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RAMP NEWSLETTER – FALL 2019, ISSUE 9

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U.S. Nuclear Regulatory Commission
Rockville, MD

U.S. NRC RAMP website:
<https://ramp.nrc-gateway.gov/>

2018 Fall International RAMP Users Meeting at Canada



The fourth international RAMP Users Group Meeting was held October 29 – November 2, 2018, at the Canadian Nuclear Safety Commission (CNSC) in Ottawa, ON, Canada. The meeting was attended by over 60 registered participants, instructors, and supported staff. In addition to American and Canadian RAMP members, the meeting was attended by international RAMP members from South Africa, South Korea, United Arab Emirates, Australia, and China.

The meeting featured training sessions and discussions for RASCAL, VARSKIN, RESRAD, MILDOS, RadToolbox, and Atmospheric Codes. The hands-on training with the code developers allowed users to test the codes and their understanding and ability to use them. Users were able to ask more in-depth questions pertaining to their needs in the discussions.

The second annual VARSKIN Technical Meeting was also held during this time. The 1.5-day technical session included 13 discussions led by government, university, and commercial RAMP members. A special symposium on the "Dose to the Lens of the Eye" was also held concurrently with the RAMP meeting. Twelve presentations were given on a variety of topics as related to regulating dose limits to the eye and models for eye dosimetry.

Aside from networking and collaborating, RAMP users also had the opportunity to tour the CNSC Emergency Operations Centre (EOC).

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RAMP Team Highlights: Summer Intern

Alexus Willis



Alexis Willis is an rising senior at Texas A&M University at College Station. She is pursuing her B.S. in Nuclear Engineering with a minor in Radiological Health Engineering and Biomedical Engineering.

Alexis joined the Office of Nuclear Regulatory Research, Division of System Analysis, Radiation Protection Branch during the summer of 2018 and returned to the NRC this past summer.

While working with the Radiation Protection Computer Code Analysis and Maintenance program (RAMP) team, she had the opportunity to be the Guest Editor of the Fall 2018 and 2019 newsletter. Alexis has also worked with the RAMP team to develop the University Corner page that will allow professors and students to obtain the resources and tools necessary to teach and learn each RAMP code. Alexis will be attending her first RAMP Meeting this fall at the Users Group Meeting in Washington, DC.

After graduating college in May, Alexis plans to pursue a M.S. Health Physics. Alexis has made this decision since working with the Radiation Protection Branch personnel.



NUCLEAR ENGINEERING
TEXAS A&M UNIVERSITY

Foreign Assignee

Shlomi Halfon, Ph.D.



Dr. Halfon is a visiting physicist from Soreq, Israel to the U.S. NRC. He is working as a foreign assignee to the RAMP program from February 2019 – February 2020.

He earned his Ph.D. at the Hebrew University of Jerusalem in 2014 and since then he is a staff member of Soreq, in the particle accelerator group SARAF (Soreq Applied Research Accelerator Facility).



Dr. Halfon is responsible of several aspects of the development and design of the future SARAF high intensity accelerator based neutron source. The facility is design to replace Soreq aging research reactor for neutron science and applications, such as neutron radiography and diffraction. He was also involved the in the calculations and the design of SARAF accelerator radiation shielding, SARAF radiation safety procedures and the accelerator medical radioisotopes production research and development.

During his year at the NRC, Dr. Halfon has been working with the RAMP development team, specifically working on a study for the possible use of VARSKIN, a skin dosimetry code, for hot-particles internal dosimetry evaluation. He will be presenting his work during the Fall 2019 RAMP User Meeting. In his spare time, Dr. Halfon has been traveling on weekends with his family and exploring the U.S.



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Code Updates and Highlights

NEW RAMP CODES

NOW AVAILABLE

NRC Dose3

NRC Dose3 code was added to the RAMP NPP Licensing Assistance codes in September 2019. This version of the NRC Dose code includes an updated user-friendly Windows GUI, an expanded radionuclide library to include 203 radionuclides with DCFs, fully user-modifiable parameters for LADTAP, GASPAP, and XOQDOQ Fortran codes, and compatibility using Windows 7 and above, Internet Explorer Version 7 and above. The more significant updates to NRC Dose3 include user options to select from more than one set of DCFs (ICRP-2 [Default], ICRP-30 or ICRP-72) and updated ICRP-72 DCFs for six age groups (infant, 1 yr., 5 yr., 10 yr., 15 yr., and adult).

