

NRC FORM 241 (7-1999) **U.S. NUCLEAR REGULATORY COMMISSION**

REPORT OF PROPOSED ACTIVITIES IN NON-AGREEMENT STATES, AREAS OF EXCLUSIVE FEDERAL JURISDICTION, OR OFFSHORE WATERS

(Please read the instructions before completing this form)

APPROVED BY OMB: NO. 2150-0013 **EXPIRES: 07/31/2002**
 Estimated burden per response to comply with this mandatory collection request: 15 minutes. This notification is required so that NRC may schedule inspection of the activities to ensure that they are conducted in accordance with requirements for protection of the public health and safety. Send comments regarding burden estimate to the Records Management Branch (7-6 ES), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to 6rs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0013), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. NAME OF LICENSEE (Person or firm proposing to conduct the activities described below) Western Kentucky University		2. TYPE OF REPORT <input type="checkbox"/> INITIAL <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> CLARIFICATION	
3. ADDRESS OF LICENSEE (Mailing address or other location where licensee may be located) Dept. Environmental Health & Safety 1 Big Red Way Bowling Green, KY 42101-3576		4. LICENSEE CONTACT AND TITLE Jonathan Paschal Computer Engineer	
		5. TELEPHONE NUMBER (Include Area Code) (270) 745-7095	6. FACSIMILE NUMBER (Include Area Code) (270) 745-5037

7. ACTIVITIES TO BE CONDUCTED UNDER THE GENERAL LICENSE GIVEN IN 10 CFR 150.20

WELL LOGGING LEAK TESTING AND/OR CALIBRATIONS TELETHERAPY/IRRADIATOR SERVICE

PORTABLE GAUGES OTHER (Specify) \Rightarrow Conduct evaluation on chemical weapons detection

RADIOGRAPHY \Rightarrow REGISTERED AS USER OF PACKAGING (CERTIFICATES OF COMPLIANCE NUMBERS)

8. CLIENT NAME, ADDRESS, CITY/COUNTY, STATE, ZIP CODE US Army SBCCOM Stan Gater BLDG E3566 APG-EA Maryland 21010		9. ACTUAL PHYSICAL ADDRESS OF WORK LOCATION (Street and Number or other location. Give as complete an address or directions as possible.) BLDG E3566, Aberdeen Proving Ground Maryland, 21010	
		10. CLIENT TELEPHONE NUMBER (Include Area Code) (401) 436-2321	11. WORK LOCATION TELEPHONE NUMBER (Include Area Code) (401) 436-2321

12. DATES SCHEDULED		13. NUMBER OF WORK DAYS	14. ADD	15. DELETE	16. LOCATION REFERENCE NUMBER
FROM	TO				NUMBER TO BE REVISION BY MONTH
	05/05/2002	05/08/2002	3		000 685

LIST ADDITIONAL WORK SITES ON SEPARATE SHEET(S) TO INCLUDE ALL INFORMATION CONTAINED IN ITEMS 9-16 ABOVE.

17. LIST RADIOACTIVE MATERIAL, WHICH WILL BE POSSESSED, USED, INSTALLED, SERVICED, OR TESTED (Include description of type and quantity of radioactive material, sealed sources, or devices to be used.)

No more than 6 Ci of tritium contained in two (2) sealed tube neutron generators manufactured by ThermoMFP Physics Model A-325-PH and Model A-320-4P, within PELAN device.

18. AGREEMENT STATE SPECIFIC LICENSE WHICH AUTHORIZES THE UNDERSIGNED TO CONDUCT ACTIVITIES WHICH ARE THE SAME, EXCEPT FOR LOCATION OF USE, AS SPECIFIED IN ITEM 9 ABOVE. (Four copies of the specific license must accompany the Initial NRC Form 241.)	LICENSE NUMBER 203-017-83	STATE KY	EXPIRATION DATE 07/31/2002
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19. CERTIFICATION (MUST BE COMPLETED BY APPLICANT)

I, THE UNDERSIGNED, HEREBY CERTIFY THAT:

- a. All information in this report is true and complete.
- b. I have read and understand the provision of the general license 10 CFR 150.20 reprinted on the instructions of this form; and I understand that I am required to comply with these provisions as to all byproduct, source, or special nuclear material which I possess and use in non-Agreement States or offshore waters under the general license for which this report is filed with the U.S. Nuclear Regulatory Commission.
- c. I understand that activities, including storage, conducted in non-Agreement States under general license 10 CFR 150.20 are limited to a total of 180 days in calendar year. With the exception of work conducted in off-shore waters, which is authorized for an unlimited period of time in the calendar year.
- d. I understand that I may be inspected by NRC at the above listed work site locations and at the Licensee home office address for activities performed in non-Agreement States or offshore waters.
- e. I understand that conduct of any activities not described above, including conduct of activities on dates or locations different from those described above or without NRC authorization, may subject me to enforcement action, including civil or criminal penalties.

CERTIFYING OFFICER - RSO or Management Representative (Name and Title) Mary J. Reynolds, RSO	SIGNATURE <i>Mary J. Reynolds</i>	DATE 05/02/2002
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WARNING: False statements in this certificate may be subject to civil and/or criminal penalties. NRC regulations require that submissions to the NRC be complete and accurate in all material respects. 18 U.S.C. Section 1001 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.

