and Instadose Plus products.

We work with large and small companies and accommodate project specific dosimetry on a regular basis. CHP has an order of magnitude more customer service than other dosimetry companies to accommodate your needs.
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Nolan Hertel, President
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Brett J. Burk, Executive Director

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Program Committee Chair: Jack Kraus
Task Force Chair: Greg Komp
Jason Davis
Deirdre Elder
Hannah Graham
Tim Kirkham
Tanya Palmateer-Oxenberg
Chris Shaw
Neil Whiteside

Table of Contents
Committee Meetings........................................2
Exhibitors...................................................7
Technical Program.........................................11
AAHP Courses...............................................19
PEP Programs...............................................21
CEL Programs...............................................23
Author Index...............................................25
Hotel Floor Plan..........................................27

Registration Hours
Grande Ballroom Foyer
Sunday 17 February  3:30 PM-5:30 PM
Tuesday 19 February  8:00 AM-3:00 PM
Monday 18 February  7:30 AM-3:00 PM
Wednesday 20 February  8:00 AM-11:30 AM

Exhibit Hours
Grande Ballroom
Monday
10:00 AM-6:30 PM  Exhibits Open
10:00 AM-10:30 AM  Coffee Break
Noon-1:15 PM  Complimentary Lunch
2:45 PM-3:15 PM  Coffee Break
Sponsored by Hi-Q Environmental Products Co.
5:00 PM-6:30 PM  Exhibitor Reception/
Poster Reception
Tuesday
9:30 AM-4:00 PM  Exhibits Open
10:00 AM-10:45 AM  Coffee Break
Noon-1:15 PM  Complimentary Lunch
3:00 PM-4:00 PM  Coffee Break
Our product line also includes:

- Calibration & Repair Services
- Silver Zeolite Cartridges
- Filter Holders (In-Line, Open Faced, Combination)
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Health Physics & Radiation Measurement Instrumentation

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ANSI N13.1-2011 Stack Sampling Location Qualification Testing & System Design

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Phone: 858-549-2820
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Internet: www.HI-Q.net

Our product line also includes:
- Calibration & Repair Services
- Silver Zeolite Cartridges
- Filter Holders (In-Line, Open Faced, Combination)
### HPS COMMITTEE MEETINGS

All Committee Meetings are in the Sheraton San Diego Hotel & Marina

#### Saturday 16 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRRPT Board and Panel</td>
<td>9:00 am – 4:00 pm</td>
<td>Marina 6</td>
</tr>
<tr>
<td>Finance and Executive Committee Meeting</td>
<td>12:00 pm – 5:00 pm</td>
<td>Room 514</td>
</tr>
<tr>
<td>Board Reception</td>
<td>6:00 pm – 7:30 pm</td>
<td>President’s Suite</td>
</tr>
</tbody>
</table>

#### Sunday 17 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPS Board Meeting</td>
<td>8:00 am – 5:00 pm</td>
<td>Marina 4</td>
</tr>
<tr>
<td>AAHP Executive Committee</td>
<td>8:00 am – 5:00 pm</td>
<td>Room 415</td>
</tr>
<tr>
<td>NRRPT Board and Panel</td>
<td>9:00 am – 4:00 pm</td>
<td>Marina 6</td>
</tr>
<tr>
<td>Program Committee Meeting</td>
<td>10:00 am – 12:00 pm</td>
<td>Maritime Boardroom</td>
</tr>
</tbody>
</table>

#### Monday 18 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRRPT Board and Panel</td>
<td>9:00 am – 4:00 pm</td>
<td>Marina 6</td>
</tr>
<tr>
<td>Scientific and Public Issues Committee</td>
<td>2:00 pm – 3:30 pm</td>
<td>Room 511</td>
</tr>
</tbody>
</table>

#### Tuesday 19 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ludlum’s calibration concepts (hands-on)</td>
<td>8:30 am – 5:30 pm</td>
<td>Spinnaker</td>
</tr>
<tr>
<td>(open to registered HPS attendees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRRPT Board and Panel</td>
<td>9:00 am – 4:00 pm</td>
<td>Marina 6</td>
</tr>
<tr>
<td>NCRP PAC-2 Meeting</td>
<td>1:00 pm – 2:00 pm</td>
<td>Room 511</td>
</tr>
<tr>
<td>PRS Business Meeting</td>
<td>1:00 pm – 2:00 pm</td>
<td>Room 514</td>
</tr>
</tbody>
</table>

#### Wednesday 20 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Committee Lunch</td>
<td>12:00 pm – 1:00 pm</td>
<td>Room 518</td>
</tr>
<tr>
<td>IRPA Medical Radiation Safety Culture Workshop</td>
<td>1:30 pm – 5:00 pm</td>
<td>Spinnaker</td>
</tr>
</tbody>
</table>

#### Thursday 21 February 2019

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRPA Medical Radiation Safety Culture Workshop</td>
<td>8:30 am – 4:30 pm</td>
<td>Harbor’s Edge Restaurant</td>
</tr>
</tbody>
</table>
Explore new consulting support services to optimize your education, compliance and ongoing radiation safety needs. Visit our friendly team at booth #409 to learn more.

**Regulatory safety support services**
LANDAUER has the unique expertise to support regulatory and dosimetry management compliance:

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Could your organization benefit from reliance on experienced radiation safety professionals?

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- **Instant feedback:** empowers medical staff to learn and adapt behavior to minimize unnecessary radiation exposure

Visit landauer.com or raysafe.com to learn more about our products and services.
SOCIAL EVENTS
All Social Events are in the Sheraton San Diego Hotel & Marina

Sunday 17 February 2019

Welcome Reception
6:00 PM – 7:30 PM Harbor Island 3
Plan on attending the HPS Welcome Reception. This is an opportunity to meet friends and start your evening in San Diego. Cash bar and light refreshments will be available during the reception.

