



Cascade Chapter



Avalanche

The official newsletter of the
Cascade Chapter of the Health Physics Society

Spring 2012 Issue

<http://www.hpschapters.org/cascade/>

E. Dale Trout Annual Meeting

This year's annual meeting will take place at the Vue in Corvallis, Oregon on May 4th. We have a number of speakers lined up for this year's annual meeting, with topics certain to be of interest to Cascade Chapter members.

The featured speaker for this year's meeting will be Health Physics Society President-Elect, Armin Ansari, PhD, CHP. Armin is a health physicist at the Centers for Disease Control and Prevention (CDC) serving as subject matter expert in CDC's radiation emergency preparedness and response activities. Armin received both his BS and PhD degrees in radiation biophysics from the University of Kansas, starting his career as a radiation biologist, and did his postdoctoral research at Oak Ridge and Los Alamos National Laboratories. He was a senior scientist with the radiological consulting firm of Auxier & Associates before joining CDC in 2002.



Armin was the lead author of the CDC guide for state and local public health planners on population monitoring, and a contributing author to the federal Planning Guidance for Response to a Nuclear Detonation. He was the 2009 recipient of Excellence in Public Health Practice Award from the National Center for Environmental Health, and a 2011 recipient of Outstanding Achievement Award from Conference of Radiation Control Program Directors. Armin is also an adjunct associate professor of nuclear and radiological engineering at Georgia Institute of Technology, a member of Georgia East Metro Medical Reserve Corps, and a member of Gwinnett County Community Emergency Response Team. He recently published the text book *Radiation Threats and Your Safety: A Guide to Preparation and Response for Professionals and Community*.

Armin had served on the Board of Directors of the Health Physics Society (HPS), and was recently elected by its membership to serve as President-Elect.

The title of Armin Ansari's presentation is *Grassroots Preparedness, a Radiation Risk Scale, and Marketing of Health Physics*. This presentation has three distinct

segments. The first segment discusses the significant impact that radiation professionals (health and medical physicists, nuclear medicine professionals, radiologic technologists, nuclear engineers, and others) can make toward better preparing their local communities for response to a radiation emergency. An available funding opportunity to facilitate recruitment and training of local radiation professionals into existing local volunteer registries is described. In the second segment, a Radiation Risk Scale is proposed as a simple tool for communicating radiation risk to the public, leaders, and decision makers. This scaling system offers several distinct advantages: a) It is simple; b) It conveys meaning and provides a frame of reference immediately; c) It does not require any understanding or use of radiation units or any mention of radiation dose rates or radioactivity levels; d) It is not affected by differences in specific national or international radiation dose limits, concentration limits, or other regulatory standards; and e) It can be used during an emergency situation or in its aftermath to promote responsible action by the public. The third and final segment of the presentation addresses the need to market the profession of health physics. An idea is presented and audience opinion and feedback is solicited using an anonymous multiple choice form.

Student Presentations

Emily Caffrey (Radiation Health Physics MS Student) – *Improving the Dosimetric Model of the ICRP Reference Crab*

The International Commission on Radiological Protection (ICRP) has modeled twelve species, termed reference animals and plants (RAPs), using simple geometric shapes in Monte-Carlo (MCNP) based simulations. The focus has now shifted to creating voxel phantoms of each RAP to determine the validity of the dose conversion factors calculated using those basic geometries. The work contained herein presents results for the voxel phantom of the ICRP reference crab, and details a generalized framework for creating voxel phantoms of other organisms. A Dungeness crab was obtained from a fish market, and a