FOR NRC USE ONLY	REVIEWING OFFICIAL (Typed/Printed Name and Title) David J. Collins, Health Physicist	SIGNATURE <i>David J. Collins</i>	DATE 5/3/2002	TOTAL USAGE - DAYS TO DATE
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<p>NRC FORM 241 (7-1999)</p> <p style="text-align: center;">U.S. NUCLEAR REGULATORY COMMISSION</p> <p style="text-align: center;">REPORT OF PROPOSED ACTIVITIES IN NON-AGREEMENT STATES, AREAS OF EXCLUSIVE FEDERAL JURISDICTION, OR OFFSHORE WATERS</p> <p style="text-align: center;"><i>(Please read the instructions before completing this form)</i></p>		<p>APPROVED BY OMB: NO. 3150-0013 EXPIRES: 07/31/2002</p> <p>Estimated burden per response to comply with this mandatory collection request: 15 minutes. This notification is required so that NRC may schedule inspection of the activities to ensure that they are conducted in accordance with requirements for protection of the public health and safety. Send comments regarding burden estimate to the Records Management Branch (7-4 E9), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to 61st@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0013), Office of Information and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.</p>				
<p>1. NAME OF LICENSEE <i>(Person or firm proposing to conduct the activities described below)</i></p> <p style="text-align: center;">Western Kentucky University</p>		<p>2. TYPE OF REPORT</p> <p><input type="checkbox"/> INITIAL <input checked="" type="checkbox"/> REVISION <input type="checkbox"/> CLARIFICATION</p>				
<p>3. ADDRESS OF LICENSEE <i>(Mailing address or other location where licensee may be located)</i></p> <p style="text-align: center;">Dept. Environmental Health & Safety 1 Big Red Way Bowling Green, KY 42101-3576</p>		<p>4. LICENSEE CONTACT AND TITLE</p> <p style="text-align: center;">Dr. Phillip Womble Assistant Professor</p>				
		<p>5. TELEPHONE NUMBER <i>(Include Area Code)</i></p> <p style="text-align: center;">(270) 745-7095</p>	<p>6. FACSIMILE NUMBER <i>(Include Area Code)</i></p> <p style="text-align: center;">(270) 745-5037</p>			
<p>7. ACTIVITIES TO BE CONDUCTED UNDER THE GENERAL LICENSE GIVEN IN 10 CFR 150.20</p>						
<p><input type="checkbox"/> WELL LOGGING <input type="checkbox"/> LEAK TESTING AND/OR CALIBRATIONS <input type="checkbox"/> TELETHERAPY/IRRADIATOR SERVICE</p> <p><input type="checkbox"/> PORTABLE GAUGES <input checked="" type="checkbox"/> OTHER (Specify) <u>⇒ Identification of UXO</u></p> <p><input type="checkbox"/> RADIOGRAPHY <u>⇒ REGISTERED AS USER OF PACKAGING (CERTIFICATES OF COMPLIANCE NUMBERS)</u></p>						
<p>8. CLIENT NAME, ADDRESS, CITY/COUNTY, STATE, ZIP CODE</p> <p style="text-align: center;">Denice Forscht Naval Explosive Ordnance Disposal Technology Division 2008 Stumpneck Road Indian Head, MD 20640</p>			<p>9. ACTUAL PHYSICAL ADDRESS OF WORK LOCATION <i>(Street and Number or other location. Give as complete an address or directions as possible.)</i></p> <p style="text-align: center;">2008 Stumpneck Road Indian Head, MD</p>			
			<p>10. CLIENT TELEPHONE NUMBER <i>(Include Area Code)</i></p> <p style="text-align: center;">(301) 744-6850 ext. 303</p>	<p>11. WORK LOCATION TELEPHONE NUMBER <i>(Include Area Code)</i></p> <p style="text-align: center;">(301) 744-6850 ext. 303</p>		
<p>12. DATES SCHEDULED</p>		<p>13. NUMBER OF WORK DAYS</p>	<p>14. ADD</p>	<p>15. DELETE</p>	<p>16. LOCATION REFERENCE NUMBER</p>	
FROM	TO	10			NUMBER TO BE ASSIGNED BY NRC 000 686	
<p>LIST ADDITIONAL WORK SITES ON SEPARATE SHEET(S) TO INCLUDE ALL INFORMATION CONTAINED IN ITEMS 9-16 ABOVE.</p>						
<p>17. LIST RADIOACTIVE MATERIAL, WHICH WILL BE POSSESSED, USED, INSTALLED, SERVICED, OR TESTED <i>(Include description of type and quantity of radioactive material, sealed sources, or devices to be used.)</i></p> <p style="text-align: center;">No more than 6 Ci of tritium contained in two (2) sealed tube neutron generators manufactured by ThermoMFPPhysics Model 325PH, within PELAN device.</p>						
<p>18. AGREEMENT STATE SPECIFIC LICENSE WHICH AUTHORIZES THE UNDERSIGNED TO CONDUCT ACTIVITIES WHICH ARE THE SAME, EXCEPT FOR LOCATION OF USE, AS SPECIFIED IN ITEM 9 ABOVE. <i>(Four copies of the specific license must accompany the initial NRC Form 241.)</i></p>			<p>LICENSE NUMBER</p> <p style="text-align: center;">203-017-83</p>	<p>STATE</p> <p style="text-align: center;">KY</p>	<p>EXPIRATION DATE</p> <p style="text-align: center;">07/31/2002</p>	
<p>19. CERTIFICATION (MUST BE COMPLETED BY APPLICANT)</p>						
<p>I, THE UNDERSIGNED, HEREBY CERTIFY THAT:</p> <p>a. All information in this report is true and complete.</p> <p>b. I have read and understand the provision of the general license 10 CFR 150.20 reprinted on the instructions of this form; and I understand that I am required to comply with these provisions as to all byproduct, source, or special nuclear material which I possess and use in non-Agreement States or offshore waters under the general license for which this report is filed with the U.S. Nuclear Regulatory Commission.</p> <p>c. I understand that activities, including storage, conducted in non-Agreement States under general license 10 CFR 150.20 are limited to a total of 180 days in calendar year. With the exception of work conducted in off-shore waters, which is authorized for an unlimited period of time in the calendar year.</p> <p>d. I understand that I may be inspected by NRC at the above listed work site locations and at the Licensee home office address for activities performed in non-Agreement States or offshore waters.</p> <p>e. I understand that conduct of any activities not described above, including conduct of activities on dates or locations different from those described above or without NRC authorization, may subject me to enforcement action, including civil or criminal penalties.</p>						
<p>CERTIFYING OFFICER - RSO or Management Representative (Name and Title)</p> <p style="text-align: center;">Mary J. Reynolds, RSO</p>			<p>SIGNATURE</p> <p style="text-align: center;"><i>Mary J. Reynolds</i></p>		<p>DATE</p> <p style="text-align: center;">04/22/2002</p>	
<p>WARNING: False statements in this certificate may be subject to civil and/or criminal penalties. NRC regulations require that submissions to the NRC be complete and accurate in all material respects. 18 U.S.C. Section 1001 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.</p>						
<p>FOR NRC USE ONLY</p>	<p>REVIEWING OFFICIAL (Typed/Printed Name and Title)</p> <p style="text-align: center;">David J. Collins, Health Physicist</p>		<p>SIGNATURE</p> <p style="text-align: center;"><i>David J. Collins</i></p>		<p>DATE</p> <p style="text-align: center;">5/2/02</p>	
				<p>TOTAL USAGE - DAYS TO DATE</p> <p style="text-align: center;">29</p>		

**CABINET FOR HEALTH SERVICES
COMMONWEALTH OF KENTUCKY
RADIOACTIVE MATERIAL LICENSE**

1. LICENSEE AND 2. ADDRESS

WESTERN KENTUCKY UNIVERSITY
DEPARTMENT OF ENV. HLTH & SFTY
1 BIG RED WAY
BOWLING GREEN, KY 42101

ATTENTION: MARY J. REYNOLDS
TELEPHONE: 270-745-7095

PURSUANT TO KRS 211.842 ET SEQ., THE KENTUCKY CABINET FOR HUMAN RESOURCES REGULATIONS, 902 KAR 100, AND IN RELIANCE ON STATEMENTS AND REPRESENTATIONS HERETOFORE MADE BY THE LICENSEE, A LICENSE IS HEREBY ISSUED TO RECEIVE, ACQUIRE, OWN, POSSESS AND TRANSFER RADIOACTIVE MATERIAL LISTED BELOW; AND TO USE SUCH RADIOACTIVE MATERIAL FOR THE PURPOSE(S) AND AT THE PLACE(S) DESIGNATED BELOW. THIS LICENSE IS SUBJECT TO ALL APPLICABLE RULES, REGULATIONS, AND ORDERS OF THE CABINET FOR HEALTH SERVICES, NOW OR HEREINAFTER IN EFFECT AND TO ANY CONDITIONS SPECIFIED BELOW.

- 3. LICENSE NUMBER: 203-017-83
AMENDMENT NO. 69
- 4. EXPIRATION DATE: JULY 31, 2002
- 5. REVIEWER: 41

6. LICENSED MATERIAL		7. FORM	8. POSSESSION LIMIT
A.	HYDROGEN 3	A. ANY FORM	A. 300 MILLICURIES
B.	CARBON 14	B. ANY FORM	B. 100 MILLICURIES
C.	PHOSPHORUS 32	C. ANY FORM	C. 100 MILLICURIES
D.	PHOSPHORUS 33	D. ANY FORM	D. 100 MILLICURIES

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E. SULFUR 35	E. ANY FORM	E. 150 MILLICURIES
F. IODINE 125	F. ANY FORM	F. 500 MICROCURIES
G. IODINE 131	G. ANY FORM	G. 500 MICROCURIES
H. CESIUM 137	H. SEALED SOURCE	H. 260 MILLICURIES
I. BARIUM 133	I. SEALED SOURCE	I. 10 MILLICURIES
J. COBALT 57	J. SEALED SOURCE	J. 25 MILLICURIES
K. COBALT 60	K. SEALED SOURCE	K. 15 MILLICURIES
L. PLUTONIUM 239	L. SEALED SOURCE (NUMEC/PU BE-160A32)	L. 1 CURIE
M. CALIFORNIUM 252	M. SEALED SOURCE (ORNL/NSD-77)	M. 20 MILLICURIES
N. CALIFORNIUM 252	N. SEALED SOURCE (SR-CF1792)	N. 20 MILLICURIES
O. AMERICIUM 241	O. SEALED SOURCE	O. 50 MILLICURIES
P. CADMIUM 109	P. SEALED SOURCE	P. 60 MILLICURIES
Q. HYDROGEN 3	Q. SEALED SOURCE	Q. 50 CURIES
R. DEPLETED URANIUM	R. METAL	R. 95 KILOGRAMS
S. CESIUM 137	S. SEALED SOURCE (TROXLER DRAWING NO. A-102112)	S. NO SINGLE SOURCE TO EXCEED 9 MILLI- CURIES
T. AMERICIUM 241	T. SEALED SOURCE (TROXLER DRAWING NO. A-102451)	T. NO SINGLE SOURCE TO EXCEED 44 MILLI- CURIES
U. NICKEL 63	U. FOIL	U. NO SINGLE SOURCE TO EXCEED 15 MILLI- CURIES

