VALPARAISO
UNIVERSITY

DEPARTMENT OF PHYSICS AND ASTRONOMY

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030-00701

COLLEGE OF
ARTS & SCIENCES
NEILS SCIENCE CENTER
VALPARAISO UNIVERSITY
VALPARAISO, INDIANA
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TELEPHONE 219 464 5369
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Licensing Branch
The U. S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

SUBJECT: RENEWAL OF LICENSE NUMBER 13-06711-01

I have enclosed the application for renewal of license number 13-06711-01, following the guidelines published in NUREG 1556 Vol. 7.

If there are questions or suggestions, please contact me. e-mail is an efficient means of communication; my address is noted below.

Sincerely,

Donald D. Koetke

Donald D. Koetke
Professor of Physics
Department Chair

e-mail: donald.koetke@valpo.edu
phone: 219-464-5377
FAX: 219-464-5489

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JUL 31 2000

NRC FORM 313 (5-1997)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

U. S. I .EAR REGULATORY COMMISSION

APPROVED B\ : NO. 3150-0120 EXPIRES: 7/31/1999

Estimated burden per response to comply with this information collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Forward comments regarding burden estimate to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0120), Office of Management and Budget, Washington, DC 20503. NRC may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a curently valid OMB control number.

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

ATLANTA FEDERAL CENTER
U. S. NUCLEAR REGULATORY COMMISSION, REGION II
61 FORSYTH STREET, S.W., SUITE 23T85
ATLANTA, GEORGIA 30303-3415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*
   - [ ] A. NEW LICENSE
   - [ ] B. AMENDMENT TO LICENSE NUMBER _____
   - [X] C. RENEWAL OF LICENSE NUMBER 13-06711-01

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip code)*
   VALPARAISO UNIVERSITY
   DEPARTMENT OF PHYSICS & ASTRONOMY
   VALPARAISO IN 46383

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED
   DEPARTMENT OF PHYSICS & ASTRONOMY
   NEILS SCIENCE CENTER ROOMS 129/130
   VALPARAISO UNIVERSITY
   VALPARAISO IN 46383

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
   Dr. Donald D. Koetke

   TELEPHONE NUMBER
   219 464-5377

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL.
   a. Element and mass number; b. chemical and/or physical form; and c. maiximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
    FEE CATEGORY Exempt 171.11(A)(1) | AMOUNT ENCLOSED $ -0-

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OFJUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
CHARLEY E GILLISPIE,Vice Pres for Admin & Fin	Charley E Gillispie	7.28.00

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

NRC FORM 313 (5-1997)

PRINTED ON RECYCLED PAPER

License Renewal: 13-06711-01
Item #5 and Item #6

Radioisotope	Chemical/Physical Form	Maximum Possession Limit	SSD Number	**Purpose for which material will be used:** (All nuclides are used in undergraduate education.)
Americium-241	Electroplated on platinum planchette (Ortec Model No. AM-1C)	0.1 millicurie	TN-274-D-101-S	Alpha source for studying properties of alpha particles
Americium-241	Sealed source (NEN Model No. NER 476A)	One source not to exceed 400 millicuries	NR-476-S-138-S	Photon irradiation/excitation source for EDXRF
Cesium-137	Sealed photon source (Nuclear Chicago Corp. Model No. 850233)	25 millicuries	NR-634-S-828-S	Photon source for photon scattering experiments
Cesium-137	Sealed photon check (button) sources: obtained from The Nucleus/Oxford/Canberra	20 microcuries - not to exceed 10 microcuries/source	No SSD - NUREG 1556 V3 Sec 5.1.1	Photon source for detector calibration and for study of photon properties.
Cesiuum-137	Sealed photon source (Ohmart Model No. A-2102 or 236C)	One source not to exceed 200 millicuries	NR-522-S-876-S	Photon irradiation source for Compton Scattering Expt.
Cobalt-60	Sealed photon check (button) sources - obtained from The Nucleus/Oxford/Canberra	20 microcuries - not to exceed 10 microcuries/source	No SSD - NUREG 1556 V3 Sec 5.1.1	Photon source for detector calibration and for study of photon properties.
H-3	Tritium-Zirconium or Tritiated Titanium Targets - bonded/non-volatile - Amersham Corp.,	25 curies	TX-634-D-160-S	Used to generate 14 MeV neutrons In Texas Nuclear neutron generator via (d+T) reaction

License Renewal: 13-06711-01
Item #5 and Item #6

Radioisotope	Chemical/Physical Form	Maximum Possession Limit	SSD Number	**Purpose for which material will be used:** (All nuclides are used in undergraduate education.)
Ruthenium-106	Sealed photon check (button) sources - obtained from Canberra or Isotope Products	10 microcuries	No SSD - NUREG 1556 V3 Sec 5.1.1	Photon source to study the angular correlation of the photons emitted in the decay of this nuclide
Plutonium	Plated alpha sources	6 micrograms	NR-277-S-801-U	Alpha source for studying nuclear structure of plutonium
Plutonium-239	5 Encapsulated Pu-Be Sources (Monsanto sources M135, M136, M137, M138, M139)	80 grams	NR-466-S-803-U	Source of neutrons for irradiation of foils and for the study of neutron properties
Strontium-90	Custom made source - Isotope Products Laboratory: SrTiO4 in Ag matrix (source number 150-84, 8 mCi, 12.1.85)	Deposited on metal backing: 10 millicuries	No SSD - Custom made source	For use in beta spectrometer; study properties of beta decay

