



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
UNITED STATES MILITARY ACADEMY
WEST POINT, NY 10996

Br 2

MADN-PHY (11-9n)

21 January 2009

MEMORANDUM FOR U.S. Nuclear Regulatory Commission - Region 1, ATTN: LAT, 475 Allendale Road, King of Prussia, Pennsylvania 19406-1415

SUBJECT: Amendment to US Nuclear Regulatory Commission License BML 31-02102-02, Docket No. 030-00897

1. Request that US Nuclear Regulatory Commission License BML 31-02102-02 issued to the Department of Physics, US Military Academy, be amended as follows:

a. Remove MAJ David Phillips as the Radiation Safety Officer and designate him as an Authorized User.

b. Designate Dr. Daniel Schultz, PhD, as the Radiation Safety Officer and an Authorized User. The Radiation Safety Committee (RSC) reviewed and approved the training and experience of Dr. Daniel Schultz at the 28 October RSC meeting. Dr. Schultz has attended classes given by the Department of Physics in the seven subject areas outlined in NUREG-1556, Volume 7. Additionally, Dr. Schultz has served for the past year as the RSO-in-Training under the supervision of the RSO. See enclosures 1 and 2 for Dr. Schultz's CV and training and experience.

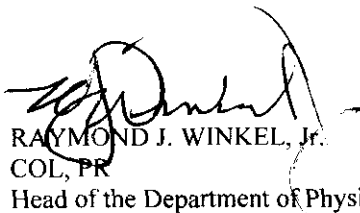
c. Designate LTC Bryndol Sones, PhD, as an Authorized User. The RSC reviewed and approved the training and experience of LTC Sones at the 28 October 2008 RSC meeting. See enclosure 3 and 4 for LTC Sones' CV and training and experience.

2. The United States Military Academy (USMA) is a public undergraduate educational institution, accredited by the Middle States Association of Colleges and Schools, offering programs of instruction leading to the bachelors degree. The USMA is an activity of the United States Army and is supported by appropriated funds. As such it appears to meet your definition of a "nonprofit educational institution" (10 CFR 171.5). Request that USMA be exempted from any fees for this action.

3. Point of contact for licensing in the Department of Physics is MAJ David Phillips, Radiation Safety Officer, (845) 938-4545, or david.phillips@usma.edu.

4 Encls

1. Dr. Schultz, CV
2. Dr. Schultz, T&E
3. LTC Sones, CV
4. LTC Sones, T&E


RAYMOND J. WINKEL, Jr.
COL, PR
Head of the Department of Physics

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REGION 1

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NMSS/RCN1 MATERIALS-002

Daniel B. Schultz

Education

May 1993	Ph.D.	Physics	University of Wisconsin—Madison
December 1989	M.S.	Physics	University of Wisconsin—Madison
May 1988	B.S.	Physics	The Pennsylvania State University, University Park
May 1988	B.S.	Astronomy	The Pennsylvania State University, University Park
			Mathematics Minor, Honors in Physics

Experience

Teaching

9/06-present	Supervisory Physicist for the Department of Physics at the United States Military Academy. Responsible for ensuring equipment is set up for laboratories in the 1,000-student core course, 30-student advanced physics program, and 35-student nuclear engineering program. Reviews laboratory program to ensure learning objectives are met. Obtain resources to run the laboratory program and oversee a \$150,000/year budget. Member of the Laboratory Resource Council for the Academy. Supervise, lead, and mentor three physical science technicians. Responsible for organizing and coordinating summer research program for 25 students and 2 faculty members at 12 locations in 3 countries. Responsible for planning and organizing the Physics portion of a summer seminar for prospective cadets that had 36 attendees a day for six days over a two week period. Assists in administering Department's Radiation Safety Program.
6/03-6/06	Director of Introductory Laboratories for three two-semester introductory physics courses with a total enrollment of about 500 students each semester and about 100 students for the summer session. Coaches, trains, and mentors 8-10 graduate student teaching assistants. In charge of developing, planning, and coordinating the laboratory portion of the courses. Also responsible for developing and maintaining lecture demonstrations. Responsible for maintaining two web sites: one for the laboratory and one for the demonstrations. Member of the Case Academic Integrity Board.
5/98-12/02	Assistant Professor at the United States Military Academy for nine semesters of sophomore-level, calculus-based physics. In charge of developing, planning, and coordinating the laboratory portion of the course for three semesters.
9/88-5/89, 1/92-5/92, 9/92-1/93	Teaching Assistant at the University of Wisconsin—Madison for three semesters of introductory lectures/labs (general physics) and one semester of intermediate undergraduate laboratory (electronics).