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V. TECHNETIUM 99	V. SEALED SOURCE	V. NO SINGLE SOURCE TO EXCEED 170 MILLI-CURIES
W. IRON 55	W. SEALED SOURCE	W. 60 MILLICURIES
X. CALIFORNIUM 252	X. SEALED SOURCE	X. NO SINGLE SOURCE TO EXCEED 25 MILLI-CURIES
Y. CADMIUM 109	Y. SEALED SOURCE (AMERSHAM MODEL CUC.D1; ISOTOPE PRODUCTS MODEL XFB SERIES-3204 AND 3205; NEW ENGLAND NUCLEAR MODEL NER-465 AND NER-467, CAPSULE LE-66; NORTH AMERICAN SCIENTIFIC MODEL IND 1602)	Y. NO SINGLE SOURCE TO EXCEED 50 MILLI-CURIES
Z. IRON 55	Z. SEALED SOURCE (ISOTOPE PRODUCTS MODEL AN-55)	Z. NO SINGLE SOURCE TO EXCEED 100 MILLI-CURIES

9. AUTHORIZED USE

- A. - G. FOR USE IN RESEARCH AND TEACHING APPLICATIONS IN THE LIFE SCIENCES. SPECIFIC APPLICATION FOR EACH INDIVIDUAL USER TO BE APPROVED BY THE UNIVERSITY RADIATION SAFETY COMMITTEE.
- H. - R. SEALED SOURCES FOR USE IN RESEARCH AND TEACHING APPLICATIONS IN THE PHYSICS DEPARTMENT. SPECIFIC APPLICATION FOR EACH INDIVIDUAL USER TO BE APPROVED BY THE UNIVERSITY RADIATION SAFETY COMMITTEE.
- Q. FOR USE IN KRUPP POLYSIUS CONTINUOUS NEUTRON ANALYZER MODEL POLAB CNA, EMR PHOTOELECTRONIC NEUTRON GENERATOR MODELS 758 AND 761, AND MR. PHYSICS CORPORATION MODEL A-3062 FOR RESEARCH AND DEVELOPMENT.

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- S. AND T. FOR USE IN TROXLER MODEL 3400 SERIES MOISTURE/DENSITY GAUGE TO MEASURE THE PROPERTIES OF CONSTRUCTION MATERIALS.
- U. FOR USE IN GAS CHROMATOGRAPHS UNITS WITH ELECTRON CAPTURE DETECTORS.
- V. THRU X. FOR RESEARCH.
- Y. FOR USE IN NITON MODEL 700 SERIES FIELD PORTABLE X-RAY FLUORESCENCE ANALYZER FOR CLASSROOM TRAINING AND ELEMENTAL ANALYSIS AT CONTAMINATED FIELD SITES.
- Z. FOR USE AS AN X-RAY FLUORESCENCE SOURCE IN RESEARCH TO DETECT CHLORINE IN COAL SAMPLES.

CONDITIONS:

10. THE LICENSEE SHALL COMPLY WITH THE PROVISIONS OF THE KENTUCKY CABINET FOR HEALTH SERVICES ADMINISTRATIVE RADIATION REGULATIONS, 902 KAR 100.
11. RADIOACTIVE MATERIAL SHALL BE USED AT THE FOLLOWING LOCATIONS AS SPECIFIED IN THE APPLICATION ON THE WESTERN KENTUCKY UNIVERSITY CAMPUS:
- A. THOMPSON COMPLEX
 - B. SCIENCE & TECHNOLOGY HALL
 - C. APPLIED PHYSICS INSTITUTE
 - D. APPLIED PHYSICS ANNEX
 - E. UNIVERSITY FARM SITE
 - F. DEPARTMENT OF ENVIRONMENTAL HEALTH AND SAFETY.

RADIOACTIVE MATERIAL CONTAINED IN THE PORTABLE X-RAY FLUORESCENCE ANALYZERS, PORTABLE MOISTURE DENSITY GAUGES, AND IN THE FORM OF TRITIUM AS CONTAINED IN THE NEUTRON GENERATORS FOR RESEARCH AND DEVELOPMENT, MAY BE USED AND STORED AT, AND TRANSPORTED TO AND FROM TEMPORARY JOB SITES, IN AREAS NOT UNDER EXCLUSIVE FEDERAL JURISDICTION, ANYWHERE IN THE COMMONWEALTH OF KENTUCKY WHERE THE CABINET MAINTAINS JURISDICTION FOR REGULATING THE USE OF RADIOACTIVE MATERIAL. THE USE OF NEUTRON GENERATORS AT TEMPORARY JOB SITES SHALL BE CONDITIONAL UPON A WRITTEN REQUEST TO AND SUBSEQUENT APPROVAL BY THE CABINET. (THIS CONDITION DOES NOT PROHIBIT USE IN OTHER STATES UNDER RECIPROCITY PRIVILEGES WHICH MAY BE GRANTED BY THE REGULATORY AGENCY HAVING JURISDICTION.)"

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12. RADIOACTIVE MATERIAL LISTED IN ITEM 6 ABOVE IS AUTHORIZED FOR USE BY THE FOLLOWING INDIVIDUAL(S) FOR THE MATERIALS AND USES INDICATED:
- | | |
|--|---|
| A. ALEXANDER BARZILOV, PH.D.
MICHAEL BELBOT, PH.D.
IVAN NOVIKOV, PH.D.
JONATHAN C. PASCHAL
GARY SPICHIGER
PHILLIP WOMBLE, PH.D. | A. SUBITEMS 6.H. THRU 6.R.,
6.V. THRU 6.X., AND 6.Z. |
| B. CLAIRE RINEHART, PH.D. | B. H-3 AS LISTED IN SUBITEM
6.A.; P-32, S-35 |
| C. KEN J. BALAK, PH.D. | C. H-3 AS LISTED IN SUBITEM
6.A.; P-32 |
| D. WEI-PING PAN, PH.D. | D. NI-63 |
| E. RICK FOWLER | E. H-3 AS LISTED IN SUBITEM
6.A.; C-14, P-32, S-35 |
| F. KINCHEL DOERNER, PH.D. | F. C-14; P-32 |
| G. CHERYL DAVIS, PH.D.
SIGRID JACOBSHAGEN, PH.D. | G. P-32 |
13. A. RADIOACTIVE MATERIAL LISTED IN SUBITEMS 6.S. AND 6.T. SHALL BE USED BY, OR UNDER THE DIRECT SUPERVISION AND IN THE PHYSICAL PRESENCE OF MATT DETTMAN.
- B. RADIOACTIVE MATERIAL LISTED IN SUBITEM 6.Y. SHALL BE USED BY, OR UNDER THE DIRECT SUPERVISION AND IN THE PHYSICAL PRESENCE OF ROD HANDY OR CHARLOTTE REEDER.
14. THE RADIATION SAFETY OFFICER FOR THE ACTIVITIES AUTHORIZED BY THIS LICENSE IS MARY J. REYNOLDS .
15. SEALED SOURCES CONTAINING RADIOACTIVE MATERIAL SHALL NOT BE OPENED.
16. RADIOACTIVE MATERIALS SHALL NOT BE USED IN OR ON HUMAN BEINGS OR IN PRODUCTS DISTRIBUTED TO THE PUBLIC.