Item No.	Suggested Response	Yes	Description Attached
5.	**RADIOACTIVE MATERIAL**		
	Unsealed and/or Sealed Sources		
	• For unsealed materials:	✳	
	– Provide element name with mass number, chemical and/or physical form, and maximum requested possession limit.		[✓]
	– For potentially volatile materials (e.g., I-125, I-131, H-3), specify whether the material will be free (volatile) or bound (non-volatile) and the requested possession limit for each form.		[✓]
	• For sealed materials:		
	– Identify each Radionuclide (element name and mass number) that will be used in each source.	✳	
	– Provide the manufacturer's (distributor's) name and model number for each sealed source and device requested.		
	– Confirm that each sealed source, device, and source/device combination is registered as an approved sealed source or device by NRC or an Agreement State.		
	– Confirm that the activity per source and maximum activity in each device will not exceed the maximum activity listed on the approved certificate of registration issued by NRC or by an Agreement State.		
	• Provide an Emergency Plan (if required).		
	Financial Assurance and Recordkeeping for Decommissioning		
	No response is needed from most applicants. If F/A or a DFP is required, submit the required documents as described in Regulatory Guide 3.66.	N/A	[ ]
6.	**PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED**		
	List the specific use or purpose of each radioisotope.	✳	[✓]

Item No.	Suggested Response	Yes	Description Attached
7.	**INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE**		
	RSO		
	Provide the name of the proposed RSO and information demonstrating that the proposed RSO is qualified by training and experience.	*	[✓]
	AUs		
	Provide the name of each proposed AU, with the types and quantities of licensed material to be used. Also provide information demonstrating that each proposed AU is qualified by training and experience to use the requested licensed materials.	*	[✓]
8.	**TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS (Occupationally Exposed Individuals and Ancillary Personnel)**		
	Submit a description of the radiation safety training program, including topics covered, groups of workers, assessment of training, qualifications of instructors, and the method and frequency of training.	*	[✓]

Item No.	Suggested Response	Yes	Description Attached
9.	**FACILITIES AND EQUIPMENT** Describe the facilities and equipment to be made available at each location where radioactive material will be used. Include a description of the area(s) assigned for the receipt, storage, preparation and measurement of radioactive materials. Submit a diagram showing the locations of shielding, the proximity of radiation sources to unrestricted areas, and other items related to radiation safety. When applicable to facilities where radioactive materials may become airborne, the diagrams should contain schematic descriptions of the ventilation systems, with pertinent airflow rates, pressures, filtration equipment, and monitoring systems. Diagrams should be drawn to a specified scale, or dimensions should be indicated. For facilities where it is anticipated that more than one laboratory or room may be used, a generic laboratory or room diagram may be submitted.	*	[✓]
10.	**RADIATION SAFETY PROGRAM** **Audit Program** The applicant is not required to, and should not, submit its audit program to the NRC for review during the licensing phase.	N/A	N/A

Item No.	Suggested Response	Yes	Description Attached
10.	**RADIATION SAFETY PROGRAM** ***(Cont'd)***		
	Radiation Monitoring Instruments	*	
	Describe the instrumentation that will be used to perform required surveys and state that: "We will use instruments that meet the radiation monitoring instrument specifications published in Appendix M to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. We reserve the right to upgrade our survey instruments as necessary."		[✓]
	OR		
	Describe the instrumentation that will be used to perform required surveys and state that: "We will use instruments that meet the radiation monitoring instrument specifications published in Appendix M to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. Additionally, we will implement the model survey meter calibration program published in Appendix M to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. We reserve the right to upgrade our survey instruments as necessary."		[ ]
	Material Receipt and Accountability		
	Develop and maintain procedures for ensuring material accountability,		
	AND		
	State that: "Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license."	*	[✓]

Item No.	Suggested Response	Yes	Description Attached
10.	**RADIATION SAFETY PROGRAM** ***(Cont'd)***		
	Occupational Dose		
	State that: "we have done a prospective evaluation and determined that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20," or "we will monitor individuals in accordance with the criteria in the section entitled 'Radiation Safety Program - Occupational Dose' in NUREG - 1556, Vol. 7, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Academic, Research and Development and Other Licenses of Limited Scope,'" dated December 1999."	*	[✓]
	Public Dose		
	No response is required from the applicant in a license application.	N/A	N/A
	Safe Use of Radionuclides and Emergency Procedures		
	Develop and maintain procedures for safe use and emergencies. State that such procedures have been developed.	*	[✓]
	If an emergency response plan is needed, submit it as a separate part of the application.	[ ]	[ ]

