ACCEPTANCE REVIEW MEMO

Licensee: Advanced Isotopes of Idaho

License No.: **Docket No.:** 030-37048

Mail Control No.: 470722

Type of Action: New **Date of Requested Action:** 09-21-05

Reviewer Assigned: **Date Assigned to Reviewer:** 10-04-05

Reviewer(s) Who Performed Review: Torres

Response Received	Deficiencies Noted During Acceptance Review
	1.
	2.
	3.
	4.

Reviewer's Initials: _____ **Date:** _____

Branch Chief's and/or SR. HP's Initials: _____ **Date:** _____

☐Yes ☐No Action - decommissioning notification should be issued within 30 days.

☐Yes ☐No Termination request < 90 days from date of expiration

☑Yes ☐No Action to be expedited (priority since it's new license)

_____Medical emergency

_____Licensee in noncompliance (i.e. no RSO, location of use/storage not on license, radioactive material in possession not on license)

_____National Security

_____Other (_____)

Branch Chief's and/or Sr. HP's Initials: RJC **Date:** 10/4/05

SISP Review

☑Yes ☐No **Non-Publicly Available, Sensitive** if <u>any</u> item below is checked

✓ Radionuclides, forms, and quantities

✓ Location of RAM

_____Building drawings with locations of RAM

_____Security of RAM (locks, alarms, etc.)

_____SS&D Catalog information

_____Specifics of Emergency Plan (routes to and from RAM, response to security events, etc.)

_____Safeguards Information

Branch Chief's and/or Sr. HP's Initials: RJC **Date:** 10/4/05

Information in this record was deleted in accordance with the Freedom of Information Act, exemptions 2 + 6
FOIA- 2007-0121

B-1

RECEIVED
SEP 26 2005
DNMS

21 September, 2005

United States Nuclear Regulatory Commission
Regional Office: Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Dear Sirs:

Enclosed please find our application for a byproduct materials license category 3c (Nuclear Pharmacy) and a check for $4,700; our application fee. Should any questions arise please contact me, Troy Curnutt at (208) 406-2543. We respectfully request that you expedite action on this application process to the extent possible.

Sincerely,

V. Troy Curnutt, C.E.O.
Advanced Isotopes of Idaho
4968 Rainbow Way
Chubbuck, ID 83202

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Advanced Isotopes of Idaho

TABLE C.2

RADIOACTIVE MATERIAL

3	V. TROY CURNUTT R.S.O.
4	CATHERINE HEYNEMAN, PHARMD Authorized Nuclear Pharmacist
	POLICY & PROCEDURE MANUAL
6	FACILITY
7	EQUIPMENT
8	DELEGATION OF AUTHORITY
9	COMMITMENTS
10	LANDLORD RELEASE
11	FORMS
12	
13	
14	
15	

Contact Information

Advanced Isotopes of Idaho
4968 Rainbow Way
Chubbuck Idaho 83202

V. Troy Curnutt RT(N)
(208) 406-2543

NRC FORM 313 U.S. NUCLEAR REGULATORY COMMISSION
(6-1999)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

APPLICATION FOR MATERIAL LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES 10/31/2001

Estimated burden per response to comply with this mandatory information collection request: 7.4 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. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), 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, NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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:

SAM NUNN ATLANTA FEDERAL CENTER
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
61 FORSYTH STREET, S.W., SUITE 23T85
ATLANTA, GEORGIA 30303-8931

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 _____
   - [ ] C RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip code)
   Advanced Isotopes of Idaho
   4968 Rainbow Way
   Chubbuck Idaho 83202

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED
   4968 Rainbow Way
   Chubbuck Idaho 83202

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
   Troy Curnutt RT(N)
   TELEPHONE NUMBER (208) 406-2543

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. maximum 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 | AMOUNT ENCLOSED $

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 OF JUNE 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

FOR NRC USE ONLY

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

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Discussion (5)
Radioactive Material

a. Elements and mass
b. Chemical and or physical form
c. Maximum amount which will be possessed at any one time

Please see Table C.2 Items 5 and 6 on NRC Form 313: Radioactive Material Use.
Please see additional information located in Section 3 "Radioactive Material"

Discussion (6)
Purpose(s) For Which Radioactive Material Will Be Used

Please see information located in Section 3 "Radioactive Material"

Discussion (7)
Individual(s) Responsible For Radiation Safety Program and Their Training Experience

Please see Section 3 "Troy V. Curnutt R.S.O.
Please see Section 4 "Catherine Heyneman, PharmD, A.N.P.

Discussion (8)
Training For Individuals Working In Or Frequenting Restricted Areas

Please see Section 5 "Policy and Procedure Manual" for a complete training guide.

Discussion (9)
Facilities And Equipment

Please see Section 6 "Facilities"
Please see Section 7 "Equipment"

Discussion (10)
Radiation Safety Program

Please see Section 5 "Policy and Procedure Manual" for our complete radiation safety guide

Discussion (11)
Waste Management

Please see Section 5 "Policy and Procedure" (page 20), 8.0 "Returned Waste"
Please see Section 5 "Policy and Procedure", "Radiation Safety Manual", Section 8 (page 52) "Waste Disposal for Radioactive Waste"

Discussion (12)
License Fees

Fee Category: **3C**

C. Licenses issued under §§ 32.72 and/or 32.74 of this chapter that authorize the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits, and/or sources and devices containing byproduct material. This category does not apply to licenses issued to nonprofit educational institutions whose processing or manufacturing is exempt under § 170.11(a)(4). These licenses are covered by fee Category 3D.

Amount Enclosed: **$4,700.00**

Table C.2 outlines the detailed responses that may be made to Items 5 and 6 on Form 313 for type of radioactive material requested and purposes for which it will be used. For example, if the applicant is seeking a license for unsealed byproduct material under 10 CFR 35.100 or 35.200, then the applicant should check the "yes" column next to 10 CFR 35.100 and 35.200 in Table C.2. The table then indicates appropriate responses for that type of use. An applicant may copy the checklist and include it in the license application.

Table C.2 Items 5 and 6 on NRC Form 313: Radioactive Material And Use
(If using this checklist, check applicable rows and fill in details, and attach copy of checklist to the application.)

Yes	Radionuclide	Form or Manufacturer/ Model No.	Maximum Quantity	Purpose of Use
✓	Any byproduct material permitted by 10 CFR 35.100	Any	As needed	Any uptake, dilution, and excretion study permitted by 10 CFR 35.100.
✓	Any byproduct permitted by 10 CFR 35.200	Any	As needed	Any imaging and localization study permitted by 10 CFR 35.200.
✓	Any byproduct material permitted by 10 CFR 35.300	Any	___ millicuries As Needed	Any radiopharmaceutical therapy procedure permitted by 10 CFR 35.300.
✓	Iodine-131	Any	___ millicuries 500 mCi	Administration of I-131 sodium iodide.
✓	Byproduct material permitted by 10 CFR 35.400 (Radionuclide _____)	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	Any brachytherapy procedure permitted by 10 CFR 35.400.
	Byproduct material permitted by 10 CFR 35.400 (Radionuclide _____)	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	Any brachytherapy procedure permitted by 10 CFR 35.400.
	Byproduct material permitted by 10 CFR 35.400 (Radionuclide _____)	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	Any brachytherapy procedure permitted by 10 CFR 35.400.
	Byproduct material permitted by 10 CFR 35.400 (Radionuclide _____)	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	Any brachytherapy procedure permitted by 10 CFR 35.400.
	Strontium-90	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	Treatment of superficial eye conditions using an applicator distributed pursuant to 10 CFR 32.74 and permitted by 10 CFR 35.400.

Table C.2 (continued)

Yes	Radionuclide	Form or Manufacturer/ Model No.	Maximum Quantity	Purpose of Use
	Byproduct material permitted by 10 CFR 35.500 Check all that apply: ☐ Gd-153; ☐ I-125; ☐ Other, describe	Sealed source or device (Manufacturer _____, Model No._____)	___ curies per source and ___ curies total	Diagnostic medical use of sealed sources permitted by 10 CFR 35.500 in compatible devices registered pursuant to 10 CFR 30.32(g).
	Iridium-192	Sealed source or device (Manufacturer _____, Model No._____)	___ curies per source and ___ curies total	One source for medical use permitted by 10 CFR 35.600, in a Manufacturer _____Model No. _____ remote afterloading brachytherapy device. One source in its shipping container as necessary for replacement of the source in the remote afterloader device.
	Cobalt-60	Sealed source or device (Manufacturer _____, Model No._____)	___ curies per source and ___ curies total	One source for medical use permitted by 10 CFR 35.600, in a Manufacturer _____Model No._____ teletherapy unit. One source in its shipping container as necessary for replacement of the source in the teletherapy unit.
	Cobalt-60	Sealed source or device (Manufacturer _____, Model No._____)	___ curies per source and ___ curies total	For medical use permitted by 10 CFR 35.600, in a Manufacturer _____Model No. _____ stereotactic radiosurgery device. Sources in the shipping container as necessary for replacement of the sources in the stereotactic radiosurgery device.
	Any byproduct material under 10 CFR 31.11	Prepackaged kits	___ millicuries	*In vitro* studies.
✓	Depleted uranium	Metal	___ kilograms 999 Kilograms	Shielding in a teletherapy unit.

Generator Shielding

Table C.2 (continued)

Yes	Radionuclide	Form or Manufacturer/ Model No.	Maximum Quantity	Purpose of Use
	Depleted uranium	Metal	___ kilograms	Shielding in a linear accelerator.
	Any radionuclide in excess of 30 millicuries for use in calibration, transmission, and reference sources. (List radionuclide: _____)	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries	For use in a Manufacturer _____Model No._____ for calibration and checking of licensee's survey instruments.
	Americium-241	Sealed source or device (Manufacturer _____, Model No._____)	___ millicuries per source and ___ millicuries total	Use as an anatomical marker.
	Plutonium (principal radionuclide Pu-238)	Sealed sources	___ millicuries per source and ___ grams total	As a component of Manufacturer _____Model No._____, nuclear-powered cardiac pacemakers for clinical evaluation in accordance with manufacturer's protocol dated _____. This authorization includes: follow-up, explantation, recovery, disposal, and implantation.
	Other	Form or Manufacturer/ Model No. _____	___ millicuries	Purpose of use _____.

Table C.3 is a checklist that may be used to identify the attached documents that the applicant is supplying for items for which a response is required. For example, an applicant may fill in the name(s) of Radiation Safety Officer in Table C.3 and then check the boxes indicating which documents pertaining to the RSO are being included in the license application. An applicant may copy the checklist and include it in the license application.

Table C.3 Items 7 through 11 on NRC Form 313: Training & Experience, Facilities & Equipment, Radiation Protection Program, and Waste Disposal

(Check all applicable rows and fill in details and attach a copy of the checklist to the application or provide information separately.)

Item Number and Title	Suggested Response	Check box to indicate material included in application
Item 7: Radiation Safety Officer Name: _____ Troy Vincent Curnutt RT(N)	Previous license number (if issued by NRC) or a copy of the license (if issued by an Agreement State) that authorized the uses requested and on which the individual was specifically named as the RSO.	☑
	OR	
	Copy of the certification(s) for the board(s) recognized by NRC and as applicable to the types of use for which he or she has RSO responsibilities.	☐
	OR	
	Description of the training and experience specified in 10 CFR 35.900(b).	☐
	OR	
	Description of the training and experience specified in 10 CFR 35.50(b) demonstrating that the proposed RSO is qualified by training and experience as applicable to the types of use for which he or she has RSO responsibilities.	☐
	AND	
	Written certification, signed by a preceptor RSO, that the above training and experience has been satisfactorily completed and that a level of radiation safety knowledge sufficient to function independently as an RSO for a medical use licensee has been achieved.	☑
	AND	
	If applicable, description of recent related continuing education and experience as required by 10 CFR 35.59.	☑

Table C.3 (continued)

Item Number and Title	Suggested Response	Check box to indicate material included in application
Item 7: Authorized Users Names and Requested Uses for Each Individual _____	Previous license number (if issued by NRC) or a copy of the license (if issued by an Agreement State) on which the physician was specifically named as an AU for the uses requested.	☐
	OR	
	Copy of the certification(s) for the board(s) recognized by NRC under 10 CFR Part 35, Subparts D, E, F, G, H, and as applicable to the use requested.	☐
	OR	
	Description of the training and experience identified in 10 CFR Part 35 Subpart J demonstrating that the proposed AU is qualified by training and experience for the use requested.	☐
	OR	
	A description of the training and experience identified in 10 CFR Part 35 Subparts D, E, F, G, and H demonstrating that the proposed AU is qualified by training and experience for the use requested;	☐
	AND	
	Written certification, signed by a preceptor physician AU, that the above training and experience has been satisfactorily completed and that a level of competency sufficient to function independently as an AU for the medical uses authorized has been achieved.	☐
	AND	
	If applicable, description of recent related continuing education and experience as required by 10 CFR 35.59.	☐
Item 7: Authorized Nuclear Pharmacists Names: _____ Catherine A. Heyneman PharmD See attached documentation	Previous license number (if issued by NRC) or a copy of the license (if issued by an Agreement State) on which the individual was specifically named ANP.	☐
	OR	
	Copy of the certification(s) for the radiopharmacy board(s) recognized by NRC under 10 CFR 35.55(a) or 10 CFR 35.980(a).	☐
	OR	
	Description of the training and experience demonstrating that the proposed ANP is qualified by training and experience.	☑
	AND	
	Written certification, signed by a preceptor ANP, that the above training and experience has been satisfactorily completed and that a level of competency • sufficient to function independently as an ANP has been achieved (10 CFR 35.55), or • sufficient to independently operate a nuclear pharmacy (10 CFR 35.980).	☑
	AND	
	If applicable, description of recent related continuing education and experience as required by 10 CFR 35.59.	☑

Table C.3 (continued)

Item Number and Title	Suggested Response	Check box to indicate material included in application
Item 7: Authorized Medical Physicists Names: _____	Previous license number (if issued by NRC) or a copy of the license (if issued by an Agreement State) on which the individual was specifically named as an AMP for the units requested.	☐
	OR	
	Copy of the certification(s) for the board(s) recognized by NRC in 10 CFR 35.51(a) or 10 CFR 35.961(a) or (b).	☐
	OR	
	Description of the training and experience demonstrating that the proposed AMP is qualified by training and experience identified in 10 CFR 35.961(c) for the units requested.	
	OR	
	Description of the training and experience demonstrating that the proposed AMP is qualified by training and experience identified in *10 CFR 35.51(b) for the units requested.*	☐
	AND	
	Written certification, signed by a preceptor AMP, that the above training and experience has been satisfactorily completed and that a level of competency sufficient to function independently as an AMP has been achieved.	☐
	AND	
	If applicable, description of recent related continuing education and experience as required by 10 CFR 35.59.	☐
Item 9: Facility Diagram	A diagram is enclosed that describes the facilities and identifies activities conducted in all contiguous areas surrounding the area(s) of use. The following information is included:	☑
	• Drawings should be to scale, and indicate the scale used.	☑
	• Location, room numbers, and principal use of each room or area where byproduct material is prepared, used or stored, as provided above under the heading "Discussion";	☑
	• Location, room numbers, and principal use of each adjacent room (e.g., office, file, toilet, closet, hallway), including areas above, beside, and below therapy treatment rooms; indicate whether the room is a restricted or unrestricted area as defined in 10 CFR 20.1003; and	☑
	• Provide shielding calculations and include information about the type, thickness, and density of any necessary shielding to enable independent verification of shielding calculations, including a description of any portable shields used (e.g., shielding of proposed patient rooms used for implant therapy including the dimensions of any portable shield, if one is used; source storage safe, etc.).	☑
	In addition to the above, for teletherapy and GSR facilities, applicants should provide the directions of primary beam usage for teletherapy units and, in the case of an isocentric unit, the plane of beam rotation.	☐

Table C.3 (continued)

Item Number and Title	*Suggested Response*	Check box to indicate material included in application
Item 9: Radiation Monitoring Instruments	A statement that: "Radiation monitoring instruments will be calibrated by a person qualified to perform survey meter calibrations."	☑
	AND/OR	
	A statement that: "We have developed and will implement and maintain written survey meter calibration procedures in accordance with the requirements in 10 CFR 20.1501 and that meet the requirements of 10 CFR 35.61."	☑
	AND	
	A description of the instrumentation (e.g., gamma counter, solid state detector, portable or stationary count rate meter, portable or stationary dose rate or exposure rate meter, single or multichannel analyzer, liquid scintillation counter, proportional counter) that will be used to perform required surveys.	☑
	AND	
	A statement that: "We reserve the right to upgrade our survey instruments as necessary as long as they are adequate to measure the type and level of radiation for which they are used."	☑
Item 9: Dose Calibrator and Other Dosage Measuring Equipment	A statement that: "Equipment used to measure dosages will be calibrated in accordance with nationally recognized standards or the manufacturer's instructions."	☑
Item 9:Therapy Unit - Calibration and Use	We are providing the procedures required by 10 CFR 35.642, 10 CFR 35.643, and 10 CFR 35.645, if applicable to the license application.	☐
Item 9: Other Equipment and Facilities	Attached is a description identified as Attachment 9.4, of additional facilities and equipment.	☐
	For manual brachytherapy facilities, we are providing a description of the emergency response equipment.	☐
	For teletherapy, GSR, and remote afterloader facilities, we are providing a description of the following:	
	• Warning systems and restricted area controls (e.g., locks, signs, warning lights and alarms, interlock systems) for each therapy treatment room;	☐
	• Area radiation monitoring equipment;	☐
	• Viewing and intercom systems (except for LDR units);	☐
	• Steps that will be taken to ensure that no two units can be operated simultaneously, if other radiation-producing equipment (e.g., linear accelerator, X-ray machine) are in the treatment room;	☐
	• Methods to ensure that whenever the device is not in use or is unattended, the console keys will be inaccessible to unauthorized persons; and	☐
	• Emergency response equipment.	☐
Item 10. Safety Procedures and Instructions	Attached procedures required by 10 CFR 35.610	☐

Table C.3 (continued)

Item Number and Title	Suggested Response	Check box to indicate material included in application
Item 10: Occupational Dose	A statement that: "Either we will perform a prospective evaluation demonstrating 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 provide dosimetry that meets the requirements listed under "Criteria" in NUREG-1556, Vol. 9, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Medical Use Licensees," dated October 2002."	☑
	OR	
	A description of an alternative method for demonstrating compliance with the referenced regulations.	☐
Item 10: Area Surveys	A statement that: "We have developed and will implement and maintain written procedures for area surveys in accordance with 10 CFR 20.1101 that meet the requirements of 10 CFR 20.1501 and 10 CFR 35.70."	☑
Item 10: Safe Use of Unsealed Licensed Material	A statement that: "We have developed and will implement and maintain procedures for safe use of unsealed byproduct material that meet the requirements of 10 CFR 20.1101 and 10 CFR 20.1301."	☑
Item 10: Spill Procedures	A statement that: "We have developed and will implement and maintain written procedures for safe response to spills of licensed material in accordance with 10 CFR 20.1101."	☑
Item 10: Installation, Maintenance, Adjustment, Repair, and Inspection of Therapy Devices Containing Sealed Sources	Name of the proposed employee and types of activities requested: _____.	☐
	AND	
	Description of the training and experience demonstrating that the proposed employee is qualified by training and experience for the use requested.	☐
	AND	
	Copy of the manufacturer's training certification and an outline of the training in procedures to be followed.	☐
Item 10: Minimization of Contamination	A response is not required under the following condition: the NRC will consider that the above criteria have been met if the information provided in applicant's responses satisfy the criteria in Sections 8.14, 8.15, 8.20, 8.24, 8.26, and 8.28, on the topics: Facility and Equipment; Facility Diagram; Radiation Protection Program; Safety Program; and Waste Management.	N/A
Item 11: Waste Management	A statement that: "We have developed and will implement and maintain written waste disposal procedures for licensed material in accordance with 10 CFR 20.1101, that also meet the requirements of the applicable section of Subpart K to 10 CFR Part 20 and 10 CFR 35.92."	☑

Radioactive Material	Chemical and/or physical form	Maximum Quantity	Authorized Uses
A. Molybdenum-99	Any molybdenum-99/technetium-99m generator manufactured, labeled, packaged, and distributed in accordance with specific license issued pursuant to 32.72 of 10 CFR Part 32 or a specific license issued to a manufacturer by the NRC pursuant to equivalent regulations.	30 Curies	Production of technetium-99m pertechnetate. Redistribution to authorized recipients
B. Xenon-133	Unit dose containers of gas or gas in solution that is the subject of an active (i.e. not withdrawn or terminated)"New Drug Application" (NDA) approved by FDA or an active (i.e. not withdrawn, terminated, or on "clinical hold") "Notice of Claimed Investigational Exemption for a New Drug" (IND) that has been accepted by the FDA.	2 Curies	Distribution to authorized recipients
C. Iodine-131	Any form listed in 10 CFR 35.300	500 mCi	Dispensed and/or distributed prepared radiopharmaceuticals to authorized recipients. Iodine-131 as iodine listed in 10 CFR 35.300 for compounding and dispensing as iodine-131 capsules and distributed to authorized recipients.
D. Technetium-99m	Any form listed in 10 CFR 35.200	30 Curies	Dispensing and/or distribution of prepared radiopharmaceuticals to authorized recipients. Use of technetium-99m pertechnetate for processing with reagent kits in preparation of radiopharmaceuticals.
E. Any radioactive material, except Iodine-131 and Technetium-99m, listed in 10 CFR 35.100	Any form listed in 10 CFR 35.100	As Needed	Dispensing and/or distributing prepared radiopharmaceuticals to authorized recipients.
F. Any radioactive material, except Iodine-131 and Technetium-99m, listed in 10 CFR 35.200	Any form listed in 10 CFR 35.200	As Needed	Dispensing and/or distributing prepared radiopharmaceuticals to authorized recipients.
G. Uranium (depleted in the isotope Uranium 235)	Plated or encapsulated metal	500 Kilograms	As shielding material in generators

Radioactive Material	Chemical and/or physical form	Maximum Quantity	Authorized Uses
H. Any radionuclide with atomic numbers 3-83, inclusive	Sealed source. Any sealed source listed in 10 CFR 35.65 that has been manufactured, labeled, packaged, and distributed in accordance with specific license issued pursuant to 32.72 of 10 CFR Part 32 or a specific license issued to a manufacturer by the NRC pursuant to equivalent regulations	250 millicuries; no single source to exceed 30 millicuries	Instrument calibration. Redistribution of sealed sources to specifically authorized recipients. Pursuant to 10 CFR 35.65(b), the licensee is authorized to redistribute sources to persons licensed pursuant to 10 CFR 32.11, or other persons specifically licensed to receive such source.
I. Any radioactive material	Analytical Samples	As Needed	For possession incident to the performance of wipe tests of sealed sources for the licensee and as a customer service
J. Iodine-125	Sealed source	500 millicuries	Receipt, storage and distribution upon prescription to authorized recipients.
K. Gold-198	Sealed source	500 Millicuries	Receipt, storage and distribution upon prescription to authorized recipients.
L. Iridium-192	Sealed source	500 millicuries	Receipt, storage and distribution upon prescription to authorized recipients.
M. Cesium-137	Sealed source	500 millicuries	Receipt, storage and distribution upon prescription to authorized recipients.
N. Palladium-103	Sealed source	2 Curies	Receipt, storage and distribution upon prescription to authorized recipients.
O. Fluorine-18	Any	As Needed	Receipt, storage and distribution upon prescription to authorized recipients.
P. Yttrium-90	Liquid	As Needed	Receipt, storage and distribution upon prescription to authorized recipients.

Pursuant to 10 CFR 32.72, we request authorization to distribute the radioactive material described in Table C.2 of this application to persons licensed pursuant to 10 CFR 32.11, or under equivalent licenses of Agreement States, for the Groups indicated below:

C. Through P. (Above)	Any form listed 10 CFR 35.100, 10 CFR 35.200, 10 CFR 35.300 and 10 CFR 35.400 may be distributed to persons licensed pursuant to those sections.

THE AMERICAN REGISTRY OF
RADIOLOGIC TECHNOLOGISTS
USE ORIGINAL CARD FOR VERIFICATION

I.D. Number	Registration Category	Valid Thru End Of
230833	N	AUG-2006

VINCENT TROY CURNUTT, R.T.
1778 MORNING GLORY
POCATELLO, ID 83201

In Compliance with CE Requirements

NEVADA STATE HEALTH DIVISION

RADIOACTIVE MATERIAL LICENSE

Pursuant to Nevada Revised Statute 459.030 and Nevada Administrative Code 459.196 and in reliance on statements and representations heretofore made by the licensee designated below a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material designated below and to use such radioactive material for the purpose(s) and at the location(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect and to any conditions specified below.

1. Name: Nevada Heart and Vascular Center	3. License Number: 03-12-0424-01
2. Address: 3150 N. Teneya Way, Suite 550 Las Vegas, NV 89128	4. Expiration Date: September 30, 2003
	5.

6. Radioactive material:	7. Chemical and/or physical form:	8. Maximum quantity licensee may possess at any one time:
A. Any radioactive material identified in Nevada Administrative Code (NAC) 459.247 except that iodine 131 or iodine 125 in doses greater than 30 microcuries are not authorized	A. Any radiopharmaceutical identified in NAC 459.247	A. As needed
B. Any radioactive material identified in NAC 459.2481 except that radionuclide generators, radioactive gases, and radioactive aerosols are not authorized; iodine 131 or 125 in doses greater than 30 microcuries are not authorized	B. Any radiopharmaceutical identified in NAC 459.2481	B. As needed

NEVADA STATE HEALTH DIVISION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 03-12-0424-01

Continued . . .

9. Authorized Use:

   A. Medical use as described in NAC 459.247.

   B. Medical use as described in NAC 459.2481.

CONDITIONS

10. Radioactive material shall be stored and used only at the licensee's facility located at 3150 N. Teneya Way, Suite 550, Las Vegas, NV.

11. Radioactive material shall be used only by, or under the supervision of, Donald James McSweyn, M.D.

12. The Radiation Safety Officer for activities authorized by this license shall be Troy Vincent Curnutt RT(N).

13.A. Individuals working with Iodine-131 in quantities greater than 1.0 millicurie per calendar quarter with chemical and physical forms that make it possible that radionuclides will be ingested, inhaled or absorbed shall be included in a bioassay program. Bioassay shall be performed within six to seventy-two hours after exposure to radioiodine.

B.(1) Notwithstanding the requirement in Part A. above, individuals participating in the medical administration of Iodine-131 in capsule or liquid form in a closed system (i.e. sealed vial and double lumen needle patient delivery system.), in quantities greater than 1 millicurie per calendar quarter and less than 15 millicuries per patient, shall be included in a quarterly bioassay program. The quarterly bioassay shall be performed within six to seventy-two hours after exposure to radioiodine.

NEVADA STATE HEALTH DIVISION

RADIOACTIVE MATERIAL LICENSE

SUPPLEMENTARY SHEET

License Number 03-12-0424-01

Continued . . .

13.B.(2) Individuals exposed to Iodine-131 due to an accidental spill, crushed capsule, or patient vomiting, or individuals exposed to a quantity equal to 15 millicuries or larger shall participate in a bioassay program in accordance with Part A above.

C. Bioassays shall consist of the measurement of the amount of radioiodine contained in the thyroid compared to a suitable standard.

D.(1) Thyroid burden of less than 0.04 microcuries of Iodine-131 will require no action.

(2) Thyroid burdens of 0.04 microcuries or greater of Iodine-131 shall be investigated as to the circumstances surrounding the uptake. Bioassays shall continue at weekly intervals until the thyroid burden has dropped below the levels specified in D.(1).

(3) Should the thyroid burdens exceed 0.14 microcuries of Iodine-131, the licensee shall restrict the worker from further radioiodine exposure until the burden falls below the levels specified in D.(1).

E. Records of all bioassay measurements described above will be maintained as part of the personnel dosimetry, retained indefinitely, and be made available for inspection by the Nevada State Health Division.

14. 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. NAC 459 shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated June 11, 1998, signed by Donald J. McSweyn, M.D.

September 3, 1998

Stanley R. Marshall, Supervisor
Radiological Health Section
Bureau of Health Protection Services
Nevada State Health Division

f\ph\ram\nhvclic

January 1, 1993

Larry Boschult
Health Division
Radiological Health Division
505 E. King Street
Carson City, Nevada 89710

Dear Mr. Boschult:

We at Cardiovascular Center of Southern Nevada would like to amend our licenses (#03-12-0293-1 and #03-12-0320-01) to add Vincent Troy Curnutt RT(N) as an alternate Radiation Safety Officer (RSO).

Vincent Troy Curnutt RT(N) qualifies under 35.900 (b), (1), (i), (ii), (iii), (iv), (v), (2), which reads:

35.900 RADIATION SAFETY OFFICER

Except as provided in 35.901, the licenser shall require an individual fulfilling the responsibilities of the RADIATION SAFETY OFFICER as provided in 35.32 to be an individual who:

(b) Has had classroom and laboratory training and experience as follows:

(1) 200 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation Protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity;

(iv) Radiation biology; and

(v) Radiopharmaceutical chemistry; and

(2) One year of full time experience as a Radiation Safety Technologist at a medical institution under the supervision of the individual identified as The Radiation Safety Officer on a division, Nuclear Regulatory Commission or Agreement State license that authorizes the medical use of radioactive material.

Vincent Troy Curnutt obtained a Bachelor of Science in Radiological Sciences from The University of Nevada, Las Vegas (UNLV) on May 13, 1990.

Enclosed are copies of the courses taken at UNLV during the 1984-86 catalog in which Mr. Curnutt graduated under.

I will take from the catalog the classes that I believe relate to this application:

RAD 100

ORIENTATION TO RADIOLOGIC TECHNOLOGY

Explains radiography, relates it to radiology and the hospital. Includes medical ethnics, hospital and departmental economics, professional organizations and membership, certification examinations, university and radiologic technology program requirements, professional opportunities. Basic radiographic terminology and radiation protection are emphasized.

3 credits.

