NRRPT® NEWS

National Registry of Radiation Protection Technologists

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Message from the Chair

Kelli Gallion

Hello fellow RRPT's. We just concluded our 62nd Board of Directors/Panel of Examiners meeting that was held in Washington D.C. in conjunction with the Annual Health Physics Society meeting. Below are some highlights from the committee reports.

- The Newsletter committee welcomes articles from all members. Articles may be sent via U.S. mail or e-mail. There are a variety of topics and ideas that the articles may contain such as on-going special projects, lessons learned/industry events, new techniques/equipment, ALARA savings techniques, fellow recognition, etc.

- The Marketing committee reported that Bartlett Nuclear, Inc. has upgraded to a Gold Sponsor, RADeCO to a Silver Sponsor, and our new Corporate sponsors are RAD-Ware, General Engineering Laboratories, and Global Dosimetry. Please support our sponsors. See a listing and business description of our sponsors beginning on page12.

- You will soon see a slight change to the **NRRPT** website, we will be removing the password requirement for accessing the Forum. We hope this change will increase the forum activity by not only making access easier for our members, but also to invite potential future RRPT's.

- The Awards committee welcomes Williams C. Young and Martin N. Hass as our most recent Emeritus Members. Also, we are pleased to report that a scholarship has been awarded to Karla Rendell. Karla is working towards a B.S. degree in Applied Science and Technology. Lastly, a recognition award is in the process of being developed in memory of Charles D. (Bama) McKnight. More information will be provided following our next meeting, which will be held in conjunction with the ISOE ALARA Symposium in January 2005.

- The Exam Panel committee reports that the test dates for 2005 will be February 5th and August 13th.

- Jeff Schaefer and Dave Tucker from Canada joined the Ad Hoc committee, which was formed to develop a Canadian (NRRPT equivalent) exam. Our Canadian exam committee, who consists of Dave Biela (US), Dwaine Brown (US), Tim Kirkham (US), Jeff Shaefer (Canada), and Dave Tucker (Canada), has established an aggressive goal date of August 2005 for the administration of the first Canadian exam. We are all very thrilled with the progress that the committee has made in such a short time. I sincerely thank Jeff and Dave for joining our meeting, and the committee for their hard work and perseverance in their accomplishments thus far.

- The Registration Maintenance Program was implemented on January 1, 1999 and completed its first 5-year cycle on December 31, 2003. There were several committee members involved in the development of this program, but this program would not have been successful without the unending support of Jim Martin. Over the last 5 years, Jim has been responsible for the maintenance and administration of the program. Thank you Jim for your dedication and for the success of our Registration Maintenance Program!

- Two new positions were filled on the Board of Directors: the two elected were Eddie Benfield and Bill Peoples. Their term will begin January 1, 2005 and run through January 1, 2010. Bill has previously served on the Board of Directors and was the Chairman in1998. Eddie has served on the Panel of Examiners for the past 2 years, has just been appointed the Awards Committee Chairman, and has been appointed to serve on an ad hoc nominations committee. Eddie's going to be busy! Welcome to the Board.

- I would like to welcome our newest members of the Panel of Examiners, they are, Keith Miller, Dave Tucker from Canada and Daren Blankenship, Darin's term begins 1/1/05.

- The Board of Directors has also reelected Steve Lancaster as Vice-Chairman, Kelly Neal as Secretary-Treasurer, and myself as Chairman for 2005.

It's hard to believe that we are more than half way through 2004, but I must say that I am extremely proud of the success that the organization has made thus far. We have set some challenging goals for ourselves in the coming year, but I know that with hard work and dedication we will conquer these goals. Thank you all for your loyalty and continued support of the Registry.