Item No.	Suggested Response	Yes	Description Attached
10.	**RADIATION SAFETY PROGRAM** ***(Cont'd)***		
	Survey	*	
	State that: "We will survey our facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in Appendix Q to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. Leak tests will be performed at the intervals approved by NRC or an Agreement State and specified in the SSD Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services to other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the sealed source or plated foil manufacturer's (distributor's) and kit supplier's instructions."	[✓]	[•]

Item No.	Suggested Response	Yes	Description Attached
10.	**RADIATION SAFETY PROGRAM** ***(Cont'd)***		
	OR		
	State that: "We will survey our facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in Appendix Q to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. Leak tests will be performed at the intervals approved by NRC or an Agreement State and specified in the SSD Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services to other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the sealed source or plated foil manufacturer's (distributor's) and kit supplier's instructions. As an alternative, we will implement the model leak test program published in Appendix R to NUREG - 1556, Vol. 7, "Consolidated Guidance about Materials Licenses: 'Program-Specific Guidance About Academic, Research and Development, and Other Licensees of Limited Scope,' dated December 1999."	[ ]	
	Transportation		
	No response is needed from applicants during the licensing phase.	N/A	N/A

Item No.	Suggested Response	Yes	Description Attached
10.	**RADIATION SAFETY PROGRAM** ***(Cont'd)***		
	Minimization of Contamination		
	The applicant does not need to provide a response to this item under the following condition. NRC will consider that the above criteria have been met if the applicant's responses meet the criteria in the following sections: "Radioactive Material - Unsealed and/or Sealed Sources," "Facilities and Equipment," "Radiation Safety Program - Safe use of Radioisotopes and Emergency Procedures," "Radiation Safety Program - Surveys," and "Radiation Safety Program - Waste Management."	N/A	N/A
11.	**WASTE MANAGEMENT**	*	
	State that: "We will use the model waste procedures published in Appendix T to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999."	[✓]	[ ]
	OR		
	"We will use the (*specify either (1) Decay-In-Storage, (2) Disposal of Liquids Into Sanitary Sewerage*) model waste procedures that are published in Appendix T to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999."	[ ]	

Item No. 7: Individuals Responsible for Radiation Safety Program and Their Training and Experience.

RSO: Dr. Donald D. Koetke

Training and Experience:

Dr. Koetke has completed radiation safety training numerous times at Argonne National Laboratory, the Los Alamos National Laboratory, Fermilab, and the Brookhaven National Laboratory, dating back to 1966 and continuing to this time. This training included DOE approved topics: sources of radiation, radiation measurement units, methods of reducing exposure and absorbed dose, methods of measurement of radiation exposure and absorbed dose, conversions to absorbed dose equivalent, ICRP, NCRP, NRC guidelines for radiation exposure limits, safe handling of radioactive materials, responsible reporting of incidents and violations, and more. Dr. Koetke has a Ph.D. in nuclear and elementary particle physics and therefore has a deep understanding of the physics of radiation sources, radiation interactions with matter, including living organisms, radiation shielding, and radiation measurements. He has been a researcher in nuclear and particle physics for over 35 years. At Valparaiso University, he has taught nuclear physics and nuclear and radiation physics laboratory courses for over 23 years. As part of this teaching, he instructs students in matters of radiation protection (see response to Item No. 8) based on texts in the field including the "Radiation Safety Technician Training Course" by Moe, Lasuk, et al., (1972). Dr. Koetke has also been employed on the scientific staff at Argonne National Laboratory to teach radiation detection, measurements, and analysis in the Division of Educational Programs. Dr. Koetke has received individual training in radiation safety, especially as applied to sources of neutrons and has further been trained in reactor use and safety at the Argonne National Laboratory.

AUTHORIZED USERS: Dr. Donald D. Koetke, Dr. Shirvel Stanislaus, Mr. Paul Nord, Valparaiso University physics students.

Source use and limitations:

Dr. Koetke is authorized to use all of the licensed sources in amount approved in the license, 13-06711-01.

Dr.Shirvel Stanislaus is authorized to use all of the licensed sources in amount approved in the license, 13-06711-01.

Mr.Paul Nord is authorized to use only the photon sources) in amounts approved in the license, 13-06711-01, specifically: Cs-137 (Ohmart source 200 mCi), Cs-137 (10 microCi "button" source), Co-60 (10 microCi "button" source), and Am-241 (photon source as mounted on Si(Li) detector assembly 400 mCi). He is also authorized to use the), Am-241 (alpha 0.1 mCi). Sr-90 (beta 8 mCi), and Ru-106 (10 microCuries)– only under the direct supervision of Dr. Donald D. Koetke or Dr. Shrivel Stanislaus.

Valparaiso University physics students enrolled in physics courses taught by Dr. Koetke and/or Dr. Stanislaus may use each of the following sources in the in amounts approved in the license, 13-06711-01, specifically: Cs-137 (Ohmart source 200 mCi), Cs-137 (10 microCi "button" source), Co-60 (10 microCi "button" source), and Am-241 (photon source as mounted on Si(Li) detector assembly 400 mCi), Am-241 (alpha 0.1 mCi). Sr-90 (beta 8 mCi), and Ru-106 (10 microCuries)– only under the direct supervision of Dr. Donald D. Koetke or Dr. Shrivel Stanislaus.