17 weeks x 3 hours per week =51 hours

RAD 111
INTRODUCTION TO RADIATION SCIENCE
The atomic chart of the nuclides, natural and inducted radioactivity, properties of nuclear and atomic radiations, radiation detection, nuclear reactors and radiation control agencies. 10 clock hours relate to radiation biology topics.
3 credits
17 weeks x 3 hours per week =51 hours

RAD 113
RADIATION SAFETY I
Concepts of radiation units and dose determinations, shielding, biological effects of radiation, radiation protection standards, internal dole calculations, health physics instruments, personnel monitoring. Twenty clock hours pertain to radiation biology topics.
3 credits
17 weeks x 3 hours per week = 51 hours

RAD 145
PHYSICS OF NUCLEAR MEDICINE
Introduction to basic physics and mathematics as applicable to nuclear medicine. Principles of imaging and non-imaging nuclear medicine instrumentation will be stressed.
2 credits
17 weeks x 2 hours per week = 34 hours

RAD 146
RADIOPHARMACEUTICALS
A lecture and demonstration presentation of the technology utilized in production, distribution, dose preparation and imaging of radioactive tracers in medicine. Emphasis will be placed on the rationale of radiopharmaceutical choice and practical implications of radionuclide characteristics exhibited in medical care.
2 credits
17 weeks x 2 hours per week =34 hours

RAD 154
DIAGNOSTIC AND THERAPEUTIC NUCLEAR MEDICINE
Preparation for nuclear medicine clinical courses. Theory of diagnostic and therapeutic nuclear medicine Studies, including anatomy and physiology of organs/systems, radiopharmaceuticals used in each study, methods of study performance, dose preparation and administration, imaging parameters and equipment calibration.
3 credits
17 weeks x 3 hours =51 hours

RAD 159
PHYSICS OF NUCLEAR MEDICINE LABORATORY
Experience with the use of monitoring devices and procedures related to medical application of radionuclides.
1 credit

17 weeks x 1 hour = 17 hours

RAD 404
RADIOISOTOPE TECHNOLOGY
An introduction to the use of radiation detection instruments and the preparation of radioactive samples. Includes instruction in radiation biology topics.
1 credit
17 weeks x 1 hour =17 hours

RAD 406
RADIATION SAFETY II
Monitoring procedures pertaining to x-ray machines, particle accelerators, teletherapy units, gamma cameras, radioisotope spills, and nuclear criticalities. Five clock hours pertain to radiation biology topics.
2 credits
17 weeks x 2 hours = 34 hours

RAD 414
RADIOISOTOPE LABORATORY
Laboratory experiment in physics, chemistry, biology, and statistical analysis relevant to radioisotope technology.
2 credits
17 weeks x 2 hours = 34 hours

RAD 440
NUCLEAR MEDICINE IN VITRO LABORATORY PROCEDURES
Utilization of the principles of saturation analysis and competitive protein binding applied to assays; laboratory quality assurance program; the operation of electronic equipment for radioassay and quality control, including practical experience in hospital laboratories.
3 credits
17 weeks x 3 hours = 51 hours

RAD 448
PATHOLOGY IN NUCLEAR MEDICINE
Pathologic processes commonly traced with radioactive substances are presented through case studies and by discussion of each organ system diagnostically studied in nuclear medicine. Emphasis is placed on aspects of anatomy and physiology of special interest in nuclear medicine and radionuclide therapy.
3 credits
17 weeks x 3 hours = 51 hours

RAD 471
NUCLEAR MEDICINE LABORATORY
Hospital applications of instruments including imaging of the brain, lung, heart, liver, spleen, kidney, and bones. Practical experience in radiation measurement and protection, and quality control procedures.

4 credits
17 weeks x 4 hours = 68 hours
Total lab hours=272 hours

RAD 472
RADIOPHARMACEUTICAL LABORATORY
Laboratory procedures for the proper handling of radionuclides. Applications of radiation protection principles utilizing common laboratory equipment. Practical experience in radiopharmaceutical preparation and aseptic technique.
1 credit
17 weeks x 1 hour = 17 hours

I have enclosed the form entitled "TRAINING AND EXPERIENCE AUTHORIZED USER OR RADIATION SAFETY OFFICER",exhibit 2, supplement A, as published in the REGULATORY GUIDE 10.8, which will describe the training,experience and dates for Mr. Curnutt.

As a personal note, I have worked in Nuclear Medicine for almost 6 years. During this time I have worked in 2 hospitals,started an out patient Nuclear Medicine department for Nevada Medical Center, and recently completing a new satellite office for the Cardiovascular Center of Southern Nevada. I believe I have a good understanding of the Regulatory Guide 10.8, as well as the Nevada Policy Document. My total hours at UNLV, in the Nuclear Medicine program are in excess of 600 hours, and my experience with actual use of radioactive materials over 6 years, I cannot even begin to calculate. I believe very strongly in radiation protection(ALARA) and all facets therein. I am committed to nuclear medicine and believe that I would make a candidate to the position of Radiation Safety Officer.

Thank you for your time and look forward to speaking with you in the future.

Sincerely,

Troy Vincent Curnutt

Troy Vincent Curnutt B.S., RT(N)

Joseph A. Kaufman M.D., RSO

EXHIBIT 2

SUPPLEMENT A

SUPPLEMENT

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF PROPOSED AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. FOR PHYSICIANS, STATE OR TERRITORY WHERE LICENSED
VINCENT TROY CURNUTT	

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
THE AMERICAN REGISTRY OF RADIOLOGIC TECHNOLOGISTS	NUCLEAR MEDICINE RT(N) LICENSE# 230833	AUGUST 1990

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING: CLOCK HOURS IN LECTURE OR LABORATORY	TYPE AND LENGTH OF TRAINING: CLOCK HOURS OF SUPERVISED ON-THE-JOB EXPERIENCE
a. RADIATION PHYSICS AND INSTRUMENTATION	UNLV -FALL 85-RAD 145 UNLV -FALL 85-RAD 159 UNLV -SPRING 86-RAD 414	34 17	
b. RADIATION PROTECTION	UNLV-FALL 86-RAD 113 UNLV-SPRING 87-RAD 406	51 34	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	UNLV-FALL 85-RAD 145 UNLV-FALL 85-RAD 154	51	
d. RADIATION BIOLOGY	UNLV-FALL 86-RAD 111 UNLV-FALL 86-RAD 113 UNLV-SPRING 85-BIO 191	10 20 34	
e. RADIOPHARMACEUTICAL CHEMISTRY	UNLV-SPRING 86-RAD 146 UNLV-SPRING 86-RAD 404 UNLV-SPRING 86-RAD 414 UNLV-FALL 86 RAD 472	34 17 31 17	

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	mCi USED AT ONE TIME	LOCATION	CLOCK HOURS	TYPE OF USE
Tc99m	5-25mCi	NEVADA MEDICAL CENTER	92+ hours	Bone,liver,lung,hear kidney,&gallbladder.
Tc99m	150mCi	" " "	3 hours	Linearity check
I123	300uCi	" " "	9.5 hours	Thyroid uptake&scan
Xe-133	10-20mCi	" " "	10.25 hours	Lung ventilation stu
Tl-201	3mCi	" " "	73 hours	Cardiac perfusion
Tl-201	3mCi	Cardiovascular Center of Southern Nevada	158 hours	Cardiac perfusion

EXHIBIT 3

SUPPLEMENT B

SUPPLEMENT — U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. PROPOSED PHYSICIAN USER'S NAME AND ADDRESS

FULL NAME

VINCENT TROY CURNUTT

STREET ADDRESS

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheet.) D
	Thyroid scan	0	
	Thyroid uptake	0	
	Lung perfusion scan	3	
	Xenon ventilation study	0	
	Aerosol ventilation scan	0	
	Renal flow scan	0	
	Brain scan	0	
	Liver/spleen scan	0	
	Bone scan	0	
	Gastroesophageal study	0	
	LeVeen shunt study	0	
	Cystogram	0	
	Dacryocystogram	0	
	Cardiac perfusion scan.	448	Tl-201 Chloride
	Cardiac stress ventriculogram	0	
	Cardiac rest ventriculogram	10	
	Gallium scan	0	
	Persantine Cardiac		
	Perfusion scan	186	Tl-201 Chloride
	TOTAL	634	

EXHIBIT 3 (Continued)

PROPOSED PHYSICIAN USER

VINCENT TROY CURNUTT

PRECEPTOR STATEMENT (Continued)

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN (Continued)

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheet.) D
P-32 (Sodium)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	0	
P-32 (Colloidal)	INTRACAVITARY TREATMENT	0	
I-131	TREATMENT OF THYROID CARCINOMA	0	
	TREATMENT OF HYPERTHYROIDISM	0	
Au-198	INTRACAVITARY TREATMENT	0	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	0	
	INTRACAVITARY TREATMENT	0	
I-125 or Ir-192	INTERSTITIAL TREATMENT	0	
Co-60 or Cs-137	TELETHERAPY TREATMENT	0	
Sr-90	TREATMENT OF EYE DISEASE	0	
	RADIOPHARMACEUTICAL PREPARATION	634	
Mo-99/ Tc-99m	GENERATOR	**	
Sn-113/ In-113m	GENERATOR	**	
Tc-99m	REAGENT KITS	**	** UNLV-SPRING 86-RAD 414 UNLV-FALL 86-RAD 472
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

LOCATION	DATES	CLOCK HOURS OF EXPERIENCE
CARDIOVASCULAR CENTER OF SOUTHERN NEVADA 2625 S. RAINBOW A&100 Las Vegas Nevada 89102 3930 S. Eastern, Las Vegas Nevada 89119	1-92 to 1-93	1 year

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

a. NAME OF SUPERVISOR
Joseph A. Kaufman M.D.,RSO

b. NAME OF INSTITUTION
CARDIOVASCULAR CENTER OF SOUTHERN NEVADA

c. MAILING ADDRESS
3930 S. Eastern, Las Vegas Nevada 89119

d. CITY

5. MATERIALS LICENSE NUMBER(S)
03-12-0293-01 & 03-12-0320-01

6. PRECEPTOR'S SIGNATURE

7. PRECEPTOR'S NAME (Please type or print)
Joseph A. Kaufman M.D.,RSO

8. DATE
December 31, 1992

EXHIBIT 3

SUPPLEMENT B

SUPPLEMENT — U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. PROPOSED PHYSICIAN USER'S NAME AND ADDRESS

FULL NAME

VINCENT TROY CURNUTT

STREET ADDRESS

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

Ex 6
Ex 6

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheets.) D
	Thyroid scan	38	I-123
	Thyroid uptake	38	I-123
	Lung perfusion scan	41	Tc99m-MAA
	Xenon ventilation study	41	Xe-133
	Aerosol ventilation scan	0	
	Renal flow scan	52	Tc99m-DTPA
	Brain scan	0	
	Liver/spleen scan	68	Tc99m-S.C.
	Bone scan	200	Tc99m-MDP
	Gastroesoonageal study	1	Tc99m
	LeVeen shunt study	0	
	Cystogram	0	
	Dacryocystogram	0	
	Cardiac perfusion scan.	269	Tl-201 Chloride
	Cardiac stress ventriculogram	0	
	Cardiac rest ventriculogram	4	Tc99m-PYP
	Gallium scan	1	Ga-67 Citrate
	Hepatobiliary scan	33	Tc99m-Choletec
	Testicular flow and scan	4	Tc99m
	Persantine Cardiac perfusion	23	Tl-201 Chloride
	TOTAL	813	

EXHIBIT 3 (Continued)

PROPOSED PHYSICIAN USER

VINCENT TROY CURNUTT

PRECEPTOR STATEMENT (Continued)

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN (Continued)

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS (Additional information or comments may be submitted in duplicate on separate sheet.) D
P-32 (Soluble)	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	0	
P-32 (Colloidal)	INTRACAVITARY TREATMENT	0	
I-131	TREATMENT OF THYROID CARCINOMA	0	
	TREATMENT OF HYPERTHYROIDISM	0	
Au-198	INTRACAVITARY TREATMENT	0	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	0	
	INTRACAVITARY TREATMENT	0	
I-125 or Ir-192	INTERSTITIAL TREATMENT	0	
Co-60 or Cs-137	TELETHERAPY TREATMENT	0	
Sr-90	TREATMENT OF EYE DISEASE	0	
	RADIOPHARMACEUTICAL PREPARATION	813	
Mo-99/ Tc-99m	GENERATOR	**	**UNLV-SPRING 86-RAD 414
Sn-113/ In-113m	GENERATOR	**	&
Tc-99m	REAGENT KITS	**	UNLV-FALL-86-RAD 472
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

LOCATION	DATES	CLOCK HOURS OF EXPERIENCE
NEVADA MEDICAL CENTER 3880 S. Jones Las Vegas Nevada 89103	3-90 to 3-92	2 years

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

4. NAME OF SUPERVISOR: JOHN I. PRETTO

5. NAME OF INSTITUTION: NEVADA MEDICAL CENTER

6. MAILING ADDRESS: 3880 S. Jones

4. CITY: Las Vegas, NV. 89103

6. MATERIALS LICENSE NUMBER(S): 03-12-0288-01

6. PRECEPTOR'S SIGNATURE: John I Pretto, MD, ACR

7. PRECEPTOR'S NAME (Please type or print): John I. Pretto M.D.,RSO

8. DATE: 12/23/92

CARDIOVASCULAR CENTER of SOUTHERN NEVADA

Joseph A. Kaufman M.D., F.A.C.C.
Paul V. Heeren M.D., F.A.C.C.
Syam S. Muntha M.D.
Richard R. Shehane M.D., F.A.C.C.
Donald J. McSweyn M.D.
Cres P. Miranda, Jr. M.D.

January 1, 1993

RE: TROY VINCENT CURNUTT, B.S., R.T.(N)

TO WHOM IT MAY CONCERN:

This letter is to affirm that Troy Vincent Curnutt has gained clinical experience at the Cardiovascular Center of Southern Nevada (License # 03-12-0293-01 and license #03-12-0320-01) in nuclear medicine starting in January 1992 until January of 1993. During this time he has supervised clinical experience, both in the pre-test and post test evaluation of patients for nuclear studies as well as the technical aspects of the studies themselves including isotope preparation, administration,and scanning procedures. During this period he has been principally involved in over 634 Thallium 201 exercise studies including test selection, testing procedures, and evaluation of the test results. The total time of nuclear medicine experience during this period has been 1902 hours.

When Mr. Curnutt started working for the Cardiovascular Center of Southern Nevada, one of his job descriptions included assuming the role of radiation safety technologist, under my supervision. He has fulfilled the role of radiation safety technologist in our facility very well.

Sincerely,

Joseph A. Kaufman, M.D., R.S.O.
JAK/bt

Westside: 2625 S. Rainbow Blvd., Suite A-100, Las Vegas, NV 89102 • Telephone (702) 364-0505
Eastside: 3930 S. Eastern, Las Vegas, NV 89119 • Telephone (702) 892-0052

January 1, 1993

RE: TROY VINCENT CURNUTT B.S., RT(N)

TO WHOM IT MAY CONCERN:

This letter is to affirm that Troy Vincent Curnutt has gained clinical experience at Nevada Medical Center(license # 03-12-0288-01) in nuclear medicine starting in March 1990 until January of 1992. During this time he has had supervised clinical experience, both in the pre-test and post test evaluation of patients for nuclear studies as well as the technical aspects of the studies themselves including isotope preparation, administration, and scanning procedures. During this period he has been principally involved in over 813 general nuclear medicine studies including, test selection, testing procedures, and evaluation of the test results. The total time of nuclear medicine experience during this period has been 2439 hours.

Sincerely,

John I. Pretto M.D., RSO

	Credit Hours
1. A minimum of 30 credits from an approved associated degree radiologic technology program	30
2. Health Sciences:	
a. RAD 406, 408, 415, 416, 462 and 463	17
b. Approved 400-level radiological sciences courses	6
3. Arts and Letters:	
a. ENG 101, 102, 104 or another course in English, American or World Literature offered by the English Department (literature includes fiction, drama and poetry)	9
b. Fine Arts: Introductory courses from ART, MUS, THA or DAN (except DAN 190)	3
c. Humanities: Courses from philosophy, foreign languages, history, public speaking (COS 101) and literature (maximum of 3 in literature). Literature courses limited to courses eligible in ENG section	6
d. History: U.S. and Nevada Constitutions	4-6
e. PHI 102, 103, 105, or MAT 111	3
f. Social Sciences: One course in three fields selected from anthropology, economics, geography, political science, psychology or sociology (including EDU 401). Excluded are ANT 109, 110, physical geography, all statistics courses	9
4. Science, Math and Engineering:	
BIO 110, 191, MAT 102	9
Any CSC, MIS or statistics course	3
5. Electives:	
15 of which must be 400-level courses	25

Students desiring to pursue a career in administration are advised to take the following courses as part of their approved electives:

Health Sciences: RAD 417.

Arts and Letters: PSY 101 and SOC 471.

Business and Economics: ACC 151, 152; MIS 101 and 105; BUS 101, 173, 404; MGT 401, 467 and 492.

Students desiring to pursue a career in education are advised to take the following courses as part of their approved electives:

Education: EDU 451, 475, and 499; ESE 498 and 571.

Students desiring a career in angiography must be licensed or registered diagnostic radiographers. It is advised that students take the following courses as part of their approved electives:

Health Sciences: RAD 461, 464, 466, 467 and 468.

Nuclear Medicine. The nuclear medicine option provides professional opportunities in the sciences and clinical techniques of nuclear medicine. A student must have junior standing in the radiological sciences department or have completed all lower-division courses required for nuclear medicine to be admitted to the nuclear medicine program. Entering high school students must complete university requirements and nuclear medicine lower-division courses during their freshman and sophomore years.

Hospital-trained nuclear medicine applicants who have an approved license, registry, or certificate may petition for credit after successfully completing 15 credits at UNLV. The amount of credit awarded is determined by the type of license, registry, or certificate awarded to the applicant; year the license, registry, or certificate was awarded; and evaluation of the applicant's hospital transcript. A maximum of 44 credits may be awarded to eligible applicants. A student receiving credit for a registry, certificate, or license must complete a minimum of 24 credits of 400-level courses in the department of radiological sciences. Multiple-registered applicants may receive credit for only one registry, license, or certificate. The credit awarded is applicable only toward the bachelor of science degree in radiological sciences. The transfer of credits received for license, registry, or certificate to other departments, colleges, or universities is at the discretion of the involved department, college, or university.

1. Health Sciences:	
RAD 100, 111, 113, 129, 139, 145, 146, 154, 159, 404, 406, 414, 416, 440, 448, 462, 471 (four times), 472, 499b	55
2. Science, Math and Engineering:	
BIO 110, 143, 144, 150, 191; CHE 110	20
3. Meet core requirements as stated by the university	34

Radiation Health Science. The radiation health science option provides professional opportunities in the radiation health science areas of medicine, government, national laboratories, private consulting groups and academics. Graduates of the program are eligible for immediate employment or may elect to pursue a master's degree in radiation health science. Due to security reasons, only U.S. citizens will be allowed to visit the Nevada Test Site during field trips or laboratory classes.

	Credit Hours
1. Health Sciences:	
RAD 105, 111, 113, 115, 145, 146, 159, 404, 406, 408, 410, 414, 415, 472, 492, 499a, 499e, 499i	35
2. Arts and Letters:	
a. ENG 101, 102 and ENG 404	9
b. History: U.S. and Nevada Constitutions	4-6
c. Social Sciences: One course in three fields selected from ANT, POS, PSY, or SOC (excluded are ANT 109, 110, physical geography, all statistics courses)	6
d. Fine Arts: Appreciation or introductory courses selected from ART, MUS, THA and DAN, except DAN 190	3

e. Humanities: Courses selected from PHI, foreign languages, HIS, public speaking (COS 101) and literature. A maximum of 3 hours may be taken in literature (literature courses limited to those in the ENG section) 6

3. Science and Math:

BIO 110, 143, 144 and 191	12
CHE 115 and 116	8
PHY 115 and 156	8
PHI 102, 103, 105 or MAT 111	3
MAT 105, 121, 122	13
Approved statistics course	3

4. Electives:

14 of which must be 400-level courses 15-17

RAD 100.
Orientation to Radiologic Technology.
Explains radiography, relates it to radiology and the hospital. Includes medical ethics, hospital and departmental economics, professional organizations and membership, certification examinations, university and radiologic technology program requirements, professional opportunities. Basic radiographic terminology and radiation protection are emphasized. Prerequisite: Consent of instructor. 1-3 credits.

RAD 103.
Radiographic Positioning and Anatomy I.
Lecture and demonstration of radiographic positioning for extremities and for visualization of viscera, including thorax, abdomen, and pelvis. Detailed study of radiographic skeletal anatomy and terminology. Prerequisite: Formal admission to the program or consent of instructor. 3 credits.

) 104.
Radiographic Positioning and Anatomy II.
Lecture and demonstration of mobile radiographic procedures, and procedures for visualization of the thorax, hips, pelvis, vertebral column, and skull. Detailed study of radiographic skeletal anatomy and terminology. Prerequisites: RAD 103 and assignment to a clinical education center in radiologic technology. 3 credits.

RAD 105.
Physics of X-ray Production.
Discussion of x-ray machine transformers, rectifiers and circuits. Theory of x-ray production. Must be taken concurrently with RAD 115. Prerequisite: Formal admission to the program. 2 credits.

RAD 106.
Radiographic Techniques.
Demonstration of the phenomena and causes of image formation and visualization. Radiographic principles and principles of radiographic quality are stressed. The context includes studies of technique-factor changes, the effects of various accessories and the effects of film processing chemicals. Causes of radiographic artifacts are discussed and explored. Prerequisite: RAD 105 or equivalent. 2 credits.

RAD 108.
Radiographic Techniques Lab.
Laboratory experiments employing various radiograph techniques to determine their effect on density, contrast, magnification, and definition. Also includes experiments of grids, subtraction techniques and linear tomography. Three hours laboratory. Must be taken concurrently with RAD 106. Prerequisite: RAD 105 or equivalent; or consent of instructor. 1 credit.

RAD 111.
Introduction to Radiation Science.
The atomic chart, chart of the nuclides, natural and inducted radioactivity, properties of nuclear and atomic radiations, radiation detection, nuclear reactors and radiation control agencies. Ten clock hours relate to radiation biology topics. 1-3 credits.

RAD 113.
Radiation Safety I.
Concepts of radiation units and dose determinations, shielding, biological effects of radiation, radiation protection standards, internal dose calculations, health physics instruments, personnel monitoring. Twenty clock hours pertain to radiation biology topics. Prerequisite: RAD 111 or consent of instructor. 1-3 credits.

RAD 115.
Physics of X-ray Production Lab.
Three hour laboratory experiments on magnetism, electromagnetism, rectification, and x-ray circuitry. Must be taken concurrently with RAD 105. Prerequisite: Formal admission to the program. 1 credit.

RAD 123.
Radiographic Positioning and Anatomy I Lab.
Phantom radiography including thoracic, abdominal and pelvic viscera, and positioning of the extremities, chest and shoulder girdle. Student-peer positioning, radiograph critique, and anatomy are integral parts of this course. Three hours laboratory. Must be taken concurrently with RAD 103. Prerequisite: Formal admission to the program or consent of instructor. 1 credit.

RAD 124.
Radiographic Positioning and Anatomy II Lab.
Phantom radiography using mobile procedures, and procedures for visualization of the thorax, hips, pelvis, vertebral column and skull. Student-peer positioning, radiograph critique, and anatomy are integral parts of this course. Three hours laboratory. Must be taken concurrently with RAD 104. Prerequisites: Completion of RAD 103 and assignment to a clinical education center in radiologic technology. 1 credit.

RAD 129.
Experience in Patient Care.
Patient care experience in body mechanics, environmental safety, sterile technique, vital signs. Also includes discussion of contrast media, GI tract, urinary tract and biliary system. Must be taken concurrently with RAD 139. Prerequisite: Consent of instructor. 1-2 credits.

RAD 130.
Clinical Education I.
A competency-based hospital laboratory where students gain clinical proficiency in radiography film processing, film filing, office procedures, patient transporting, observing and assisting in radiographic studies. Supervision by hospital and university personnel. 16 hours/week. Prerequisites: Prior or concurrent registration in RAD 100, 103, 105 and 111, and formal admission to the program. 1-3 credits.

RAD 131.
Clinical Education A.
A competency-based hospital laboratory where students gain proficiency in the areas of chest and abdominal radiography. Supervision by hospital and university personnel. Prerequisite: RAD 130. 1 credit.

RAD 132.
Clinical Education II.
A competency-based hospital laboratory where students gain proficiency in the areas of upper GI tract, lower GI tract, oral cholecystography and intravenous pyelography examinations. Supervision by hospital and university personnel. Prerequisites: Prior or concurrent enrollment in RAD 104, 106 and 129. 1-3 credits.

RAD 133.
Clinical Education III.
A competency-based hospital laboratory where students gain proficiency in the areas of the spine, pelvis, ribs, knee, ankle, shoulder, elbow and wrist radiography. Supervision by hospital and university personnel. Prerequisites: RAD 132 and completion of all first-year radiologic technology courses. 1-4 credits.

RAD 134.
Clinical Education IV.
A competency-based hospital laboratory where students gain proficiency in the areas of the toe, foot, os calcis, lower leg, femur, finger, hand, forearm, humerus, and sternum radiography. Supervision by hospital and university personnel. Prerequisites: RAD 133 and prior or concurrent registration in RAD 113 and 152. 4 credits.

RAD 135.
Clinical Education B.
A competency-based hospital laboratory where students gain proficiency in the area of portable radiography. Supervision by hospital and university personnel. Prerequisite: RAD 134. 1 credit.

RAD 136.
Clinical Education V.
A competency-based hospital laboratory where students gain proficiency in the areas of scapula, clavicle, AC joints, and skull radiography. Supervision by hospital and university personnel. Prerequisites: RAD 135 and prior or concurrent registration in RAD 156. 1-4 credits.

RAD 137.
Clinical Education VI.
A competency-based hospital laboratory where students gain proficiency in the areas of arthrography, myelography, tomography and surgery. In addition, the student will gain experience in the areas of lymphography, bronchography, hysterosalpingography, sialography, cholangiography, mammography and pelvimetry. Supervision by hospital and university personnel. Prerequisite: RAD 136. 4 credits.

RAD 139.
Experience in Patient Care Laboratory.
Laboratory experience in basic nursing care. Emphasis is on illness and its determination, sterile technic, contrast media, and basic life support. Must be taken concurrently with RAD 129. Prerequisite: Consent of instructor. 1 credit.

RAD 145.
Physics of Nuclear Medicine.
Introduction to basic physics and mathematics as applicable to nuclear medicine. Principles of imaging and non-imaging nuclear medicine instrumentation will be stressed. 2 credits.

RAD 146.
Radiopharmaceuticals.
A lecture and demonstration presentation of the technology utilized in production, distribution, dose preparation and imaging of radioactive tracers in medicine. Emphasis will be placed on the rationale of radiopharmaceutical choice and practical implications of radionuclide characteristics exhibited in medical care. Prerequisite: Concurrent enrollment in RAD 145. 2 credits.

RAD 152.
Introduction to Radiographic Pathology.
Radiographic anatomy with particular emphasis on pathological terminology which the student encounters in clinical areas. Hospital-based radiology lectures augment the student's understanding of radiographic anatomy, pathology and radiation biology. Prerequisite: Consent of instructor. 1-2 credits.

RAD 154.
Diagnostic and Therapeutic Nuclear Medicine.
Preparation for nuclear medicine clinical courses. Theory of diagnostic and therapeutic nuclear medicine. Studies, including anatomy and physiology of organs/systems, radiopharmaceuticals used in each study, methods of study performance, dose preparation and administration, imaging parameters and equipment calibration. Prerequisite: RAD 146. 3 credits.

RAD 156.
Introduction to Special Procedures.
Introduces students to the basic equipment and exams performed for basic special procedures. Content includes sialography, bronchography, myleography, pelvimetry, hysterosalpingography, arthrography, lymphangiography, xeroradiography, ultrasound, CT and introduction to angiographic methodology of approaches. Prerequisite: RAD 104 or consent of instructor. 1-2 credits.

RAD 159.
Physics of Nuclear Medicine Laboratory.
Experience with the use of monitoring devices and procedures related to medical application of radionuclides. Prerequisite: Concurrent enrollment in RAD 145. 1 credit.

RAD 404.
Radioisotope Technology.
An introduction to the use of radiation detection instruments and the preparation of radioactive samples. Includes instruction in radiation biology topics. Prerequisites: RAD 113 and concurrent enrollment in RAD 414. 1 credit.

RAD 406.
Radiation Safety II.
Monitoring procedures pertaining to x-ray machines, particle accelerators, teletherapy units, gamma cameras, radioisotope spills, and nuclear criticalities. Five clock hours pertain to radiation biology topics. Prerequisite: RAD 113 or consent of instructor. 2 credits.

RAD 408.
Environmental Radioactivity.
Radiation effects on man, physical and biological transport mechanisms, sources of environmental radioactivity, methods of environmental surveillance, and environmental contamination from accidents. Twenty clock hours pertain to radiation biology topics. Prerequisite: RAD 111 or consent of instructor. 3 credits.

RAD 410.
Scientific Illustration.
Techniques and materials used in the production of scientific nd medical illustrations. Practice in graphing, projections. dimensioning, shading, lettering, and paste-up for modern reproduction methods. Prerequisite: Consent of instructor. 3 credits.

RAD 414.
Radioisotope Laboratory.
Laboratory experiments in physics, chemistry, biology and statistical analysis relevant to radioisotope technology. Prerequisites: RAD 113 and concurrent enrollment in RAD 404. 2 credits.

RAD 415.
Radiographic Physics.
Diagnostic and therapy x-ray equipment; gamma-ray teletherapy; x-ray machine calibration and dose-rate measurement; quality control of diagnostic and therapy x-rays; radiation units. Prerequisite: RAD 105 or consent of instructor. 3 credits.

RAD 416.
Departmental Administration and Supervision.
Applies general principles of administration and supervision to departments of radiology. A description of the various administrative and supervisory positions and the duties related to each. Prerequisite: Registered technologist or consent of instructor. 3 credits.

RAD 417.
Departmental Records and Budgeting.
Includes all records normally kept in a hospital department f radiology. Instruction on and practical experience in writing yearly department budget. Three hours laboratory. Prerequisite: RAD 416 or consent of instructor. 2 credits.

RAD 430.
Medical Radiation Safety Practicum.
Observation and participation in radiation safety practice pertaining to radiation sources; radiation safety evaluations; state and federal standards; shielding; and internal and external dose calculations and measurements. The student will be assigned to a hospital and/or clinical laboratory. Prerequisites: RAD 404 and 414. 3 credits.

RAD 431.
Environmental Safety Practicum.
Environmental sampling techniques and measurements; food, air, and water protection guides; radiation accident management; and personnel dosimetry methods will be topics of investigation. Prerequisite: Consent of instructor. 3 credits.

RAD 432.
Radiation Methods and Standards Practicum.
Methods of preparation, measurement and calculation of radioactive standard materials. Quality control techniques used in various methodologies pertaining to radioactive standard materials, instrumentation and regulatory procedures will be investigated. Prerequisite: Consent of instructor. 3 credits.

RAD 440.
Nuclear Medicine In Vitro Laboratory Procedures.
Utilization of the principles of saturation analysis and competitive protein binding applied to assays; laboratory quality assurance program; the operation of electronic equipment for radioassay and quality control, including practical experience in hospital laboratories. Prerequisites: RAD 111 and prior or concurrent registration in RAD 146. May be repeated to a maximum of 6 credits. 3 credits.

RAD 448.
Pathology in Nuclear Medicine.
Pathologic processes commonly traced with radioactive substances are presented through case studies and by discussion of each organ system diagnostically studied in nuclear medicine. Emphasis is placed on aspects of anatomy and physiology of special interest in nuclear medicine and radionuclide therapy. Prerequisite: RAD 154 or consent of instructor. 3 credits.

RAD 450.
Introduction to Ultrasound.
Examination of the Doppler Principle and basic systems operation. Correlation of sectional anatomy with ultrasound procedures. Lectures and demonstration of imaging techniques and display modes of various ultrasound equipment. Prerequisite: RAD 156 or consent of instructor. 3 credits.

RAD 451.
Pathology for Ultrasound Technologists.
Advanced lectures on anatomy and pathology as they relate to ultrasound. Also includes discussion of patient positioning, scanning techniques and artifacts. Prerequisite: RAD 450. 2 credits.

RAD 452.
Ultrasound Laboratory.
Hospital-based laboratory allowing students the use of various types of ultrasound equipment to improve technical abilities. Includes demonstration and use of A-scan, B-scan, real-time and doppler. Prerequisites: RAD 450 and concurrent enrollment in RAD 451. 1 credit.

RAD 461.
Angiographic and Neurologic Instrumentation.
Lecture and demonstration related to instrumentation and accessories employed during angiographic and neurological procedures. Prerequisites: RAD 156. 1 credit.

RAD 462.
Sectional Anatomy of Special Imaging Technology.
Sectional anatomy related to computerized tomography, ultrasound, and nuclear medicine. Prerequisite: RAD 146 or RAD 156. 3 credits.

