Health Physics Society Midyear Meeting

Recent Advances in Planning and Response to Radiation Emergencies

2009 Topical Meeting
Health Physics Society
(The Forty-Second Midyear Topical Meeting of the Health Physics Society)
American Academy of Health Physics

Saturday, January 31 - Tuesday, February 3, 2009

Final Program

La Quinta Inn & Suites, and Henry B. Gonzalez Convention Center
San Antonio, Texas

Health Physics Society Committee Meetings

all meetings take place in the la Quinta hotel
unless noted by cc (henry b. gonzalez convention center)

Friday, January 30, 2009

Finance committee
8:00 - 11:00 am — Fiesta A

abhp part ii panel workshop
8:00 am - 5:00 pm — Bowie West

hps eXecutiVe committee
Noon - 5:00 pm — President's Suite (Founders)

Saturday, January 31, 2009

aahpeXecutiVe committee
8:00 am - 5:00 pm — 101B (CC)

abhp part ii panel workshop
8:00 am - 5:00 pm — Bowie West

hps board oFdirectors
8:00 am - 5:00 pm — Crockett East/West

program committee task Force
11:00 am - 1:00 pm — 101A (CC)

continuing education committee
12:45 - 1:45 pm — Bowie East

Sunday, February 1, 2009

history committee
Noon - 1:30 pm — Bowie West

2010 pds Faculty meeting
1:30 - 2:00 pm — Bowie West

scientiFic & public issues committee
4:00 - 5:30 pm — Fiesta A

Monday, February 2, 2009

science support committee
9:00 - 11:00 am — Bowie West

n12.22 working group
9:00 am - 4:00 pm — 102B (CC)

lab accreditation policy committee
10:00 am - 12:30 pm — Bowie East

international collaboration committee
11:30 am - 2:00 pm — Bowie West

lab accreditation assessment committee
Noon - 2:00 pm — Bowie East

ad hoc communication and outreach committee
12:15 - 2:00 pm — 102A (CC)

homeland security committee
5:30 - 6:30 pm — Bowie West

Tuesday, February 3, 2009

ansi n42.320 committee
9:00 am - Noon — 102A (CC)

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Registration Hours
Ballroom A, Foyer (CC)

Saturday, January 31 .....3:30-6:30 PM
Sunday, February 1 .....7:30 AM-3:00 PM
Monday, February 2.....8:00 AM-3:00 PM
Tuesday, February 3.....8:00 AM-Noon

Exhibit Hours
Ballroom A (CC)

sunday	4:45-6:15 PM	Opening Reception
monday	9:45 AM-4:30 PM	Exhibits Open
	10:00-10:45 AM	Refreshment Breaks
	Noon-1:00 PM	Lunch in Exhibit Hall
	3:15-4:00 PM	Refreshment Breaks
tuesday	9:30 AM-Noon	Exhibits Open
	9:35-10:30 AM	Refreshment Breaks

Speaker Ready Room

Saturday	1:00-5:00 pm
Sunday & Monday	8:00 am-Noon; 1:15-5:00 pm
Tuesday	8:00-11:00 am

La Quinta Inn & Suites - San Antonio Convention Center

303 Blum
San Antonio, TX 78205 USA
210-222-9181

TECHNICAL TOURS

monday, February 2nd

southwest research institute

12:30-5:00 pm **on site: $20**

The Southwest Research Institute (SWRI) is offering presentations with selected tours concerning: Aerospace Electronics and Information Technology, Applied Physics, Automation and Data Systems, Chemistry and Chemical Engineering, Engine, Emissions and Vehicle Research, Fuels and Lubricant Research, Geosciences and Engineering, Mechanical and Materials Engineering, Signal Exploitation and Geolocation, Space Science and Engineering, Training, Simulation, and Performance Improvement and Sealed Source Activities. For more information you can look at the SWRI web site at http://www.swri.org. You must be a US Citizen to take this tour, and you must have a photo id, like a driver's license, in order to tour the High-Level Radiation Effects Facility (Hot Lab).

tuesday, February 3rd

university of texas health science center/san antonio research imaging center

2:30-4:30 pm **on site: $20**

The University of Texas Health Science Center Research Imaging Center is home to two Cyclotrons used for the advancement of PET imaging research. The facility is the first academic facility to house both an unshielded 17 MeV cyclotron as well as a self-shielded 11 MeV cyclotron. The self-shielded 11 MeV cyclotron is part of the brand new state-of-the-art imaging facility commissioned in 2008. These cyclotrons are used for the production of F-18 and O-15 radiopharmaceuticals essential to the complex PET imaging research required to help further the understanding of the human anatomy, metabolic activity, and organ function.

NIGHT OUT/DINNER

monday, February 2nd

buckhorn saloon & museum

6:30-9:30 pm **on site: $55**

This San Antonio Night Out tradition will include a buffet dinner of BBQ Poorboy Sandwiches, Hill Country Market Sausage, Pecan-Encrusted Fried Chicken Tenders, Salad Wagon, Nacho Station, Fresh Garden Vegetables, Assorted Hill Country Sweets, Coffee and "Beer and Margaritas on the Rocks (sponsored by Canberra)." The Buckhorn Saloon opened in 1881 with a standing offer to all patrons "Bring in your deer antlers and you can trade them for a shot of whiskey or a beer." The Buckhorn Saloon collection of horn and trophy mounts grows as cowboys and hunters bring in animals of all kinds for their free beer. In 1898, Teddy Roosevelt frequented the saloon and recruited Roughriders at the bar. When prohibition became law in 1920, the Buckhorn Saloon became the Buckhorn Curio Museum. As the years passed, the collections increased to include rattlers and other snakes, as well as birds from all over the world. In 1932, prohibition ended and the Saloon was back in business. The Buckhorn Museum, on the Riverwalk, has been a HPS San Antonio Night Out tradition since the South Texas Chapter has hosted meetings. Join us for a night of Texas style fun, food, and drinks.

RECOMMENDED ON YOUR OWN EXCURSIONS

Family Fun - San Antonio's zoo is home to more than 3,800 animals representing over 750 species. A few of the current exhibits are the African Plains, Butterflies! Caterpillar Flight School, Lory Landing, Gibbon Forest, Rift Valley, Cranes of the World, and Kronkosky's Tiny Tot Nature Spot. The zoo offers educational exhibits along with learning resources. The San Antonio Children's Museum is located at 305 E. Houston Street, San Antonio, TX and home of the Tooth Booth, Texas Treasure Cave and Wild Texas Spring, Kid-powered Elevator, and Good Cents Bank. Brackenridge Park is one of the focal points for outdoor family activities in San Antonio, TX. The park is located adjacent to the San Antonio zoo and offers picturesque views of the San Antonio River while picnicking, pedal boating, fishing, birding, bicycling, walking, or having the kids play at the playground.

historic Fun - San Antonio, TX, is the home of the Alamo that represents nearly 300 years of history. The Alamo consists of the Shrine, the Long Barrack Museum, and the Gift Museum that exhibits the Texas Revolution and Texas history. Visitors are welcome to stroll through the beautiful Alamo Gardens and take a short walk over to the River Walk for lunch after the tours. The Witte Museum is a premier San Antonio museum of South Texas history, culture, and natural science. The Witte Museum offers permanent exhibits that include dinosaur skeletons, cave drawings, wildlife dioramas, and even some live animals.

local sporting events - The world famous Spurs find their home in San Antonio, TX. Come out and view some of our sporting teams including the San Antonio Missions (baseball team), San Antonio Rampage (ice hockey) or the San Antonio Spurs (basketball team). The San Antonio Spurs have started a dynasty by winning 4 NBA basketball championships in the last 10 years.

the plaza wax museum - Located in the downtown area the Plaza Wax Museum is one of the finest wax muse-

ums anywhere. It is home of the Tinseltown's most famous stars, past and present, the Theatre of Horrors, the pageant of Texas History, and the experience of religion history. (210) 224-9299

ripley's believe it or not - Experience the ultimate adventure with Robert Ripley's world-famous collection featuring over 500 exhibits in themed galleries. Some of the feature exhibits are the Man with Four Pupils, the Devil and the Damsel, the Lord's Prayer written on a single grain of rice, and the Iron Maiden. (210) 224-9299

natural bridge caverns - This is a beautiful and historical cavern system that offers high energy, educational, fun and is family oriented. Whether you are a first timer, an avid caver or someone in between, Natural Bridge Caverns awaits with a once in a lifetime experience you will never forget. You can pan for precious stones, take the ultimate leap of faith from the Watchtower, go caving on one of the adventure tours or simply experience nature on the original Discovery Tour.

http://www.naturalbridgecaverns.com

la Villita - La Villita is located on the south bank of the San Antonio River. It was originally a settlement of primitive huts for the Spanish soldiers stationed at the Alamo and, after a flood in 1819, was replaced with brick, stone, and adobe houses. La Villita is the site of General Santa Ana's cannon line in the Battle of the Alamo and is now home to a thriving art community that stands as a monument to San Antonio's past. http://lavillita.com

tower of americas - For more than 35 years, the Tower of Americas has offered residents and tourists of San Antonio, Texas, the most breathtaking view of Alamo City. Visitors can dine at the revolving restaurant, owned by Landry's Restaurants, at the top of the 750-foot-tall Tower of Americas, or enjoy the scenery from the observation deck. The Tower of America's is home to a Texas-themed 4-D, multi-sensory theater. (210) 223-3101

san Jose - This is the second mission of five located in San Antonio, TX, and was founded in 1720. The mission Trail Tour includes a tour guide that will cover the five Spanish Missions that laid the foundation for the city of San Antonio, TX. For more information go to www.missiontrailtours.com

<u>shopping and restaurants</u>

The River Walk in San Antonio, Texas is home to many excellent restaurants a short walking distance from the hotel. The main cuisine is Mexican food, but San Antonio, Texas, is home to other specialty restaurants that are sure to fulfill your dining needs.

bohanan's (american & seafood) - 219 E. Houston Street Bohanan's is located in the heart of historic downtown San Antonio and offers specialty beefs including the Japanese Akaushi Steaks and Mediterranean Prime Aged Center Cuts of Midwestern Corn Fed Beef. The menu includes mouth-watering seafood and flaming table-side desserts. www.bohanans.com

boudro's (southwestern) - 421 E. Commerce Street Boudro's is an experience to savor, embracing all the flavor of our regional heritage with a distinctive menu of Texas and Southwestern specialties. Highlighted foods are the smoked shrimp enchiladas and the blackened prime rib to seafood straight from the Gulf. www.boudros.com

casa rio (mexican) - 430 E. Commerce Street. Casa Rio is one of the first San Antonio businesses to open its doors to the River and is home of a taste of history on the river. Casa Rio offers a wide variety of Mexican food dishes that are sure to meet all your expectations. www.casa-rio.com

county line (bbQ) - 111 W. Crockett Street County Line restaurants have been serving up legendary barbeque for over 25 years. This is located directly on the River walk and offers some down home barbeque taste. www.countyline.com

guenther house (breakfast & lunch) - 205 East Guenther StreetThis is the elegant home of the Pioneer Flour Mills' founding family. It is located at the foot of the oldest historical district in Texas and is completely restored for your pleasure. Guenther House is known for their excellent for homemade breakfast foods and offers salad plates for lunch or a lighter side. www.guentherhouse.com

hard rock café san antonio (american) - 111 W. Crockett Street. Hard Rock is a three story restaurant that is situated along the city's famous Riverwalk area. The restaurant serves gourmet meals in hefty servings while offering a viewing of some rock 'n' roll memorabilia. Be sure to visit the gift store for some collectible items before returning home. www.hardrock.com

mi tierra (mexican) - 218 Produce Row. This Mexican restaurant and bakery is a great tourist attraction and is open 24 hours a day. It features strolling musicians and a huge selection of classic Tex-Mex meals. www.mitierracafe.com

morton's steakhouse (american) - 300 E. Crockett St. For 30 years, Morton's has served only the finest quality food such as USDA prime-aged beef, fresh fish and seafood. www.mortons.com

paesano's riverwalk (italian) - 111 W. Crockett St The guests will enjoy the comfortable contemporary ambience at the Paesano's Riverwalk. It breaks the boundaries of traditional Italian cuisine with modern Mediterranean cuisine. Enjoy the legendary Shrimp Paesano or Oven-Baked Pizzas. www.paesanosriverwalk.com

rainforest café (american) - 110 E. Crockett St
The Rainforest Café has something for everyone from seafood, beef and chicken to pastas and pizza. Younger guests can enjoy the new kids menu and everyone is sure to enjoy the rain and the thunderstorms throughout the Rainforest. www.rainforestcafe.com

rio rio cantina (mexican) - 421 E. Commerce St
This restaurant serves California Tex-Mex as the specialty and is one of the best of all that Mexican food has to offer with a colorful fiesta of freshness and that South-of-the-Border flavor. Try the Enchiladas Suizas, the Fajitas, or the Queso Flameado. www.riocantina.com

rosarios (mexican) - 910 S. Alamo St. This restaurant has received national, statewide, and local recognition while being featured in Southern Living Magazine, the New York Times and San Antonio Express News for being one of the Top 50 Restaurants for Mexican Food in the US. Be sure to visit this location. www.rosariosa.com

ruth chris (steaks/american) - 1170 E. Commerce St. This is a great location for atmosphere and occupies space on three levels. They are known for their delicious steaks and superb wines. www.ruthschrissa.com

schilos (delicatessen) - 424 E. Commerce St. Schilos is an authentic German Deli serving San Antonio since 1917. They are known for their delicious root beer and signature cherry cheesecake. www.schilos.com

spaghetti warehouse (italian) - 1226 E. Houston St
The Spaghetti Warehouse combines Old World Italian Traditions with American abundance in hearty, made from scratch dishes. www.meatballs.com

sushi Zushi (sushi & asian cuisine) - 203 S. Saint Mary's. Sushi Zushi is well-known for its sushi but offers a wide variety of Asian Cuisine. To reserve your spot online go to: http://www.opentable.com/single.aspx?rid=20611& restref=20611

the palm (seafood) - 233 E. Houston St. The Palm has been renowned for its aged USDA prime steaks, Jumbo Nova Scotia lobsters, Italian entrees, and warm smiles with an atmosphere like nowhere else. www.thepalm.com

Zuni grill (american southwest) - 223 Losoya St. Breakfast, lunch, and dinner inspired by flavors of the American Southwest. Zuni Grill offers a little something for everyone. Zuni's open, airy spaces and riverside patio seating offer scenic views of the Riverwalk. www.zuni-grill.com

desserts or sweets

Enjoy some sweets after a long day, or during breaks, at one of the following:

ben & Jerrys - 111 West Crocket Street, Suite 207

hagen daz - 207 Losoya St

This listing is only a few of the wonderful restaurants you can taste in the San Antonio area. Please feel free to visit http://www.alamocity.com/restaurants/ for additional Riverwalk area restaurants.

need coffee?

starbucks - 111 W Crockett Street (Riverwalk & live music); 711 E Riverwalk Drive (Marriott Riverwalk)

night life scene - downtown

Here are a few of the highlights of the downtown night life. Everywhere you turn on the Riverwalk there is a place to go for drinks and fun!

coyote ugly saloon

Fat tuesday's

howl at the moon

mad dog's pub

medusa lounge

pat o 'briens

polly esther's

soho wine & martini bar

tower of americas

Zenbar ultralounge

Zinc wine & champagne bar

If you have a car or are willing to pay for a cab ride outside of downtown, here are some additional places to visit, shop and eat:

bravo cucina italiana (italian) - 15900 La Cantera Parkway. This is a casual eatery offering great Italina food under a Roman ruin décor. www.bravoitalian.com

pF chang's (chinese) - 255 E. Basse or 15900 La Cantera Parkway. PF Chang's offers a classic blend of Chinese design with a modern bistro look. www.pfchangs.com

paloma blanca (mexican) - 5800 Broadway. Well-known for offering San Antonio much more than traditional "Tex-Mex" fare. These tempting offers include grilled snapper, enchiladas verdes, pozole soup, hand-made flautas and tacos al pastor. www.palomablanca.net

t he a lamo Quarry - 255 E. Basse. The Alamo Quarry Market is located just minutes from downtown. It is nestled in an environment rich with history and has a fabulous collection of stores, restaurants and theatres that will inspire you to shop all day and play at night. www.the-quarrymarket.com

t he c heesecake Factory (a merican) - 7400 San Pedro Ave. The Cheesecake Factory is known for their service and outstanding selection of a variety of foods. Don't forget that before you leave you must try their world famous cheesecake.

t he s hops at l a c antera - 15900 La Cantera Parkway. This is an open-air marketplace that brings a new vitality and sophistication to shopping in San Antonio. The Shops at La Cantera have a variety of stores and restaurants to choose from. Visit www.theshopsatlacantera.com for more information.

a dditional h ighlights near s an a ntonio, t X

Historic Downtown Fredericksburg, wine vineyards, and Enchanted Rock: www.fredericksburg-texas.com

New Braunfels, Historic Gruene, www.gruene texas.com

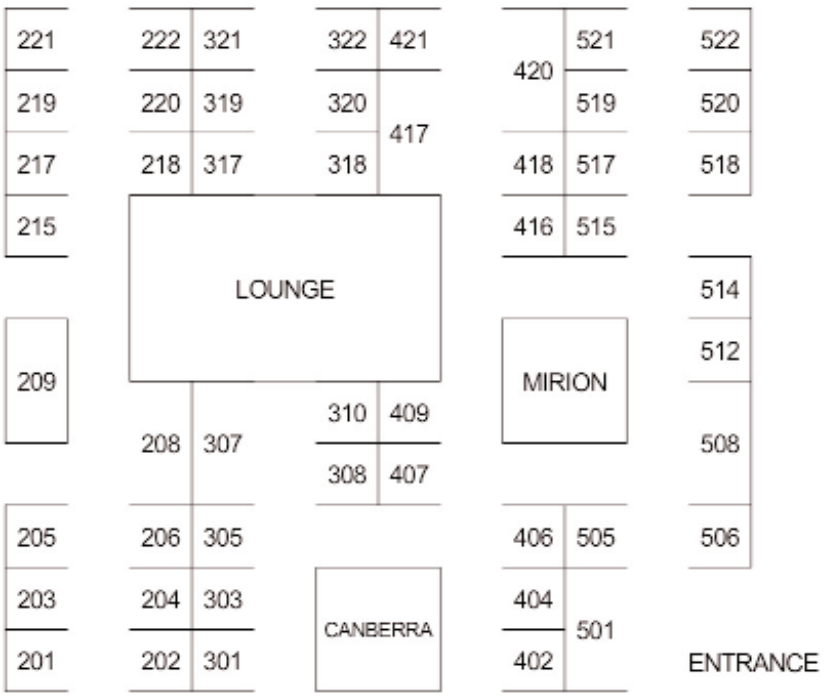
Prime Outlets - San Marcos was recently ranked the 3rd Best Place to Shop in the world as seen on ABC's "The View." It is a shopper's haven with over 130 luxury and brand names such as: Neiman Marcus Last Call Clearance Center, Gucci Outlet, Giorgio Armani General Store, Escada Company Store, Polo Ralph Lauren Factory Store, Pottery Barn Outlet, Saks Fifth Avenue OFF 5th, Victoria's Secret Outlet, Betsey Johnson, Williams-Sonoma Outlet and many more! The center features architecture designed after the Piazza San Marco in Venice, Italy.

2009 Midyear Meeting Exhibitors

e xhibits are located in b allroom a (c c)

Exhibit Hours *Ballroom A (CC)*		
s unday	4:45-6:15 PM	Opening Reception
m onday	9:45 AM-4:30 PM	Exhibits Open
	10:00-10:45 AM	Refreshment Breaks
	Noon-1:00 PM	Lunch in Exhibit Hall
	3:15-4:00 PM	Refreshment Breaks
t uesday	9:30 AM-Noon	Exhibits Open
	9:35-10:30 AM	Refreshment Breaks

Exhibit Hall Floor Plan



2009 Midyear Meeting Exhibitors

exhibits are located in ballroom a (cc)

2009 annual meeting - minneapolis, mn **booth: 222**
www.hps.org

2010 midyear meeting - albuquerque, nm **booth: 220**
www.hps.org

aahp/abhp **booth: 406**
1313 Dolley Madison Blvd.
Suite 402
McLean, VA 22101
703-790-1745; Fax: 703-790-2672

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When G. William Morgan died in 1984, he bequeathed a substantial fund to the Health Physics Society. The will requires that the fund's interest be used to have internationally known experts present papers at the Society's meetings. Michael C. O'Riordan of the United Kingdom's National Radiation Protection Board was the first international expert to be supported by the Society through the Morgan Fund. O'Riordan's presentation "Radon in Albion" was part of the Indoor Radon Session at the 1989 Albuquerque meeting.

G. William Morgan was a Charter member of the Society and during the Society's early years a very active member. Bill began his health physics career at Oak Ridge National Laboratory as part of the Manhattan Project. He later joined the Atomic Energy Commission and was instrumental in the development of the initial regulations that became part of 10 CFR Part 20. He was a great champion of education and helped establish the AEC Health Physics Fellowship Program. Bill later became very successful in the real estate business, but always retained his interest in the health physics profession. The Society's Presidents Emeritus Committee has responsibility for the selection of the international experts who will be supported by the G. William Morgan Trust Fund.

Technical Program

If a paper is going to be presented by other than the first author, the presenter's name has an asterik (*)
All sessions take place in the Henry B. Gonzalez Convention Center unless noted otherwise

s unday, Feb. 1

7:00-8:00 am — La Quinta

c e l 1 — **Fiesta c (l a Quinta)**
international a tomic e nergy a gency t raining packages for First r esponders
Thomas O'Connell
IAEA

c e l 2 — **Fiesta d (l a Quinta)**
portable r adiation d etectors, s electing the r ight t ool for the Job
James T. (Tom) Voss
Voss Associates

8:15 am- 12:15 pm — Mission 103

SAM-A Plenary Session

Chair: Dick Toohey

8:15 a m
o pening c omments
Toohey, R.
President, HPS

8:25 a m — **s a m-a .1**
a Federal interagency-l evel View of r esponse to r adiation e mergencies
Taylor, T.P.
Office of Science and Technology Policy, Executive Office of the President

9:00 a m — **s a m-a .2**
Fd n y r esponse to a r adiological e mergency: d ecisions of the incident c ommanders
Ingram, R. ***(G. William Morgan Lecture)***
Fire Department, City of New York

9:35 a m — **br e a k**

10:05 a m — **s a m-a .3**
c ommunicating with the media in the a ftermath of a r adiological e mergency: w ho s hould s peak, and w hat s hould t hey s ay?
Karam, A. ***(G. William Morgan Lecture)***
Karam Consulting LLC

10:40 a m — **s a m-a .4**
monitoring of people Following a r adiation e mergency: c d c 's r ole
*Miller, C.W., Ansari, A.**
Centers for Disease Control and Prevention

11:15 a m — **s a m-a .5**
e pa 's r esponse r ole after a r adiological e mergency
Cardarelli II, J.
Environmental Protection Agency, National Decontamination Team

11:50 a m — **Questions and a nswers**

1:30 - 3:15 pm — Mission 103A

SPM-A Medical Response Activities by Hospital and Emergency Medical Systems

Chairs: Eva Lee, Ronald Goans

1:30 pm — **s pm-a .1**
r adiological e mergency planning for h ealth c are Facilities
Elder, D.H., Strzelczyk, J.
University of Colorado Hospital

1:45 pm — **s pm-a .2**
c ivilian and m ilitary partnering d uring a r egional, m ultiagency e xercise i nvolving m ultiple "d irty b ombs"
Wilson, J.E.
U.S. Army

2:00 pm — **s pm-a .3**
t he a bsolute l ymphocyte t est as a t riage i nstrument in m ass c asualty r adiation e vents
Goans, R.E.
MJW Corp and the Radiation Emergency Assistance Center/Training Site

2:15 pm — **s pm-a .4**
t he a a pm w orking g roup on r esponse to r adiation i ncidents
Hendee, E., Fairobent, L.
AAPM

2:30 pm — **s pm-a .5**
r apid i nternal d ose m agnitude e stimation in e mergency s ituations using a nnual l imits on i ntake c omparisons
Sugarman, S.L., Toohey, R.E., Goans, R.E., Christensen, D.M.
Radiation Emergency Assistance Center/Training Site (REAC/TS), Oak Ridge Associated Universities (ORAU), MJW Corp.