Research

6/89-12/91, 6/92-8/92, 1/93-5/93	Research Assistant at the University of Wisconsin—Madison. Conducted thesis research under Frank Scherb: instrument design, observation, analysis and publication for ground-based observing program to obtain high-resolution spectra of visible-wavelength emission line from neutral and ionic species in cometary atmospheres using a 150 mm dual-etalon Fabry-Perot spectrometer. (Research continued 1/92-5/92 and 9/92-1/93 during teaching appointments.)
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Computers

5/01-9/01	Information management officer for Department of Physics with over 80 Windows NT based computer systems. Responsible for installation of PASCO Science Workshop 750 data acquisition systems in classrooms and lab rooms. Developed demonstrations and laboratories using the data acquisition systems.
5/91-5/93	Manager for <i>Astronomical Image Processing System (AIPS)</i> , a widely used image processing software package.
9/90-12/91	System Manager for the Space Physics group at the University of Wisconsin. Maintained and managed two MicroVAX systems for a group of about 25 users, at both software and hardware levels.

Encl 1

Leadership

- 10/06-1/08 Nuclear Research Officer in the US Army's single Chemical, Biological, Radiological, Nuclear, and High Yield Explosive (CBRNE) Command. Responsible to deploy in support of combatant commanders, combined and joint force commanders, and supported Lead Federal Agencies in combating weapons of mass destruction operations. Reviewed and developed operational plans for two explosive ordnance disposal groups, one chemical brigade, one special mission company, and a mobile analytic team. Served as a nuclear weapons effects officer in the only nuclear disablement team in the US Army. Coauthored a nuclear reactor disablement checklist for possible use in the future by combatant commanders, including a set of eight draft plans for disabling potential proliferant plutonium pathways. Completed the Nuclear Counter Proliferation Course.
- 2/05-2/06 Embedded troop trainer in Mazar-e-Sharif, Afghanistan as part of Task Force Phoenix. Mentored and trained Afghan National Army officers in support of *Operation Enduring Freedom*.
- 3/03-12/04 Force Integration Officer with the 99th Regional Readiness Command (RRC). Assisted in the performance of organizational integration functions necessary to support the 99th RRC and the United States Army Reserve Command objectives. Assisted the Deputy Chief of Staff-Forces in providing timely and relevant support to soldiers, units and commanders in the 99th RRC. Reviewed and managed the execution of policies, plans, procedures, and programs pertaining to Force Integration. Executed the actions and requirements of the Force Structure Program. Assisted in the development and execution of the Force Modernization Plan. Was the Organizational Integrator for Ordnance. Compiled, analyzed, and disseminated data for use by full time personnel to balance their recommendations about the distribution of units and personnel across the continental United States that did not create undo advantages or disadvantages for any single command.
- 12/96-3/98 Commander of the 2nd Maintenance Company headquartered in Korea with support teams in eight locations in Korea, Japan, Hawaii, and Alaska. Responsible for the health, welfare, and morale of 163 soldiers. Responsible for maintaining all test measurement, and diagnostic equipment in the Pacific Theater.
- 10/93-2/96 Maintenance officer assigned to the 2nd Armored Cavalry Regiment at Fort Polk, LA. Served as assistant operations officer, maintenance platoon leader, maintenance troop executive officer, maintenance support team leader, and regimental supply officer. Deployed with and lead a maintenance support team to Haiti for five months that supported all US forces in Haiti.

Academic Awards

Penn State Teas Scholarship (1985-1988)
 ΦBK (Phi Beta Kappa) (1987)
 Golden Key Honor Society (1988)

Memberships

American Physical Society
 ΣΞ (Sigma Xi)
 American Association of Physics Teachers

Publications

- Naessens, E., D. Schultz, K. Sheetz, "Limited Time Labs/Exercises for High School or First-Year Undergraduate (Nonmajor) Physics Students", American Association of Physics Teachers Workshop, Rochester, NY (2001).
- Schultz, D., *Fabry-Perot Observations of Comet Austin 1989c1 = 1990V*, Ph.D. dissertation, University of Wisconsin (1993)
- Schultz, D., F. Scherb, F.L. Roesler, " H_2O^+ Production Rates of Comets Austin 1990 V and P/Halley 1986 III", *Icarus*, **104**, 185-196 (1993)
- Schultz, D., G.S.H. Li, F. Scherb, F.L. Roesler, "The $\text{O}(\text{}^1\text{D})$ Distribution of Comet Austin 1989c1 = 1990 V", *Icarus*, **101**, 95-107 (1993)
- Schultz, D., "Fabry-Perot Techniques of Observing Cometary Plasmas", *Fourth COSPAR Colloquium: Critical Problems in the Plasma Environments of Comets and Other Non-Magnetized and Weakly Magnetized Bodies*, (1992)
- Schultz, D., G.S.H. Li, F. Scherb, F.L. Roesler, "Comet Austin (1989c1) $\text{O}(\text{}^1\text{D})$ and H_2O Production Rates", *Icarus*, **96**, 190 (1992)
- Schultz, D., F. Scherb, F.L. Roesler, G.S.H. Li, "Fabry-Perot Observations of $[\text{O I}]\text{}^6300$ Emission from Comet Austin (1989c1)", *B.A.A.S.*, **23**, 1163 (1991)
- Schultz, D., F. Scherb, F.L. Roesler, G.S.H. Li, J. Harlander, R. Oliverson, "Fabry-Perot Observations of Comet Austin (1989c1)", *B.A.A.S.*, **22**, 1104 (1990)
- Li, G.S.H., F. Scherb, D. Schultz, F.L. Roesler, J. Harlander, R. Oliverson, "Observations of $[\text{O I}]\text{}^6300$ Å Emission from Comet Austin (1989c1)", *B.A.A.S.*, **22**, 1102 (1990)
- Schultz, D., F. Scherb, F.L. Roesler, G. Li, J. Harlander, T.P.P. Roberts, D. Vanden Berk, S. Nossal, M. Coakley, and R. Oliverson, "Fabry-Perot Observations of Comet Austin", *Workshop on Observations of Recent Comets (1990)*, 45 (1990)

