

# NRRPT® NEWS

## National Registry of Radiation Protection Technologists

Summer 2007 Edition

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### Chairman's Message



Kelli Gallion

Greetings fellow RRPT's! The Board and Panel Annual meeting was held in conjunction with the HPS Meeting on July 8-12, 2007 in Portland, OR. It was great seeing all of you that were able to attend.

Congratulations to Dave Biela for his much deserved honor of the Arthur F. Humm Jr. Award. Dale Perkins, Chairman of the Awards Committee along with approximately 50 friends and family presented Dave with his award in Portland, OR. (See article on page 5)

A BIG Thank You to RRPT's Maynard Wright, author of "Musings of an Old!! RPT (And Then Some)" and Ron Lee, author of "Start-Up and Deactivation Projects at Savannah River Tritium Facilities". Both will receive a **NRRPT** shirt as a token of appreciation. Keep those news articles coming!!! If you didn't have an opportunity to read the articles mentioned above, the Spring Newsletter is still available on the **NRRPT** website at [NRRPT.org](http://NRRPT.org).

"Out with the old and in with the new". As I mentioned in the last newsletter, our information booth was in dire need of a makeover. Thanks to Dale Perkins and Steve Lancaster for making this happen, it looks great!

The next **NRRPT** Board and Panel meeting will be held in Ft. Lauderdale, FL in conjunction with the ISOE North American ALARA Symposium, January 12-15, 2008. The meeting topic of the ALARA Symposium is "Dose Reduction".

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Following our February 2007 exam, the Registry now stands at 4,937!!!

Best Wishes and Thank You All for Your Continued Support.

Kelli



Working our **OLD** exhibit booth in June 2005:  
Kelli Gallion & DeeDee McNeill



Working our **NEW** exhibit booth now:  
Rick Rasmussen, Todd Davidson & Karen Barcal

## Greetings from the Exam Panel Chair! Karen Barcal

As the Board & Panel Meeting in Portland, OR winds down and everyone heads home, I would like to take a minute to thank everyone for their efforts. A lot was accomplished in a short time. RRPTs who work at sites where panel members also work, please take a moment to thank them. Positions on the panel are voluntary and without their support and hard work, the registry would not be the great organization it is today. I would also like to welcome the new panel members for 2007: John Olson (LANL), Todd Davidson (Paducah GDP), Lisa McAuley (Boston University) and Tom Hansen (Chase Environmental Group). Additional spots on the panel are open, if you'd like to volunteer, please let me know ([kbporch928@sprintmail.com](mailto:kbporch928@sprintmail.com)). Members must be current with dues, registration maintenance and have a letter from their employer documenting support for attending two meetings per year. Participating on the panel ensures we get fresh ideas, maintain the professional standing of our organization, and is a great way to network. In spite of all the work necessary at each meeting (and in between) we also manage to have a lot of fun.

I encourage all current RRPTs to "be a mentor". Help your fellow candidates study for the test. It reinforces your own knowledge while helping someone else succeed as well. Helping someone study is a great time to think about potential questions. Remember, you can earn points towards your maintenance by developing questions and sending them in. I encourage all RRPTs to maximize the value of your accomplishment: visit the website and view the available courses on line; apply the credits earned towards a degree; attend the meetings; or submit an article for the newsletter.

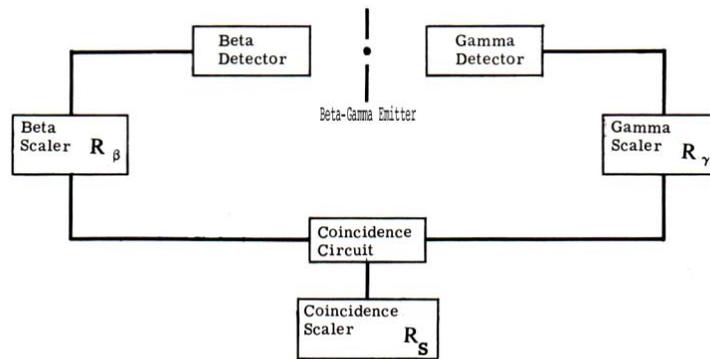
Your input is always welcome on any matter, please send it to me at the above email address, pass it along to any board or panel member, or send it to DeeDee McNeill at the registry office in Kennewick, WA.

# A General Review of Coincidence Counting

## By Augustinus Ong, Dartmouth College

The purpose of this write-up is to reacquaint ourselves with and to remind ourselves how to determine the true activity of mixed emitter radionuclides: i.e., those that emit a combination of alpha particles and gamma rays, beta particles and gamma rays or two different gamma rays.