2:45 pm — **s pm-a .7**
a d ecision t ool for o ptimizing d esign of c ommunity r eception c enters
Lee, E.K., Ansari, A., Caspary, K., Smalley, HK.., Chen, C.H.
Georgia Tech, Centers for Disease Control and Prevention

3:00 pm **spm-a.8**
on involvement of hematological units and bone-marrow transplantation centres in delivery of health care to Victims of radiological accidents
*Grahev, M., Melkova, K., Frolov, G., Pushkareva, S., Davtyan, A., Konchalovsky, M., Bushmanov, A.**
Burnasyan Federal Medical Biophysical Centre of FMBA of Russia, Blohin Cancer Russian Centre

1:30 - 4:45 pm **Mission 103B**

SPM-B Special Session: Nevada Test Site Contributions to Radiological Emergency Response and Homeland Security

Chairs: Carson Riland, Craig Marianno

1:30 pm **spm-b.1**
the role of the nevada test site in homeland security and radiological emergency response
Riland, C.
Remote Sensing Laboratory

2:00 pm **spm-b.2**
a solution for real-time acquisition, analysis, and dissemination in support of nuclear emergency response
Essex, J., Marianno, C.
Remote Sensing Laboratory

2:15 pm **spm-b.3**
locating illicit radioactive material: instrumentation design considerations
Marianno, C.
Remote Sensing Laboratory

2:30 pm **spm-b.4**
aerial neutron detection of cosmic-ray interactions with the earth's surface
Maurer, R., Stampahar, T., Smith, E.
Remote Sensing Laboratory

2:45 pm **spm-b.5**
ams national reachback capability - new aerial tools for helping the emergency responders
Wasiolek, P., Lyons, C.
NNSA/RSL-Nellis

3:00 pm **break in eXhibit hall**

3:30 pm **spm-b.6**
defensible data in a Field test environment
Chilton, G.L., Keegan, R.P., Zajac, F.L., Peppard, R.G.
NSTec

3:45 pm **spm-b.7**
radioscopic screening of cargoes with dual megavoltage (meV) energy barriers for detecting nuclear materials
Zhang, L., Regentova, E.E., Curtis, S., Wilson, Z., Chen, G.*
University of Nevada, Las Vegas, Varian Medical Systems, Security and Inspection, Inc.

4:00 pm **spm-b.8**
dosimetry of screening cargo containers: measurement of isodose lines
*Patton, P., Boyd, W., Lowe, D., O'Brien, R., Curtis, S.**
University of Nevada, Las Vegas

4:15 pm **spm-b.9**
laminated amorphous silicon neutron detector
McHugh, H.
NSTEC/GREAT BASIN

4:30 pm **spm-b.10**
multiple-coincidence active neutron interrogation of Fissionable materials
Tinsley, J.R., Hurley, J.P., Keegan, R.P., Trainham, R.
NSTec

3:45 - 4:45 pm **Mission 103A**

SPM-C Military Response to Catastrophic Domestic Incidents

Chairs: Ken Kerns, Stephen Simpson

3:45 pm **spm-c.1**
the united states army radiological advisory medical team and its ongoing role in responding to national nuclear and radiological emergencies
Melanson, M.A., Scott, A.L., Miallius, A.P.
Walter Reed Army Medical Center

4:00 pm **spm-c.2**
us air Force radation response
Miller, V.J.
U.S. Air Force

4:15 pm **spm-c.3**
the u.s. army dosimetry center's deployable dosimetry laboratory: providing rapid, accurate, and accredited measurements to battlefield and incident commanders in modern operations
Thompson, A., Byrd, D., Harris, B.
U.S. Army

4:30 pm **spm-c.4**
training in preparation for state and local radiological response
McDaniel, B.
Volpentest Hazardous Material Management and Emergency Response (HAMMER) Training Facility

4:45-6:15 pm **Ballroom A**

Exhibits Opening Reception

monday, Feb. 2

7:15-8:15 am **CELs**

cel 3 **mission 103a**
basic disaster life support for radiological and nuclear preparedness and response
John C. White
Southwestern Medical Center at Dallas

cel 4 **mission 103b**
practical radiation detection training for First responders: lessons learned by rscs during supported drills and exercises, common mistakes
Eric L. Darois, Fredrick P. Straccia
Radiation Safety & Control Services (RSCS), Inc.

8:30 - 10:00 am **Mission 103A**

MAM-A Radiation Hazards from Radiological Dispersal Devices & INDs

Chair: Dan Strom

8:30 am **mam-a.1**
emergency intakes of Fission product mixtures and single radionuclides for triage
Brodsky, A., Reeves, M.D.G.
Georgetown University, Northrop Grumman IT

8:45 am **mam-a.2**
assessing internal contamination using the canberra inspector 1000 Following an rdd event
Burgett, E., Hertel, N.
Georgia Institute of Technology

9:00 am **mam-a.4**
the relative importance of internal dose: an analysis of the detonation of a low yield improvised nuclear device in an urban setting
Raine, D., McClellan, G., Millage, K., Nelson, E.
Applied Research Associates, Inc., Defense Threat Reduction Agency

9:15 am **mam-a.5**
update on plans to eliminate cesium choloride
Rushton, R.
Hopewell Designs, Inc.

9:30 am **mam-a.6**
radiological dispersion events: when there's no device and no bomb
Strom, D.J.
Pacific Northwest National Laboratory

9:45 am **mam-a.7**
lessons learned from the First nuclear test at trinity
Shonka, J., Widner, T.
Shonka Research Associates, ChemRisk, Inc.

10:00 am **break in eXhibit hall**

8:15 am - 12:15 pm **Mission 103B**

MAM-B Special Session: Radiological Emergency Planning and Public Health

Chairs: Ruth McBurney, Charles Miller

8:15 am **mam-b.1**
public health response to a nuclear/radiological emergency
Lanza, J.J.
Florida Department of Health

8:35 am **mam-b.2**
the role of cdc in a public health emergency involving radiation or radioactive materials
Miller, C.W.
Centers for Disease Control and Prevention

8:55 am **mam-b.3**
challenges of population monitoring Following a radiological emergency
Whitcomb, Jr., R.C.
Centers for Disease Control and Prevention

9:15 am **mam-b.4**
public health organizations' involvement in planning for radiological emergencies
Blumenstock, J.S.
Association of State and Territorial Health Officials

9:35 am **mam-b.5**
cdc-crcpd roundtable on communication and teamwork: keys to successful radiological response
Salame-Alfie, A.
New York State Department of Health

9:55 am **panel discussion**

10:15 am **break in eXhibit hall**

10:45 am **mam-b.6**
the role of Volunteer radiation professionals in improving radiological preparedness
Ansari, A.
Centers for Disease Control and Prevention

11:05 am **mam-b.7**
establishing a radiation response Volunteer corps
*Passetti, B., Williamson, J., Gilley, D.B.**
Florida Bureau of Radiation Control

11:25 am **mam-b.8**
pennsylvania's experience in involving health physics Volunteers in emergency preparedness and response
Yusko, J.G.
Pennsylvania Department of Environmental Protection

11:45 a m **m a m-b .9**
c r c pd's r ole in e mergency preparedness: c onsistency, partnerships, and r esources
Steves, K.
Kansas Department of Health and Environment

12:05 pm **panel d iscussion**

10:30 am - Noon **Mission 103A**

MAM-C Cleanup of Areas Affected by Nuclear Weapons or Dispersal Devices

Chairs: Derek Favret, Nick Bates

10:30 a m **m a m-c .1**
a n s i/h ps s tandard n 13.12: s tatus r eport on the r evision to the s urface and Volume c learance s tandard
Kennedy, Jr., W.E.
Dade Moeller & Associates

10:45 a m **m a m-c .2**
a pplications of the h istorical e mergency r esponse and m odern-d ay c haracterization and c leanup of a n uclear w eapons a ccident s ite to First r esponders
Hackett, J.R., Caputo, D., Tepperman, M., Weismann, J.
Cabrera Services, Inc.

11:00 a m **m a m-c .3**
c lean-up and s ource r ecovery at a Former w eapons s torage a rea "c " s tructure
Fyffe, J.G.
U.S. Air Force

11:15 a m **m a m-c .4**
u se of g eospatial i nformation s ystems in n uclear w eapons or r adiological d ispersal d evice e mergency r esponse
Bahl, C., Favret, D.
U.S. Air Force

11:30 a m **m a m-c .5**
e nvironmental p rotection a gency a irborne g amma e mergency m apper p roject
Cardarelli II, J.J., Thomas, M., Curry, T., Faller, S.
EPA National Decontaminaiton Team, EPA Radiological Emergency Response Team

11:45 a m **m a m-c .6**
u se of s wipe s amples in r esponse to a r adiological d ispersal d evice i ncident
Gogolak, C.V.
Consultant

Noon-2:00 pm **Ballroom A**

Complimentary Lunch in Exhibit Hall

1:30 - 2:00 pm **Ballroom A Foyer**

Poster Session

p.1 t omorrow's g amma-r ay s pectroscopy t echnology: t ransition e dge s ensors with 47 eV e nergy r esolution at 103 keV
Johnson, T., Ullom, J., Rabin, M.
Colorado State University, NIST, Los Alamos National Laboratory

p.2 d etect o n-line, u ltra l ow r adiation u sing s tatistical m ethods
Grof, Y., Akbarzadeh, M., Monk, J.
CEMRC Carlsbad, WTS Carlsbad

p.3 c ++ c omputer c ode for e xact d ecision l evels and e rrors of t ype i w hen the s ample c ount t ime is an i nteger t imes g reater than the b ackground c ount t ime
Potter, W.E., Strzelczyk, J.
Consultant, Sacramento, CA, University of Colorado Hospital

2:00 - 5:15 pm **Mission 103A**

MPM-A Integration of Agencies and Resources & National Response Framework

Chairs: John Till, Amir Mohagheghi

2:00 pm **m pm-a .1**
d ynamic u se of e nvironmental m easurement d ata for d ecision-m aking and c ommunication in e mergency r esponse s ituations
*Grogan, H.A., Mohler, H.J., Rocco, J. R., Stetar, E. A., Till, J. E.**
Risk Assessment Corporation

2:15 pm **m pm-a .2**
e nvironmental s ampling d uring p ublic h ealth e mergencies
Antenucci, A., Cirino, N., Costello, C., Egan, C., Keenan, R., Pennell, P., Rafferty, R., Virgil, M., Wilson, L.*
New York State Department of Health

2:30 pm **m pm-a .3**
t he b iodosimetry p rogram at the b iomedical a dvanced r esearch and d evelopment a uthority
Grace, M., Moyer, B., Voigt, B., Homer, M., Macaluso, A., Manning, R.
BARDA

2:45 pm **m pm-a .4**
t he g r ad e r program for Qualifying r adiation d etection s ystems for h omeland s ecurity a pplications
Blumenthal, D.J., Johnson, M., Sleeper, C.
DHS/DNDO, Pacific Northwest National Laboratory

3:00 pm **mpm-a.5**
laboratory participation in the department of homeland security domestic nuclear detection office program for Qualifying radiation detection instruments for homeland security applications
Johnson, M.
Pacific Northwest National Laboratory

3:15 pm **mpm-a.6**
u.s. department of energy consequence management under the national response Framework
Van Etten, D.M., Guss, P.P.
National Security Technologies, LLC

3:30 pm **break in eXhibit hall**

3:45 pm **mpm-a.7**
interaction of civilian support team and regional hazmat teams in a rural state
Corti, D.
University of Montana

4:15 pm **mpm-a.8**
the role of the iaea in responding to nuclear accidents and radiation emergencies
Kerns, K.
Iowa State University, International Atomic Energy Agency

4:30 pm **mpm-a.9**
an independent examination of the national planning scenarios
Widner, T.E., Le, M.H., Intrepido, A.J.
ChemRisk, Inc.

4:45 pm **mpm-a.10**
international consequence management: a survey
Mohagheghi, A., Sircy, M.
Sandia National Laboratories, US Central Command

5:00 pm **mpm-a.11**
who rempan network and international system of medical and public health assistance in radiation emergencies
Carr, Z., Perez, M.
World Health Organization

2:00 - 5:15 pm **Mission 103B**

MPM-B Advances in Instrumentation

Chairs: Frazier Bronson, James Voss

2:00 pm **mpm-b.1**
a radiation dosimeter for First responders
Patel, G.N., Crowe, F., Watanabe, Y.
JP Laboratories, Inc, Crowe and Company, LLC, Masonic Cancer Center

2:15 pm **mpm-b.2**
statewide implementation of a new personal radiation detector for emergency responders
Lombardo, A.J., Desrosiers, A., Seif, T.
Polimatrix, IEMA

2:30 pm **mpm-b.3**
us air Force Field deployable environmental data acquisition and position transmission system (edapts) modernization
Clark, K., Fyffe, J.
U.S. Air Force

2:45 pm **mpm-b.4**
emergency response efficiency calibrations for portable gamma spectroscopy instruments
Bronson, F., Bosko, A.
Canberra

3:00 pm **mpm-b.5**
portable instruments for real-time radiation mapping
Voss, J.T.
Voss Associates

3:15 pm **break in eXhibit hall**

3:45 pm **mpm-b.6**
deploying portable continuous air monitors for emergencies
Voss, J.T.
Voss Associates

4:00 pm **mpm-b.7**
pennsylvania's response to radiological accidents
Yusko, J., Vyenielo, M.
Pennsylvania Department of Environmental Protection

4:15 pm **mpm-b.8**
evaluation of radiological screening technology and appropriate training procedures: lessons learned
Le, M.H., Widner, T.E., Intrepido, A.J.
ChemRisk, Inc.

4:30 pm **mpm-b.9**
use of isotopic ratios for the identification of enriched uranium
Kawabata, K., Beimer, S., Honsa, P.
U.S. EPA-Las Vegas

4:45 pm **mpm-b.10**
detection of gamma and neutron sources using portable equipment - a comparison of Fundamental physical parameters impacting the instrument selection and search strategies
Iwatschenko, M. A.
Thermo Scientific

5:00 pm **mpm-b.11**
ensuring reliability of radiation detection equipment through national and international standards
Chiaro, P.J.
Oak Ridge National Laboratory

t uesday, Feb. 3

8:30 am - 12:15 pm **Mission 103A**

TAM-A Training and Guidance for Professionals, First Responders, First Receivers and Members of the Public in Response to a Radiological Attack

Chairs: Ray Johnson, Tom O'Connell

8:30 a m **t a m-a .1**
introduction and demonstration of the "radiological emergency command packet"
Crawford, J.
University of Missouri-Columbia

8:45 a m **t a m-a .2**
international atomic energy agency emergency preparedness and response for First responders
O'Connell, T.F.
IAEA

9:00 a m **t a m-a .3**
to help First responders - it's time for us to become myth busters
Johnson, R.
Dade Moeller and Associates

9:15 a m **t a m-a .4**
elements of the history of poisoning that can improve our emergency response readiness
Widner, T. E., Le, M.H., Intrepido, A.J.
ChemRisk, Inc.

9:30 a m **t a m-a .5**
who's empowered to protect, how are they empowered, and what do they need to know?
Strom, D.
Pacific Northwest National Laboratory

9:45 a m **t a m-a .6**
a combined hardware-software strategy for triage of internally contaminated persons
Waller, E., Wilkinson, D.
University of Ontario Institute of Technology, Defence Research and Development Canada - Ottawa

10:00 a m **break in eXhibit hall**

10:30 a m **t a m-a .7**
nuclear weapon attack response: suggested methodologies for reducing radiation Fatalities
Anderson, V.E., Thomas, J.M.
California Department of Public Health

10:45 a m **t a m-a .8**
planning tools for operating community reception centers in response to large scale radiation emergencies
Ansari, A., Caspary, K.
Centers for Disease Control and Prevention, Oak Ridge Institute for Science and Education

11:00 a m **t a m-a .9**
radiological emergency planning for public health professionals and First responders
Salame-Alfie, A., Costello, C.
New York State Department of Health

11:15 a m **t a m-a .10**
emergency responder courses in radiological and nuclear preparedness and response: the ndls F courses
White, J.C.
U-TX Southwestern Medical Center

11:30 a m **t a m-a .11**
health physics society as a training resource for public education
Crowe, F.A.
Crowe and Company, LLC

11:45 a m **t a m-a .12**
an external dose reconstruction involving a radiological dispersal device
Hearnsberger, D., Poston, J., Hamilton, I.
Kaizen Innovations, Texas A&M University, Baylor College of Medicine

12:00 pm **t a m-a .13**
guidance of interregional radiation emergency practical medical training - russian experience
Bushmanov, A.U., Kotenko, K.V., Kretov, A.S.
FMBC of FMBA of Russia

note For chps

the american academy of health physics has approved the following meeting-related activities for continuing education credits for chps:

- **meeting attendance is granted 2 cecs per half day of attendance, up to 12 cecs;**
- **aahp 8 hour courses are granted 16 cecs each;**
- **hps 2 hour pep courses are granted 4 cecs each;**
- **hps 1 hour cels are granted 2 cecs each.**

8:15 am - 12:15 pm **Mission 103B**

TAM-B Special Session: Recent Developments in Radiological Incident Planning and Response by Federal Agencies

Chairs: John Crapo, David Bowman

8:15 am **tam-b.1**
national preparedness issues related to nuclear or radiological incidents
Kish, J.
DHS/FEMA

8:35 am **tam-b.2**
regional response structure for management of domestic incidents
Daigler, D.
DHS/FEMA

8:55 am **tam-b.3**
protection action guidelines and recommendations - an update
Tupin, E.
US Environmental Protection Agency Radiation and Indoor Air

9:15 am **tam-b.4**
the advisory team for the environment, Food and health activities and initiatives
Noska, M.A.
US Food & Drug Administration

9:35 am **break in eXhibit hall**

10:05 am **tam-b.5**
advances in data management within the Federal radiological monitoring and assessment center (FRMAC)
Clark, H., Allen, R., Essex, J., Pobanz, B.
US Department of Energy Office of Emergency Response, Chainbridge Technologies, National Security Technologies, LLC, Lawrence Livermore National Laboratories

10:25 am **tam-b.6**
advances in risk communication tools for support to incident managers and decision makers
Crapo, J.L.
Oak Ridge Institute for Science & Education

10:45 am **tam-b.7**
establishing a web-based consortium of cytogenetic laboratories for rapid triage and emergency radiation dose assessment
Livingston, G.K., Jenkins, M.S., Christensen, D.M., Wiley, A.L., Van Dyke, D.L.
Oak Ridge Associated Universities, Mayo Clinic

11:05 am **tam-b.8**
development of a regionally-based airborne radiation monitoring program
Remick, A.L., McCall, K.A.
US Department of Energy, National Security Technologies, LLC

11:25 am **tam-b.9**
nuclear/radiological incident exercises - Validation of efforts, source of opportunities to improve
Smith, C.L., Smith, D.E.
Oak Ridge Institute for Science & Education

11:45 am **Questions and answers**

1:30 - 2:45 pm **Mission 103A**

TPM-A Interdiction and Security of Radiological Materials and Border & Port Initiatives

Chairs: William Rhodes, Birsen Ayaz

1:30 pm **tpm-a.1**
a preventative radiological/nuclear detection program in the state of Florida
Lanza, J.J.
Florida Department of Health

1:45 pm **tpm-a.2**
emergency response challenges for health physicists
Rhodes, W., Lasche, G.
Sandia National Labs

2:00 pm **tpm-a.3**
a review of response to implementing increased irradiator security controls
Princewill, J., Sanza, B.
Northwestern University

2:15 pm **tpm-a.4**
alternate technique for Field estimation of uranium enrichment
Favret, D., Gross, I., Meyers, S., Pugh, D.
U.S. Air Force, Oak Ridge National Laboratory

2:30 pm **tpm-a.5**
background and minimum detectable activity (mda) of radiation detectors for homeland security borders
Ayaz-Maierhafer, B., DeVol, T.A.
Clemson University

1:30 - 2:45 pm **Mission 103B**

TPM-B Population Screening and Monitoring

Chair: Gary Kramer

1:30 pm **tpm-b.1**
portal monitoring: a methodology for increasing throughput
Kramer, G.H., Hauck, B., Marro, L., Capello, K., Chiang, A.*
Health Canada

1:45 pm **t pm-b.2**
a deployable non-invasive technique for screening radiologically exposed populations
Wilkinson, D., Pace, P., Wyatt, H., Bugden, M.*
Defence R&D Canada, Atomic Energy of Canada Limited

2:00 pm **t pm-b.3**
a Fast bioassay method for uranium and plutonium isotopes in Faecal samples
Li, C., Varve, Z., Lariviere, D., Sadi, B., Lai, E., Kramer, G.H.
Health Canada, Carleton University

2:15 pm **t pm-b.4**
optimized sr-90 urine bioassay method for emergency response
Li, C., Sadi, B., Jodayree, S., Moodie, G., Daka, J., Kramer, G.H.
Health Canada, Carleton University

2:30 pm **t pm-b.5**
the need to collect individual exposure-related data Following radiation accidents and events
Simon, S., Bouville, A.
National Cancer Institute

3:15 - 4:15 pm **Mission 103A**

TPM-C Crisis Risk Communication

Chairs: Robert Emery, Robin Hill

3:15 pm **t pm-c.1**
the psychology of nuclear Fear and loathing: why are u.s., Japanese, and French attitudes different towards radiation
Thomas, J.
California Department of Public Health

3:30 pm **t pm-c.2**
application of the iaea's international nuclear event scale in communicating events
Jones, C.G.
U.S. Nuclear Regulatory Commission

3:45 pm **t pm-c.3**
risk communication considerations to Facilitate the screening of mass populations for potiential contamination with radioactive materials
Emery, R.J., Sprau, D.D., Morecook, R.C.
University of Texas School of Public Health, East Carolina University, Houston Community College System

4:00 pm **t pm-c.4**
calculations in disaster: comparative risk assessment and program evaluation methodology
Thomas, J., Anderson, V.
California Department of Public Health

3:15 - 4:15 pm **Mission 103B**

TPM-D Special Session: Advancements in Emergency Preparedness Regulations and Guidance

Chair: Patricia Milligan

3:15 pm **t pm-d.1**
protective action recommendation study
Sullivan R.L., Phillips H.A.
U.S. Nuclear Regulatory Commission

3:30 pm **t pm-d.2**
evacuation time estimate study and guidance
Milligan P.A.
U.S. Nuclear Regulatory Commission

3:45 pm **t pm-d.3**
reviewing emergency preparedness in new reactor applications
Phillips H.A.
U.S. Nuclear Regulatory Commission

4:00 pm **t pm-d.4**
state-of-the-art reactor consequence analysis
Sullivan R.L., Phillips H.A.
U.S. Nuclear Regulatory Commission

Abstracts

sam-a.1 Taylor, T.; Office of Science and Technology Policy, Executive Office of the President; ttaylor@ostp.oep.gov

a Federal interagency-level View of response to radiation emergencies

Congress established OSTP through the National Science and Technology Policy, Organization, and Priorities Act of 1976 (Public Law 94-282). OSTP has two primary missions. OSTP staff advises the President and his staff on scientific issues. Staff works closely with counterparts in other offices of the Executive Office of the President to ensure that science is adequately represented and well understood. Secondly, OSTP coordinates research and development across the federal government. In areas where it is necessary to coordinate research across federal agencies, OSTP provides these agencies with an opportunity to come together, discuss their research programs and develop a coordinated approach to ensure that there are no gaps in the research, no repetition in research investments, and that budgets are being used wisely.

OSTP is engaged in a number of interagency activities to strengthen our national response to radiological emergencies, particularly in preparation for managing the catastrophic consequences of a terrorist attack using a radiological dispersal device (RDD) or nuclear device. Activities being conducted through the National Science and Technology Council will be described, including the Nuclear Defense Research and Development Roadmap and the recently published Planning Guidance for Protection and Recovery Following RDD and Improvised Nuclear Device (IND) Incidents.

sam-a.2 Ingram, R. (G. William Morgan Lecture); Fire Department of New York

Fdny response to a radiological emergency: decisions of the incident commanders

A look at the pre-incident issues faced by responders in technology, standards, and training that impact planned post-event tactical operations of Fire/HAZMAT, Law Enforcement, and Health and Emergency Medical Service providers with a specific view of the Fire Department, City of New York response. This presentation will include a brief review of the current state of equipment, technology, standards and testing for responders today and how the FDNY incorporates these capabilities into its training programs and internal tactical response plans to meet the goals of the NYC interagency plan.

sam-a.3 Karam, A. *(G. William Morgan Lecture)*; Karam Consulting LLC; paksbi@rit.edu

communicating with the media in the aftermath of a radiological emergency: who should speak, and what should they say?