TRAINING AND RADIOISOTOPE EXPERIENCE

Daniel B. Schultz

1. Education.

B.A. in Physics from the Pennsylvania State University, University Park, PA, 1988.
 B.A. in Astronomy from the Pennsylvania State University, University Park, PA, 1988.
 M.S. in Physics from the University of Wisconsin-Madison, Madison, WI 1990.
 Ph.D. in Space Physics, University of Wisconsin-Madison, Madison, WI 1993.

2. Training. Training and experience at the United States Military Academy under the supervision of COL Edward Naessens, Ph.D., LTC Mark Visosky, Ph.D., Dr. Brian Moretti, Ph.D., and MAJ David Phillips, M.S., in classes, laboratories, and on the job from 2007-2008. (See attachment for training dates).

Area 1: Radiation Protection Principles
 Area 2: Characteristics of Ionizing Radiation
 Area 3: Units of Radiation Dose and Quantities
 Area 4: Radiation Detection Instrumentation
 Area 5: Biological Hazards of Exposure to Radiation
 Area 6: NRC Regulatory Requirements and Standards
 Area 7: Hands-on Use of Radioactive Materials

<i>Area</i>	<i>Date/Duration</i>	<i>Type of Training</i>
1	22-25 July 2008	Seminar/On-the Job
2	Aug 2007-Feb 2008	Classroom
3	14-27 Feb 2008	Classroom
4	Aug 2007-Jan 2008	Laboratory
5	10 Mar-14 Apr 2008	Classroom
6	22-25 July 2008	Seminar/On-the Job
7	Nov 2007-Apr 2008	Laboratories and On-the-job

3. Experience with Isotopes, 2007-Present

<i>ISOTOPE</i>	<i>MAXIMUM ACTIVITY</i>	<i>TYPE OF EXPERIENCE</i>
Natural Uranium	2500 kg	Light Water Moderated Subcritical Assembly
Pu-239	80 g	Sealed neutron source
Cs-137	50 mCi	Compton Experiment
Co-57	10 mCi	Mossbauer Experiment
Am-241	10 mCi	X-ray Studies
Ba-133	7 μ Ci	Check Source
Bi-207	5.2 μ Ci	Check Source
C-14	10 μ Ci	Check Source
Cd-109	8 nCi	Check Source
Cl-36	9.1 μ Ci	Check Source
Co-60	5 μ Ci	Check Source
Eu-152	5 μ Ci	Check Source

Encl 2

Training And Radioisotope Experience: Daniel B. Schultz

<i>ISOTOPE</i>	<i>MAXIMUM ACTIVITY</i>	<i>TYPE OF EXPERIENCE</i>
Gd-148	0.2 μ Ci	Check Source
Kr-85	0.2 μ Ci	Check Source
Mn-54	0.1 μ Ci	Check Source
Na-22	0.7 μ Ci	Check Source
Nb-94	0.14 μ Ci	Check Source
Ni-63	2.4 mCi	Fluorescence Spectroscopy
Pa-234	9 nCi	Check Source
Pb-210	0.05 μ Ci	Check Source; Milliken Oil Drop Experiment
Pm-147	6 nCi	Check Source
Po-210	2 nCi	Check Source
Ra-266	5 nCi	Check Source
Sr-90	5.3 μ Ci	Check Source
Tc-99	0.2 μ Ci	Check Source
Th-230	16 nCi	Check Source
Tl-204	0.32 μ Ci	Check Source
U-238	5 nCi	Check Source
Zn-65	0.9 μ Ci	Check Source (Mixed with Cs-137)

Training Areas (NUREG 1556, VOL. 7, PARA 8.7.1)