Best Regards,
Kelli A. Gallion

You must do the thing you think you cannot do. *Eleanor Roosevelt*

The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them. *(Sir) William Bragg*

How wonderful it is that nobody need wait a single moment before starting to improve the world. *Anne Frank*

Using LLD in Counting: A Simple Step-By-Step Approach to Screening Low-Activity Samples

By Augustinus Ong
Dartmouth College

The purpose of this paper is to reacquaint ourselves with and show how to apply a simple method from health physics' radio-analytical notes for screening samples for low levels of radioactive contaminants.

The problems that arise in low-activity-level screening include but are not limited to the following: interference from natural radioactivity; detector efficiency; cross-contamination of samples due to poor handling techniques; and, of course, statistical uncertainty associated with radioactivity sampling and measurement. In fact, it is the last that is the dominating factor in screening of low-activity samples, which we will address here.

So how do we go about using counting statistics for assessing low-level activity? The standard practice below is based on estimating the minimum significant gross count at a 95% confidence level (i.e., it has a 5% chance of accepting a false positive detection, Type I error; or a 5% chance of rejecting a true positive, Type II error). Once we have taken the measurements of our samples and statistically analyzed them, we now must decide whether there is activity present in a given sample or not. This decision is based on estimating the Lower Limit of Detection (LLD). The LLD is the smallest amount of net activity above background that will be registered as positive with a given level of confidence, in this instance, 95%. There are many LLD equations that can be used, the choice of which depends on various factors, such as the equality of counting times for samples and for background, or counts for background. In the following equation, chosen for its simplicity, LLD assumes a 95% confidence level.

The particular estimated Lower Limit of Detection equation that we will use is

$$LLD = 4.65\ k\ s_B$$

where, k is the coefficient which relates activity to the count rate

$$k = 1 / e$$

where, e = the counting yield for the type and energy of radiation and the counting geometry.

$$e = \text{net count rate} / \text{activity}$$

where, $s_B = SQRT(R_B / t_B)$; R_B = background counting rate
t_B = background counting time

For screening samples, counting times for samples (t_G) and for background (t_B) kept the same (i.e., $t_G = t_B = t$).

$$LLD = 4.65 [(1 / e) SQRT (R_B / t)]$$

Solving for t:

$$t = 21.62 [R_B / (LLD)^2 e^2]$$

This equation represents the counting time required to achieve an estimated LLD with a 95% confidence level. Note that in order to minimize the counting time for a particular LLD, R_B should be minimized and ε should be maximized; the former can be minimized by using lead shield around the detector.

A step-by-step procedure:

1. Operate the GM tube at its normal voltage level.

2. Perform a ten-minute background count of a blank sample on the sampling holder:

   Total background counts: N_B = __________ counts

3. Calculate the background count rate:

   $R_B = N_B$ / 10 min = __________________ cpm

4. Record the current activity of the standard traceable source:

   Activity: A = ________________________ pCi

   _________ pCi x 0.037 Bq/pCi = _________ Bq

   _________ Bq x 60 sec/min = ____________ dpm

5. Perform a ten-minute count of the standard traceable source:

   N_G = __________________________ counts

   Calculate the gross count rate:

   $R_G = N_G$ / 10 min = _____________ cpm

   Calculate the net count rate:

   $R = R_G - R_B$ = _________________ cpm

6. Calculate the counting yield for the standard traceable source:

   e = R (cpm) / A (dpm)

7. Calculate the required counting time to have an LLD = 100 dpm (arbitrary limit that is approximately little less than 2 Bq)

   $t = 21.62 \, [R_B / (LLD)^2 e^2]$

   Time, t, is the counting time for all unknown samples.

8. Calculate the gross counts based on the LLD = 100 dpm:

   N_G = [(100 dpm) (e) (t)] + [(R_B) (t)]

   N_G = ______________________ counts

   N_G is the screening level.

9. Count each unknown sample for time = t. Note which samples have gross counts which exceed the screen level.

10. Calculate the activity of each sample:

   A = [(N_G / t) - R_B] (1 / e)]

11. Tabulate the results in a spreadsheet:

Sample Number	Gross Counts	Activity	Greater than Screening Level?