Anything associated with radiation and radioactivity sparks concerns and fears among the general public, and interest among the media. In the event of any radiological emergency, it will be necessary to tell the public what has happened and how to keep themselves and their families safe; and the most efficient way to do this is through the media. Fortunately, the media is likely to be at the scene almost immediately, although their aims may not coincide with those of the health physicists, emergency responders, and public officials who are addressing the emergency. This may produce multiple tensions, exacerbated by the fact that those most willing to talk to the media may not be those best suited for this role for any number of reasons (e.g. perceived credibility, understanding of the issues, the ability to engender public trust and confidence, etc.). These issues will be addressed, drawing upon a combination of observations and personal experience gleaned from a decade of working with the media on various radiological stories.

sam-a.4 Miller, C.W., Ansari, A.; Centers for Disease Control and Prevention; asa4@cdc.gov

monitoring of people Following a radiation emergency: cdc's role

Following a radiation emergency, evacuated, sheltered, or other identified members of the public would require external and/or internal radiological monitoring and, if indicated, decontamination. In addition, the potentially-impacted population would be identified for dose reconstruction, biodosimetry/bioassay, medical treatment (chelation therapy, cytokine treatment, etc.), and possible entry into long-term health and medical monitoring programs and registries. The current capacity to implement these activities at the State, local, Tribal level is extremely limited.

The Department of Health and Human Services has designated the Centers for Disease Control and Prevention (CDC) as the lead agency to coordinate the Federal support for population monitoring activities. Under the Nuclear/Radiological Incident Annex of the National Response Framework, HHS/CDC is responsible for supporting State, local, and tribal governments in (1) monitoring people for external contamination; (2) monitoring people for internal contamination; (3) population decontamination; (4) administering available pharmaceuticals for internal decontamination, as deemed necessary by State health officials; and (5) establishing a registry of potentially exposed individuals, performing dose reconstruction, and conducting long-term monitoring of this population for potential long-term health effects.

CDC is undertaking a number of activities to fulfill its responsibilities in the area of population monitoring. It prepared a planning guide for state and local public health planners highlighting the many challenges in a mass casualty radiation incident and suggesting ways to address those challenges. CDC is also developing improved laboratory techniques for radioanalysis of urine bioassays, and it is studying the use of existing hospital equipment as well as hand-held radiation instruments for rapid screening and prioritization of individuals with internal contamination. In addition, CDC recently developed a training toolkit, specifically tailored to public health professionals, for planning and responding to radiation emergencies.

s a m-a .5 Cardarelli II, J.; Environmental Protection Agency, National Decontaminaiton Team; cardarelli.john@epa.gov

e pa 's r esponse r ole after a r adiological e mergency

The U.S. Environmental Protection Agency (EPA) has statutory authority to conduct environmental response activities for hazardous substance emergencies, including radionuclides. These authorities are reflected in the National Response Framework under Emergency Support Function 10 and the Nuclear/Radiological Incident Annex. The Framework presents the principles that enable all response partners to prepare and provide a unified national response to disasters and emergencies. It establishes a comprehensive, national, all-hazards approach to domestic incidents. As laid out under the Nuclear/Radiological Incident Annex, EPA has varying roles and responsibilities associated with a multi-agency response to radiological emergencies, depending on the ownership or control of the materials involved in the emergency. Other major players at the Federal level include the Department of Defense, Department of Energy, National Aeronautics and Space Administration, Nuclear Regulatory Commission, and Department of Homeland Security, including Customs and Border Protection and U.S. Coast Guard. In some cases EPA may lead Federal environmental response activities, while in others it may provide support to another Federal agency. Regardless of which Federal agency leads the Federal response actions, EPA provides long-term coordination of Federal support for environmental monitoring activities through leadership of the Federal Radiological Monitoring and Assessment Center, which transitions from DOE to EPA during the intermediate phase of a response to a radiological emergency. EPA regional and headquarter resources support local and state authorities via the incident command system throughout the response. Decisions about clean-up levels and decontamination technologies will be determined through the optimization process outlined in the Department of Homeland Security guidance on protective actions for response to radiological dispersal device (RDD) and improvised nuclear device (IND) incidents. The agency's response to the TOPOFF 4 RDD exercise, lessons learned, and a summary of an internal agency RDD recovery workshop will demonstrate the agency's current capabilities, capacities, and the considerable task that lies before us to effectively carry out our response and clean-up responsibilities. In addition, the actions the agency is taking to enhance our current capabilities will be presented.

s pm-a .1 Elder, D.H., Strzelczyk, J.; University of Colorado Hospital; Deirdre.Elder@uch.edu

r adiological e mergency planning for h ealth c are Facilities

While radiation accidents are rare, several recent events that involved dispersal of radioactive materials provided lessons for emergency response planning. In the period immediately following a large scale radiological emergency, such as an RDD, health care facilities may be faced with a sudden influx of both injured persons and the "worried well." Hospital planning must include procedures for separating the injured from those who are concerned about possible contamination and for dealing with radioactive contamination of patients, equipment and emergency responders. Hospitals should also plan for diagnosis and medical management of individuals with radiation-induced health effects and communication with emergency response networks and the public. Hospital policies for treating patients who may be contaminated need to be developed and communicated clearly to emergency department personnel and emergency responders prior to any emergency situation. Policies should include the identification of the emergency coordinator and his/her back-up person, guidelines for controlling the spread of contamination and the appropriate personal protective equipment that should be used to minimize the radiation doses to healthcare workers. Policies for protective actions and operational procedures during the first 24 - 48 hours must be established in the planning stage not in the immediate period after the event. They must be scientifically founded and based on the latest available data on the probable effects and realistic hazard assessments.

s pm-a .2 Wilson, J.; U.S. Army; jim.wilson4@us.army.mil

c ivilian and m ilitary p artnering d uring a r egional, m ultiagency e xercise i nvolving m ultiple "d irty b ombs"

In May, 2008, members of the Moncrief Army Community Hospital (MACH), Fort Jackson, South Carolina, participated in a large scale exercise involving treating patients injured by the detonation of radiological dispersion devices. During this scenario, multiple devices were detonated in a large American city and casualties were transported throughout the United States under the provisions of the National Defense Medical System (NDMS). The local operation in Greenville, SC integrated state, local and federal assets to receive, screen and treat patients transported by rail for continuing on medical care and then to place them in a number of local medical centers. Personnel from several local hospitals, state and local law enforcement, emergency services, animal control, veterinary services and volunteer

groups were unified under the Incident Command System to establish a reception area, decontamination facility, and an initial treatment center and transportation plan. As a result of this exercise local responders, civilian and military, increased their abilities to come together quickly and successfully respond to a large scale emergency in a relatively short period of time. This talk highlights the capabilities that exist at MACH and the many lessons learned about integration of multiple agencies, the absolute necessity for prior coordination and the need for realistic joint training exercises.

spm-a.3 Goans, R.; MJW Corp and the Radiation Emergency Assistance Center/Training Site; ronald.goans@comcast.net

the absolute lymphocyte test as a triage instrument in mass casualty radiation events

Medical triage of a very large population after a mass casualty weapon event is a challenging and resource-intensive task. It is possible to distinguish 2 Gy at 48 hours with acceptable sensitivity and specificity by screening each individual for an absolute lymphocyte count less than 2000 /mm^3 (normal range 1500-3500 /mm11 ^3). A pilot study was undertaken at the Radiation Emergency Assistance Center/Training Site (REAC/TS) to simulate blood screening at the point of triage. Using well-described criticality events in the REAC/TS Radiation Accident Registry, the first blood sample taken from patients was analyzed. Times of the initial blood draw ranged from 4-12 hours post-incident. Good initial hematology data was available for 15 patients in the moderate dose range 2-6 Gy (mean dose of 3.7 ± 1.1 Gy). Additional cases (n=5) were available for a high dose range (6-100 Gy), while 10 cases were available for relatively low dose (0-1 Gy). In the dose range 2-6 Gy, the average absolute lymphocyte count (mean ± SD) was 1520 ± 460/mm^3. Using a triage cut-point of 2000/mm^3, this will give a sensitivity and specificity of approximately 85% and a false negative rate and false positive rate of approximately 15%. Assuming a prevalence of 20% irradiated patients in the presenting patient base, the positive predictive value of the test in the 2-6 Gy range is 59% and the negative predictive value is 96%. In the high dose range, the sensitivity of the test approaches 100%. Furthermore, in the low dose range (< 1 Gy), all lymphocyte values were normal. An increase in the prevalence of actually irradiated patients will increase the positive predictive value of the test and decrease the negative predictive value. Furthermore, parallel testing with additional parameters (time to emesis, neutrophil/lymphocyte ratio, and various biomarkers) will increase the sensitivity of the lymphocyte triage test.

spm-a.4 Hendee, E., Fairobent, L.; AAPM; eric.hendee@phci.org

the aapm working group on response to radiation incidents

The American Association of Physicists in Medicine has recently formed a Working Group on Response to Radiation Incidents. The members have a wealth of knowledge in the Medical Response to Radiation Incidents, as it relates to first responders and hospital activities. We are actively collaborating with organizations such as the Health Physics Society, and would like to take this opportunity to introduce the HPS to our activities and plans for the future.

spm-a.5 Sugarman, S., Toohey, R., Goans, R., Christensen, D.; Radiation Emergency Assistance Center/Training Site (REAC/TS), Oak Ridge Associated Universities (ORAU), Radiation Emergency Assistance Center/Training Site (REAC/TS) and MJW Corp.; steve.sugarman@orise.orau.gov

rapid internal dose magnitude estimation in emergency situations using annual limits on intake comparisons

It is crucial to integrate health physics into the medical management of radiation illness or injury. The key to early medical management is not necessarily radiation dose calculation and assignment, but radiation dose magnitude estimation. The magnitude of the dose can be used to predict potential biological consequences and the corresponding need for medical intervention. It is, therefore, imperative that physicians and health physicists have the necessary tools to help guide this decision making process. All internal radiation doses should be assigned using proper dosimetry techniques, but the formal internal dosimetry process often takes time that may delay treatment, thus reducing the efficacy of some medical countermeasures. Magnitudes of inhalation or ingestion intakes, or intakes associated with contaminated wounds, can be estimated by applying simple rules of thumb to sample results or direct measurements and comparing your answers to known limits for a projection of dose magnitude. Although a regulatory unit, the annual limit on intake (ALI) is based on committed dose, and can therefore be used as a comparison point. For example, internal dose magnitudes associated with contaminated wounds can be estimated by comparing a direct wound measurement taken soon after the injury to the product of the ingestion ALI and the associated f1 value (the fractional uptake from the small intestine to the blood). International Commission on Radiation Protection (ICRP) Publication 96, as well as other resources, recommends treatment based on ALI determination. Often, treatment decisions have to be made without having all of the information one would like to have. However, one can still perform dose magnitude estimations in order to help effectively guide the need for medical treatment by properly assessing the situation and appropriately applying basic rules of thumb.

spm-a.7 Lee, E., Ansari, A., Caspary, K., Smalley, H., Chen, C.; Georgia Tech, CDC; eva.lee@gatech.edu

a decision tool for optimizing design of community reception centers

Population monitoring is a process that begins soon after a radiation incident is reported and continues until all potentially affected people have been monitored and evaluated for: 1) needed medical treatment, 2) the presence of radioactive contamination on the body or clothing, 3) the intake of radioactive materials into the body, 4) the removal of external or internal contamination (decontamination), 5) the radiation dose received and the resulting health risk from the exposure, and 6) long-term health effects. Population monitoring (including people and their pets) is accomplished locally and is the responsibility of state, local, and tribal governments. Many critical components of population monitoring should be put in place in the first few hours after the incident, before the arrival of federal assets that might be used to assist in the monitoring efforts. However, the challenges of population monitoring especially in the first few hours and days after a radiation incident tend to be overlooked in emergency response planning. In this talk, we will discuss practical considerations for operating a community reception center, and the development of a software that can be used as a decision tool for optimizing design of community reception centers, building on the established infrastructure and planning at the state and local public health departments throughout the country. The software allows the determination of appropriate layout of screening centers, estimates and optimizes the necessary staffing needs, and provides an insight on process flows and optimal throughput that the operations can support. It also allows the users to analyze the risks of radiation contamination spread and determine mitigation strategies.

spm-a.8 Grahev, M., Melkova, K., Frolov, G.*, Pushkareva, S., Davtyan, A., Konchalovsky, M.; Burnasyan Federal Medical Biophysical Centre of FMBA of Russia, Blohin Cancer Russian Centr; frolov63@bk.ru

on involvement of hematological units and bone-marrow transplantation centres in delivery of health care to Victims of radiological accidents

Anybody cannot quite shut out a probability of a large-scale radiological accident. In this case, some hematology units of local medical institutions could be involved in medical care delivery to radiation accident victims. The experience of hematology unit's stuff in the management of chemotherapy induced bone marrow insufficiency and cytostatic injuries of gastrointestinal tract and skin is very important in the treatment of patients with Acute Radiation Syndrome (ARS). And usually multi-field hospital besides hematology units include blood transfusion services, intensive care unit and hemodialysis, specialists in trauma and burn's treatment, which help may be useful in cases of combined radiation injuries. A unified Program for examination and treatment patients with the ARS for hematology units was developed. Because not every hematological unit is possible to perform the necessary treatment of patients with severe and very severe ARS, the special attention is paid to the necessity of immediate clinic understanding of the level of whole body irradiation. This program specifies the examinations, following which solutions regarding possible time of occurring, depth and duration of forthcoming critical cytopenia would be made within the first week after exposure. In turn, this information will help to make decision on the reasonability of either hospitalization or out-patient treatment; to determine the extent of medical care required: an option of the infection prophylaxis strategy; need in ñytokine therapy; fluid resuscitation and transfusion of blood cellular components, reasons for allogeneic hemopoietic stem-cell (HSC) transplantations; to identify patients requiring only symptomatic therapy; and to select a hospital for future treatment of the patient. A patient can be exposed to dose > 4 - 6 Gy must be moved up to the intensive hematology unit specializing in HSC transplantation.

spm-b.1 Riland, C.; Remote Sensing Laboratory; rilandca@nv.doe.gov

the role of the nevada test site in homeland security and radiological emergency response

One of the Nevada Test Site's (NTS) primary missions is National Security. The NTS has supported numerous organizations Homeland Security and Radiological Emergency Response needs before, and after 9/11. The NTS has a long history of training emergency response personnel and being a part of the Nation's radiological emergency response teams. More recently, the NTS' missions have expanded to additional training, equipment testing and a variety of other unique homeland security activities. This paper provides an overview of homeland security activities conducted in connection with the Nevada Test Site.

spm-b.2 Essex, J., Marianno, C.; RSL; Essexjj@nv.doe.gov

a solution for real-time acquisition, analysis, and dissemination in support of nuclear emergency response

The Real-time Data Acquisition and Dissemination (RDAD) architecture is a suite of standards and protocols that allow emergency response assets to provide more field data, faster, and greater reliability to decision makers. These technologies allow mobile data acquisition platforms to transmit data through any IP communication channel to central command and control assets for review and autonomous QA/QC. The RDAD architecture includes flexible client components including hardened data collection devices that provide low bandwidth data transmission capabilities. Thus far sensor integration has included aerial, vehicle, and pedestrian based platforms.

spm-b.3 Marianno, C.; RSL; mariancm@nv.doe.gov
locating illicit radioactive material: instrumentation design considerations

Prior to 9/11, specialized instrumentation for detecting illicit radioactive material was almost exclusively in the hands of highly-trained teams from the federal government. These teams were comprised of experts in radiation and radioactive material. Now Homeland Security has invested millions of dollars in the development of radiation detection equipment for use by non-experts such as border patrol, customs, and local law enforcement. Due to this new customer base, the design parameters for these instruments have changed. They must be easy to use, easy to interpret and, in most cases, light weight. To achieve these goals, scientists and engineers must choose the most appropriate detection material, electronic components, and software/firmware. This talk will examine design considerations for these systems. A review of current commercial systems will be given in addition to discussing future trends.

spm-b.4 Maurer, R., Stampahar, T., Smith, E.; Remote Sensing Laboratory; maurerrj@nv.doe.gov
aerial neutron detection of cosmic-ray interactions with the earth's surface

We have demonstrated the ability to measure the neutron flux produced by the cosmic-ray interaction with nuclei in the ground surface using aerial neutron detection. High energy cosmic-rays (primarily muons with GeV energies) interact with the nuclei in the ground surface and produce energetic neutrons via spallation. At the air-surface interface, the neutrons produced by spallation will either scatter within the surface material, become thermalized and reabsorbed, or be emitted into the air. The mean free path of energetic neutrons in air can be hundreds of feet as opposed to a few feet in dense materials. As such, the flux of neutrons escaping into the air provides a measure of the surface nuclei composition. It has been demonstrated that this effect can be measured at long range using neutron detectors on low flying helicopters. Radiological survey measurements conducted at Government Wash in Las Vegas, Nevada, have shown that the neutron background from the cosmic-soil interactions is repeatable and directly correlated to the geological data. Government Wash has a very unique geology, spanning a wide variety of nuclide mixtures and formations. The results of the preliminary measurements are presented.

spm-b.5 Wasiolek, P., Lyons, C.; NNSA/RSL-Nellis; WASIOLPT@nv.doe.gov
ams national reachback capability - new aerial tools for helping the emergency responders

One of the U.S. Department of Energy's National Nuclear Security Administration (NNSA) emergency response assets is the Remote Sensing Laboratory (RSL) Aerial Measuring System (AMS) used to detect, measure, and track radioactive material before and during emergencies to locate sources or determine contamination levels. Since September 11, 2001, increasing numbers of local, state, and federal entities are entering into the AMS arena. NNSA has recognized a need by these entities for an AMS Reachback Center that would provide training and assistance on all aspects of AMS. The Center will assist local, state, and federal agencies in establishing the skills, resources, and training needed for a successful AMS regional operation. Beginning in January 2008 and continuing through April 2008, a pilot program was created in collaboration between NNSA and the U. S. Department of Homeland Security's Domestic Nuclear Detection Office (DNDO). The purpose of this collaboration was to provide aerial radiological surveillance and equipment technique training to local law enforcement offices in four major U.S. cities: Chicago, Washington, DC, New York City, and Los Angeles. The Mobile Aerial Radiological Surveillance (MARS) training curriculum was developed by personnel from NNSA headquarters and NNSA support teams. A total of 44 students participated in the training events that were held during this period. The positive reaction to this program has led to the establishment of the RSL as the headquarters for the National Aerial Measuring System Reachback (NAMSR) Center. The NAMSR Center will provide an AMS Home Team aerial stand-by duty team for decision makers, state authorities, scientists, and RAP teams to discuss, plan, and analyze available data for aerial responses. An additional role of the Center will be to serve as the SME for the training of newly established aerial radiological monitoring assets. The purpose of this presentation is to review the history, success, and future plans of the National AMS Reachback Center.

spm-b.6 Chilton, G.L., Keegan, R.P., Zajac, F.L., Peppard, R.G.; NSTec; chiltogl@nv.doe.gov
defensible data in a Field test environment

This paper provides an overview of the instrument testing campaigns conducted by NSTec at the Nevada Test Site with a focus on data quality control. The focus in the past was to prove that testing can be done correctly, and that it can be done according to test design. In recent times there has been an additional focus on proving that the data collection was done according to test design. The process of setting up a database system to collect test data with integrated quality control is described. This includes a discussion of the establishment of protocols to collect data in a verifiable manner, and discusses the process of recording Test Observation Reports and Corrective Action Reports. The importance of a strong quality assurance and quality control program is stressed. This work was done by National Security Technologies, LLC, under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy.

spm-b.7 Zhang, L., Regentova, E.E., Curtis, S.*, Wilson, Z., Chen, G.; University of Nevada, Las Vegas, Varian Medical Systems, Security and Inspection, Inc.; sszjcurtis@att.net

radioscopic screening of cargoes with dual megavoltage (meV) energy barriers for detecting nuclear materials

Radiographic screening of cargo containers is performed by switching between 6 and 9 MeV of boundary energies as rapidly as 200 times per second and measuring the attenuation of photons in the matter by a detector. The use of high energy photons allows the imaging of materials through the steel cargo container walls. The interdigitated imaging X-rays are used to distinguish between different densities of objects within the container. The collected data is transformed into intensity levels in two interlaced images which can be analyzed for material identification. Materials belonging to a target group are identified through the analysis of ratios of the dual energy signals and the signal obtained at 9 MeV level. The shape analysis is invoked to identify objects of interest. The techniques are developed for producing a consolidated high quality image suitable for visual inspection and to alert customs officials of a specific threat material (such as SNM). The experiments show the ability of penetration through 17 inches of an iron shield. The techniques developed contribute to the overall effort to improve the efficiency and accuracy of material identification at US Customs inspection facilities.

spm-b.8 Patton, P., Boyd, W., Lowe, D., O'Brien, R., Curtis, S.*; University of Nevada, Las Vegas; sszjcurtis@att.net

dosimetry of screening cargo containers: measurement of isodose lines

Due to the increased threat of terrorists' activities, security efforts within the United States and aboard have been greatly intensified. Recent reports suggest that terrorists might attempt to smuggle either radiological dispersal devices or weapons of mass destruction through our ports of entry. In today's society, it is imperative that the U.S. government and private sector are able to detect nuclear weapons materials rather quickly. Dual energy x-ray imaging systems are capable of measuring the effective atomic number of the contents of a container and determine if the material in the container has an atomic number high enough to be of concern. Dual energy x-ray imaging has been a tool in medical diagnosis for several years. Subjecting an object to x-rays of different energies allows for the determination of the atomic composition of the material being x-rayed. This is possible because the x-rays either interact through different mechanisms or the probability of interaction through a particular mechanism is greatly different. Due to the fact that civilians may be in close proximity to containers requiring x-ray investigation, it is necessary to determine what radiological risk various x-ray spectrums present to persons exposed by the primary and secondary beams. This research measured the maximum dose rate at different locations within the imaging area for different x ray energy spectrums and various cargo configurations and geometries. These results helped to determine the exclusion area for unshielded cargo imaging.

spm-b.9 McHugh, H.; NSTEC/GREAT BASIN; mchughhr@nv.doe.gov

laminated amorphous silicon neutron detector

An internal R&D project was conducted at the Special Technologies Laboratory of NSTec to determine the feasibility of developing a multi-layer Boron-10 based thermal neutron detector using the amorphous silicon (AS) technology currently employed in the manufacture of liquid crystal displays. The Boron-10 neutron reaction produces an alpha that can be readily detected. A single layer detector, limited to an approximately 2 micron thick layer of boron, has a theoretical sensitivity of about 3%; hence a thin multi-layer device with high sensitivity can theoretically be manufactured from single layer detectors. Working with NREL (National Renewable Energy Laboratory), an AS PiN diode alpha detector was developed and tested. The PiN diode was deposited on a Boron-10 coated substrate. Testing confirmed that the neutron sensitivity was nearly equal to the theoretical value of 3%. However, adhesion problems with the Boron-10 coating prevented successful development of a prototype detector. Future efforts will include boron deposition work and development of integrated AS signal processing circuitry.

spm-b.10 Tinsley, J.R., Hurley, J.P., Keegan, R.P., Trainham, R.; NSTec; tinslejr@nv.doe.gov

multiple-coincidence active neutron interrogation of Fissionable materials

An extension of the Associated Particle Imaging technique that is used for the detection and imaging of hidden explosives, the present measurements use a beam of tagged 14.1 MeV neutrons in coincidence with two or more gammas to probe for the presence of fissionable materials. We have measured neutron-gamma-gamma coincidences with targets of depleted uranium, tungsten, lead, iron, and carbon and will present results that show the multiple coincidence counting rate for the depleted uranium is substantially above for any of the non-fissionable materials. In addition, the presence of coincidences involving delayed gammas spectra provides a signature for fissionable materials that is distinct from that for non-fissionable ones. Information from the tagged neutron involved in the coincidence event is used to compute the position of the fissionable material in all three dimensions. The result is an imaging probe for fissionable materials that is compact and portable, and produces relatively low levels of background radiation. Simultaneous measurements on packages of interest for both explosives and fissionable materials are now feasible.

spm-c.1 Melanson, M., Scott, A., Miallius, A.; Walter Reed Army Medical Center; mark.melanson@us.army.mil

the united states army radiological advisory medical team and its ongoing role in responding to national nuclear and radiological emergencies