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17. EXPERIMENTAL ANIMALS ADMINISTERED RADIOACTIVE MATERIALS, OR THEIR PRODUCTS, SHALL NOT BE USED FOR HUMAN CONSUMPTION.
18. THE LICENSEE SHALL NOT USE RADIOACTIVE MATERIAL IN OR ON HUMAN BEINGS EXCEPT AS PROVIDED OTHERWISE BY SPECIFIC CONDITION OF THIS LICENSE.
19. DETECTOR CELLS CONTAINING RADIOACTIVE MATERIAL SHALL NOT BE OPENED OR THE FOIL SOURCES REMOVED FROM THE DETECTOR CELL BY THE LICENSEE.
20. MAINTENANCE, REPAIR, CLEANING, REPLACEMENT AND DISPOSAL OF FOILS CONTAINED IN DETECTOR CELLS SHALL BE PERFORMED BY THE DEVICE MANUFACTURER OR OTHER PERSONS SPECIFICALLY AUTHORIZED BY THE CABINET, THE U.S. NUCLEAR REGULATORY COMMISSION, OR AN AGREEMENT STATE.
21. ANY CLEANING, MAINTENANCE OR REPAIR OF THE GAUGE(S) INVOLVING REMOVAL OF THE SOURCE ROD FROM THE DEVICES OR REMOVAL OR DISMANTLING OF SHIELDING SHALL BE PERFORMED ONLY BY THE MANUFACTURER OR BY OTHER PERSONS SPECIFICALLY AUTHORIZED BY THE CABINET, THE U.S. NUCLEAR REGULATORY COMMISSION OR AN AGREEMENT STATE TO PERFORM SUCH SERVICES.
22. EACH PORTABLE GAUGE SHALL HAVE A LOCK OR OUTER LOCKED CONTAINER DESIGNED TO PREVENT UNAUTHORIZED OR ACCIDENTAL REMOVAL OF THE SEALED SOURCE FROM ITS SHIELDED POSITION. THE GAUGE OR ITS CONTAINER MUST BE LOCKED WHEN IN TRANSPORT, STORAGE OR WHEN NOT UNDER THE DIRECT SURVEILLANCE OF AN AUTHORIZED USER.
23. THE LICENSEE SHALL CONDUCT A QUARTERLY PHYSICAL INVENTORY TO ACCOUNT FOR ALL SEALED SOURCES RECEIVED AND POSSESSED UNDER THE LICENSE. THE RECORDS OF THE INVENTORIES SHALL BE MAINTAINED FOR FIVE (5) YEARS FROM THE DATE OF THE INVENTORY FOR INSPECTION BY THE CABINET, AND SHALL INCLUDE THE RADIONUCLIDES, QUANTITIES, MANUFACTURER'S NAME AND MODEL NUMBERS, LOCATION OF SEALED SOURCES, THE DATES OF THE INVENTORY, AND THE NAME OF THE INDIVIDUAL CONDUCTING THE INVENTORY.
24. THE LICENSEE IS AUTHORIZED TO HOLD RADIOACTIVE MATERIAL WITH A PHYSICAL HALF-LIFE OF LESS THAN 65 DAYS FOR DECAY-IN-STORAGE BEFORE DISPOSAL IN ORDINARY TRASH PROVIDED:
- RADIOACTIVE WASTE TO BE DISPOSED OF IN THIS MANNER SHALL BE HELD FOR DECAY A MINIMUM OF TEN (10) HALF-LIVES.
 - PRIOR TO DISPOSAL AS NORMAL WASTE, RADIOACTIVE WASTE SHALL BE MONITORED TO DETERMINE THAT ITS RADIOACTIVITY CANNOT BE DISTINGUISHED FROM BACKGROUND WITH TYPICAL LOW-LEVEL LABORATORY SURVEY INSTRUMENTS. ALL RADIATION LABELS WILL BE OR OBLITERATED.

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25. C. A RECORD OF EACH DISPOSAL PERMITTED UNDER THIS LICENSE CONDITION SHALL BE RETAINED FOR THREE YEARS. THE RECORD MUST INCLUDE THE DATE OF DISPOSAL, THE DATE ON WHICH THE RADIOACTIVE MATERIAL WAS PLACED IN STORAGE, THE RADIONUCLIDES DISPOSED, THE SURVEY INSTRUMENT USED, THE BACKGROUND DOSE RATE, THE DOSE RATE MEASURED AT THE SURFACE OF EACH WASTE CONTAINER, AND THE NAME OF THE INDIVIDUAL WHO PERFORMED THE DISPOSAL.
26. THE LICENSEE MAY ALSO RECEIVE, POSSESS, USE, TRANSFER, OWN OR ACQUIRE RADIOACTIVE MATERIAL NOT IN EXCESS OF FIVE (5) TIMES THE QUANTITIES LISTED IN 902 KAR 100:080, SECTION 2.
27. EXCEPT AS SPECIFICALLY PROVIDED OTHERWISE IN THIS LICENSE, THE LICENSEE SHALL CONDUCT ITS PROGRAM IN ACCORDANCE WITH THE STATEMENTS, REPRESENTATIONS, AND PROCEDURES CONTAINED IN THE DOCUMENTS, INCLUDING ANY ENCLOSURES, LISTED BELOW. THE CABINET FOR HEALTH SERVICES REGULATIONS, 902 KAR 100, SHALL GOVERN UNLESS STATEMENTS, REPRESENTATIONS, AND PROCEDURES IN THE LICENSEE'S APPLICATION AND CORRESPONDENCE ARE MORE RESTRICTIVE THAN THE REGULATION.
- A. APPLICATION DATED MARCH 6, 2001, SIGNED BY MARY J. REYNOLDS, RSO AND GERALD E. TICE, VICE-PRESIDENT.
- B. WESTERN KENTUCKY UNIVERSITY RADIATION SAFETY MANUAL RECEIVED JUNE 7, 2001, SIGNED BY GARY RENSDALL, PRESIDENT.
- C. LETTERS DATED:
1. JUNE 5, 2001, SIGNED BY GERALD E. TICE, VICE-PRESIDENT AND MARY J. REYNOLDS, RSO.
 2. JULY 16, 2001, SIGNED BY MARY J. REYNOLDS, RSO.
 3. SEPTEMBER 24, 2001, SIGNED BY GERALD E. TICE, VICE-PRESIDENT.
 4. DECEMBER 7, 2001, SIGNED BY DR. GERALD E. TICE, VICE-PRESIDENT.
 5. JANUARY 4, 2002, SIGNED BY DR. GERALD E. TICE, CHAIR, RSC AND MARY J. REYNOLDS, RSO.
 6. FEBRUARY 19, 2002, SIGNED BY GERALD E. TICE, CHAIR, RADIATION SAFETY COMMITTEE AND MARY J. REYNOLDS, RSO.
 7. MARCH 19, 2002, SIGNED BY GERALD E. TICE, CHAIR, RADIATION SAFETY COMMITTEE AND MARY J. REYNOLDS, RSO.

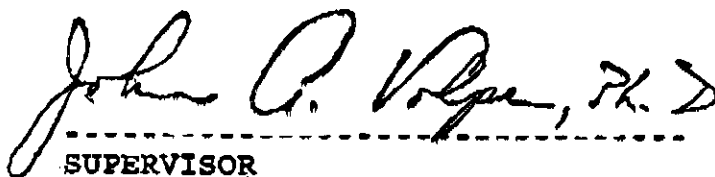
CABINET FOR HEALTH SERVICES
COMMONWEALTH OF KENTUCKY
RADIOACTIVE MATERIAL LICENSE

LICENSE NUMBER: 203-017-83

AMENDMENT 69

PAGE 8

D. EXEMPTION DATED MARCH 26, 2002, SIGNED BY JOHN A. VOLPE,
PH.D., MANAGER, RADIATION HEALTH & TOXIC AGENTS BRANCH.



SUPERVISOR
RADIATION HEALTH & TOXIC
AGENTS BRANCH

MARCIA R. MORGAN

SECRETARY
CABINET FOR HEALTH SERVICES

DATE ISSUED MAY 2, 2002



Western Kentucky University

Radiation Work Permit

Permit Reference Number: API-0005

This form is to be completed and approved prior to any work performed with radioactive materials. If this work is routine work (same procedures performed on a continual basis), only one form needs to be submitted for the duration of the work. If the work changes significantly, a resubmission of the form may be required.

PRIMARY RESPONSIBLE INVESTIGATOR: Dr. Phil Womble
 TITLE/POSITION: Assistant Professor
 DEPT: API BUILDING: API ROOM: N/A PHONE: 780-2518

List all the isotopes and physical forms for which the permit is being sought:

Isotope*	Maximum (in millicuries) that you are requesting to be in your possession at any one time, including waste and stores.	Physical Form	Source Shall Be		
			Sealed	Open	Part of Device
³ H	No more than 6000 mCi	Solid deposited on filament and target	X		X

*Also complete and submit the Radioactive Materials Information Form.

This application is: An initial application for this radioactive material
 A request for an increase/change regarding the radioactive material
 Other Off site use of radioactive material

All Building(s) and Room(s) where isotope will be stored and/or used:

West Jefferson Facility, Battelle, Columbus, OH

Aberdeen Proving Ground, Edgewood Facility, Aberdeen, MD (Federal facility)

Are all of these locations currently listed on the radioactive materials license and posted for usage/storage of radioactive material? Yes No Other

Valid Authorization Numbers you currently hold, if any:

Number	Isotope	Amount
N/A	N/A	N/A

Please answer the following questions (use another sheet of paper, if additional space is required).