Monday 18 February 2019

Complimentary Lunch in Exhibit Hall
Noon – 1:15 PM Grande Ballroom

Poster Session
5:00 PM – 6:30 PM Grande Ballroom

Exhibitor Reception
5:00 PM – 6:30 PM Grande Ballroom
Join the exhibitors for food, a cash bar, and the latest in health physics equipment.

Tuesday 19 February 2019

Complimentary Lunch in Exhibit Hall
Noon – 1:15 PM Grande Ballroom

Congratulations to our HPS Award Recipients

G. William Morgan Lectureship
Dr. Bernard le Guen

Dade Moeller Lectureship
Dr. Luis Benevides
2019 HPS MIDYEAR MEETING EXHIBITORS
Exhibits are located in the Sheraton San Diego Hotel & Marina, Grande Ballroom

Exhibit Hours

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 AM – 6:30 PM Exhibits Open</td>
<td>9:30 AM – 4:00 PM Exhibits Open</td>
</tr>
<tr>
<td>10:00 AM – 10:30 AM Coffee Break</td>
<td>10:00 AM – 10:45 AM Coffee Break</td>
</tr>
<tr>
<td>Noon – 1:15 PM Complimentary Lunch</td>
<td>Noon – 1:15 PM Complimentary Lunch</td>
</tr>
<tr>
<td>2:45 PM – 3:15 PM Coffee Break</td>
<td>3:00 PM – 4:00 PM Coffee Break</td>
</tr>
<tr>
<td>Sponsored by Hi-Q Environmental Products Co.</td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 6:30 PM Exhibitor Reception/Poster Session</td>
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</table>
2019 HPS MIDYEAR MEETING EXHIBITORS
Exhibits are located in the Sheraton San Diego Hotel & Marina, Grande Ballroom

2019 Annual Meeting
Orlando, Florida
www.hps.org/meetings
Join us for the HPS 2019 Annual Meeting in Orlando, Florida!

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Bionomics Inc. is the leading service provider to generators of low level radioactive waste and mixed waste. With 30+ years in business, we have the proven experience and knowledge to reduce client risks. We disposition common and specialty waste streams, with scheduled pickups to meet the needs of our clients. We use our own trained and qualified brokers and technicians to provide specialty supplies, make pickups, track waste, and arrange for final processing and disposal at only the top-tier facilities. We provide disposal certificates for all shipments. We also perform specialty projects, such as decontamination, decommissioning, lab cleanouts, surveys, and disposal of legacy wastes.

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www.chpconsultants.com
CHP Consultants provides half price radiological instruments and creative solutions. We are introducing the Counts.Pro™ device to revolutionize the collection of survey and laboratory data. Counts.Pro™ turns count rate meters into mobile laboratories that instantly update to secure cloud storage. CHP Dosimetry provides NVLAP-accredited TLD badge service with great service.

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Louisville, KY 40299
502-267-1455
www.chaseenv.com
Chase Environmental’s Radiological Services Group is dedicated to servicing smaller quantity generators of low level and mixed radioactive waste – as well as providing remediation and license termination needs of a wide range of clients. Additionally – we provide a dedicated consulting service for industrial type clients who either use radioactive materials in their process – or who wish to prevent the introduction of radioactive materials to their processes. We go to great lengths to ensure quality, compliance, safety and value at every point in the process – while providing a great customer service experience. For more information – or to request a quote for services please contact John O’Neil at 877-389-2124 or joneil@chaseenv.com.

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858-549-2820
www.HI-Q.net

Hi-Q Environmental Products Company is an ISO 9001:2015 Certified designer/manufacturer that has been providing air sampling & monitoring equipment, systems and services to the nuclear and environmental monitoring industries since 1973. Our product line ranges from complete stack sampling systems to complex ambient air sampling stations. Our product catalog includes: Continuous duty high & low volume air samplers, radiation measurement instrumentation, radiation monitoring systems, air flow calibrators, radiiodine sampling cartridges, collection filter paper and both paper-only or combination style filter holders. Along with the ability to design complete, turn-key, stack and fume hood sampling system, HI-Q has the unique capability to test ducts and vent stacks as required by ANSI N13.1-1999/2011.

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813-626-6848
www.lablogic.com

LabLogic specializes in instrumentation and software dedicated to the measurement and analysis of radioisotopes used in environmental, pharmaceutical, nuclear medicine and research laboratories. Our products include liquid scintillation counters, radiation monitors, personal dosimeters, radio-chromatography instruments and software, microplate readers and a variety of radiation safety consumables. For further information please visit www.lablogic.com or call our office on 813-626-6848.

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Glenwood, IL 60425
708-755-7000
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Strategically aligned as leaders in radiation measurement, management, education and safety, these providers join to offer optimal radiation products and services wherever you work – health care, industry, energy or research. Learn about expanded consulting capabilities to augment shrinking staffs and new products to save time while efficiently and effectively managing personnel and patient safety programs. Visit booth #409 to hear the many ways your organization can benefit.

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800-622-0825
www.ludlums.com

Ludlum Measurements, Inc. has been designing, manufacturing, and supplying radiation detection and measurement equipment in response to the world’s need for greater safety since 1962. Throughout its more than 5-decade history, it has developed radiation detection technologies and instruments in support of enhancing the safety of personnel and the environment.
Mirion Technologies  
Booth: 102

5000 Highlands Parkway  
Smyrna, GA 30082
800-243-4422
www.mirion.com

Mirion Technologies is a leading provider of innovative products, systems and services related to the measurement, detection and monitoring of radiation. The company delivers high quality, state of the art solutions that constantly evolve to meet the changing needs of its customers. With the addition of the Canberra brand in 2016, Mirion expanded its portfolio and the breadth of its expertise to bring a new standard of solutions to the market. Every member of the Mirion team is focused on enhancing the customer experience by delivering superior products, exceptional service and unsurpassed support. Mirion Technologies: Radiation Safety. Amplified.