Established in 1961, the United States Army Radiological Advisory Medical Team (RAMT) is one of the Department of Defense's premier medical response assets. Originally, the RAMT was established to provide world class expertise in supporting the medical response to a nuclear weapon accident or incident worldwide. In the aftermath of September 11th, 2001, the RAMT mission expanded to include supporting any national nuclear or radiological disaster. With the capability to deploy highly trained and robustly equipped medical and health physics expertise, RAMT is uniquely qualified to offer a wide spectrum of support in the response to emergencies ranging from a radiation mishap, to a nuclear weapon accident or incident, to an act of nuclear or radiological terrorism. RAMT's special capabilities include decontamination of contaminated patients, ambulances, and medical treatment facilities, medical management of internally contaminated patients (to include chelation and decorporation therapy), and radiation risk assessment and communication expertise. Located at Walter Reed Army Medical Center in Washington, D.C., the RAMT is a key component of the National Capitol Area response to a nuclear or radiological incident. Given this critical mission, RAMT has coordinated and participated in plans and exercises involving civilian hospitals and local civilian agencies within the Baltimore - Washington area. This talk will highlight the RAMT's unique capabilities, recent collaborative efforts, and how these open partnerships have been mutually beneficial, greatly enhancing the Country's overall ability to respond effectively to a nuclear or radiological incident, whatever the cause.

spm-c.2 Miller, V.; Air Force; vivien.miller@us.af.mil

us air Force radation response

The unique aspects of the Air Force's responsibility of protecting its assets at home stations and overseas, along with additional strategic roles and responsibilities, require a distinctive radiation response framework. Historically, this framework primarily focused on response to the accidents regarding nuclear weapons (i.e. broken arrow events). Presently the increase in the variety of radiation threats, particularly the change in focus toward radiological dispersion devices (RDDs), requires the Air Force to establish a comprehensive response methodology. This presentation will provide an up-to-date description of the general radiation response framework of the Air Force; specifically in regards to initial (first) and specialized response teams. Initial responders to a radiation emergency are established at every Air Force base and are derived from the civil engineering corps and the biomedical science corps. The Air Force's specialized response team, Air Force Radiation Assessment Team (AFRAT), provides expert radiation response and support as necessitated by the situation. This presentation will provide an encompassing overview of the resources utilized by each team, proficiency development through exercise participation/training, and the integration of these teams within the architecture of the emergency response spectrum. The content of this presentation may be of particular interest to civil response agencies that are located near Air Force bases.

spm-c.3 Thompson, A., Byrd, D., Harris, B.; Health Physics Society; aaron.m.thompson2@us.army.mil

the u.s. army dosimetry center's deployable dosimetry laboratory: providing rapid, accurate, and accredited measurements to battlefield and incident commanders in modern operations

The U.S. Army Dosimetry Center (ADC) issues, receives, and interprets ionizing radiation dosimetry for Department of the Army personnel through a National Voluntary Laboratory Accreditation Program (NVLAP) approved process. Currently, during possible homeland or theater radiological emergency operations, soldiers without an active ADC account rely on high dose nuclear operations dosimetry developed during the Cold War. The detection range and accuracy of these high dose dosimeters is insufficient for the modern emergency response and theater scenarios. The Thermoluminescent Dosimeter (TLD), used by the ADC, has the detection capabilities necessary for such scenarios. The ADC is effective at providing the dosimetry needs for fixed facilities and regular accounts. However, the ADC has had shipping and tracking issues with accounts in deployed operations and is not adept at handling the high speed turn around of measured data necessary for commanders in emergency response or theater operations. In response to these challenges the ADC developed a self-contained deployable dosimetry laboratory (DDL) capable of monitoring radiation exposure on-site. This mobile facility provides immediate access to over 10,000 TLDs with accredited measurements for commanders. The DDL thus provides an ideal extension to the ADC to provide response for emergency operations and rapid results for theater accounts.

spm-c.4 McDaniel, B.; Volpentest Hazardous Material Management and Emergency Response (HAMMER) Training Facility; Bobby_A_McDaniel@rl.gov

training in preparation for state and local radiological response

The National Guard Bureau's Weapons of Mass Destruction (WMD) Civil Support Teams (CSTs), comprised of full-time Army National Guard and Air National Guard members, were established to rapidly deploy and assist and support local and state authorities at domestic WMD/Nuclear, Biological, or Chemical (NBC) incident sites. Their primary role is determining the nature and extent of an attack or incident; providing technical advice on WMD

response operations; and event identification and support the arrival of follow-on state and federal military response assets. While CSTs are highly skilled and highly trained in chemical and biological responses some weaknesses in managing potential radiological events had been identified. Improved practical training and radiological exercises were sought by CST leadership. The presentation focuses on training provided by the Volpentest Hazardous Material Management and Emergency Response (HAMMER) training facility located in Richland, WA. HAMMER, with teaming from Washington Department of Health, is providing this training, using radioactive materials, based on a "crawl, walk, run" progression of knowledge and skills. The training culminates with a final, day-long exercise that simulates a WMD scenario using not only sealed radiological sources, but also short-lived, dispersible radioactive material for maximum training realism and hands-on experience.

mam-a.1 Brodsky, A., Reeves, M.D., G.; Georgetown University, Northrop Grumman IT; AlBrodsky@aol.com

emergency intakes of Fission product mixtures and single radionuclides for triage

Members of the public will need to know quickly whether they have inhaled or ingested amounts of radioactive material that would be likely to harm them following a radiological or nuclear attack. Data on symptoms and effects of exposures to humans, as well as animals, to fission products in plumes from underground Soviet tests have been declassified by the Khazakhstan government and recently published. These human data tend to confirm the estimates of one of the authors that an inhalation of about 11 MBq (300 microcuries) of gross fission products decayed less than 30 days after a nuclear detonation could be chosen as an "acceptable" emergency intake, comparable in acute and chronic effects to the original standard of 25 R of external gamma irradiation. These observations indicate that, for fission product mixtures as well as most other nuclides potentially useful to terrorists for dispersion among the public, emergency intake quantities can be derived that would allow rapid detection of gamma emission outside the body for initial triage with simple portable instruments.

mam-a.2 Burgett, E., Hertel, N.; Georgia Institute of Technology; eric.burgett@nnrc.gatech.edu

assessing internal contamination using the canberra inspector 1000 Following an rdd event

The Canberra Inspector 1000 has been investigated as a triage tool following a radiological dispersal device. This widely available handheld spectrometer offers an easy to use interface and allows for isotope identification. Dual settings allow the user to record a spectrum for analysis as well as read dose rates. The detector utilizes a gain stabilized 3 inch by 3 inch NaI(Tl) detector. The detector's response has been measured using a slab phantom. These measurements were used to validate an MCNP model of the detector. The detector's response to internal contamination after inhalation as a function of time after the RDD event has been investigated. Monte Carlo simulations using six phantoms based on the stylized Medical Internal Radiation Dose (MIRD) phantoms were used in the study to determine the count rates for the detectors placed on four different locations, the front and rear right lungs, left thigh, and neck (thyroid). Isotopes that were chosen for investigation were those most likely to be used in an RDD event. The time dependent distribution of the radioactive material in the body organs was calculated using DCAL. Results for both photopeak integration as well as dose rate response for the Canberra Inspector 1000 will be presented. This work was performed under funding provided by the Radiation Studies Branch of the Centers for Disease Control and Prevention

mam-a.4 Raine, D., McClellan, G., Millage, K., Nelson, E.; Applied Research Associates, Defense Threat Reduction Agency; dudley.raine@ara.com

the relative importance of internal dose: an analysis of the detonation of a low yield improvised nuclear device in an urban setting

One scenario envisioned by those concerned with a potential terrorist attack involves the detonation of a low yield (<10 kiloton (kT)) improvised nuclear device (IND) in an urban location in the United States. The fatalities and casualties from prompt weapon effects must obviously be considered in such a scenario, as should potential external radiation exposure due to fallout. The question of the relative importance of potential internal doses to the external dose in the fallout area is invariably raised; this consideration is of particular interest when evaluating evacuation vice shelter-in-place options. Calculations were performed using the Defense Threat Reduction Agency's Hazard Prediction and Assessment Capability (HPAC) tool, the Fallout Inhalation and Ingestion Dose to Organs (FIIDOS) code, and other post-processing algorithms. The analysis provides estimates of the internal doses expected to be accrued during the aftermath of the detonation of an IND and compares them to the expected external doses. The internal dose pathways considered include inhalation and incidental ingestion of both descending and resuspended fallout. The relative impact of each exposure pathway for shelter and evacuation scenarios is assessed at various locations downwind from ground zero. The HPAC calculations of expected casualties from prompt effects (radiation, thermal pulse, and blast overpressure) and external exposure to fallout are also presented to provide an additional context for the analysis.

mam-a.5 Rushton, R.; Hopewell Designs, Inc.; rorushton@hopewelldesigns.com

update on plans to eliminate cesium choloride

The elimination of cesium choloride is under review by the Nuclear Regulatory Commission. Cesium-137 is used in hundreds of irradiators for instrument calibration, blood irradiators, research, and other uses. A report by the National Academy of Sciences in spring of 2008 recommended that

cesium chloride be eliminated because of the potential risk and large impact that would result from a dirty bomb made of cesium chloride. This presentation will review the current status of rulings, hearings, and possible schedule for the elimination of cesium chloride. This program has the potential to cause major disruption to the nuclear and medical communities if it is implemented too quickly. The potential impact and costs will be reviewed. Alternative technologies to cesium chloride will be covered.

mam-a.6 Strom, D.; Pacific Northwest National Laboratory; strom@pnl.gov

radiological dispersion events: when there's no device and no bomb

This presentation is a plea to "think out of the box" in planning and preparation for radiological attack. Politicians and the popular press talk about "dirty bombs." More technical people talk about "radiological dispersion (or dispersal) devices" or RDDs. The use of these terms excludes radiological dispersion events (RDEs) in which there is no bomb and no device. Historically, not all chemical and biological attacks have involved the use of a bomb or device, and such attacks may have relied on their victims being unaware of the attack until it was too late to invoke protective actions or countermeasures. It is evident that no announcement of an RDE, through an explosion or otherwise, is needed from the standpoint of producing dose. From the standpoint of producing terror or mass disruption, once the event is discovered, these will most likely occur with no help form those responsible for the RDE. As a basis for planning and preparedness, it may be prudent to assume that all radioactive sources are dispersible, regardless of their original form. Furthermore, consideration of means of dispersion other than emplacement or airborne release should be considered. Finally, large sources in IAEA Categories 1 and 2 are likely to become more dispersible over time due to the fact that they are above room temperature due to decay heat, they may have significant degradation of source form due to self-irradiation, and they may have significant transmutation of material. Considering transmutation, in the absence of oxygen, 137CsCl becomes BaCl2 and Ba metal over time, and 90SrTiO4 becomes Zr(TiO4)2 and Zr metal over time; these mixtures may be expected to have different chemical properties from the original compounds. Considering self-irradiation, large sources over a decade old may experience doses in excess of 10 billion grays, levels that may change their material properties. RDEs encompass RDD events and dirty bomb events, but may include other means of dispersion.

mam-a.7 Shonka, J., Widner, T.; jjshonka@shonka.com

lessons learned from the First nuclear test at trinity

Trinity was the first test of a nuclear weapon. It was conducted on July 16, 1945 near Alamogordo, New Mexico. Trinity was a test of an implosion-type plutonium bomb with a nominal yield of 20 kilotons. Aside from the external exposure rate, the impact on a downwind population with no protective actions taken has not previously been considered. Current day lessons can be gleaned for consideration of modern radiation emergencies, including considerations of capabilities in tools such as the HOTSPOT code. For the last decade, the authors have been part of a team conducting the Los Alamos Historical Document Retrieval and Assessment Project (LAHDRA) for the Centers for Disease Control and Prevention. As an element of our activity, we have retrieved all of the available information on the Trinity test, and have attempted to understand the significance of the radiological impact, including internal exposures, to off-site populations from Trinity. It was surprising to us that this study had not previously been performed. Trinity is unique among nuclear tests in that a population was present as close as 25 kilometers downwind from a low altitude (30 m) detonation, with no protective measures taken before or afterwards. Numerous pathways for exposure to man were available. Our studies to date will be summarized. As an example of the complexities that can be considered, exposure to radioactive iodine was possible through milk (both from grass consumption by the cows or goats as well as by ingestion of contaminated water from dammed impoundments (ponds) used for watering livestock that served as large-scale fallout collectors), consumption of cistern water derived from rooftop collectors, inhalation with significant fallout and resuspension reported by downwinders for days post-event. Any of these pathways can provide significant thyroid exposures when no protective action is taken. Other nuclides that have been considered include fission products, strontium and plutonium.

mam-b.1 Lanza, J.J.; Florida Department of Health; john_lanza@doh.state.fl.us

public health response to a nuclear/radiological emergency

The new National Response Framework (NRF) utilizing the National Incident Management System (NIMS) stresses the all-hazards approach to domestic incident management including nuclear/radiological emergencies resulting from accidents as well as man-made intentional incidents/events. Secondary to the events of September 11, 2001, the public health infrastructure in the United States has been significantly augmented. However, recent surveys conducted by governmental and private public health organizations have shown that public health workers feel that they are unprepared to deal with radiological terrorism/ emergencies. Federal, State, and local public health agencies are developing awareness training programs for emergency responders (i.e., public health workers, first responders, first receivers) and the general public describing the role of public health during nuclear/radiological emergencies. This presentation covers the role of federal response teams and State and local public health service providers prior to, and subsequent of, a nuclear/radiological emergency. Special attention is paid to the emergency response structure at all levels.

mam-b.2 Miller, C.W.; Centers for Disease Control and Prvention; cym3@cdc.gov

the role of cdc in a public health emergency involving radiation or radioactive materials

The Department of Health and Human Services (HHS) is a Cooperating Agency under the Nuclear/Radiological Incident Annex of the National Response Framework. As part of HHS, the Centers for Disease Control and Prevention (CDC) would be a major public health entity responding to a nuclear/radiological incident, whether accidental or intentional. CDC expects to support HHS by implementing specific roles and responsibilities that include: • Assisting in the deployment of the Strategic National Stockpile; • Supporting State, tribal, and local officials in monitoring the potentially-impacted population; • Assessing the health of and medical effects of radiological exposures on people in the community, emergency responders and other workers, and high-risk populations; • Providing technical assistance, advice, and consultation to state and local health departments on medical treatment, follow-up, and decontamination of victims exposed to radioactive materials, and protection of food and water supplies from radioactive contamination; • Establishing and maintaining a registry for long-term follow-up of people exposed to or contaminated by radioactive materials; • Communicating with the public, policy makers, and the media. Since September 11, 2001, CDC has been spending an increasing amount of time and resources preparing to fulfill these responsibilities. Working with a variety of federal, state, tribal, and local public health partners, these activities include (1) increased participation in emergency preparedness exercises through the Advisory Team on Environment, Food, and Health; (2) development of communication materials for members of the public, clinicians, and public health officials; and (3) development of guidelines for handling contaminated fatalities and monitoring people potentially exposed to radioactive materials. The current status of these and other activities being undertaken by CDC is discussed.

mam-b.3 Whitcomb, R.C., Jr.; Centers for Disease Control and Prevention; RWhitcomb@cdc.gov

challenges of population monitoring Following a radiological emergency

The Centers for Disease Control and Prevention (CDC) is supporting the Department of Health and Human Services (HHS) by implementing guidance, training, education, and communications materials related to population monitoring called for under the Nuclear/Radiological Incident Annex of the National Response Framework. CDC is also working with its traditional public health partners and the Conference of Radiation Control Program Directors (CRCPD) to develop a collaborative effort in addressing many of the population monitoring challenges facing our nation following an accidental or intentional nuclear/radiological incident. These challenges include: • Epidemiological surveillance systems are not fully prepared/designed for radiological emergencies; • Public Health and Radiation Control Programs are not fully integrated in all states; • Public health workforce and clinicians need training to prepare them to respond to a radiological or nuclear emergency; and • Clinical laboratory capability is insufficient or non-existent. Working with a variety of federal, state, tribal, and local public health partners, CDC is addressing these challenges by (1) developing epidemiological training focused on assisting state and local public health to identify the at risk population; collect and report radiation-related data with typical morbidity/mortality event reporting; and prioritize individuals for decontamination, medical treatment, registries, and long term monitoring programs. (2) Co-hosting with CRCPD a "Roundtable on Communication and Teamwork: Keys to Successful Radiological Response"; (3) developing education, training, and communications material for the public health workforce; and (4) developing new methods for rapid analysis of small biological samples for a variety of radionuclides and is seeking resources to develop a public health Laboratory Response Network for radionuclides. The current status of these and other activities being undertaken by CDC is discussed.

mam-b.4 Blumenstock, J.S.; Association of State and Territorial Health Officials; jblumenstock@astho.org

public health organizations' involvement in planning for radiological emergencies

State public health agencies play a critical and essential role in a jurisdiction's overall readiness planning to effectively detect, respond to, and recover from all hazards emergencies, including radiation incidents. This includes having robust plans and the requisite capacity and capability to effectively management the consequences of such events to minimize morbidity and mortality through monitoring, analysis and detection, protective actions determination, decontamination and medical countermeasures distribution, and mass casualty medical care coordination. This session discusses how our Nation's state and territorial pubic health agencies, individually and collectively, are assisted and supported by their national association, the Association of State and Territorial Health Officials (ASTHO), in fulfilling this mission. Discussion includes overviews of the Association's Vision, Mission and available resources; key program services designed to provide technical assistance and forge sound national practice policy; peer group support activities; ongoing and planned preparedness-related projects relevant to radiological incident planning and response; and opportunities for future collaborations and partnerships.

mam-b.5 Salame-Alfie, A.; New York State Department of Health; asa01@health.state.ny.us

cdc-crcpd roundtable on communication and teamwork: keys to successful radiological response

In an effort to help prepare the nation for a public health threat involving nuclear/radiological incidents, the Centers

for Disease Control and Prevention (CDC) and the Conference of Radiation Control Program Directors (CRCPD) sponsored the "Roundtable on Communication and Teamwork: Keys to Successful Radiological Response" on June 2008. The purpose of the roundtable was to bring together representatives from state and local public health agencies and radiation control programs to: increase awareness and understanding of our responsibilities for preparing and responding to radiological incidents; strengthen communications and improve working relationships among participating organizations; and share information on available resources. Participants included experts in the broad fields of health physics, hospital preparedness, epidemiology, public health preparedness, risk communication, psychology and emergency medicine. Participants represented federal agencies, state and local health departments and professional organizations. Short presentations about each organization were followed by a scenario discussion designed to elicit ideas from the participants regarding the role of public health during a radiological emergency. It was followed by a presentation on the roles of public health during a radiological emergency and examples of successful collaboration. Facilitated discussions were used to 1) identify gaps, capabilities and strategies; 2) identify ways to strengthen communication; 3) list challenges to both internal and external coordination relative to radiological response; 4) provide short term solutions to communication issues, and provide a list of organizations we could partner with or add to our list of initial contacts; and 5) provide some short- and long-term strategies to continue the newly developed partnership. There was a very positive response from the participants and an interest from all the parties to continue this initial partnership.

mam-b.6 Ansari, A.; Centers for Disease Control and Prevention; aansari@cdc.gov

the role of Volunteer radiation professionals in improving radiological preparedness

The need for radiation protection expertise in preparing for and effectively responding to a nuclear or radiological emergency is paramount. In case of a terrorist attack involving a radiological dispersal device or an improvised nuclear device, the public health, radiation control, and emergency management authorities at all levels of government will face many challenging issues requiring radiation protection expertise. For example, local public health authorities will need to monitor concerned citizens for radioactive contamination, provide them with information, and support operations at evacuation centers or shelters to accommodate the displaced population. This is likely to be true even in communities which are located at a considerable distance from the incident scene. The scarcity of resources under those conditions will exacerbate the response at local level where these services are most needed. In the United States, there are tens of thousands of radiation professionals working at hospitals, universities, nuclear power industry, and environmental, engineering, and consulting firms. These include health physicists, medical physicists, radiological or nuclear medicine technologists, and others. If these radiation professionals participate in available volunteer organizations in their own communities, they can provide an invaluable and much-needed resource to their community in the event of a radiation emergency. To be effective, the enlisting and appropriate training of volunteers need to be done before such emergencies occur. Fortunately, mechanisms now exist to enlist and train interested radiation volunteers in state-wide registries. These state programs are briefly described in the presentation. For volunteer radiation professionals, the time commitment is minimal. Potential rewards are significant.

mam-b.7 Passetti, B., Williamson, J., Gilley, D.B.*; Florida Bureau of Radiation Control; debbie_gilley@doh.state.fl.us

establishing a radiation response Volunteer corps

In the event of a radiological emergency, population monitoring for large numbers of individuals must be available to assist in identifying citizens who may be contaminated with radioactive material and to reassure those who are not contaminated. The National Response Framework assigns coordination of federal support for population monitoring to Health and Human Services, Public Health and Medical Services function. This coordination of federal support does not necessarily include resources for the actual monitoring; this is expected to be provided by the state and local government. The National Response Framework suggests that states need to be prepared to respond to radiologic incidents with the establishment of population monitoring centers to assist in identifying citizens who may be contaminated with radiation and to reassure those who are not contaminated that they may return to a safe location. In an effort to satisfy this requirement, the State of Florida established a Radiation Response Volunteer Corps (RRVC) as a sub specialty of the federally-established Medical Reserve Corps. Members of the health physics and medical physics community were identified as potential volunteers. Training was provided to the volunteers by the Florida Department of Health's Bureau of Radiation Control with assistance from the Florida Health Physics Society, Centers for Disease Control, and the Florida Medical Reserve Corps. Attendees were encouraged to volunteer for this activity through their local Medical Reserve Corps unit. Tools to establish a Radiation Response Volunteer Corps within the Medical Reserve Corps in other states or regions are discussed.

mam-b.8 Yusko, J.G.; Pennsylvania Department of Environmental Protection; jyusko@state.pa.us

pennsylvania's experience in involving health physics Volunteers in emergency preparedness and response

Several years ago, the need for professional yet volunteer assistance in responding to radiological incidents within Pennsylvania was recognized, and the Department of Environmental Protection (PA DEP), in conjunction with the

Pennsylvania Emergency Management Agency (PEMA) developed the Pennsylvania Radiological Assistance Program (PA RAP). This is a mechanism for augmenting existing radiological technical personnel to advise the on-scene incident commander for radiological incidents. A PA RAP qualified individual, complete with the necessary tools and equipment, requisite skills and techniques would be deployed by PEMA for the technical support regarding radiation hazards at a radiological event or incident. The selection, training, equipment, and responsibilities of the volunteers is discussed and detailed, which includes some of the procedures utilized by these individuals when their services would be needed in the response to and mitigation of a radiological event or incident. Although volunteers are expected to have a generally satisfactory working knowledge of ionizing radiation and its effects, this is supplemented by both initial and periodic refresher training, which is mandatory for all volunteer participants in PA RAP.

mam-b.9 Steves, K.; Kansas Department of Health and Environment; ksteves@kdhe.state.ks.us

crcpd's role in emergency preparedness: consistency, partnerships, and resources

State radiation control programs have the responsibility of assuring the safety of the public from unnecessary radiation, including preparation for and response to radiological incidents and other emergencies. For states that have nuclear power plants within their borders or within the 10-mile emergency planning zones, states provide teams for offsite emergency planning, assessment, detection, and radiological assistance to local government. In all states, homeland security and preparedness for other radiological emergencies has become an important role for radiation control programs. The Conference of Radiation Control Program Directors (CRCPD), an organization whose membership consists primarily of directors and staff of state, territorial and local radiation control programs, provides many activities to maintain consistency and minimize guidance development time for states. In the areas of homeland security and emergency response, CRCPD provides operational guidance, tools and models for emergency planning, outreach to and collaboration with federal agencies and other organizations to support emergency preparedness, and responds to changes in federal guidance and to emerging issues. Information on state resources and mechanisms for obtaining those resources in an emergency are also important functions of the organization. The ability to include volunteer assistance from other radiation professionals and partnering with other organizations will improve states' capability to prepare for and respond to radiological emergencies. This presentation provides an overview of the support provided by CRCPD to federal, state, and local governmental organizations for their radiological preparedness efforts, including guidance documents, tools, planning models, outreach, education, and a network of partners and volunteers.

mam-c.1 Kennedy, Jr., W.E.; Dade Moeller & Associates; kennedy@moellerinc.com

ansi/hps standard n13.12: status report on the revision to the surface and Volume clearance standard