Training and Experience:

Dr. Donald D. Koetke: Please see the relevant material provided for the RSO section above which obviously applies here as well.

Dr. Shirvel Stanislaus: Dr. Stanislaus has a Ph. D. in nuclear physics and has been an active researcher in nuclear physics for over 12 years. He has successfully passed the required radiation safety training at the TRIUMF accelerator facility, at the Los Alamos National Laboratory, and at the Brookhaven National Laboratory on numerous times. These were the same tests noted above for Dr. Koetke and covered the same material. Locally, Dr. Stanislaus has been trained by Dr. Koetke in the safe use of the specific sources noted in the license 13-06711-01.

Mr. Paul Nord: Mr. Nord has a B.S. degree in physics from Valparaiso University (1991) and has been a full time employee at Valparaiso University since that time, with the title, Technical Specialist. Among his many duties is the responsibility to assist in laboratory setup and maintenance and this extends to the nuclear physics laboratories (see Item No. 9). Mr. Nord has taken all of the nuclear physics and radiation detection, measurements, and analysis courses as a student. He has also been personally trained by Dr. Koetke in the safe handling of the sources noted above. Mr. Nord's use of these sources is with the prior approval of Dr. Koetke or Dr. Stanislaus in each case.

Valparaiso University physics students: Valparaiso University students enrolled in physics courses, specifically PHYS-345, PHYS-430L, and PHYS-445 may use those sources noted above only under the direct supervision of Dr. Koetke or Dr. Stanislaus. These students have first been trained in radiation safety (see Item No. 8) and their work with the sources is closely monitored.

Item No. 8: Training for Individuals Working in or Frequenting Restricted Areas (Occupationally Exposed Individuals and Ancillary Personnel)

Training Program:

Valparaiso University Physics Students: All students who are to work in the restricted areas, rooms NSC 129 or NSC 130 (designated below as 129/130) are first required to attend a 3 hour class on radiation and radiation safety. This class is taught by Dr. Donald D. Koetke, the designated RSO and Professor of Physics at Valparaiso University. The class consists of lecture, demonstration, and practice on the part of the students. The students are then quizzed on their knowledge. Demonstrations are done with radiation detection equipment (calibrated survey meters) to show how they work and how they are to be used (and not used) and how to read and record the measurements. Students are then asked to use the instruments to take prescribed measurements to demonstrate that they understand the use of the instruments because they will use these in their work in 129/130 regularly. At the beginning of each laboratory period, Dr. Koetke or Dr. Stanislaus acquaints the students with the sources of radiation for the experiment they will be doing that laboratory period and discusses the possible hazards of each. Every effort is made to impress the student with the need to be cautious and responsible in the laboratory, especially when in proximity to radioactive sources. A copy of the "The Rules and Regulations for the Nuclear Physics Laboratory" is given to each student and these rules and regulations are gone over in the radiation safety class. (See last paragraph in this Item No.8.) Violations of "The Rules and Regulations" will warrant immediate action which may include expulsion from the laboratory for that laboratory class or for a longer period of time. During each laboratory period, the students' activities in 129/130 are monitored to be sure they follow prescribed radiation safety practices.

Mr. Paul Nord: Mr. Nord has been through the radiation safety training class as a student and has participated along with students in the PHYS-345 class several times since he has become a full time employee. He is supervised by Dr. Koetke and/or Dr. Stanislaus and is reminded of proper radiation safety procedures for the tasks he is asked to do.

Custodial Support Staff: The custodial support staff is limited to a selected person who, when he/she is to work in the laboratory to clean, is supervised by Dr. Koetke or Dr. Stanislaus who review safety procedures, proscribe boundaries for cleaning and movement, and monitor the work. Areas that are deemed potentially hazardous are pointed out and marked or roped off to prevent access by the custodial support staff. There is no other formal radiation safety training because these entries are infrequent and each is supervised.

Topics covered:

All students in the courses in which they will be working in 129/130 have previously successfully completed PHYS-243, a second year college course in the physics of atoms, nuclei, and the solid state. This includes a study of radiation, sources of radiation, properties of radiation (charge, electromagnetic radiation, interaction with matter, etc.) and quantitative problem solving to demonstrate their understanding of these concepts. These are briefly reviewed in the radiation safety class.

Topics related to radiation safety not covered in PHYS-243 and are stressed in this radiation safety class. Students are referred to the manual, "Radiation Safety Technician Training Course" by Moe, Lasuk, et al., and sections of this manual are photocopied for the student's reading and reference. Other texts on radiation safety which are available in the University Library are also noted.