RAD 463.
Comprehensive Radiographic Pathology.
Technologist-radiologist team teaching is used to present pathological conditions that demand both recognition and special treatment by radiologic technologists. Prerequisite: RAD 152 or consent of instructor. 3 credits.

RAD 464.
Angiographic and Neurological Procedures.
Lecture and demonstration of the technical factors, filming, pre- and post-care of angiographic and neurological procedures. Prerequisite: RAD 156 or equivalent. 2 credits.

RAD 465.
Angiographic and Neurological Clinical Education I.
Clinical experience in angiographic and neurological special procedures especially regarding equipment set-up, filming, sterile technique and operation of equipment. 16 hours/week. Prerequisite: RAD 464. 4 credits.

RAD 466.
Angiographic and Neurological Clinical Education II.
Clinical experience in performing angiographic and neurological procedures. Students will select and set up equipment, perform radiography, scrub, and perform proper preventive maintenance for accessories and equipment. 40 hours/week. Prerequisite: RAD 465. 8 credits.

RAD 467.
Cardiac Catheterization.
Orientation and demonstration of modern methods of cardiac catheterization. Includes demonstration of equipment, analysis of radiographs, ECG monitor, blood gases and basic life support. Six hours practicum, one hour lecture. Prerequisites: RAD 462 and RAD 464, or consent of instructor. 3 credits.

RAD 468.
Angiographic and Neurological Clinical Education III.
Practical experience in performing angiographic and neurological procedures. Students will select and set up the equipment, perform filming, scrub and adhere to sterile technique, provide proper basic and advanced life support where indicated, provide proper pre- and post-examination patient care, and perform proper preventive maintenance for accessories and equipment. 16 hours/week. Prerequisite: RAD 466. 4 credits.

RAD 471.
Nuclear Medicine Laboratory.
Hospital applications of instruments including imaging of the brain, lung, heart, liver, spleen, kidney, and bones. Practical experience in radiation measurement and protection, and quality control procedures. Prerequisite: Prior or concurrent registration in RAD 154. May be repeated to a maximum of 16 credits. 1-4 credits.

RAD 472.
Radiopharmaceutical Laboratory.
(Formerly RAD 148). Laboratory procedures for the proper handling of radionuclides. Applications of radiation protection principles utilizing common laboratory equipment. Practical experience in radiopharmaceutical preparation and aseptic technique. Prerequisite: RAD 154. 1 credit.

RAD 479.
Computer Assisted Image Formation.
Science of image formation using computer assistance in formulating sectional images in radiographic tomography. Hardware and software aids in image analysis will be discussed along with digital radiography, positron emission, computerized tomography and nuclear magnetic resonance scanning. Prerequisites: RAD 105 and 106, or consent of instructor. 3 credits.

RAD 480.
Principles of Computerized Tomography.
Study of sectional anatomy, pathological variations, techniques and procedures that will produce diagnostic radiographic images of human structures using computerized tomography. Prerequisite: RAD 152 or consent of instructor. 3 credits.

RAD 481.
Computerized Tomography Laboratory I.
Practice in producing computerized tomographic images for the clinical situation. Experimentation is performed by students in order to provide an understanding of the various principles of computerized tomographic image formation. Three hours hospital laboratory, one hour lecture. Orientation to patient examination. Prerequisite: Prior or concurrent registration in RAD 479. 1 credit.

RAD 482.
Clinical Experience in Computerized Tomography.
Practical application of computerized tomography in a clinical setting. Students will energize and operate computerized tomography equipment, with emphasis on examination procedures and patient management. Prerequisite: RAD 480 or consent of instructor. May be repeated to a maximum of 12 credits. 3 credits.

RAD 490.
Individual Study.
Independent study and/or research in radiologic technology or a related area. Prerequisite: Consent of instructor. May be repeated to a maximum of 6 credits. 1-3 credits.

RAD 492.
Directed Individual Study.
Participation in a laboratory study or a library research project pertaining to some technical, statistical or sociological aspect of the radiation technologies. The project may be conducted at a radiation laboratory, clinic, hospital or at the university. The student will submit a report in publishable form as evidence of his or her accomplishment. Prerequisite: Consent of instructor. May be repeated to a maximum of 3 credits. 1-3 credits.

RAD 499.
Selected Topics in Radiologic Technology.
Advanced studies in one or more of the following areas: (a) Quality Control. (b) Jurisprudence. (c) Administration. (d) Nuclear Medicine. (e) Radiation Health Science. (f) Ultrasound. (g) Computerized Tomography. (h) Angiography. (i) Radiation Therapy. (j) Allied Health Education. (k) Professional Certification. Prerequisite: Consent of department (may not be taken for credit in lieu of regular required courses in the approved program in the university). May be repeated to a maximum of 3 credits. 1-3 credits.

BIO 108.
Human Genetics and Eugenics.
The study of those aspects of human inheritance of special interest to students of anthropology, psychology and sociology. No credit will be given to students with any biological science major or minor. Prerequisite: BIO 101 or 110. 3 credits.

BIO 110.
Principles of Modern Biology.
A study of the basic characteristics of living systems, including structure and function at the cellular, organ, organism, population and ecosystem levels. This is a course for biology majors and is a prerequisite for upper-division courses. Three hours laboratory. Satisfies the general education core requirement for a laboratory science course. 4 credits.

BIO 111.
Animal Biology.
An introduction to animal biology, with emphasis on structure, function and diversity. This course is designed for biology majors and is a prerequisite for upper-division courses. Three hours laboratory. Satisfies the general education core requirement for a laboratory science course. 4 credits.

BIO 112.
Plant Biology.
An introduction to plant biology with emphasis on structure, function and diversity. This course is designed for biology majors and is a prerequisite for upper-division courses. Three hours laboratory. Satisfies the general education core requirement for a laboratory science course. 4 credits.

BIO 122.
Plants of the Southwestern Deserts.
A study of the typical desert plant community types as they occur within the United States, along with the identification of their more common species. Additional topics include a consideration of plant morphological and physiological adaptations to aridity; and the nature, origin and occurrence of arid environments. Intended for non-biology majors. Six hours laboratory. Not open for credit to biological sciences majors. Satisfies the general education core requirement for a laboratory science course. 3 credits.

BIO 134.
Animals of the Southwestern Deserts.
Identification and study of animal life in the desert. Designed for elementary and secondary teachers and non-professional biologists. Three hours laboratory. Not open for credit to biological science majors. Satisfies the general education core requirement for a laboratory science course. 3 credits.

BIO 143.
Human Anatomy and Physiology I.
The structure and function of the skeletal, articular, muscular, nervous, and sensory systems. Three hours laboratory. Prerequisite: BIO 110. Repeats 3 credits of BIO 145. 3 credits.

BIO 144.
Human Anatomy and Physiology II.
The structure and function of the digestive, respiratory, circulatory, excretory, genital, and endocrine systems. Three hours laboratory. Prerequisite: BIO 143. Repeats 3 credits of BIO 145. 3 credits.

BIO 145.
Human Anatomy and Physiology.
(Same as BIO 143-144). The structure and function of the skeletal, articular, muscular, nervous, sensory, digestive, respiratory, circulatory, excretory, genital and endocrine systems. Six hours laboratory. Prerequisite: BIO 110. 6 credits.

BIO 149.
Desert Survival.
Primarily for the non-science major who wishes to improve skills and knowledge concerning techniques for survival in extreme environmental conditions. Aspects will include the physiology of man under stressful conditions, identification of useful plants and animals, and aboriginal life styles and skills. Three hours laboratory. Satisfies the general education core requirement for a laboratory science course. 3 credits.

BIO 150.
Infection and Resistance.
Principles of microbiology, including characteristics of the more common pathogenic bacteria and viruses: how they cause disease, how they are transmitted and how the body resists them. The laboratory covers basic techniques in microbiology and immunology, disinfection and chemotherapeutic agents. Three hours laboratory. Prerequisite: BIO 101 or 110. 4 credits.

BIO 170.
Clinical Parasitology.
A study of the major human diseases of parasitic origin and the protozoan, helminth and arthropod organisms which cause and transmit them. Emphasis will be placed on modes of transmission, pathology, laboratory diagnosis, preventive measures and public health implications. Three hours laboratory. Prerequisite: One semester of biology. 3 credits.

BIO 191.
Radiation Biology.
An introduction to the effects of radiation on living systems. Prerequisite: BIO 101 or 110. 2 credits.

BIO 401.
Principles of Genetics.
An introduction to features of heredity and variation among plants and animals. Three hours laboratory. Prerequisites: BIO 110, 111, 112; and CHE 170 or 174. 4 credits.

BIO 402.
Cytology and Cytogenetics.
Cell structure and function of cytoplasmic organelles. A cytogenetics approach will emphasize the role of chromosomes in differentiation and development of plants and animals. Three hours laboratory. Prerequisite: BIO 401. 3 credits.

BIO 403.
Race and Genetics.
(Same as ANT 461.) A consideration of the biological and genetic interpretations of the recent population distributions of mankind. Prerequisites: ANT 109 or 110, and BIO 101 or 110. 3 credits.

BIO 410.
Evolution.
Evolutionary principles, designed to provide a synthesis of biological relationships essential for the professional biologist. Prerequisites: BIO 110, 111 and 112. 3 credits.

BIO 421.
Plant Morphology.
The structure, development, reproduction and evolution of the classes of vascular plants. Three hours laboratory. Prerequisite: BIO 110, 111 and 112. 3 credits.

2005
Continuing Education
for
Troy V. Curnutt

echelon

> <engageyourmind

Certificate of Program Completion

troy V Curnutt
License/Registry Number: 230833
has satisfactorily completed
Establishing an Advanced Nuclear Imaging Center
on 6/10/2004 6:59:24 PM

This course is approved by the following organization(s) for continuing education credit:

American Society of Radiologic Technologists		**Society of Nuclear Medicine**	
Provider:	echelon	Provider:	echelon
	711 Winyah Dr Orlando, FL 32803		711 Winyah Dr Orlando, FL 32803
	www.echeloned.com		www.echeloned.com
Provider No.:		Provider No.: RHB# 0001	
Course Ref. No.: FLZ0053024		Course Ref. No.: 019934	
CE Credits: 1		Continuing Education Hours: 1	
Category: Category A		Category: Category A	
Program Coordinator/Director: *Dr. Judith Anderson*		Program Coordinator/Director: *Dr. Judith Anderson*	

Florida DOH - Bureau of Radiation Control	
Provider:	echelon
	711 Winyah Dr Orlando, FL 32803
	www.echeloned.com
Provider No.: 3201064	
Course Ref. No.: 06062143	
CE Credits: 1	
Category: 00-Technical	
Program Coordinator/Director: *Dr. Judith Anderson*	

Please do not send this certificate to your professional board (unless requested). Keep it for your own records.

Society of Nuclear Medicine

PACIFIC SOUTHWEST TECHNOLOGIST CHAPTER, INC.

PET/CT – 2005

June 24, 2005
LAS VEGAS, NV

Faculty

Paul Christian, CNMT, PET
Technical Director
Cyclotron Lab and Molecular Imaging
Huntsman Cancer Institute, U. of Utah

Nancy M. Swanston, CNMT, PET
Supervisor, Diagnostic Imaging
The University of Texas
M.D. Anderson Cancer Center

7:15am - 7:55am	Registration/Continental Breakfast		
7:55am - 8:00am	Announcements		
	Session V (.75R, 1.25NI)		
8:00 a.m. - 8:30 a.m.	PET Image Reconstruction	30 mins.	Paul
8:30 a.m. - 9:30 a.m.	PETCT Radiation Safety	60 mins.	Nancy
9:30 a.m. - 10:15 a.m.	Site Planning	45 mins.	Paul
10:00m - 10:15am	Break		
	Session VI (2 NI)		
10:30 a.m. - 11:15 a.m.	PETCT & RTP	45 mins.	Nancy
11:15 a.m. - 11:45 a.m.	Contrast Media	30 mins.	Nancy
11:45 a.m. - 12:15 p.m.	Future Directions of PETCT	30 mins.	Nancy & Paul
12:15 p.m. - 12:30 p.m.	Resource Review/ Q & A	15 mins.	Nancy & Paul
12:30pm	Adjourn		

Knowing is not enough, we must apply. Willing is not enough, we must do!
-Johann Wolfgang von Goethe

Society of
Nuclear Medicine
PACIFIC SOUTHWEST
TECHNOLOGIST CHAPTER, INC.

PET/CT – 2005

June 23, 2005
LAS VEGAS, NV

Faculty

Paul Christian, CNMT, PET
Technical Director
Cyclotron Lab and Molecular Imaging
Huntsman Cancer Institute, U. of Utah

Nancy M. Swanston, CNMT, PET
Supervisor, Diagnostic Imaging
The University of Texas
M.D. Anderson Cancer Center

7:15am - 7:55am	Registration/Continental Breakfast		
7:55am - 8:00am	Announcements		
	Session I (2.25 NI)		
8:00 a.m. - 8:15 a.m.	Welcome & Opening Remarks	15 mins	Nancy & Paul
8:15 a.m. - 9:15 a.m.	Clinical Indications	60 mins	Nancy
9:15 a.m. - 9:45 a.m.	PET & CT Physics	30 mins	Paul
9:45 a.m. - 10:15 a.m.	Cross Sectional Anatomy	30 mins	Nancy
10:15m-10:30am	Break		
	Session II (1.5 NI)		
10:30 a.m. - 11:15 a.m.	PET Instrumentation	45 mins	Paul
11:15 a.m. - 12:00 p.m.	CT Instrumentation	45 mins	Paul
12:00pm- 1:00pm	Lunch		
	Session III (1 NI, 1.25 R)		
1:00 p.m. – 1:45 p.m.	Radiopharmaceutical Production: Cyclotrons/ Generators	45 mins	Paul
1:45 p.m. - 2:15 p.m.	Radiopharmaceuticals	30 mins	Nancy
2:15 p.m. - 3:30 p.m.	Patient Prep & Mgmt (Emergency Care)	75 mins	Nancy
3:15pm – 3:30pm	Break		
	Session IV (1.5 I)		
3:45 p.m. - 5:15 p.m.	Protocols: PET & CT	75 mins	Nancy
5:15 p.m. – 5:30 p.m.	Q & A	15 mins	Nancy & Paul

Troy Curnutt

Society of Nuclear Medicine
PACIFIC SOUTHWEST TECHNOLOGIST CHAPTER, INC.

Has attended the following seminar

PET/CT
JULY 23, 2005
LAS VEGAS, NV

8 CEU's, 8 VOICE credits:

1. Session I (023426) Nonimaging 2.25 hr
2. Session II (023427) Nonimaging 1.5 hr
3. Session III (023428) Nonimaging 1.0 hr, Radiopharmacy 1.25 hr
4. Session IV (023429) Imaging 2.0 hr

8 ASRT/category A credits:

CAD 0075017 8 hrs

Susan Gavel CNMT
Susan Gavel, CNMT
Chair, Continuing Education
Pacific Southwest Technologist Chapter

Society of Nuclear Medicine
Pacific Southwest Technologist Chapter
RHB 0001

NRC FORM 313A (10-2002) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 10/31/2005

TRAINING AND EXPERIENCE AND PRECEPTOR STATEMENT

PART I – TRAINING AND EXPERIENCE

Note: Descriptions of training and experience must contain sufficient detail to match the training and experience criteria in the applicable regulations.

1. Name of Individual, Proposed Authorization (e.g., Radiation Safety Officer), and Applicable Training Requirements (e.g., 10 CFR 35.50)

10 CFR 35.55 Catherine A. Heyneman, Authorized Nuclear Pharmacist

2. For Physicians, Podiatrists, Dentists, Pharmacists – State or Territory Where Licensed

Idaho and California Idaho License # P4966 - California License # RP446764

3. CERTIFICATION

Specialty Board	Category	Month and Year Certified
Purdue University School of Pharmacy	Nuclear Pharmacy Certificate Program	June 2005

Stop here when using Board Certification to meet 10 CFR Part 35 training and experience requirements.

4. DIDACTIC OR CLASSROOM AND LABORATORY TRAINING (optional for Medical Physicists)

Description of Training	Location	Clock Hours	Dates of Training
Radiation Physics and Instrumentation	Purdue University		5-16-05 to 5-27-05
Radiation Protection	Purdue University		5-16-05 to 5-27-05
Mathematics Pertaining to the Use and Measurement of Radioactivity	Purdue University		5-16-05 to 5-27-05
Radiation Biology	Purdue University		5-16-05 to 5-27-05
Chemistry of Byproduct Material for Medical Use	Purdue University		5-16-05 to 5-27-05
OTHER	Please see attached documentation from Purdue University		

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Radioiodine capsule prep.

APPENDIX B

NRC FORM 313A (10-2002) U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE AND PRECEPTOR STATEMENT (continued)

5a. WORK EXPERIENCE WITH RADIATION

Description of Experience	Name of Supervising Individual(s)	Location and Corresponding Materials License Number	Dates and Clock Hours of Experience
RAM receiving, shipping, preparing kits, QC all products Molly breakthrough, thyroid bioassay	Gloria Gest & Dennis Latino	Sierra Pharmacy-Reno Nevada Nevada RAM # 16-11-0373-01	6-13-05 to 9-01-05 193.5 hours
		See attached letter for specific dates and hours	
Reviewed decontamination procedures, calculated and assayed kits Dispensed & QC doses, performed constancy & accuracy checks Eluted generators.	Tony Huffman	Biotech Pharmacy- Las Vegas Nevada RAM # 03-11-0332-01	7-05-05 to 7-14-05 92.5 hours
		See attached letter for specific dates and hours	
Prepared radioiodine Caps, dispensed xenon, prepared and assayed kits. performed QC. Eluted generators. Prepared delivery containers for transportation, meeting D.O.T. needs	Eric McDowell & Bill Baker	PDSI - Salt Lake City Utah Utah RAM # 1800225	6-22-05 to 8-20-05 215.5 hours
		See attached letter for specific dates and hours	

5b. SUPERVISED CLINICAL CASE EXPERIENCE

Radionuclide	Type of Use	No. of Cases Involving Personal Participation	Name of Supervising Individual	Location and Corresponding Materials License Number	Dates and Clock Hours of Experience
Tc-99m	Myocardial, liver, bone, lung kidney, gall bladder, brain, vein	> 120	Gloria Gest PharmD	Sierra Pharmacy-Reno Nevada Nevada RAM # 16-11-0373-01	6-13-05 to 9-01-05 193.5 hours
I-125	Radioiodine capsule prep.	> 20	Gloria Gest PharmD	Sierra Pharmacy-Reno Nevada Nevada RAM # 16-11-0373-01	6-13-05 to 9-01-05 193.5 hours
Tl-201	Myocardial Perfusion	> 200	Gloria Gest PharmD	Sierra Pharmacy-Reno Nevada Nevada RAM # 16-11-0373-01	6-13-05 to 9-01-05 193.5 hours
Tc-99m	Myocardial, liver, bone, lung kidney, gall bladder, brain, vein	> 50	Tony Huffman R.Ph	Biotech Pharmacy- Las Vegas Nevada RAM # 03-11-0332-01	7-05-05 to 7-14-05 92.5 hours
I-131	Radioiodine capsule prep.	> 20	Tony Huffman R.Ph	Biotech Pharmacy- Las Vegas Nevada RAM # 03-11-0332-01	7-05-05 to 7-14-05 92.5 hours
I-123	Diagnostic Thyroid assay	> 25	Tony Huffman R.Ph	Biotech Pharmacy- Las Vegas Nevada RAM # 03-11-0332-01	7-05-05 to 7-14-05 92.5 hours
Tc-99m	Myocardial, liver, bone, lung kidney, gall bladder, brain, vein	> 250	Eric Mcdowell, PharmD	PDSI - Salt Lake City Utah Utah RAM # 1800225	6-22-05 to 8-20-05 215.5 hours
Xe-133	Lung ventilation	> 20	Eric Mcdowell, PharmD	PDSI - Salt Lake City Utah Utah RAM # 1800225	6-22-05 to 8-20-05 215.5 hours

NRC FORM 313A
(10-2002)

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE AND PRECEPTOR STATEMENT (continued)

6. FORMAL TRAINING (applies to Medical Physicists and Therapy Physicians)

Degree, Area of Study or Residency Program	Name of Program and Location with Corresponding Materials License Numbers	Dates	Name of Organization that Approved the Program (e.g., Accreditation Council for Graduate Medical Education) and the Applicable Regulation (e.g., 10 CFR 35.490)

7. RADIATION SAFETY OFFICER – ONE-YEAR FULL-TIME TRAINING

☐ YES ☐ N/A Completed 1-year of full-time radiation safety experience (in areas identified in item 5a) under supervision of _____ the RSO for License No. _____.

8. MEDICAL PHYSICIST – ONE YEAR FULL-TIME TRAINING/WORK EXPERIENCE

☐ YES ☐ N/A Completed 1-year of full-time training in therapeutic radiological physics under the supervision of _____ who meets requirements for Authorized Medical Physicists; and

☐ YES ☐ N/A Completed 1-year of full-time work experience (for areas identified in item 5a) for _____ modality(ies) under the supervision of _____ who meets requirements for Authorized Medical Physicists for _____ modality(ies).

9. SUPERVISING INDIVIDUAL – IDENTIFICATION AND QUALIFICATIONS

The training and experience indicated above was obtained under the supervision of *(if more than one supervising individual is needed to meet requirements in 10 CFR 35, provide the following information for each)*:

A. Name of Supervisor

_____

B. Supervisor is:

☐ Authorized User ☐ Authorized Medical Physicists

☐ Radiation Safety Officer ☐ Authorized Nuclear Pharmacists

C. Supervisor meets requirements of Part 35, Section(s) _____.

for medical uses in Part 35, Section(s) _____.

D. Address

E. Materials License Number

_____

APPENDIX B

NRC FORM 313A (10-2000) U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE AND PRECEPTOR STATEMENT (continued)

PART II – PRECEPTOR STATEMENT

Note: This part must be completed by the individual's preceptor. If more than one preceptor is necessary to document experience, obtain a separate preceptor statement from each. This part is not required to meet the training requirements in 10 CFR 35.590.

Item 10 must be completed for Nuclear Pharmacists meeting the requirements of 10 CFR Part 35, Subpart J. Preceptors do not have to complete items 11a, 11b, or the certifying statements for other individuals meeting the requirements of 10 CFR Part 35, Subpart J.

☑ YES ☐ N/A 10. The individual named in Item 1 has satisfactorily completed the training requirements in 10 CFR 35.980 and is competent to independently operate a nuclear pharmacy.

☐ YES ☐ N/A 11a. The individual named in Item 1 has satisfactorily completed the requirements in Part 35, Section(s) and Paragraph(s) _____.

☐ YES ☐ N/A 11b. The individual named in Item 1. is competent to independently function as an authorized _____ for _____ uses.

12. PRECEPTOR APPROVAL AND CERTIFICATION

☑ I certify the approval of item 10 and certify I am an Authorized Nuclear Pharmacist;

or

☐ I certify the approval of items 11a and 11b and certify I am an Authorized Nuclear Pharmacist;

or

☐ I certify the approval of items 11a and 11b, and I certify that I meet the requirements of _____ or equivalent Agreement State requirements to be a preceptor authorized _____ for the following uses of byproduct material: _____

A. Address: Sierra Radiopharmacy
601 Mill St
Reno, NV 89502

B. Materials License Number: 16-11-0373-01

C. NAME OF PRECEPTOR (print clearly)	D. SIGNATURE – PRECEPTOR	E. DATE
Dennis Latino	[signature]	9/14/05

PURDUE UNIVERSITY

WEST LAFAYETTE, INDIANA

SCHOOL OF PHARMACY AND PHARMACAL SCIENCES
DEPARTMENT OF INDUSTRIAL AND PHYSICAL PHARMACY
DIVISION OF NUCLEAR PHARMACY

This certificate is awarded to

Catherine Heyneman

as evidence of completion of the

NUCLEAR PHARMACY CERTIFICATE PROGRAM

June 6, 2005

John M. Pezzuto
Dean, School of Pharmacy
and Pharmacal Sciences

Kara Duncan Weatherman
Director,
Nuclear Pharmacy Certificate Programs

PURDUE

SCHOOL OF PHARMACY AND PHARMACAL SCIENCES

June 6, 2005

Ex 6

Catherine Heyneman

Dear Catherine,

We are pleased to provide the enclosed certificate to recognize formally your completion of the Nuclear Pharmacy Certificate Program. We enjoyed the brief opportunity to share our knowledge from the world of academia. We wish you the very best for a gratifying and successful professional career.

As you continue on in your career, please do not hesitate to let us know if we can be of any assistance to you – we consider you part of the "Purdue family" and we look forward to hearing from you in the future!

Sincerely,

Kara D. Weatherman

Kara Duncan Weatherman, PharmD, BCNP
Director – Nuclear Pharmacy Certificate Programs
Division of Nuclear Pharmacy

Division of Nuclear Pharmacy, Department of Industrial and Physical Pharmacy

Heine Pharmacy Building, Room 308 575 Stadium Mall Drive West Lafayette, IN 47907-2091
(765) 494-1441 Fax: (765) 496-3367 URL: www.purdue.edu/nuclearpharmacy

PURDUE UNIVERSITY

memo

TO: Catherine Heyneman
FROM: Kara Duncan Weatherman, PharmD, BCNP
DATE: June 6, 2005
SUBJECT: Nuclear Pharmacy Certificate Program Completion

Enclosed you will find the following:

- **TWO** originals of the completion letter signed by myself stating that you have successfully completed the course
- A certificate of completion of the course, signed by myself and the Dean of the School of Pharmacy, John Pezzuto; and
- The Nuclear Pharmacy Certificate Program Outline with the hourly breakdown of your training in the categories specified by the U.S. Nuclear Regulatory Commission. Please note, your signed Synopsis of Clock Hours breakdown is located within this packet.

I would like to take this opportunity to congratulate you on completing the course. I encourage you to continue your education in nuclear medicine and nuclear pharmacy by routinely reading the Journal of Nuclear Medicine and the Journal of Nuclear Medicine Technology and by participating in your local nuclear medicine organization. Purdue's Certificate Program has given you a foundation that you can build on, and our faculty remains available to you if you have questions at a later date. I join with Dr. Shaw in hoping that you will find nuclear pharmacy as satisfying a profession as we have. I hope to see you at some future date at one of the regional or national meetings.

Enclosures

PURDUE

SCHOOL OF PHARMACY AND PHARMACAL SCIENCES

June 6, 2005

Catherine Heyneman

Ex 6

Dear Catherine,

We are pleased to provide the enclosed certificate to recognize formally your completion of the Nuclear Pharmacy Certificate Program. We enjoyed the brief opportunity to share our knowledge from the world of academia. We wish you the very best for a gratifying and successful professional career.

As you continue on in your career, please do not hesitate to let us know if we can be of any assistance to you – we consider you part of the "Purdue family" and we look forward to hearing from you in the future!

Sincerely,

Kara D. Weatherman

Kara Duncan Weatherman, PharmD, BCNP
Director – Nuclear Pharmacy Certificate Programs
Division of Nuclear Pharmacy

Division of Nuclear Pharmacy, Department of Industrial and Physical Pharmacy

Heine Pharmacy Building, Room 308 575 Stadium Mall Drive West Lafayette, IN 47907-2091
(765) 494-1441 Fax: (765) 496-3367 URL: www.purdue.edu/nuclearpharmacy

BIOTECH Pharmacy

BIOTECH Special Care

July 14, 2005

This document certifies that Catherine Heyneman, PharmD, completed the following hours at BioTech Pharmacy located at 3940 S. Eastern, Las Vegas, NV 89119:

7/5/05	9am – 5pm	8 hrs
7/6/05	5am – 5pm	12 hrs
7/7/05	4:30am – 5pm	12.5 hrs
7/8/05	5am – 5pm	12 hrs
7/11/05	5am – 5pm	12 hrs
7/12/05	5am – 5pm	12 hrs
7/13/05	5am – 5pm	12 hrs
7/14/05	5am – 5pm	12 hrs

Total hours from 7/5 – 7/14/05 = 92.5 hrs

Tony Huffman, PharmD

Tony Huffman, PharmD
Nuclear Pharmacist

SIERRA RADIOPHARMACY

September 1, 2005

Dear Sir or Madam:

I certify that Catherine Heyneman successfully completed the following hours as an intern at Sierra Radiopharmacy:

Date	Time In	Time Out	Hours
6/13/05	0300	1730	14.5
6/14/05	0300	1700	14
6/15/05	0300	1700	14
6/16/05	0300	1700	14
6/17/05	0300	1700	14
7/18/05	0300	1700	14
7/19/05	0300	1700	14
7/20/05	0300	1700	14
7/21/05	0300	1700	14
7/22/05	0300	1700	14
08/29/05	0300	1700	14
08/30/05	0300	1700	14
08/31/05	0300	1700	14
09/01/05	0300	1400	11
Total			**193.5 hours**

Sincerely,

Dennis Latino, RPh
Authorized Nuclear Pharmacist

601 MILL STREET • RENO, NEVADA • 89502
PHONE: 775 786 9585 • FAX: 775.786 9339

PDSI PHARMACEUTICAL & DIAGNOSTIC SERVICES, INC.
1152 West 2240 South, Suite E
West Valley City, UT 84119
(801) 485-3344 Fax (801) 485-1982
A DIVISION OF CardinalHealth NPS

August 20, 2005

This letter certifies that Catherine Heyneman, PharmD, has completed 215.5 hours of training at Pharmaceutical and Diagnostic Services, Inc. under the supervision of Dr. Eric McDowell, an authorized nuclear pharmacist.

Date	Hours Worked
6/22 – 6/24/05	27
6/29 – 7/1/05	45
8/1 – 8/2/05	30.5
8/4 – 8/5/05	30
8/8 – 8/9/05	30
8/11/05	15
8/16 – 8/17/05	31
8/20/05	7
Total	**215.5**

Eric McDowell, PharmD

Eric McDowell, PharmD
Authorized Nuclear Pharmacist
Pharmaceutical and Diagnostic Services, Inc.

NUCLEAR PHARMACY CERTIFICATE PROGRAM

Synopsis of Clock Hours of Training

School of Pharmacy and Pharmacal Sciences

Department of Industrial and Physical Pharmacy

Division of Nuclear Pharmacy

Purdue University

West Lafayette, Indiana 47907

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Nuclear Pharmacy Certificate Program Outline

Contents:

1. Program Concept
2. Synopsis of Clock Hours of Training
3. Videocassette and Workbook (Self-Study Portion) Clock Hours
4. Campus Portion Laboratory and Lecture Clock Hours
5. Instructional Staff

Abbreviations Used:

RPI:	Radiation Physics Instrumentation
RP:	Radiation Physics
MA:	Math
RB:	Radiation Biology
RC:	Radiochemistry

Nuclear Pharmacy Certificate Program Concept

The School of Pharmacy and Pharmacal Sciences at Purdue University offers a Certificate Program in Nuclear Pharmacy. The goal of the certificate program is to provide fundamental information to post-graduate pharmacists that will serve as a foundation for attaining competency as practitioners in nuclear pharmacy. The program follows the guidelines for nuclear pharmacy training prepared by nuclear pharmacists in the American Pharmaceutical Association, Section on Nuclear Pharmacy Practice.

There are two distinct phases of the certificate program. The first part utilizes self-study concepts, including lectures on videotape and correlated reading assignments. The nuclear pharmacy manager, or other qualified nuclear pharmacist at the practice site, serves as the clinical instructor and mentor for the pharmacist in training. This portion is self-paced by the trainee with regular examinations returned to Purdue to assist in monitoring the learning process. Successful completion of the didactic phase qualifies the trainee to attend a two-week long training session at Purdue. While on campus, the trainee participates in laboratory exercises and has opportunities for personal interaction with the instructors during lectures presented. Certification is awarded to those trainees who have completed the program and are able to demonstrate their knowledge and competence by examination in each of the key areas addressed by the program.

TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES*

Name: **CATHERINE HEYNEMAN**

Location of Training	Date(s) of Attendance	Nuclear Pharmacy Certificate Program	Total Clock Hours of Course	Breakdown of Course Content in Clock Hours								
				Radiation Physics & Instru-mentation		Radiation Protection		Math Pertaining to Radio-activity		Radiation Biology		Radio-pharma-ceutical Chemistry
				A	B	A	B	A	B	A	B	A
Purdue University		Video-Workbook	150	54		37		11		23		25
		On-Site	73	26		19		13		4		11
Column "A" refers to a Lecture/Laboratory Course			223	80		56		24		27		36
Column "B" refers to a Supervised Laboratory Experience			TOTAL HOURS	80		56		24		27		36

- This form is representative of that which is used to apply for an NRC license amendment for an authorized user.

Kyra D. Weatherman

Director, Nuclear Pharmacy Certificate Program

Nuclear Pharmacy Certificate Program

Videocassette and Workbook (*Self-Study Portion*) Clock Hours

Instructor	Material	Clock Hours	
Dr. Stan Shaw	**Physics and Overview**	RPI	30
	Radiation Energy	RP	2
	Atomic Structure	MA	4
	Nuclides	RC	12
	Radioactive Decay and Half-Life		
	Ideal Radionuclide for Imaging		
	Modes of Radioactive Decay		
	Interaction of Ionizing Radiation with Matter		
	Radiation Detection Methods		
	Radiopharmaceuticals: Characteristics and Chemistry		
	Central Nervous System		
	Pulmonary System		
	Liver and Hepatobiliary System		
	Spleen		
	Cardiac Imaging		
	Skeletal System		
	Renal System		
	Endocrine System		
	Miscellaneous Procedures and Radiopharmaceuticals		
	In Vivo Radiopharmaceuticals Not Requiring Imaging		
	Radiopharmaceuticals Used in Therapy		

Dr. Robert Landolt	**Radiation Protection**	RPI	2
	Terms and Units	RP	14
	Protection from External Exposure		
	Portable Survey Instruments		
	Personnel Monitoring		
	Internal Dose Calculations		
	Contamination Control		
	Waste Management		
	Packaging, Labels and Placards		
	10 CFR Standards for Protection Against Radiation		
	10 CFR Notices, Instructions, and Reports to Workers		
Mr. Jim Ponto	**Drugs & Radiopharmaceuticals**	RPI	4
	Drugs & Radiopharmaceuticals, Parts 1 and 2:	RP	4
	Interactions and their effect on diagnostic accuracy of	MA	4
	Nuclear Medicine Procedures	RC	8
	Drugs & Radiopharmaceuticals, Part 3:		
	Interventions used to improve differential diagnosis in		
	Instrument Quality Assurance		
	Technetium Chemistry; Radiolytic Decomposition		
	Pediatric Dosage Calculations		
	Adverse Reactions to Radiopharmaceuticals		
	Record Keeping		
	Preparation and Dispensing of Radiopharmaceuticals		
	Formulation Problems		

Anne Smith	Radionuclide Generator: Mo-99/Tc-99m Generator	RPI	3
	Quality Control Testing of Radiopharmaceuticals	RP	2
		MA	1
Dr. Richard Kowalsky	Radiopharmaceuticals for Brain Imaging	RPI	5
	Radiopharmaceuticals for Heart Imaging Update	RP	5
	Radiopharmaceuticals for Kidney Imaging Update	RC	5
	Radiopharmaceuticals for Treatment of Bone Pain	RB	1
	Monoclonal Antibodies for Radioimmunodiagnosis		
	Somostatin Receptor Imaging		
Dr. Wayne Kessler	**Instrumentation**	RPI	8
	Spectrometry	MA	2
	Counting Efficiency		
	Coincidence Loss		
	Background		
	Liquid Scintillation Counting		
	Statistics of Radioactivity		
Dr. Paul Simms	Radionuclide Production, Part 1	RPI	4
	Radionuclide Production, Part 2		
Dr. Stan Shaw	**Radiation Biology and Protection**	RB	20
	Energy Transfer	RP	8
	Mechanisms of Change		
	Aqueous Radiation Chemistry		
	Target Theory and Dose-Response		
	Radiation Effects on Macromolecules		
	Radiation Effects on Cells		
	Acute Effects		
	Delayed Effects		
	Genetic Effects		
Dr. William Widmer	Late Effects of Ionizing Radiation	RB	2

Nuclear Pharmacy Certificate Program

On-Site Laboratory Schedule

Instructor	Laboratory	Clock Hours	
Dr. Stan Shaw	Contamination and Decontamination	RP	3
	Basic Radiation Safety	RPI	3
	G.M. Counting	RP	1
		RPI	3
Dr. Kara Duncan	Gamma Ray Scintillation Spectrometry I	RPI	4
	Gamma Ray Scintillation Spectrometry II	RPI	3
	Multichannel Analyzer	RPI	3
	Dose Calibrator	RPI	3
	Shipping and Receiving	MA 1	RP 2
	Elution of the Tc-99m Generator and Quality Control of the Eluate	RPI 2	MA 2
	Radiochemical Purity Testing	RPI 2	RC 1
	Preparation and Dispensing of Selected Radiopharmaceuticals	RPI 2	MA 2
	Aseptic Technique and Sterility Testing	RC	3
	Gamma Camera Instrumentation	RPI	3
	Review of Math Used in Nuclear Pharmacy	MA	3
	Counting Statistics in Nuclear Pharmacy Practice	MA	3
	Iodine Compounding and Instrumentation	MA	2
		RB	2

Nuclear Pharmacy Certificate Program

On-Site Lecture Schedule

Instructor	Topic	Clock Hours	
Dr. Mark Green	Chemistry of Metal-Labeled Radiopharmaceuticals	RC	5
	PET Radiopharmaceutical Chemistry	RPI	1
	PET Imaging and Concept		
	Radionuclide Generator for PET		
Dr. Stan Shaw	Regulatory Agencies	RP	4
	10 CFR Parts 19 and 20		
Mack Richard	10 CFR Part 35 Medical Regulations	RP	2
	Performance Criteria for Radiobioassay	RB	2
Dr. Kara Duncan	Formed Element Labeling and Aids Safety Procedures	RC	2
Dr. Gordon Born	DOT Hazardous Materials Handling	RP	2
Dr. Jim Schweitzer	Film Badge Dosimetry	RP	2

Nuclear Pharmacy Certificate Program

Instructional Staff

Videocassette - Workbook

Dr. Stanley M. Shaw, Ph.D.
Professor of Nuclear Pharmacy
Purdue University
West Lafayette, Indiana 47097

Dr. Robert Landolt, Ph.D.
Professor of Health Physics
Purdue University
West Lafayette, Indiana 47097

Dr. Wayne V. Kessler, Ph.D.
Professor of Bionucleonics
Purdue University
West Lafayette, Indiana 47907

Dr. Paul C. Simms, Ph.D.
Professor of Physics
Purdue University
West Lafayette, Indiana 47097

Dr. Richard J. Kowalsky, PharmD, BCNP, FAPhA
Associate Professor Pharmacy and Radiology
University of North Carolina
Chapel Hill, North Carolina 27599

Mr. James A. Ponto, M.S., B.C.N.P.
Division of Nuclear Medicine
University of Iowa Hospitals and Clinics
Iowa City, Iowa 52242

Ms. C. Anne Smith, M.S., B.C.N.P.
Nuclear Pharmacy Program Director
Purdue University
West Lafayette, IN 47907

Dr. William R. Widmer, D.V.M.
Associate Professor of Diagnostic Imaging
Department of Veterinary Clinical Sciences
School of Veterinary Medicine
Purdue University
West Lafayette, Indiana 47907

On-Site

Dr. Mark A. Green, Ph.D.
Professor of Nuclear Pharmacy
Purdue University
West Lafayette, Indiana 47097

Dr. Jim Schweitzer, Ph.D.
Radiation Safety Officer
Purdue University
West Lafayette, Indiana 47097

Mr. Mack Richard, M.S.
Radiation Safety Officer
Indiana University Medical Center
Indianapolis, Indiana 46202

Dr. Stanley M. Shaw, Ph.D.
Professor of Nuclear Pharmacy
Purdue University
West Lafayette, Indiana 47097

Dr. Gordon Born, Ph.D.
Professor of Medicinal Chemistry and Health Sciences
Purdue University
West Lafayette, Indiana 47907

Dr. Kara Duncan, PharmD, BCNP
Adjunct Assistant Professor
Purdue University
West Lafayette, Indiana 47097

POLICIES & PROCEDURES

FORWARD

This Policy & Procedure Manual sets forth the radiation safety programs for Advanced Isotopes of Idaho Nuclear Pharmacy.

This manual is effective when a RAM license is granted to the corporation by the Nuclear Regulatory Commission. From time to time, there may be changes to this manual. Whenever a change is made, the new pages will be inserted as indicated by the page number. All changes to the manual will have the effective date of the change in the upper right hand corner of each page that has been changed. Those pages that do not have such a date are effective on the day the license is issued.

22

Policies and Procedures

1.0 Pharmacy Opening

1.1 Purpose

Daily operations of a nuclear pharmacy require preparation of personnel and facilities in order to perform work in a safe and efficient manner. Performance of preoperational components will contribute to unhindered radiopharmaceutical preparation.

1.2 Rationale

Performance of pharmacy opening procedures ensures that radiopharmaceutical preparation, dispensing, and packaging will be carried out in an accurate and efficient manner and minimize personnel radiation exposure.

1.3 Equipment

Facility key	Film and TLC badges
Lab coats	Facility computer

1.4 Procedure

1. Unlock doors and deactivate alarms

2. Personnel check-in
   a. Personnel dosimetry
      All individuals must put on their personal dosimeters
   b. Protective apparel
      All personnel working or entering a restricted area shall wear a buttoned laboratory coat. Disposable gloves shall be worn by all personnel handling radioactive material or in any area where the potential for handling items contaminated with radioactive material exist.

3. Check answering service/phone recorder/fax for messages

4. Obtain additional prescriptions and medication orders from the answering service/phone recorder/fax.

5. Activate computer

2.0 Daily Preliminary Preparation of Instrumentation

2.1 Purpose

Daily calibrations of instrumentation used to support radiopharmaceutical production provide quality control and assurance in preparing client prescriptions and maintaining personnel radiation exposures ALARA.

2.2 Rationale

Instrument calibration/operational checks performed on a routine basis ensure that dose preparations are correctly dispensed and that radioactive material handling has been accomplished in a safe and efficient manner.

2.3 Equipment

Dose Calibrators	Survey meters
Survey equipment/area alarm monitors	Laminar flow hood

2.4 Procedures

1. Dose calibrator (done each day of use)

   (consult manufacturer's operations manual for specific instructions)

   a. Voltage test check
      i. Determine voltage reading.
      ii. Note and investigate any reading below manufacturer's guidelines.
      iii. If unable to resolve problem, immediately remove from service and consult the manufacturer.

   b. Background radiation
      i. Check instrument background and zero if necessary.
      ii. Investigate and correct any conditions that raise instrument background by more than 25% of routine level.
      iii. Recheck instrument background.

   c. Daily constancy check (see constancy form in Appendix 1)

   NOTE – this procedure should be performed while wearing gloves and using remote handling devices.

      i. Measure background level at the same instrument setting.
      ii. Assay reference standard using the appropriate setting (i.e., Cesium-137 setting for Cesium-137)

iii. Calculate the actual net activity of each source by subtracting the background from the digital readout of the dose calibrator.
iv. Calculate the predicted activity of each source based upon the decay calculations.
v. Record and initial findings in appropriate record log.
vi. Using the Cesium-137 standard, check other settings that are routinely used. Record the values.
vii. Variations greater than ± 5% from predicted activity indicates the need for instrument repair or adjustment.

NOTE – all dose calibrators will have this test performed on them daily.

2. Survey Equipment/Area Alarm Monitors
(Consult manufacturer's operations manual for specific instructions)

a. Calibration
i. Each survey instrument or area monitor should bear a calibration sticker listing the date of the last calibration. Each survey instrument that indicates a condition of being out of the calibration period (twelve months from the date of the last calibration as the license specifies) will not be used and will be taken out of service and returned for calibration.
ii. An operational check will be performed daily on each unit when used for response to radiation by placing a small reference check source at the surface of the detector (less than 1 microcurie of Cesium-137 or other suitable radionuclide). The results will be recorded and initialed in the appropriate log.

b. Placement
i. Survey instruments will be placed at all doors which are exit points from the restricted area. These units will be used by personnel to monitor hands, feet, and clothing upon exit from the restricted area.

c. Use
i. Upon leaving the restricted area, personnel should monitor their hands, feet, and clothing. The survey meter probe should be as close as possible to the area being monitored and no more than one inch from the surface, moving at a speed of no more than 2 inches per second. The hands should be monitored on both sides, the lab coat on the sleeves and the front in the chest and waist area, and the shoes on the bottom. If contamination measuring greater than twice instrument background is identified, remove

contaminated protective clothing or decontaminate the identified area.

3. Survey Meters

   a. Calibrations
      i. See Section 2.4.2.a.i
      ii. See Section 2.4.2.a.ii

      NOTE – Monitoring of radiation will be performed with the shield in the appropriate position (open or closed) for the task being performed.

   b. Placement
      i. Survey meters must be available by drawing stations so hands and hood may be frequently monitored
      ii. Survey meters must be available in the shipping and receiving area to determine package surface radiation levels and transport indices and to monitor incoming shipping containers.
      iii. Survey meters must be available in restricted areas for routine and emergency radiological surveys.
      iv. See Section 2.4.2.b.i

4. Laminar Flow Hoods

   a. Certification
      i. Certification of hood will be performed at installation and at required intervals by an authorized consultant. Hoods will be repaired if necessary.

   b. Operation
      i. Hoods will be turned on at least 15 minutes prior to use.
      ii. Only necessary items will be placed in the hood to minimize eddy current effects for particulate matter.
      iii. Hoods will be aseptically cleaned with 70% isopropyl alcohol and surveyed at least daily.

3.0 Generator Elution

3.1 Purpose

This procedure defines the steps to elute a Molybdenum-99/Technetium-99m (Mo-99/Tc-99m) generator. The generator eluate is the starting material for radiopharmaceutical compounding of the Technetium-99m based imaging agents.

3.2 Rationale

Proper generator elution allows the pharmacist to work with eluates of desired activities and concentrations in preparing kits and dispensing doses. This provides for a smooth transition of the work shift.

3.3 Equipment

Mo-99/Tc-99m generator	Lead shielded elution vial
Dose calibrator	Remote handling device

3.4 Procedure

1. After receipt of generator and performance of appropriate radioactive material receiving procedures (wipes, surveys, log-in, etc.), remove generator from its shipping carton and place it in a secondary shield. The secondary shield is usually provided by the generator manufacturer and should be in place before receiving the generator. Additional shielding may be required depending on the proximity of the generator to personnel work areas and the intensity of its associated radiation field.

2. Generator Elution
   (Consult the manufacturer's package insert for specific details)

   a. Calculate routine technetium-99m pertechnetate utilization requirements. Record lot number (generator number) of generators to be eluted.
   b. Determine the desired eluate volume and select the appropriate size of evacuated elution vial.
   c. Place the elution vial in a lead shielded container.
   d. Aseptically connect the shielded vial to the appropriate generator and elute for the desired time or volume.
   e. Remove vial and replace generator secondary shielding to minimize radiation exposure.
   f. In a properly calibrated dose calibrator, determine the total activity and record this activity and volume of each eluate.
   g. Evaluate each eluate to ensure that it meets NRC regulations and company specifications for human use:

i. The Molybdenum-99 content shall be less than 0.15 microcurie per millicurie of technetium-99m at the time of patient administration.

h. If the eluate does not meet the criterion listed above, remove from use.

3. Eluate Assay

NOTE – All transfers and manipulation of the unshielded collection vial should be done quickly and deliberately using remote handling devices such as tongs or forceps and should be performed behind a table top shield with a leaded glass section through which to observe the procedures. All work areas should be covered with absorbent paper.

a. Follow the prescribed steps:
   i. Set the dose calibrator to assay technetium-99m.
   ii. Transfer the collection vial from the elution shield to the dose calibrator well.
   iii. Record and initial the displayed activity.
   iv. Note the volume of the eluate in the vial and record this information.
   v. Calculate technetium-99m activity:

$$\text{Activity} = \frac{\text{displayed activity (millicuries)}}{\text{volume in mL}}$$

b. Alternate method:
   i. Aseptically withdraw 1 mL of eluate from the shielded collection vial using a shielded syringe.
   ii. Assay the aliquot and the elution vial, record, and initial.
   iii. Total volume of the eluate may be calculated as follows:

$$\text{Volume} = \frac{\text{Total activity of eluate in millicuries}}{\text{Millicuries of activity in 1 mL}}$$

c. Enter the date, time of assay, activity concentration, volume of eluate, and generator lot number in the appropriate record log (see Kit Prep/Eluate form in Appendix 1)

4.0 Personnel Safety Controls

4.1 Purpose

This procedure describes radiological safety controls to be used by pharmacy personnel during the production of unit-dose and multidose radiopharmaceuticals.

4.2 Rationale

Radiological safety controls permit safe product preparation and dispensing which minimizes personnel radiation exposure hazards.

4.3 Equipment

Lab coat	GM survey meters
Whole body badge	Absorbent underpads
TLD finger badges	Remote handling devices
Disposable gloves	

4.4 Procedure

1. Wear a buttoned lab coat and assigned dosimeters while working in restricted areas.

2. Always wear disposable gloves when working with radioactive materials.

3. Work surfaces in restricted areas should be covered with absorbent paper to aid in contamination control. These include the product preparation and dispensing stations, package receipt, preparation areas, quality control areas, etc.

   NOTE – caution should be exercised not to obstruct air flow in laminar flow preparation areas.

4. Prepare and dispense radiopharmaceuticals only at designated locations in the restricted area. Under no circumstance should radioactive materials be taken from the restricted area unless they have been properly prepared for transportation and are considered contamination-free.

5. Take advantage of all available shielding while handing radioactive materials. This includes:

   a. Handing radioactive material in shielded containers when transporting these materials in the restricted area.
   b. Preparing and dispensing radiopharmaceuticals behind a lead L-block using syringes and vial shields and remote handling devices as appropriate.

6. Dispensing liquid radioiodine only in a glove box type fume hood which is under negative pressure.

7. Disposable gloves should be monitored routinely with a GM survey meter/frisker during a production run to check for contamination. Change gloves as necessary.

8. Perform a radiation survey of the preparation and dispensing areas at the end of a production run to check for gross contamination and/or unshielded sources of radiation. Take corrective action as necessary for identified contamination or unshielded radiation sources. These surveys need not be documented as they are designed as an ongoing evaluation to control radiological conditions at the facility.

9. Monitor hands, feet and lab coats with GM survey meter/frisker at the end of a production run. Decontaminate as necessary.

5.0 Dose Preparation

5.1 Purpose

This procedure describes the preparation of unit-dose and multidose radiopharmaceuticals.

5.2 Rationale

Properly prepared radiopharmaceuticals contribute to adequate biodistribution after human administration permitting optimal diagnostic and therapeutic results.

5.3 Equipment

Laminar flow hood	Unit dose shield containers
Dose calibrator	Multidose shield containers
Technetium-99m eluate	Alcohol swabs
Appropriate labels	Saline (0.9%)
Kit reagent vials	Syringe shields
Syringes	

5.4 Procedure

1. Dose preparation will be performed in a laminar flow hood or at a drawing station behind a lead L-block using syringe shields, shielded containers, and remote handling devices as necessary.

2. Only technetium-99m pertechnetate with a minimum shelf life of 6 hours is acceptable for preparing technetium-99m radiopharmaceuticals.

3. The following product preparation procedures described will serve as guidelines and manufacturer's package instructions may provide additional consideration related to product preparation.

4. Only the desired radiopharmaceuticals will be located at a drawing station at any one time. All other radiopharmaceuticals (except those being used at different separate drawing stations) will be stored in properly marked locations.

    a. Unit dose and multidose radiopharmaceutical preparation

        i. Each unit-dose syringe or multidose vial must be labeled with:
            1. Standard radiation symbol
            2. The words "Caution – Radioactive Material"

3. The name and prescription number of the radiopharmaceutical
4. Any other regulatory requirements

ii. From the bulk radiopharmaceutical vial, withdraw the required volume needed to obtain the requested dose activity

iii. Assay each unit dose syringes in a properly adjusted dose calibrator

iv. If the assayed activity exceeds the prescription's requested amount, adjust the dose.

v. All unit dose and/or multidose prescriptions will be dispensed for shipment in appropriate shielded containers.

vi. All lead shielded containers will be labeled with:
1. Prescription number
2. Patient's name or "For Physician Use"
3. Practitioner's and/or institution's name
4. The standard radiation symbol
5. The words "Caution – Radioactive Material"
6. The name of the radioactive drug
7. The amount of radioactive material contained in millicuries (mCi) or microcuries (μCi)
8. If a liquid, the volume in milliliters (mL)
9. The requested calibration date and time
10. Lot number

b. Preparation of technetium-99m radiopharmaceuticals

i. Determine the number of kit reagent vials to be used.

ii. For identification, label each reagent vial with date, preparation time, lot number and any other description desired. Place vial into a similarly labeled shielded container.

iii. Calculate the amount of technetium99m pertechnetate required. Record and initial the lot number and volume of the technetium99m pertechnetate used in kit reagent preparation.

iv. Determine the required volume of saline to be added to the kit reagent vial, based upon a routine total volume.

v. Record the saline volume added.

vi. Aseptically inject the technetium99m pertechnetate into the vial.

vii. Using remote handling devices, remove the kit reagent vial and place in a dose calibrator. During transfer of the reaction vial, visually check the product to assure that no particulate matter is present in water-soluble radiopharmaceuticals. If any matter is present in water-soluble technetium99m radiopharmaceuticals, discard the product. Record product disposition.

viii. Record and initial the kit's total activity and assay time.
ix. Allow the preparation to incubate if necessary at the appropriate temperature for the appropriate time.
x. Remove the bulk technetium-99m pertechnetate to the designated storage area while not being used for kit reagent preparation.
xi. Withdraw a test sample of the product.
xii. Perform appropriate radiochemical purity tests to determine the product's labeling efficiency/purity.
xiii. Record and initial test results (see QC form in Appendix 1).
xiv. Determine, record, ad initial the expiration time for the product prepared.

6.0 Package Preparation for Shipment

6.1 Purpose

All packages and shipments which leave the facility will be labeled and surveyed in accordance with 10 CFR 71.5 and 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport.

6.2 Rationale

This procedure minimizes the radiation exposure and contamination hazard to the general public and meets required safety standards.

6.3 Equipment

Spec. 7A container
Lead syringe containers
Lead vial containers
DOT labels
Plastic containers (for beta emitters)
Dry wipes
Security seals
Multichannel analyzer
Bill of lading

6.4 Procedure

1. All radiopharmaceuticals offered for shipment will be packaged in individual shielded containers.

   a. Each unit dose product will be dispensed in an approved disposable syringe, assayed and loaded into an appropriate syringe container.
   b. Each multidose product will be dispensed into a vial, assayed, and then loaded into a shielded container.

      NOTE: The multidose lead containers are 3/8 inch thick and result in external surface readings of less than 0.5 milliroentgen/hr for 700 to 750 millicuries of technetium99m.

   c. Affix the appropriate label to the outer container for each product dispensed.
   d. A heat shrink may be applied to all unit dose and multidose containers prior to shipment.
   e. Expired molybdenum-99/technetium-99m generators being returned to the manufacturer will be shipped in their original containers.
   f. All doses will be properly secured and braced in their shipping container using DOT specification-tested packaging inserts prior to shipment.

2. Each package prepared for transportation will be checked for proper inventory.

a. Review all of the client's radiopharmaceutical orders.
b. Check these against the items that have been loaded into the shipping container.
c. Remove any radiopharmaceuticals that have not been ordered by the client.
d. Fill any radiopharmaceutical orders requested but not found in the packaging during the inventory check.
e. Once all radiopharmaceutical orders have been verified to be filled and are in the shipping container, place any other nonradioactive items into the package.

3. Contamination wipe tests will be performed and evaluated on each package offered for transportation prior to shipment.

   a. Wipe the external surfaces of the radioparmaceutical containers (inner source container). The wipes should be evaluated on a multichannel analyzer. If contamination levels exceed specified action levels, decontaminate the containers until follow-up wipes indicate acceptable results.
   b. The external surfaces of each shipping container offered for transportation will be wiped on all surfaces for contamination. The total area wiped should be approximately 300 centimeters^2 (12 inches x 12 inches) as per 49 CFR 173.443. If the contamination levels exceed 6600 disintegrations per minute, the shipping containers must be decontaminated until subsequent wipes indicate acceptable results.

4. The contents of each package will be listed on the bill of lading (shipping papers) and on the packing slip when used.

   a. If not preprinted, list the radionuclide, the proper shipping name, the chemical form, and the physical form on the bill of lading or shipping paper.
   b. List the amount in millicuries of each radionuclide in the shipping container.
   c. Record the appropriate radioactive label description in the Type Label column. The words "Radioactive White I", "Radioactive Yellow II", or "Radioactive Yellow III" must be used.
   d. After the contents of the package have been checked and verified on the bill of lading or packing slip, close the package, and place the packing slips on the side of the container.

5. Each package offered for transportation shall have a security seal.

   a. After the container has been closed, place the security seal through the locking mechanism.
   b. Once the package leaves the lab, the driver is not authorized to

open that package for any reason.

6. Label the package as to the content and external radiation levels.

   a. Survey the shipping container with a GM meter on all six sides both at the external surface and at one meter (transport index). Note the highest radiation reading at each distance.
   b. Place two DOT labels on opposite sides of the shipping container based on the survey findings.

      NOTE – Radioactive White I Label:
      Surface reading less than 0.5 milliroentgens/hr
      Transport Index = 0 (background)

      Radioactive Yellow II Label:
      Surface reading less than 50 milliroentgens/hr
      Transport index = less than 1 milliroentgens/hr

      Radioactive Yellow III Label
      Surface reading between 50 and 200 milliroentgens/hr
      Transport index = between 1 and 10 milliroentgens/hr

   c. Place the appropriate information on both labels concerning the radionuclide content, activity, and transport index as necessary (a Radioactive White I package has no transport index)
   d. Record this information on the bill of lading (shipping paper) and package description form.
   e. When a radionuclide is reshipped in the same manufacturer's container in which it came, a radiation and contamination survey will be performed to verify the manufacturer's finding before it is shipped. Any findings that exceed those stated by the manufacturer should be resolved and corrected before reshipment. Record the results as described in this section.
   f. If any package offered for transportation is labeled as a Radioactive Yellow III package, notify the driver or contract courier that the vehicle must be placarded on all four sides with the words "Radioactive Material." Placarded vehicles that make intercity deliveries must comply with the appropriate sections of 49 CFR.

7. Check each package for appropriate labeling. The following labels must be affixed to the package per 49 CFR 172.406(a):

   a. USA DOT 7A TYPE A RADIOACTIVE MATERIAL, nos

   This should be affixed near the required DOT label in letters at least one half inch high per CFR 172.406(a).

   b. UN 2982

This should be affixed near the required DOT label.

c. IN CASE OF EMERGENCY:
CALL ADVANCED ISOTOPES
208.406.2543

8. 49 CFR 172.406(a) requires the following statements:
   a. From: ADVANCED ISOTOPES
      4968 Rainbow Way
      Chubbuck, Idaho 83202
      To: Client Address (complete facility address must be listed)

9. Other statements as necessary, such as "Use gloves and observe radiation safety procedures when handling this package"

10. Affix the above labels that are missing.

11. Prepare the shipper's certification statement

    a. Once the package has been properly loaded, surveyed and documented on the DOT labels, packing slips and bill of ladings, sign the shipper's certification statement on the bill of lading. This indicates that the radioactive materials are properly classified, described, packaged and marked, and are in proper condition for transportation according to the applicable DOT regulations.

12. Release the package for shipment

7.0 Product Delivery

7.1 Purpose

This procedure describes the delivery of dispensed radiopharmaceuticals and radioactive materials to clients.

7.2 Rationale

Transporting radioactive materials in compliance with DOT regulations minimizes radiation exposure to drivers and members of the general public.

7.3 Equipment

Bracing (wooden racks)
Bungee cords/webbed belts
Bill(s) of lading
Emergency information packet
Emergency notification sign

7.4 Procedure

NOTE - All drivers should have a current, valid driver's license and meet any applicable requirements of the Motor Carrier Safety Regulations found in 49 CFR. Each facility manager is responsible for ensuring compliance with commercial zone boundary requirements for the transportation of radioactive materials. Each driver is responsible for obeying local and state traffic regulations while operating a motor vehicle. Under no circumstances is a package to be opened after leaving the facility.

1. Check delivery vehicle for operability. Remove any vehicle from service that is found to be nonoperational and report it to the facility manager.

2. Check delivery vehicle for emergency notification sign (should be on side or rear window). This sign should contain information concerning who may be contacted in the event of an emergency if the driver is unavailable. Replace missing sign if necessary.

3. Check delivery vehicle for sign which states "Medical Delivery Vehicle." These signs can be attached to the side or rear of the vehicle. Replace missing sign if necessary.

4. Check delivery vehicle for emergency information packet located in the glove compartment of the vehicle. Replace missing packet if necessary.

5. Vehicle loading:
   a. Check bill(s) of lading against the number of packages to be delivered. Check the addresses on the packages against those listed

on the bill(s) of lading Ensure that all appropriate information has been listed on the bill(s) of lading and the shipper's certification statement has been signed.

b. Any packages labeled as "Radioactive Yellow III" will require that the vehicle be placarded with the words "Radioactive" on all four sides as required by 49 CFR 172.519 and 172.556.
c. Load the packages into the vehicle trunk insuring that they are blocked and braced. If there is a "Radioactive Yellow III" package, load it so that the radiation level at the driver's position is less than 2 milliroentgens/hr.
d. Secure the packages by bungee cord(s) or webbed belts.
NOTE – if the car is in an unrestricted area while being loaded and it is necessary to make more than one trip to load all the packages, either lock the vehicle each time a trip must be made back into the facility or have another driver maintain direct surveillance over the vehicle being loaded.
e. After the vehicle is loaded, ensure that all bill(s) of lading, necessary directions, and deliver instructions are present. Place these items in the vehicle such that they are always within arm's reach.
f. After making sure all doors and trunk are closed, begin delivery run.

6. Package Delivery
   a. Upon arrival at a customer's facility, remove the package(s) to be delivered. Check the address label to ensure the correct package(s) are delivered.
   b. Lock all vehicle doors while making the delivery.
   NOTE – always lock the vehicle doors when it is necessary to leave the vehicle unattended for ANY PERIOD OF TIME.
   c. Deliver the package to the authorized location. It may be necessary to obtain a door key or the assistance of a security guard to deliver the package(s). If required, find someone to take responsibility for the delivery. If this cannot be done, call the facility pharmacist-in-charge for further instructions.
   d. After delivery of all packages containing a "Radioactive Yellow III," remove vehicle placarding before continuing on with the remaining run.

7. Package Return
   a. Pick up any packages which are to be returned to the facility. Under no circumstances is a courier to prepare a package for return to the facility. If the client has not prepared the package, DO NOT remove that package from the client's facility. Notify the client orally or in writing of what needs to be done.
   b. Secure all packages as before and proceed to make all deliveries following the above instructions.
   c. Return to the facility at the end of the delivery run.

d. Remove all returned packages from the vehicle and deposit them in the designated returned package area in the facility.
e. Note any vehicle malfunctions or potential problems and report information upon return to the facility.