RADTRAN

RADTRAN 6.02.1 computer code was added to the RAMP NPP Licensing Assistance codes in April 2019. This version is a Fortran95 compiled version that can be executed in batch mode only from a command prompt. The NRC is evaluating the development of an upgraded user-friendly GUI to support the ease of use for input development, execute RADTRAN 6.02.1, and re-branding this version of the code as **NRCRADTRAN**.

CODE UPDATES

GALE

GALE version 3.2 was released in September 2019. This version of the GALE code contains a user-friendly GUI with the GALE86 modeling parameters and ANS/ANSI-18.1-1999 reactor coolant source term as the default values in the code. In addition to the default values, GALE 3.2 also provides the users the options to select a reactor coolant source term from the ANS/ANSI-18.1-1984 & 2016 versions and modify certain GALE code fixed modeling parameters for both PWRs and BWRs.

VARSKIN

VARSKIN 6.2.1, has been released. This version uses a newly developed Fortran dynamic-link library (.dll executable) and Fortran coding that was upgraded from FORTRAN 77 to Fortran 2018. An uncertainty/sensitivity report has been released for VARSKIN and is available online. Additionally, a VARSKIN workbook is now available for use as training material. VARSKIN is now available in Spanish and French.

GENII

GENII has fully migrated from the PNNL website over to the RAMP website. Recently, **GENII Version 2.10.2a** was released. This version corrects some minor errors and supplies better interactions within the Windows 10 environment. Current GENII development efforts are underway to add additional accident-related dispersion capabilities such as a new 95th Percentile dispersion model and a new method allowing plume rise from fires. As soon as the NQA-1 quality assurance testing and documentation are complete, the full installation (tentatively designated **Version 2.10.3**) will be updated for RAMP users to download, including updated User's Manual and additional example cases – Coming Winter 2019.

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International Partners

INTERNATIONAL PARTNERS UPDATE



RAMP has over 1,300 members, and approximately 250 are international users. The program has long standing RAMP agreements with South Africa, Canada, South Korea, Taiwan, United Arab Emirates (UAE), Spain, Vietnam, and Armenia.

On 12 March 2019, **Ghana** signed an agreement with RAMP. RES Director Ray Furstenu and Acting Director-General Innocent J. K. Aboh of the Nuclear Regulatory Authority of

Ghana (NRA) agreed on collaborative efforts in radiation protection research at the 31st Annual Regulatory Information Conference in Rockville, MD. (pictured above)

RAMP also welcomes **Australia** and **Ukraine** to RAMP. Both have signed full 3 year RAMP agreements. **Canada** and **South Korea** has also renewed their RAMP Agreement.

The RAMP Team is working on the next RAMP Meeting (Spring 2020), which will be hosted by one of our international partner countries.

INTERNATIONAL PARTNERS ON RAMP WEBSITE

The RAMP Website features the **International Partners** page that allows members to learn about the RAMP partnerships that the NRC has with other agencies worldwide. The International Partners page allows countries to see the benefits of becoming an international partner as well as the conditions of RAMP Agreements.

International Partners

Benefits to International Partners	Conditions of RAMP Agreements
Code maintenance, development, benchmarking, and uncertainty studies	RAMP international agreements will typically be renewed every 3 years
Access to the most current versions of the code	Host a RAMP Meeting
Cooperative forum to resolve code errors and inefficiencies	Abide by Code Sharing Practices
Training	Fiscally Responsible

➤ The U.S. Nuclear Regulatory Commission has implemented over 100 bilateral and multilateral agreements with more than 30 countries and the Organization for Economic Co-Operation and Development

➤ If you would like additional information, please contact us at ramp@nrc.gov

[Armenia](#)

Organization: Armenian Nuclear Regulatory Authority

Address: 4 Tigran Mets, Yerevan 0010, Armenia

Phone Number: +374 10 54 39 91

Website: <http://www.anra.am/index.aspx>

Agreement Codes: RASCAL

Member Since: 9/27/2016

<https://ramp.nrc-gateway.gov/content/member-countries>

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RAMP in the Spotlight

In their article “Consolidation of Health Physics Computer Codes: Sustainable Gains in Efficiency, Innovation, and Collaboration,” Stephanie Bush-Goddard, Vered Shaffer, and Kerstun Norman (2018) recount numerous personnel and resource challenges impeding the growth and sustainability of the health physics profession. The shortfalls have been recognized for decades (Toohey 2017), with dire warnings published as far back as 1976 (Moeller and Eliassen).