In summary, this step-by-step method for screening samples for low-levels of radioactivity can be helpful to radiologic technologists. The LLD value provides a desired level of confidence that allows us to assess true radioactivity above background in a sample within normal statistical variations in its net count.

2005 NRRPT Exam Dates

February 5, 2005

Deadline for application: December 17, 2004

August 13, 2005

Deadline for application: June 17, 2005

Application Fee: $200
Retake Fee: $100
Late Fee: $30

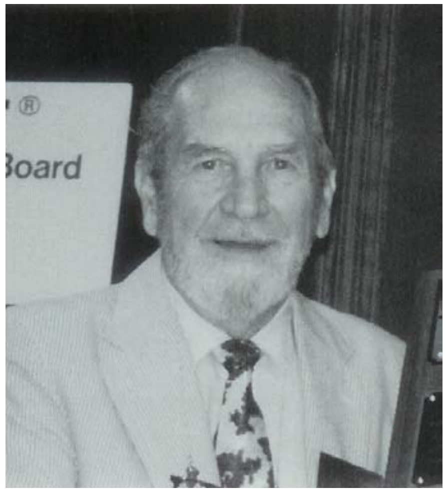
** Exam applications may be downloaded from our web page **

www.NRRPT.org

DeeDee McNeill, Don Marshall & Kelli Gallion enjoying the **NRRPT** Night-Out sponsored by Bartlett Services, FRHAM Safety Products & General Engineering Laboratories

C. D. (Bama) McKnight, RRPT
1926 - 2004

One of the few remaining 'pioneers' of the NRRPT has found everlasting peace.



Charles D. McKnight, affectionately called 'Bama', closed his bright blue eyes for the last time on June 16, 2004. He had successfully fought off lung cancer for three years, but after gall bladder surgery in April, he never left ICU.

Bama lived in Bessemer, Alabama, a small town in the vicinity of Birmingham, from 1932 – 1942 when his dad moved his family to his new job in New Orleans. It is traditional that you never get to represent your home state until you leave the state, so, while in high school, his classmates called him "Alabama", "Alabam", and "Bama".

His musical career as a drummer required extensive travel away from home. Many times in other states he would be asked where he called "home". As his parents and brother were living there, his response was "New Orleans". Then they would ask, "Why do they call you 'Bama' when you are from Louisiana?" His answer was an old vaudeville reply, "I got sick and tired of being called Louise!"

His sense of humor and quick wit was the hallmarks of Bama. I know of no one who met him that did not like him from the very start.

His travels with different bands brought him to Las Vegas in 1958 where he had many gigs at the local casinos with "name" stars, but the work was so sporadic that after collecting 25 weeks unemployment, he had to start looking for a steady job to support his growing family.

After many job interviews (he was willing to take anything until he found another music engagement). He accepted a job on February 13, 1959, temporarily, with REECo at the Nevada Test Site as a "Radiation Monitor". It provided $5.00 a day subsistence (because of the remote location) and an hourly wage of $1.75 during a three month probation period. Well, that "temporary" job lasted 30 years! It was at REECo that Bama found a second calling as an instructor/teacher. He taught hundreds of people who took the RERO course at the NTS. Once you met Bama you never forgot him. Bama had the gift of making the technically difficult understandable and enjoyable.

Bama was one of the early members of the exam panel for he NRRPT. His contributions of "in the trenches" practical Health Physics knowledge was essential in assisting the Board and Panel during the formative years of the NRRPT. To list all of the many ways Bama helped the NRRPT over these many years would take many pages of text. Bama was made a Fellow of the NRRPT in 1992 and was awarded the Arthur F. Humm Jr. Award in 1996. Bama was truly one of the major building blocks of the Registry.

His daughters, Colleen Shurtz and Karen Esplin, and sons Jack Babb, Tom, Daryl and Patrick McKnight survive him.