1. Explain briefly the intended use of the radioactive materials/equipment.

Elemental characterization, non-destructive analysis of improvised explosive devices (IED), and chemical warfare (CW) agents.

2. Name and describe the experiment in general terms. Indicate typical amounts (mCi) of radioactive materials to be used, and duration/frequency of use. Describe physical/chemical manipulations or activations intended, if applicable. If this procedure is intended for only a short term, state projected dates. If reciprocity is required, attach all documentation. Also, complete a hazard analysis, if necessary.

PELAN, containing a sealed tube neutron generator of no more than 3 Ci tritium, will be evaluated as a non-intrusive IED and CW agents identification device. The testing will take place between April 13, 2002 and May 10, 2002 at Columbus, OH and Aberdeen, MD.

Testing at Columbus OH will take place under a reciprocity agreement with the State of Ohio.

For the tests at Aberdeen Proving Ground, NRC Form 241 is required for approval of proposed activities in non-agreement states, areas of exclusive federal jurisdiction, or offshore waters.

3. Will this material be used by persons other than you? Yes No
 If yes, provide information to identify these persons, their qualifications, and indicate how you intend to ensure that they receive adequate supervision.

Jon Paschal will also be using PELAN. He is listed as a responsible investigator on the license for use of all sources at API facilities.

4. Are you familiar with the provisions and regulations of the following:

Standards for Protection Against Radiation, 902 KAR 100:019? Yes No
 WKU Radioactive Materials License? Yes No
 WKU Radiation Safety Manual (with signed signature page back to RSO)? Yes No

5. If there is (or shall be) possession of survey and monitoring equipment, complete the Survey and Monitoring Equipment Form. Itemize specific items owned and/or those which you plan to obtain if this application is approved. A monitoring device is generally required if millicurie amounts are requested.

- There is (or shall be) survey/monitoring equipment; a completed Survey and Monitoring Equipment Form is attached. Include any additional information that is important regarding survey/monitoring equipment.
 Survey/monitoring equipment is not required.

One of the neutron monitors routinely used at API will be taken to Battelle, Columbus OH, and Aberdeen Proving Ground, MD for neutron radiation monitoring.

6. Outline the specific plans for the transportation, receipt, use, and storage of radioactive material(s). Specify the records that will be kept.

Transportation: See TRANSPORTATION OF NEUTRON GENERATOR HEAD section in attached PELAN RADIATION ISSUES

Receipt: Source will be wipe-tested by personnel of Battelle and Aberdeen Proving Ground; a copy of the results of the wipe-tests will be recorded

Use: See PELAN OPERATION section in attached PELAN RADIATION ISSUES

Storage: See OVERNIGHT STORAGE section in attached PELAN RADIATION ISSUES

7. Outline the specific plans for storage and disposal of radioactive waste. Specify the records that will be kept.

No radioactive waste shall be generated.

8. Describe arrangements that have been made with the Radiation Safety Officer with respect to personnel monitoring requirements.

There is (or shall be) personnel monitoring; a completed Survey and Monitoring Equipment Form is attached. Include any additional information that is important regarding personnel monitoring.

Personnel monitoring is not needed (state why).

API personnel will wear their WKU-issued dosimeters.

9. Outline the plans for the orientation of assistants, staff, students, or visitors in relation to Items 5 and 7 above, and with respect to radiological safety in general.

RJ's have been trained by WKU RSO. RSO's of Battelle and Aberdeen Proving Ground are responsible for personnel there. They have received a copy of the PELAN RADIATION ISSUES.

10. Describe any storage facility(ies) for the radioactive material(s) and outline plans to secure isotope(s) and contaminated waste to prevent use or possession by unauthorized personnel, or to prevent accidental loss.

See OVERNIGHT STORAGE section in attached PELAN RADIATION ISSUES

For transportation issues, see TRANSPORTATION OF NEUTRON GENERATOR HEAD in attached PELAN RADIATION ISSUES

11. What facilities and protective equipment are available? (Hoods, absorbent paper, labels, tags, shielding, etc.)

See OPERATIONAL RADIATION SAFETY, EMERGENCY SHUTDOWN, and RADIATION DOSE MEASUREMENT sections in attached PELAN RADIATION ISSUES

12. Describe the precautions that will be taken to test for leakage and/or contamination upon receipt of these materials.

Survey and wipe tests by Battelle and Aberdeen Proving Ground RSO's.

13. What measures will be taken to prevent, detect, and handle a "spill"?

See TRITIUM LEAKS and EMERGENCY PROCEDURES IN CASE OF MAJOR FIRE sections in attached PELAN RADIATION ISSUES




- 14. Please provide any other information which might be helpful to the Radiation Safety Officer and the Radiation Safety Committee.

Activation information is covered in INDUCED IRRADIATION section in attached PELAN RADLATION ISSUES

DOCUMENTATION REQUIRED IN ADDITION TO THIS FORM

Please complete and submit the Radioactive Materials Information Form (available from the RSO). If there are any hazards that are anticipated during the course of work, please complete and submit a Hazard Analysis Form, available from the Dept. of Environmental Health and Safety. If survey or monitoring equipment is involved, please complete and submit a Survey and Monitoring Equipment Form (available from the RSO).

CERTIFICATION: I certify that the work performed with the materials requested in this application will be done in accordance with the rules and regulations contained in the 902 KAR 100, Western Kentucky University's license, and the WKU Radiation Safety Manual.

Primary Responsible Investigator Signature	<u></u>	Date	<u>4/8/02</u>
Approved by	<u> (Radiation Safety Officer)</u>	Date	<u>4/8/2002</u>
	<u> (Radiation Safety Committee Chair)</u>	Date	<u>4/8/02</u>



Western Kentucky University

Survey and Monitoring Form

Permit Reference Number: API-0005

Radiation Detectors					
Manufacturer	Model	Serial #	Radiation(s) Detected	Last Calibrated	Calibrated By
Victoreen	190N, RP-N	161-probe	0	2/20/2002	Inovision
Victoreen	190N, RP-N	149-probe	0	12/12/2001	Inovision

Occupational Monitoring				
# Badges	Badge Supplier	Badge Type	Radiation(s) Detected	Rotation Period
2	ICN Dosimetry	Whole Body	0	Monthly
1	ICN Dosimetry	Control	0	Monthly

Visitor/Observer Monitoring					
Manufacturer	Model	Serial #	Radiation(s) Detected	Last Calibrated	Calibrated By
Monitoring to be supplied by Radiation Safety Program of visited facility.					

Primary RI's Signature: *[Signature]* Date 4/8/02

Approved by: *Hay J. Reynolds* Date 4/8/2002
 (Radiation Safety Officer)

Meredith C. Jue Date 4/8/02
 (Radiation Safety Committee Chair)



Western Kentucky University

RADIOACTIVE MATERIALS INFORMATION FORM

Permit Reference Number: API-0005

Isotope*	Original Activity/Date	Identifying Information			Half-Life	Radiations/%	On License?	Exempt Quantity? (cite State reg.)
		Manufacturer	Model	S/N				
H-3	1.98 Ci /12/18/98	MF Physics, A-325PH, 199834-8125-102			12.33 a	Beta /100%	Yes	No
Some isotopes activated on tube	3 mrem/hr on contact after two hours of neutron production	N/A			~9 m	Gamma and xray/ unknown	N/A	N/A
H-3	2 Ci/ 2001	MF Physics, A-325PH, 200103-0150-404			12.33 a	Beta /100%	Yes	No

*If any radioisotopes are produced as a result of the procedure (e.g., activation products), please give all relevant information.

How do you ensure that radioactive materials are secured from ALL Non-Authorized Users?

The radioactive material involved will be handled by Responsible Investigators under the WKU Radioactive Materials License #203-017-83, and stored in a secure location at the sites designated on the accompanying RWP.

Primary RI's
Signature:

Date:

4/8/02

Approved by:

(Radiation Safety Officer)

Date:

4/8/2002

(Radiation Safety Committee Chair)

Date:

4/8/02

RADIOACTIVE WORK PERMIT AMENDMENT

Permit Reference Number: API-0005

The Western Kentucky University Radiation Safety Committee has approved the amendment to the Radiation Work Permit Number API-0005. This amendment modifies item 2 of the permit to send the neutron generators to Battelle through a license transfer of material, as opposed to under reciprocity agreement.