1. Radiation Protection Principles
2. Characteristics of Ionizing Radiation
3. Units of Radiation and Dose
4. Radiation Detection Instrumentation
5. Biological Hazards of Exposure to Radiation
6. NRC Regulatory Requirements and Standards
7. Hands-on Use of Radioactive Materials

Radiation Protection Principles

Course	Lesson	Topic	Date Attended
PH374 (06)	35	Time, Distance, Shielding, and HVL	4-Nov-08
PH374 (06)	37	X-Ray Shielding	4-Nov-08
PH374 (06)	38	Airborne Radioactivity	4-Nov-08
PH374 (06)	39	Hazard Assessment	4-Nov-08
NE452 (07)	5	Shielding form Line Sources	4-Nov-08
NE452 (07)	12	Shielding Gamma Rays	20-Sep-07

Characteristics of Ionizing Radiation

Course	Lesson	Topic	Date Attended
PH374	2	Transformations I (Alpha, Gamma, IT)	16-Jan-08
PH374	3	Transformations II (Beta, Orbital EC, IC)	18-Jan-08
PH374	4	Transformation Kinetics I (Activity)	23-Jan-08
PH374	5	Transformation Kinetics II (Serial Decay)	25-Jan-08
PH374	7	Radiation Interactions I (Charged Particle Interactions)	31-Jan-08
PH374	8	Radiation Interactions II (Photon Attenuation)	4-Feb-08
PH374	9	Radiation Interactions III (Mass, Volume Interaction Rates)	6-Feb-08
PH374	10	Radiation Interactions IV (Photon Interactions)	8-Feb-08
PH374	11	Radiation Interactions V (Transfer & Absorption Fractions)	12-Feb-08
NE300	4	Nuclear Physics II	28-Aug-07
NE300	6	Nuclear Stability and Radioactive Decay	4-Sep-07
NE300	7	Nuclear Reactions and Binding Energy	6-Sep-07
NE300	9	Neutron Interactions and Cross Sections	12-Sep-07
NE300	11	Energy Loss in Scattering	18-Sep-07
NE300	13	Phase-Line Writ I	
NE300	14	Fission I	26-Sep-07
NE300	15	Fission II	28-Sep-07
NE300	16	Fission Chain Reactions and Fuels	2-Oct-07

Units of Radiation and Dose

Course	Lesson	Topic	Date Attended
PH374	12	Radiation Dosimetry I (Energy Imparted, Energy Transferred)	14-Feb-08
PH374	15	Radiation Dosimetry III (Exposure and Gamma Constant)	25-Feb-08
PH374	16	Radiation Dosimetry IV (Dose Limits)	27-Feb-08

Radiation Detection Instrumentation

Course	Lesson	Topic	Date Completed
NE452	3	Buildup Factors	24-Aug -07
NE452	11	Removal Cross Sections	18-Sep -07
NE452	12	Shielding Gamma Rays	20-Sep -07
NE452	15	Introduction to Radiation Detectors	28-Sep -07
NE452	16	Properties of Radiation Detectors: Pulse Height Spectra, Resolution, and Efficiency	2-Oct -07
NE452	20	Gas Filled Detectors: Proportional Counters	15-Oct -07
NE452	23	Scintillators: Organic and Inorganic	23-Oct -07
NE452	25	Scintillators: Radiation Spectroscopy I	Done in lab room 29 Oct 07
NE452	26	Scintillators: Radiation Spectroscopy II	31-Oct -07
NE452	27	Complications to Predicted Response Functions	2-Nov 07
NE452	29	Semiconductor Diode Detectors	8-Nov 07
NE452	30	Semiconductor Junction Bias I	13-Nov 07
NE452	33	Germanium Detectors	21-Nov 07
NE452	34	Germanium Detectors: Resolution and Pulse Shaping	27-Nov 07
NE452	36	Neutron Detectors: Slow Neutrons	3-Dec 07
NE452	39	Neutron Detectors: Fast Neutrons	11-Dec 07
NE355	LAB	Sub-critical Assembly Flux Mapping Lab	28-Jan -08

Biological Hazards of Exposure to Radiation

Course	Lesson	Topic	Date Attended
PH374	20	Cellular Radiobiology I (Direct/Indirect Action, RBE, LET)	10-Mar-08
PH374	21	Cellular Radiobiology I (Direct/Indirect Action, RBE, LET) (con't)	12-Mar-08
PH374	25	Early Radiation Effects (ARS and Local Tissue Damage)	2-Apr-08
PH374	27	Late Effects I (Radiation-Induced Carcinogenesis)	8-Apr-08
PH374	28	Late Effects II (Hereditary Effects of Radiation Exposure)	10-Apr-08
PH374	29	Late Effects III (Radiation Effects in Utero)	14-Apr-08

NRC Regulatory Requirements and Standards

Course	Lesson	Topics	Date Completed
Seminar	TBD	NRC Licensing	22-25 July 2008
		ARA Licensing	22-25 July 2008
		10 CFR 20	22-25 July 2008
		DOT Transportation Requirements	22-25 July 2008