The need for comprehensive, clearance criteria for items, equipment, and facilities contaminated with radioactive materials has been recognized for several decades. Initial attempts to develop American National Standards Institute (ANSI)/Health Physics Society (HPS) N13.12 began in 1964 limited to the consideration of surface contamination. In 1999, the final version of ANSI/HPS N13.12 was formally issued with an expanded scope to consider clearance for both surface and volume contamination. It provided both the primary dose standard for clearance and derived screening levels. However, the 1999 standard was not fully adopted by U.S. Federal or State agencies because, although judgment and consensus were used in its development, the technical basis was not deemed robust enough to warrant broad application. In Vienna, the International Atomic Energy Agency (IAEA) published Safety Series No. RS-G-1.7 Application of the Concepts of Exclusion, Exemption and Clearance, along with Safety Report Series No. 44 Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance. Responding to the IAEA recommendations, the U.S. Federal agencies concerned with controlling radiation exposures requested that the writing group for this standard be reformed to determine if it would be possible to harmonize, or bring into accord, the 1999 version of this standard and the IAEA recommendations. The writing group was reformed in 2005, and the standard, limited only to clearance and not exemption or exclusion, is being revised as a result of the harmonization effort. Although not intended for intervention criteria, this standard does provide information useful to making real-time decisions regarding clearance of materials from contaminated areas. An overview is presented of the current status of the writing group's efforts, and the significant departures from the 1999 version.

mam-c.2 Hackett, J.R., Caputo, D., Tepperman, M., Weismann, J.; Cabrera Services, Inc.; jhackett@cabreraservices.com

applications of the historical emergency response and modern-day characterization and cleanup of a nuclear weapons accident site to First responders

An explosion and fire in a BOMARC missile launching pad in June 1960 resulted in the direct release of weapons grade plutonium (WGP) within the confines of an Air Force site in central New Jersey. The emergency response, while following standard practices of the day, resulted in the initial spread of residual contamination throughout the site, which was distributed further as a result of routine maintenance and site operational activities. Lessons applicable to modern-day emergency response can be learned from the spread of WGP contamination throughout the site. The spread of contamination reinforces the necessity for site controls during an emer-

gency situation, the involvement of health physics professionals with planning and first response, and a detailed emergency response plan. In 2007, Cabrera Services, Inc. completed field characterization and remediation activities at the site, and in 2008 issued the final report to recommend site closure according to Record of Decision (ROD) requirements. Cabrera utilized a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) based characterization methodology to identify locations with contamination exceeding ROD criteria. In addition, innovative technologies incorporating driveover gamma scanning, a multi-channel analyzer system, and integrated Global Positioning System units were used to quickly identify, locate, and map areas of concern, which were then correlated with soil concentration data obtained from the onsite laboratory. The dynamic and flexible work processes and real-time data collection procedures utilized for this project would be invaluable in an emergency response situation.

mam-c.3 Fyffe, J.G.; US Air Force; james.fyffe@us.af.mil

clean-up and source recovery at a Former weapons storage area "c" structure

Since September 11th, 2001 there has been a great deal of concern over the accessibility of radioactive sources that could be used for harmful purposes. The United States Air Force has endeavored to secure and dispose of un-used or abandoned radioactive sources to limit potential access to these sources. Part of this effort involved closing out a special nuclear material permit for Travis Air Force Base, CA. Travis AFB contains a former WSA (Weapons Storage Area). All buildings and grounds associated with the WSA were surveyed and remediated as needed for closing out the permit excluding one structure. Building 903 was a "C" structure used by the AEC (Atomic Energy Corporation) to maintain and repair weapons components. In the process of closing out the permit the Radiation Safety Officer at Travis AFB determined that source lockers in building 903 were contaminated. Furthermore, one source locker possibly contained an abandoned radiological source of undetermined type and origin. The radiological source was expected to be a Radium/Beryllium neutron source that was typically used in weapons maintenance operations. This presented a unique opportunity to test and train the light team concept of AFRAT (Air Force Radiation Assessment Team). AFRAT is a worldwide deployable team of health physicists, bioenvironmental engineers, and bioenvironmental engineering technicians in three main elements; field survey, laboratory analysis, and dosimetry. AFRAT deployment, training, event response, and lessons learned are discussed.

mam-c.4 Bahl, C., Favret, D.; U.S. Air Force; cory.bahl@brooks.af.mil

use of geospatial information systems in nuclear weapons or radiological dispersal device emergency response

Standard nuclear weapon or radiological dispersal device emergency response procedures in the past consisted of personnel responding to an event with equipment and supplies limited by what they could physically carry. Traditionally, this included pencil, paper, compass or basic GPS devices, in addition to radiation monitoring equipment. Because of the complexities associated with nuclear/radiological emergency response activities, data received for subsequent health physics analysis was sometimes unusable. By integrating current environmental survey techniques and equipment into a field team's response capabilities, data has become standardized. The use of these techniques has allowed the data to be easily configurable to the needs of the mission and allows for response activities to be more efficiently planned on-site. This presentation is designed to illustrate how Geospatial Information Systems have revolutionized data management during emergency response activities.

mam-c.5 Cardarelli II, J., Thomas, M., Curry, T., Faller, S.; US Environmental Protection Agency National Decontaminaiton Team, EPA Radiological Emergency Response Team; cardarelli.john@epa.gov

environmental protection agency airborne gamma emergency mapper project

The US Environmental Protection Agency Airborne Spectral Photometric Environmental Collection Technology (ASPECT) program provides assistance to the first responder by providing an aerial tool to collect photographic, chemical and physical (infrared and gamma radiation) information quickly and relay this information directly to decision makers in the field. Since 2001, ASPECT has assisted the response community in over 72 incidents ranging from ammonia releases to the recent pre-deployment to support the National Governors Association Meeting. The aircraft is located near Dallas, Texas and is "wheels-up" within one hour of activation. EPA recently initiated the ASPECT Gamma Emergency Mapper (GEM) project to improve the airborne gamma-screening and mapping capability of ground-based gamma contamination following a wide-area radiological dispersal device or fallout from an improvised nuclear device attack. The goal is to develop the most advanced gamma-radiation detection capability mountable within an Air Command 680 FL airframe. The ASPECT GEM committee membership consists of members from the EPA National Decontamination Team, Environmental Response Team, Radiological Emergency Response Team, academia, and a national laboratory. Up to eight NaI 2x4x16 detectors are among the suite of detectors to be mounted in the aircraft. This presentation provides the current status, expected radiological detection capabilities, and the timeline to achieve a fully operational improved platform.

mam-c.6 Gogolak, C.V.; Consultant; carl@gogolak.org

use of swipe samples in response to a radiological dispersal device incident

Swipe samples provide useful information about removable surface activity that often cannot be obtained otherwise. However, swipe sample results have a very high uncertainty, which is often not adequately evaluated. To advance to a more quantitative interpretation of swipe results, it is necessary to examine the various sources of uncertainty associated with the measurement. The uncertainty components due to variation in input quantities over all possible contaminants, surfaces, swipe materials, wetting agents, and analysis methods are so large for a generic approach to interpreting swipes that it is not likely to be productive to attempt to reduce them, except under explicit conditions with known components. In the case of an RDD with a well-characterized source term, sampling protocol and analysis method, it should be possible to produce an uncertainty budget that can identify the dominant sources of uncertainty and those that can be easily reduced, minimized or eliminated. Sampling and analysis protocols can be established for specific scenarios to accomplish this. Closely related to the evaluation of uncertainty is the interpretation of negative swipe results. If the uncertainty is not specified or is inadequately evaluated, it will not be clear whether there is no removable activity, or whether the measurement was not sufficiently sensitive to identify it. To avoid this issue requires developing measurement quality objectives (MQOs) for the detection of contamination of a specified type on a specific surface using a particular sampling and analysis protocol. In each case, an action level must be specified for the exposure scenario so that it can be determined that the methods used have the required sensitivity (e.g., minimum detectable activity [MDA]). Realistic detection limit calculations would allow a quantitative statement indicating that if a wipe sample does not show contamination, that it can be concluded that the removable contamination present is at less then the action level with a specified degree of certainty.

p.1 Johnson, T., Ullom, J., Rabin, M.; Colorado State University, National Institutes of Standards and Technology, Boulder, CO, Los Alamos National Laboratory

tomorrow's gamma-ray spectroscopy technology: transition edge sensors with 47 eV energy resolution at 103 keV

Transition edge sensors (TES) are a novel high-energy-resolution gamma-ray spectrometer for nuclear materials analysis. Our prototype has demonstrated energy resolutions of 47 eV at 103 keV as compared to resolutions of ~500 eV using present state-of-the-art Germanium spectrometers. The prototype consists of a 14-pixel multiplexed array of transition edge sensor microcalorimeters operated inside a cryogenic dewer. The TES microcalorimeter consists of a thin-film bilayer of molybdenum (Mo) and copper (Cu) as a superconducting thermometer with a tin (Sn) photon absorber. The TES microcalorimeter functions on the principle that at low temperatures (~0.1 K), the sensor has an extremely small heat capacity. Therefore, heat deposited in the absorber by interacting gamma-ray photons increases the TES's temperature and thus, increases the resistance of the superconducting Mo/Cu bilayer thermometer. The energy of the photon is measured as a pulse-shaped decrease in the calorimeter's current. Single-pixel TES microcalorimeters of ~1 mm2 provide slow count rates of 50-100 counts/second. The Quantum Devices Group, National Institute of Standards and Technology, working with Los Alamos National Laboratory, successfully demonstrated a 14-pixel array of TESs to increase the system count rate and collection area. Group research focuses on increasing the array size to 256 pixels, which will then provide system count rates and collecting areas comparable to Germanium spectrometers but achieve sub-100 eV energy resolutions. Mature evolutions of the TES array technology are ideal for non-destructive assay of nuclear materials because the unmatched energy resolution enables separation of spectral peaks in the complicated plutonium (Pu) gamma-ray spectrum.

p.2 Grof, Y., Akbarzadeh, M., Monk, J.; CEMRC Carlsbad, WTS Carlsbad; grof@cemrc.org

detect on-line, ultra low radiation using statistical methods

There is a need for early detection of contamination in sites that are processing, shipping or disposed radioactive materials. We develop a system which can detect very low concentration of radioactive isotopes, especially TRU (Trans-Uranium) isotopes. The system is measuring on line and it can be connected to the air monitoring at the site. Results showed very short response and very low concentration compare to other systems. The system is based on a statistical forecasting method which is learning the environment behave and compare the actual results to the forecasting. The method eliminates all the natural and regular radiation exposure in the environment. Remaining only the clear view of the contamination. The first results from the system, using a very simple GM detector, show that the system can detect levels of Pu-239 contamination smaller then 20 dpm with very simple analyzing tool. We intend to use a more sophisticate detector and a better analyzing tool and the detection limit will be lower then 1 dpm.

p.3 Potter, W., Strzelczyk, J.; Consultant, Sacramento, CA, University of Colorado Hospital; pspr189729@aol.com

c ++ computer code for exact decision levels and errors of type i when the sample count time is an integer times greater than the background count time

In the past there have been papers where the blank (background) is counted for the same amount of time or longer than the sample. In emergency and cleanup operations situations may arise where the sample is counted longer than

the blank. In particular, it is well known that the optimum ratio of blank count time to sample count time equals the square root of the ratio of the respective count rates. The presented approach assumes that both the blank count and the sample contribution to the gross count are Poisson distributed. Also it is assumed that the expected blank count is known. The net count is transformed into an integer. A code in C++ computes the exact probability density function for the transformed net count when there is no activity in the sample. The validity of the computations is verified by checking that the sum of probabilities is close to 1.0 and that the expected value of the net count is close to zero. The decision level is determined by summation of the right tail of the probability density function when there is no activity in the sample. Activity is said to have been detected if the observed net count is greater than the decision level. The code runs on the current Microsoft operating systems. The entire C++ code for decision levels is given. This code could be expanded to yield codes for detection limits and confidence intervals. The computed results are compared with the usual Poisson-normal approximation for the decision level. Minimally the computed results are valid for expected blank counts in the sample count time <= 300.0, ratios of the sample count time to the blank count time <= 20, and errors of type I >= 0.001. Uncertainty in the expected blank count can be readily examined by utilizing confidence intervals for the expected value of a Poisson distribution in conjunction with the code.

mpm-a.1 Grogan, H. A., Mohler, H.J., Rocco, J. R., Stetar, E. A., Till, J. E.*; Risk Assessment Corporation; johntill@mindspring.com

dynamic use of environmental measurement data for decision-making and communication in emergency response situations

A key need in response to emergencies with significant environmental consequences is the accumulation and efficient evaluation of data to allow decision makers to quickly develop a sense of what human health risks may be present and to make sound decisions considering available information. In addition, anticipating information needs before they arise and having a tested functional system in place, particularly in high-stress situations, will help maximize preparedness. RACER (Risk Analysis, Communication, Evaluation, and Reduction) provides a dynamic framework for the collection, storage, distillation, and rapid synthesis of data into the information and knowledge needed to manage environmental situations. This integrated approach to guide decision-making and communication is based on five concepts: 1) efficient and consistent access, analysis, and processing of data for evaluation of human health risk; 2) incorporation of social, political, and economic factors along with human health risk into the decision making process; 3) reevaluation of decisions as new information becomes available; 4) transparency in the process that allows decisions to be traced back to the information upon which they were based; and 5) effective communication of the basis for decisions and confidence. The RACER framework allows for clear presentation of needed information to decision-makers in a top-down fashion that focuses on the end result while still providing rapid access to input data and maintaining the flexibility to change assumptions and incorporate new information as it becomes available. This paper will provide an overview of the RACER framework with examples of its implementation.

mpm-a.2 Antenucci, A., Cirino, N., Costello, C.*, Egan, C., Keenan, R., Pennell, P., Rafferty, R., Virgil, M., Wilson, L.; New York State Department of Health; cac04@health.state.ny.us

environmental sampling during public health emergencies

At the request of New York State's Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) Task Force, staff at the New York State Department of Health's (DOH) Wadsworth Center Laboratories and the Center for Environmental Health collaborated with the NYS Department of Environmental Conservation (DEC) and the NYS Office of Fire Prevention and Control (OFPC) to develop procedures for collecting environmental samples in Level A personal protective equipment (PPE). Staff at DOH and DEC have expertise in sample collecting, but are not qualified to use Level A PPE. Staff at OFPC are qualified for Level A PPE, but have no training in sample collection. Procedures developed include sampling for biological, chemical and radiological contaminants in air, wipe, liquid and solid matrices. These procedures are designed for use in public health emergencies in which the type and degree of hazard is unknown. Staff from OFPC will use these procedures to collect samples under the direction of DOH and DEC staff who respond to these types of emergencies as members of the Environmental Assessment Group (EAG). OFPC and EAG staff trained on these procedures during four sessions in 2005, four sessions in 2006, and three sessions in 2007. At the culmination of each training session, there was a functional exercise where both EAG and OFPC staff worked together to demonstrate what they had learned. Throughout the training and exercises, the procedures evolved as a result of comments submitted by both OFPC and EAG staff. As personnel have become more familiar with sampling procedures, the time devoted to training on these procedures has been decreased to "just-in-time" training followed by a full-day exercise and technical decontamination of personnel in order to more closely simulate what would happen during an actual public health emergency. In 2009, OFPC and EAG staff will demonstrate their skills during EMPIRE 2009, a full-scale radiological exercise.

mpm-a.3 Grace, M., Moyer, B., Voigt, B., Homer, M., Macaluso, A., Manning, R.; BARDA; marcy.grace@hhs.gov
the biodosimetry program at the biomedical advanced research and development authority

A large-scale radiological incident would result in an immediate critical need to assess the radiation doses for thousands of individuals. Diagnostic and dosimetric devices and their capabilities are central for triaging decisions. The Biomedical Advanced Research and Development Authority (BARDA) is the focal point within the Department of Health and Human Services (HHS) for the advanced development, acquisition, and manufacturing infrastructure building of medical countermeasures to protect the American civilian population against chemical, biological, radiological, and nuclear (CBRN) and naturally occurring threats to public health. BARDA and the National Institute of Allergy and Infectious Diseases (NIAID) at National Institutes of Health (NIH), the Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC) collaboratively support research and development of new and improved medical treatments and diagnostics for radiation casualties. BARDA coordinates the interagency HHS Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) operations for research, development, licensure, acquisition, storage, maintenance, deployment, provision, and guidance for emergency use in a radiation incident. The BARDA approach utilizes a diverse, balanced portfolio of medical radiation countermeasures. HHS and the Department of Defense (DoD) are coordinately supporting research and development of new and dual use therapeutic products to treat the multiple body systems injured during nuclear and radiological attacks. Most recently BARDA released a Request for Information (RFI) to gather information on technologies and manufacturing capabilities to meet biodosimetry requirements. HHS anticipates in 2009 the issuance of solicitations (Request for Proposals and/or Broad Agency Announcements) for advanced development of biodosimetric devices and new medical countermeasures to treat various aspects of Acute Radiation Syndrome.

mpm-a.4 Blumenthal, D., Johnson, M., Sleeper, C.; DHS/DNDO, PNNL; daniel.blumenthal@dhs.gov
the gradeR program for Qualifying radiation detection systems for homeland security applications

The Domestic Nuclear Detection Office (DNDO) of the U.S. Department of Homeland Security (DHS) is mandated by Congress to set Technical Capability Standards and implement a Test and Evaluation program to provide information and related testing on performance, suitability and survivability information for preventive radiological/nuclear (rad/nuc) detection systems in the United States. DNDO intends to meet these requirements by establishing the Graduated Rad/Nuc Detection Evaluation and Reporting (GRaDER) program. The GRaDER program provides a continuing means of independently testing and evaluating commercially available rad/nuc detection systems against ANSI N42 performance standards to ensure that only the best radiation detector capabilities are funded by government procurement and grant programs. GRaDER will provide performance and operationally relevant technical information on these systems to DHS components, and state, local and tribal governments and first responders. This presentation introduces the GRaDER program, identifies the standards on which it is based, and explains its potential impact on first responders who receive DHS grants.

mpm-a.5 Johnson, M.; Pacific Northwest National Laboratory; michelle.johnson@pnl.gov
laboratory participation in the department of homeland security domestic nuclear detection office program for Qualifying radiation detection instruments for homeland security applications

The U.S. Department of Homeland Security (DHS) Domestic Nuclear Detection Office (DNDO) is mandated by Congress to set Technical Capability Standards, and implement a Test and Evaluation program to provide performance, suitability, and survivability information, and related testing, for preventive radiological/nuclear (rad/nuc) detection equipment in the United States. DNDO met these requirements by establishing the Graduated Radiation/Nuclear Detection Evaluation and Reporting (GRaDER) program. To participate in the GRaDER program as a test and evaluation laboratory, laboratories must be accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to test radiation detection instruments for homeland security applications. DNDO may also accept a test and evaluation laboratory on the basis of a laboratory's self-declaration of conformity to the NVLAP requirements. This presentation describes the process employed by one national laboratory to self-declare conformity with the NVLAP requirements and to become accepted by the DNDO as a test and evaluation laboratory. Additionally, some elements of the quality assurance program developed to meet the NVLAP requirements are discussed.

mpm-a.6 Van Etten, D.M., Guss, P.P.; National Security Technologies, LLC; vanettdm@nv.doe.gov
u.s. department of energy consequence management under the national response Framework

Under the Nuclear/Radiological Incident Annex of the National Response Framework, the U.S. Department of Energy (DOE) has specific responsibilities as a coordinating agency and for leading interagency response elements in the Federal Radiological Monitoring and Assessment Center (FRMAC). Emergency response planning focuses on rapidly providing response elements in stages after being notified of a nuclear/radiological incident. The use of Home Teams during the field team deployment period and recent advances in collecting and transmitting data from the field directly to assessment assets has greatly improved incident assessment times for public protection decisions. The DOE's Remote

Sensing Laboratory (RSL) based in Las Vegas, Nevada, has successfully deployed technical and logistical support for this mission at national exercises such as Top Officials Exercise IV (TOPOFF IV). In a unique response situation, DOE will provide advance contingency support to NASA during the scheduled launch in the fall of 2009 of the Mars Science Laboratory (MSL). The MSL rover will carry a radioisotope power system that generates electricity from the heat of plutonium's radioactive decay. DOE assets and contingency planning will provide a pre-incident response posture for rapid early plume phase assessment in the highly unlikely launch anomaly. This work was done by National Security Technologies, LLC, under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy.

mpm-a.7 Corti, D.; University of Montana; dan.corti@mso.umt.edu

interaction of civilian support team and regional hazmat teams in a rural state

Hazardous materials response in sparsely populated states is inherently different than in urban settings. Post 911, a short term influx of federal funds have allowed rural hazardous materials response teams to become better equipped and generally better trained but they may still lack fundamental skills to deal with a radiological emergency. Concurrently, National Guard Civilian Support Teams have become operational in rural states and can provide an additional level of training, expertise and equipment to a state or county run hazardous materials response. This presentation describes the history and evolution of a statewide hazardous materials response team in Montana and how that team has come to interact with the Montana Civilian Support Team. Limitations, opportunities, mobilization requirements and command structure during an incident are discussed in detail. Ongoing challenges such as currently reduced federal funding, low number of real events and resulting difficulty in maintaining interest among team members and complexity/diversity of instrumentation relative to available training hours are discussed with recommendations to address these issues.

mpm-a.8 Kerns, K.; Iowa State University, International Atomic Energy Agency; kckerns@iastate.edu

the role of the iaea in responding to nuclear accidents and radiation emergencies

Ken Kerns served the past year as a consultant to the International Atomic Energy Agency (IAEA) working in the Incident and Emergency Centre (IEC). The primary mission of the IAEA is to promote the peaceful use of atomic energy. To fulfil this mission, the IAEA is obligated through two Conventions to assist in managing major radiation events throughout the world. The IEC is the Agency's focal point for responding to radiation incidents or emergencies and has three main emergency response functions; the international exchange of real-time information, providing prompt advice and assistance to Member States as requested, and finally, providing relevant, accurate, and coherent information to the media and the general public. This presentation discusses the roles, procedures, and resources of the IAEA, and specifically, the IEC in response to a radiation emergency. The presentation will highlight recent responses to worldwide events.

mpm-a.9 Widner, T.E., Le, M.H., Intrepido, A.J.; ChemRisk, Inc.; twidner@chemrisk.com

an independent examination of the national planning scenarios

The 15 National Planning Scenarios support formation of a "useful planning resource" within the Department of Homeland Security's Capabilities-Based Planning system. The scenarios highlight a plausible range of major events that pose the greatest risk to the Nation. They include nuclear and radiological attacks, biological attacks and outbreaks, chemical attacks and incidents, natural disasters, and information or control system attacks. The intent was to help the government allocate terrorism prevention funds on a risk-based scale. In the described work, the publicly available documentation of the National Planning Scenarios was examined and evaluated with regard to 1) the reasonability of approaches and assumptions used in assessing potential impacts of each scenario; 2) commparison to and learning from real-world events; 3) the transferability of the scenarios from the settings in which they were envisioned to other parts of the country; and 4) influences on risk-based resource allocation that could result from widespread application of the planning scenarios. Two notable findings of the review, likely resulting from the analyses for the scenarios being conducted by different people or teams of individuals, are that 1) there is significant unevenness in the level of analysis that has been conducted for the scenarios, or at least in the level of detail that is provided in the summary descriptions of each scenario, and 2) there is a wide variation in the levels of conservatism that are adopted in the assessments of potential impacts of the scenarios as outlined.

mpm-a.10 Mohagheghi, A., Sircy, M.; Sandia National Laboratories, US Central Command; ahmohag@sandia.gov

international consequence management: a survey

There are certain scenarios for incidents involving radiological materials that can overwhelm even the vast US response resources. The individual response capabilities of countries in regions such as Middle East, Levant Caucuses, or Central Asia range from inadequate to non-existent. Even a relatively small event will overwhelm the resources of a single state. In addition, most events will have regional impacts that can involve multiple countries. The US DOE has a mature consequence management program with a wide range of resources available to it for responding to incidents involving radiological materials. These resources include scientific staff, health physics professionals, radiological control technicians, communications and logistics specialists, aerial measuring systems, mobile and fixed laboratories, and atmospheric modeling tools. In addition, the US Central

Command has an outreach program called the Cooperative Defense Program to build up the capacity of allied countries to respond effectively to the incidents involving radiological materials. These activities include consequence management, medical radiological mass casualty and CBRN-Passive Defense. We will discuss the status of current efforts to address these problems and the proposed approaches to enhance regional capabilities to respond to accidental or intentional releases of radiological materials.

mpm-a.11 Carr, Z., PEREZ, M.; World Health Organization; carrz@who.int

who rempan network and international system of medical and public health assistance in radiation emergencies