He now lies in peace next to his wife 'Loy'. He will deeply missed by all that had the privilege to know or work with him. God bless his soul.

Paul Harvey

A Comparison of Techniques Used to Evaluate Low Level Radiochemical Data

By Theresa L. Parrotte, Bob Wills RRPT, Scott C. Moreland,
J. Stan Morton Ph.D., James B. Westmoreland
General Engineering Laboratories, LLC

Abstract

Radiochemistry laboratories provide analytical data in the form of results, uncertainties and detection limits. When evaluating radiochemistry results, the user will eventually be confronted with the need to make a decision regarding the presence or absence of radioactivity. The method used to make this assessment must be carefully selected or the results can be misleading. This is especially true for low level determinations where the activity is difficult to distinguish from the background. Comparisons of three approaches used to assess radiochemical data are discussed to assist the data user.

Introduction

All analytical methods and systems have a certain level of ‘noise’ associated with them. This noise is due to random variations in the analytical and detection components of a system. In its simplest form a positive detection is a measurement “signal” distinguishable from the background “noise”. When analyzing at low concentrations there is a point where the method’s results can not be distinguished from the “noise” level of the analytical system. The terms used to describe the detection threshold are numerous and include minimum detectable activity, decision level, critical level, lower limit of detection, quantification limit, etc.

Because radiological measurements are random in nature, statistical evaluations are effective in calculating the sensitivity of a measurement. Radiation detectors demonstrate statistical fluctuations in that each time a background measurement is made, a different result is typically observed. Furthermore, the observed backgrounds can be assigned a mean and a variance. The statistical calculations improve as more background counts are measured. Detectors with higher background count rates actually follow the statistical models better than detectors with very low count rates. Therefore, counting backgrounds longer improves the performance of the statistical model. Most calculations used to determine a limit of detection are based on Poisson statistics and a 95% confidence interval marking the level where the signal is distinguishable from the noise. The above assumptions have held through radiological measurements since the 1960’s with many lively debates in the ensuing years.

The lowest threshold used to distinguish a positive result is the decision level threshold (DLC) or sometimes called the decision level or critical level. The DLC is represented by Equation (1).

$$DLC = \frac{1.645 * \sqrt{B(ts)(1+\frac{ts}{tb})}}{K * ts} \qquad \text{Eq. (1)}$$

where: 1.645 is a statistical value representing the 95% confidence interval
B is the gross background count rate (cpm)
ts is the sample count time (minutes)
tb is the blank count time (minutes)
K is a constant to convert counts to activity units

The DLC is an a posteriori (after the fact) measurement that can be compared with the result in order to make a judgment as to the presence or absence of activity in the sample. At the DLC one can say that there is a 95% confidence that the measured result is above the background. Stated differently, if twenty replicate measurements were made on a blank sample, one result would be expected above the DLC (also known as a false positive).

A second measure of sensitivity is the minimum detectable activity (MDA) Eq. (2). As the level of activity in a sample increases above the background (i.e. the sample is no longer a blank) a new distribution forms and at a certain level above the critical level the MDA is established. Although the MDA sounds like a level below which no activity will be detected, this is actually not the case. A laboratory can frequently detect activity below the MDA (approximately 50% of the time). This is a primary reason that it is not advisable to exclude data by reporting <MDA.

$$MDA = \frac{3 + 3.29 * \sqrt{B(ts)(1 + \frac{ts}{tb})}}{K * ts} \qquad \text{Eq. (2)}$$

Variables are defined are the same as referenced in Eq. (1)

The MDA is roughly equivalent to the term lower limit of detection (LLD) although various published calculations differ from Eq. (2). For example, some equations use 2.71 as opposed to 3 and others use 4.66 rather than 3.29. Most of these variations come from attempts to better represent the 95% confidence interval for low level counting or from simplifying the equations to assume identical background and counting times. From the equations above it is evident that counting a sample longer will improve the sensitivity of the measurement (Strom, Stansbury HPS 1992).