Hands-on Use of Radioactive Material

1 st Quarter		2 nd Quarter		3 rd Quarter		4 th Quarter	
JANUARY	Date	FEBRUARY	Date	MARCH	Date	APRIL	Date
<ul style="list-style-type: none"> Monthly Survey TLD Exchange Review 3rd Qtr Consol. Dos. Rpts. Download 3rd Qtr ADR's PH366 Rad Safety Trng NE355 Rad Safety Trng TLD Issue - PH366/NE355 Instrument Calibration 	31-Jan-08 28-Jan-08 28-Jan-08 29-Jan-08	<ul style="list-style-type: none"> Monthly Survey Leak Test: α sources RSC Meeting Instrument Calibration 	11-Mar-08	<ul style="list-style-type: none"> Monthly Survey Instrument Calibration 		<ul style="list-style-type: none"> Monthly Survey TLD Exchange Review 4th Qtr Consol. Dos. Rpts. Download 4th Qtr ADR's Download NRC Form 5's Annual Notification to Workers DD Forms 1952's and CY ADR's to MTF/Occ Health Instrument Calibration 	30-Apr-08 22-Apr-08
5 th Quarter		6 th Quarter		7 th Quarter		8 th Quarter	
MAY	Date	JUNE	Date	JULY	Date	AUGUST	Date
<ul style="list-style-type: none"> Monthly Survey Leak Test: α sources Leak Test: β/γ sources Instrument Calibration 		<ul style="list-style-type: none"> Monthly Survey Update Required Postings Update Appl. Orders Annual Rad Safety Program Review Semi-Annual Sealed Source Inv. Instrument Calibration 	25-Jul-08	<ul style="list-style-type: none"> Monthly Survey TLD Exchange Review 1st Qtr Consol. Dos. Rpts. Download 1st Qtr ADR's Semi-Annual Sealed Source Inv. Instrument Calibration 	17-Jul-08	<ul style="list-style-type: none"> Monthly Survey Leak Test: α sources RSC Meeting D/Physics Radiation Safety Training EMS Memo Instrument Calibration 	25-Oct-08 18-Aug-08 24-Jul-08
9 th Quarter		10 th Quarter		11 th Quarter		12 th Quarter	
SEPTEMBER	Date	OCTOBER	Date	NOVEMBER	Date	DECEMBER	Date
<ul style="list-style-type: none"> Monthly Survey Instrument Calibration 	30-Sep-08	<ul style="list-style-type: none"> Monthly Survey TLD Exchange Review 1st Qtr Consol. Dos. Rpts. Download 2nd Qtr ADR's Instrument Calibration 	21-Oct-08	<ul style="list-style-type: none"> Monthly Survey Leak Test: α sources Leak Test: β/γ sources Instrument Calibration 	21-Nov-07 None Req. 21-Nov-07 21-Nov-07	<ul style="list-style-type: none"> Monthly Survey Semi-Annual Sealed Source Inv. Instrument Calibration 	18-Dec-07 18-Dec-07

Bryndol A. Sones
Lieutenant Colonel, United States Army
Academy Professor, Department of Physics, United States Military Academy

ACADEMIC BACKGROUND

Ph.D. in Nuclear Engineering, Rensselaer Polytechnic Institute, 2004
MS in Physics, Massachusetts Institute of Technology, 1997
BS in Engineering Physics, United States Military Academy, 1987

MILITARY EDUCATION

Command and General Staff College, 2002
Combined Arms Service Staff School, 1995
Air Load Planners Course, 1992
Infantry Officer Advance Course, 1992
Air Assault School, 1991
Ranger School and Infantry Mortar Platoon Officer Course, 1988
Infantry Officer Basic Course, 1987
Airborne School, 1985

MILITARY ASSIGNMENTS

Associate Professor, Nuclear Engineering Program, Dept of Physics, USMA, 2008-Present
Core Physics Program Director, Dept of Physics, USMA, 2004-2008
Executive Officer, Defense Threat Reduction Agency, Alexandria, VA, 2000-2001
Instructor and Assistant Professor, Dept of Physics, USMA, 1997-2000
Company Commander, B Co, 3/22 IN, Schofield Barracks, HI, 1993-1995
Air Operations Officer, 1st Bde, 25th IN Division, Schofield Barracks, HI, 1992-1993
Aide De Camp, Deputy Commanding General, Fort Dix, NJ, 1991
Officer in Charge, Basic Rifle Marksmanship, Fort Dix, NJ, 1989-1990
Company Executive Officer, CSC, 2/503d IN, Camp Hovey, Korea, 1988
Mortar Platoon Leader, CSC, 2/503d IN, Camp Hovey, Korea, 1988

COURSES TAUGHT

Introductory Classical Mechanics
Introductory Electricity and Magnetism
Differential Calculus
Nuclear Instrumentation and Shielding

RESEARCH AREA

Novel X-ray production for industrial or medical applications.