The WHO network for Radiation Emergency Medical Assistance was established in 1987, in response to the Chernobyl accident and the events which followed. Two Emergency Conventions were adopted in 2006, and WHO is a full party to both. To fulfill its role under Emergency Conventions, WHO set up a network of several specialized institutions, on expertise of which WHO would rely in case of radiation emergencies. In more than 20 years, the network expanded and includes today more than 40 institutions around the world with specialization in various fields relevant to first response, monitoring, diagnosis and clinical management of exposed patients, dosimetry, risk communication, long term follow-up etc. Since 2007, the newly revised International Health Regulations (IHR, 2005) have put an additional mandate to WHO, as the IHR now concerns public health emergencies of any nature, including those of radio-nuclear nature. This step united various technical departments of the WHO in one platform of public health risk assessment, provision of assistance, strengthening the capacity of the 193 Member States of the WHO through the application and implementation of the IHR - a legally binding tool to all countries. Since 2007, two new initiative were launched on the basis of the REMPAN network: development of a global stockpile for radiation emergencies and establishment of the Global Biodosimetry Laboratory Network - BioDoseNet. In 2008, WHO REMPAN is 21 years old. It "came of age," but it is still expanding and welcoming new members.

mpm-b.1 Patel, G.N., Crowe, F., Watanabe, Y.; JP Laboratories, Inc, Crowe and Company, LLC, Masonic Cancer Center; gnpatel@jplabs.com

a radiation dosimeter for First responders

A credit card sized radiation dosimeter for monitoring harmful high dose of 10 10,000 mSv is presented. It is designed for minimizing the panic and worry in an event of radiological accident, such as an explosion from a radiological dispersion device. When exposed to radiation, the sensing strip develops blue color instantly and the color intensifies as the dose increases. Thus, it provides the wearer and medical personnel instantaneous information on cumulative radiation exposure. Radiation exposure can be estimated simply by matching the colors of the sensing strip with the adjacent color reference bars. If false positives or negatives occur due to abnormal use, the user can monitor them with a multi-purpose indicator on the sensor which also indicates when to replace the dosimeter. Thus, dosimeter can minimize the panic, worry and triages the information..The dosimeter has shelf life of one year at room temperature and a red liftable filter to protect the sensor from sunlight. Effects of sunlight, temperature, annealing, dose, dose rate, temperature of irradiation, energy and the type of radiation are presented.

mpm-b.2 Lombardo, A., Desrosiers, A., Seif, T.; Polimatrix, IEMA; alombardo@sec-tn.com

statewide implementation of a new personal radiation detector for emergency responders

The Illinois Law Enforcement Alarm System (ILEAS) awarded a state-wide law enforcement and first responder procurement that would put up to 20,000 portable radiation detectors model PM1703MO-1 into use over a four-year planning cycle. This may be the largest such introduction of radiation detectors into daily use by first responder personnel in the United States. The procurement process included an industry-wide competition with detailed technical and field testing including analysis by law enforcement and fire service personnel, state radiation protection specialists, and Argonne National Laboratory. The energy-compensated radiation detector-dosimeter selected (PM1703MO-1) combines the functions of a personal radiation detector (PRD) scintillation detector and an electronic personal dosimeter (EPD) Geiger-Muller-tube. The small size of the unit easily fits on the utility belt or on the vehicle dash board. The State-wide implementation of a single PRD/EPD over a four year period presents numerous project management challenges. The key items include planning performance based training for a wide range of users, providing interim response procedures during the transition, determining the order of implementation based on key transportation corridors and prioritized urban areas, and creating a support infrastructure capable of providing virtually immediate assistance to PRD users statewide on a 24/7 basis. The Illinois Emergency Management Agency's Bureau of Environmental Safety has been tasked with designing, implementing and overseeing all of these components to ensure the success of this effort. The paper provides a current status report of the challenges and successes associated with this State-wide rollout.

mpm-b.3 Clark, K., Fyffe, J.; USAF; krystyn.clark@us.af.mil

us air Force Field deployable environmental data acquisition and position transmission system (edapts) modernization

The US Air Force Radiation Dosimetry Team (RDT) provides radiation dosimetry for the CBRNE Consequence Management Response Force. The RDT leads the way for radiation dosimetry. First, the RDT gained National

Voluntary Laboratory Accreditation Program accreditation of electronic personal dosimeters (EPDs), used to maintain a dose of record when responding to a radiological event. An upgrade added EDAPTS, a personnel monitoring system with the capability of linking GPS to dosimetry via telemetry. Real-time exposures and physiological data (such as heart rate, breathing rate and body temperature) are tracked for responders and relayed in real-time to a central location. The latest upgrade overcomes limitations in range and data entry to allow the RDT to support a larger radiological event and issue dosimetry and EDAPTS more quickly to responders. Another improvement is the pairing of field instrumentation to EDAPTS resulting in real-time data collection. The modernized EDAPTS adds capabilities for improved decision-making and health threat reduction for responders. The RDT has the flexibility to deploy EDAPTS with AFRAT field and laboratory teams or can independently augment any combination of agencies and resources as part of the National Response Framework making it a valuable asset as part of a unified national response.

mpm-b.4 Bronson, F., Bosko, A.; Canberra; fbronson@canberra.com

emergency response efficiency calibrations for portable gamma spectroscopy instruments

The past few years have seen the convergence of 3 important technologies that can greatly improve the abilities to correctly respond to a radiation emergency: small portable gamma spectroscopy instruments, powerful portable computers, and mathematical efficiency calibrations. Now, instead of performing screening evaluations and sending samples to a laboratory for analysis, the emergency responder can identify the nuclide, and determine the activity or concentration, all in a matter of minutes after arriving at the real or suspected accident scene. These portable instruments include NaI scintillators for lowest cost, Ge spectrometers for best identification and accuracy, and LaBr scintillators with intermediate cost and capability. In order for the instrument to go beyond simply identifying the nuclide, and to give a quantitative result, an efficiency calibration must be performed. Various accident scenarios were reviewed to determine a wide range of likely counting geometries that the emergency worker might encounter. Efficiency calibrations were generated mathematically for these sample types at several source-detector distances for each of the 3 instruments. MDAs have been computed for each of the instruments and geometries.

mpm-b.5 Voss, J.; Voss Associates; jtvoss@newmexico.com

portable instruments for real-time radiation mapping

This presentation states the criteria for a useful radiation survey instrument with the ability to provide radiological maps of the surveyed area in real time. Often personnel desire to have nearly complete radiological survey data before the information collected in the field has been processed. Using signal processors with higher capacity and software programmed to manipulate that data it is possible for the hand-held survey instrument to perform the tasks normally done at the surveyor's computer, i.e., run statistical analysis on the data points, apply efficiency and correction factors to the raw numbers, compare the data to previously collected data, and generate a final report which may include both the tabulated data and a radiological survey map. This level of performance would allow the surveyor to respond more rapidly to any significant changes or radiological hazards in the area being surveyed. A hand-held radiation survey instrument with this level of capability would need to be capable of responding to the radiations just as a simpler instrument would but also would need to apply efficiency and correction factors to the counts detected. The instrument would need to have maps stored in memory that could be recalled by the surveyor for the area under evaluation. A touch sensitive screen and menu buttons should be used for logging the specific data points on the appropriate spot on the map displayed on that screen. Each data point would also be stored in a sequential log file along with the date and time of the collection of the data point. The instrument should provide for the addition of a barcode reader, GPS, and wireless two-way communications. Such an instrument would greatly minimize the time required of the surveyor to complete a radiological survey while at the same time provide for a greater level of quality control over the data collected.

mpm-b.6 Voss, J. T.; Voss Associates; jtvoss@newmexico.com

deploying portable continuous air monitors for emergencies

This presentation describes a strategy for using portable Continuous Air Monitors (CAMs) in emergency situations. An emergency involving airborne radioactive aerosols can pose a hazard to the public and the environment. Portable CAMs correctly positioned and a method of evaluating wind patterns can provide information to assist the incident command personnel in responding to the hazard. The portable CAMs must provide real-time data and incident command personnel must know the location of those CAMs, personnel at risk, and the previously mentioned air patterns. Ideally, the portable CAMs should be self-powered (battery powered with solar power recharging), communicate wirelessly using encryption, capable of providing useable radionuclide information, operate at an acceptable air sampling rate, provide its current location, and receive and respond to remote commands. A combination of greater signal processing power in the available portable CAMs, better filter media, and higher efficiency air sampling pumps can lead to a portable air monitoring unit with as much capability as a good stationary CAM. That capability combined with the portability of the CAM provide to incident command personnel the best possible information on the radioactive aerosol concentrations.

mpm-b.7 Yusko, J., Vyenielo, M.; PA DEP; JYusko@state.pa.us

pennsylvania's r esponse to r adiological a ccidents

As a consequence to the terrorist events of September 11, 2001, the Pennsylvania Department of Environmental Protection acquired a number of new rapid response vehicles and ancillary equipment to improve our detection and response capability, not only for use in terrorist incidents, but also for routine use in and around the fixed nuclear facilities within Pennsylvania. These include three large and fully-equipped "Radiation Rapid Response" vehicles (R3V) and seven modified pick-up trucks, the latter also outfitted with onboard as well as deployable matrix probes for monitoring ambient gamma radiation fields. The probes, when deployed, can transmit both location, functional status, and radiation field data via satellite upload to the R3Vs and other similarly-equipped monitoring stations, to allow operators continuous readout of current conditions. Besides the new equipment, our radiological emergency response plan has been reevaluated and consequently upgraded significantly. Descriptions of the equipment and the capabilities are given, along with plans for the continuing evolution of the plans and procedures for assessing radiological emergencies. The history of their deployment at recent federally-evaluated exercises around some of Pennsylvania's nuclear power plants is also presented.

mpm-b.8 Le, M.H., Widner, T.E., Intrepido, A.J.; ChemRisk, Inc.; mle@chemrisk.com

e valuation of r adiological s creening t echnology and a ppropriate t raining p rocedures: l essons l earned

In response to heightened national security resulting from the looming threat of potential terrorist attacks that may use radiological materials, industry has begun to develop more sophisticated technology in hopes of detecting and categorizing all radioactive materials entering the United States via air, sea, and land. New federal law also mandates that by 2012, all cargo entering United States must be scanned for radiological materials before entry. Historically, screening devices could only detect the presence of elevated radiation levels and could not differentiate between radioisotopes; such screening devices lead to false positive or false negative responses by security personnel. Recent new technology, however, has provided mobile screening devices that can differentiate between radioisotopes. Such screening allows security personnel to more accurately assess the possible risks form cargo. Misunderstandings of how the devices work can, however, still put screeners in potential predicaments. By examining specific incidences stemming from misunderstanding of associated technology and imperfections in nuclide analysis software packages, we have considered how to better prepare and train security personnel to properly implement screening technologies. These case studies involving incidents of false positives and false negatives serve as lessons for evaluating how best to use new screening technology to protect U.S citizens.

mpm-b.9 Kawabata, K., Beimer, S., Honsa, P.; US Environmental Protection Agency, Las Vegas; kawabata.ken@epa.gov

u se of i sotopic r atios for the i dentification of e nriched u ranium

A NaI(Tl) detector system using a single discrimination window is used to identify enriched uranium fragments by the comparison of isotopic ratios. The uranium enrichment identification is facilitated by the measurement of the counts for a set time period for a particular energy region divided by the counts produced for the entire measurement energy region of the detector in the same set time period. This uranium enrichment method would utilize a quick comparison of a ratio and a calibration curve from a common field instrument measurement instead of using a field multi-channel analyzer and subsequent calculations. The simplicity of the measurement makes it possible for less trained individuals to use a common radiation detector to detect enriched uranium.

mpm-b.10 Iwatschenko, M.A.; Thermo Scientific; michael.iwatschenko@thermofisher.com

d etection of g amma and n eutron s ources u sing p ortable e quipment - a c omparison of Fundamental p hysical p arameters i mpacting the i nstrument s election and s earch s trategies

In many respects the detection of hidden neutron emitters is different to the detection of gamma sources. These differences apply especially to the importance of background fluctuations caused by naturally occurring radioactive material in the case of gamma radiation and the optimum measuring time, which is significantly longer for neutron detection purposes. Furthermore it is important to take into consideration that for both neutron and gamma radiation there is no linear relationship between dose rate and count rate for typical portable instrumentation. The influence of shielding, scattering, moderation and the influence of the source to detector distance is discussed in several typical scenarios. Taking these basic physical properties into account, the dedicated practical training of users regarding the appropriate search process is of eminent importance and can enhance the detection efficiency of the man-instrument system tremendously. Experimental data with focus on the detection of industrial Cs-137 and AmBe sources is given.

mpm-b.11 *Chiaro, P.J.; Oak Ridge National Laboratory*

e nsuring r eliability of r adiation d etection e quipment through n ational and i nternational s tandards

With the multitude of radiation detection equipment already being marketed and even more in the design stages, it is becoming increasingly important that standards exist to ensure these equipment are ready for their intended purpose. With the advent of reliability standards, the user community can be assured that the equipment they intend to use to protect themselves and others against the threat from illegal radiation materials can be relied upon to

perform as expected. Existing ANSI and IEC Standards are being updated and new standards developed to provide a set of requirements to ensure the reliability of radiation detection equipment. An update on the current status of standards addressing the reliability issues of radiation detection equipment will be presented.

tam-a.1 Crawford, J.; University of Missouri-Columbia; crawfordw@missouri.edu

introduction and demonstration of the "radiological emergency command packet"

The Radiological Emergency Command Packet (RECP) is a portable, "no batteries required", oil, water and weather resistant set of radiological emergency response command guides that can be used in a variety of scenarios.
The RECP is not meant to replace the numerous electronic devices or radiological response tools or aids deployed at an event, but rather be used in conjunction with them. The RECP is a compilation of the ICS style of command documentation, with general thumb rules, practical guides, procedures, forms and tools for radiological emergency response. It can be a used as an initial response plastic brain or checklist in communicating the status and pertinent data of an active scene, communicating initial and long term actions, while also using the Incident Command style of forms, tools and procedures structured specifically for radiation emergency response. The RECP is designed to enhance the transfer of information during an emergency. One of the true advantages of this packet is that it can be stored away in any normal storage environment, glove compartment, duffel bag, command vehicle, etc. until needed without being plugged-in or needing batteries to be fully charged. The RECP is not designed to replace your facility's Standard Operating Procedures, Standard Operating Guides, Emergency Action Plans, etc., but rather act as a companion to them, and if necessary, a useful stand alone radiation emergency response command guide for smaller municipalities
Furthermore, the RECP would be useful for those organizations that simply don't have access to or funding for well stocked response libraries, radiological emergency trained staff and/or portable electronic response reference equipment (laptops) that need external power sources to use.

tam-a.2 O'Connell, T.F.; IAEA; oconnelltom@netscape.net

international atomic energy agency emergency preparedness and response for First responders

In October of 2006, the International Atomic Energy Agency (IAEA) published the MANUAL for FIRST RESPONDERS to a RADIOLOGICAL EMERGENCY. The manual provides practical guidance for first responders to enable them to safely respond in the first few hours of a radiological emergency. Since 2006, the manual has proven to be a document that has gained acceptance throughout the international community. The document has since been translated into four different languages. In addition to the manual, a training package has been developed and numerous deliveries of the training package have been delivered world wide. In addition, a portable version of the package that can be loaded into a PDA or a smartphone has been developed at the request of the first responder community. A overview of the IAEA manual and associated training and field application tools will be described and explained.

tam-a.3 Johnson, R.; Dade Moeller and Associates; ray.johnson@moellerinc.com

to help First responders - its time for us to become myth busters

While we lament the continuing poor public understanding of radiation, the media continue to report radiation myths. Thus, first responders and the public alike are often reminded about "deadly radiation." For responders to effectively carry out their duties, they have to first overcome their ingrained fears of radiation. Because the media basically reports radiation only as bad news, everyone has learned to fear and avoid radiation at all costs. If the first responders are acting out of their fears (running), what is everyone else to think. While some first responders may have a realistic understanding of radiation, many others around them may be in a panic. People tend to be most afraid of what they know the least about, and most people do not know much about radiation, except the myths perpetuated by the media. Some of the myths to be busted include: 1) radiation is deadly (only under extreme circumstances), 2) the only safe level of radiation is zero (there is no zero, we are exposed to radiation all the time), 3) radon and CT scans are OK, but radiation is not (these are the largest source of most people's radiation exposures), 4) radiation will cause deformities in newborns (very unlikely except for extreme circumstances), 5) radiation causes you to glow (never), 6) radiation can be spread by contact (radioactive material may be spread by contact, but no more so than any biological or chemical hazard and normal sterile procedures should suffice), 7) the effects of radiation are immediate and disastrous (not likely), 8) radiation damage to DNA will result in terrible consequences (a DNA molecule is incredibly large, only part of it is needed, it is constantly undergoing damage from many causes, DNA damage is mostly repairable, and every cell of our body has a complete DNA molecule), 9) and many more myths that need busting to help first responders do their jobs.

tam-a.4 Widner, T.E., Le, M.H., Intrepido, A.J.; ChemRisk, Inc.; twidner@chemrisk.com

elements of the history of poisoning that can improve our emergency response readiness

Poisons and successful and unsuccessful poisonings of individuals and groups have played important roles in history involving the intelligence communities, world leaders, and terrorist groups. The example that health physicists are likely most familiar with is the fatal poisoning of Alexander Litvinenko with Po-210, but there have been numerous other cases in which radioactive materials were the agents of

choice. Some basic knowledge of poisoning events could be a useful element in training and guidance for professionals, first responders, and first receivers for radiological and non-radiological incidents. The described work examines: 1) the reasons that poisoning is a popular tool (advantages over other types of weapons); 2) the typical attributes of people who resort to poisoning; 3) types of poisoning targets (specific and random); 4) motivations for poisoning; 5) the characteristics of an "ideal poison" (and what makes some radionuclides particularly attractive to poisoners); 6) methods that have been used to deliver poisons; 7) methods of action for poisons that have been used; and 8) signs, symptoms, and detection of poisoning.

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w ho's e mpowered to p rotect, h ow a re t hey e mpowered, and w hat d o t hey n eed to k now?

In 1996, the author published a paper entitled "Ten Principles and Ten Commandments of Radiation Protection." That paper recognized that radiation protection consists of far more than "time, distance, and shielding," notions that can be acted on by workers to manage external irradiation, but that are of little use for the prevention of intakes of radioactive materials. The paper encompassed the entirety of radiation protection, including actions that may be taken at many levels (commandments) and the principles on which they are based. This paper expands the previous paper by further specifying who can take actions, where their empowerment comes from, and what knowledge is needed to act appropriately. Who is empowered to take radiation protection actions? Depending on the circumstances, it can be workers, managers, health care professionals, regulators, legislators, law enforcement personnel, and/or individual members of the public. How are individuals or groups empowered to take protective actions? Their empowerment comes from many sources, including self-preservation; education and training; administrative procedures; posting and labeling; provision and use of personal protective equipment; design, creation, and maintenance of engineered barriers; medical care; treaties, laws, regulations, recommendations, and guidance. Examples of hitherto unknown radiological hazards being discovered and subsequently managed are provided. The basis for radiation protection action is knowledge of the radiological situation. What do individuals or groups need to know to choose the correct course of action? The answers to this question differ as widely as approaches to managing radiation risks listed in the 1996 paper. This paper ends with a systematic analysis of information needs for radiation protection. *Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle under Contract DE-AC05-76RLO 1830. Strom DJ. 1996. Ten Principles and Ten Commandments of Radiation Protection. Health Phys. 70(3):388-393.

t a m-a .6 Waller, E., Wilkinson, D.; University of Ontario Institute of Technology, Defence Research and Development Canada - Ottawa; ed.waller@uoit.ca

a c ombined h ardware-s oftware s trategy for t riage of i nternally c ontaminated p ersons

In the event of a radiological dispersal device (RDD) event or other non-malignant release of radioactive material, it is possible for radionuclides to enter the human body through inhalation, ingestion, skin and wound absorption. Post-release there is a need to rapidly triage potentially exposed persons, to (a) decide on appropriate treatment strategies, (b) perform dosimetric assessments, and (c) clear non-exposed persons from the scene (and alleviate the worried well phenomena). The triage strategy assumes that (i) there exists a field capability to measure the presence of contamination, identify the isotope(s) involved, and estimate the activity order of magnitude inhaled, (ii) once identified, there is a treatment strategy available, and (iii) there exists sufficient decorporation pharmaceuticals to treat affected personnel. From a medical perspective, removal of radionuclides leading to dose aversion is of high importance. The efficacy of medical decorporation strategies is extremely dependant upon the time of treatment delivery after intake. The "golden hour", or more realistically 3-4 hours, is optimal when attempting to increase removal of radionuclides from extracellular fluids prior to cellular incorporation. To assist first response personnel in making timely triage assessments, it is desirable to have a hardware solution for rapid field assessment of internal contamination and a software tool which compiles existing radionuclide decorporation therapy data and allows a user to perform simple diagnosis leading to potential appropriate decorporation treatment strategies. This talk presents a comprehensive triage and treatment strategy using a Radiological Triage Mask™ and MEDECORTM medical decorporation software.

t a m-a .7 Anderson, V.E., Thomas, J.M.; California Department of Public Health; victor.anderson@cdph.ca.gov

n uclear w eapon a ttack r esponse: s uggested m ethodologies For r educing r adiation Fatalities.

The immediate effects of a nuclear weapon attack will cause mass death, shock and confusion. Depending on meteorological conditions, fallout having radiation levels of greater than one Gray/hr can arrive within one hour or less downwind from the explosion site. We present a concise, simple approach that we believe will help to minimize radiation fatalities from these high levels of fallout and useful rules of thumb are given. This approach can also serve as the framework for both response planning and public communication. The national scenario of a 10 kiloton improvised nuclear device detonated at ground level was used as the baseline for effects.

t a m-a .8 Ansari, A., Caspary, K.; Centers for Disease Control and Prevention, Oak Ridge Institute for Science and Education; asa4@cdc.gov

planning t ools for o perating c ommunity r eception c enters in r esponse to l arge s cale r adiation e mergencies

Public health response to a radiation emergency includes coordination of radiological monitoring of the affected population. These services include: a) assessment for immediate medical needs, b) radiological monitoring for presence of external and internal contamination, c) external decontamination, d) assessing need for bioassays, e) medical intervention for decorporation, f) establishing a registry, g) assessing the need for and providing counseling, and h) determining need for short-term medical follow up. When a large population (including concerned citizens) is potentially impacted, community reception centers offer a mechanism to efficiently provide such monitoring services to the affected population, including their pets. These reception centers are modeled closely after points of dispensing (POD) which many public health communities across the country have already incorporated in their response plans for biological threats. As a follow on to the publication of Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners, the Centers for Disease Control and Prevention is developing a number of tools for local and state public health, emergency management, and radiation control officials who are responsible for population monitoring in their jurisdictions. The tools discussed in this presentation include the community reception center flow diagrams describing various functional modules, staffing and equipment needs, and a decision tool (software) for optimizing reception center operations. These tools are useful for training, exercise development, strategic planning, and real-time optimization of available staff and equipment resources.

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r adiological e mergency planning for public h ealth professionals and First r esponders

Planning and training for a radiological event was identified as an area needing further attention in New York State (NYS). In September 2007, a very successful two-day training session was conducted at the University of Albany School of Public Health in order to address this need. As a result of the positive feedback received during the first session, five additional training sessions were conducted between February and July 2008, each in a different region of NYS. The training was targeted primarily to local health department staff and their emergency response partners (e.g. Emergency Management, Fire, Emergency Medical Services and HAZMAT) who would provide primary response for a Radiological Dispersal Device (RDD) event. Hospitals were also invited to the training, as they are first receivers. The purpose of the additional sessions was to further reach out to the target audience and to encourage collaboration between local health departments, state health department radiation control program staff and local emergency response partners. During the training, local and national experts engaged learners on basic radiation emergency response concepts and local emergency planning related to responding to RDDs and other radiological events. Training included presentations (basic radiation concepts, radiological emergency response concepts, population monitoring, risk communication issues and emergency planning basics), a facilitated discussion (public health response to a dirty bomb) and small group activities (risk communication and local planning for radiological incidents). The training was co-sponsored by the New York State Department of Health, University at Albany School of Public Health, and the New York State Association of County Health Officials. Over 400 people participated in these six training sessions.