This decision was made based on the conversation between the RSO for Battelle, Craig Jensen, and the WKU RSO, Mary Reynolds.

Approved by:

Mary Reynolds
(Radiation Safety Officer)

Date 4/12/2002

Gerald F. Irie
(Radiation Safety Committee Chair)

Date 4/12/02

RADIOACTIVE WORK PERMIT 2nd AMENDMENTPermit Reference Number: API-0005

The Western Kentucky University Radiation Safety Committee has approved the second amendment to the Radiation Work Permit Number API-0005. This amendment allows the replacement of one neutron generator for another. The same manufacturer, model, source activity, and procedures apply.

This decision was made based on the discovery that the current PELAN II is not working at Battelle, and there is need to continue the tests. Also, as Battelle is only licensed to possess two neutron generators, the non-working generator shall be shipped to WKU (not necessarily received by WKU) prior to their receipt of the replacement generator.

Approved by:

<u><i>Maupf. Reynolds</i></u> (Radiation Safety Officer)	Date <u>4/16/2002</u>
<u><i>Gerald C. Jue</i></u> (Radiation Safety Committee Chair)	Date <u>4/16/02</u>



Western Kentucky University

Radiation Work Permit

Permit Reference Number: API-0006

This form is to be completed and approved prior to any work performed with radioactive materials. If this work is routine work (same procedures performed on a continual basis), only one form needs to be submitted for the duration of the work. If the work changes significantly, a resubmission of the form may be required.

PRIMARY RESPONSIBLE INVESTIGATOR: Dr. Phil Womble
 TITLE/POSITION: Assistant Professor
 DEPT: API BUILDING: API ROOM: N/A PHONE: 780-2518

List the all the isotopes and physical forms for which the permit is being sought:

Isotope*	Maximum (in millicuries) that you are requesting to be in your possession at any one time, including waste and stores.	Physical Form	Source Shall Be		
			Sealed	Open	Part of Device
³ H	No more than 6000 mCi (3,000 mCi each)	Solid deposited on filament and target	X (2 sources)		X (2 devices)

*Also complete and submit the Radioactive Materials Information Form.

This application is: An initial application for this radioactive material
 A request for an increase/change regarding the radioactive material
 Other Off site use of radioactive material

All Building(s) and Room(s) where isotope will be stored and/or used:

NAVY EOD TECHNOLOGY DIVISION (NEODTD), INDIAN HEAD, MD (Federal facility)

Are all of these locations currently listed on the radioactive materials license and posted for usage/storage of radioactive material? Yes No Other

Valid Authorization Numbers you currently hold, if any:

Number	Isotope	Amount
N/A	N/A	N/A

Please answer the following questions (use another sheet of paper, if additional space is required).

1. Explain briefly the intended use of the radioactive materials/equipment.
Elemental characterization, non-destructive analysis of unexploded ordnance
2. Name and describe the experiment in general terms. Indicate typical amounts (mCi) of radioactive materials to be used, and duration/frequency of use. Describe physical/chemical manipulations or activations intended, if applicable. If this procedure

is intended for only a short term, state projected dates. If reciprocity is required, attach all documentation. Also, complete a hazard analysis, if necessary.

PELAN, containing a sealed tube neutron generator of no more than 3 Ci tritium, will be evaluated as a non-intrusive unexploded ordnance identification device. The testing will take place between May 10, 2002 and May 25, 2002 at Indian Head, MD. Although testing will be performed using only one PELAN unit, because of the continuous use of PELAN over 15 days, a second PELAN unit will be needed as a back up, in case of malfunction of the first PELAN unit.

For the tests at NEODTD, an NRC Form 241 is required for approval of proposed activities in non-agreement states, areas of exclusive federal jurisdiction, or offshore waters.

- 3. Will this material be used by persons other than you? Yes No
 If yes, provide information to identify these persons, their qualifications, and indicate how you intend to ensure that they receive adequate supervision.

Jon Paschal and Ivan Novikov will also be using PELAN. They are listed as responsible investigators on the license for use of all sources at API facilities.

- 4. Are you familiar with the provisions and regulations of the following:

Standards for Protection Against Radiation, 902 KAR 100:019?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
WKU Radioactive Materials License?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
WKU Radiation Safety Manual (with signed signature page back to RSO)?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

- 5. If there is (or shall be) possession of survey and monitoring equipment, complete the Survey and Monitoring Equipment Form. Itemize specific items owned and/or those which you plan to obtain if this application is approved. A monitoring device is generally required if millicurie amounts are requested.

- There is (or shall be) survey/monitoring equipment; a completed Survey and Monitoring Equipment Form is attached. Include any additional information that is important regarding survey/monitoring equipment.
- Survey/monitoring equipment is not required.

One of the neutron monitors routinely used at API will be taken to Indian Head, MD for neutron radiation monitoring.

- 6. Outline the specific plans for the transportation, receipt, use, and storage of radioactive material(s). Specify the records that will be kept.

Transportation: See TRANSPORTATION OF NEUTRON GENERATOR HEAD section in attached PELAN RADIATION ISSUES

Receipt: Source will be wipe-tested by personnel NAVBODTD; a copy of the results of the wipe-tests will be recorded

Use: See PELAN OPERATION section in attached PELAN RADIATION ISSUES

Storage: See OVERNIGHT STORAGE section in attached PELAN RADIATION ISSUES

7. Outline the specific plans for storage and disposal of radioactive waste. Specify the records that will be kept.

No radioactive waste shall be generated.

8. Describe arrangements have that have been made with the Radiation Safety Officer with respect to personnel monitoring requirements.

There is (or shall be) personnel monitoring; a completed Survey and Monitoring Equipment Form is attached. Include any additional information that is important regarding personnel monitoring.

Personnel monitoring is not needed (state why).

API personnel will wear their WKU-issued dosimeters.

9. Outline the plans for the orientation of assistants, staff, students, or visitors in relation to Items 5 and 7 above, and with respect to radiological safety in general.

RI's have been trained by WKU RSO. RSO of NAVEODTD, Indian Head, MD is responsible for personnel there. He has received a copy of the PELAN RADIATION ISSUES.

10. Describe any storage facility(ies) for the radioactive material(s) and outline plans to secure isotope(s) and contaminated waste to prevent use or possession by unauthorized personnel, or to prevent accidental loss.

*See OVERNIGHT STORAGE section in attached PELAN RADIATION ISSUES
For transportation issues, see TRANSPORTATION OF NEUTRON GENERATOR HEAD
in attached PELAN RADIATION ISSUES*

11. What facilities and protective equipment are available? (Hoods, absorbent paper, labels, tags, shielding, etc.)

See OPERATIONAL RADIATION SAFETY, EMERGENCY SHUTDOWN, and RADIATION DOSE MEASUREMENT sections in attached PELAN RADIATION ISSUES

12. Describe the precautions that will be taken to test for leakage and/or contamination upon receipt of these materials.

Survey and wipe tests by NAVEODTD, Indian Head, MD RSO.

13. What measures will be taken to prevent, detect, and handle a "spill"?

See TRITIUM LEAKS and EMERGENCY PROCEDURES IN CASE OF MAJOR FIRE sections in attached PELAN RADIATION ISSUES

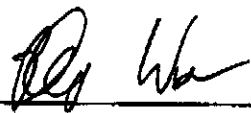


14. Please provide any other information which might be helpful to the Radiation Safety Officer and the Radiation Safety Committee.

Activation information is covered in INDUCED IRRADIATION section in attached PELAN RADLATION ISSUES

DOCUMENTATION REQUIRED IN ADDITION TO THIS FORM

Please complete and submit the Radioactive Materials Information Form (available from the RSO). If there are any hazards that are anticipated during the course of work, please complete and submit a Hazard Analysis Form, available from the Dept. of Environmental Health and Safety. If survey or monitoring equipment is involved, please complete and submit a Survey and Monitoring Equipment Form (available from the RSO).

CERTIFICATION: I certify that the work performed with the materials requested in this application will be done in accordance with the rules and regulations contained in the 902 KAR 100, Western Kentucky University's license, and the WKU Radiation Safety Manual.