RAMP, an initiative led by the U.S. NRC, is a cooperative, code-sharing program that provides for development, maintenance, improvement, distribution, and training for radiation protection, dose assessment, and emergency response computer codes. Members give direction, provide suggestions and identify bugs through meetings, email, and on-line forums by directly interacting with code developers and the RAMP Team. RAMP also seeks to leverage cooperation with programs within other agencies.

From this bright past comes an even brighter future for RAMP. The way ahead includes:

- Consolidating codes with similar calculation end points (e.g., radiation dose) to reduce costs associated with maintaining multiple codes
- Maintaining codes and models to the latest standards and approaches (e.g., atmospheric and dosimetric models as well as ICRP dose coefficients)
- Ensuring software and quality assurance documentation are up to date
- Developing accessible training that employs modern information technology
- Reaching out to potential federal, professional and academic partners, both domestic and international, to expand outreach and welcome new codes.

References

Bush-Goddard SP, Shaffer VA, Norman KJ. Consolidation of health physics computer codes: sustainable gains in efficiency, innovation, and collaboration. *Health Phys* 115:652–656; 2018.

Moeller DW, Eliassen R. Assessment of health physics manpower needs. *Health Phys* 31:1–11; 1976.

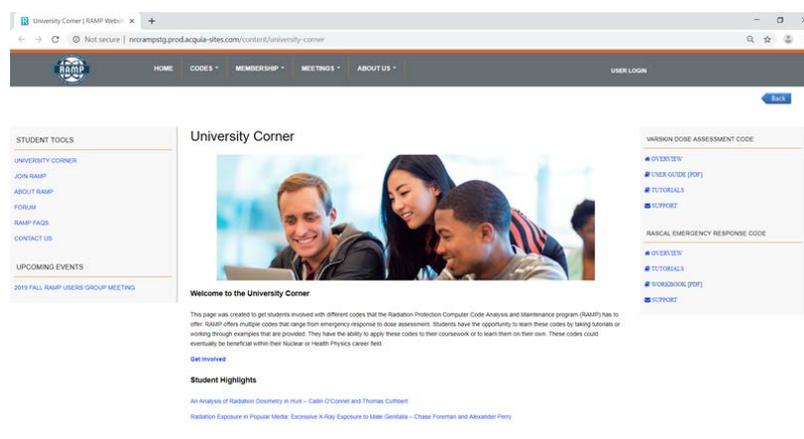
Toohey RE. Thirteenth annual Warren K. Sinclair keynote address: where are the radiation professionals (WARP)? *Health Phys* 112:121-125; 2017.

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University Corner

A large portion of RAMP members are students; therefore, the RAMP Team decided to create a page where students could obtain the resources and tools necessary to learn each code. Currently, the **University Corner** features tutorials and workbooks for students. The codes focus primarily on emergency response and dose assessment. Eventually, we plan to feature webinars and assignments for students. The goal is to have professors implement these radiation protection codes into their curriculum. The RAMP Team plans to add assignments and answer keys that will make this transition easier. These codes will be used by multiple universities and colleges in Health Physics, Radiation Protection, or Nuclear Engineering courses.



STUDENT HIGHLIGHTS



Cailin O'Connell



Thomas Cuthbert

At Texas A&M University at College Station, Nuclear Engineering students, Cailin O'Connell, and Thomas Cuthbert used Phantom with Moving Arms and Limbs (PIMAL) to analyze Radiation Dosimetry in *Hulk*. The study aims to characterize expected effects from the 8500 rad dose defined in the film, and to compare them with the fictional outcome described.

They used PIMAL to create a male stylized phantom in the same position as the movie character, and edited to include a Cs- 137 source. Monte Carlo N-Particle (MCNP) 6.2 was used to compute organ absorbed doses, and the International Commission on Radiological Protection (ICRP) 103 guidelines were used to compute detrimental dose.