Parametric X-ray (PXR) Production. A smooth, energy tunable x-ray can be produced through the interaction of relativistic electrons and the periodic structure on crystalline materials. Medical imaging opportunities using two distinctly different mechanisms: selective x-ray energies that optimize image contrast or phased imaging which exploit elastic scattering differences between different types of tissue. Either technique may use the unique characteristics of PXR to resolve many medical imaging problems with soft tissue. Already, PXR has been

BRYNDOL A. SONES (cont'd)

used to image soft tissue phantom and future steps are to engineering a practical set-up that can be brought into a medical facility.

Physics education

Research in this area is being done along two approaches: use of technology and use of group dynamics to improve student cognitive development in physics. Three projects exist with the use of technology for student visualization (mathematical modeling and video capture using LoggerPro), assessment (Synchroneyes and Web-based activities), and engagement (Personal Response Systems). Two other projects exist with respects to group dynamics (formal groups) and organizational climate (USCC chain of command). Collaboration is interdisciplinary with efforts with the Department of Mathematical Sciences, English, and Leadership and Behavioral Sciences.

SCHOLARLY WORK

1. Refereed Publications.

- (a) **B. Sones** and Y. Danon. "Production and application of a novel energy-tunable x-ray source at the RPI LINAC," Nuclear Instruments and Methods in Physics Research B, p. 98-101 (2007).
- (b) **B. Sones**, Y. Danon, and R.C. Block. "X-ray imaging with parametric X-rays (PXR) from a lithium fluoride (LiF) Crystal," Nuclear Instruments and Methods in Physics Research A, 560, p. 589-597, (2006).
- (c) **B. Sones**, Y. Danon, and R.C. Block. "Lithium Fluoride (LiF) Crystal for Parametric X-Ray (PXR) Production," Nuclear Instruments and Methods in Physics Research B, 227, p. 22-31, (2005).
- (d) Y. Danon, **B. Sones**, R. Block. "Dead time and pileup in pulsed Parametric X-rays spectroscopy," Nuclear Instruments and Methods in Physics Research A, 524, p. 287-294, (2004).
- (e) K. An, **B. Sones**, C. Fang-Yen, R.R. Dasari, M.S. Feld. "Optical bistability induced by mirror absorption: measurement of absorption coefficients at the sub-ppm level," Optics Letters, Vol 22, No. 18, 1997.

2. Refereed Conference Proceedings.

- (a) **B. Sones**, Y. Danon. "Experiments with relativistic electrons producing tunable X-rays from Cu crystals," American Nuclear Society 2008, Annual Meeting, Anaheim, CA, accepted for publication in ANS Transactions vol. 98, p. 395 (2008).
- (b) **B. Sones**, Y. Danon. "Thin metallic crystals for Parametric X-ray (PXR) production," American Nuclear Society 2007 Annual Meeting, Boston, MA, ANS Transactions vol. 96, p. 337 (2007).
- (c) **B. Sones**, Y. Danon, R. Block. "The effects of electron scattering on the absolute Parametric X-ray (PXR) yield calculations," American Nuclear Society 2005 Annual Meeting, San Diego, CA, ANS Transactions vol. 92, p. 648 (2005).
- (d) **B. Sones**, Y. Danon, R. Block. "Novel X-Ray Imaging Opportunities for the RPI Linear Accelerator's Tunable, Quasi-monochromatic X-ray Source," American Nuclear Society 2004 Annual Meeting, Pittsburgh, PA, ANS Transaction vol. 90, p. 68 (2004).

BRYNDOL A. SONES (cont'd)