The method detection limit (MDL) is another term that should not be confused with DLC, MDA or LLD. The MDL is used for non-radiological measurements (metals, organics, general chemistry etc.) and is based on a 99% confidence interval. (Title 40 CFR Part 136, Appendix B). The procedure for determining the 99% confidence level for MDL involves running multiple standards near the detection limit and then applying a statistical calculation to determine the MDL.

Although some rigorously debate its merit, a common practice for radiological laboratories is to determine a sample specific MDA, also known as an a posteriori (after the fact) MDA. This calculation is useful in assessing the sensitivity achieved in the determination of a specific sample activity. The a posteriori MDA will account for the actual detector efficiency and volume used in the measurement while the a priori MDA must make assumptions that cannot be known until after a measurement is made. In reviewing the MDA, a data user can assess if the laboratory met the sensitivity requirements of a contractual or regulatory level. At the reported MDA the data user can also conclude that there is a 95% probability that the activity detected is above the DLC.

Evaluation of uncertainties has gained popularity as a means of determining the significance of a measurement. In this approach the data user compares the result to some multiple of the uncertainty in order to establish a threshold for detection. For example, comparing a result to 2 times the total propagated uncertainty (TPU) (MacLellan) has been proposed as an improved means of determining the critical level. The TPU is a calculation that approximates all sources of uncertainty in the analytical process.

Summary

The table on page 10 shows how low-level detection decisions are different for the three cases discussed. The DLC is clearly the most conservative approach, followed by the TPU and finally the MDA comparison. General Engineering Laboratories, LLC (GEL) provides data in formats that can be customized to meet the specific requirements of a given project. We select counting times and sample aliquots to match the sensitivity required. It is very important to communicate in advance any special sensitivities or calculations that are required for a project. GEL has remained flexible in reporting radiological data due to the need to service programs that are effectively "etched in stone". For these reasons we resist the urge to suggest one particular approach, since the approach ultimately depends on what the data user is trying to accomplish.

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Experimental

The table below provides a comparison of results calculated by DLC, MDA and 2x TPU. The results are based on a 10g sample, a 96% yield for plutonium analysis, 1000-minute background and sample count time and a 27% counting efficiency.

Isotope	Activity	TPU	DLC	MDA	Net Area	BKG Area	Activity >DLC	Activity >2*TPU	Activity > MDA
Pu- 239	0.00	0.00	0.00	0.53	0	0			
	0.35	0.25	0.00	0.53	2	0	√		
	0.53	0.31	0.00	0.53	3	0	√		
	0.70	0.35	0.00	0.53	4	0	√	√	
	0.88	0.39	0.00	0.53	5	0	√	√	√
	1.76	0.56	0.00	0.53	10	0	√	√	√
	2.64	0.68	0.00	0.53	15	0	√	√	√
Pu- 239	0.00	0.35	0.58	1.69	0	2			
	0.35	0.43	0.58	1.69	2	2			
	0.70	0.50	0.58	1.69	4	2	√		
	0.88	0.53	0.58	1.69	5	2	√		
	1.06	0.56	0.58	1.69	6	2	√		
	1.23	0.58	0.58	1.69	7	2	√	√	
	1.76	0.66	0.58	1.69	10	2	√	√	√
	2.64	0.77	0.58	1.69	15	2	√	√	√
Pu- 239	0.00	0.50	0.82	2.17	0	4			
	0.35	0.56	0.82	2.17	2	4			
	0.70	0.61	0.82	2.17	4	4			
	0.88	0.63	0.82	2.17	5	4	√		
	1.58	0.73	0.82	2.17	9	4	√	√	
	1.76	0.75	0.82	2.17	10	4	√	√	
	2.29	0.81	0.82	2.17	13	4	√	√	√
	2.64	0.84	0.82	2.17	15	4	√	√	√
Pu- 239	0.00	0.61	1.01	2.54	0	6			
	0.88	0.73	1.01	2.54	5	6			
	1.06	0.75	1.01	2.54	6	6	√		
	1.23	0.77	1.01	2.54	7	6	√		
	1.41	0.79	1.01	2.54	8	6	√		
	1.58	0.81	1.01	2.54	9	6	√		
	1.76	0.83	1.01	2.54	10	6	√	√	
	2.64	0.92	1.01	2.54	15	6	√	√	√
Pu- 239	0.00	0.79	1.30	3.12	0	10			
	0.18	0.81	1.30	3.12	1	10			
	0.88	0.88	1.30	3.12	5	10			
	1.41	0.93	1.30	3.12	8	10	√		
	1.76	0.96	1.30	3.12	10	10	√		
	2.11	1.00	1.30	3.12	12	10	√	√	
	2.64	1.04	1.30	3.12	15	10	√	√	
	3.52	1.11	1.30	3.12	20	10	√	√	√