8.0 Returned Waste

8.1 Purpose

This procedure describes the handling and management of radioactive waste from clients.

8.2 Rationale

Proper handling and management of returned waste minimizes radiation and biohazard exposure to personnel.

8.3 Equipment

GM survey meter
Multichannel analyzes
Waste storage bins (shielded)
Dry wipes
Disposable gloves

8.4 Procedure

NOTE: Observe precautions in the following sections when handling returned waste.

1. Handle all packages containing radioactive waste while wearing disposable gloves, proper dosimetry and a buttoned lab coat.
2. Inspect packages for any obvious sign of damage. Notify facility Radiation Safety Officer if damage is noted. Follow his/her instructions in handling the package. Otherwise, continue with procedure.
3. Using the lowest range possible on the survey meter, measure the radiation level at one meter from the package surface on all sides. Measure the radiation level at the package surface on all sides.

   NOTE – Return waste will generally consist of used syringes and multidose vials. Therefore, the highest radiation level at the package surface must be no more than 0.5 milliroentgens/hr. If this level is exceeded, notify the facility's Radiation Safety Officer for further instructions.
4. Segregate the waste by the half-life of the material, and the type of waste (biological or non-biological). Below is the scheme of waste bins that will be used:

Bin S:	Tc-99m only Vials only
Bin BS:	Biological Tc-99m only Syringes and miscellaneous
Bin L:	Long half-life vials only (Tl-201, Ga-67, I-123, In-111)

Bin BL: Long half-life materials (half life less than 100 hrs)
Includes Tl-201, Ga-67, I-123, In-111, and Xe-133
Syringes and miscellaneous

Bin BI: Biological radioactive waste (I-131 only)

NOTE: Biological waste is any waste that has come into contact with human blood

These classifications are based on expected volumes of waste generated with the short half-life waste being the greatest waste produced.

5. Break down returned syringes and vial shields and empty into appropriate storage bins.

6. Deface and remove all labeling from the shielded containers and survey for contamination with a GM meter using an unshielded probe. Any labels measuring twice background will be treated as radioactive waste and stored accordingly for decay. Labels not found contaminated may be treated as routine waste.

7. After all waste has been stored for radioactive decay, survey returned packages and shielded containers for contamination on both inside and outside surfaces. Remove those items measuring twice background for decontamination or storage until background levels of radiation are reached. Routine decontamination consists of using Radiac™ Spray (or similar agent) and wiping with a paper towel to remove contamination. Resurvey to verify decontamination effectiveness. Return containers and packages to routine use.

9.0 Radiation Contamination Control

9.1 Purpose

This procedure describes the methods that will be used to control radioactive contamination.

9.2 Rationale

Contamination control minimizes personnel radiation exposure trough precautions and preventative measures.

9.3 Equipment

Lab coats	Absorbent underpadding
Disposable gloves	GM survey meter

9.4 Procedure

1. Lab coats and disposable gloves
   a. All personnel will wear a buttoned lab coat when entering and working in a restricted area.
   b. All personnel will wear disposable gloves when handling radioactive materials (sealed and unsealed forms).
   c. Personnel directly involved in preparation and dispensing of radiopharmaceuticals will routinely check their disposable gloves with an unshielded probe (GM survey meter). Any reading above background indicates that gloves must be changed.

      NOTE – the probe on the GM survey meter should be covered with saran wrap or other suitable material to prevent cross contamination.

   d. Upon leaving the restricted area, monitor hands, feet, and clothing (lab coat) for contamination.
   e. Before releasing lab coats from the facility for cleaning, survey for contamination with a GM meter.

2. Surface absorbent coverings
   a. All work station surfaces in restricted areas will be covered with absorbent underpadding or equivalent.
   b. These covered surfaces will be monitored after production runs with a GM survey meter. Areas that read greater than 5 milliroentgens/hr at 1 inch from the surface will be replaced.
   c. Absorbent padding will be replaced biweekly for both contamination control and facility cleanliness.
3. Waste disposal
   a. Waste generated from facility operations (i.e., disposable gloves,

syringes, contaminated underpadding, etc., will be placed in clearly identified waste containers lined with plastic in the restricted area. Those containers will be labeled with the "Caution – Radioactive Materials" sign and the word "Waste."

b. All waste generated in the restricted areas will be considered contaminated until proven otherwise by radiological survey. This includes "cold" trash cans located in unrestricted areas. All waste must be less than or equal to background when measured in a low background area to be considered releasable. All other waste will be placed in the waste storage area. Record and initial all readings in the appropriate log before releasing waste into an unrestricted area.

4. Contaminated surface

a. Surfaces such as floors and countertops that are identified as contaminated should be contaminated to less than 0.1 milliroentgen/hr. If decontamination is not effective, the area should be covered with absorbent underpadding and taped in place t prevent the spread of contamination. It may also be necessary to place lead shielding over the area to reduce radiation exposure. Label the area with a radiation caution sign.

10.0 Handling of Potentially Infectious Materials

10.1 Purpose

Precautions will be taken by facility personnel to avoid direct contact of skin and mucous membranes with blood and blood products that are potentially infectious.

10.2 Rationale

The transmission of infectious diseases while handling potentially contaminated materials is a possibility. Therefore, appropriate safeguards should be instituted to lower the risk of personnel infections from these materials.

10.3 Equipment

Lab coats/gowns
Gloves
Household bleach/Cidex or similar agent

10.4 Procedure

Infection Control:

1. Mechanical devices should be used for the manipulation of all liquids in the laboratory.

2. Gloves must be worn when handling blood specimens to avoid skin contact.

3. Gowns or buttoned lab coats must be worn and should be discarded appropriately before leaving the lab.

4. Hands must be washed after removing gowns/coats and gloves and upon completion of laboratory activities.

5. Needles should not be bent after use, but should be promptly placed in a puncture-resistant container.

6. All procedures and manipulations of potentially infectious material should be performed carefully to minimize the creation of droplets and aerosols.

7. Laboratory work surfaces must be decontaminated with a disinfectant such as sodium hypochlorite solution following any procedure involving potentially infectious material. This includes the breakdown of lead shielded containers and syringes returned from hospitals.

8. All potentially contaminated materials should be decontaminated and disposed of with regard to their possible biohazard.

9. Notify facility manager if contamination is suspected.

FACILITY MANAGEMENT

1.0 Facility Management

1.1 Purpose

This procedure describes facility management activities necessary to run the pharmacy.

1.2 Rationale

Adequate facility management allows the pharmacy to run on a dependable basis.

1.3 Equipment

None

1.4 Procedure

1. Security
   a. The facility manager is responsible for maintaining a key control system such that only essential personnel (authorized users) have access to the facility.
   b. The facility manager or her designate is responsible for maintaining positive control over facility entry during normal work hours.
   c. The pharmacist-in-charge is responsible for ensuring all the doors/windows are locked and the security alarm is activated upon closing at the end of the day.

2. Safety/First Aid
   a. The facility manager is responsible for ensuring hazardous working conditions such as sharp edges, slippery floors, etc., are eliminated from the work area.
   b. The facility manager will instruct staff personnel to inform him/her of any hazardous condition of which the facility manager is unaware.
   c. Each staff member is to immediately report a personal injury to the facility manager or his designate no matter how minor.
   d. The telephone numbers of the local fire department, police department, and ambulance service will be posted in conspicuous areas throughout the facility.
   e. Each facility will maintain a standard first aid kit for use in the event of personnel injury.
   f. If a staff member punctures a finger, hand, arm, or any other part of the body with a used syringe needle, it is to be reported immediately to the facility manager or the pharmacist-in-charge. Arrangements will be made to see a physician.

g. In the event of fire:
    i. Notify all personnel in the facility
    ii. Use an appropriate rated fire extinguisher if it is possible.
    iii. If not, evacuate the facility immediately and notify the fire department.
    iv. Report to the chief fire fighter on the scene and describe to him any radiological conditions that may be hazardous to the fire fighters.
    v. Staff personnel and fire fighters are not to leave the area until a contamination survey has been performed on these individuals with available survey equipment. These surveys will be performed under the supervision of the facility Radiation Safety Officer or his/her designate.

3. Document Posting Requirements
    a. The following documents are to be posted in a conspicuous area in the facility such that all personnel will see them during their normal workday.
        i. NRC-3 form
        ii. Copy of inspection results for 5 days after receipt of form.
        iii. State Board of Pharmacy license
        iv. Pharmacist licenses
        v. Pharmacy technician licenses
        vi. Workman's compensation statement
        vii. Any other state or local required posting
    b. You may either post or if it is no practical, you may post a notice which describes the following documents and state where they may be examined.
        i. Copies of 10 CFR Parts 19 and 20
        ii. Copies of the Radioactive Material (RAM) License, license conditions or documents incorporated into the license by reference and amendments thereto.
        iii. The operating procedures applicable to license activities.
        iv. Any notice of violation involving radiological working conditions, proposed injunction of civil penalty or order issued pursuant to subpart B of 10 CFR Part 2, and any response from the licensee.

2.0 Janitorial Staff

2.1 Purpose

This procedure provides steps that will be taken when janitorial personnel must enter restricted area for the purpose of general housekeeping.

2.2 Rationale

It is important for the janitorial staff to perform routine housekeeping chores with minimal radiation exposure.

2.3 Equipment

Lab coats	Direct reading dosimeters (200 mR range)
Dosimeter	Assigned film badge

2.4 Procedure

1. Perform the following:
   a. Before the janitorial staff enters the restricted area for the first time, each person will be given inservice training. The training must be documented with the individual's signature.
   b. In lieu of training, the janitorial staff may be escorted by facility personnel while in the restricted areas.
   c. Janitorial staff members will be given a lab coat and a pocket dosimeter or assigned film badge. Pocket dosimeters will be read, recorded and initialed by facility personnel upon entry and departure of the restricted area.
   d. Janitorial staff will be instructed not to handle any radioactive materials.
   e. All noncontaminated trash in the restricted area will be monitored by the staff for contamination before the janitorial staff can remove it for disposal. Any contaminated trash will be removed by the facility and stored for radioactive decay. Trash is considered contaminated if it reads higher than background with a GM survey meter.
   f. Cleaning tools such as dust mops or brooms will be monitored with a GM survey meter for contamination before being released from the restricted area. Any cleaning tools that measure above background will be retained until background levels are reached.
   g. Cleaning personnel will monitor hands, clothing, and feet before leaving the restricted area.
   h. Notify the facility Radiation Safety Officer if any unusual readings are found.

3.0 Visitors

3.1 Purpose

This procedure provides steps that will be taken when a visitor enters restricted areas.

3.2 Rationale

By following these procedures, Advanced Imaging is providing assurance that members of the general public may safely visit the facility while maintaining exposures within regulatory limits.

3.3 Equipment

Dosimeter charger
Lab coats
Direct reading dosimeters (200 mR range)

3.4 Procedure

1. Perform the following:
   a. A general description of the lab is given to all visitors before entering the restricted area.
   b. Each visitor's name, address and phone number is recorded in the visitor log book (see Appendix 1). Record the restricted area entry and exit time. Authorized personnel must record dosimeter readings for entry and departure of the restricted area.
   c. Give each visitor a lab coat.
   d. If a large group is touring the lab, give one person a pocket dosimeter. The dosimeter should be worn on the outside of the lab coat.
   e. Pharmacy personnel will escort visitors through the restricted area.
   f. Visitors cannot handle radioactive materials
   g. Upon leaving the restricted area, the pocket dosimeter will be read and the exposure results will be recorded. Each person will use the frisker to monitor hands, feet, and clothing. Record and initial results on the survey log.
   h. Immediately contact the facility's Radiation Safety Officer if the pocket dosimeter reads off the scale or contamination is found on the visitor's hands, feet, or clothing.

4.0 **Data Log Entries**

4.1 Purpose

This procedure describes the requirements for data entries to logs.

4.2 Rationale

Data log entries provide record information indicating that a measurement, action, review, or verification has been performed.

4.3 Equipment

N/A

4.4 Procedures

1. Requirements
   a. Data log entries must meet the requirements for the following:
      i. Radioactive materials license(s)
      ii. Food and Drug Administration
      iii. Other state, county, and local regulations
   b. This list of required entries will be supplied, reviewed, and updated on a semiannual basis, or more frequently if required.
2. Information Entries
   a. Measurements, actions, reviews, or verifications will be documented no later than four hours after the related event.
   b. These entries will be dated and initialed by the personnel who either performed the related event or who directly observed the event.

AUDIT AND TRAINING PROGRAMS

1.0 Audit Program

1.1 Purpose

This procedures describes the internal audit program

1.2 Rationale

An effective audit program provides the necessary information to evaluate facility performance.

1.3 Equipment

None

1.4 Procedure

1. Regulatory Audit

   A. Frequency
      i. Will be performed annually by the pharmacist-in-charge.
      ii. These audits will be performed on an unannounced basis.
   B. Audit Findings Reporting Requirements
      i. A copy of the audit findings will be given to the Facility Manager within 1 week after the audit has been completed.
   C. Corrective Actions
      i. The Facility Manager will notify all employees of the corrective actions (if any) which will or have been taken
      ii. This notification is required within 20 days after receiving the audit form.

2.0 Training

2.1 Purpose

Training ensures that all employees are skilled or proficient at their assigned duties and responsibilities and understand the exact scope and nature of those duties.

2.2 Rationale

Proper training of personnel increases the competency of the staff, improves productivity, and contributes to the maintenance of regulatory compliance.

2.3 Equipment

Lesson plans	Individual instruction
Videotapes	Procedure manual

2.4 Procedure

1. Frequency
   Training will be given to any employee who works in or frequents the vicinity of a restricted area. Initial training will be conducted and documented before an individual engages in routine activities in the restricted area.

2. Training Content
   Extent of training will be commensurate with the scope of duties and will be given prior to working in or around the restricted area. There will be 4 training classifications:
   - A. General employee (all personnel)
     - i. "Standard for Radiation Protection" 10 CFR Part 20
     - ii. "Instructions to Radiation Workers" 10 CFR Part 19
     - iii. ALARA exposure philosophy
     - iv. NRC Regulatory Guide 8.13 "Instructions Concerning Prenatal Radiation Exposure" for female employees.
     - v. Required posting and documents
     - vi. Applicable conditions in license applications and amendments
     - vii. Organizational chart
     - viii. Personnel policy manual
     - ix. Responsibility to report any license condition which may lead to a violation of regulations or cause unnecessary radiation exposure.
   - B. Authorized user (pharmacist and/or technologist)
     - i. Basic radiation physics
       1. Atomic structure

2. Decay process and types of emissions
3. Radioactivity – definitions and units
4. Interactions of radiation with matter
5. Half-life, inverse square law, and half-value layers
6. Decay constant formula and use of decay tables
7. Calculation of radiation dose in air, tissue and bone.
8. Radiation dose – dose rate, time, and average dose.
9. Characteristics of radiation sources (liquids and other physical forms

ii. Radiation Biology

1. Acute and chronic exposures
2. Somatic and genetic effects
3. Basis of maximum permissible dose
4. Typical somatic effects at various dose levels
5. Genetic effects and genetically significant dose
6. Factors affecting biological damage (dose, dose rate, type of radiation, type of tissue, amount of tissue, biological variation and chemical modifiers)

iii. Radiation Protection

1. Principles of radiation safety and ALARA management program
2. "Standard for Radiation Protection" 10 CFR Part 20
3. "Instructions to Radiation Workers" 10 CFR Part 19
4. License conditions for radiation safety program
5. Radioactive shipment receiving, opening, handling, storage and security procedures
6. Radiation labels and required posting and documents.
7. Routine proper use,, inventory, and accountability procedures for sealed sources, or devices containing sealed sources
8. Leak test of sealed sources and contamination control
9. Shipment returns, DOT regulations and supplier instructions and forms
10. Radiation detection instrumentation
11. NRC Draft Regulatory Guide "Instructions Concerning Prenatal Radiation Exposure"

12. Title 10 CFR part 35 "Medical Use of Radionuclides" and NRC Regulatory Guide 10.8 Procedures and License Applications
13. Radiation exposure and contamination control.

C. Auditor/Radiation Safety Officer
   i. All training as outlined above for an authorized user/lab technician
   ii. All license and regulatory requirements
   iii. Proper record maintenance procedures
   iv. Performance and evaluation of:
      1. Handling techniques
      2. Bioassays
      3. Leak testing of sealed sources
      4. Air monitoring
      5. Fume hood measurements
      6. Instrument quality control
   v. Waste disposal procedures and regulations
   vi. Decontamination procedures

D. Driver
   i. General employee training
   ii. Daily opening procedures
   iii. Radiation detection instrumentation and procedures
   iv. Package check-in procedures from manufacturers
   v. Package check=in procedures for return packages and activity residues from hospitals.
   vi. Package preparation for shipment.
   vii. DOT regulations and requirements
   viii. Delivery procedures to hospitals
   ix. Driving responsibilities, vehicle maintenance, and radiation surveys of vehicles.
   x. Radioactive waste segregation and storage
   xi. Contamination control
   xii. Handling of potentially infectious material
   xiii. Protection against injury from needles
   xiv. Protective clothing and remote handling devices
   xv. Room surveys and wipe testing
   xvi. Empty package disposal
   xvii. Emergency procedures

RADIATION SAFETY MANUAL

This radiation manual sets forth the radiation safety program. This manual is effective when a RAM license is granted to the corporation. When changes are made to this manual, the user will insert the new pages and remove the old. All changes will have the date changed indicated on the upper right-hand corner of each page that has been changed. Those pages that do not have such a date are effective on the day the license was issued.

1.0 Policy Statement

This radiation safety program has been established to protect the general public, our customers, and our employees from unnecessary radiation exposure. Accomplishment of this goal shall be achieved through full compliance with the provisions of this manual and the NRC regulations. Accordingly, the manager must operate the facility in complete conformance with the m annual and the NRC license. Additionally, each employee must understand and comply with those specific provisions that apply to her or his job.

2.0 Radiation Safety

A. The Radiation Safety Officer (RSO) is Troy Curnutt, CNMT. The RSO is the individual whose general responsibility will be to incorporate and oversee the radiation safety programs. In the absence of the RSO (e.g., in the early morning when only one authorized user is present, when the RSO is sick or on vacation), the authorized users must assume the duties of the RSO and ensure compliance with state and federal regulations and the terms and conditions of our license. These responsibilities include:

1. General surveillance over all activities involving radioactive material, *including monitoring and special surveys.*
2. Ensuring compliance with NRC rules and regulations, as well as conditions of the Radioactive Material License
3. Monitoring the performance of fume hoods that are associated with isotope work.
4. Serving as the primary source of radiation protection information for personnel at all levels of responsibility.
6. Supervising and coordinating the receipt, opening, and delivery of all shipments of radioactive material arriving at the nuclear pharmacy.
7. Supervising the distribution and processing of personnel monitoring equipment.
8. Conducting training programs in proper procedures for the use of radioactive material.
9. Supervising and coordinating the radioactive waste disposal program.
10. Supervising the safe storage of all radioactive materials not incurrent use.
11. Ensuring that sealed sources are leak tested at proper intervals.
12. Maintaining an inventory of all radioactive materials and limiting the quantity of radionuclides at the facility to the amounts authorized by the license.

B. The RSO has the authority to halt any procedure or work which could jeopardize the safety of personnel or the general public and if necessary can seize or suspend radioactive materials, equipment or any other articles which may prove to be a health hazard.

C. Radiation signs will bear the radiation symbol of authorized color and background and wording consistent with regulations. "Notice to Employee" forms, along with all other required postings, will be posted in a sufficient

number of places to permit employees working in a restricted area to observe a copy on the way to or from their place of employment.

D. Survey programs

1. All elutions, preparation, assay and dispensing areas will be surveyed daily with a low-energy survey meter and decontaminated if necessary.
2. Laboratory areas where only small quantities of radioactive material are used are to be surveyed weekly.
3. Waste storage areas and all other laboratory areas will be surveyed weekly.
4. All measurements of radiation levels will be taken with a survey meter sufficiently sensitive to detect 0.1 mR/hr.
5. A series of wipe tests using alcohol wipes or small squares of paper towel will be taken from those surfaces where contamination could be expected to exist. Each wipe will be rubbed over a surface area of about 100 square centimeters to maintain a consistent means of determining the amount of removable contamination. The wipes will be counted using a gamma well counter. The amount of removable activity will be recorded.
6. Records will include:
   a. A drawing of the area surveyed identifying relevant features such as active storage areas, active waste areas, etc.
   b. Measured exposure rate in mR/hr keyed to locations on the drawing for survey areas.
   c. Detected contamination levels in dpm keyed to locations on the drawing for area wipe tests
   d. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels, or exposure rates after corrective action, and any appropriate comments.

E. Contamination Limits

1. If any wipe sample of approximately 100 square centimeters indicates more than 2000 net dpm in the restricted areas or 200 dpm in an unrestricted area, the area will be cleaned or shielded until the contamination has been reduced to acceptable limits. Should samples show an easily detectable amount of activity above background, the sample area will be cleaned or shielded to reduce the possibility of excess exposure or contamination.
2. Area monitors will be placed in unrestricted areas to assure that radiation levels to any person in an unrestricted area will be less than 500 mR per year, 100 mR in any 7 consecutive days, or 2 mR/hr.

F. Personnel monitoring

1. All personnel will wear finger and whole body monitors. Finger monitors will be worn by all regular handlers of radioactive material. Whole body monitors will be worn on the torso during the working day.
2. Employees will receive a new set of monitors once every month.
3. All radiation reports will be posted for all employees to view their readings.

3.0 General Rules for Handling Radioactive Materials

It is the responsibility of those working with radioactive materials to protect themselves and others from radiation hazards arising from their work. Poor work habits cannot be tolerated. The following regulations shall be observed:

1. No visitors allowed in radiation areas unless properly supervised, instructed, and issued a dosimeter.
2. No eating, drinking or smoking in the restricted areas. No cosmetics or hand lotions are to be applied in the lab. Keep pens, pencils, and fingertips out of mouth.
3. Always wear lab coats or other protective clothing in areas where radioactive materials are used.
4. Always wear disposable gloves when handling radioactive materials.
5. Monitor hands and clothing for contamination after each procedure or before leaving the area.
6. Always use syringe shields and vial shields when drawing and dispensing.
7. Cover all surfaces where radioactive materials are handled with absorbent paper.
8. Keep radioactive materials shielded at all times.
9. Label all radioactive material with radioactive symbol and provide pertinent information (radionuclide, concentration, volume, date, time, lot number, etc.).
10. Do not pipette any material by mouth.
11. Use tongs to handle radioactive materials. Never handle radioactive materials with hands.
12. Working with radioactive materials with open wounds or exposed surfaces of the body is prohibited unless properly dressed and protected.
13. Handle radioactive materials as quickly as possible and maximize shielding.
14. Be cognizant of personnel in the area.
15. Always wear personnel monitoring devices in areas where radioactive materials are used or stored.
16. Dispose of radioactive waste only in specially designated, properly shielded receptacles.
17. Confine radioactive solutions in covered containers that are clearly identified and labeled with the name of the compound, radionuclide, date, and activity.
18. Always transport radioactive materials in shielded containers.

4.0 Ordering and Receiving Radioactive Materials

All orders for radioactive materials will be placed by a nuclear pharmacist or a nuclear pharmacy technician under the supervision of the nuclear pharmacist. Products will only be purchased from pharmaceutical houses that have authorization and appropriate licensing by the FDA and the NRC. The pharmacist or technician must calculate the activity of the current inventory prior to ordering to ensure that quantities ordered will not exceed the possession limits of the RAM license.

Deliveries of radioactive material to the pharmacy will be received by the pharmacist or trained personnel. In the event of delivery during off-duty hours, the pharmacist will be notified and arrangements will be made for pickup or an arranged delivery time.

All doors entering the restricted areas of the laboratory will be made unavailable to unauthorized personnel. Only the nuclear pharmacists listed on the RAM license will be issued keys to the restricted areas.

All incoming deliveries will be checked upon arrival for possible contamination. The pharmacist or technician will wear gloves and place the delivery on absorbent paper. She/he will then give the package a physical inspection and, using a GM survey meter, will take a surface reading and reading at one meter and compare it to the label type and transport index used by the shipper. A wipe test of external box and internal surfaces of the container will be made. All information will be recorded in the receiving log/invoice and filed. The RSO will be contacted if wipe tests are greater than 200 dpm net, if the transport index does not correlate with the manufacturer's transport index, if the surface reading does not correlate with the manufacturer's label, or if leakage of any type is suspected.

5.0 Preparation and Dispensing of Radiopharmaceuticals

A. The actual preparation and dispensing of radiopharmaceuticals will only be performed by a licensed nuclear pharmacist, registered pharmacist or intern under supervision of a licensed nuclear pharmacist and only on the prescription of an authorized physician at a licensed institution. Dose drawing may be performed by a technician under the supervision of a licensed nuclear pharmacist. Prior to the dispensing of any radiopharmaceutical, the institution's license will be checked to verify that they are licensed to receive the product and limits have not been exceeded.

B. Formulation of kits
1. Kits will be prepared as described in the package insert or on the nuclear pharmacy kit formulation chart.
2. No kit shall be formulated if the kit has exceeded its expiration date.
3. Radiopharmaceuticals which are temperature-sensitive (such as MAA) are to be kept in a refrigerator marked for this purpose.
4. Dilution of kits will be with 0.9% normal saline USP containing no bacteriostatic excipients.
5. All kits will be properly labeled and shielded.
6. Aseptic technique will be used at all times
7. Syringe shields are to be used during kit formulation.
8. Quality control of radiochemical purity is to be performed after each kit is formulated.

C. Drawing procedures
1. Always use rubber gloves before handling radioactive materials.
2. Always work behind lead or lead glass shielding.
3. Swab all vials with a germicidal prior to entry.
4. Do calculations prior to drawing to account for radioactive decay. Decay factor charts may be used for this purpose.
5. Check to assure proper isotope and dose prior to dispensing.
   a. Final volume should correlate with that calculated.
   b. Compare lot number on prescription and that of kit to assure proper isotope.
   c. Doses should be checked against recommended doses. If there is a variance, prescription should be verified.
   d. No dose shall be dispensed past the designated shelf life of that kit.
   e. Use syringe shields whenever possible.
   f. Label the lead container as soon as possible.
   g. Never work with more than 1 vial of product on the drawing station and always double check for product name.

D. Procedure for handling Xenon-133 gas
1. Xe-133 gas will be handled and transformed with special care to minimize the possibility of accidental breakage or release of the radioactive material.
2. The Xe-133 will be stored in its lead shipping container within the storage cave inside of the fume hood. The fume hood will operate on a continual

basis with an air flow velocity not less than 100 cubic feet per minute at its exhaust opening. The exhaust hood opening is 4 square feet. Air can enter the room through the door or the vent system. The majority of air leaving the room is through the fume hood which also keeps the room at a slight negative pressure.

3. In the event of breakage or accidental release of a radioactive gas, the area would be evacuated immediately and the room would be totally closed off. No one would be allowed to reenter the room until the room had been surveyed with a GM meter and the radiation levels have reached background.
4. The air which is exhausted from this room is released directly into an unrestricted area located on the roof of the laboratory. This release point is isolated from all air intakes and adjacent buildings by distances exceeding 50 feet.
5. We should have negligible Xenon-133 gas released into restricted or unrestricted areas. However, in the event that as much as 5% of the stored Xenon-133 gas should escape into the environment due to leakage, defective vials, or accidental breakage, the following calculations will show that we would still be within the maximal permissible concentrations (MPC):
    i. The maximum concentration of Xenon-133 over 40 hours in 7 consecutive days for this restricted area has been calculated on the following basis:
        1. Maximum amount of Xenon-133 to be stored averaged per week is approximately 7 vials containing 10 mCi Xenon-133 with a 3-day precalibration equaling approximately:

           7 vials x 10 mCi/vial x 1.5 = 105 mCi
           (3 day precal factor = 1.5)

        2. Estimated escape fraction (max Xenon-133 activity lost due to leakage and accidental breakage) is 0.05
        3. Air flow volume is 75 cubic feet/minute
        4. A conversion factor (C) can be calculated:

$C = A/V \times f$ where: C = concentration
A = max activity in μCi
V = air flow volume
f = escape fraction

$$C = \frac{105 \text{ mCi} \times (1000\ \mu\text{Ci/mCi})}{75\ \text{ft}^3/\text{min} \times 6.797 \times 10^7 \text{ mL per 40 hr week}} \times 0.05 = 1.03 \times 10^{-6}$$

Conversion Factors:
1 cubic feet/min = 6.797×10^7 mL in 40 hours
1 mCi = 1000 μCi

This verifies that the MCP for occupational exposure of 1×10^{-4} μCi/mL as stated in Appendix B Table 1 of 10 CFR Part 20 will not be exceeded.

In the event of breakage or accidental release of a radioactive gas, the area would be evacuated immediately and the room would be totally closed off. No one will be allowed to reenter the room until the room has been surveyed with a GM meter and the radiation levels have reached background.

The air which is exhausted from this room is released directly into an unrestricted area located on the roof of the laboratory. This release point is isolated from all air intakes and adjacent buildings by a distance exceeding 50 feet.

The maximum concentration of Xe-133 for the unrestricted area (the roof exhaust) is calculated below:

1. Maximum amount of Xe-133 released per year is based upon 105 mCi per week times the escape fraction of 0.05:

   105 mCi/wk x 0.05 x 52 weeks/yr = 273 mCi/yr

2. Total air flow volume from all areas equals 75 cubic feet/min.

   Therefore, using the preceding values and appropriate conversion factors, C can be calculated:

$$C = A/V = \frac{273 \text{ mCi} \times (1000 \ \mu\text{Ci/mCi})}{75 \text{ ft}^3\text{/min} \times 1.484 \times 10^{10} \text{ mL/yr}} = 2.45 \times 10^{-7} \ \mu\text{Ci/mL}$$

This verifies that the MPC of 3×10^{-7} μCi/mL as stated in the guidance document for 10 CFR Part 20 will not be exceeded.

3. Evacuation in the event of accidental release of radioactive gas will be calculated as follows:

   Evacuation Time = T = -V/Q x ln (C x V/A)

Where: V = volume of the storage room in mL
= 1560 cubic feet
= 1560 cubic feet x 28,320 mL/cubic foot
= 4.42×10^7 mL

Q = the total air exhaust
= 75 cfm x 28,320 mL/cf
= 2.12×10^6 mL/min

C = the MPC for Xe-133
= 1×10^{-4} μCi/mL (restricted area)

A = the highest activity of gas in a single container (μCi)
= 15 mCi (10 mCi vial with 3 days precalibration time)
= 15,000 μCi

Conversion factor = 1 cfm = 28,320 mL/min

Calculation:

$$T = \frac{-4.42 \times 10^7 \text{ mL}}{2.12 \times 10^6 \text{ mL/min}} \times \ln[(1 \times 10^{-4} \mu\text{Ci/mL}) \times 4.42 \times 10^7 \text{ mL}/15{,}000 \mu\text{Ci}]$$
$$= -20.8 \times \ln(0.295)$$
$$= 25.42 \text{ minutes}$$

Thus, in the event of accidental release, the area would be evacuated immediately and the room would be closed off and no one would be allowed to enter the room prior to 25.42 minutes.

E. Procedures for handling radioiodine

Special equipment required for handling radioactive iodine will include a radioiodine fume hood, thyroid bioassay probe, I-131 air sampling filter, and special handling devices.

1. Thyroid bioassay
All individuals who handle open forms of radioactive iodine will be required to have a thyroid bioassay performed. Individuals who routinely work compounding iodine capsules or diluting I-131 must have a thyroid bioassay performed weekly. I-125 will not be handled in an open form, thus making thyroid I-125 bioassay unnecessary.