Primary Responsible Investigator Signature	<u></u>	Date	<u>5/1/02</u>
Approved by	<u> (Radiation Safety Officer)</u>	Date	<u>5/1/2002</u>
	<u> (Radiation Safety Committee Chair)</u>	Date	<u>5/1/02</u>



Western Kentucky University

Survey and Monitoring Form

Permit Reference Number: API-0006

Radiation Detectors					
Manufacturer	Model	Serial #	Radiation(s) Detected	Last Calibrated	Calibrated By
Victoreen	190N, RP-N	161-probe	η	2/20/2002	Inovision
Victoreen	190N, RP-N	149-probe	η	12/12/2001	Inovision

One of the two will be used.

Occupational Monitoring				
# Badges	Badge Supplier	Badge Type	Radiation(s) Detected	Rotation Period
2	ICN Dosimetry	Whole Body	$\alpha, \beta, \gamma, \eta$	Monthly
1	ICN Dosimetry	Control	$\alpha, \beta, \gamma, \eta$	Monthly

Visitor/Observer Monitoring					
Manufacturer	Model	Serial #	Radiation(s) Detected	Last Calibrated	Calibrated By
Monitoring to be supplied by Radiation Safety Program of visited facility.					

Primary RI's Signature:

[Handwritten Signature]

Date

5/1/02

Approved by:

[Handwritten Signature]
(Radiation Safety Officer)

Date

5/1/2002

[Handwritten Signature]
(Radiation Safety Committee Chair)

Date

5/1/02



Western Kentucky University

RADIOACTIVE MATERIALS INFORMATION FORM

Permit Reference Number: API-0006

Isotope*	Original Activity/Date	Identifying Information			Half-Life	Radiations/%	On License?	Exempt Quantity? (cite State reg.)
		Manufacturer	Model	S/N				
H-3	1.98 Ci/ 12-18-1998	MF Physics, A-325PH, 199834-8125-102			12.33 a	Beta /100%	Yes	No
H-3	2.15 Ci/ 11-18-1998	MF Physics, A-325PH, 199827-8104-101			12.33 a	Beta /100%	Yes	No
H-3	1.43 Ci/ 3-15-2002	MF Physics, A-320-4P, 200103-0150-404			12.33 a	Beta /100%	Yes	No
H-3	2.2 Ci/ 3-28-2002	MF Physics, A-320-4P, 200066-0150-401			12.33 a	Beta /100%	Yes	No
Some isotopes activated on tube	3 mrem/hr on contact after two hours of neutron production	N/A			~9 m	Gamma and xray/ unknown	N/A	N/A
Important Note: Only two of the four listed neutron generators are to be used for the test.								

*If any radioisotopes are produced as a result of the procedure (e.g., activation products), please give all relevant information.

How do you ensure that radioactive materials are secured from ALL Non-Authorized Users?

The radioactive material involved will be handled by Responsible Investigators under the WKU Radioactive Materials License #203-017-83, and stored in a secure location at the sites designated on the accompanying RWP.

Primary RI's
Signature:

Date: 5/1/02 Approved by:

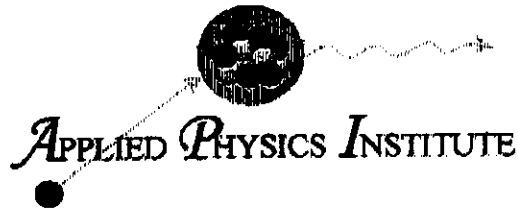
(Radiation Safety Officer)

Date: 5/1/02

(Radiation Safety Committee Chair)

Date: 5/1/02

WESTERN KENTUCKY UNIVERSITY

**PELAN RADIATION ISSUES**

Date: January 20, 2002

INTRODUCTION

PELAN is intended to be used for detection of explosive devices, illicit drugs, as well as chemical warfare agents and anti-personnel landmines.

PELAN has been through a series of laboratory and field trials using simulated and real explosives, drugs, chemical warfare agents, etc. These trials have taken place over the last four years at the Applied Physics Institute, at Federal facilities in the USA and various national and international facilities worldwide.

RADIATION SOURCE

PELAN contains a sealed tube neutron generator Model A-325PH manufactured by MF PHYSICS. It produces neutrons by accelerating deuterium ions through a potential difference of up to 100,000 Volts and allowing them to impinge on a tritium target. Neutron characteristics of the generator are:

Neutron fluence : $1-1.5 \times 10^8$ n/s in a 4π geometry
Amount of tritium in the sealed tube: approx. 1.1×10^{11} Bq (3 Ci)

The neutron generator head (manufactured by MF Physics) is contained in the upper horizontal cylindrical segment of the PELAN probe (see figure on p. 6). The head consists of a pressure housing, electrical connectors, a high voltage section and a neutron generator tube. The head volume is normally filled with sulfur hexafluoride which is used as an insulating gas. The housing of the accelerator head is sealed, and is designed to contain any tritium that may be present due to breakage of the tube. The neutron generator tube is a sealed tube constructed from stainless steel, vacuum melt iron, copper, glass and ceramic. Laser welds, TIG welds and high temperature braze materials are used in tube fabrication. All braze materials have melting points of 779°C or higher.

Please note that the neutron generator does not produce any neutrons until several switches are turned ON. To start the neutron generator, the main power key in the Power and Control Module of PELAN must be turned ON, the neutron

generator interlock must be closed, and the START icon on the palm-top computer must be depressed.

RADIATION TRAINING

Personnel that work with PELAN should have been issued neutron dosimeters and have received radiation training in:

- Radiation effects
- ALARA principle
- Posting and chaining of radiation areas
- Storage of neutron generator
- Radiation monitoring devices, and
- Radiation emergency procedures

PELAN OPERATION

PELAN has been built to operate as an automatic instrument with minimum intervention from the operator. The operation of PELAN is done with the palm-top computer, from a distance of up to 30 m from the PELAN probe. The interrogation procedure is as follows:

1. The operator places the PELAN probe within a few centimeters from the object to be interrogated. A power source (110/220 V AC or a 12 V battery pack) is connected to the PCM.
2. The PCM main power key is turned ON, the neutron generator interlock is closed, and the operator with the palm-top computer removes himself to a safe stand-off distance (see the section on operational radiation safety).
3. The operator presses the START icon on the palm-top. An automatic procedure is initiated, whereby a high voltage is placed across the neutron generator tube, and all pulsing electronic circuits and data acquisition modules are powered. When all systems are readied, an automatic data acquisition cycle is initiated and data are acquired for a pre-determined time. At the end of acquisition time, the neutron generator power is automatically turned off, and the accumulated data are de-convoluted. The results of the de-convolution are fed to a decision-making tree, and the computer displays the words THREAT or NO THREAT if no explosive has been detected in the interrogated object. For the cases of chemical warfare agents etc., similar types of display are used.

RADIATION DOSE MEASUREMENTS

PELAN is to be used in places where a threat exists, or where there is a suspicion of contraband transportation. Since it is not a stationary device, radiation protection is primarily afforded through distance, and by operating PELAN at the lowest practically possible level of neutron production. Repeated measurements with calibrated neutron monitors (VICTOREEN Model RP-N neutron monitor) have shown that the neutron dose rate is approximately 0.01 mSv/hr (1 mRem/hr) at a distance of 8 m (25 ft) from the PELAN probe, and about 0.005-0.007 mSv/hr (0.5-0.7 mRem/hr) at 13 m (40 ft) from the probe. Please note that at these low radiation levels, neutron dosimeters are not very accurate, although they carry a certified calibration. In many instances, two calibrated VICTOREEN monitors were used simultaneously, and the readings were averaged. Each interrogation of a suspicious object takes place within 5 minutes. The badged personnel will operate PELAN from a distance of 8 m or larger, depending on the available space. All unbadged personnel will be requested to remain at a distance of 13 m or larger. At 13 m, for a five minute interrogation, an unbadged person will receive a dose of 0.0006 mSv (0.06 mRem). This dose is less than 1/10 of the dose that this person will receive per day from natural radiation exposure (which averages 0.008 mSv/day (0.8 mRem/day)). If ten interrogations are witnessed by this person (and this approaches the realistic maximum of interrogations/day) this person will receive from PELAN an approximately equal amount of radiation to the one received/day from natural radiation exposure. If this person flew a distance of 1,900 km in order to witness the field trials, he/she received an approximate dose of 0.03 mSv during the round trip flight (compared to the 0.006 mSv (0.6 mRem) received from PELAN for ten interrogations).

The above comparisons indicate that the radiation exposure with the operation of PELAN is very small. At any rate, the ALARA principle should be utilized during all field use.