The emphasis in this radiation safety class is on radiation measurement units, methods of reducing exposure and absorbed dose, methods of measurement of radiation exposure and absorbed dose, conversions to absorbed dose equivalent, SI units for radiation measurement and reporting, ICRP, NCRP, NRC guidelines for radiation exposure limits, safe handling of radioactive materials, biological consequences of radiation, and responsible reporting of incidents and violations. The ALARP principle is stressed to motivate students to take measures to reduce unnecessary radiation exposures. Students are acquainted with those relevant sections from the 10 CFR which govern the safe use of radiation, allowable limits on source activity, www sites for such information, and are given exercises to use the www to find the information requested. Radiation warning signs are shown and their significance is discussed. It is emphasized throughout the instruction that, while it is the duty of the instructor/supervisor to do everything reasonable to assure their radiation safety, it is ultimately the student's responsibility to make the radiation safety measurements in the areas in which they will be working to convince themselves that the area is acceptably safe, that is, radiation exposures are within acceptable limits. Their measurements are recorded on a chart.

Frequency of Training:

The requisite course sequence in the curriculum places PHYS-345 before PHYS-430L and before PHYS-445. Therefore, the most complete training as described above is done at the beginning of the semester in which the student is enrolled in PHYS-345, a laboratory course in radiation detection, measurements, and analysis. At the start of

PHYS-430L, a review is done to remind students of what they learned in the radiation safety class in PHYS-430L because as much as 12 months may have elapsed between the conclusion of PHYS-345 and the start of PHYS-430L. Again, students are reminded of their responsibility to make the radiation safety measurements, to record these, and to make appropriate judgments of the radiation safety in the areas in which they work.

Instructor and Qualifications:

The instructor is Dr. Donald D. Koetke, the designated RSO. His qualifications have been detailed in the response to Item No. 7 and are deemed entirely adequate for these instructional responsibilities.

Formal Statement of "The Rules and Regulations for the Nuclear Physics Laboratories" is posted at the entrance to the nuclear physics laboratory for all entering personnel to see. In addition, these are given to each student who will be working in the laboratory and are part of the overall radiation safety they receive at the start of a new semester.

Item No. 9: Facilities and Equipment

Radioactive materials under this license and the accelerator/neutron-generator described below are housed in the nuclear physics laboratories of the Valparaiso University Neils Science Center, rooms NSC 129 and NSC 130 (referred to as 129/130). The referenced materials are used exclusively in these laboratory rooms.

The laboratory consists of three rooms. The room housing the accelerator/neutron-generator measures 7.46 m x 6.15 m x 5.41 m high. Entrance to this room is possible only through a doorway whose entrance can be blocked by a 40.6 cm thick steel and concrete door. The walls of this room are 1.52 m thick constructed of approximately 1 m of concrete and 0.5 m of sand. A ventilated fume hood is located in the corner of the room. Personnel are admitted to this room only with the approval of Dr. Donald Koetke or Dr. Shirvel Stanislaus.

Adjacent to the accelerator room (130-b)is the control room which measures 9.14 m x 4.54 m x 2.69 m high. This room houses the accelerator control panel, the vault used for storage of radioactive materials, and electronics, detectors, and computers for measurement radioactivity. Also located at the entrance to this room are the radiation safety monitoring instruments which may be easily accessed for radiation safety monitoring.

Both rooms have a non-recirculating air handling system by which the heated or cooled air from the building air handling system flows though the rooms, leaving the rooms through a large exhaust fan vented to the outside through a six inch HEPA filter. The air in the rooms is exhausted continuously such that there is an entire change of the air in the rooms every 7.5 minutes.

Tritium targets are kept in sealed containers and stored under the fume hood in the reactor room when not installed in the neutron generator. Thr fume hood iskept locked and can be opened by Dr. Koetke or Dr. Stanislaus. The ~25 mCi Cs-137 source and the Sr-90 beta source are kept under a fume hood in room 129-b, the door to which is locked with a special security lock. The ~200 mCi Cs-137 source is kept in room 130-b in the location shown on the drawing for use in the Compton scattering experiment mounted on the table shown. This source container is bolted to the table and is kept locked in the closed position with a padlock when not in use. This padlock canbe opened only by Dr. Koetke or Dr. Stanislaus when needed in the instructional program. The Am-241 photon excitation source is kept mounted on the Si(Li) detector in room 129-b, which assembly is enclosed in a Pb lined enclosure. The Pu-Be sources are kept in a 55 gallon drum,

specially constructed inside to accommodate the five sources in individual sealed tubes, each of which is immersed in water. The drum is kept full of water at all times. The sources may be removed (only by Dr. Koetke or Dr. Stanislaus) individually for use in experiments and for leak testing. The radiation levels outside the drum are monitored before each use of the sources and determined to be acceptably low for safe access. At no time do these sources leave room 130-b. All other licensed sources as well as all of the exempt radioactive sources are kept locked and inventoried in the vault in room 130 as noted on the drawing. Access to room 130 (and 130-b) is controlled by the door to the hallway. This door is locked with a special security lock which is opened only by Dr. Koetke, Dr. Stanislaus, or Mr. Paul Nord, the latter acting under authorization from Dr. Koetke or Dr. Stanislaus. Copies of the keys to rooms 130 and 129-b are kept in the office of the Vice President for Business Affairs. A copy of the keys are kept in the lock-box on the exterior of the building for use by authorized emergency personnel. (See response to Item No. 10.)