NRRPT  
Booth: 203

PO Box 3084  
Westerly, RI 02891
401-637-4811
www.nrrpt.org

To encourage and promote the education and training of Radiation Protection Technologists and, by doing so, promote the science of Health Physics.

NUVIA Dynamics Inc.  
Booth: 208

222 Snidercroft Road  
Concord, ON L4K 2K1 Canada
905-760-9512
nuviatech-instruments.com

We offer standard and tailored measurement solutions to nuclear owners, operators and stakeholders for all stages of a facility’s life cycle under the NUVIATech Instruments brand. Either components (detectors, analyzers or software) or complete systems which can incorporate carrier / conveyor equipment, GPS control and/or signal processing units are available.

NV5-Dade Moeller  
Booth: 304

1835 Terminal Drive, Suite 200  
Richland, WA 99354
509-946-0410
www.NV5.com

NV5-Dade Moeller, provides professional and technical services to government and commercial clients in radiological and nuclear safety, public and worker protection, and environmental project operations. We have experience in a wide range of disciplines, including health physics, industrial hygiene, occupational safety, training, environmental services, infrastructure, engineering and program management.

ORTEC  
Booth: 508

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Oak Ridge, TN 37830
865-483-2124
www.ortec-online.com

ORTEC has been an industry leader in the design and manufacture of ionizing radiation detectors, nuclear instrumentation, analysis software, and integrated systems for over 55 years. Our products are deployed globally for Nuclear Security, Waste Management, Health Physics, and Radiochemistry Laboratory Applications. Visit our booth today and allow us to assist you with your nuclear measurement needs.

Radiation Safety & Control Services Inc (RSCS)  
Booth: 401

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603-778-2871
www.radsafety.com

RSCS offers expertise in all aspects of radiation safety and measurement applications. We specialize in operational and decommissioning services for nuclear, industrial, medical, and government radiological facilities. Our services include health physics consulting, technical staffing, training, instrumentation (sales, installation, calibration, and repair), emergency planning, and specialized radiological characterizations and measurements.
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spectrallabs.com

Spectral Labs Incorporated’s (SLI) portfolio ranges from immersive simulation training software and apps to air particle and contraband detectors and technology interfaces. SLI’s Employee Owners demonstrate a “Passion for Practical Solutions” through innovative hardware and software technologies that benefit military, responder, and law enforcement customers.

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281-291-7769  
www.tracerco.com/monitors

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714-997-8090  
www.tgainc.com

Thomas Gray and Associates, Inc. (TGA) is a licensed radioactive services company that offers a full suite of health physics consulting that includes facility decommissioning, on-site services, training, radioactive materials processing, disposal brokerage, nuclide identification, transportation, packaging, and decay-in-storage services.

Versant Medical Physics and Radiation Safety  
116 S. Riverview Drive  
Kalamazoo, MI 49004  
888-316-3644  
versantphysics.com

Versant Medical Physics & Radiation Safety provides exceptional quality consulting and support services to healthcare providers, including Radiation Safety Software: Odyssey, Personnel Dosimetry Badges & Management, and Regulatory Support Services & Audits. Our mission is to produce accurate results to improve the quality of its client’s, and their patient’s, lives.
MONDAY

7:15 AM – 8:15 AM

CEL-1
The Case Against LNT
Fellman A
NV5

11:00 AM

MAM-A.4
Deterministic Opportunities and Stochastic Journeys: A Career in the Armed Services as a Physicist
Benevides L
US Navy

11:40 AM

Q&A Session

7:15 AM – 8:15 AM

CEL-2
Dosimetry Challenges of New Nuclear Medicine Theranostic Agents
Stabin M
RADAR, Inc.

1:30 PM – 5:00 PM

Harbor Island 3

MAM-A
Plenary Session

8:30 AM – 12:00 PM

Harbor Island 3

MPM-A
NCRP: Special Session;
Military Health Physics, Part 1
Chairs: John Cuellar, Daniel Sowers

8:30 AM

MAM-A.0
Introduction
HPS President Nolan Hertel

8:40 AM

MAM-A.1
An IRPA, WHO, IOMP Initiative on Radiation Safety Culture in Health Care
le Guen B
IRPA

2:00 PM

MPM-A.2
Army Contributions to Early Health Physics; 1858 to 1977
Komp GR, Mikulski H*
GK Technical Services, US Army

9:20 AM

MAM-A.2
Enhancing Safety and Quality When Using Radiation In Medicine – WHO’s Views and Actions
del Rosario Pérez M
World Health Organization

3:00 PM

COFFEE BREAK
Grande Ballroom

10:00 AM

COFFEE BREAK
Grande Ballroom

10:30 AM

MAM-A.3
Radiation Safety in Healthcare
Gress D
American College of Radiology

3:30 PM

MPM-A.4
Radiation Advisory Medical Teams
VanHorne-Sealy J
US Army

4:00 PM

MPM-A.5
Defense Health Agency – Establishing a Master Material License with the Nuclear Regulatory Commission
Stewart HM
Defense Health Agency

3:30 PM

MPM-A.3
The VA Ionizing Radiation Registry Program
McClung DK
US Department of Veterans Affairs

3:00 PM

COFFEE BREAK
Grande Ballroom

4:00 PM

MPM-A.5
Defense Health Agency – Establishing a Master Material License with the Nuclear Regulatory Commission
Stewart HM
Defense Health Agency
MONDAY

4:30 PM MPM-A.6
HP Roles at the New DHS CWMD Office
Reyes R
DHS

5:00 PM – 6:30 PM Grande Ballroom
Exhibitor Reception
Join the exhibitors for food, a cash bar, and the latest in health physics equipment.