In health physics, the almost simultaneous detection of two emissions, within a time of  $10^{-5}$  second, will require coincidence-counting circuitry to determine the true activity of a mixed emitter. The following is a simplified block diagram for a beta-gamma coincidence counting circuitry:



A beta-gamma emitter is placed between two counters, one that is sensitive to beta particles and the other to gamma rays. We wish to determine the true activity of the sample by measuring the total activity of beta emitted as detected by the beta detector and registered by the beta scaler,

$$R_{\beta} = A \epsilon_{\beta} \quad (1)$$

where  $\epsilon_{\beta}$  is the efficiency of the gamma detector portion of the circuitry. Similarly, activity as detected by the gamma detector is

$$R_{\gamma} = A \epsilon_{\gamma} \quad (2)$$

where  $\epsilon_{\gamma}$  is the efficiency of the beta detector portion of the circuitry.

Signals from both beta and gamma scalers pass through the coincidence circuit and are then registered by the coincidence scaler. The coincidence circuit will reject signals from the two detectors if the signals do not arrive within the coincidence time of the circuit. Those that do will be recorded by the scaler as

$$R_s = A \epsilon_{\beta} \epsilon_{\gamma} \quad (3)$$

Solving equations (2) and (3) will yield an uncorrected activity of the mixed emitter

$$A = [R_{\beta} R_{\gamma}] / R_s \quad (4)$$

Notice that equation (4) does not require the efficiency values to derive the activity of the sample. This simplification, however, does not take into account the necessary counting corrections in determining the true activity of a sample.

The following equations will correct for background, resolving time (the sum of the dead time and the recovery time), and the dead time (a minimum time an instrument needed to record two incoming pulses as separate pulses) of each portion of the coincidence circuitry.

For the background correction:

$$r(s)_\beta = R_\beta + r(b)_\beta = A \epsilon_\beta + r(b)_\beta \quad (5)$$

$$r(s)_\gamma = R_\gamma + r(b)_\gamma = A \epsilon_\gamma + r(b)_\gamma \quad (6)$$

$$r(s)_s = R_s + r(b)_s = A \epsilon_s + r(b)_s \quad (7)$$

where  $r(s)_\beta$ ,  $r(s)_\gamma$ ,  $r(s)_s$  are their respective observed beta, gamma, and coincidence activities, and  $r(b)_\beta$ ,  $r(b)_\gamma$ ,  $r(b)_s$  are their associated background activities.

The final equation (8) for determining the true activity of a mixed emitter is

$$A = \{ [R_\beta R_\gamma / R_s] \{ 1 + R_s T_D + T [ 2 r(s)_\beta r(s)_\gamma - r(s)_s [r(s)_\beta + r(s)_\gamma] ] \} / r(s)_s \quad (8)$$

where  $T_D$  is the dead time and  $T$  is the resolving time of the coincidence circuit.

EXAMPLE 1:

An I-129 sample is placed in the sample chamber in an instrument similar to the above illustration. Assume the dead time,  $T_D$ , is 0.15 msec and the resolving time,  $T$ , is also 0.3 msec. The background readings are  $r(b)_\beta = 30$  cps,  $r(b)_\gamma = 10$  cps,  $r(b)_s = 25$  cps.

The sample readings are  $R_\beta = 500$  cps,  $R_\gamma = 900$  cps,  $R_s = 350$ . What is the true active of this beta/gamma emitter?

From equation (8),

$$A = \{ [500 \text{ cps} \times 900 \text{ cps}] / 350 \text{ cps} \} \{ 1 + 350 \text{ cps} \times 0.00015 \text{ sec} + 0.0003 \text{ sec} [ 2 \times 530 \text{ cps} \times 910 \text{ cps} - 375 \text{ cps} [ 530 \text{ cps} + 910 \text{ cps} ] ] \} / 375 \text{ cps}$$

$$A = \{ [1286 \text{ cps}] \{ 1.105 + 0.00015 \text{ sec} [ 964600 \text{ cps per sec} - 375 \text{ cps} [ 1440 \text{ cps} ] ] \} / 375 \text{ cps} \}$$

$$A = \{ [1286 \text{ cps}] \{ 1.105 + 0.00015 \text{ sec} [ 964600 \text{ cps per sec} - 540000 \text{ cps per sec} ] \} / 375 \text{ cps}$$

$$A = \{ [1286 \text{ cps}] \{ 1.105 + 0.00015 \text{ sec} [ 1132 \text{ per sec} ] \}$$