The laboratory in room 130 contains a series of interlocking connections which must be satisfied prior to the operation of the accelerator/neutron-generator. Scram switches are located in room 130-b in easy access from any point on the perimeter of the room. These are kept in the open position unless operation of the accelerator/neutron-generator is imminent. Operation of the accelerator/neutron-generator requires that the large steel and concrete door be closed to room 130-b after all personnel are evacuated whenever the accelerator is to accelerate deuterium ions. Warning lights indicating the operation of the accelerator/neutron-generator are located in the control room, room 130-b, and the hallway outside room 130.

A drawing of the nuclear physics laboratory is enclosed with this report. Shown on the drawing is the location of the radiation sources noted above. Radiation surveys have been done on the perimeter of room 130-b under the most extreme conditions and found to be consistent with background radiation. Radiation levels one foot from the vault are consistent with room background. When the Cs-137 (~200 mCi) source is closed, external readings ~1 foot from the source are consistent with room background. When the source is open, the 0.662 MeV photons are collimated in a forward cone of opening angle ~15 degrees in the forward direction to irradiate a metal target. The forward area is roped off to prevent students from encountering the forward photon beam and students are directed to leave the room when exposures are being taken. At ~3 feet in the forward direction the exposure is ~200 mR/hr. Outside the beam, the radiation levels quickly fall to room background levels. Radiation levels outside the Pb-lined enclosure containing the Am-241 photon source and Si(Li) detector are consistent with background. The

radiation levels 1 foot from the Cs-137 (~30 mCi) source and the Sr-90 source stored under the fume hood are likewise consistent with background.

The "Rules and Regulations for the Nuclear Physics Laboratories" are posted at the entrance to the nuclear physics laboratory for all entering personnel to see. (See Item No. 8.)

Item No. 10: Radiation Safety Program

Radiation Monitoring Instruments

The following is the list of instruments used in radiation monitoring and radiation surveys.

Alpha Monitoring:

- Nuclear Chicago Photomultiplier tube equipped with XTA alpha crystal.
- ORTEC solid state Si surface barrier detectors used with ORTEC vacuum chamber, model 804. . This device is calibrated on each use for quantitative radiation safety measurements with ± 5% precision calibrated alpha sources.
- Argonne National Laboratory continuous flow gas proportional counter, scaler and power supply. This device is calibrated on each use for quantitative radiation safety measurements with ± 5% precision calibrated alpha sources.

Beta Monitoring:

- Nuclear Chicago photomutliplier tube equipped with XTB beta crystal.
- ORTEC solid satate Si surface barrier detectors used with ORTEC vacuum chamber model 804. This device is calibrated on each use for quantitative radiation safety measurements with ± 5% precision calibrated beta sources.
- Argonne National Laboratory continuous flow gas proportional counter, scaler and power supply. This device is calibrated on each use for quantitative radiation safety measurements with ± 5% precision calibrated beta sources.

Gamma/Beta Monitoring:

- Bicron Surveyor 2000 (200 mR/hr full scale)
- Warrington Laboratories, Inc., (Nuclear Chicago Model No. 2650) (100 mR/hr full scale)
- 2" x 2" NaI(Tl) detectors (with PMT) and MCA. This assembly is calibrated on each use for quantitative radiation safety measurements with ± 5% precision calibrated photon sources.
- Dosimeter Corporation of America pocket dosimeter (Gammas) model number 886; 200 mrem full scale.

- Landauer personal badge service. Each student working in the laboratory has an individually assigned badge which is worn in the laboratory at all time therein. Each staff person likewise wears an individually assigned badge when working in the laboratory, including (Dr. Koetke, Dr. Stanislaus, Mr. Nord, and the Custodial Service Employee.)

Neutron Monitoring:

- NRC Industries RemRad, South Hampton, PA (1000 mRem/hr full scale)
- Dosimeter Corporation of America pocket dosimeter (Thermal Neutrons Only) model number 609; 200 mrem full scale.
- Dosimeter Corporation of America pocket dosimeter (Fast Neutrons + Gammas) model number 884; 200 mrem full scale.
- Landauer personal badge service. Each individual who will be working near a source of neutrons will wear an individually assigned badge which will be neutron sensitive.

Airborne Tritium Monitoring:

- Atomic Accessories, Inc., Air Monitor – Tritium model TSM –91-B.

All radiation monitoring badges are stored immediately inside the entrance to the nuclear physics laboratory. Students entering the laboratory are required to clip their badge on their shirt and to sign in a log book showing all student activity in the laboratory. The students are required to sign out when they leave the laboratory.

Statement re radiation monitoring instruments: We will use instruments that meet the radiation monitoring instrument specifications published in Appendix M to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. We reserve the right to upgrade our survey instruments as necessary.