5:00 PM – 6:30 PM Grande Ballroom
Poster Session

P.1 An Innovative Approach to Legacy Uranium Mining Hazard Communication
Wier BA, Charley PH, Johnson TE, John G, Wier B
Colorado State University, Dine College

P.2 Chronic Low Dose Radiation Affects Locomotion In Drosophila Melanogaster Larvae In A Non-Linear, Dose-Dependent Manner
Gee S, Borrego M, Zornik E
Reed College

P.3 X-ray Backscatter Modelling for Quantitative X-ray Fluorescence Microscopy Studies
Lopez A, Gherase M
Cal State Univ- Fresno
<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Session Code</th>
<th>Session Title</th>
<th>Chair(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Harbor Island 3</td>
<td>CEL-3</td>
<td>Fundamentals of Environmental Health Physics</td>
<td>Whicker JJ</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Spinnaker</td>
<td>CEL-4</td>
<td>Personnel Contamination Monitoring the 411</td>
<td>Googins SW</td>
</tr>
<tr>
<td>8:30 AM – 12:00 PM</td>
<td>Harbor Island 3</td>
<td>TAM-A</td>
<td>NCRP: Special Session; Military Health Physics, Part 2</td>
<td>Chairs: Alan Hale, Jama VanHorne-Sealy</td>
</tr>
<tr>
<td>8:30 AM</td>
<td></td>
<td>TAM-A.1</td>
<td>Recent Updates to Technical Guide 236: Radiological Area Survey – A Field Guide</td>
<td>Livingston BE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TAM-A.2</td>
<td>Exposure Limit Deviations for the Solid State – Active Denial Technology</td>
<td>Frey JF, Lamoreaux RW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TAM-A.3</td>
<td>Explanation of the DOD Policy on the Turn-In of Radioactive Items of DOD Origin Found in the Public Domain</td>
<td>Kurth MF, Department of Defense</td>
</tr>
<tr>
<td>10:00 AM</td>
<td></td>
<td>TAM-A.4</td>
<td>Update on Machine Based Irradiation Versus Gamma Irradiators for Blood Irradiation within Department of Defense (DoD)</td>
<td>Mikulski HT, Belin TR</td>
</tr>
<tr>
<td>11:00 AM</td>
<td></td>
<td>TAM-A.6</td>
<td>Army Radiation Program and the U.S. Army Center of Military History</td>
<td>Habiba K, Mikulski TH</td>
</tr>
<tr>
<td>11:30 AM</td>
<td></td>
<td>TAM-A.8</td>
<td>Update of the Army Radiation Program</td>
<td>Mikulski HT</td>
</tr>
<tr>
<td>12:00 PM</td>
<td></td>
<td>TAM-A.9</td>
<td>Armed Forces Radiobiology Research Institute – Current Activities and Update</td>
<td>Burke GF</td>
</tr>
<tr>
<td>12:00 PM</td>
<td></td>
<td></td>
<td>COMPLIMENTARY LUNCH</td>
<td>Grande Ballroom</td>
</tr>
<tr>
<td>1:30 PM – 4:15 PM</td>
<td>Harbor Island 3</td>
<td>TPM-A</td>
<td>Dosimetry/Medical Physics</td>
<td>Chair: Alan Fellman</td>
</tr>
</tbody>
</table>

Grande Ballroom
1:45 PM
Misleading Approaches Used To Defend The Linear Non-Threshold Hypothesis
Fellman A
NV5 Dade Moeller

2:00 PM
Protein Biomarkers for Assessment of Radiation Exposure in the Hematopoietically Humanized Mouse Model
Columbia University, New York

2:15 PM
A Direct Comparison of Biodosimetry and Physical Dosimetry Techniques for Possible Triage Application
Sholom S, Balajee A, McKeever SW
Oklahoma State University, Oak Ridge Associated Universities

2:30 PM
Kinetic Simulations Predict the Presence of Dose-Rate Effects in the Thermoluminescence of LiF:Mg,Ti (TLD-100)
Ginsburg D, Eliyahu I, Oster L, Reshes G, Horowitz YS*, Biderman S
Ben Gurion University of the Negev, Soreq Nuclear Research Center, Sami Shamoon College of Engineering, Nuclear Research Center Negev

2:45 PM
EPR Dosimetry in Human Fingernail, Part 1: Origin of Endogenous Signal
Tkatchenko N, Romanyukha A, Reyes R*, Swarts SG, Gourier D, Trompier F
Institut de Radioprotection et de Sûreté Nucléaire, Naval Dosimetry Center, Uniformed Services University of the Health Sciences, University of Florida, Institut de Recherche de Chimie de Paris

3:00 PM
COFFEE BREAK
Grand Ballroom

3:30 PM
Combining High-Throughput Robotics and Imaging Flow Cytometry to Perform the Micronucleus Assay for Triage Radiation Biodosimetry
Columbia University Medical Center, MilliporeSigma, Consumer and Clinical Radiation Protection Bureau, Health Canada

3:45 PM
A Health Physicist’s Perspective of Medical Uses of Lasers and Ionizing Radiation
Rogers JM