The study found that total detrimental dose was higher than any human being could receive without acute effects and possible death. Hemorrhaging and central nervous system breakdown leading to potential death would be possible. The fictional outcome, therefore, was not realistic. To view their work, visit the RAMP website.



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Fall 2019 RAMP Users Group Meeting

October 28 - November 1, 2019

United States Nuclear Regulatory Commission (NRC)

	Radiation Protection Computer Code Analysis and Maintenance Program (RAMP)				
2019 Fall Users Group Meeting, October 28 - November 01, 2019 United States Nuclear Regulatory Commission 3 White Flint North (3WFN), 11601 Lansdowne Street, North Bethesda, MD 20852 Two White Flint North (2WFN), 11545 Rockville Pike, Rockville, MD 20852 RAMP Website: https://ramp.nrc-gateway.gov/					
Monday October 28, 2019	8:00 AM – 9:00 AM	Registration and Check-In (3WFN 1C03/1C05)			
	9:00 AM – 12:00 PM	Opening Remarks, Tour of Operation Center (3WFN 1C03/1C05 & Emergency Response Tour)			
	1:00 PM – 4:30 PM	RASCAL	VARSKIN Training	RESRAD	
	6:00 PM – 7:30 PM	RAMP Meeting Social Night (City Perch Kitchen + Bar)			
Tuesday October 29, 2019	8:00 AM – 8:45 AM	Morning Primer: ATMO Codes			
	9:00 AM – 12:00 PM	RASCAL	NRC Dose3	VARSKIN Technical Meeting	RESRAD
	1:00 PM – 5:00 PM				
Wednesday October 30, 2019	8:00 AM – 8:45 AM	Morning Primer: RADTRAN			
	9:00 AM – 12:00 PM	RASCAL	NRC Dose3 Code Discussions	VARSKIN Technical Meeting	RESRAD
	12:00 PM – 1:00 PM	International Lunch Meeting			
	1:15 PM – 5:00 PM	RAMP Tours at NIH			
	6:00 PM – 8:00 PM	Optional: RAMP Dinner Night			
Thursday October 31, 2019	8:00 AM – 8:45 AM	Registration for the Non-LWR HP Technical Meeting (3WFN 1C03/1C05)			
	9:00 AM – 12:00 PM	Non-LWR HP Technical Meeting including RADTRAD Code Discussions	Internal Dosimetry IMBA Code	RASCAL Code Open Discussions	
	1:00 PM – 5:00 PM				
Friday November 01, 2019	8:00 AM – 8:45 AM	Morning Primer: Open Discussions with Code Developers (3WFN 1C05)			
	9:00 AM – 11:00 AM	RADTRAD Code Discussions for Int'l Users	Country to Country Discussions		
	11:00 AM – 12:00 PM	RAMP Closing Remarks and Ceremony (3WFN 1C03)			

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WE'D LOVE TO HEAR FROM YOU!

The RAMP Team welcomes your thoughts and feedback on any code features and enhancements for the RAMP codes and the RAMP website.

Please send your feedback to RAMP@nrc.gov.



RAMP @ the 2019 Millennial Nuclear Caucus



On April 4, 2019, **Pacific Northwest National Laboratory (PNNL)** hosted the 2019 Millennial Nuclear Caucus, presented by the U.S. Department of Energy's Office of Nuclear Energy (DOE-NE) to connect the next generation of leaders in nuclear innovation with the region's researchers and industry. Our PNNL RAMP team member, **Luba Lavrentiev**, presented the RAMP Program poster during the information expo and educated attendees about the Radiation Protection Computer Code Analysis and Maintenance program. #NuclearVisionary

CONTINUING EDUCATION CREDITS

The RAMP 2019 User's Meeting was awarded **36 CECs** by the American Academy of Health Physics (AAHP). The AAHP CEC approval number is **2019-06-005**.



IN THE NEXT ISSUE OF RAMPED UP...

- 2019 Fall RAMP Users Meeting Recap
- Who's new in RAMP?
- Code Updates and Highlights
- More Details on the Spring 2020 Users Group Meeting
- ...and More!!