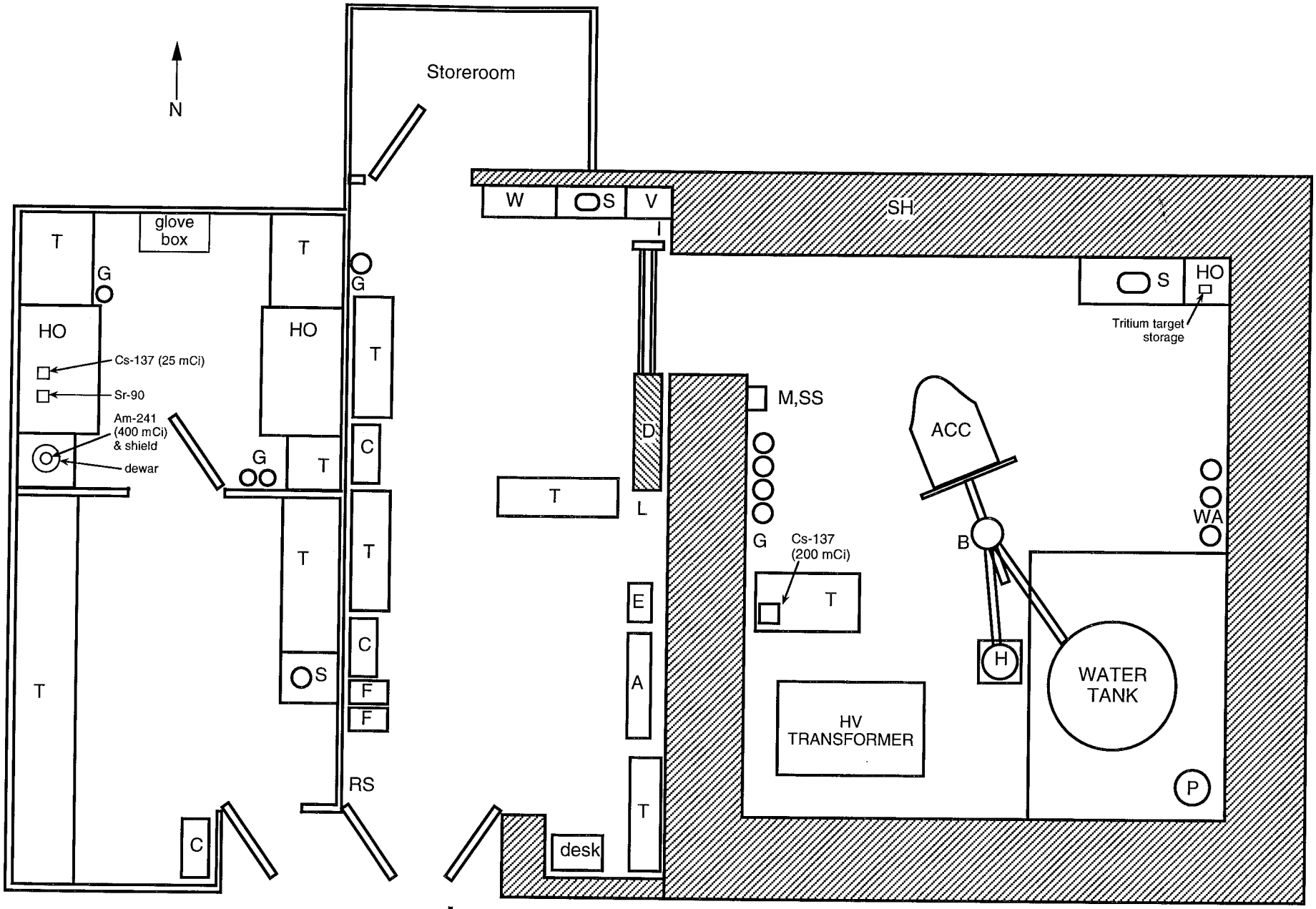
Statement re audit inventories: Physical inventories will be conducted at intervals not to exceed 6 months, to account for all sealed sources and devices received and possessed under the license.

Statement re personnel monitoring: We have done a prospective evaluation and determined that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20," or "we will monitor individuals in accordance with the criteria in the section entitled 'Radiation Safety

Program - Occupational Dose' in NUREG - 1556, Vol. 7, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Academic, Research and Development and Other Licenses of Limited Scope,'" dated December 1999."

Statement re safe use of radionuclides and emergency procedures: Procedures for safe use and for emergency response have been developed and will be available for inspection.

Statement re survey practices or procedures: We will survey our facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in Appendix Q to NUREG - 1556, Vol. 7, 'Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope,' dated December 1999. Leak tests will be performed at the intervals approved by NRC or an Agreement State and specified in the SSD Registration Certificate. Leak tests will be performed by an organization authorized by NRC or an Agreement State to provide leak testing services to other licensees or using a leak test kit supplied by an organization authorized by NRC or an Agreement State to provide leak test kits to other licensees and according to the sealed source or plated foil manufacturer's (distributor's) and kit supplier's instructions. As an alternative, we will implement the model leak test program published in Appendix R to NUREG - 1556, Vol. 7, "Consolidated Guidance about Materials Licenses: 'Program-Specific Guidance About Academic, Research and Development, and Other Licensees of Limited Scope,' dated December 1999.