2. In vivo thyroid bioassay procedure:
   a. With a known I-131 source, peak the analyzer by adjusting the amplifier gain until the peak of the source is at channel 364.
   b. Set the window to read all counts between 30 and 428 KeV.
   c. Obtain a background count for 1 minute.
   d. Place capsule or rod source in a thyroid neck phantom and center on detector face and obtain counts for 1 minute.
   e. Calculate net standard counts by subtracting background.
   f. Place the detector against the neck over the thyroid and obtain counts.
   g. Calculate net thyroid counts by subtracting background.
   h. Calculate thyroid activity via:
   $$\frac{\text{Net neck cpm}}{\text{Net std cpm}} \times \mu\text{Ci of standard} = \mu\text{Ci in thyroid}$$
   i. Action limit is 0.04 μCi as per NRC regulation guide 8.20.
   j. Minimum detectable activity (MDA) is a measurement of instrument sensitivity. It must be proven that the instrument can

detect the action limit of 0.04 μCi. The following formula will be used to determine MDA:

$$MDA = \frac{3.3 \text{ x square root of } (2 \text{ x Bkg x Tb})}{CF}$$

Where Bkg = background counting rate, Tb = background counting time, and CF = calibration factor (cpm of std/activity of std)

k. Only equipment with an MDA of less than 0.04 μCi will be used to perform bioassays.

3. Iodine-131 Air Monitoring

A. The handling of volatile radioactive materials such as radioactive iodine requires that air sampling is to be performed to document that maximum permissible concentrations (MPC) are not exceeded in the unrestricted areas.

B. An in-line air sampling filter will be used for the sampling of air in the unrestricted area (air being vented to the outside) and restricted area (air in the work environment). A filter connected to a vacuum pump will continually intake air samples in the area post the charcoal trap and prior to the top of the stack n the top of the roof opening up to the unrestricted area.

C. Procedures:

a. Air monitoring for unrestricted and restricted areas are to be performed on a weekly basis.

b. Wearing clean disposable gloves, remove charcoal cartridge from the air sampling apparatus.

c. Count the cartridge in the well counter for 1 minute. Make sure that the analyzer window is set for Iodine-131 and that an efficiency factor for this analyzer setting has been calculated.

d. Count an unused cartridge for 1 minute to get a background.

e. Note the sampling pump air flow in mL/min from measured flow of vacuum pump or air flow gauge.

f. Determine "pump on duration" in minutes from last air monitoring.

g. Calculate the concentration of volatile Iodine-131 in μCi/mL in the unrestricted area using the following equations:

i. Iodine-131 μCi in filter = $\frac{\text{cartridge cpm}}{2.22 \times 10^6 \text{ dpm}/\mu\text{Ci} \times \text{EF}}$

where EF = efficiency factor

ii. mL air flow = sampling pump air flow x duration

iii. Iodine-131 μCi/mL = i/ii

h. Assure concentration calculated in step g is less than 2×10^{-10} μCi/mL for the unrestricted area and 2×10^{-9} μCi/mL for the restricted area per 10 CFR Part 20 Appendix B. Notify RSO immediately if this concentration is exceeded.

4. I-131 Check-In Procedures
   A. Follow routine procedures for receipt of radioactive material.
   B. When performing the wipe test on the inner source container, the sealed tin can should be thoroughly wipe tested.
   C. Use an alcohol wipe to wipe the entire can surface.
   D. Count it in (not on) the well counter.
   E. If no contamination is found on this sealed tin can > 0.01 μCi (22,000 dpm), place it in storage until it becomes necessary to use it. If significant contamination is found, report your findings to the RSO and double seal the container and place it in storage (zip-lock or air-tight plastic container are recommended).

5. Preparation For Use
   A. For therapy solution and diagnostic capsules, open the sealed tin can in the charcoal filtered I-131 glove box.
   B. Remove the lead shield and perform a wipe test on it. If significant contamination is found, then this shield shall be replaced with an uncontaminated shield. The contaminated shield shall be double sealed and placed in waste storage along with the tin can, since it will also be contaminated.
   C. Store the diagnostic capsules in the standard laboratory fume hood in a sealed plastic bag or air-tight plastic container.
   D. To prevent the possibility of volatile I-131 escaping from the therapy solution, and as a precaution to prevent contamination, release the partial pressure over the liquid I-131 by venting it through a 10cc or larger charcoal-filled syringe barrel.
   E. If a high concentration of I-131 is not required, buffer the solution or use a buffer diluent when preparing liquid I-131 therapy doses.
   F. I-131 Capsule Compounding Procedure
      a. Materials:
         1. Sodium phosphate dibasic USP
         2. Gelatin capsules size #0
         3. Gelatin capsules size #1
         4. I-131 sodium iodide solution USP
         5. B-D lo dose (0.5 cc insulin) syringe
         6. Syringe shield
         7. Remote handling device (i.e., tongs, recapping straw)
         8. Disposable latex gloves
         9. Disposable sleeves

10. GM survey meter
11. Radioisotope dose calibrator
12. I-131 capsule shield

b. Procedure:

a. Fill #1 size caps with sodium phosphate dibasic USP according to "Extemporaneous Filling Methods" described in Remington's Pharmaceutical Sciences 18th edition, P 1659.

b. Wear protective gloves and perform all compounding procedures that involve I-131 within the glove box behind the leaded glass L-shield. The glove box exhaust motor should be on. Use syringe shields and remote handling tools when performing manipulations with I-131 sources.

c. Calculate the volume of I-131 solution necessary to fill the prescribed dose, and draw into a syringe. The maximum volume that a #1 size cap will hold is 0.25 mL. If the calculated volume is greater than 0.25 mL, more than one capsule will be compounded.

d. The maximum amount of I-131 solution contained in any vial is 1000 mCi. The calibrated activity and the calibration date is written on the top of the current shipment container. The concentration is 500 mCi/mL so the volume on calibration date is 2 mL.

e. Cover the I-131 capsule compounding shield with plastic wrap to prevent it from becoming contaminated. Place the bottom (large half) of a #0 cap into the shield. Place a #1 sodium phosphate capsule inside the #0 cap. Make sure that the capsule is positioned deeply within the lead shield so that only the tip of the capsule is exposed.

f. Assure glove box operation by testing air flow through arm ports.

g. Withdraw the calculated volume of I-131 solution using a 0.5 cc B-D syringe or glass microsyringe. Use syringe shields and remote handling tools, and keep radioactive sources shielded when not in use. Assay the syringes in the dose calibrator to verify that it contains the necessary activity. 5 – 10% of the measured activity will remain in the syringes as residual activity, dependent onI-131 solution volume in the syringe. Therefore, draw 10% over the desired dose (i.e., draw 11 mCi to fill a 10 mCi dose).

h. Stick the needle deep into the center of the capsule and slowly inject the volume into the syringe. Cap

the #0 capsule with its top half using the recapping straw. Turn the capsule compounding shield upside down on top of the shielded dispensing vial and allow the capsule to drop into the vial.

i. After placing the I-131 capsule in a shielded dispensing vial seal the vial and assay in the dose calibrator. Label the prescription appropriately and dispense. Do not dispense a dose greater than +/- 10% of that prescribed.

j. Dispose of the I-131 syringe in the shielded container in the I-131 storage area. Monitor the area with a GM meter and decontaminate as necessary.

k. Bioassay must be performed within 72 hours of capsule preparation.

6. Contamination Control

   A. After each use of I-131 solution, the area where this material was handled must be cleaned up and decontaminated immediately. Since we are dealing with a highly concentrated I-131 solution, contamination significantly contributes to volatile I-131.

   B. After use, make sure the vial septum is thoroughly cleaned with an alcohol swab. Rinse out the I-131 syringe into a sealed vial containing saline at least 10 times to insure that the syringes will be decontaminated prior to being stored.

   C. It is highly recommended that liquid I-131 be handled in a double charcoal filtered glove box, which is located outside the standard laboratory fume hood. The effluent from this glove box should be piped to the lab fume hood to insure that MPC levels are not exceeded and contamination is isolated to the glove box area. In this way, cross contamination between the work are and the volatile material storage area is prevented.

6.0 Quality Control

Molybdenum-99/Technetium-99m generators will be used to produce technetium-99m which will be utilized to formulate kits or subdivide into unit-dose or multidose preparations. Manufacturers' directions will be followed for eluting the generators and only clear solutions will be used.

6.1 Radionuclidic Purity

Molybdenum breakthrough will be checked for after each elution by using a moly breakthrough well in conjunction with the dose calibrator. No eluate will be used that exceeds USP limits.

6.2 Radiochemical Purity

Chromatography will be used to determine bound and unbound product. The radiochemical purity of the radiopharmaceutical will be determined after the production of each Tc-99m labeled product.

Non-technetium isotopes are to be bought from reputable houses which follow strict in-house quality control. Non-technetium isotopes to be bought in bulk and subdivided include Gallium-67, Iodine-131, Thallium-201 or any other isotope that is not restricted by licensure, FDA, or NRC regulations.

6.3 Particle Sizing

By utilizing a microscope and hemocytometer, particle sizing or agglutination will be determined to assure that he productions of Tc-99m MAA and Tc-99m Sulfur Colloid or any other product that requires particle sizing does not exceed USP set limits.

6.4 Calibrator Quality Control

A. Calibrator Accuracy

To be performed annually utilizing national bureau of standards sources cobalt-57 and cesium-137. The actual activity will be calculated and compared to the observed activity:

$$\frac{\text{Observed activity}}{\text{Actual activity}} = \pm 5\% \text{ of actual standard activity}$$

B. Calibrator Constancy

Measures day to day consistency of calibrator performance. Each channel will be checked and compared to the previous day's reading and should not exceed ± 5%.

C. Calibrator Linearity

To be performed quarterly by decay methods or shielding methods to determine if calibrator is linear from 1 μCi to 100 mCi. Not to exceed ± 5% of the calculated value.

D. Calibrator Geometry

To be performed at setup or after repair to assure calibrator reads within ± 2% of the activity in volumes ranging from 1 to 30 mL.

7.0 Transportation of Radiopharmaceuticals

7.1 All shipments will be made in conformance with the Department of Transportation (DOT) regulations for shipment of hazardous materials.

7.2 Local deliveries will be made by pharmacy personnel in a company vehicle in accordance with DOT regulations. All radiopharmaceuticals will be transported in Type A containers. These containers are durable and will seal upon closure and will withstand abuse. The container will be lined with tan absorbent material and shielding will be provided for all radiopharmaceuticals. The shield of the container used for transportation will be composed of 1/8 or ¼ inch lead with a lead lid cover. The shipping container will be labeled with:

A. "Radioactive Materials" shipping label as required by guidelines of DOT – 49 CFR part 173.

B. Names and addresses of destination and shipper.

7.3 Each individual isotope in transport will be individually contained in the manufacturer's lead containers. All materials will be contained in a minimum of 1/8 inch lead container. Exposure rate will not exceed 200 mR/hr at the surface or 10 mR/hr at 1 meter while in transit. The radiopharmaceuticals will be delivered to the facility (hospital or imaging center) and placed in a predesignated area not accessible to the public.

7.4 Air and ground carriers may be utilized following DOT guidelines. Doses will be placed in a lead container and wrapped with absorbent paper and surrounded by absorbent material which is capable of absorbing two times the volume of the radiopharmaceutical.

8.0 Waste Disposal for Radioactive Materials

8.1 Laboratory Waste

A shielded waste bin will be located near the drawing station surrounded by lead and will be utilized for the disposal of Tc-99m, Ga-67, Tl-201, and In-111 radioactive waste formulated at the drawing station. When the storage bin is full, it is then transferred to the waste room where it is emptied into the appropriate large waste bin. All other isotope waste will be left in the shields or pigs and transported immediately to the waste room where they will be placed in the appropriate waste receptacle.

8.2 Waste Room Disposal

The waste room is a restricted area and will be posted accordingly. The waste room is used to store radioactive waste, contaminated articles or equipment, and old generators so they can decay safely. The waste will be segregated by half-life of the material and biohazard potential. Below is the scheme:

Bin S:	Tc-99m only Vials only
Bin BS:	Biological Tc-99m only Syringes and miscellaneous
Bin L:	Long half-life vials only (Tl-201, Ga-67, I-123, In-111)
Bin BL:	Long half-life materials (half life less than 100 hrs) Includes Tl-201, Ga-67, I-123, In-111, and Xe-133 Syringes and miscellaneous
Bin BI:	Biological radioactive waste (I-131 only)

NOTE: Biological waste is any waste that has come into contact with human blood

Any contaminated waste, article, glassware, etc. will be handled in a way such as to minimize exposure to personnel. This may include decontamination with Radiacwash or storing it behind sufficient shielding for decay in which it will be labeled with the date surveyed and reading in mR/hr and will not be removed form storage until readings are equal to background.

A disposal log book will be used to identify isotope, weeks accumulated, mCi amounts of isotopes placed in storage, date it reached nonradioactive status and sent for disposal to an outside waste disposal company licensed to incinerate this type of waste.

All radiation labels and syringes will be made unusable before disposal. Shielded waste bins re marked according to isotope to facilitate the disposal process. All isotopes will be decayed for a minimum of 10 half-lives and then will be surveyed with a GM meter to assure activity is less than or equal to

background, at which time it will be disposed of.

8.3 Mo-99/Tc-99m Generators

Generators will be stored from 2 to 6 weeks and then returned to the manufacturer for disposal or decayed for a minimum of 10 half-lives and broken down for disposal. All references to the radioactive materials on the carton will be removed or blacked out.

8.4 Additional Waste

Routine gloves and absorbent paper changes are to be stored in a plastic bag-lined receptacle marked "gloves." This possibly contaminated waste will be stored until monitors indicate readings comparable to background after which they will be discarded with the regular trash.

8.5 Returned Radioactive Waste

Radioactive waste retrieved from customers will be vials and/or syringes returned in their original shield or pig. They will be placed in an approved carrying case and returned to the pharmacy. The shipping container and shields or pigs will be monitored for contamination. The retrieved radioactive waste will then be separated into the appropriate waste receptacle. The RSO will contact the NRC if a hospital habitually returns contaminated shields pigs, or any other article which may pose a health hazard to the carrier. Only radioactive waste which was generated by the lab will be picked up and returned to the pharmacy. The nuclear medicine department will be responsible for the disposal of any radioactive waste that they may have generated.

9.0 Emergency Procedures

A copy of these procedures will be posted in each area where radioactive material is used or stored. A decontamination kit is located in each room within the restricted area. The contents of this kit include: disposable waterproof gloves, absorbent paper, disposable pads, and plastic bags.

9.1 Minor Spills

A. Notify persons in the area that the spill has occurred.
B. Prevent the spread by covering the spill with absorbent paper.
C. Clean up using disposable gloves and remote handling tongs. Carefully fold the absorbent paper. Insert absorbent paper and all other contaminated materials, such as disposable gloves, into a plastic bag. Put the plastic bag into the radioactive waste container.
D. Survey with a low-range, thin-window GM survey meter. Check the area around the spill, hands, and clothing for contamination
E. Report the incident to the RSO.

9.2 Major Spills

A. Clear the area. Notify all persons not involved to vacate the room.
B. Prevent the spread by covering the spill with absorbent paper. Insert absorbent paper and all other contaminated materials, such as disposable gloves, into a plastic bag. Put the plastic bag into the radioactive waste container.
C. Shield the spill if possible, but only if it can be done without further contamination or without significantly increasing your radiation exposure.
D. Close the room and lock the doors to prevent entry.
E. Call the RSO immediately.
F. Remove contaminated clothing and store for further evaluation by the RSO. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

9.3 Definition of Major and Minor Spills

Estimate the amount of radioactivity spilled. Initiate a major or minor spill procedure based on the following dividing line. Spills above these millicurie amounts are considered major, below are considered minor.

Radionuclide	mCi	Radionuclide	mCi
P-32	10	Tc-99m	100
Cr-51	100	In-111	10
Co-57	100	I-123	10
Co-58	10	I-131	1
Fe-59	10	Yb-169	10
Co-60	1	Hg-197	100
Ga-67	100	Au-198	10
Se-75	10	Tl-201	100
Sr-85	10		

9.4 Theft

A. A pharmacy vehicle containing radioactive materials shall not be left unattended. If the vehicle is left unattended, then the radioactive materials shall be secured and the vehicle locked.

B. If a vehicle containing radioactive material is stolen, immediately contact the RSO, the law enforcement agencies, and the NRC.

C. If radioactive materials (i.e., generators) are stolen from a secured storage area within a hospital, immediately contact the RSO, the RSO of the hospital, and the NRC.

9.5 Motor Vehicle Accident

A. A copy of "Procedures to Follow for a Motor Vehicle Accident" will be kept in all vehicles at all times.

B. Standard Procedure for a Motor Vehicle Accident:

1. Using a GM meter, determine if there is a spill or if there is contamination outside the transportation container.
2. Contact the RSO
3. Contact the NRC

C. Begin decontamination procedures as instructed by the RSO and the NRC.

D. Follow usual procedures as outlined for notification of police and insurance company.

10.0 Reporting Forms

10.1 Daily Forms

A. Daily Area Survey (completed daily in restricted areas only)
B. Shippers Certificate (completed for each delivery made by drivers)
C. Daily Dose Calibrator Constancy Test (completed before each day's use of the instrument)
D. Kit Prep/Elution Form (completed for each kit and Mo-99/Tc-99m generator elution)
E. QC Form

10.2 Weekly Forms

A. Weekly Wipe Test
B. Bioassay Record (completed weekly for each employee who handles I-131)
C. Weekly I-131 Air Monitoring Record (I-131 air sampling form filled out weekly)

10.3 Quarterly Forms

A. Quarterly Dose Calibrator Linearity Test
B. Quarterly Sealed Source Inventory
C. Quarterly Gamma Well Efficiency Test Record

10.4 Semiannual Forms

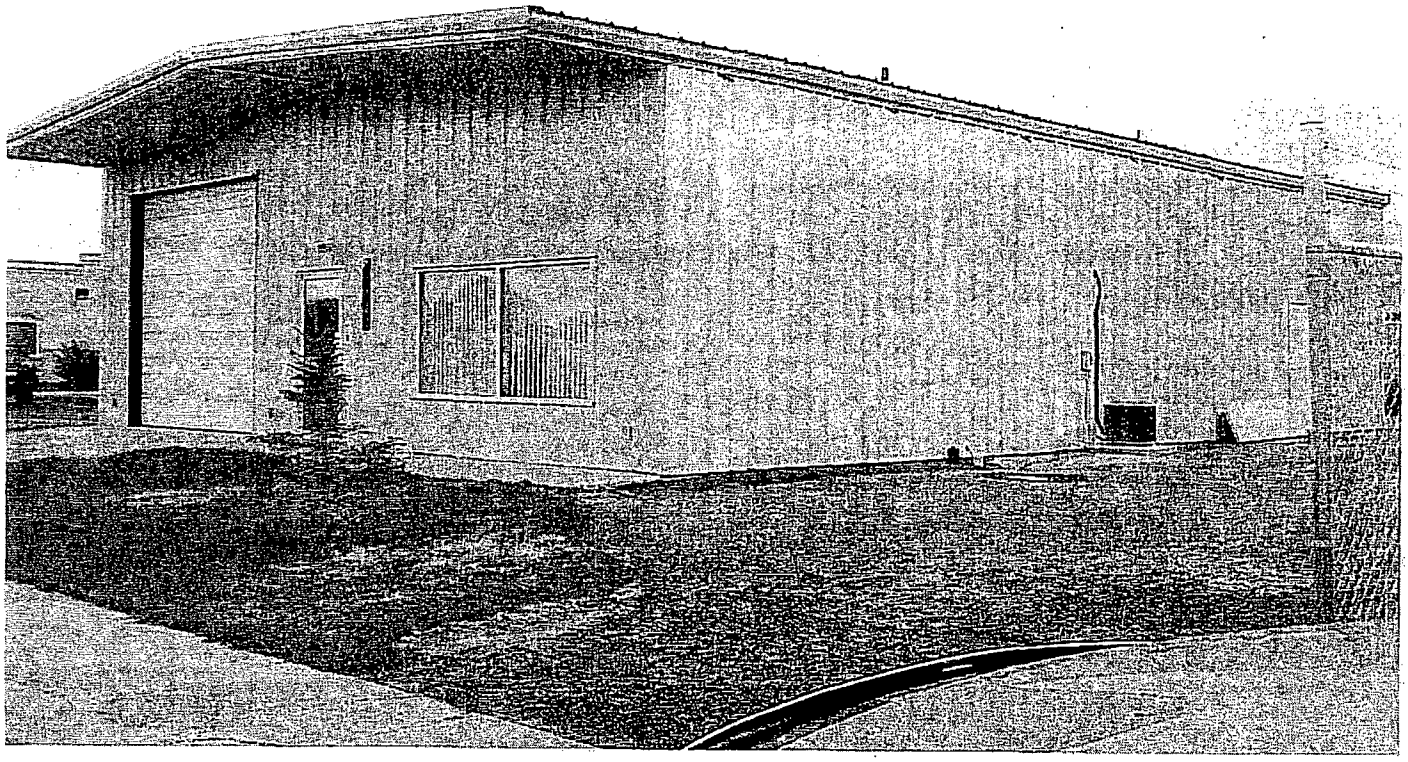
A. Semiannual Leak Test Record

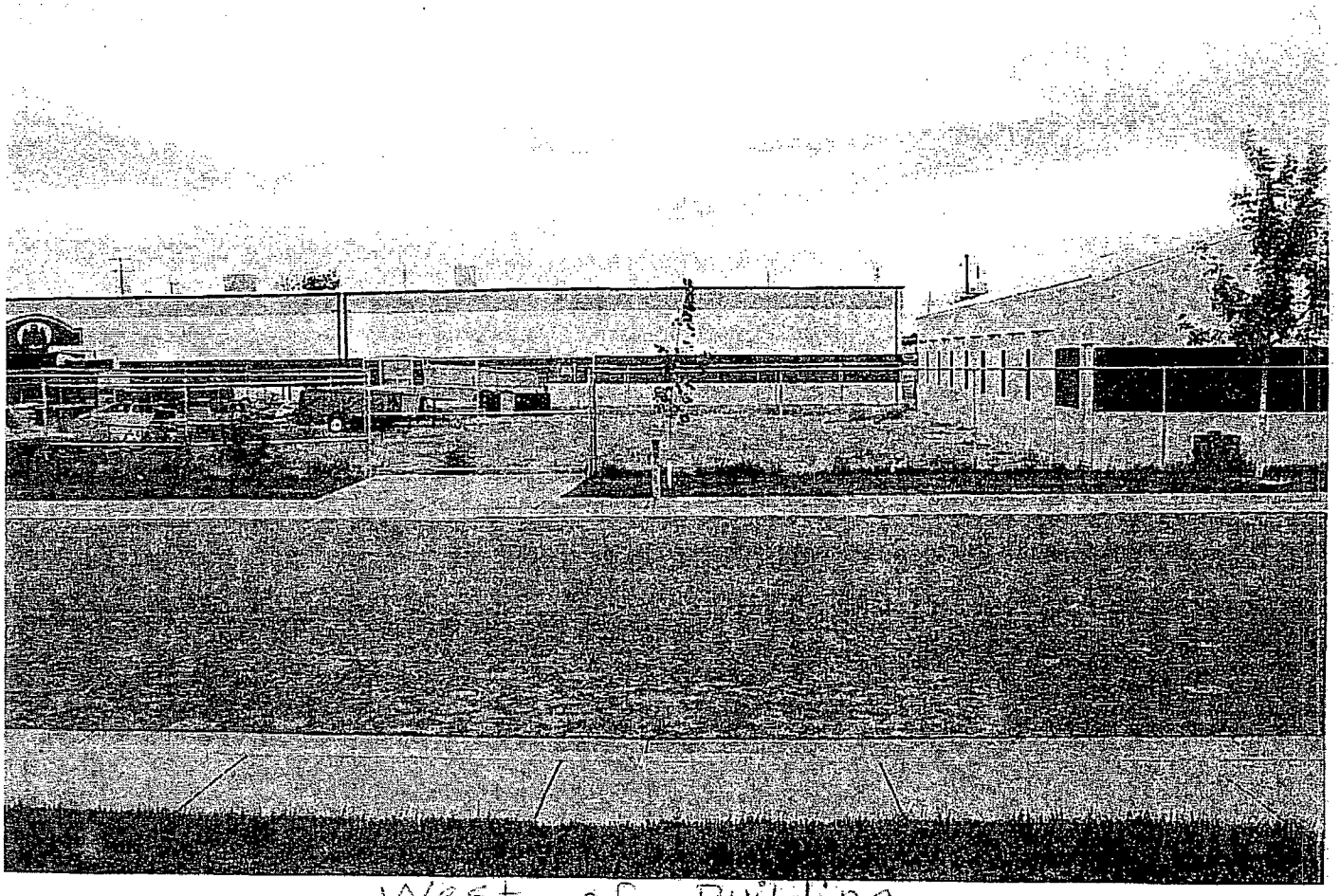
10.5 Annual Forms

A. Dose Calibrator Accuracy Test

10.6 As Needed Forms

A. Employee Acknowledgement Form for Receipt of General Radiation Safety Information
B. Dose Calibrator Geometrical Variation Test Record (completed whenever a dose calibrator is installed, repaired, or adjusted)
C. Return Waste Instruction Form for Radiopharmacy Customers (completed with all new accounts)
D. Receipt of Radioactive Material (completed on arrival of any radioactive material)
E. Radiopharmacy Incident Report (completed if any radiation policies or procedures are broken)
F. Visitor Log Sheet (completed each time a visitor enters the restricted area)





West of Building

Discussion

Location, Room Numbers and Principal Use of Each Room
or Area Where Byproduct Material is Prepared, Used or Stored

Receiving / Data Entry

Radioactive shipments will enter and exit out of this "garage bay". Advanced Isotopes of Idaho vehicles will be loaded and unloaded. In the office area of the room, data entry will occur.

Lunch Room

Employee break room

Bath

Employee restroom

Manager Office

Administrative office.

Pharmacy Area

Radioactive material is prepared, stored, and compounded. Local shielding will be employed to reduce the exposure to personnel. The back door will only be used for emergencies. The double front door to the "Pharmacy Area" will have a hand and feet survey meter.

IV Room

This room is under negative pressure. All I-131 and Xenon-133 is stored in a negative pressure exhaust cabinet. Radiolabeling of blood products are performed in a Class 100 flow hood in this room. Quality control of radiopharmaceutical are also performed here.

10.0 ALARA Program

1. Management commitment
   A. We, the management of Advanced Isotopes, are committed to the program described herein for keeping individual and collective doses as low as reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policy, procedures, and instructions to foster the ALARA concept within our institution.
   B. The RSO will perform a formal annual review of the radiation safety program, including ALARA considerations. This will include reviews of operating procedures and past dose records, inspections, etc., and consultations with the radiation safety staff or outside consultants.
   C. Modifications to operating and maintenance procedures and to equipment and facilities will be made I they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate if necessary, that improvements have been sought, that modifications have been considered and that they have been implemented when reasonable. If modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.
   D. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

The NRC has emphasized that the investigational levels in this program are not new dose limits but, as noted in ICRP Report 26, "Recommendations of the International Commission on Radiological Protection," serve as check points above which the results are considered sufficiently important to justify investigations.

Investigational Levels (millirems per calendar quarter)

	Level I	Level II
1. Whole body, head and trunk, active blood-forming organs, lens of eyes or gonads	125	375
2. Hands and forearms, feet and ankles	1875	5625
3. Skin of whole body*	750	2250
*Not normally applicable to medical use operations except those using significant quantities of beta emitters		

The RSO will evaluate our institution's overall efforts for maintaining doses ALARA on an annual basis This review will include the efforts of the authorized users, and workers as well as those of management.

Ex 2

8.23
ITEM 10
AREA SURVEYS

We have developed and will implement and maintain written procedures for area surveys in accordance with 10 CFR 20.1101 that meet the requirements of 10 CFR 20.1501 and 10 CFR 35.70.

8.24
ITEM 10
SAFE USE OF UNSEALED LICENSED MATERIAL

We have developed and will implement and maintain procedures for safe use of unsealed byproduct material that meet the requirements of 10 CFR 20.1101 and 10 CFR 20.1301

8.25
ITEM 10
SPILL PROCEDURES

We have developed and will implement and maintain written procedures for safe response to spills of licensed material in accordance with 10 CFR 20.1101.

8.28
ITEM 11
WASTE MANAGEMENT

We have developed and will implement and maintain written disposal procedures for licensed material in accordance with 10 CFR 20.1101, that also meet the requirements of the applicable section of Subpart K to 10 CFR Part 20 and 10 CFR 35.92.

8.29
ITEM 12
FEES

Please see enclosed check number _____, in the amount of $_____.00.

8.16
RADIATION MONITORING INSTRUMENTS

Radiation monitoring instruments will be calibrated by a person qualified to perform survey meter calibrations.
We reserve the right to upgrade our survey instruments as necessary as long as they are adequate to measure the type and level of radiation for which they are used.
Please see attached description of proposed survey meters labeled;

1. (3) Ludlum 14C Survey Meters with various probes
2. (1) Ludlum 177 Alarm Ratemeter with 44-9(Pancake)hand and 44-25 foot probes

8.17
ITEM 9
DOSE CALIBRATOR AND OTHER EQUIPMENT USED TO MEASURE DOSAGES OF UNSEALED BYPRODUCT MATERIAL

Equipment used to measure dosages will be calibrated in accordance with nationally recognized standards or the manufacturer's instructions.

8.19
ITEM 9
OTHER EQUIPMENT AND FACILITIES

The hot lab is always closed and monitored by the authorized user/s. Sealed calibration sources are stored in locked cabinets in the hot lab.

8.22
ITEM 10
OCCUPATIONAL DOSE

Either we will perform a prospective evaluation demonstrating 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 provide dosimetry that meets the requirements listed under "Criteria" in NUREG-1556, Vol. 9, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Medical Use Licenses," dated October 2002.

Advanced Isotopes of Idaho

MEMO

TO: ALL EMPLOYEES

FROM: ADVANCED ISOTOPES OF IDAHO

RE: DELEGATION OF AUTHORITY

****

Troy Curnutt, RT(N), has been appointed Radiation Safety Officer and is responsible for ensuring the safe use of radiation. The Radiation Safety Officer is responsible for managing the radiation safety program; identifying radiation safety problems; initiating, recommending, or providing corrective actions; and ensuring compliance with regulations. The Radiation Safety Officer is hereby delegated the authority necessary to meet those responsibilities.

In Mr. Curnutt's absence, Catherine Heyneman PharmD will act in his behalf. Ms. Heynemanr is the Alternate Radiation Safety Officer at Advanced Isotopes of Idaho.
Mr. Curnutt will follow the guidelines that have been established by federal, state and local governments, as well as, those implemented here at Advanced Isotopes of Idaho.

Thank you for your cooperation,

Troy V Curnutt

Operating Partner

MID-AMERICA ISOTOPES, INC.
706 EAST LIBERTY LANE
COLUMBIA MO 65010

The lexan glove box has several advantages which are listed below.

(1) It is approximately 30% larger than the other current available models (more work surface).

(2) The "arm holes" are oval which accommodates different size employees (more room for arm movement & less restrictive movement from side to side).

(3) The air speed control is now inside the upper unit. A start-stop switch is located on the outside upper unit with an indicator light. This allows the "Radiation Safety Officer" to maintain a constant airflow velocity with every individual who uses the glove box.

(4) A Minihelic gauge is installed to measure static pressure, the same instrument that is on the biohazard hoods. This may be used to equate air flow velocity.