4:00 PM
Simulation of the Effect of Post-Irradiation Optical Excitation on the Dose Response of Thermoluminescent LiF:Mg,Ti (TLD-100)
Ginsburg D, Eliyahu I, Oster L, Reshes G, Horowitz YS*, Biderman S
Ben Gurion University of the Negev, Soreq Nuclear Research Center, Sami Shamoon College of Engineering, Nuclear Research Center Negev
WEDNESDAY

8:30 AM – 12:00 PM Harbor Island 3

WAM-A
Contemporary Health Physics Issues, Part 1
Chairs: Frazier Bronson, Carolyn McKenzie

8:30 AM WAM-A.1
Occupational Radiation Protection Aspects of Alkaline Leach Uranium in Situ Recovery (Isr) Facilities in the United States
Brown SH

8:45 AM WAM-A.2
Advantages and Limitations of GPS-Based Gamma Surveys
Schierman M, Ruedig E
ERG

9:00 AM WAM-A.3
Performance Comparisons Between SrI2 Gamma Spectroscopy Scintillators and Other Improved-resolution Detectors for Typical Health Physics Applications
Bronson F
Mirion Technologies - Canberra

9:15 AM WAM-A.4
Compliance Issues Associated with Use and Operation of Non Medical X-ray Devices at a University
Tarantino C
Radiation Regulatory Specialists

9:30 AM WAM-A.5
TENORM from Rare Earths Production – Items for Future Consideration
Egidi PV
U.S. EPA

9:45 AM WAM-A.6
Successful Experience in Migrating from Radioactive Irradiators to X-ray Irradiators for Blood and Medical Research Applications
Kamen J
Icahn School of Medicine at Mount Sinai

10:00 AM COFFEE BREAK
Ballroom Foyer

10:30 AM WAM-A.7
Community Exercise in Radiological Emergency Response
Mohammad S, Tamez A*, Everett S
University of Texas Southwestern Medical Center

10:45 AM WAM-A.8
University of California System-wide Approach to Permanent Reduction of Cesium Irradiators
MacKenzie CJ, Smith KB
University of California

11:00 AM WAM-A.9
Cesium Irradiator Replacement Project
Meng RA
Columbia University

11:15 AM WAM-A.10
A Novel Method for Quick Assessment of Internal Radiation Exposure in the Aftermath of a Large Radiological Incident
Karam PA, Korir G, Karam A
Mirion Technologies, Radsafe Technologies Ltd

11:30 AM WAM-A.11
Study on Continuous Measuring Technique for Radon-in-water Concentration Based on Extraction Membrane
Wang Y, Zhang L, Wang J, Guo Q
Peking University, State Key Laboratory of NBC Protection for Civilian

11:45 AM WAM-A.12
Detecting a Small Beta Activity in a Large Gamma Background
Nieves A, Brown K
University of Pennsylvania

12:00 PM LUNCH ON YOUR OWN

8:30 AM – 12:00 PM Spinnaker

WAM-B
Special Session: Medical Health Physics
Chairs: John Hough, William Pavlicek

8:30 AM WAM-B.1
Experience with a Peak Skin Dose Tracking System at Mayo Clinic
Pavlicek W, Nelson K, Tannahill G
Mayo Clinic

9:00 AM WAM-B.2
Reducing Patient Skin Dose with Fluoroscopy; Controllable versus Uncontrollable Factors
Pavlicek W, Nelson K, Tannahill G
Mayo Clinic
WEDNESDAY

9:30 AM WAM-B.3
A Monte Carlo Model for the Evaluation of Shadow Shields used in Special Procedures and Cardiac Cath Labs
Metzger RL
Radiation Safety Eng, Inc

10:00 AM COFFEE BREAK
Ballroom Foyer

10:30 AM WAM-B.4
Reducing Physician Operator Exposures with Fluoroscopy
Pavlicek W, Nelson K, Tannahill G
Mayo Clinic

11:00 AM WAM-B.5
Fluoroscopy Safety – Physician, Technologist and Nursing Staff Training and Competencies
Pavlicek W, Nelson K, Tannahill G
Mayo Clinic

11:30 AM WAM-B.6
Estimation of Annual Occupation Dose from Cumulative Air Kerma Usage in Fluoroscopy
Gougy J
Swedish Medical Center

12:00 PM LUNCH ON YOUR OWN

1:30 PM – 4:30 PM Harbor Island 3

WPM-A
Contemporary Health Physics Issues, Part 2
Chairs: John Hageman, Tracy Ikenberry

1:30 PM WPM-A.1
Mobile Facility for Preparing Category 3 - 5 Sealed Sources for Deep Borehole Disposal
Hageman JP, Miller JJ
Consultant, International Isotopes, Inc

1:45 PM WPM-A.2
Decommissioning of Particle Accelerators
Vylet V
Jefferson Lab

2:00 PM WPM-A.3
Use of Scaling Factors to Account for Alpha Emitters during Power Plant Decommissioning
Van Der Karr MT
EnergySolutions

2:15 PM WPM-A.4
NORM Total Alpha Surface Radioactivity Thresholds for Clearance of Personal Property
Ikenberry T, Schofield W, Millsap J
NV5 & MSA, LLC

2:30 PM WPM-A.5
Improving Value to HPS Stakeholders: Engaging Presentations
Mahathy JM
ORAU

2:45 PM WPM-A.6
Demonstration of a Field Alpha Spectrometry Tool and Polymer-Ligand Extractant for Fast Actinide Analysis of Fused Glass Samples
Plionis AA, Rim JH, Hoteling NJ, Guise RE
Nevada National Security Site, Remote Sensing Laboratory, Los Alamos National Laboratory

3:00 PM COFFEE BREAK
Ballroom Foyer

3:30 PM WPM-A.7
Dynamic Gamma Spectral Measurements of Primary Coolant Piping at Various Operating Nuclear Power Plants
Bronson F
Mirion Technologies - Canberra