CT scan was performed at the Oregon State University College of Veterinary Medicine. A set of the CT images were uploaded into 3D Doctor Software and the organs were manually segmented. Using the Human Monitoring Laboratory of Canada's software Voxelizer, a voxel model was created from the segmented CT images. The density and elemental composition of the organs, save for the shell, were taken to be that of ICRP four-component human soft tissue, consistent with previous models. The crab shell composition was theoretically calculated based on a researched composition, and the density was corrected for the modeled shell thickness, resulting in a final density of 1.04 g/cm^3 . For the purposes of the MCNP model, the crab is assumed to sit in an infinite saltwater medium. The files were run with each of the following identifiable organs as sources: shell, gills, gonads, hepatopancreas (digestive glands) and heart. Absorbed fractions (AFs) for all identified organs were calculated at several discrete initial energies: 0.01, 0.015, 0.02, 0.03, 0.05, 0.1, 0.2, 0.5, 1.0, 1.5, 2.0, and 4.0 MeV for photons and 0.1, 0.2, 0.4, 0.5, 0.7, 1.0, 1.5, 2.0 and 4.0 MeV for electrons. Sufficient histories were run to reduce uncertainty in most AFs to 5-10%, although for some of the lower energy electron runs the error for a few of the tallies was on the order of 20%. AFs whose error exceeded 50% were reported as zeroes. Absorbed fractions were then tabulated for each organ as a source and target at each energy listed above. The AF's were highly dependent on the location of the target organ relative to the source organ. A significant amount of energy escaped many of the source organs, likely due to their small size. The findings suggest that the historical assumption of total energy absorption in the source organ is perhaps not valid for smaller organisms.

Jarvis Caffrey (Nuclear Engineering MS Student)
– Oregon State University's radiological support for a Woods Hole Oceanographic Institute research cruise near Fukushima Dai'ichi

Oregon State University (OSU) provided radiological support for the Woods Hole Oceanographic Institute during a 15 day sampling mission in the Pacific Ocean near Fukushima Dai'ichi from the 5th to 19th of June, 2011. A real-time method of determining radiocesium concentration in seawater was rapidly developed and implemented to acquire a continuous measurement of radiocesium concentration throughout the cruise. A NaI(Tl) detector was housed within a custom-built cavity and data was acquired with custom spectroscopy hardware and software. Direct calibration for concentration of ^{137}Cs was performed in the presence of ^{134}Cs synthesized in the OSU TRIGA reactor, using known activity ratios measured at the sea outlet of Fukushima Dai'ichi. The maximum detected concentration of radiocesium was $3.8 \pm 0.2 \text{ Bq/L}$ of ^{137}Cs , with respective mean and median ^{137}Cs concentrations of 0.78 and 0.47 Bq/L. Repeated health physics surveys were also performed

throughout the cruise to ensure safety of the crew and science personnel, yielding no measurable dose above background.

Elijah Dickson (Radiation Health Physics PhD Student) – ***Experimental Evaluation of the Protection Provided by Structurally Significant Components of Select Structures***

The human health and environmental effects following a postulated accidental release of radioactive material to the environment has been a public and regulatory concern since the early development of nuclear technology and has been researched extensively to better understand its risks for accident mitigation and emergency planning purposes. The object of this research is to develop the technical basis for contemporary building shielding factors for U.S. housing stock used in radiological consequence assessments. Building shielding factors quantify the protection a certain building-type provides from a passing plume of radioactive material and deposition on the ground. State-of-the-art radiological consequence assessments account for shielding quality provided by local structures to generate realistic estimates of the potential risks imposed on a local population. Unfortunately, much of the data used to determine the quality of shielding around nuclear facilities and urban environments is based on 1950's era suburbia and is not applicable to the densely populated urban environments seen today. As such, the technical basis behind the shelter-in-place protective action strategies which reference this data must be re-examined to help provide credible sheltering data for emergency planning analysts. The most accurate and direct approach to analyzing how well a structure can shield people from ionizing radiation would be to subject each building make and model used by those of a target population and release plumes of radioactive material into the environment. Measurements of exposure outside verses inside would then be used to develop protection factors applicable to that specific structure. While this is not entirely practicable, laboratory experiments can build physical models (walls and roofs) representing U.S. housing stock to perform experimental attenuation measurements with a range of gamma-ray energies representative of a passing radioactive plume and subsequent deposition on the ground. Advance Monte Carlo computer modeling can verify the experimental attenuation data. Verified data can then be applied to detailed housing designs modeled with generic computer aided drafting software. Additional Monte Carlo modeling can then help develop detailed isopleth exposure plots within each building-type. Data from the isopleth plots would be used to develop protection factors applicable to specific housing units in the U.S. Thus, the protection factors developed by this research will be validated from experimental shielding data based on contemporary housing data collected for U.S. communities. These contemporary

protection factors can be applied to radiological consequence assessments and emergency response plans.