$$A = 1639 \text{ cps}$$

Continued on page 17

## Arthur F. Humm, Jr. Award Presented to Dave Biela

Dave Biela was presented the Arthur F. Humm Award at the summer meeting of the NRRPT in Portland, Oregon in July. This award is presented to persons who have given outstanding support to the NRRPT. Dave passed the Registry exam in 1986. He became a member of the Panel of Examiners in 1990 where he immediately became very active in the work of the Panel. Dave's efforts resulted in his election as the Vice-Panel Chairman in 1993. This is a role he held until he was elected Chairman of the Panel in 1999. During Dave's tenure as Vice-Chairman and then Chairman, the Panel basically rewrote the examination question bank while going to great lengths to ensure the quality of the questions. Dave served as Panel Chairman until 2005, holding the distinction of serving in that capacity longer than any previous Chairman. Not one to take time off, Dave was elected to the position of Vice-Chairman of the NRRPT Board of Directors in 2006. He is currently in that position.



Dale Perkins Presents the Humm Award to Dave Biela

Dave is largely responsible for a number of other significant events in the life of the Registry. It was under Dave's leadership that the Registry was able to begin offering two exams each year making it much easier for exam candidates to schedule time to sit for the test. Under Dave's direction, the Registry was able to develop a Canadian exam. As Panel Chairman Dave moved exam administration and review from an external testing service to an internal process which saves over \$8,000 per year. An added benefit was that the turnaround time for exam results went from two months to two weeks.

Members of the Registry owe Dave a huge "thank you" for his tireless work over the past seventeen years. Dave has been the face of the Registry and has never lost sight of who the Registry serves.



Dave Biela and his wife Diane



Dave Biela's children, Kristin & Christopher Biela and long-time friend Lindsay Nelsen

## NNSA/Lab Team Recovers 15,000th Radioactive Source

By Nancy Ambrosiano

With the arrival of a shipment to Los Alamos, a landmark 15,000th radioactive item was recovered from an urban area, logged in, and secured safely away from potential misuse. The source was recovered by a Laboratory Off-site Source Recovery Project team representing the National Nuclear Security Administration. For eight years, OSRP staff have traveled the country, collecting thousands of radioactive sources from warehouses, tool sheds, schools, and offices where they are no longer needed for industry or research. OSRP was initiated by the Department of Energy in 1999 as an environmental management project to recover and dispose of excess and unwanted sealed radioactive sources. The project was transferred in 2003 to the Office of Global Threat Reduction (known as NA-21) of DOE's National Nuclear Security Administration.

The 15,000th source came from an industrial-gauge manufacturer near Los Angeles that had used the measurement device to measure plastic and paper thickness during production, one of 306 unwanted sealed sources containing Americium at this one location. The sources, small tungsten-shielded, teardrop-shaped items, each contain about 150 millicuries of Americium-241. The OSRP team verified and packaged the sources, then loaded them into a special drum for shipment to Los Alamos, where they are stored prior to approval of the drum for disposition at DOE's Waste Isolation Pilot Plant southeast of Carlsbad, New Mexico.

Radioactive sealed sources packaged by NNSA's OSRP include more than 15,000 curies of Americium-241, 10,000 curies of Plutonium-238, and 10,000 grams of Plutonium-239, collected from more than 600 sites. The sealed sources were once used in applications ranging from nuclear-powered cardiac pacemakers to gauges used in the manufacture of paper.

"The OSRP has achieved the goal of providing an end-of-life disposition pathway for the sealed-source life cycle in the United States, including sources for which no disposal pathway previously existed," said Project Leader Julia Whitworth of Nuclear Nonproliferation (NN). "The team's efforts guarantee continued medical and other beneficial uses of sealed sources but solve the disposition problem of unwanted sources for future generations."

In 2006, under the guidance of NA-21, OSRP also began recovering unwanted or unused sealed sources of U.S.-origin distributed overseas. The team has so far repatriated U.S.-origin radioactive sources from Africa, Australia, and Uruguay with more international and domestic sites planned for this year. Other recent accomplishments include obtaining international authorization for use of its S300 shipping container and field-sealable special form capsules, as well as initiating a cooperative effort with Chinese authorities in support of the 2008 Beijing Olympics.



Photos from the NRRPT Board & Panel Meeting in Portland, OR  
and our NRRPT Night-Out at Salty's Restaurant on the River



A few of our Board & Panel Members:  
Auggie Ong, Mark Bayless,  
Rick Rasmussen & John Olson



Arthur F. Humm, Jr. Award recipient Dave Biela and  
Board of Director's Chairman Kelli Gallion



Dave Biela & Eddie Benfield with beautiful  
Mount Hood in the background



The "Brews Brothers", together again!  
Curt Repass & Jerry Allen

The NRRPT "Night-Out" has become a tradition for Board & Panel members and family & friends of the registry. Over 50 people attended the dinner and award ceremony at Salty's Restaurant on the River. This tradition continues due to the generous contributions of our "Night-Out" sponsors and supporters. Many, many thanks to them!!