3:45 PM WPM-A.8
Evaluation Of Skyshine Contributions During Electron Injection At A Synchrotron Facility Using CERN’s FLUKA Code
Hastings AD, Wilson IV CA, Hamideh AM, Wang WH
Louisiana State University

4:00 PM WPM-A.9
Thorium Molten Salt Reactors (TMSR): Key Radiation Protection Challenges
Sun C
USNRC

4:15 PM WPM-A.10
Armed Forces Radiobiology Research Institute – Training Program Review
Divis JA
WEDNESDAY

1:30 PM – 5:00 PM  Spinnaker

WPM-B
IRPA Special Session on Radiation
Safety Culture in Medicine
(co-sponsored by HPS)
Chair: Steve King

1:30 PM
Opening & Introduction

2:00 PM
Plenary Session 1: The worldwide Importance of
Radiation Safety Culture in Healthcare

2:30 PM  COFFEE BREAK
Ballroom Foyer

3:00 PM
Plenary Session 2: Organizations’ Views & Actions on
RSCHC Global, Regional & National Perspectives

4:30 PM
Plenary Session 3: Stakeholders’ Views Five key Issues
for Developing a RPCM
THURSDAY

9:00 AM – 4:00 PM Harbor’s Edge Restaurant

IRPA Special Session on Radiation Safety Culture in Medicine
(co-sponsored by HPS)
Chair: Steve King

9:00 AM
Morning introduction and expected outcomes, working procedure

9:30 AM
Break-out group sessions: Establishing RP culture in medicine

• Explanation to the plenary on break out group composition and working procedures
• Three groups will identify the key elements to be considered in the process of establishing and maintaining RSCHC, and will propose a preliminary framework for the future development of the guidance document.
• Topics to be addressed:
  1. Key elements for establishing and developing a radiation safety culture in health care (RSCHC)- general approach
  2. Particular considerations for building a strong radiation safety culture in paediatric imaging
  3. How to engage patients/parents in RSCHC improvement?
  4. Strengths, weaknesses, opportunities & threats for improving RSCHC in Africa (SWOT analysis)
  5. Tools and indicators for assessing RSCHC
     - Wrap-up, preparation of the report to the plenary

10:30 AM
COFFEE BREAK

11:00 AM
Break-out group sessions: Establishing RP culture in medicine (continued)

12:00 PM
LUNCH ON YOUR OWN

1:30 PM
Plenary Session 4: Reports from the break-out groups
One rapporteur from each group will provide feedback from the breakout sessions including a summary of discussions & conclusions, key factors and framework proposed by the group, suggestions.
• Report from groups
• Q & A + discussion

2:15 PM
Plenary Session 5: Towards the development of a guidance document
Facilitated open discussion on the framework for establishing and maintaining RSCHC. Topics for discussion:
• Key elements in the framework
• Guidance document
  – Scope, purpose, target audience
  – Content outline, structure, format, language/s
  – Related products (leaflets, implementation tools, check-lists)
• Next steps, concluding remarks

4:00 PM
Final questions and answers

THANK YOU
to Versant Medical Physics and Radiation Safety for their support of this session.
AAHP Course #1
8:00 AM – 5:00 PM
Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers
*Michael Stabin, PhD, CHP; RADAR, Inc.*
Location: Marina 3

Internal dose calculations for nuclear medicine applications or for protection of radiation workers are based on the same fundamental concepts and units. The various systems developed to provide a basis for the needed calculations (e.g. ICRP 30/60/103, MIRD, RADAR) use equations that appear to be different, but are in fact identical when carefully studied.

The RADAR method harmonized the defining equations and units employed to provide quantitative analysis for these two general problem areas. This program will show, from a theoretical standpoint, how all of these systems are identical in concept, and will then show, using practical examples, how each is applied to solve different problems. For nuclear medicine, an overview will be given of the current state of the art and promise for future improvements to provide more patient specificity in calculations and better ability to predict biological effects from calculated doses. For occupational applications of internal dosimetry, an overview will be given of currently applicable models and methods for bioassay analysis and dose assessment, showing several practical examples.

AAHP Course #2
1:00 PM – 5:00 PM
Practical External Dosimetry Management
*Tosh Ushino, CHP; MJW Corp*
Location: Marina 4

This course addresses practical management of external dosimetry program. We will review the fundamentals of radiation interactions, radiation sources, and detector theory. We will discuss different types of dosimeters (passive and active), their characteristics, and how radiation interacts with them. In addition to the standard dosimeter badges for beta, gamma and x-ray radiation, the course will cover dosimeters for neutron, eye, and extremity. The course will also present multi-badging and EDE calculations.

The course will discuss potential sources of errors, dose investigations, dose assignment and documentation, how radiation dosimetry services work, and Do-It-Yourself-Quality Assurance. Example investigations are presented and discussed. If time permits, the course will also cover use of the Varskin code for calculating shallow dose from contamination.
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Sunday 8:00 AM – 10:00 AM

1-A Evaluation or MARSSIM and MARSAME Surveys
David Stuenkel, Trinity Engineering Associates
Location: Marina 2

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides guidance on how to demonstrate that a site complies with applicable radiation dose- or risk-based release criteria. In a similar way, the Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) manual, a supplement to MARSSIM, provides guidance on how determine proper disposition of materials and equipment. While both MARSSIM and MARSAME provide comprehensive guidance, the focus of both is one the design and evaluation of final surveys, known as final status surveys in MARSSIM and disposition surveys in MARSAME. This presentation will discuss the evaluation of final status surveys and disposition surveys. This will include preliminary data review; calculations of upper confidence levels, minimum detectable concentrations, and minimum quantifiable concentrations; and the performance of statistical tests. Illustrative examples will be used to demonstrate these concepts.