- (e) **B. Sones**, Y. Danon, R. Block. "LiF Crystal Advantages in Parametric X-Ray (PXR) Production," American Nuclear Society 2003 Winter Meeting, New Orleans, LA, ANS Transactions vol. 89, p. 483 (2003).
 - (f) **B. Sones**, Y. Danon, R. Block. "Advances in Parametric X-rays (PXR) Production at the RPI LINAC," American Nuclear Society 2003 Annual Meeting, San Diego, CA, ANS Transactions vol. 88, p. 352 (2003).
 - (g) J. Geuther, Y. Danon, F. Saglime, **B. Sones**. "Electron Acceleration for X-ray Production Using Paired Pyroelectric Crystals," abstracts of the Sixth International Meeting on Nuclear Applications of Accelerator Technology, San Diego, CA AccApp'03, p. 591, (2003).
 - (h) **B. Sones**, Y. Danon, R. Block. "Optimization of Parametric X-Ray Production," American Nuclear Society 2002 Annual Meeting, Hollywood, FL, ANS Transactions vol. 86, p. 240 (2002).
 - (i) Y. Danon, **B. Sones**, R. Block. "Novel X-Ray Source At The RPI LINAC," American Nuclear Society 2002 Annual Meeting, Hollywood, FL, ANS Transactions vol. 86, p. 185 (2002).
3. Invited Presentations and Conference Activities.
- (a) November 2006, Panel Member and Keynote Speaker, Technology in the Classroom, Northeast Wiley Faculty Network Conference, "Innovation in the Physics Classroom-Increasing Motivation and Mastery," Rensselaer Polytechnic Institute, Troy, NY.
 - (b) May 2006, Presentation, "West Point 'on point' for the Army and the Nation: two centuries of service in peace and war," Proceedings of the 13th Hwarangdae International Symposium and Commemoration of the 60th Anniversary of the Founding of the Korean Military Academy, Seoul, Korea.
 - (c) April 2006, Chairman, Session on Materials Science and Engineering, American Nuclear Society National Student Conference, "Nuclear Power: a look at the future," Rensselaer Polytechnic Institute, Troy, NY.
 - (d) August 2003, Presentation, "Experiments with a LINAC Generated Quasi-Monochromatic Parametric X-rays Source," Workshop for Medical and Biological Imaging with Novel X-ray Beams, Idaho Accelerator Center, Pocatello, ID.
4. Scholarly and Academic Community Service.
- (a) Physics textbook acknowledged reviewer, Randall Knight's Physics for Scientists and Engineers with Modern Physics: A Strategic Approach, 2nd edition, Addison Wesley Publishing.
 - (b) Physics textbook acknowledged reviewer, Karen Cummings, et. al., Understanding Physics, 2nd edition, Wiley Publishing.
 - (c) Grant proposal reviewer, US Civilian Research Development Foundation, a National Science Foundation established public-private partnership to promote international scientific and technical collaboration, primarily between the United States and Eurasia, through grants, technical resources, and training.
5. Academic Presentations and Posters. (Note: duplication of ANS meeting presentations and refereed proceedings listed above in 4.b. above are highlighted with an asterisk.)
- (a) August 2008, Presentation, "Feasibility studies of Parametric X-rays use in a Medical Environment," 20th International Conference on the Application of Accelerators in Research and Industry (CAARI-2008), Fort Worth, TX.
 - (b) *June 2008, Presentation, "Experiments with relativistic electrons producing tunable X-rays from Cu crystals" American Nuclear Society Annual Meeting, Anaheim, CA.
 - (c) August 2007, accepted Poster Presentation, "Projection of physics studies outside of the science building: a use of institutional resources to promote science in places your would

BRYNDOL A. SONES (cont'd)

- least expect it," American Association of Physics Teachers Summer Meeting, Greensboro, NC.
- (d) *June 2007, Presentation, "Thin metallic crystals for Parametric X-ray (PXR) production," American Nuclear Society Annual Meeting, Boston, MA.
 - (e) April 2007, Poster Presentation, "Comparative Essays on Physics: An interdisciplinary trial to incorporate physics readings in a composition course at West Point," NY State chapters of the American Physical Society and the American Association of Physics Teachers, West Point, NY.
 - (f) August 2006, Presentation, "Production and application of a novel energy-tunable x-ray source at the RPI LINAC," 19th International Conference on the Application of Accelerators in Research and Industry (CAARI-2006), Fort Worth, TX.
 - (g) *July 2006, Presentation, "How technology and dormitory climate can affect student performance," American Association of Physics Teachers Summer Meeting, Syracuse, NY.
 - (h) *June 2005, Presentation, "The effects of electron scattering on the absolute Parametric X-ray (PXR) yield calculations," American Nuclear Society Annual Meeting, San Diego, CA.
 - (i) *June 2005, Presentation, "Assessment of student analytical processing in written laboratory reports," American Association of Physics Teachers Summer Meeting, Salt Lake City, UT.
 - (j) *June 2004, Presentation, "Novel X-Ray Imaging Opportunities for the RPI Linear Accelerator's Tunable, Quasi-monochromatic X-ray Source," American Nuclear Society Annual Meeting, Pittsburgh, PA.
 - (k) *November 2003, Presentation, "LiF Crystal Advantages in Parametric X-Ray (PXR) Production," American Nuclear Society Annual Meeting, San Diego, CA.
 - (l) September 2003, Poster in absence, "*Lithium Fluoride (LiF) Crystals for Parametric X-Ray (PXR) Production*," Bi-Annual Meeting, Radiation from Relativistic Electrons in Periodic Structures, RREPS 03, Tomsk, Russia.
 - (m) August 2003, Presentation, "*Experiments with a LINAC Generated Quasi-Monochromatic Parametric X-rays Source*," Workshop for Medical and Biological Imaging with Novel X-ray Beams, Idaho Accelerator Center, Pocatello, ID.
 - (n) *June 2003, Presentation, "*Advances in Parametric X-rays (PXR) Production at the RPI LINAC*," American Nuclear Society Annual Meeting, San Diego, CA.
 - (o) March 2003, Poster, "*Experimental Studies of Relativistic Electron Interactions with Single Crystals*," Accepted Graduate Student Day, Rensselaer Polytechnic Institute, Troy, NY.
 - (p) *June 2002, Presentation, "Optimization of *Parametric X-rays (PXR) Production*," American Nuclear Society Annual Meeting, Hollywood, FL.
 - (q) May 2002, Presentation, "*Experimental Methods for Optimization of Parametric X-rays (PXR)*," MANE Graduate Student Conference, Rensselaer Polytechnic Institute, Troy, NY.
 - (r) March 2000, Presentation, "*Quantitative student assessment in the design of examinations*," USMA Center for Teaching Excellence Symposium, West Point, NY.
 - (s) January 2000, Poster, "*Modeling the flight of a missile*," American Mathematical Society Meeting, Washington, DC.
 - (t) April 1986, Presentation, "*Tests of an indium antimonide infrared detector array for ship-based missile detection*," Student Optics Conference, University of Rochester, Rochester, NY.