OPERATIONAL RADIATION SAFETY

During operation, when setting up a PELAN interrogation, an area of radius 10 m around the PELAN probe is to be cordoned off. Appropriate radiation signs are to be placed along the perimeter, warning personnel not to cross into the cordoned area.

EMERGENCY SHUTDOWN

When PELAN has been energized and neutrons are produced, the neutron production can be instantaneously stopped via the STOP icon on the palmtop.

TRITIUM LEAKS

As previously described in the Radiation Source Section, the neutron generator head is designed to contain any tritium that may be present due to breakage of the neutron generator tube. The generator head is routinely leak tested for tritium on a monthly basis by wiping the generator head and counting the wipe in a liquid scintillation counter. Gloves are worn when handling the tube until leak tests show that tritium has not leaked from the tube. Records of leak tests are maintained. This procedure will also be performed prior to a) shipment of the PELAN probe to any other location, b) prior to operating PELAN after its arrival at the facility, and c) any following transportation. If a tritium leak is detected in the generator head, or when an accident has occurred that may have breached the integrity of the head, the head will be inserted and sealed in a PVC pipe. The sealed pipe will then be returned to the manufacturer, since the head does not have any customer serviceable part. There is no reason to expect personnel to receive exposure to tritium unless an accident ruptures the head's stainless steel housing and the inner sealed housing of the tube. In the event of such catastrophic failure, a survey of body fluids on the exposed individual(s) will be conducted for evidence of tritium uptake.

TRANSPORTATION OF NEUTRON GENERATOR HEAD

The neutron generator head, according to the US CFR 173.424, is an excepted package for radioactive instrument. As such there are no radiation markings or labels required for its shipment. The package is prepared for shipment according to CFR 173.422 by carrying a label stating "This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package instruments, or articles, UN2910". It is then shipped via overnight carrier.

Prior to transportation and after the wipe test, the SF₆ gas contained in the neutron generator head is released to the atmosphere, using an appropriate pressure manifold. Upon the receipt of the head at the site where PELAN is going to be used, and after the results of the arrival wipe test, the neutron generator head is pressurized again at the manufacture recommended pressure, using the pressure manifold.

OVERNIGHT STORAGE

For overnight storage, PELAN's key is removed and the unit is placed in a secure area within the boundaries of the facility where PELAN is used. The key of the container is carried by authorized personnel, and a telephone number where they can be reached after hours is posted in the vicinity of the storage space and with the facility's security personnel.

EMERGENCY PROCEDURES IN CASE OF MAJOR FIRE

If a major fire occurs and the possibility exists that the temperature at the location of the probe reached the braze material melting point [779°C] all personnel should be kept at a distance of 20m or more from the position of the probe. If the neutron generator head has been breached, the tritium in the titanium tritide target will evaporate and will escape in the atmosphere. Assuming a maximum tritium load in the tube of 2.6×10^{11} Bq that escaped, and that the general public has been kept at the minimum distance of 20 m from the PELAN probe, the 2.6×10^{11} Bq of tritium will be diluted to less than 4600 m³ of air/ 3.7×10^7 Bq of tritium, the non-occupational Maximum Permissible Concentration (NCRP Report No. 72).

Individuals who may be called upon to fight a fire in the PELAN site should be made aware that radioactive material will be present (NCRP Report No. 72).

If the neutron generator head does not have any visible breaching marks, a wipe should be taken (from a safe distance) of the PELAN probe for leak testing.

INDUCED IRRADIATION

After each use of PELAN there is radioactivity induced in both the parts of PELAN surrounding the neutron generator tube and the interrogated material.

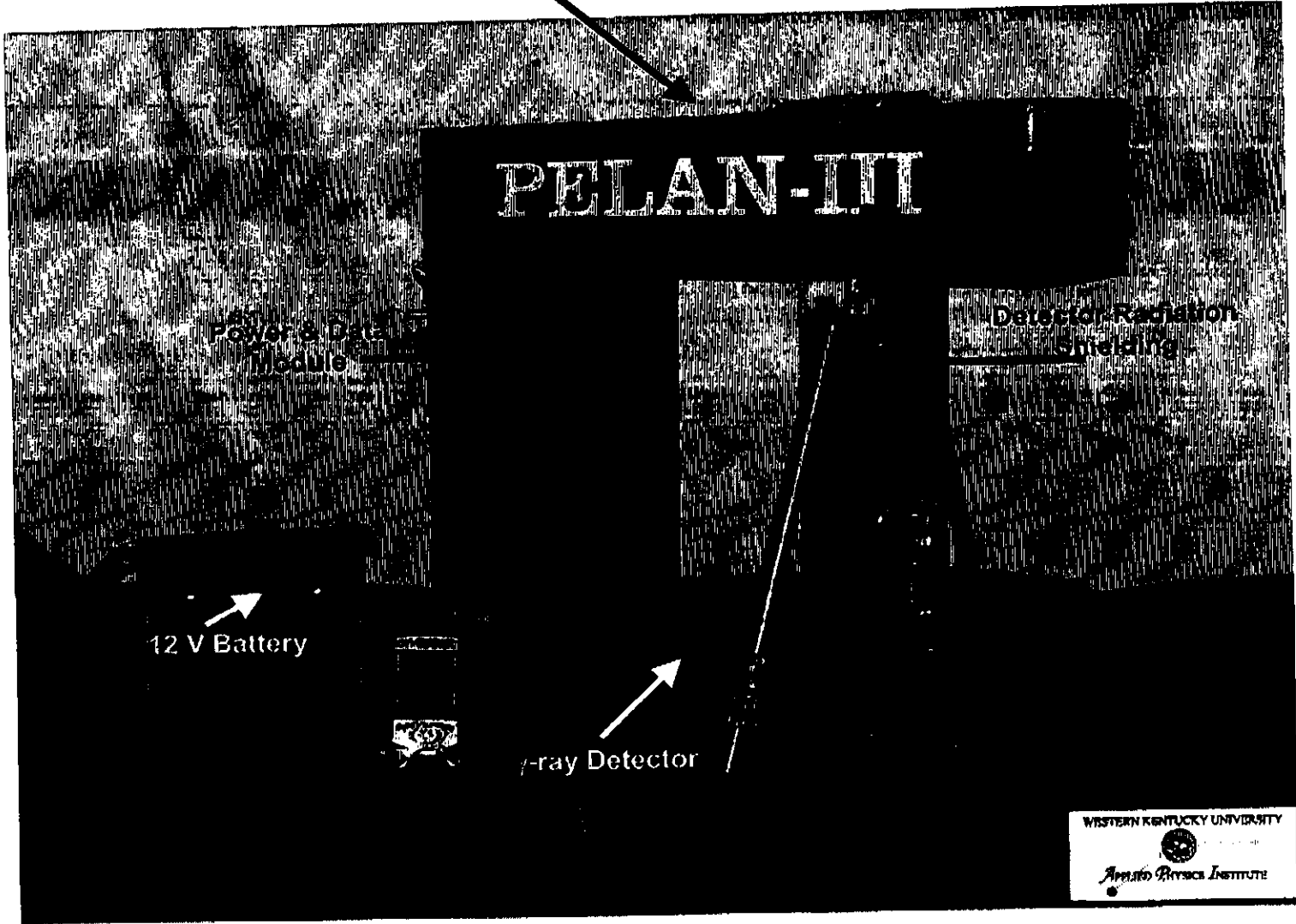
PELAN induced irradiation

Several experiments were carried out whereby PELAN was continuously operated for 2 hours and the induced radiation was measured on the outside surface of the tube at the position of the tritium target. On contact, gamma and x-ray dose of 0.03 mSv/hr (3 mRem/hr) was measured, with an average half-life of approximately 9 minutes. The dose at a distance of 30 cm from the surface was less than 0.003 mSv/hr (0.3 mRem/hr). To put these numbers into perspective, an operator that spends 5 minutes moving the PELAN probe from one position to another, would expect to receive approximately 10% of the radiation that he/she receives in one day from natural radiation exposure.

Induced irradiation in the interrogated material

Studies and several calculations carried out by the US Dept of Defense have shown that no detectable level of irradiation damage occurs in any of the materials that are irradiated with fast neutrons over a few minutes.

Neutron Generator



12 V Battery

PELAN-III

Power & Data
Module

Detector Radiation
Shielding

Gamma Detector

WESTERN KENTUCKY UNIVERSITY
Aerialo Physics Institute