Colby Mangini (Radiation Health Physics PhD Student) – *Determination of Beta-Particle Dose-Point-Kernels for High-Z Sources Typical in Hot Particle Skin Dosimetry*

‘Hot particle’ skin dosimetry calculations are commonly performed using homogeneous dose-point-kernels (DPK) in conjunction with scaling and backscatter models to account for non-homogenous geometries. The development of a new scaling model for determining the actual DPK for beta-particles transmitted by a high-Z source material is presented. The model is based on a determination of the amount of mono-energetic electron absorption that occurs in a given source thickness through the use of EGSnrc (Electron Gamma Shower) Monte Carlo simulations. Integration over a particular beta spectrum provides the beta-particle DPK following self-absorption as a function of energy, thereby accounting for spectral hardening that may occur in higher-Z materials. Beta spectra of varying spectral shapes and endpoint energies are used to test the new model for select source materials with $13 \leq Z \leq 94$. The development of a new volumetric backscatter model is also presented. The model will correct for beta-particle backscattering that occurs both in the source medium and in the medium surrounding the source. Hot particle backscatter factors will be constructed through selective integration of point-source backscatter factors over a given source geometry. Selection criteria will be based on individual source-point positions within the source and will determine which, if any, backscatter factors are used. The new scaling model and backscatter model will be implemented into the DPK-based code VARSKIN for extensive dose testing and verification. Current results will be compared to comparable Monte Carlo simulations. Overall, the goal of this research is to demonstrate that significant improvements can be made to DPK-based models when dealing with high-Z volumetric sources in non-homogeneous geometries.

Japan Nuclear Accident Update

We are fortunate again this year to have Michael Grissom, CDR, MSC, USN (Ret.) joining us at the annual meeting to give an update on the radiological situation, reactor stabilization, and worker and population dose estimates following Japan’s Fukushima nuclear power reactor accident. Michael Grissom is President of MPG-HP, Inc., a Veteran-Owned Small Business specializing in Radiation Safety Program Reviews and Environmental, Safety and Health Staff Assessments. Mr. Grissom’s experience in nuclear power plant accident response gives him a unique perspective on the unfolding events in Japan. In September 1979 and April 1980, Mr. Grissom was a consultant to Porter-Gertz at Three Mile Island (TMI), Middletown, PA

during the post-accident recovery effort as a member of the TMI Unit 2 Recovery Team, Effluent and Dose Assessment Group. In this capacity, Mr. Grissom evaluated the August 1979 worker beta-dose overexposures issue, coordinated preparation of a calibration source using TMI Unit 2 primary coolant water by the Babcock and Wilcox Chemistry staff at Blacksburg, VA, and did plant worker exposure mock-up analyses to reconstruct the exposure scenario.

The title of Michael Grissom’s presentation is *Fukushima – 13 Months Later*. The presentation will cover the following points:

- Review of Headwinds to Recovery:
 - Tohoku Oki Earthquake and following seismic events (~600)
 - Tsunamis
 - Weather
 - Casualties/Severe Damage/Psychological Trauma
- Sequence of Events at Fukushima Daiichi NPGS (emphasis 1st 2 weeks):
 - Updated Information from TEPCO
 - Updated Information from Japanese Government
 - Updated Information from the ANS
 - Updated Information from US NRC Headquarters Task Force’s “Recommendations on Enhancing Reactor Safety in the 21st Century”
 - Updated Information from “Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of the Tokyo Electric Power Company”
- Exposure Estimates:
 - NIRS Fukushima Residents External Doses
 - NIRS Fukushima Children Internal Doses
 - TEPCO Fukushima Daiichi Worker Doses

Chapter News and Announcements

2012 Elections

Ballots will be sent out soon for electing Chapter Officers for 2012. The Nominating Committee has worked hard and put together an excellent slate of candidates for the open positions. Nominees are: Philip Campbell (Health Physicist with the University of Washington) for President, and Emily Caffrey (Health Physicist with Oregon State University) for Secretary. Watch for your ballot coming soon to your e-mail inbox. Ballots will be counted and the new officers announced during the May 4th meeting.