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e mergency r esponder c ourses in r adiological and n uclear p reparedness and r esponse: t he n d l s F c ourses

Courses have been developed across the country to teach Emergency Responders how to deal with large-scale disasters, and include response to a radiological environment. The National Disaster Life Support Foundation is a consortium composed of academic institutions, the American Medical Association, and the American College of Emergency Physicians, and is supported by a Congressional Appropriation through the Centers for Disease Control. Courses presented have been developed by the Foundation's members to provide critical capability to Emergency Physicians, Nurses, Technologists and Technicians, and other Emergency Response personnel. The Radiation segments are presented in short summary, including taught modules of Basic Radiation Physics, Transportation Accidents, Radiological Dispersal Devices, Radiation Exposure Devices, Nuclear Weapons, and "Three Myths that can Paralyze Medical Response." The last was presented by Ruth McBurney as President-Elect of the Health Physics Society, to the 'Gathering of Eagles,' the conference of the Medical Directors of the 25 largest Metro areas, and the Myths and countervailing facts are presented. The goal of overcoming fear of radiation in students is worthwhile, and is shown to be a constant struggle for instructors. Issues regarding understanding dose in rem vs. Gy are discussed as a significant hurdle, in part due to the large installed base of Emergency Response detection equipment. The experience of the major 'Dirty Bomb' drill at Texas Motor Speedway is summarized, where all responding hospitals closed due to contamination even though detected radiological hazards were minimal. These courses have been presented around the country in a face-to-face venue by a number of National and Regional Training Centers, and current status of the program is pre-

sented. HPS involvement has to date been minimal, but is increasing. An analysis of new and future iterations of the course in development is presented, including proposed online versions.

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h ealth physics s ociety as a t raining r esource for p ublic e ducation

Massive amounts of federal funding has rightfully been spent to develop policy and guidance for incident management, still the guidance, planning and preparation at the local level remains inadequate. Much has been and is being done by the Department of Homeland Security as well as various federal and state agencies with regard to detection, prevention and preparation for WMD incidents but the vulnerability of First Responders remains high. These men and women are "first on the scene" as a natural or man-made disaster unfolds and must take action even though federal response resources will not be available for hours or even days after an incident. Even with proper training, there will not be enough responders such as police, fire, or paramedic teams to help most citizens in the critical early time after an incident. Given the "invisible" nature of radiation exposure, the average citizen needs access to adequate information about proper action immediately after an incident. Training and user-friendly equipment will encourage active citizen participation and preparedness to provide the needed critical surge capacity to supplement government efforts during a radiological or nuclear incident. As society at large is not trained in Health Physics, the non-radiological (e.g. economic, social and psychological) consequences of an event may be worse than the radiological impacts as a result of a lack of pre-established response guidance and protective measures understandable to the public and officials. The wealth of knowledge and expertise that exists within the Health Physics Society should be leveraged to develop training for the public to prevent unreasoned fear through knowledge, understanding, and training. Reassurance, proper guidance and training will keep panic from overwhelming the public health care system and hopefully avoid unnecessary large scale evacuations.

t a m-a .12 Hearnsberger, D., Poston, J., Hamilton, I.; Kaizen Innovations, Texas A&M University, Baylor College of Medicine; dhearnsberger@kaizeninnovations.com

a n e xternal d ose r econstruction i nvolving a r adiological d ispersal d evice

The National Council on Radiation Protection and Measurements (NCRP) Report No. 138 (NCRP 2001) indicates that exposures received by first responders will be important for a number of reasons, including planning for the appropriate use of key personnel in an extended emergency situation. This work attempts to provide additional radiological exposure knowledge so that an Incident Commander (IC) with limited or no information can make more informed decisions regarding disposition of personnel, members of the public and other resources. A method to provide such insight begins with providing a model that describes the physics of radiation interactions, radiation source and geometry, collection of field measurements, and interpretation of the collected data. A Monte Carlo simulation of the model is performed so that calculated results can be compared to measured values. The results of this investigation indicate that measured organ absorbed doses inside a tissue equivalent phantom compared favorably to the derived organ absorbed doses measured by the Panasonic thermoluminescent dosimeters (TLDs) and with Monte Carlo 'N' Particle (MCNP) modeled results. Additionally, a Victoreen 450P pressurized ion chamber measured values of integrated dose and they compared well with the Panasonic right lateral (RLAT) TLD. This comparison indicates that the Victoreen 450P could potentially serve as an estimator of real-time effective dose and organ absorbed dose if energy and angular dependence corrections could be taken into account. Finally, the data presented in this investigation indicate that the MCNP model developed provides a reasonable method to determine organ absorbed dose and effective dose of a simulated Radiological Dispersal Device (RDD) in an Inferior-Superior (IS) geometry with Na99mTcO4 as the source of radioactive material.

t a m-a .13 Bushmanov, A., Kotenko, K., Kretov, A.; FMBC of FMBA of Russia; radclin@yandex.ru

g uidance of interregional radiation emergency practical medical training - r ussian experience

One of the most important lines of activity for IAEA during last years is increasing awareness among medical community on the possible effects of radiation exposure and recognition of the radiation injury, they have put a lot of efforts for this direction. But, unfortunately, training activities of this type did not cover the important area of practical medical training (on-job training) using real cases of overexposure. Majority of countries in the world have no enough experience to provide such interregional training (taking into account the number of potential patients per year, national experience, national arrangements, etc.). Burnasian Federal Medical Biophysical Center of Federal Medical Biological Agency, Moscow, Russia (earlier Clinical department of the State Research Center - Institute of Biophysics and Burnasyan Clinical hospital 6 of Federal Medical Biological Agency) are known for their experience, and high-level expertise. From clinical records they have following estimation of treated cases per year: acute radiation sickness and patients with leukaemia exposed up to 12 Gy 5-6 cases, local radiation injury 1- 2 cases. The most important targets of the interregional fellowship are to provide medical personnel involved in a medical response to radiation emergencies with practical knowledge and experience in treatment and management of acute radiation sickness and local radiation injuries. Fellowship duration is for 2 weeks with 5 working days a week. It is possible to provide three courses per year with beginning on according agreement. The main activities

of the fellowship are as follows: Course of lectures on diagnostics and treatment of acute radiation injuries, Everyday clinical examination of patients in the department of acute radiation disease or in the department of local radiation injuries, Training in applying and understanding the results of methods for estimation of radiation doses (cytogenetic, ESR, whole body counter).

t a m-b.1 Kish, J.; DHS/FEMA

n ational preparedness issues r elated to n uclear or r adiological i ncidents

Development and implementation of key components of the mandated the National Preparedness System provide opportunity as well as risk to existing preparedness practices of Federal, State, local, tribal, and industry partners. The proliferation of policies through numerous related Homeland Security Presidential Directives – most notably HSPD 5, HSPD 8; and doctrinal foundations established by the National Response Framework, National Incident Management System present ongoing challenges to long standing practices in the emergency management profession. One general example that highlights these dynamics is reconciling the suite of emergent Homeland Security policies and doctrine with existing regulation and policy in the Radiological Emergency Preparedness Program. A long standing program, born from the Kemeny Commission following the Three Mile Island accident, the Radiological Emergency Preparedness Program provides the structured manner in which planning and capabilities for areas surrounding operating nuclear power stations are organized, exercised, and evaluated. The advent of significantly reorganized structures at the Federal level, coupled with mandated procedural modifications at the local and State levels affecting well established procedures require those protocols be constantly reviewed and updated. These efforts also have implications broader than the governments and industry partners at specified sites – they affect and are affected by planning and capabilities across the nation. Accounting for both natural and man made hazards impacting nuclear or radiation preparedness in a terrorism context adds a new and complex dimension. Even when successfully undertaken, the impacts of updated plans, procedures, structures, funding sources, and expected outcomes presents significant challenges for participants at all levels of government, and industry, as well as for affected disciplines can be profound and ongoing.

t a m-b.2 Daigler, D.; DHS/FEMA

r egional r esponse s tructure for m anagement of d omestic i ncidents

In response to a Homeland Security Presidential Directive, the Department of Homeland Security published a comprehensive, national approach to incident management that is applicable at all jurisdictional levels and across functional disciplines (the National Incident Management System, or NIMS). Based on the lessons learned from responses to natural disasters, the Federal Emergency Management Agency (FEMA) has developed Incident Management Assistance Teams (IMAT) to bring the most qualified, experienced emergency management personnel and capabilities in response to all-hazard incidents to better implement the provisions of NIMS and the National Response Framework. These teams establish a cadre of full-time staff entirely dedicated to exercising, analyzing, and executing disaster response. The mission of the IMAT will be to support local governments in all-hazards planning and incident action planning; provide expertise in all emergency management functional areas; support states and other response organizations in an incident by establishing command, coordination, and communications; provide real-time situational awareness; coordinate other Federal agencies to provide response/recovery resources; and execute Stafford Act authorities and FEMA missions to direct the support, integration, and coordination of Federal resources in order to mitigate the impacts from the incident. The concept of operations for these teams will be described in further detail in this presentation.

t a m-b.3 Tupin, E.; US Environmental Protection Agency Radiation and Indoor Air; DeCair.Sara@epamail.epa.gov

p rotection a ction g uidelines and r ecommendations - a n u pdate

The United States Environmental Protection Agency (EPA) is updating the 1992 "Manual of Protective Actions and Protective Actions for Nuclear Incidents" (PAGs Manual). The PAGs are decision levels to help state and local authorities make radiation protection decisions during emergencies. More specifically, they are the projected radiation doses at which specific action may be warranted in order to reduce or avoid that dose. The proposed revision provides several key updates: • It clarifies the use of the 1992 protective action guides and protective actions for incidents other than nuclear power plant accidents. • It provides new guidance concerning the consumption of drinking water during and after a radiological emergency. • It updates the dosimetry basis to current international guidance for all derived response levels and dose conversion factors. • And it includes guidance for dealing with long-term site restoration following a major radiological release, based on Department of Homeland Security guidance on implementing PAGs after a radiological dispersal device (RDD) or improvised nuclear device (IND).

t a m-b.4 Noska, M.A.; US Food & Drug Administration; michael.noska@fda.hhs.gov

t he a dvisory t eam for the e nvironment, Food and h ealth a ctivities and i nitiatives

The Advisory Team for the Environment, Food and Health ("Advisory Team" or "A-team") is a federal interagency group of health physicists and other allied health professionals chartered by the Federal Radiological Preparedness Coordinating Committee (FRPCC) to assist

State, Local and Tribal (S/L/T) authorities in responding to radiological/nuclear emergencies. The mission of the Advisory Team is to make protective action recommendations to S/L/T officials based on plume dispersion models and assessments of radiological data collected in the field. The Advisory Team also provides health physics expertise to the federal Coordinating Agency and other federal agencies as outlined in the Nuclear/Radiological Incident Annex, and occupies an appropriate position within Unified Command. The Advisory Team is principally composed of representatives from the U.S. Department of Agriculture, the Environmental Protection Agency and the Department of Health and Human Services, including the Centers for Disease Control and Prevention and the Food and Drug Administration; other departments/agencies may participate as needed. The Advisory Team is prepared to assist from the early (emergency) phase of an event through the late (recovery) phase. Working closely with the DOE-led Federal Radiological Monitoring and Assessment Center (FRMAC), the Advisory Team utilizes federal guidance documents and other relevant sources to make its recommendations for the protection of health by limiting exposures through food and environmental pathways.

t a m-b.5 Clark, H., Allen, R., Essex, J., Pobanz, B.; US Department of Energy Office of Emergency Response, Chainbridge Technologies, National Security Technologies, LLC, Lawrence Livermore National Laboratories; harvey.clark@hq.doe.gov

a dvances in d ata m anagement within the Federal r adiological m onitoring and a ssessment c enter (Fr m a c)

Dramatic advances in data management have been made as a result of the Paperless FRMAC initiative, sponsored by the DOE's Office of Emergency Response (NA-42). The FRMAC is the hub for all radiological monitoring and the production of data products that interpret those measurements in terms of protective action guidelines. As such, very large amounts of data must be quickly assimilated from numerous sources and then widely distributed as graphical interpretations as fast as possible. Paperless FRMAC is a broad initiative to move that data faster, farther and better through telemetry, automation, and networking. This discussion reviews for the first time the status of the now two-year-old Paperless FRMAC initiative. Key features of Paperless FRMAC include multipath telemetry of measurements from DOE field teams, 24/7 Internet presence, early data entry by first responders, support for distance collaborations, and data exchange with the EPA's SCRIBE database. The heart of the enterprise is the RAMS database, which provides seamless interfacing with GIS, LIMS, and TurboFRMAC for calculations. Paperless FRMAC is presented to users via two Internet websites. The first, FRMAC Portal website, is restricted to the emergency responders for data input, analysis, and product development. The second, CMweb website, is the showroom for completed and approved products, which are made much more widely available. In fact, CMweb offers seamless, single log-in access to all data products for any IMAAC, NARAC or CMweb user.

t a m-b.6 Crapo, J.L.; Oak Ridge Institute for Science & Education; john.crapo@orise.orau.gov

a dvances in r isk c ommunication t ools for s upport to i ncident m anagers and d ecision m akers

Effective communication of the consequences of a nuclear or radiological incident is essential for key leaders and decision makers to institute measures to provide for the health and safety of the responders and the public. Until recently, this decision-making process had been limited to areas where a mature radiological emergency response capability existed (i.e. those areas in which a nuclear power generating station was sited). With an emerging threat of nuclear or radiological terrorism, potential targets of such an incident have extended to localities with a developing or non-existent radiological response capability. The National Nuclear Security Agency's Office of Emergency Response has developed a three-pronged approach, in collaboration with other Federal agencies and response capabilities, to ensure that consequence assessment predictions and products are readily understood by a non-technical audience so that critical decisions can be made and implemented in an expeditious matter. This approach has included developing less-technical consequence assessment products, revising existing technical consequence assessment products, and developing a briefing book for use by liaisons to local, state, tribal and Federal government level to help effectively communicate the consequences of the incident. These new products and their intended use are described.

t a m-b.7 Livingston, G.K., Jenkins, M.S., Christensen, D.M., Wiley, A.L., Van Dyke, D.L.; Oak Ridge Associated Universities, Mayo Clinic; gordon.livingston@orise.orau.gov

e stablishing a w eb-b ased c onsortium of c ytogenetic l aboratories for r apid t riage and e mergency r adiation d ose a ssessment

Nuclear terrorism has emerged as a significant threat on the world stage which could require timely medical countermeasures to minimize radiation-related casualties. Early dose assessments are critical since optimal medical treatment must be guided by the dose received by an individual. The dicentric chromosome aberration assay is considered the "gold standard" for assessing radiation dose, but it is time-consuming and the relatively few specialized radiation cytogenetic laboratories worldwide could easily be overwhelmed by a large number of blood samples associated with a mass casualty event. One solution to the problem of surge capacity is to employ the large national resource of expert cytogeneticists who work in more than 140 clinical cytogenetic laboratories associated with major medical centers. This clinical resource could assist with both remote scoring of chromo-

some breakage and with the lymphocyte cell culture. This clinical expertise allows for remote scoring of dicentric chromosomes using electronic image files shared between laboratories using the internet. A strategy built around a dedicated/secure website and associated data base could rapidly increase scoring capacity while adding redundancy and reducing the turn-a-round time to provide physicians with dose estimates. We have shown that results obtained by scoring dicentric chromosomes in metaphase cell images on the computer monitor are equivalent to those obtained by scoring directly through the microscope over a wide range of Co 60 gamma radiation doses. This work has created a large image library with tens of thousands of metaphase cell images which can be used for training and proficiency testing. Currently, six laboratories have agreed to participate in the consortium. An expanding consortium could provide a strong resource for consequence management of radiological/nuclear incidents in the U.S. and abroad.

t a m-b.8 Remick, A.L., McCall, K.; US Department of Energy, National Security Technologies, LLC; alan.remick@nnsa.doe.gov

d evelopment of a r egionally-b ased a irborne r adiation m onitoring p rogram

Rapid assessment of the scope and magnitude of a release of radioactivity, particularly one that has the potential to impact large population and/or agricultural centers, is essential to ensure adequate steps be taken as quickly as possible to provide for the health and safety of the public and the environment. U.S. Department of Energy's National Nuclear Security Administration (NNSA) has a dedicated group of scientists, engineers, and technicians who respond to radiological accidents/incidents anywhere in the world. Included within this response capability is an aerial radiation measurement system that was developed to provide rapid response to a radiological emergency response that employs both helicopters and fixed-wing aircraft. To ensure prompt response to threats of a nuclear or radiological incident initiated anywhere in the United States additional resources locations have been identified to allow national assets to respond within a reasonable time to an incident location. The federal plan for deployment of a regional capability, coordination of assets, and acquisition of data from extant systems will be discussed. The plan will also address how state and local agencies can acquire support and information retaining to federal regional assets to be used during a radiological emergency.

t a m-b.9 Smith, C.L., Smith, D.E.; Oak Ridge Institute for Science & Education; christopher.smith@orise.orau.gov

n uclear/r adiological i ncident e xercises - Validation of e fforts, s ource of o pportunities to i mprove

Exercises are the primary tool available to the US Government for evaluating its nuclear and radiological incident management capability. Prior to 2003, the US Government conducted nuclear and radiological emergency exercises with organizations and communities knowledgeable in nuclear power or nuclear weapons. Since 2003, exercises like Top Officials 2, Southern Crossing 2006, Top Officials 4, and Diablo Bravo 2008 reflect the recent increased emphasis in the US Government on terrorism-related events. These exercises presented complex and realistic problems involving operations in multiple functional areas that required critical thinking, rapid problem solving, and effective responses by trained personnel. Most importantly, these exercises introduced nuclear and radiological incident management issues to new communities across the country. The result not only identified individual agency shortfalls and procedure changes, but also led to new initiatives, such as advances in risk communication tools, intended to improve Federal, State, and local operational capabilities. An integrated evaluation and analysis of these National-level exercises provides objective feedback on US Government-wide capabilities and validates efforts to expose new communities to nuclear and radiological incident response and recovery activities.

t pm-a .1 Lanza, J.; Florida Department of Health; john_lanza@doh.state.fl.us

a p reventative r adiological/n uclear d etection p rogram in the s tate of Florida

Since radiation exists in our environment from a variety of sources, it is sometimes challenging for law enforcement officers and others to distinguish naturally-occurring radiological materials (NORM) and medical sources of radiation from threat level radiological materials. The integration of readings from detection and identification equipment with intelligence and other information must occur to separate these sources. Since legitimate materials with radiological signatures are transported or medically applied each and every day, it is imperative to quickly assess the threat potential without a significant disruption to commerce or in healthcare situations. Various technologies are being deployed to detect illicit radiological/nuclear materials. The detection of these materials requires the use of scientific equipment such as personal radiation detectors (PRDs), radioisotope identification devices (RIIDs), and Advanced Spectroscopic Portal (ASP) Monitors. This presentation will describe the implementation of preventative radiological/nuclear detection methodologies by Florida agencies in various applications including commercial vehicles, maritime, and special events venues.

t pm-a .2 Rhodes, W., Lasche, G.; Sandia National Labs; wgrhode@sandia.gov

e mergency r esponse c hallenges for h ealth p hysicists

This presentation will cover three main topics in the emergency response framework. The US government is in the process of reviewing its policies for radioactive material security. This review process will be discussed, and preliminary information and conclusions of the review will be pro-

vided in the context of preparing for emergencies. A recent study of photon and neutron background radiation completed by Sandia National Laboratories will also be presented. The final topic will include some interesting examples of emergency response radiation monitoring issues and results that will include several case studies.

tpm-a.3 Princewill, J., Sanza, B.; Northwestern University, Chicago Illinois, Northwestern University; jpr890@northwestern.edu

a review of response to implementing increased irradiator security controls

Introduction: A new GC cell 40 gamma irradiator was purchased to meet growing research demands and to replace an older version prone to frequent repairs and longer irradiation time. Installation coincided with a nationwide security plan developed by the Nuclear Regulatory Commission (NRC). Because these additional security measures will be verified by the State regulatory agency, satisfactory compliance was the only goal. Noncompliance is subject to license modification, suspension or revocation and/or civil penalties. Background: The regulatory agency determined that Northwestern University (NU) radioactive materials license needs to implement increased controls to supplement existing regulatory requirements. This paper describes the implementation of the increased controls and reviews the response to the security measures. Implementation: Active users of the irradiator were identified and classified. A method to show proof of Trustworthiness and Reliability (T&R) in writing was established for all identified. Training sessions suitable for each category was established. Specific actions were taken to reinforce facility or storage housing radioactive material quantities of concern. Levels of security modes were employed including swipe cards, motion sensors, biometric readers and sophisticated detector systems. Vendors within and outside NU were contacted for quotes to implement different phases of the job. After meeting university policy and regulatory requirements, fingerprinting was the last hurdle for granting unescorted access. In Conclusion: What are the lessons to learn while implementing the increased controls? The efforts, the results and the responses will be presented.

tpm-a.4 Favret, D., Gross, I., Meyers, S., Pugh, D.; US Air Force, Oak Ridge National Laboratory; derekfavret@hotmail.com

alternate technique for Field estimation of uranium enrichment

Determination of uranium enrichment in the field is typically accomplished by calculating activity ratios for U-235 and U-238 through use of gamma spectrometry. Due to their respective abundances, either the 143 keV or 186 keV photon emission of U-235 and the 1001 keV photon emission of Pa-234m are typically utilized in calculating nuclide activity. Accurate activity estimates in the field are challenging due to factors such as source-to-detector geometry, sample matrix, efficiency calibration, etc. Portable gamma spectrometers designed for first responders use an algorithm to compare count ratios of these photon emissions to estimate the presence of enriched uranium. This technique has been found to identify false positive results when an unknown sample does not meet the infinite thickness criterion for the 1001 keV photon emission. This presentation illustrates a modified technique, utilized by DOE and DoD Health Physicists, to estimate uranium enrichment of unknown samples in shipping containers.

tpm-a.5 Ayaz-Maierhafer, B., DeVol, T.A.; Clemson University; ayaz@clemson.edu

background and minimum detectable activity (mda) of radiation detectors for homeland security borders

Using a combination of experiment and Monte Carlo modeling, this research compares and contrasts the absolute detection efficiency, background count rate and minimum detectable activity (MDA) of NaI(Tl), HPGe, LaCl3(Ce), LaBr3(Ce), HPXe and CZT radiation detector materials. An experimental background measurement for the 7.62 cm x 7.62 cm right circular cylinder NaI(Tl) detector was performed at 100 cm from the subject soil and used to develop the MCNP5 model of the simulated background spectrum. The following detectors were evaluated: 7.62 cm x 7.62 cm right circular cylinder of NaI(Tl) and HPGe, 40.64 cm x 10.16 cm x 5.08 cm rectangular prism of NaI(Tl), 2.54 cm diameter x 2.54 cm length right circular cylinder of LaCl3(Ce), 3.81 cm diameter x 3.81 cm length right circular cylinder of LaBr3(Ce), 11.3 cm diameter x 17 cm long cylinder HPXe (bulk density = 0.25 g/cc), and 1 cm x 1 cm x 1 cm cube of CZT. The absolute detection efficiency was measured or modeled for these detectors for the following point sources and energies: Ba-133 (0.356 MeV), Cs-137 (0.661 MeV), Mn-54 (0.834 MeV) and Co-60 (1.173 and 1.332 MeV). MCNP was used to model the background count rates in the regions of interest of these radionuclides to determine the MDAs. Based on a 3600 sec count time, the calculated MDA ranged from 42,000 Bq for the 1 cm^3 CZT down to 3,600 Bq for the rectangular prism of NaI(Tl). Details of these measurements and calculations are presented.

tpm-b.1 Kramer, G., Hauck, B.*, Marro, L., Capello, K., Chiang, A.; Health Canada; gary_h_kramer@hc-sc.gc.ca

portal monitoring: a methodology for increasing throughput

The National Internal Radiation Assessment Section (NIRAS), which operates the Canadian National Calibration Reference Centre for Bioassay and In Vivo Monitoring, has field deployable equipment for emergency response. A substantial part of this toolkit is a set of portal monitors that can be used to quickly screen people into the “uncontaminated” and the “contaminated”. The former term refers to a person who has less than 60 kBq of activation/fission products and the latter group are contaminated by that amount or more. Recent field work has shown that one type of the NIRAS’s portal monitors can be alarmed at significant distances if the

level of contamination is high enough. The other types, which do not initiate a count until either an infra-red beam is broken or a proximity detector is activated, do not alarm but their background will be raised and this causes other problems. This work has uncovered some of the problems that will be encountered when dealing with a large crowd that contains some contaminated individuals resulting in longer times to screen concerned individuals. This paper proposes a method of group monitoring to help speed up the process of screening a large number of potentially contaminated persons through a series of portal monitors. In short, the group of potentially contaminated persons will be kept remote from the portal stations. Depending on a real-time estimate of the percentage of contaminated persons in the crowd, groups of persons will be selected for screening . The hypergeometric distribution has been used to decide on the sampling group size with an expectation that 90% of the time no contaminated person will be present in the group. Once removed from the main waiting area, the group will be pre-screened and then depending on the result sent to the appropriate portal. It is anticipated that this will greatly speed up processing as it substantially reduces the transit time. Transits times have also been estimated in addition to the number of personnel required to run all of NIRAS's field deployable equipment.