Our "Night-Out" was sponsored by: **FRHAM Safety Products**

Additional supporters: Canberra, Dade Moeller Technical Services & Duke Power Co.

## More Musings of an Old RPT

By Maynard Wright

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### A Resurgence Of Nuclear Power—To Be Or Not To Be?

As I said in my last article, since 1979 and TMI, nuclear power in America has been dead. Nuclear now provides about 20% of the total electric power used in America. The American nuclear industry has not broken ground on a new nuclear unit since 1979. Many other countries, including China, Japan, France and South America, are now building plants at breakneck speed. Will America experience a resurgence of interest in building nuclear power plants? I think so!!!

I concede that I have not done an adequate job of researching this material to confirm these statements, but I believe that in 2005 or 2006 there was a meeting of major consortium of utility companies and Bush administration staff members. The purpose of this meeting was to develop interest in building more nuclear plants and conserving our fossil fuels. The Bush administration offered incentive packages to initiate site characterization studies for new nuclear plants. The results of the consortium were that many utilities did agree to do the site studies and provide letters of intent to the administration. The meetings took place over a few months totaling about four or five separate meetings (I said that I have not done the research needed to be more specific).

In view of these events then just what does this bode for the future of nuclear power in America? Currently, many nuclear plants are aging and need extensive repair and structural improvements. Along with this, many are facing a license renewal process. Many plants have reached the limit of their storage capacity for spent fuel. The combined result of these factors is that much of the 20% load that is now provided by nuclear will be lost in the next ten to twenty years if changes are not put in place now. The load forecasters and boards of directors of the various utilities are aware of these imminent threats to continued use of nuclear power, too.

Between ten and twenty years ago, all that this would mean was that the utilities would need to build more coal, oil and gas fueled plants, which some of them did. Now, with the continued safe operation of the present generation of nuclear plants and the realization that the TMI event really did not do as much harm as all of newspaper hype back then caused people to believe that it did, nuclear is looking good again.

This suggests that now there is even a preference for nuclear over fossil fuels. There must still be a mix of types of new generating capacity provided but now nuclear appears to be a strong favorite. Many factors contribute to this; the heightened concern for the environment, the monumental cost of installing cleanup equipment that can reduce the sulfur emissions from coal plants, and the new, smaller enhanced safety models of nuclear plants all make nuclear more appealing.

I said in my previous article that I am glad that I got into nuclear power when I did because of the opportunities that it afforded before TMI. Now I believe that new technicians coming into the field will have an even brighter future than we did back then. Yes, it will certainly be different. We were the pioneers that got nuclear power up and running. We did most of the groundwork in developing methods, procedures and formulas that were needed to get things started. The next generation of nuclear technicians will doubtlessly open up new horizons and venture into new spaces here-to-fore unknown and unchartered. I hereby express my conviction that in the next ten to twenty years nuclear will grow to providing as much as 30% of the total electric needs of America. The opportunities will be there. Enjoy them!

## Training Link on Website

By Tim Kirkham

As some of you may have already noticed, the website now has a link called "Training". This link will actually serve two purposes for our members; 1) to give our members the tools they need to recruit people to our profession, and 2) to give our members another way to achieve some continuing education and/or maintenance registration points. The first set of PowerPoint presentations that are uploaded deal with our RP2020 initiative and recruitment. Our Board of Directors have realized that the best way for us to multiply our ranks is for our members to get into the high schools and share what we do. We also realized that we would need to help our members do this by giving them the tools to start the process.

The first of the uploaded presentations is called *Where do you go from here?*. This presentation begins by briefly touching on the baby-boomer retirement issue and then launches into the science and technology world and the need for professionals in the energy sector. This would be good for a general discussion with students trying to decide what to do with their lives.

The second presentation is geared toward the radiological profession and is called *Where do I go from here - RP?*. This is basically the same as the first presentation except has several slides discussing radiation protection.

The third set of slides is called *Career Day* and is designed exactly for that purpose. The slides start out with the history of radiation protection and contain some pretty interesting pictures. Toward the end of the slides, degree programs are listed (AS to PhD) as well as a slide for you to insert what you do in your job/position. Some of the slides within this presentation might be too graphic (radiation damage to persons) and should be removed if the audience is not a mature audience.