2012 Chapter Dues

We are still accepting payment of chapter dues for 2012. Dues for 2012 remain the same as last year: \$25 for Plenary membership, \$20 per person for Group membership, and \$12.50 for Student and Member Emeritus membership. You can pay your dues together with your meeting registration at the May 4 chapter meeting, or mail a check payable to CCHPS to the chapter secretary at the address

shown below. More information about the different membership categories and the benefits of each type of membership can be found on the [CCHPS website](#).

2012 E. Dale Trout Annual Meeting

The 2012 Cascade Chapter of the Health Physics Society E. Dale Trout Annual Meeting will be held **Friday May 4, 2012** at the Vue, 517 SW 2nd St., Corvallis, Oregon (located downtown Corvallis on the 5th and 6th floors of the Elements Building).

Agenda

- 8:45 Executive Committee Meeting
- 9:00 Breakfast*
- 9:00 - 9:30 Registration and Election
- 9:30 Ballot Closed
- 9:30 Chapter Business Meeting
 - Treasurer's Report
 - Committee Reports
 - Old Business
 - New Business
- 10:00 Student Presentations
- 12:00 Lunch
- 12:45 Featured Presentation – Armin Ansari, PhD, CHP, Health Physics Society President-Elect, *Grassroots Preparedness, a Radiation Risk Scale, and Marketing of Health Physics*
- 1:45 Break
- 2:00 Presentation – Michael Grissom, *Fukushima – 13 Months Later*⁺
- 3:00 Meeting Adjourned
- 3:00 - 4:30 No-Host Bar Happy Hour with entertainment provided by Mike Zittle's jazz trio, *Cadillac Lunch*

*Breakfast sponsored by Mirion Technologies.

⁺Mr. Grissom's presentation sponsored by Seltech.

Be sure to stay for the Happy Hour after the meeting to visit with your fellow chapter members and guests and hear some great jazz.

A special thank you to Mirion Technologies and Seltech for their financial assistance which helped make this meeting possible. Please visit their booths at the meeting.

Cost

Prices for the meeting are:

| | <u>Meeting Only</u> | <u>Lunch & Meeting</u> |
|--------------|---------------------|----------------------------|
| Member | \$10 | \$25 |
| Group Member | Free | \$15 |
| Non-member | \$15 | \$30 |

Registration

You can register for the meeting by sending an e-mail message to: cascadechapterhps@gmail.com. Please e-mail your registration by April 30th, and specify if you want lunch or not, and if you are bringing a guest.

Food Menu

Breakfast

Continental Breakfast Buffet including a fresh fruit tray with coffee, orange juice, and water service.
Assorted coffee cakes, fresh baked Danish and muffins.

Lunch

Taco Bar
Features spicy ground beef or chicken, taco shells, cheese, onions, lettuce, tomato, olives and salsa.
Coffee, tea, assorted beverages.
Dessert

Afternoon Break

Bite size brownies, a fresh fruit platter, and assorted cold beverages.

Parking

Parking is available in the lot to the South of the building.

Directions to the Meeting

From North or South on I-5:

- Take I-5 Exit # 228 for Oregon Highway 34.
- Drive WEST on Highway 34 10.2 mi. to downtown Corvallis (across the Willamette River Bridge). You will be on NW Harrison Blvd.
- Turn LEFT (SOUTH) onto NW 4th St/US-20 W/OR-34 W/OR-99W S/Pacific Hwy W. (NW 4th St is just past NW 3rd St.)
- Drive SOUTH on NW 4th St. 0.5 miles and turn LEFT onto SW Washington Ave. (SW Washington Ave. is just past SW Adams Ave.)
- Turn RIGHT onto SW 2nd St.
- The Vue is on the left at 517 SW 2nd St., Corvallis.

[Click here for a map.](#)

Cascade Chapter Officers:

President: John Pickering
President-Elect: Charles Croft
Secretary: Carl Bergsagel
Treasurer: John Gough
Member-at-Large: Norm Dyer

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