(5) The upper unit will accommodate three 12" X 12" X 1" filters. Other available units will only accommodate two.

(6) The motor/blower unit is larger and provides a wider range of airflow velocity. This could become necessary if the filters became clogged with dust or regulations concerning airflow change. Currently most glove boxes are drawing 50 LPM which at best barely meets regulatory requirements. This motor/blower has the ability to exceed this requirement three times.

(7) The glove box lower unit is made of a material called "Lexan". This material is much stronger and more durable than plexiglass.

(8) There is a separate bottom to the glove box that can be removed and decontaminated if necessary.

LEXAN GLOVE BOX SPECIFICATIONS

1) MAIN ENCLOSURE CONSTRUCTED OF 1/4" THICK CLEAR POLYCARBONATE SHEET WHICH IS THERMOFORMED TO CREATE AN ARCHITECTURALLY PLEASING APPEARANCE. SIDE PANELS ARE SOLVENT CEMENTED TO MAIN SECTION THEN GROUND AND POLISHED. FRONT OF UNIT TO HAVE (2) 9" ARM PORTS WHICH ARE GROUND AND POLISHED SMOOTH.

2) BASE SECTION CONSTRUCTED OF 1/4" THICK POLYPROPLENE SHEET RABBETED AROUND EDGES FOR MAIN ENCLOSURE TO FIT FIRMLY ON BASE.

3) AIR DIFFUSER CONSTRUCTED OF 1/4" THICK CLEAR POLYCARBONATE SHEET. 1/2" DIA HOLES ON 2" STAGGERED CENTERS. DIFFUSER SUPPORTED BY 5/16 S/S THREADED ROD WITH PVC SPACERS

4) BLOWER BOX CONSTRUCTED OF 20 GA. GALVANEALED STEEL AND FINISHED WITH NASSAU BLUE EPOXY PAINT. BLOWER BOX IS HINGED TO MAIN SECTION FOR CONVENIENT FILTER REPLACEMENT AND SPEED ADJUSTMENT. UNIT TO HAVE GASKET SEAL BETWEEN BLOWER BOX AND MAIN SECTION.

5) UNIT IS EQUIPPED WITH A SHADED POLE BLOWER WHICH IS CAPABLE OF MOVING 200 CFM OF AIR @ 3/4" STATIC PRESSURE. BLOWER REQUIRES 115 VOLT 2.9 AMP SERVICE.

6) BLOWER IS EQUIPPED WITH AN ELECTRONIC SPEED CONTROL, LOCATED INSIDE HINGED TOP, FOR ADJUSTING AIR FLOW

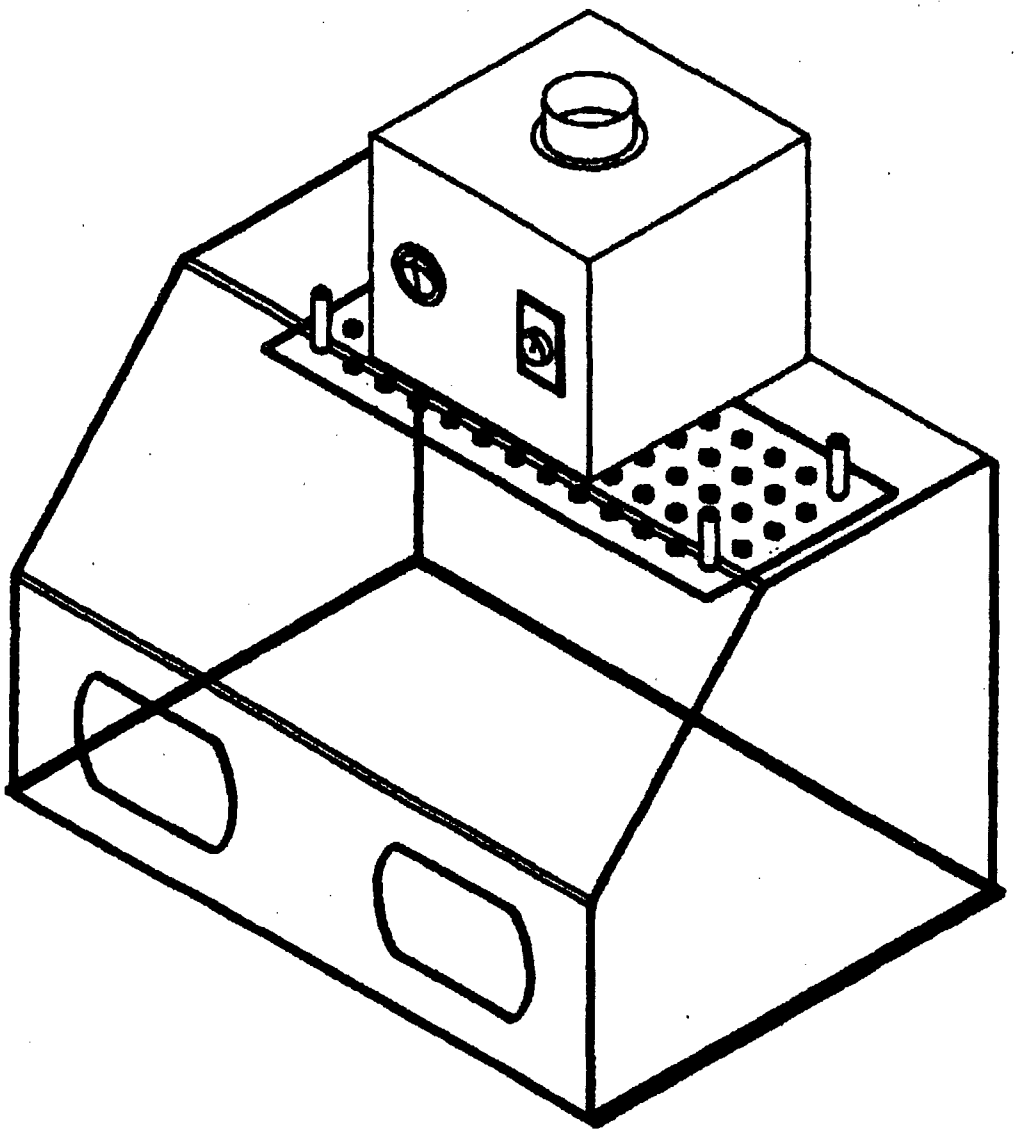
7) ILLUMINATED ON/OFF SWITCH ON FRONT OF BLOWER BOX TO INDICATE IF UNIT IS RUNNING.

8) MINIHELIC PRESSURE GAUGE TO INDICATE FILTER REPLACEMENT AND AIR FLOW

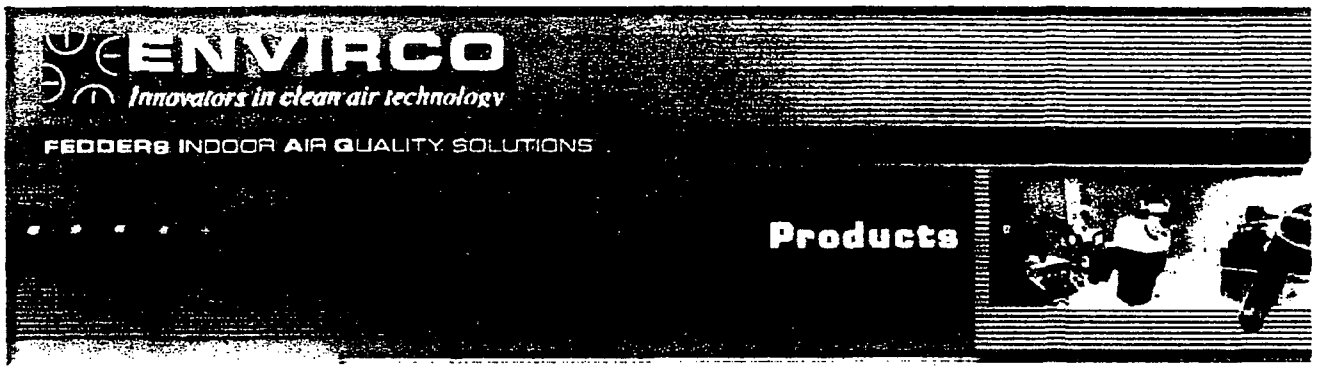
9) 8 FT. 115 VOLT POWER CORD.

10) THE FILTERS SUPPLIED WITH THIS UNIT ARE (2) 12 X 12 X 1" BLACK PAINTED STEEL FRAME WITH 60 ACTIVITY COCONUT SHELL CARBON AND A 4 X 8 MESH.

11) UNIT SUPPLIED WITH A 4" DIAMETER STAINLESS STEEL EXHAUST COLLAR ON TOP OF BLOWER BOX



Mid-America Isotopes, Inc.
706 E. Liberty Lane
Ashland, MO 65010



PDF | 224 Kb

TT Table Top Work Station
A self-contained, horizontal laminar flow, multi-purpose work station.

The Envirco TT Table Top is an economical, laminar flow module that can be mounted on an existing table or bench. It provides an ISO Class 5* (Class 100) environment within the work area that complies with the latest IEST Recommended Practices.

Shown with optional matching support stand

Horizontal Laminar Airflow

The positive pressure† laminar airflow provides product or protection within the work area, which is defined by the removable clear acrylic side panels and plastic laminated work surface. Air from within the cabinet is returned to the room through the front access opening.

Standard Features

- An ISO Class 5* environment utilizing an aerosol challenged high efficiency particulate air (HEPA) filter
- Ten standard sizes with 24 inch deep work areas. Custom sizes available
- A welded aluminum cabinet with exterior finished in corrosion resistant polyurethane enamel
- Perforated, anodized aluminum diffuser screen protects the HEPA filter and maintains uniform airflow velocity within the work area
- Quiet operation (65 dBA ± 3 measured 30 inches from the filter face)
- Non-glare plastic laminated work surface for easy cleaning
- Recessed fluorescent lighting provides 150 foot candles at the work surface.
- Clear, removable acrylic side panels
- Easy disassembly for access through a small door
- Optional, matching support stand serves as a base for the TT Module to provide a console-type work station

Reverse Laminar Flow Option

The reverse or negative pressure laminar airflow TT Table Top Work Station

Increased Functionality for Your Dose Calibrator...

CRC®-15R Enhanced Software

Add more functionality to your CRC-15R Dose Calibrator with the CRC-15R ENHANCED SOFTWARE, with all of the same great features of the CRC-15R plus a few new ones.

- ★ Inventory control
- ★ Dose table calculations
- ★ Newly added linearity protocol
- ★ Radiochromatography QC package
- ★ Built in geometry testing

The CRC-15R ENHANCED SOFTWARE will still perform the Daily QC protocol, zero adjust, background subtraction, system test, accuracy (with a deviation percentage) and constancy. In addition, the software will calculate dose tables, perform geometry tests (for between 2 and 10 measurements), do radiochromatography, calculate linearity (using standard, Lineator or Calicheck methods) and maintain a radiopharmaceutical inventory of kits or unit doses. All of the acquired data are printable.

The CRC-15R Enhanced Software is an available option in all new CRC-15R Dose Calibrators or it can be added to your existing CRC-15R.

15R Enhanced Features

- ★ Capintec quality and reliability
- ★ Calculation of a printable dose table
- ★ Inventory control - maintains inventory of unit doses and kits
- ★ Linearity test - calculates a report for standard, lineator and calicheck methods
- ★ Geometry test showing variations for 2 to 10 different measurements
- ★ Radiochromatography of kit QC strips - one strip, two strip, HMPAO and MAG3

```
STANDARD LINEARITY
#      MEASURED      %VAR
1      50.4mCi       2.10
2      36.5mCi       1.85

Any Key to Continue
```

Standard Linearity Test Results Screen

```
INVENTORY
1. ADD
2. KIT
3. WITHDRAW
4. PRINT
5. DELETE
```

Inventory Menu

```
QC TEST
Sinlge Strip
Top      / (Top + Bottom)
                  %
Bottom   / (Top + Bottom)
                  %

Any Key to Continue
```

Single Strip Result Screen

CRC®-15R RADIOSCOPE DOSE CALIBRATOR TECHNICAL DATA

Ionization Chamber

Type:	Thin wall, deep well, high pressure
Dimensions	25 cm (10") high x 6 cm (2.5")dia.
Cabling	1.8m (6') interconnecting cable

Measurement Range

Type	Auto Ranging
Activity	250 GBq (6 Ci), max.
Resolution	.001 MBq (0.01uCi), max.

Display Screen

Type	Dot Matrix Liquid Crystal Display
Format	Direct reading in Bq or Ci
Bq/Ci Reading	User selectable or fixed
Values Displayed	Nuclide name (Atomic symbol, Mass number), calibration number

Electrometer

Accuracy	Better than ± 2%
Linearity	Within ± 2%
Response Time	Within 2 sec. for very low activity sample, 4 to 16 sec. (user selectable)

Repeatability of Measurement

Repeatability	Within ± 1% within 24 hours during which time the calibrator is on all the time.

Tests

Diagnostics	Full test of program, system memories
Quarterly	Daily, Accuracy and Linearity
Daily	Auto Zero, Auto Background Adjust, Data Check, Accuracy and Constancy

Nuclear Data

Nuclear Setting keys	9 Pre-set, 5 User
Calibration Key	Over 200 nuclides
System Memory	Over 80 nuclides (w/cal number and half-life)

Standard Source Data

System Memory	Co-57, Co-60, Ba-133, Cs-137 Standard Sources

Molybdenum-99 Assay

Methods	Canisters of CAPMAC
Measured Values	Mo-99 elution, Tc-99m, Tc-99m/Mo-99 Ratio

PC Port (Optional)

Interface	Rs-232C Protocol
Compatibility	Standard Nuclear Medicine Management Systems

Standard Source Data

System Memory	Co-57, Co-60, Ba-133, Cs-137 Standard Sources

Printer (Optional)

Type	Epson Roll, Epson Slip or Okidata full size dot matrix
Printing Options	Full size test reports. Measured results on tickets.

Power Requirements

90-127 VAC (50/60Hz) 0.1A

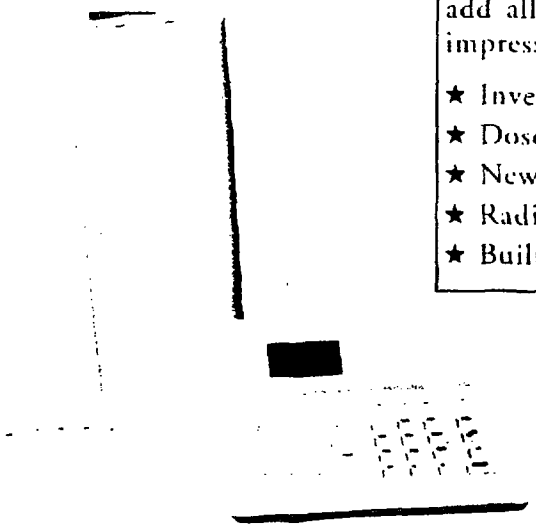
180-250 VAC(50/60Hz) 0.05A

Dimensions

Display Unit	
Dimensions	10cm x 26cm x 26cm. (4"x10"x10")
Weight	2kgm, (4lbs)
Chamber Unit	
Dimensions	42cm x 17cm, (16" x 7")
Weight	16 kgm, (35 lbs)
Cable length	1.8 m, (6')

Capintec, Inc.
6 Arrow Rd., Ramsey, N.J. USA 07446
Toll Free 800.631.3826 / 201.825.9500
Fax: 201.825.4829
www.capintec.com

CRC®-15R DOSE CALIBRATOR



CRC®-15R Enhanced Software

With the optional software upgrade you can add all of these great features to the 15R's impressive software package.

- ★ Inventory control
- ★ Dose table calculations
- ★ Newly added linearity protocol
- ★ Radiochromatography QC package
- ★ Built in geometry testing

Item # 5130-3036

Top Line Technology...
Bottom Line Affordability

The Capintec CRC®-15R gives you state-of-the-art technology plus outstanding features in the industry's smallest package. The CRC®-15R is designed to meet the demands of your Nuclear Medicine Department with accuracy and ease of operation. A sophisticated microchip platform eliminates analog controls while boosting speed of activity measurements.

Innovative designs, proven performance and the most comprehensive technical system available is what you would expect from the leader in dose calibrator design and development!

Product Details

The CRC®-15R dose calibrator provides you with advanced features, added speed and the accuracy you need to measure activity levels and prepare doses. Using the most space efficient design in the industry, the CRC®-15R consists of a large, easy-to-read display that indicates Nuclide Name, Number, Activity, Unit of Measure and Calibration Number.

All nuclide data is entered via the custom keyboard that includes nine preset and five user-definable keys. In addition, the user can enter in over 80 nuclides by using the Nuclide symbol such as Co for cobalt and 60 for Co 60. Calibration numbers for over 200 radionuclides are easily accessed by use of the Cal key.

Other capabilities include storage of five reference sources in memory that are automatically decay corrected for today's time and date. Dose calibration quality control tests and self-diagnostics are built-in along with automatic zero and background subtraction making the CRC®-15R extremely easy to use. An optional printer enables the CRC®-15R to print full size records and patient tickets with peel off labels for vial and syringe identification.

For the latest technology and expert service rely on the proven performance of our dose calibrators and our commitment to customer support.

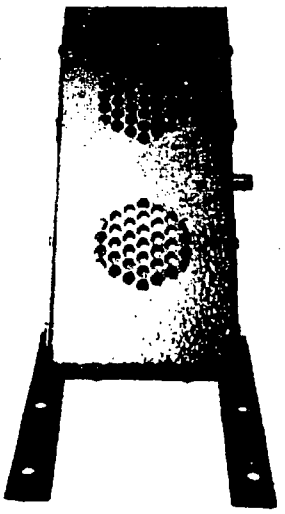
HIGHLIGHTS

- On screen display of Nuclide Name, Number, Activity, Unit of Measure and Calibration Number
- Large character, high visibility display with automatic backlighting
- Over 80 Nuclides with half-lives in memory
- Automatic zero and background subtraction
- Built-in dose calibration, quality control and self diagnostics
- Compatible with Nuclear Medicine Management Systems
- Optional printer for full size NRC records and patient labels for syringes and vials.
- Optional remote display indicating Nuclide, Activity and Unit of Measure

Capintec, Inc.

MODEL 44-25 Pancake G-M Hand Probe

PART NUMBER:47-1508



The Model 44-25 is a pancake G-M Hand probe for contamination survey with an alarm ratemeter

INDICATED USE: Alpha beta gamma survey; Frisking
DETECTOR: Pancake type halogen quenched G-M
WINDOW: 1.7 plus or minus 0.3 mg/cm² mica
WINDOW AREA:
Active - 15 cm²
Open - 12 cm²
EFFICIENCY(4pi geometry): Typically 5%-C-14; 22%-Sr-90/Y-90; 19%-Tc-99; 32%-P-32; 15%-Pu-239
SENSITIVITY: Typically 3300 cpm/mR/hr (*Cs-137 gamma*)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 microseconds
COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalers
OPERATING VOLTAGE: 900 volts
CONNECTOR: Series "C" (*others available*)
CONSTRUCTION: Aluminum housing with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 1.8" (4.6 cm)H X 2.7" (6.9 cm)W X 10.7" (27.2 cm)L
WEIGHT: 1 lb (0.5kg)

Replacement Parts

Pancake G-M Tube

Ordering Info.

MODEL 44-9 Pancake G-M Detector

PART NUMBER:47-1539

The Model 44-9 is a pancake G-M that can be used with several different instruments including survey meters, scalers, ratemeters, and alarm ratemeters

INDICATED USE: Alpha beta gamma survey; Frisking
DETECTOR: Pancake type halogen quenched G-M
WINDOW: 1.7 plus or minus 0.3 mg/cm² mica
WINDOW AREA:
Active - 15 cm²
Open - 12 cm²
EFFICIENCY(4pi geometry): Typically 5%-C-14; 22%-Sr-90/Y-90; 19%-Tc-99; 32%-P-32; 15%-Pu-239
SENSITIVITY: Typically 3300 cpm/mR/hr (*Cs-137 gamma*)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 microseconds
COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalers
OPERATING VOLTAGE: 900 volts
CONNECTOR: Series "C" (*others available*)
CONSTRUCTION: Aluminum housing with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 1.8" (4.6 cm)H X 2.7" (6.9 cm)W X 10.7" (27.2 cm)L
WEIGHT: 1 lb (0.5kg)

Replacement Parts

Pancake G-M Tube
Protective Screen

Ordering Info. **Model 44-9 Response Curve**

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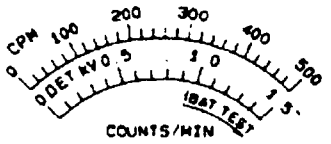
Page last updated: December 2000

For Alpha Detection	For Beta Detection	For Gamma Detection	For Alpha/beta/gamma Detection
Model 43-1*	Model 44-1*	Model 44-2	Model 44-7
Model 43-2*	Model 44-6	Model 44-3	Model 44-9
Model 43-5*	Model 44-7	Model 44-6	Model 44-88
Model 43-65*	Model 44-9	Model 44-7	Model 44-89
Model 43-90*	Model 44-21	Model 44-9	Model 44-94
Model 44-7	Model 44-38	Model 44-10	
Model 44-9	Model 44-40	Model 44-17	
Model 44-88	Model 44-88	Model 44-20	
Model 44-89	Model 44-89	Model 44-21	
Model 44-94	Model 44-94	Model 44-38	
	Model 44-116*	Model 133-2	
		Model 133-4	
		Model 133-6	
		Model 133-7	
		Model 133-8	

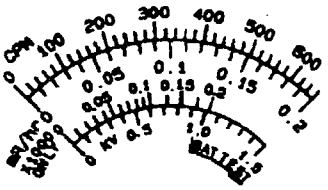
***For Mylar window scintillators it is strongly suggested that the optional overload indicator be used to better determine the presence of a light leak.**

Common Meter Dials



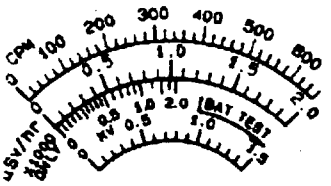
202-096

202-096
0 - 500 cpm; 0 - 1.5 kV
For Any Detector



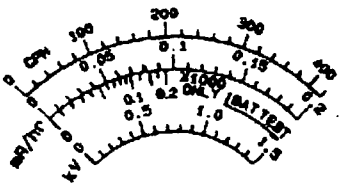
202-642

202-642
0-660 cpm; 0-0.2 mR/hr
For Model 44-9; 44-40; 44-88; 44-89; 44-94



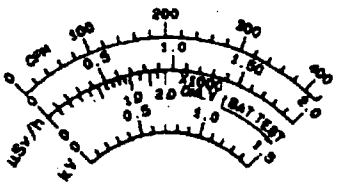
202-704

202-704
0-660 cpm; 0-2 µSv/h
For Model 44-9; 44-40; 44-88; 44-89; 44-94



202-420

202-420
0-420 cpm; 0-0.2 mR/hr
For Model 44-7



202-861

202-861
0-420 cpm; 0-2 µSv/h
For Model 44-7

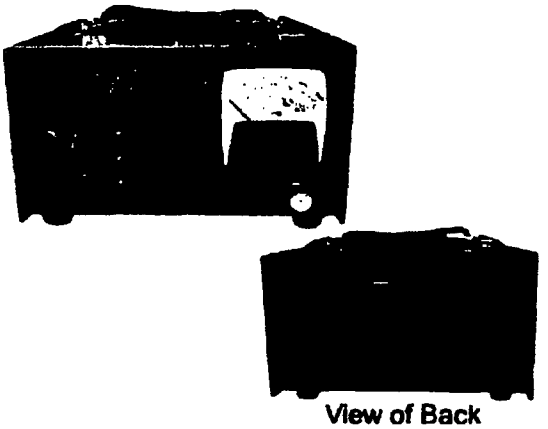
202-698

202-698
0-0.5 µR/hr
For Model 44-2

MODEL 177 Alarm Ratemeter

PART NUMBER:48-1632

- *4 Ranges*
- *Adjustable Alarm*
- *Utilizes G-M and Scintillation Detectors*
- *Battery Back-up*
- *Pulse Output*
- *Recorder Output*
- *Total Counting Range from 0 - 500,000 cpm*



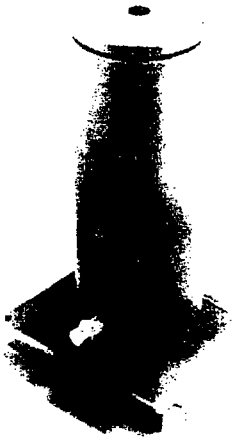
View of Back

INDICATED USE: Multi-purpose radiation monitoring; frisking
COMPATIBLE DETECTORS: G-M, scintillation
METER DIAL: 0 - 500 cpm, 0 - 1.5 kV, BAT TEST (*others available*)
MULTIPLIERS: X1, X10, X100, X1k
LINEARITY: Reading within plus or minus 10% of true value with detector connected
CONNECTOR: Series "C" (*others available*)
AUDIO: Built in unimorph speaker with volume control (*greater than 60 dB at 2 feet full volume*)
ALARM: Indicated by a red lamp and full volume audible tone
DATA OUT: 9 pin series "D" connector allowing for external connections of the following items: battery; unregulated supply; instrument common ground; alarm signal (*current sink*); pulse out; external background subtract; and recorder output.
RECORDER OUTPUT: Correlated to meter reading (*adjustable to 1 volt at 1 mA*)
CALIBRATION CONTROLS: Accessible from back of instrument (*protective cover provided*)
HIGH VOLTAGE: Adjustable from 200 - 1500 volts (*can be read on meter*)
THRESHOLD: Adjustable from 10 - 100 mV
RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
RESET: Push-button to zero meter
POWER: 95 - 135 VAC (*178 - 240 VAC available*), 50 - 60 Hz single phase (*less than 100 mA*), 6 volt sealed lead acid rechargeable battery (*built in*)
BATTERY LIFE: Typically 50 hours (*battery condition can be checked on meter*)
BATTERY CHARGER: Battery is continuously trickle charged when instrument is connected to line power and turned on (*optional external fast charger is available*)
METER: 2.5" (6.4 cm) arc, 1 mA analog type
CONSTRUCTION: Cast and drawn aluminum with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 5" (12.7 cm)H X 8" (20.3 cm)W X 6" (15.2 cm)L
WEIGHT: 4.2 lbs (1.9 kg)

MODEL 243 Shielded Well Scintillator

PART NUMBER:47-1621

The Model 243 is a shielded well counter utilizing a NaI (Tl) scintillator with well.



INDICATED USE: Gamma assay
DETECTOR: 2"(5.1cm) diameter X 1.8"(4.6cm) thick integral NaI(Tl) well scintillator
WELL:0.7"(1.7cm) diameter X 1.6"(3.9cm) Deep
EFFICIENCY (4pi geometry): Typically 70% - I-129
SENSITIVITY: Will detect 0.005 microCi gamma or 200 dpm removable contamination for Tc-99m, I-131, Tl-201, In-111, I-125, Cs-137, and Ga-67
COMPATIBLE INSTRUMENTS: Typically used with Model 1000, Model 2000, Model 2200, and others
TUBE: 2"(5.1cm) diameter magnetically shielded photomultiplier
OPERATING VOLTAGE: Typically 500 - 1200 volts
DYNODE STRING RESISTANCE: 60 megohm
CONNECTOR: Series "C" (*others available*)
CONSTRUCTION: 0.5"(1.3cm) thick lead and removable cap with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 11" (27.9cm)H X 8"(20.3cm)W X 8" (20.3cm)L
WEIGHT: 30 lbs (13.6 kg)
SHIPPING WEIGHT: 46 lbs (20.9kg)

Ordering Info.

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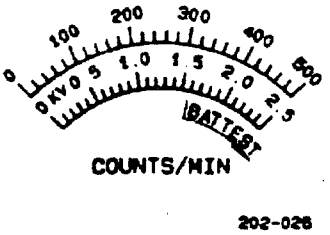
For Alpha Measurements	For Beta Measurements	For Gamma Measurements	For Alpha/beta/gamma Measurements
Model 43-1	Model 44-1	Model 44-2	Model 44-7
Model 43-2	Model 44-7	Model 44-3	Model 44-9
Model 43-9	Model 44-9	Model 44-7	Model 44-88
Model 43-10	Model 44-21	Model 44-9	
Model 44-7	Model 44-88	Model 44-10	
Model 44-9	Model 120	Model 44-17	
Model 44-88		Model 44-21	
Model 120		Model 203	
Model 182		Model 243	
Model 218			

Meter Dial



202-026
0 - 500 cpm, 0 - 2.5 kV

Replacement Parts

Cables
Meter Assembly
Meter Movement

Software

Application Software Download

Ordering Info.; Manual

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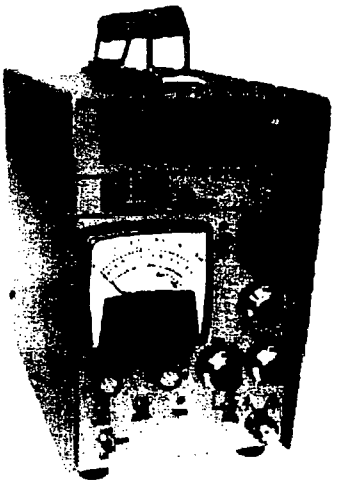
Page last updated: August 7, 2001

MODEL 2200 Scaler/Ratemeter SCA

PART NUMBER:48-1651



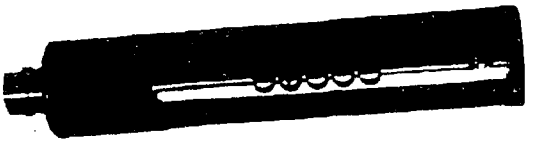
- *6 Decade LED Display*
- *Single Channel Analyzer*
- *Ratemeter with Total Counting Range from 0 - 500,000 cpm*
- *Adjustable Scaler Count Time from 6 seconds - 990 minutes*

INDICATED USE: Gross sample counting; Single channel analyzing
COMPATIBLE DETECTORS: G-M, proportional, scintillation
CONNECTOR: Series "C" (*others available*)
SCALER: 6 digit LED display providing a range of 0 - 999999 counts
SCALER LINEARITY: Reading within plus or minus 2% of true value
TIMER: Thumbwheel adjustment from 0 - 999 minutes with selectable divisions of X0.1 and X1
RATEMETER: 0 - 500,000 cpm total range
METER DIAL: 0 - 500 cpm; 0 - 2.5 kV; BAT TEST
MULTIPLIERS: X1, X10, X100, X1000
LINEARITY: Reading within plus or minus 10% of true value with detector connected
RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
ZERO: Push button to zero meter
HIGH VOLTAGE: Adjustable from 200 - 2500 volts (*will support 60 megohm scintillation loads*)
THRESHOLD: Voltage sensitive; adjustable from 1.0 - 10.0
WINDOW: Adjustable from 0 - 10.0 above threshold setting (*can be turned on or off*)
DISC(Discriminator): Adjustable from 2 - 100 mV at a threshold setting of 1.0
RS-232: 9 pin connector allowing for printer, or software interface
POWER: 95 - 250 VAC 50 - 60 Hz single phase (*less than 100 mA*) or 4 each "D" cell batteries (*housed in externally accessible compartments*)
BATTERY LIFE: Typically 120 hours with alkaline batteries (*battery condition can be checked on meter*)
METER: 2.5"(6.4cm) arc, 1 mA analog type
CONSTRUCTION: Aluminum housing with beige powder coat paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
SIZE: 8.5"(21.6cm)H X 5"(12.7cm)W X 9.3"(23.5cm)L
WEIGHT: 6.9 lbs (3.1kg) w/o batteries

MODEL 44-38 Energy Compensated G-M

PART NUMBER:47-1588

The Model 44-38 is an energy compensated sidewall G-M detector with a rotary beta shield for general purpose survey.