All of these presentations are designed to be modified for your audience. We encourage all of you to talk to your high school's science department about coming in and talking about our profession. We ask that for those of you who do decide to give presentation give the NRRPT feedback as to the presentation that you used, how you modified it and the affect it had on the audience. With type of feedback, we hope to modify the current presentation to make them easier to present. Furthermore, if any of you have presentation material that you have used in the past, please forward on to the NRRPT.

Presentations for continuing education and maintenance points are currently being developed and will be on the site soon. If any of the membership would like to see a specific subject or topic covered, please notify the NRRPT office or myself at [tkirkham@ensr.aecom.com](mailto:tkirkham@ensr.aecom.com).

### 2008 USA NRRPT Exam Dates

**February 23, 2008**

Deadline for application: December 14, 2007

**August 2008** - To be determined

Deadline for application: June 15, 2008

Application Fee: \$250

Retake Fee: \$125

Late Fee: \$50

\*\* Exam applications may be  
downloaded  
from our web page \*\*

**[www.NRRPT.org](http://www.NRRPT.org)**



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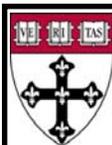
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**In-Place Filter Testing Workshop 8/20 – 8/24**  
**Occupational and Environmental Radiation Protection: Principles and Practices of Radiation Safety 4/23 - 4/26**

**Radiation Safety Officer Training for Laboratory Professionals 6/11 – 6/15**

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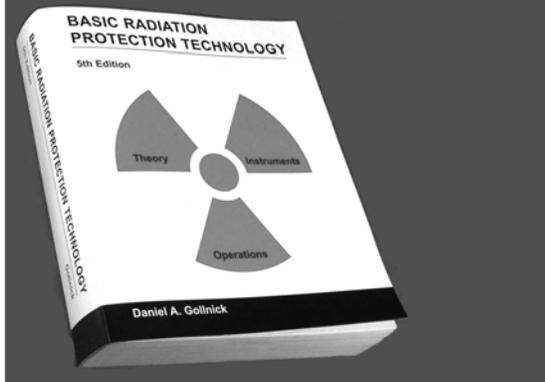
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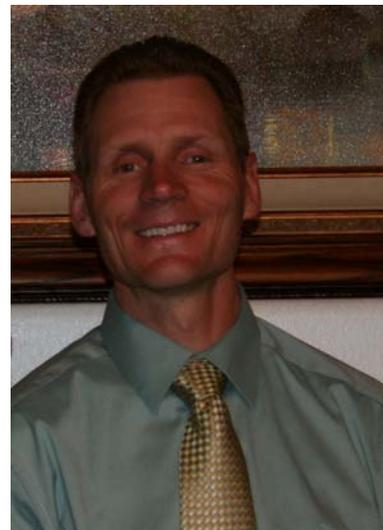
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**\*\* BIO ON OUR BOARD MEMBER \*\***  
**Rick Rasmussen**



Rick began his radiation protection career more than twenty years ago in the Navy Nuclear Power Program as an Engineering Laboratory Technician. After spending nine years in the Navy, Rick joined Los Alamos National Laboratory as a radiological control technician. After completing his graduate program in Health Physics he became a technical staff member and currently works with the Off-Site Source Recovery Project which collects unwanted, excess or abandoned radioactive sealed sources domestically and internationally. Rick also serves in the New Mexico National Guard as Nuclear Medicine Science Officer with a Weapons of Mass Destruction Civil Support Team.

In 1995, Rick became a Registered Radiation Protection Technologist and served on the NRRPT Panel of Examiners from 1997 through 2005 when he was elected to the NRRPT Board of Directors.

Away from work, Rick enjoys riding his mountain bike and spending time with his wife of 21 years Janneke and his three sons Tyler, Kyle and Drew.

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Continued from page 4

As the above example shows, we can measure the absolute activity of a mixed emitter by employing coincidence technique of detection. It, of course, depends on the emissions of two coincident radiations that are readily distinguishable. The beauty of this technique is that the absolute detector efficiencies,  $\epsilon_{\beta}$   $\epsilon_{\gamma}$ , are not required. An easier method to measure the activity is to use a beta absorber that is thick enough to stop the betas from reaching a detector, and so one can simply measure the gamma rays and then determine the activity of the mixed emitter. The drawback is that some of the gamma rays will also be attenuated, and thus the measurement will be lower than the absolute activity.

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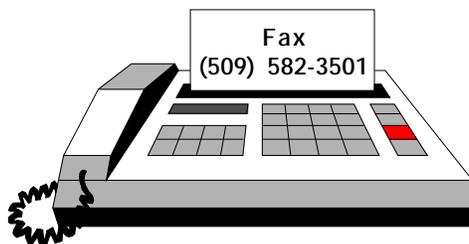
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