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After you have checked out the store you can provide input or make suggestions for additional merchandise that you would like to see the store carry at nrrpt@nrrpt.org.

** BIO ON OUR EXAM PANEL CHAIRMAN **
Dave Biela

Dave's career in Radiation Protection started in the U.S. Air Force. His military training as a Senior Explosive Ordinance Disposal Technician included working with nuclear devices. After completion of his military duties Dave was hired at the West Valley Demonstration Plant as a HP Technician. Since that time Dave has moved through progressively challenging assignments leading to his current duties as Senior Health Physicist. His development and experience has included job coverage, supervision, waste management, training and ALARA, all from the perspective of a Department of Energy facility. He became a Registered Radiation Protection Technologist in 1986 and completed his Registration Maintenance in 1999.

Dave's DOE background was a welcome addition to the Panel of Examiners in 1988. Based on Dave's personal attention to detail and tenacity he was appointed the Vice Chairman of the Exam Panel in 1993. After serving in that capacity for 6 years he was appointed as Chairman in 1999.

Dave's position as Exam Panel Chairman automatically gives him a seat on the **NRRPT** Board of Directors. Despite all of the duties that the Panel entails, which includes preparing and administering 2 examinations a year, Dave has the time to also serve on the Board's Finance Committee.

Bartlett Nuclear, Inc.

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RADeCO

Fred Lucci
P.O. Box 509
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For over 25 years, RADeCO has set the standard for air sampling in the nuclear industry. We supply the highest quality air sampling equipment, filter media, and sampling cartridges. We also provide a full range of calibration, repair service, and spare parts for all your air sampling and air flow measurement equipment. In addition to being an **NRRPT** Corporate Sponsor, RADeCO offers special discounts to the **NRRPT** membership.

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Dick Warnock
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(949) 368-6784

Edison's Radiological Calibration Laboratory has existed for 20 years. It was created to provide calibration and repair services of radiological measurement instruments and equipment in support of SCE's Nuclear Generating Stations. This modern facility is located south of San Clemente, CA at the San Onofre Nuclear Generating Facility. It provides calibration, repair services and equipment rentals to companies in the energy, nuclear, medical, pharmaceutical, aerospace and technical industries.

STP Nuclear Operating Company

Bill Bullard, RPM
P.O. Box 289
Wadsworth, TX 77843
(361) 972-7130
wtbullard@stpegs.com
www.stpegs.com

More than fifty registered Radiation Protection Technologists are proud to work at the South Texas Project's two nuclear power plants. These plants, some of the world's newest, produce more than 2500 megawatts of electricity. The plants, and the team that operates them, set industry standards in safety, reliability and efficiency.