1-B Harmony in Concepts and Units for Internal Dose Calculations for Nuclear Medicine Applications or for Protection of Radiation Workers
Michael Stabin, PhD, CHP; RADAR, Inc.
Location: Marina 3

Internal dose calculations for nuclear medicine applications or for protection of radiation workers are based on the same fundamental concepts and units. The various systems developed to provide a basis for the needed calculations (e.g. ICRP 30/60/103, MIRD, RADAR) use equations that appear to be different, but are in fact identical when carefully studied. The RADAR method harmonized the defining equations and units employed to provide quantitative analysis for these two general problem areas. This program will show, from a theoretical standpoint, how all of these systems are identical in concept, and will then show, using practical examples, how each is applied to solve different problems. For nuclear medicine, an overview will be given of currently applicable models and methods for bioassay analysis and dose assessment, showing several practical examples.

1-C Medical Laser Safety Program – What Health Physicists Need to Know
Deidre Elder, University of Colorado Hospital
Location: Spinnaker

Medical laser systems are used in many clinical settings, including ophthalmology and dermatology clinics, interventional radiology and cardiology and the operating room. Whether it is a small clinic or a large academic medical center, a health care facility with laser applications should have a program in place to ensure the safety of patients and personnel. Health Physicists and Medical Physicists may be asked to oversee laser safety programs at medical facilities and need the tools to run an effective program. The 2018 edition of the American National Standard for Safe Use of Lasers in Health Care (ANSI Z136.3-2018) was released in August and will be discussed along with other standards that apply to the use of medical lasers.

Sunday 10:30 AM – 12:30 PM

2-A Alpha Spectroscopy for the HP
Craig Maddigan, ORTEC
Location: Marina 2

This course offers a fast-paced review of the basic principles of alpha spectroscopic analysis for the Health Physicist. The course includes a review of the nature and origins of alpha-particle emitting radioactivity, basic physics of alpha particle interaction with matter, considerations and consequences of sample preparation for alpha spectroscopy, alpha spectroscopy system components and calibrations, and a primer on interpretation of alpha spectroscopy data.

2-B Thorium Molten Salt Reactors (TMSR): Key Radiation Protection Challenges
Casper Sun, Health Physicist
Location: Marina 3

Join this lecture for an overview of thorium molten salt reactors (TMSR) and their radiation safety requirements. In recent years, the potential of TMSR has captivated the attention of our nuclear energy industry. Key benefits include fuel flexibility—the ability to burn spent fuels, thorium, and unwanted plutonium—as well as reduced risk, both during normal reactor operations...
and in case of emergency. As Richard Martine noted in MIT Technology Review (2016), “cheaper and cleaner nuclear plants could finally become a reality...the technology was invented more than 50 years ago”.

Overall, TMSR is a very promising option for nuclear energy, but there’s work to be done. We’ll review the top radiation protection considerations around TMSR today, including neutron radiation protection, fuel loading management and chemical separation, and controlling neutron flux in the core. Lastly, you’ll get a quick look at things to come: robotic radiation workers operating advanced nuclear reactors.

2-C Full Range Risk Training for Health Physicists
Rick Whitman & Kim Kearfott; Associate Faculty
SPEA Homeland Security; Nuclear Engineering and Radiological Sciences, University of Michigan
Location: Spinnaker

Radiation Safety Officers often face many more challenges than just health physics. Because Health Physicists typically work alone, programs providing training need to provide students a full range of risk tools to ensure program success and safety. HPs need to develop the ability to explain complex topics across different populations from researchers to support staff, and even to the public without invoking fear including the psychology of stress management. HPs need the ability to brief both up and down the management chain on how secondary concerns, e.g., legal weaknesses and challenges, environmental requirements, changing licensing or protection requirements, labor union challenges, and other topics could prove problematic and even expensive to the larger organization. As research becomes more complex HPs often need to plan for seemingly mutually exclusive safety requirements involving one or more simultaneous hazards: radioactive material; machine generated radiation; non-ionizing radiation; chemicals; explosives; biologicals or more in addition to human and environmental concerns. This presentation will present both scenarios and recommendations to improve Health Physics training.

3-A Gamma Spectroscopy for the Health Physicist
Craig Maddigan, ORTEC
Location: Marina 2

This course offers a fast-paced review of the basic principles of gamma spectroscopic analysis for the Health Physicist. The course includes a review of the nature and origins of gamma emitting radioactivity, basic physics of gamma interaction with matter, consequences of gamma interactions on gamma spectra, gamma spectroscopy system components and calibrations, gamma spectroscopy analysis methods, and interpretation of gamma spectroscopy data.

3-C Technical Basis and Operational Experience for Clearance of Personal Property from SLAC Accelerator Facilities
James Liu, Ryan Ford, Jim Allan, Sayed Rokni; Radiation Protection Department, SLAC National Accelerator Laboratory (SLAC)
Location: Spinnaker

At high energy particle accelerators, induced radioactivity in accelerator components or materials can occur as a direct or indirect consequence to exposure to the particle beam and/or the secondary radiation particles due to beam losses. Management of the potentially activated materials is an important part of the radiation protection program. This presentation addresses the release of the materials from radiological control (i.e., clearance of personal property) in accelerator facilities to meet the DOE Order 458.1 requirements. SLAC, a high-energy electron accelerator facility, has successfully release metals for recycle in the past few years. The SLAC material clearance program with its technical bases are consistent with the DOE Technical Standard DOE-STD-6004-2016 on “Clearance and Release of Personal Property from Accelerator Facilities”.