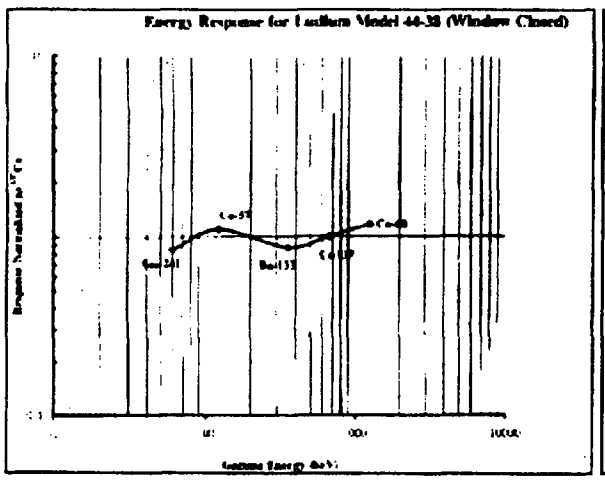


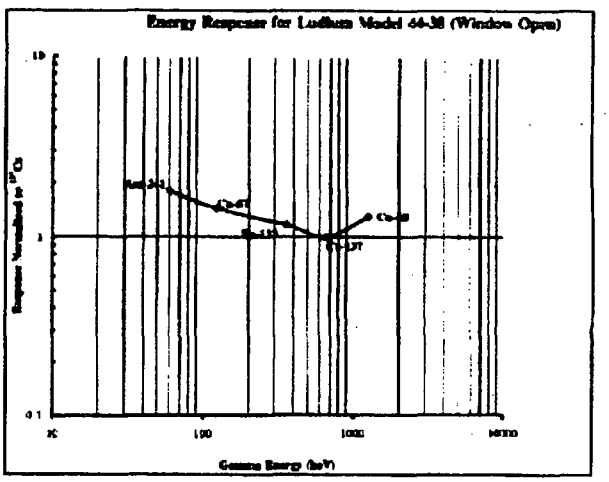
INDICATED USE: Beta gamma survey
DETECTOR: 30 mg/cm² stainless steel wall halogen quenched G-M
SENSITIVITY: Typically 1200 cpm/mR/hr (*Cs-137 gamma*)
BETA CUT OFF: Approximately 200 keV (*window open*)
ENERGY RESPONSE: Within ±15% of true value from 50 keV - 1.25 MeV
DEAD TIME: Typically 95 microseconds
COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalers
OPERATING VOLTAGE: 900 volts
CONNECTOR: Series "C" (*others available*)
CONSTRUCTION: Anodized aluminum housing with rotary beta window
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 1.3" (3.3 cm) diameter X 6.5" (16.5 cm)L
WEIGHT: 1 lb (0.5kg)

Replacement Parts

G-M Tube

Response Curves





MODEL 44-9 Pancake G-M Detector

PART NUMBER:47-1539

The Model 44-9 is a pancake G-M that can be used with several different instruments including survey meters, scalers, ratemeters, and alarm ratemeters

INDICATED USE: Alpha beta gamma survey; Frisking
DETECTOR: Pancake type halogen quenched G-M
WINDOW: 1.7 plus or minus 0.3 mg/cm² mica
WINDOW AREA:
Active - 15 cm²
Open - 12 cm²
EFFICIENCY(4pi geometry): Typically 5%-C-14; 22%-Sr-90/Y-90; 19%-Tc-99; 32%-P-32; 15%-Pu-239
SENSITIVITY: Typically 3300 cpm/mR/hr (*Cs-137 gamma*)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 microseconds
COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalers
OPERATING VOLTAGE: 900 volts
CONNECTOR: Series "C" (*others available*)
CONSTRUCTION: Aluminum housing with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 1.8" (4.6 cm)H X 2.7" (6.9 cm)W X 10.7" (27.2 cm)L
WEIGHT: 1 lb (0.5kg)

Replacement Parts

Pancake G-M Tube
Protective Screen

Ordering Info. **Model 44-9 Response Curve**

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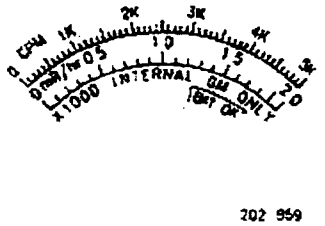
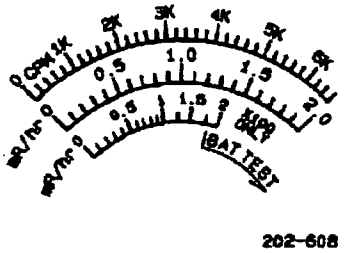
Page last updated: December 2000

Model 44-88	Model 44-9	Model 44-6	Model 44-88
Model 44-89	Model 44-38	Model 44-7	Model 44-89
Model 44-94	Model 44-88	Model 44-9	Model 44-94
	Model 44-89	Model 44-38	
	Model 44-94		

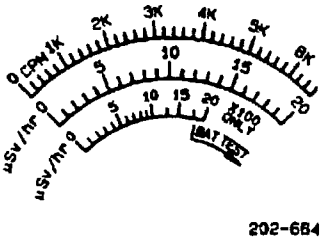
Common Meter Dials



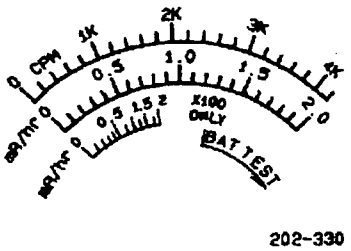
202-859
0 - 5k cpm; 0-2 mR/hr
For Any Detector



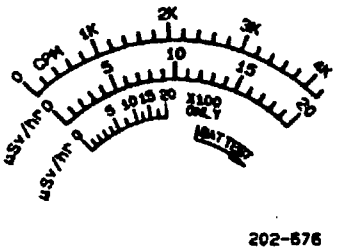
202-608
0-6.6k cpm; 0-2 mR/hr
For Model 44-9; 44-9-18; 44-40; 44-88; 44-89; 44-94



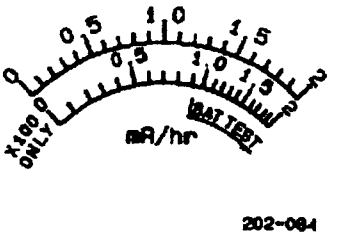
202-664
0-6.6k cpm; 0-20 µSv/h
For Model 44-9; 44-9-18; 44-40; 44-88; 44-89; 44-94



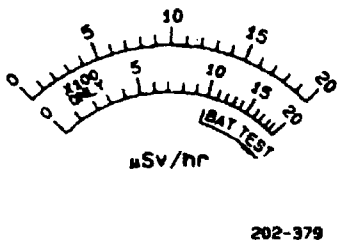
202-330
0-4k cpm; 0-2 mR/hr
For Model 44-7



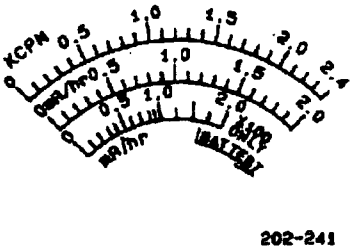
202-676
0-4k cpm; 0-20 µSv/h
For Model 44-7



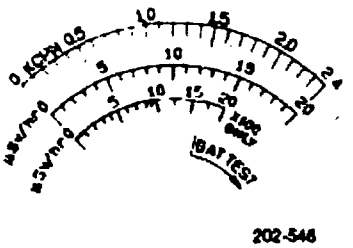
202-084
0-2 mR/hr
For Model 44-6; 44-38



202-379
0-20 µSv/h
For Model 44-6; 44-38



202-241
0-2 mR/hr; 0-2.4k cpm
For Model 44-6; 44-38

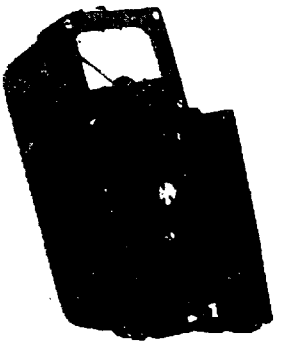


202-546
0-20 µSv/h; 0-2.4k cpm
For Model 44-6; 44-38

Accessories **Replacement Parts**

MODEL 14C Survey Meter

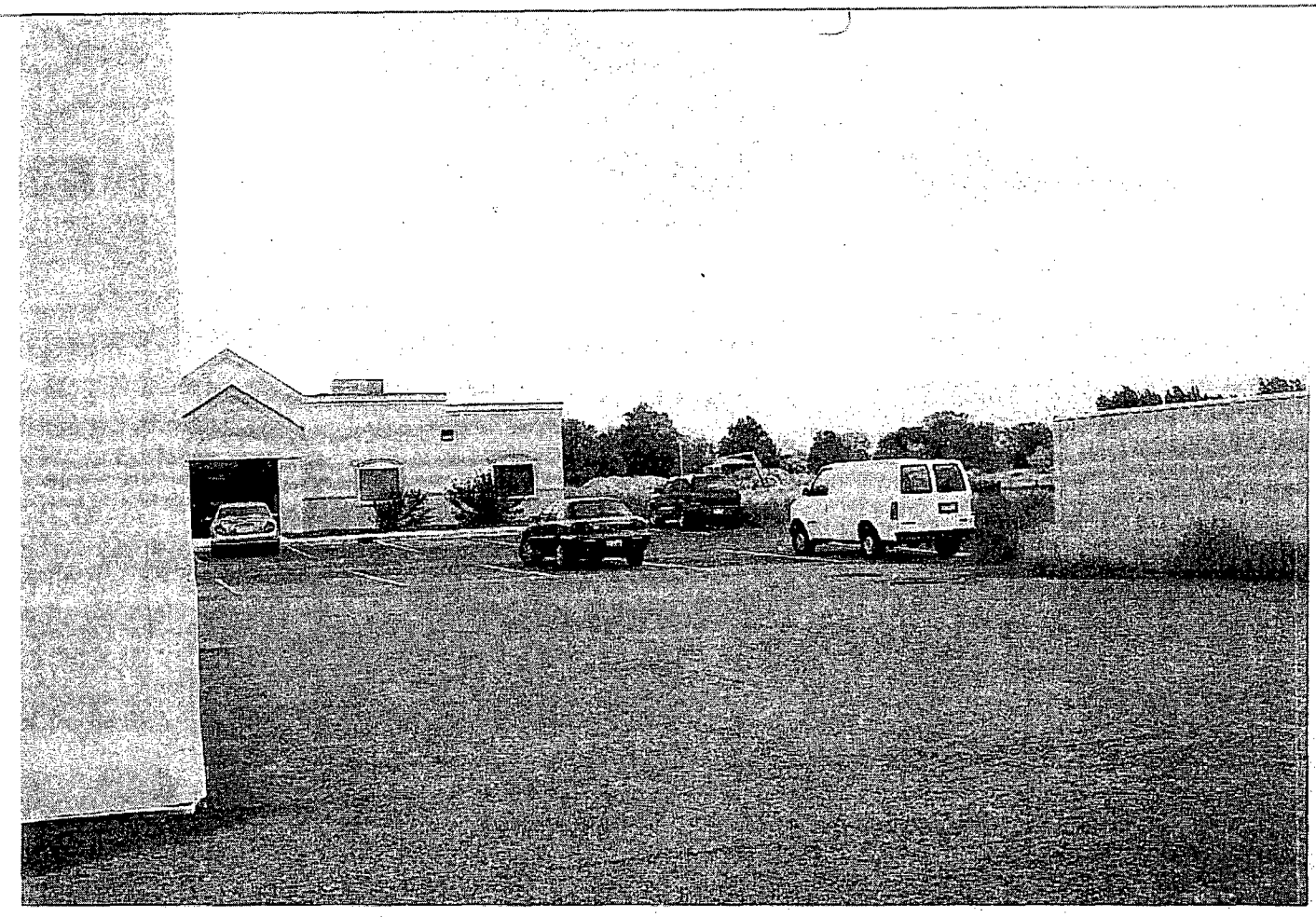
PART NUMBER:48-1611

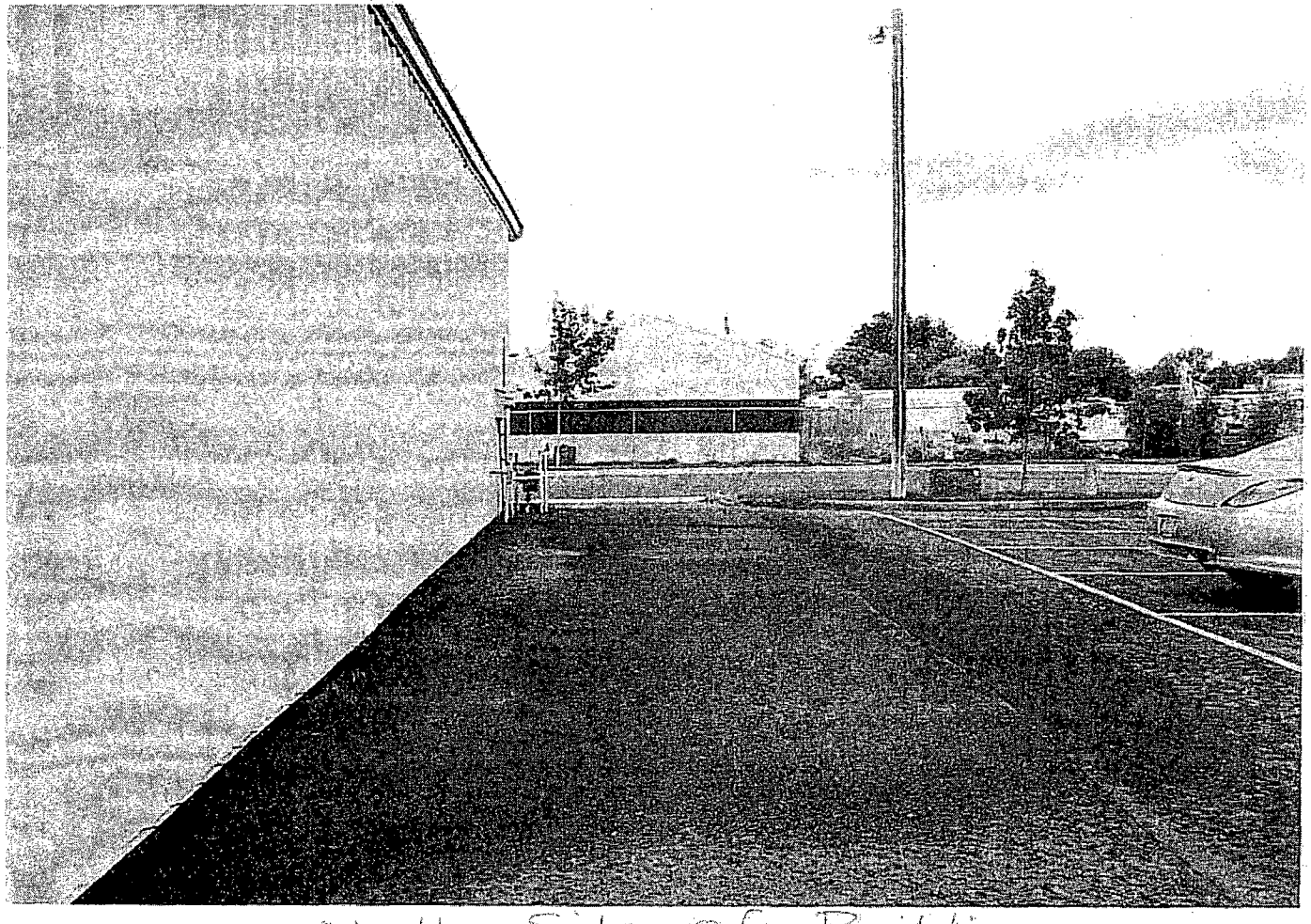


- *5 Ranges*
- *Internal High Range Energy Compensated G-M*
- *Utilizes G-M or Scintillation Detectors*
- *Total Range from 0 - 2000 mR/hr*

COMPATIBLE DETECTORS: G-M, scintillation
METER DIAL: Typically 0 - 2 mR/hr and cpm, BAT TEST (*others available*)
MULTIPLIERS: X0.1, X1, X10, X100, X1000
LINEARITY: Reading within plus or minus 10% of true value with detector connected
CONNECTOR: Series "C" (*others available*)
INTERNAL DETECTOR: Energy compensated G-M (***used with X1000 scale only***)
ENERGY RESPONSE: Within plus or minus 15% of true value between 60 keV - 3 MeV (***internal detector only***)
THRESHOLD: 30 mV plus or minus 10 mV
AUDIO: Built in unimorph speaker with ON/OFF switch (*greater than 60 dB at 2 feet*)
CALIBRATION CONTROLS: Accessible from front of instrument (*protective cover provided*)
HIGH VOLTAGE:900 volts
THRESHOLD: 30 mV plus or minus 10 mV
RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
RESET: Push-button to zero meter
POWER: 2 each "D" cell batteries (*housed in sealed compartment that is externally accessible*)
BATTERY LIFE: Typically greater than 1000 hrs.(***battery condition can be checked on meter***)
METER: 2.5" (6.4 cm) arc, 1 mA analog type
CONSTRUCTION: Cast and drawn aluminum with beige polyurethane enamel paint
TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)
May be certified for operation from -40° F(-40° C) to 150° F(65° C)
SIZE: 6.5" (16.5 cm)H X 3.5" (8.9 cm)W X 8.5" (21.6 cm)L
WEIGHT: 3.5 lbs (1.6 kg) including batteries

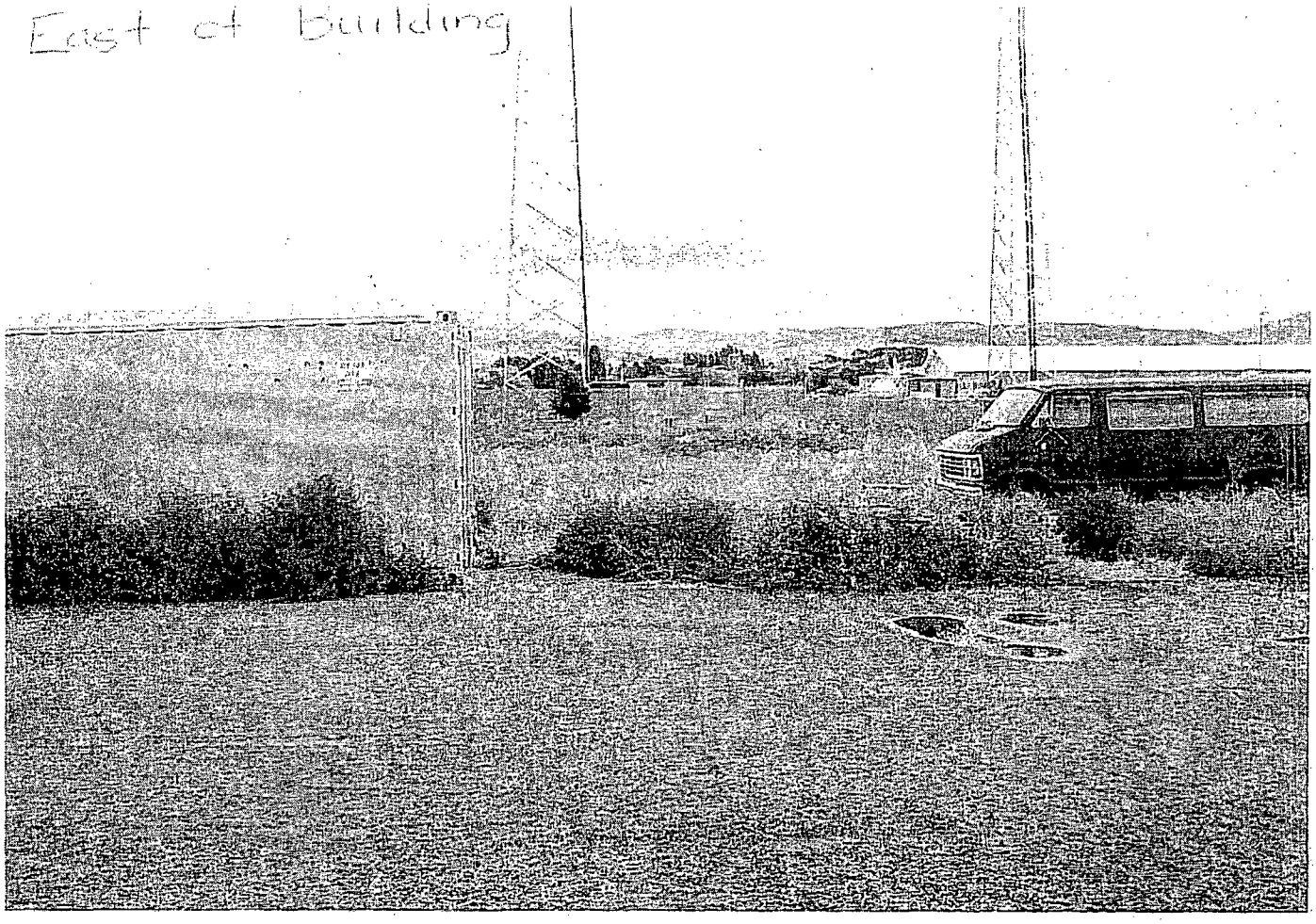
For Alpha Detection	For Beta Detection	For Gamma Detection	For Alpha/beta/gamma Detection
Model 44-7	Model 44-6	Model 44-2	Model 44-7
Model 44-9	Model 44-7	Model 44-3	Model 44-9

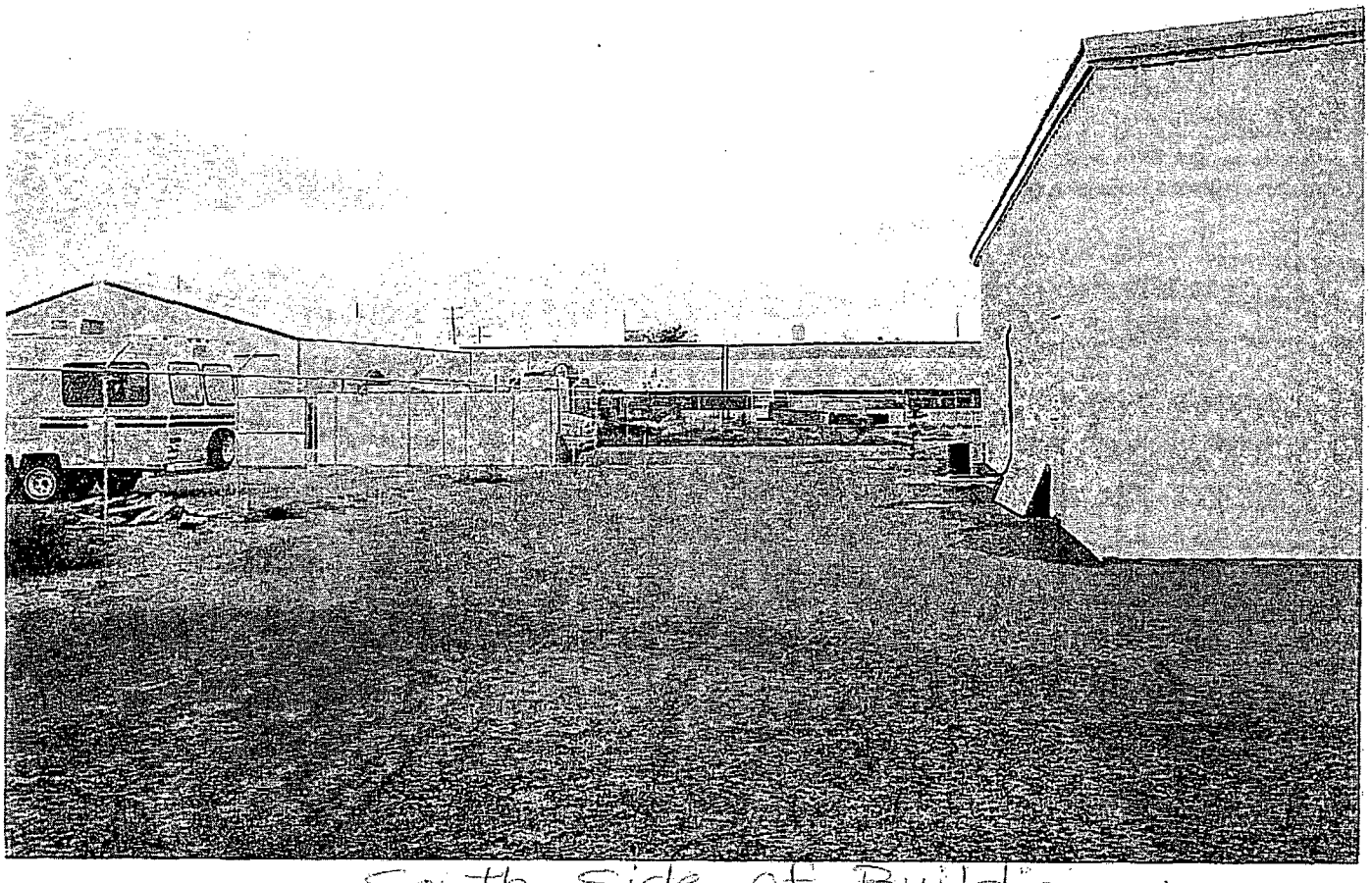




North Side of Building

East of Building





South Side of Building

Facing North

Advanced Isotopes of Idaho
4968 Rainbow Way
Chubbuck Idaho 83202

To Whom It May Concern,

I am the owner of the property at **4968 Rainbow Way Chubbuck Idaho 83202. Advanced Isotopes of Idaho** is currently leasing our building and intends to develop a nuclear pharmacy. I have been made aware that the facility will be utilizing radioactive material which has been approved for human use. Also, low-level radio-isotopes for quality control purposes will be used and stored at this site. I understand that the use will be regulated under state and federal law. Advanced Isotopes of Idaho has my permission to use this facility for these purposes.

Sincerely,

Brad Frasure

Brad Frazer 9-22-05
Owner

BRAD FRASURE

[redacted]

444 Hospital Way, Suite 777
Pocatello, Idaho 83201

Phone (208) 478-6449
Fax (208) 478-6455

Ex 6

Non
P
22

Appendix 1: Forms

Constancy Check
Kit Prep/Elution Record
QC Form
Visitor Log Book

Advanced Isotopes
Daily Dose Calibrator Constancy and Accuracy Tests

Calibrator Make & Model: _____ **Serial Number:** _____

Month/Year _____

Date	Bkg	Cs-137	Ga-67	Tc-99m	In-111	I-123	I-131	Xe-133	Tl-201	Initials
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										

Differences greater than +/- 5% indicate the need for instrument repair or adjustment.
Note: Each calibration setting should be checked with the Cs-137 reference standard per Appendix D, Section 2 of the NRC Regulatory Guide 10.8.

DAILY KIT PREP SHEET

M T W T F S S	
DATE	/ /

Kit	Lot	Elution #	Conc@Cal time (mCi/mL)	Total Volume (mL)	Prep Time	Tc-99m Volume (mL)	Activity@Prep/ Activity@Cal Time	QS Volume (mL)	RPh Initials
MAA	101		8 @ 0800				/		
MAA	102		10 @ 1600				/		
Choletec	101		15 @ 0500				/		
MDP	101		75 @ 0500				/		
Sulf Coll	101		8 @ 0500				/		
MAG-3	101		20 @ 0500				/		
HDP	101		50 @ 0500				/		
DTPA	101		60 @ _____				/		
Cardiolite	101		100 @ 0500				/		
Cardiolite	102		100 @ 0500				/		
Cardiolite	103		100 @ 0500				/		
Cardiolite	104		100 @ 0500				/		
Cardiolite	105		100 @ 0500				/		
Cardiolite	106		100 @ 0500				/		
Cardiolite	901		33 @ 0500				/		
MAA	201		10 @ 1100				/		
Cardiolite	201		100 @ 1100				/		
Cardiolite	202		100 @ 1100				/		
							/		
							/		
							/		
							/		
							/		
							/		

Elution Information

Elution #	Elution Time	Generator Number	Elution Volume (mL)	Tc-99m Activity (mCi)	Mo-99 Activity (uCi)	uCi Mo-99/ mCi Tc-99m	Assay @ Time	Vol (mL)	Eluted By
1							@		
2							@		
3							@		
4							@		
5							@		
6							@		

DAILY QUALITY CONTROL LOG

M T W T F S S	
DATE	/ /
INITIALS	

PRODUCT	TIME	LOT	BKG	ORIGIN	FRONT	ORIGIN	FRONT	% PURITY
				SG/NS		Particle Size OK?		
MAA		1				Y	N	
MAA		2				Y	N	
				SG/H20		SA/20% NS		
Choletec		1						
				SG/NS		W3/Acet		
MDP		1						
				SG/H20		Particle Size OK?		
Sulfur Colloid		1				Y	N	
				W3/H20		W3/20% NS		
Mag3		1						
				SG/NS		W3/Acet		
HDP		1						
				SG/NS		W3/Acet		
DTPA		1						
				SG/MEK				
NeutroSpec		1						
				W3/Acet				
ELUTION (Tech)								
				W3/EtAcet				
Cardiolite		1						
Cardiolite		2						
Cardiolite		3						
Cardiolite		4						
Cardiolite		5						
				Sal**	EtAcet**			
Ceretec		1						
				SG/65.35*	ORIGIN	MIDDLE	FRONT	
Myoview		1						
Myoview		2						
Myoview		3						
Myoview		4						
Myoview		5						

*65.35 = 65% methylene chloride/35% acetone

** Mix 3cc saline + 3 cc ethyl acetate in evac vial. Add small amt of Ceretec. Shake 1 min. Turn upside down and allow to separate. Take 1 cc sample of each phase and count. 80% of counts should be in ethyl acetate.

ADVANCED ISOTOPES
VISITOR LOG BOOK

Date	Name	Company/ Address	Telephone	Dosimeter Serial No.	Time In	Reading (mR)	Time Out	Reading (mR)	Initials

10-05-05
DATE

This is to acknowledge the receipt of your letter/application dated 09-21-05, and to inform you that the initial processing, which includes an administrative review, has been performed.

☒ There were no administrative omissions. Your application will be assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

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

The action you requested is normally processed within 90 days.

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

Your action has been assigned **Mail Control Number** 470722.
When calling to inquire about this action, please refer to this mail control number.
You may call me at 817-860-8103.

Sincerely,

Colleen Meanahan
Licensing Assistant

NRC FORM 532 (RIV)
(9-2003)

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: _____
Status Code: 3
Fee Category: _____
Exp. Date: 0
Fee Comments: _____
Decom Fin Assur Reqd: _____

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED
Applicant/Licensee: ADVANCED ISOTOPES OF IDAHO
Received Date: 20050926
Docket No: 3037048
Control No.: 470722
License No.:
Action Type: New Licensee

2. FEE ATTACHED
Amount: $4700.00
Check No.: 2002

3. COMMENTS

Signed Colleen Murnahan
Date 10/03/05

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 _____

From: Origin ID: (702)565-6905
Greg Spatafore
Advanced Imaging Center of Poc
116 Mint Orchard Drive

Henderson, NV 89015

FedEx Express

Ship Date: 22SEP05
Actual Wgt: 1 LB
System#: 4990646/INET2200
Account#: S *********

REF:

Delivery Address Bar Code

RECEIVED
SEP 26 2005
DNA

SHIP TO: (208)406-2543 BILL SENDER

NRC New Application
US Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Regional Office: Region IV
Arlington, TX 760118064

STANDARD OVERNIGHT **FRI**

Deliver By: 23SEP05

TRK# 7917 3565 0822 FORM 0201

DFW A1

76011 -TX-US

XH FWHA