Plan view of Nuclear Physics Laboratory
Valparaiso University
Neils Science Center rooms 129 and 130

Materials Index –
For plan view of Nuclear Physics Laboratory
Valparaiso University
Neils Science Center rooms 129 and 130

A	Accelerator Controls
ACC	300 keV Texas Nuclear Accelerator
B	Bending Magnet
C	Storage Cabinets
D	Steel and Concrete Movable Door
E	Electronics Rack
F	File Cabinets with Radiation Survey Instruments on top
G	Gas Bottles
H	High Vacuum Scattering Chamber
HO	Fume Hood
I	Door Interlock
L	Accelerator Operation Warning Lights
M	Tritium Monitor
P	PuBe Storage Bin
RS	Radiation Safety Film Badge Rack
S	Sinks
SH	Concrete and Sand Shielding
SS	Scram Switch
T	Laboratory Tables
V	Safe for Radioactive Sources
W	Workbench
WA	Water Treatment Tanks and Pump

VALPARAISO
UNIVERSITY

DEPARTMENT OF PHYSICS AND ASTRONOMY

August 1, 2000

Licensing Branch
The U. S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

COLLEGE OF
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physics@valpo.edu
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http://www.physics.valpo.edu

SUBJECT: RENEWAL OF LICENSE NUMBER 13-06711-01

I failed to include the attached page with my license application. This page is referenced in the application. Please append it to my application which you received on 31 July 2000.

I apologize for any inconvenience this may cause you.

Sincerely yours,

Donald D. Koetke

Donald D. Koetke
Professor of Physics
Department Chair

e-mail: donald.koetke@valpo.edu
phone: 219-464-5377
FAX: 219-464-5489

306780

AUG 4 2000

Rule and Regulations for the Nuclear Physics Laboratory

1) All coats and hats must be left outside the laboratory.
2) All individuals in the laboratory are required to sign in and out of the laboratory using the log book provided.
3) No eating, drinking or smoking is allowed in the laboratory at any time.
4) Personal radiation monitoring badges must be worn in the laboratory at all times. The badges must be returned to the rack in the laboratory when leaving the laboratory and they should not be taken out of the laboratory except for brief periods.
5) No visitors are allowed in the laboratory without the consent of the instructor in charge.
6) Radiation survey measurements must be taken at the beginning of each laboratory period in accordance with the instructions given by the instructor. The readings of the radiation levels must be recorded on the radiation survey report sheet.
7) Personnel are advised to wash their hands when leaving the laboratory at the end of the laboratory work and certainly prior to eating or drinking. Items such as pens and pencils should not be placed in the mouth.
8) No radioactive material is to leave the laboratory without the specific consent of the instructor.
9) Pay attention to all radiation warning signs and exercise due caution at all times when handling radioactive sources.
10) When working with unsealed sources it is advised to wear disposable gloves.
11) The use of radioactive liquids may only be done after specific written procedures are submitted to the instructor, reviewed, and approved.

INDIVIDUALS WHO DO NOT ADHERE TO THESE RULES AND REGULATIONS WILL BE REMOVED FROM THE LABORATORY

Valparaiso University
Department of Physics and Astronomy

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Valparaiso University
Department of Physics and Astronomy

VALPARAISO
UNIVERSITY

DEPARTMENT OF PHYSICS AND ASTRONOMY

14 December 2000

Ms. Toye Simmons
U.S. N.R.C, Region III Offices
801 Warrenville Road
Lisle, IL 60532-4351

COLLEGE OF
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WORLD WIDE WEB
http://www.physics.valpo.edu

Dear Ms. Simmons:

In response to the question about the activity of the electroplated ^{241}Am alpha source, the activity of that source is 0.12 μCi on 3/7/63. However, given the 433 yr halflife, this is still a good estimate of the activity.

In response to your request for further information on training practices and procedures for our technical staff and other support staff, I hereby certify that "we will follow the recommended 'Radiation Safety Training Topics' found in *NUREG-SR1556, Vol. 7, Appendix J*, emphasizing those topics which are pertinent to the individual's responsibilities in the nuclear physics laboratories at Valparaiso University."

Thank you for your telephone call referencing the aforementioned Appendix J. I have found that accessing the relevant NUREG's and the contents of Title 10 of the CFR is most easily done over the www. The server used for these purposes is remarkably fast and the organization is excellent, making the need to keep paper volumes in my office largely unnecessary. This also guarantees that I will access the most recently approved document.

Please feel free to contact me if there are further questions or concerns.

Best wishes for the coming holiday season.

Donald D. Koetke
Professor of Physics
Department Chair
Department of Physics and Astronomy

Donald.koetke@valpo.edu
http://www.physics.valpo.edu/faculty/dkoetke

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 03620
Status Code: 2
Fee Category: EX 3P
Exp. Date: 20000731
Fee Comments: 170.11(A)(4)
Decom Fin Assur Reqd: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
   Applicant/Licensee: VALPARAISO UNIVERSITY
   Received Date: 20000731
   Docket No: 3000701
   Control No.: 306780
   License No.: 13-06711-01
   Action Type: Renewal

2. FEE ATTACHED
   Amount: Ø
   Check No.:

3. COMMENTS

Signed D. A. Hersey
Date 8-14-2000

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /__/)

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:
   Amendment _____
   Renewal _____
   License _____

3. OTHER _____

Signed _____
Date _____