AmerenUE-Callaway Plant

Among the nation's top utility companies in size and sales, Ameren is the parent of AmerenUE, based in St. Louis, MO, and AmerenCIPS, based in Springfield, IL. Ameren is also parent to several nonregulated trading, marketing, investment and energy-related subsidiaries. Ameren employees, totaling approximately 7,400, provide energy services to 1.5 million electric and 300,000 natural gas customers over 44,500 square miles in Illinois and Missouri.
Contact: Bob Farnam (573) 676-8784

American Electric Power

American Electric Power is a multinational energy company with a balanced portfolio of energy assets. AEP, the United States' largest electricity generator, owns and operates more than 42,000 MW of generating capacity in the U.S. and select international markets. AEP is a leading wholesale energy marketer, ranking among North America's top providers of wholesale power and natural gas with a growing wholesale presence in European markets. In addition to electricity generation, AEP owns and operates natural gas pipeline systems, natural gas storage, coal mines, and the fourth-largest inland barge company in the U.S. AEP is also one of the largest electric utilities in the U.S., with almost 5 million customers linked to AEP's wires. Contact: David Wood (616) 465-2559

Calvert Cliffs Nuclear Power Plant

Constellation Nuclear, LLC, a member of the Constellation Energy Group, owns and operates the Calvert Cliffs Nuclear Power Plant and Nine Mile Point Units 1 and 2. Constellation Nuclear was created to ensure CEG has a reliable, efficient and diversified fuel base for its merchant energy business.

Contact: Steve Sanders (410) 495-3574

Chase Environmental Group, Inc.

Chase maintains a staff of professionals with years of experience in providing radioactive and mixed waste disposal solutions. Chase also offers comprehensive remediation and decommissioning services

Contact: John O'Neil (877) 382-2124

Catawba Nuclear Station

Catawba Nuclear Station, operated by the Duke Power Nuclear Generation group, is a dual unit 1129 Mw Westinghouse PWR facility on the shores of Lake Wylie. We are proud to have over 35 members of our Radiation Protection staff, registered by NRRPT, working at our nuclear station.

Contact: Mark Helton (803) 831-3777

F&J Specialty Products, Inc.

F&J SPECIALITY PRODUCTS, INC. (F&J) has a registered ISO9001 quality management system implemented for its production of air samplers, airflow calibrators, radioiodine collection cartridges, tritium and C-14 collectors, radon detection products and more. Many instruments are certified to UL and CSA electrical safety standards. F&J provides a complete line of accessories and consumables such as filter paper, smears, filter holders and radioiodine collection cartridges. Providing our customers with reliable and durable products is our corporate goal. Contact: Frank Gavila (352) 680-1177

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Linn State Technical College

Linn State Technical College, in collaboration with the University of Missouri Nuclear Science Engineering Institute (NSEI), Missouri University Research Reactor (MURR), and AmerenUE Callaway Nuclear Plant has developed a Nuclear Technology Associate of Applied Science (AAS) Degree program. This two-year degree program offers a unique opportunity to obtain state-of-the-art education and training that will make graduates prime candidates for Radiation Protection/Nuclear Technician positions.

Students will study and gain hands-on experience in radiation physics, radioactive testing and analysis, radiological instrumentation, reactor operations, safety and handling procedures, and various industrial applications and safeguards.

The courses are offered at the Advanced Technology Center (ATC) located in Mexico, Missouri. The Advanced Technology Center (ATC) is a cooperative effort among the City of Mexico, Linn State Technical College, Moberly Area Community College and the University of Missouri Outreach and Extension.

To find out more about this degree program, visit the Linn State Technical College website (www.linstate.edu), the Advanced Technology Center website (www.atc.org) or call 573-897-5000.

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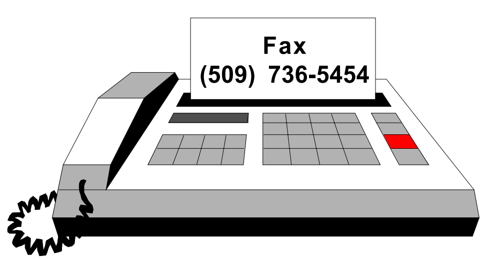

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