t pm-b.2 Wilkinson, D., Pace, P.*, Wyatt, H., Bugden, M.; Defence R&D Canada, Atomic Energy of Canada Limited; diana.wilkinson@drdc-rddc.gc.ca

a deployable non-invasive technique for screening radiologically exposed populations

Present technologies used to identify irradiated individuals are too time consuming and expensive to be suitable as a mass casualty screening tool. A rapid, non-invasive tool is needed to sort the affected population. We investigated InfraRed (IR) thermal imaging as a rapid screening tool for identification of individuals who need further medical attention and those who may need counseling. The concept of using thermal imaging for medically affected individuals was tested and proved beneficial during the SARS crisis (Ng, Med. Phys. 32 (1), January, 2005). It has also been used in the past to follow the progress of local radiation exposure caused by the induction of a regional inflammatory response. At a recent Thermal Engineering Conference (Budapest, 2003), Imre Benko and Gyorgy Koteles presented a sentinel paper on the use of infrared thermogrammetry (IR-TGM) for early detection and quantification of radiation induced injury and dermatitis. Based on these findings, we conducted a pilot study that used the IR imaging system to acquire images of radiation induced changes in mice and determine if thermal differentials could be diagnostic of radiation exposure. Preliminary studies indicate that whole-body-exposure to 2Gy ionizing radiation induces transient thermal-profile changes in irradiated mice. (CRTI-2646PC015*)

t pm-b.3 Li, C., Varve, Z., Lariviere, D., Sadi, B., Lai, E., Kramer, G.; Health Canada, Carleton University; li_chunsheng@hc-sc.gc.ca

a Fast bioassay method for uranium and plutonium isotopes in Faecal samples

Following a radiological or nuclear emergency, bioassay provides rapid assessment of internally contaminated individuals and facilitates timely medical intervention. Scientists have developed a reliable faecal bioassay method for uranium and plutonium isotopes that consists of burning, fusion, dissolution, separation, and counting. However, it requires days to get the final results. In this work, we present a fast bioassay method for uranium and plutonium isotopes in faecal samples, which consists of fast sample decomposition and measurement steps. Samples are decomposed by refluxing and microwave digestion and measured by automated SPE separation (solid phase extraction) and ICP-MS measurement (inductively coupled plasma mass spectrometry). The completed experiments on 13.5-gram synthetic faecal samples (representing 10% of daily excretion from an ICRP Reference Man) spiked with 10-20 mg UO2 (NBS Ref. # 97) and Pu-239 solution showed that this method meets the bioassay criteria for both accuracy and repeatability. More important, the sample turnaround time has been significantly shortened (to about 1 day). Experiments on 135-gram samples (representing the daily excretion from an ICRP Reference Man) are currently are under way, focusing on accelerating the sample decomposition process and ensuring sample homogeneity (after refluxing) which allows us to use aliquots of a sample for actinide bioassay.

t pm-b.4 Li, C., Sadi, B., Jodayree, S., Moodie, G., Daka, J., Kramer, G.; Health Canada, Carleton University; li_chunsheng@hc-sc.gc.ca

optimized sr-90 urine bioassay method for emergency response

Strontium-90 (Sr-90) was identified as one of the high-risk radionuclides in the Coordinated Risk Assessment, a collaborative effort of USA, UK, Canada, Australia and New Zealand. It could be used in a radiological dispersal device (RDD) via an energetic dispersion or a covert dispersion in a terrorist attack. During such an event, the first responders and the affected public can be internally contaminated with Sr-90 via inhalation, ingestion, or wounding. Liquid scintillation counting (LSC) of urine samples is a convenient and reliable bioassay method for assessing such internal contamination. However, LSC measurement for Sr-90 in urine suffers from both Y-90 interference and matrix quenching. In this work, we optimized the LSC bioassay method for Sr-90 in urine by stripping urine colorants and other organics using the Eichrom® Pre-filter and removing Y-90 from the samples using an anion exchange column. Both steps are rapid and robust, making this method ideal for both laboratory and field applications. The optimized method will be tested on a field deployable instrument, the TRIATHLER^{R}, in August and September, 2008.

tpm-b.5 Simon, S., Bouville, A.; National Cancer Institute, National Institutes of Health; ssimon@mail.nih.gov

the need to collect individual exposure-related data Following radiation accidents and events

The need for collection of data necessary to produce unbiased individual dose assessments should not be overlooked after unplanned radiation accidents or events. In order to determine the true health-related consequences of the radiation exposure in terrorist events, it will be essential to estimate radiation absorbed organ and whole-body doses received by those in the vicinity. While the activities of immediate concern will be triage, medical treatment, and decontamination, there will also be an opportunity to collect individual information useful for retrospective dose assessments. The types of data essential for dose reconstruction can be anticipated by health physicists and would include, at least for external dose, length of exposure, distance from the source, and degree of shielding. Estimation of internal dose will be more difficult but can rely on measurements, e.g., bioassay, obtained later. However, accurately documenting the whereabouts of each person at the time of the event, and the time they spent in the vicinity may not be easy, particularly when the group includes injured persons, children, and the elderly. Moreover, the difficulty in obtaining accurate individual information grows substantially with the passage of time since the limitations of memory recall often results in inaccurate reporting. The kinds of information that need to be collected immediately and preferably, on-site, include: Who? How many? Length of exposure? How can persons be contacted later? While a few strategies have been envisioned to capture information soon after such events, the chaos that is likely to ensue from a terrorist event will make this kind of data collection extremely difficult. But the success or failure to collect such data, and to link it unambiguously with individuals, will determine to a large degree, the success or failure of realistically evaluating individual doses, a necessary component to determining the radiation-related consequences of terrorist events.

tpm-c.1 Thomas, J.; California Department of Public Health; james.thomas@cdph.ca.gov

the psychology of nuclear Fear and loathing: why are u.s., Japanese, and French attitudes different towards radiation.

The Japanese and French have embraced nuclear power generation where the United States remains ambivalent. I explore possible explanations for these differences using current social psychology and evolutionary psychology ideas. These include: human behaviors toward things perceived as predators versus vermin; attitudes towards magical versus mundane phenomena; and the perception of experts as wizards versus shaman. I further examine the possible strategies to turn around public opinion and the pitfalls we must avoid.

tpm-c.2 Jones, C.G.; U.S. Nuclear Regulatory Commission; cynthia.jones@nrc.gov

application of the iaea's international nuclear event scale in communicating events

The International Nuclear Event Scale (INES) is an international event ranking scale developed by technical subject matter experts in cooperation with the International Atomic Energy Agency and the Nuclear Energy Agency to provide fast, flexible and authoritative information on the occurrence of nuclear and radiological events that are of interest to the international community. Just like information on earthquakes or temperature would be difficult to understand without the Richter or Celsius scales, the INES Scale explains the significance of events from a range of activities, including industrial and medical use of radiation sources, operations at nuclear facilities and transport of radioactive material. Events are classified on the scale at seven levels: Levels 13 are designated as incidents and Levels 47 are termed accidents. The scale is designed so that the severity of an event is about ten times greater for each increase in level on the scale. The INES communications network currently receives and disseminates information on events and their appropriate INES rating to INES National Officers of more than 60 countries. Historically, the scale was applied to classify events that occur at nuclear installations, but now a revised INES Users Manual brings together all uses such as transportation, fuel cycle, and radiation exposure events, into one single document. Since 2004, countries began to report radiation source-related events involving all materials and transport events that are classified at INES Level 2 or higher. This paper will present an overiew of the newly revised INES User's manual, how the rating scale works, and present a summary of the worldwide reporting events over the past several years.

tpm-c.3 Emery, R., Sprau, D., Morecook, R.; University of Texas School of Public Health, East Carolina University, Houston Community College System; Robert.J.Emery@uth.tmc.edu

risk communication considerations to Facilitate the screening of mass populations for potiential contamination with radioactive materials

Experience gained during a field training exercise with a Medical Reserve Corps unit on the screening of large groups of individuals for possible contamination with radioactive material revealed that while exercise participants were generally attentive to the proper use of protective equipment and detectors, they tended to overlook important basic risk communications aspects. For example, drill participants did not actively communicate with the persons waiting in line for screening, a step which would provide re-assurance, possibly minimized apprehension, and would clarify expectations. When questioned on this issue of risk communication, drill participants were often able to craft ad hoc messages, but the messages were inconsistent and likely would not have

significantly helped diminish anxiety and maintain crowd control. Similar difficulties were encountered regarding messaging for persons determined to be contaminated, those departing the screening center, and those to be delivered to the media. Based on these experiences, the need for a suggested list of risk communication points was identified. To address this need, a set of risk communications templates were developed that focused on the issues likely to be encountered in a mass screening event. The points include issues such as the importance of remaining calm, steps for minimizing possible intake or uptake, considerations for those exhibiting acute injuries, expected screening wait times, the process to be followed and the information to be collected, the process to be undertaken for those exhibiting contamination, and symptoms to watch for after departure. Drill participants indicated in follow-up discussions that such pre-established risk communication templates would serve to enhance their ability to assist in times of emergency and noted the potential broader applicably of the approach for use in responses for other disasters types as well.

tpm-c.4 Thomas, J., Anderson, V.; California Department of Public Health; james.thomas@cdph.ca.gov
calculations in disaster: comparative risk assessment and program evaluation methodology

It is difficult in the public health arena to evaluate relative risks of unfortunate events as disparate as natural epidemics (e.g., bird flu) and nuclear terrorism. Where to best spend limited resources becomes subjective and often falls prey to political expediency. This is further complicated with the competing strategies of prevention versus consequence management. We present a method of annualizing risk cost of these events in both lives and dollars to allow objective comparisons. We illustrate its use by comparing a pandemic flu outbreak with a 10-kiloton nuclear terrorism event in a major city. A graphical method to optimize program spending using cost avoidance is demonstrated. The method is further shown to be useful in evaluating which future improvements will give the best payoff.

tpm-d.1 Sullivan R.L., Phillips H.A.; U.S. Nuclear Regulatory Commission; holly.phillips@nrc.gov
protective action recommendation study

Emergency preparedness in the areas surrounding nuclear power plants represents some of the most robust emergency planning in the nation. An important component of these plans is the implementation of protective actions to ensure the safety of the public in the event of a general emergency condition at the plant. The staff has performed a study of NRC protective action recommendation (PAR) guidance as contained in NUREG 0654, Supplement 3 and published the results as NUREG/CR-6953 Vol 1. "Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents." An additional task was added to the project entitled "Study of Public Views on Nuclear Power Plant Emergency Preparedness Protective Action." The study utilized focus groups to assess likely public reaction within nuclear plant emergency planning zones to protective action direction during an emergency, particularly considering sheltering or staged evacuations. Separate focus groups also appraised emergency worker response expectations and gained insights into their understanding of public response to emergencies. Using information gleaned from the focus groups, a national telephone survey of residents living within ten miles of a nuclear power plant was conducted to develop an understanding of public tendencies towards emergency planning. The focus groups were completed by fall 2006, and the telephone survey of emergency planning zone populations was finished by spring 2008. In accordance with the results of the study and Commission direction, the NRC is revising Supplement 3 of NUREG-0654/FEMA-REP1, ACriteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants (NRC, 1980a). This presentation shares the results of the Protective Action Recommendation study and its significance to emergency preparedness.

tpm-d.2 Milligan P.A.; U.S. Nuclear Regulatory Commission; patricia.milligan@nrc.gov
evacuation time estimate study and guidance

In recent years, technologies supporting the development of Evacuation Time Estimates (ETEs) have substantially changed and additional evacuation considerations have emerged. ETEs are part of the planning basis for each nuclear power plant, and as such, ETE studies are required to be performed by licensees to estimate the time needed to evacuate the public in the unlikely event of a serious accident. While this presentation focuses on nuclear power plant evacuations, ETEs are crucial when orchestrating any evacuation. As advancements in new technologies that support evacuations and evacuation planning continue, and as new information on evacuations becomes available, it is important that these technologies and information be considered in developing an ETE. The NRC staff revised existing ETE guidance in 2004 and is currently developing proposed rulemaking that will update the requirements for ETEs. Presently, the regulations do not specify when to review and update the ETEs after the plant has been initially licensed. The proposed rulemaking would require licensees to review and update their ETEs periodically when the population changes or significant changes are made to the emergency planning zone infrastructure. To reflect the rulemaking changes in the guidance, the NRC has commissioned Sandia National Laboratories to develop ETE analysis input parameters that will represent the current state of knowledge in emergency planning. Consistent methods, assumptions, and input parameter values will allow for a more meaningful comparison of ETE values among nuclear power plant sites. The ETE guidance will also include a personal computer-based capability for analyzing how roadway network changes, evacuation plan

modifications, and other factors would influence evacuation times. This presentation discusses the proposed changes in rulemaking and guidance regarding ETEs.

t pm-d.3 Phillips H.A.; U.S. Nuclear Regulatory Commission; holly.phillips@nrc.gov

r eviewing e mergency p reparedness in n ew r eactor a pplications

The Nuclear Regulatory Commission is currently accepting and reviewing applications from companies considering building new nuclear power plants in the United States. The current fleet of operating nuclear power plants were licensed under a two-step process described in 10 CFR Part 50 requiring both a construction permit and an operating license. In 1989, the NRC established an alternative licensing process in 10 CFR Part 52. The Part 52 process includes provisions for design certifications, early site permits (ESP), and combined license (COL) application. A COL includes a construction permit and an operating license with conditions. For an application submitted under 10 CFR Part 52, the level of emergency planning review will depend on whether the application is for an ESP, design certification, or COL. An ESP review includes, at a minimum, physical characteristics unique to the proposed site that could significantly impede the development of emergency plans, and the description of contacts and arrangements made with offsite response organizations. At this time, the applicant can also submit additional information to address either major features of emergency plans or provide complete and integrated emergency plans for review. A design certification only addresses those design features, facilities, functions, and equipment that are technically relevant to the design and are not site-specific, and affect some aspect of emergency planning or the capability of a licensee to cope with plant emergencies. A COL application review includes an evaluation of all applicable emergency preparedness requirements. It may incorporate emergency plans that are approved in connection with the issuance of an ESP and/or design features contained in a certified design. The review of the previously approved referenced information is to confirm it is appropriately incorporated into the emergency plans contained in the COL application. This presentation explains the role of emergency planning review in each type of application.

t pm-d.4 Sullivan R.L., Phillips H.A.; U.S. Nuclear Regulatory Commission; holly.phillips@nrc.gov

s tate-of-the-a rt r eactor c onsequence a nalysis

This presentation discusses the progression and current findings of the NRC's State-of-the-Art Reactor Consequence Analyses (SOARCA) project, part of the ongoing refinement in severe accident and off-site consequence analysis. The SOARCA project is being performed by the NRC, with assistance from Sandia National Laboratories, to: (1) evaluate and update, as appropriate, analytical methods and models for realistic evaluation of severe accident progression and offsite consequences; (2) develop state-of-the-art reactor consequence assessments of severe accidents; and (3) identify mitigative measures that have the potential to significantly reduce risk of offsite consequences. To conduct the analyses, staff will use an improved understanding of source terms and severe accident phenomenology, and credit the use of severe accident mitigation strategies and procedures that were not in place when previous studies were performed. In addition to better understanding of accident phenomenology, the analyses will include design, operation, and emergency preparedness improvements to more accurately reflect plant performance and emergency response activities. Initial results have shown that the combined effect of code improvements, plant's improvements, and realistic consideration of mitigative actions results in substantial decrease in accident consequences.

Professional Enrichment Program

Saturday, January 31, 2009 - LaQuinta Hotel

Saturday, 8:00-10:00 am

pep 1-a introduction to mcnp/mcnpX

Eric Burgett

Georgia Institute of Technology

This course provides a short introduction into using the MCNP/MCNPX code packages. During this class, students will be shown how to install the code, how to interpret problems and create MCNP models of physical systems, create MCNP/MCNPX input files, visualize their input files, run the code, and extract the useful data from the output. This course is designed for health physicists who have little to no experience in MCNP/MCNPX or who need a short refresher or update on the code usage. Example problems will be presented that are of interest to the health physics community such as dose estimation from complex radiation fields and shielding design/evaluation for various sources. Students are encouraged to bring laptops to the class that already have the MCNP/MCNPX code installed (The instructor will not be able to distribute the code to the attendees). Only one of the MCNP or MCNPX codes is needed. To obtain the software, all users should register with RSICC to obtain copies of the software at www-rsicc.ornl.gov. For students who do not wish to register, or cannot register, several remote computers may be available with the code pre-installed for their use to use these computers, laptops will be required to login to these remote computers.

pep 1-b materials, tools, and methods for health physicists to get engaged in community emergency support (responder train-the-trainer session 1 of 2)

Brooke Buddemeier, Tom Clawson

Lawrence Livermore National Laboratory, Technical Resources Group, Inc.

In addition to certifications in the training programs below (3 CDs full movies and training materials), information will be provided on the how to interface with emergency responders and national programs that are available to help Health Physicists who are interested in getting engaged in preparing and responding to radiological and nuclear terrorism.

Excellent training materials exist for training first responders (firefighters, law enforcements, EMT), but you can't just download all them off the internet. Students who successfully complete PEP 1-B and 2-B sessions will be certified instructors for the TEPP program. Over 20 hours of "Train the Trainer" coursework has been compressed into this PEP class designed for the radiation safety professional. The Modular Emergency Response Radiological Transportation Training (MERRTT) offers over 16 modules of multimedia rich training material including presentations, student & instructor guides, tests, practical exercises, and regionally available training aids. Additional materials on response to radiological and nuclear terrorism will be provided as well as suggestions on how to work with the responder community.

pep 1-c cancelled

Saturday, 10:30 am-12:30 pm

pep 2-a intermediate mcnp for homeland security applications

Eric Burgett

Georgia Institute of Technology

This intermediate course will cover special topics of interest to homeland security applications. During this course, the students will be taught more advanced features of the code. The topics to be focused on are active interrogation systems. Here students will create models of active bremstrahlung imaging systems, and pulsed x-ray induced fission sources. Topics such as time dependence, advanced geometry and mesh tallies will be covered in this class as they apply to the homeland security setting. This class is designed for users of the MCNP code that already have an understanding of the code, and can make materials, surfaces and cells. Students who attend the introduction course should be prepared and be able to understand the content of this class. This class is taught in an interactive learning mode. Students are encouraged to bring their own laptops with the code already installed. For students who do not wish to register, or cannot register, several remote computers may be available with the code pre-installed for their use to use these computers, laptops will be required to login to these remote computers. To obtain the software, all users should register with RSICC to obtain copies of the software at www-rsicc.ornl.gov.

pep 2-b materials, tools, and methods for health physicists to get engaged in community emergency support (certification test and additional materials)

Brooke Buddemeier, Tom Clawson, John Lanza

Lawrence Livermore National Laboratory, Technical Resources Group, Inc., Florida Department of Health

This session is the second half of the training provided in session #1 and the required competency testing for those who which to become certified trainers. In addition, participants will learn about the Medical Reserve Corps (MRC), which is a federal DHHS program that provides an existing infrastructure and an opportunity for health and medical physicists and other radiation professionals to assist their local community during an all-hazards disaster but especially after a radiological emergency. Local public health operating as ESF-8 would need radiation specialists to provide staffing at hospitals, triage and reception centers, and other locations in a radiation disaster. This PEP component will

provide attendees with an introduction to the organization of the MRC, how they can join their local MRC, other trainings that they will receive as MRC members, and the benefits of MRC membership. In addition, the concept of the Radiation Response Volunteer Corps will be discussed and how this might be implemented in each state as a means of directing health and medical physicists to their local MRCs. [This is the second session, certification requires completion of both sessions.]

pep 2-c skin dosimetry and Varskin 3

Jim Durham
Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute

The skin is the primary target organ during personnel contamination events. Varskin 3 Version 3.0.1 was released in October 2006 for use as a tool to model the dose to skin from skin contamination. The Windows-based code models both infinitely-thin and particulate sources either directly on the skin or on a cover material such as protective clothing. In addition, a syringe model was added to the geometry options. Adding radionuclides to the Varskin 3 library has been greatly simplified, and data entry is accomplished on a single screen. This presentation will discuss the biological effects of radiation on skin at both high and low doses and will provide a demonstration of Varskin 3 with hands-on examples. Attendees will receive an instructional version of Varskin 3 Version 3.0.1 and electronic copies of the Users Manual and QA documentation.

Saturday, 2:00-4:00 pm

pep 3-a dose modeling and statistical assessment of hot spots

E.W. Abelquist
Oak Ridge Associated Universities

Dose modeling is performed to calculate receptor doses to demonstrate compliance with the radiological criteria for decommissioning and license termination. Historically, the hot spot criteria were administratively established as some multiple of the average guideline (e.g., Regulatory Guide 1.86 and DOE 5400.5). More recently, the Multiagency Radiation Survey and Site Investigation Manual (MARSSIM) introduced the concept of the hot spot area factor. This work discusses a technically defensible approach for modeling the receptor dose due to smaller "hot spots" of residual radioactivity. Nearly 700 combinations of environmental pathways, radionuclides and hot spot sizes were evaluated in this work. The hot spot sizes studied ranged from 0.01 m2 to 10 m2, and included both building and land area exposure pathways. Dose modeling codes RESRAD, RESRAD-BUILD, and MicroShield were used to assess hot spot doses and develop pathway-specific area factors for eleven commonly-encountered radionuclides. The research identified pathways that are particularly "hot spot sensitive"—i.e., particularly sensitive to changes in the areal size of the contaminated area. The external radiation pathway was the most hot spot sensitive for eight of the eleven radionuclides studied. The external radiation pathway was also the most sensitive of the building occupancy pathways. A Bayesian statistical approach for assessing the acceptability of hot spots is proposed. A posterior distribution is generated based on the final status survey data that provides an estimate of the 99th percentile of the contaminant distribution. Hot spot compliance is demonstrated by comparing the upper tolerance limit——defined as the 95% upper confidence level on the 99th percentile of the contaminant distribution in the survey unit—with the DCGL99th value. The DCGL99th is the hot spot dose limit developed using the dose modeling research to establish area factors mentioned above. The proposed approach provides a hot spot assessment approach that considers hot spots that may be present, but not found. Examples are provided to illustrate this approach.

pep 3-b materials, tools, and methods for health physicists to get engaged in community emergency support (health physicists and their role in disaster response)

Jerrold T. Bushberg, John Lanza, Edwin M. Leidholdt, Jr.
University of California, Davis, Florida Department of Health, National Health Physics Program, US Department of Veterans Affairs

This is the third of three PEP sessions provided to enable health and medical physicists and other radiation specialists to become credentialed as a radiation disaster responders (but not a first responder) in their local community. It is recommended, although not required, that the student also take Session # 1 & #2 as this session will build on those sessions.

Health and medical physicists and other radiation specialists could play a valuable role in their local community's response to a radiation disaster. This PEP will introduce the participants to the roles that they would fill during a radiological emergency and will provide them with the information they need to assist emergency responders in their community. Topics covered would include: The Role of Public Health in a Radiological Emergency; Hospital Response following a Terrorist Event involving Radioactive Material; Emergency Department Management of Radiation Casualties and considerations for mass contaminated causality care.

pep 3-c integration of radiation protection and emergency management program assets

Dann C. Ward
Sandia National Laboratories

The Sandia National Laboratory Emergency Management organization has been working towards full integration of Radiation Protection Program assets during an

emergency response situation. This lecture will identify and discuss the necessary organizational, training infrastructure, and radiological equipment needs to address the response phase of an event. The regulatory drivers for emergency response situations associated with a DOE facility will be discussed at length as well as the interface process with DOE Radiological Assistance Program (RAP) assets when events have off-site implications.

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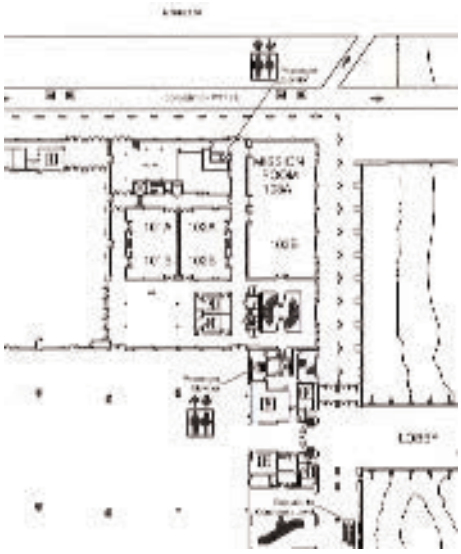

h enry b. g onzalez First Floor plan

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Join us this summer in m inneapolis, m innesota
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