AWARDS AND ACHIEVEMENTS

1. Military.

BRYNDOL A. SONES (cont'd)

- (a) Defense Meritorious Service Medal, Meritorious Service Medal (3), Ranger, Expert Infantryman's Badge, Airborne, Air Assault.
 - (b) Infantry Officer's Advanced Course, Commandant List, 1991.
 - (c) Fort Dix MacArthur Leadership Award, 1990.
2. Scientific.
- (a) American Nuclear Society:
 - Best Paper in Session, ANS Summer Meeting, 2004.
 - Best Paper in Session, ANS Summer Meeting, 2002.
 - (b) Rensselaer Polytechnic Institute, Graduate School
 - Founder's Award For Excellence , 2003. For recognition within top 10% of school, leadership, demonstration of excellent originality and imagination that may be evidenced by the potential to solve problems and possess skills to promote new ideas and theories in his/her field of study.
3. Service.
- (a) Pacific Grove High School: Alumni Hall of Fame, 2008.
 - (b) Boy Scouts of America: Explorer Advisor Award of Merit, 1990.

SOCIETIES AND ORGANIZATIONS

American Association of Physics Teachers
American Nuclear Society
Association of the United States Army
Alpha Nu Sigma
Phi Kappa Phi
Society of Physics Students

TRAINING AND RADIOISOTOPE EXPERIENCE

Bryndol A. Sones

I. EDUCATION

B.S. in Engineering Physics from United States Military Academy, West Point, NY, 1987
M.S. in Atomic Physics, Massachusetts Institute of Technology, Cambridge, MA, 1997
Ph.D. in Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY, 2004

II. TRAINING

Training and experience at Rensselaer Polytechnic Institute using a 60-MeV electron accelerator to produce energy tunable x-rays under the supervision of Dr. Yaron Danon, PhD, and at the United States Military Academy using a Co-57 source for the Mossbauer Experiment under the supervision of the COL(R) Thomas Lainis, PhD, and with MAJ David Phillips, RSO, developing radiation safety procedures for cadet nuclear engineering experiments.

Area 1: Radiation Protection Principles
Area 2: Characteristics of Ionizing Radiation
Area 3: Units of Radiation Dose and Quantities
Area 4: Radiation Detection Instrumentation
Area 5: Biological Hazards of Exposure to Radiation
Area 6: Hands-on Use of Radioactive Materials

<i>AREAS</i>	<i>LOCATION OF TRAINING</i>	<i>DATE/DURATION</i>	<i>TYPE OF TRAINING</i>
1-4, 6	United States Military Academy, NY	2004-2008	Class/Experiments
1-6	Department of Nuclear Engineering, Rensselaer Polytechnic Institute, NY	2001-2004	Lab/Research
1-4, 6	United States Military Academy, NY	1986-1987, 1997-2000	Class/Experiments

III. EXPERIENCE WITH ISOTOPES

ISOTOPE	MAXIMUM ACTIVITY	DATE/DURATION	TYPE OF EXPERIENCE
Cs-137	30 mCi	Sep 1986 10 hr	Compton Scattering Experiment
Co-57	5 mCi	Various Dates 1997-2000 30 hr	Mossbauer Experiment
Am-241	25 mCi	Various Dates 2001-2004 30 hr	XRF and X-ray Detector Calibration
60 MeV Electrons	50 mR/H	Various Dates 2001-2004 100 hr	Experimental work in the RPI LINAC target room
U-235	10 mR/H	Jan-May 2002 20 hrs	Class at RPI Reactor

Encl 4

This is to acknowledge the receipt of your letter/application dated

1/21/2009, and to inform you that the initial processing which includes an administrative review has been performed.

☒ AMEND. 31-02102-02
There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

☐ Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 143230.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.