The technical bases that support the clearance of metals (e.g., aluminum, iron, steel, copper, and lead) associated operational experience at SLAC will be presented. The emphasis of the technical basis is placed on the volumetric radioactivity aspects, instead of surface contamination, due to potential activation at high-energy accelerator facilities and the more challenging measurement methods for volumetric radioactivity. The technical basis includes process knowledge (e.g., characteristics of induced radioactivity, proxy radionuclides versus the hard-to-measure radionuclides, and surface maximum activity), measurement protocols (including quantification of detection capability), and a release criterion based on that the release measurements are indistinguishable from background (IFB).

SLAC has developed and implemented a material management and release program for the material clearance and metal recycling. The program includes the establishment of radiation detection instrumentation and measurement methods to meet the ANSI N13.12 screening level requirements for clearance of accelerator materials. These instruments include portable instruments with sufficient detection capability for survey on material surfaces, field gamma spectrometer for confirmatory measurements, and a portal gate monitor. The discussion will also include best practices for instrument set-up, field measurements, documentation and record management, and communication with stakeholders. A summary of recycling progress, as well as lessons learned and mitigation of safety hazards, at SLAC will be provided.
### Monday 7:15 AM – 8:15 AM

**CEL-1 The Case Against LNT**  
*Alan Fellman, CHP; NV5*  
**Location:** Spinnaker  
Radiation safety programs must establish compliance with radiation regulations which continue to be based on the linear no-threshold (LNT) hypothesis and the ALARA principle, despite overwhelming sound, peer-reviewed science that demonstrates the existence of a carcinogenic threshold and/or hormesis at low doses. LNT and ALARA insist that when we make changes that lower worker dose by as little as one μSv, we are making the workplace safer. Public health authorities and many radiation safety professionals have convinced most members of the public that when we evacuate 150,000 persons following Fukushima to keep them from receiving tens of mSv, we are improving public health despite the fact that this decision has resulted in more than 1,600 fatalities among evacuees. Yet despite compelling evidence revealing LNT to be fraudulent, the consistent response taken by regulatory agencies and scientific bodies whose recommendations are cited as the basis of regulatory actions is to deflect or rationalize away the science at best or simply pretend it doesn’t exist so as to maintain allegiance to a worldview of radiation safety built on ALARA and LNT. A sample of relevant findings supporting this allegation will be presented.

### Monday 7:15 AM – 8:15 AM

**CEL-2 Dosimetry Challenges of New Nuclear Medicine Theranostic Agents**  
*Michael Stabin, PhD, CHP; RADAR, Inc.*  
**Location:** Marina 3  
The term theranostics is defined as the integration of a diagnostic test with a specific therapeutic intervention. The diagnostic test should identify patients who will likely respond to a particular therapy, fail to respond to a given drug or eventually exhibit adverse events. The therapeutic application seeks to treat a specific disease. This session will describe the criteria for selecting good theranostic radiopharmaceuticals, and provide an overview of several useful theranostic agents in use, or under consideration for use, in nuclear medicine therapy, with a focus on the radiation dosimetry aspects.

### Tuesday 7:15 AM – 8:15 AM

**CEL-3 Fundamentals of Environmental Health Physics**  
*Jeffrey J. Whicker, PhD*  
**Location:** Harbor Island 3  
Environmental health physics is a multi-disciplinary application of radiation protection to the public and the environment from exposures to radioactive materials released or present in the surrounding environment. It requires study of the transport, fate and effects of radioactive materials in the environment, and knowledge of how human and non-human receptors interact with the environment. The origins of environmental health physics can largely be traced to above-ground nuclear testing and the recognition that regulations were needed for public safety. Today, all key regulatory agencies (e.g., EPA, NRC, DOE) have requirements related to radiation protection of the public. Key elements for public radiation protection include 1) dose limits (public and non-human biota), 2) requirements for facility emission controls (e.g., filters, waste treatments, etc.), 3) measurements (effluent and environmental surveillance) to measure emissions and effectiveness of engineered controls, 4) requirements for radioactive wastes, 5) release limits for property leaving sites with radiological operations, 6) emergency preparedness for accidental releases, and 7) knowledge of radiation risk imposed in the context of that inherent from naturally occurring radioactive materials. In this course, we will discuss the fundamental aspects of the practice of environmental health physics including a regulatory overview, development of goals for property release (how clean is clean?), important aspects of environmental sampling programs, and general methods to calculate radiation doses to identified receptors.

### Tuesday 7:15 AM – 8:15 AM

**CEL-4 Personnel Contamination Monitoring the 411**  
*Shawn W. Googins MS, CHP; Technical Services Manager, Radiation Safety & Control Services Inc.*  
**Location:** Spinnaker  
This CEL will cover the basics of personnel contamination monitoring from simple frisking with GM pancake probes to sophisticated hand-foot-cuff monitors and whole body personnel contamination monitors. Learn some of methods and equipment used, the capabilities, and limitations of the equipment. Refresh your understanding of the equipment’s MDAs for passive internal monitoring and more! Practical examples and information will be presented.

To download a CEL talk, use this link and type in the corresponding CEL Code:  
CEL1 – 1854  
CEL2 – 4350  
CEL3 – 8816  
CEL4 – 9865
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<thead>
<tr>
<th>A</th>
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<tbody>
<tr>
<td>Arguelles DW</td>
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<td>13</td>
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<td>11</td>
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<td>13</td>
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<td>11</td>
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<td>Borisky MJ</td>
<td>13</td>
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<td>Borrego M</td>
<td>12</td>
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<td>Brenner DJ</td>
<td>13, 14</td>
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<td>Bronson F</td>
<td>15, 16</td>
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<td>Brown K</td>
<td>15</td>
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<td>Brown SH</td>
<td>15</td>
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